"The creative workshop"

Introduction

Hardwares and Softwares:

1. Arduino

Arduino is a popular microcontroller platform that can be programmed to control various electronic devices and create interactive projects. It can be used in a variety of fields such as robotics, automation, and IoT.

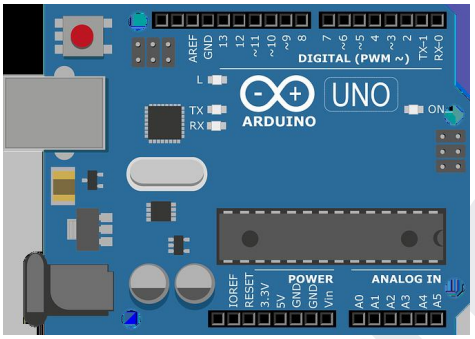


Fig:- Arduino Uno

2. Sensors

Sensors are electronic devices that can detect changes in the environment and provide information to a microcontroller such as an Arduino. There are many types of sensors available, including temperature, humidity, light, sound, and motion sensors.

3. Breadboard

A breadboard is a reusable board used for prototyping electronic circuits. It has holes to insert electronic components such as resistors, capacitors, and ICs, and is designed to allow quick and easy modifications to the circuit.

Fig:- Breadboard

4. LED

LEDs, or Light Emitting Diodes, are electronic components that emit light when a current is applied. They are commonly used in electronics projects to provide visual feedback or indicators.

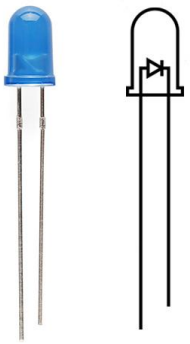


Fig:- Led

5. Buzzer

Buzzers are electronic components that produce sound when a current is applied. They are often used in electronics projects for alarms, alerts, or sound effects.

Fig:- Buzzer

6. connecting wires

Connecting wires are essential components used to connect electronic devices together. They come in different lengths, colors, and connectors to suit different applications.

Fig:- Connecting wires

7. Battery

A battery can provide power to an electronic device without the need for a power outlet. It is commonly used in portable projects and can be recharged or replaced when needed.

Fig:- Battery

Arduino: Introduction, Evolution, Types and Features of Arduino UNO

Arduino is an open-source electronics platform based on a simple microcontroller board and a development environment for writing software. It was created in 2005 by a team of Italian developers to provide a low-cost way for artists, designers, and hobbyists to create interactive projects. Since then, Arduino has become a popular tool for creating a wide range of projects, from simple blinking LEDs to complex robotics systems.

The Evolution of Arduino

The first Arduino board was based on the Atmel AVR microcontroller and was developed in 2005 by Massimo Banzi, David Cuartielles, Tom Igoe, Gianluca Martino, and David Mellis. The name "Arduino" comes from a bar in Ivrea, Italy, where the developers used to meet. The first Arduino board was designed to be easy to use and affordable, with a simple USB interface that allowed it to be programmed with a computer.

Since then, Arduino has evolved and expanded to include a wide range of boards and modules based on different microcontrollers, including ARM, Intel, and ESP8266. It has also spawned a large community of developers and users who share their projects and code, making it easy for anyone to get started with Arduino.

Types of Arduino Boards

There are many different types of Arduino boards, each with its own set of features and capabilities. Some of the most popular types of Arduino boards include:

1. Arduino Uno: This is the most popular and widely used Arduino board. It is based on the ATmega328P microcontroller and has 14 digital input/output pins, six analog inputs, a 16 MHz quartz crystal, a USB connection, and a power jack.
2. Arduino Mega: This board is similar to the Uno, but with more digital and analog input/output pins, making it suitable for larger and more complex projects.
3. Arduino Nano: This is a smaller and more compact version of the Uno, with a similar set of features and capabilities.
4. Arduino Due: This board is based on the ARM Cortex-M3 processor and is designed for more advanced projects that require faster processing speeds and more memory.
5. Arduino Ethernet: This board includes an Ethernet port, allowing it to connect to the internet and communicate with other devices over a network.

Arduino Uno: Features and Why it is Used

The Arduino Uno is the most popular and widely used Arduino board, with a wide range of applications in electronics and programming. It has several features that make it a popular choice for hobbyists and professionals alike.

Firstly, the Uno is very easy to use and program, thanks to its simple and intuitive interface. It can be programmed using a variety of programming languages, including C, C++, and Arduino's own language, based on Wiring.

Secondly, the Uno is very affordable and widely available, making it accessible to a wide range of users. It can be purchased from a variety of sources, including online retailers, electronics stores, and hobby shops.

Finally, the Uno is very versatile and can be used for a wide range of applications, from simple LED blinking to complex robotics projects. It has a wide range of input/output pins, making it suitable for interfacing with a variety of sensors and actuators.

In conclusion, Arduino has come a long way since its creation in 2005, and has evolved to become a powerful and versatile platform for creating interactive projects. With its wide range of boards and modules, and its large and supportive community of developers and users, Arduino is sure to remain a popular choice for electronics enthusiasts and professionals for years to come.

Sensor: Ultrasonic Sensor

Introduction to Ultrasonic Sensors

Ultrasonic sensors are devices that use sound waves with frequencies higher than the human audible range to detect objects and measure distances. These sensors emit ultrasonic waves, which bounce off objects and return to the sensor. By measuring the time it takes for the waves to return, the sensor can determine the distance between itself and the object.

Ultrasonic sensors are used in a wide range of applications, from parking sensors in cars to level sensors in industrial tanks. They are also commonly used in robotics and automation, where they can be used for object detection, navigation, and obstacle avoidance.

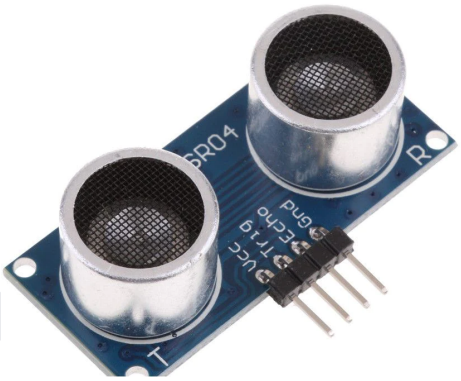


Fig:- Ultrasonic Sensor

Types of Ultrasonic Sensors

There are two main types of ultrasonic sensors: proximity sensors and ranging sensors. Proximity sensors are used to detect the presence of an object within a certain range, while ranging sensors are used to measure the distance between the sensor and an object.

Proximity sensors are often used in applications such as automatic doors, where they can detect the presence of a person and open the door accordingly. Ranging sensors, on the other hand, are

used in applications such as level sensing, where they can measure the distance between the sensor and the surface of a liquid in a tank.

Pin diagram

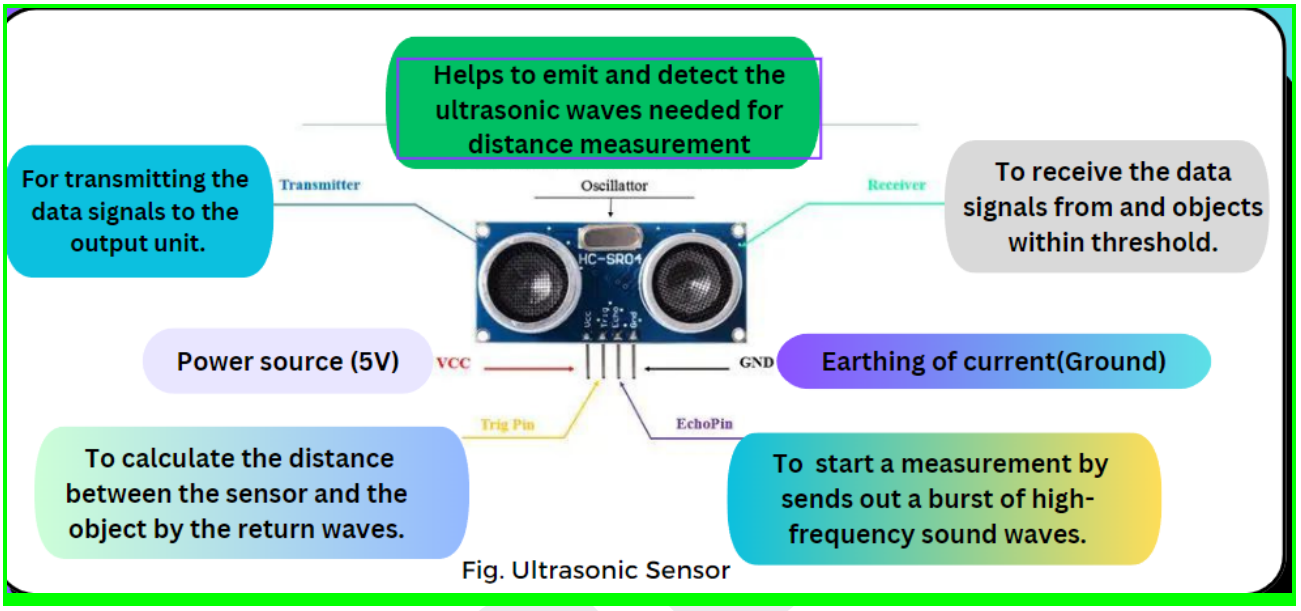


Fig:- Pin diagram of ultrasonic sensor

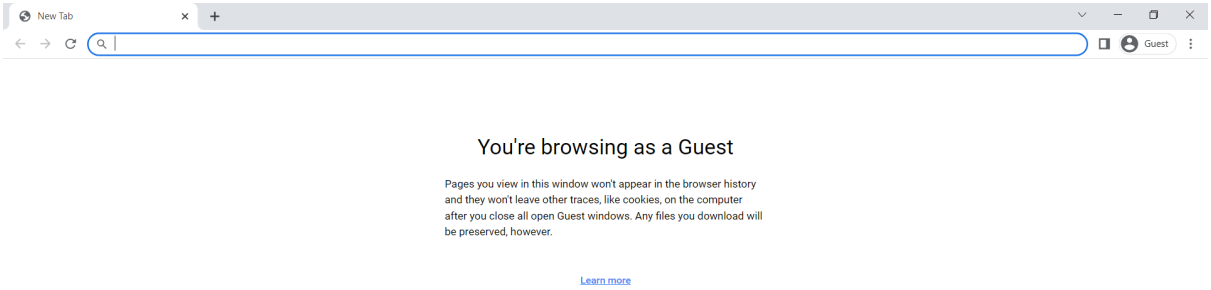
Applications of Ultrasonic Sensors

Ultrasonic sensors are used in a wide range of applications across many industries. In automotive applications, they are used for parking assistance, blind spot detection, and collision avoidance. In manufacturing, they are used for part inspection, assembly line monitoring, and quality control.

In the medical field, ultrasonic sensors are used for imaging and diagnostics, as well as for measuring blood flow and pressure. They are also used in agriculture for crop monitoring and irrigation control, and in environmental monitoring for air and water quality testing.

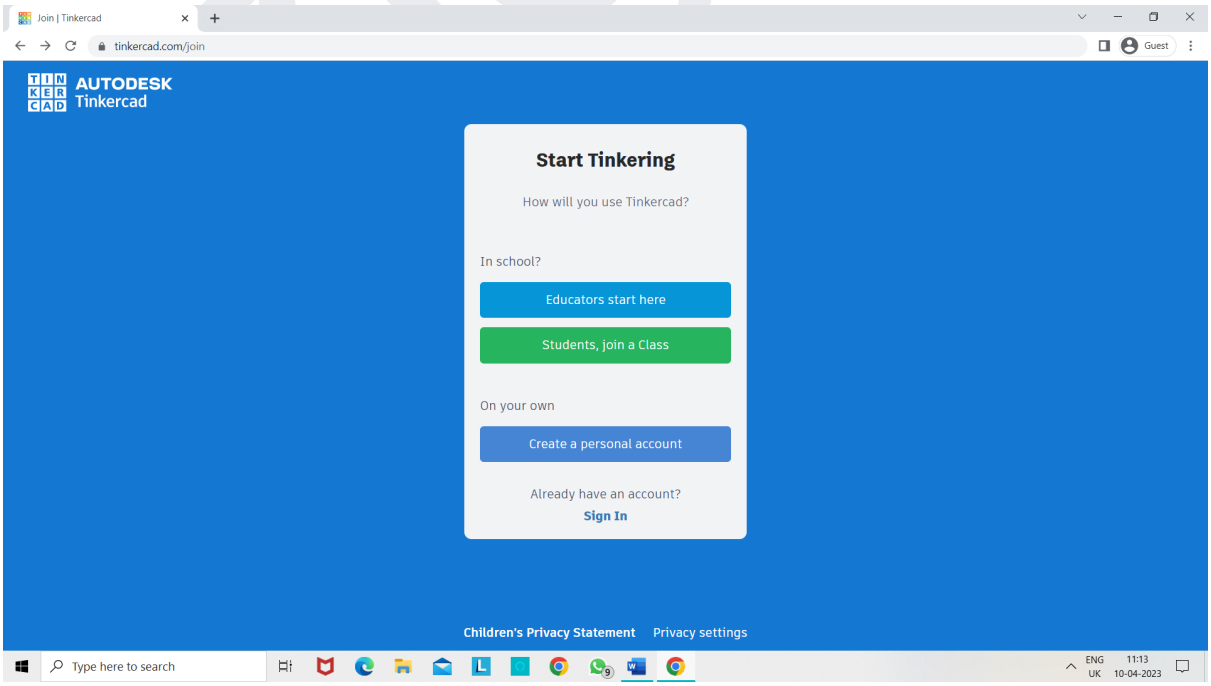
Build Project by simulating in Tinkercad

Step 1: Open the Google Chrome in your System

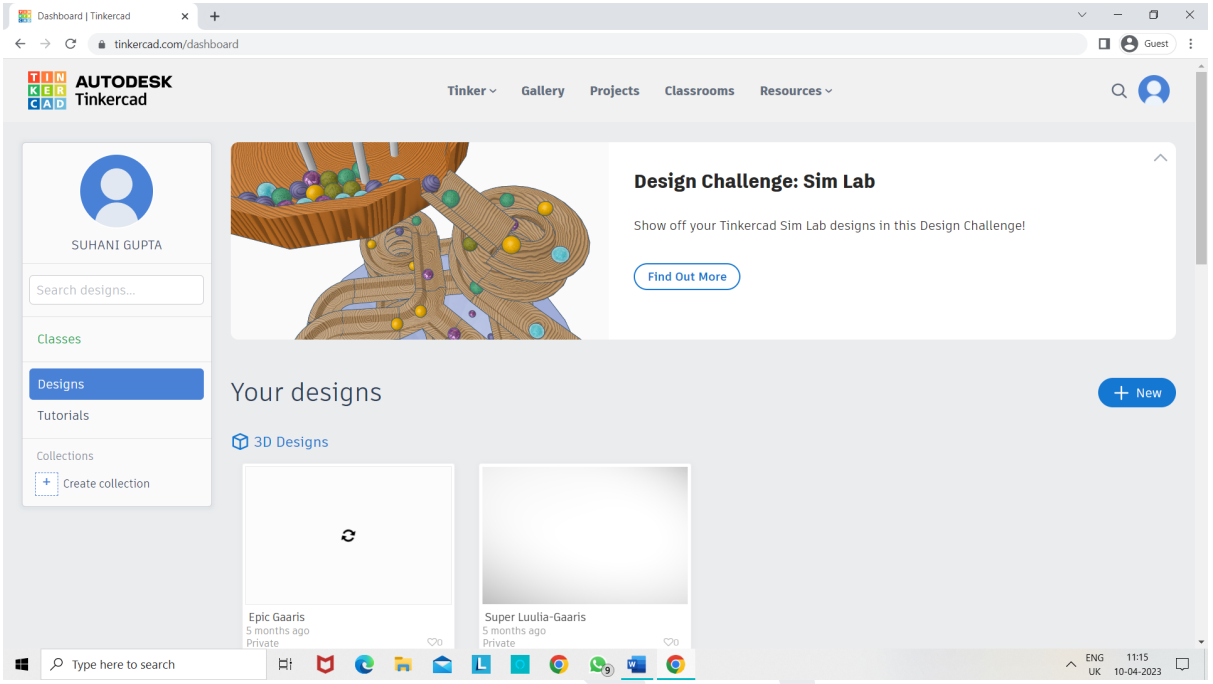


Step 2: Type www.tinkercad.com in Search Bar

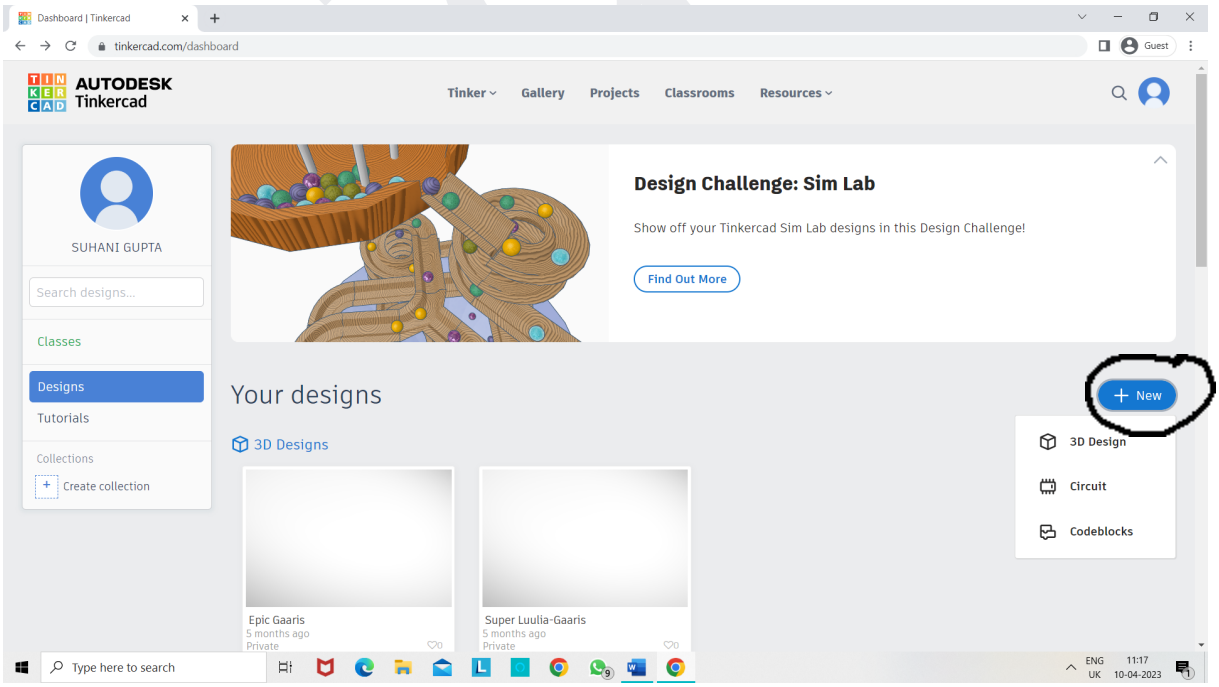
Step 3: Click on Sign up account.



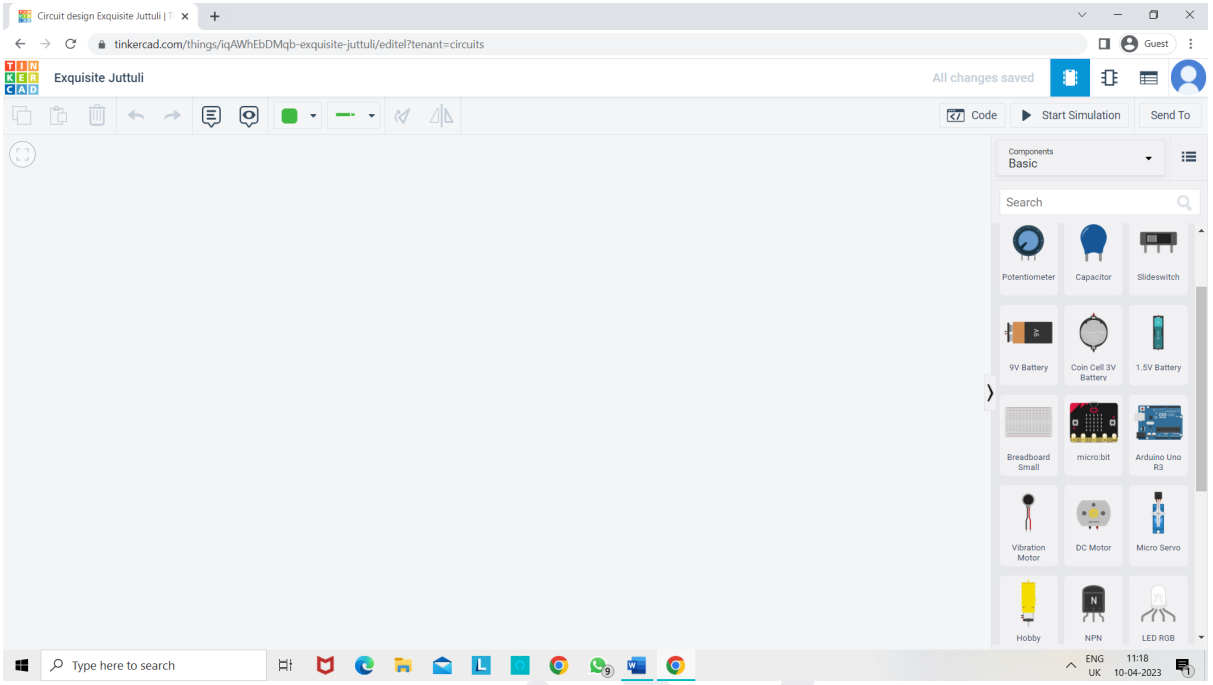
Step 4: Click on Create a personal Account and setup your account using google account



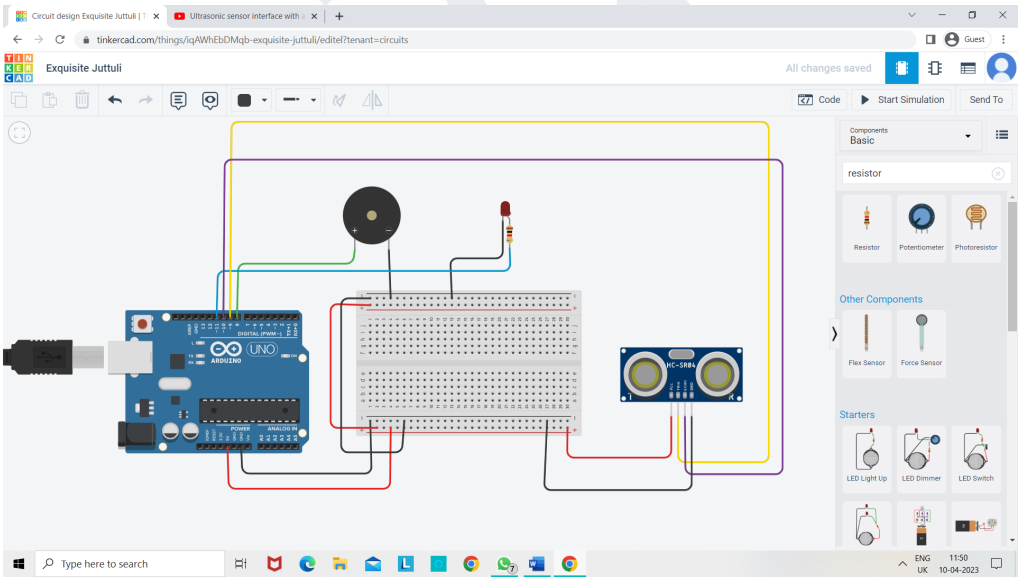
Step 5: Click on New, given in the Right side of the page and 3 option will be there, Choose circuit from that option.



Step 6: The tab will look like this, In Search Bar, Search for Ultrasonic Sensor, breadboard, Arduino Uno, Buzzer, Led.



Step 7: Connect all the components as shown is picture given below



First, the 5v and Gnd pins are connected to the breadboard Positive and negative terminal.

Then the Ultrasonic pins Vcc is connected to Positive terminal of Breadboard and Gnd is connected to negative terminal of breadboard.

The trig and Echo of Ultrasonic is connected to digital pin no. 9 and 10 of Arduino Board; buzzer and LED negative terminal is connected negative terminal of Breadboard.

Positive terminal of buzzer is connected to digital pin no. 8 of Arduino and LED positive terminal is connected to the resistor and resistor is connected to the digital pin 11 of Arduino Board.

STEP 8: Paste the code in code section and click on start the simulation.

Understand the code

```
const int trigPin = 9;
const int echoPin = 10;
const int buzzer = 8;
const int ledPin = 11;
// defines variables
long duration;
int distance;
int safetyDistance;
void setup(){
   pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
pinMode(echoPin, INPUT); // Sets the echoPin as an Input
pinMode(buzzer, OUTPUT);
pinMode(ledPin, OUTPUT);
Serial.begin(9600);
}

void loop(){
  digitalWrite(trigPin, LOW);
delayMicroseconds(2);

// Sets the trigPin on HIGH state for 10 micro seconds
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);

// Reads the echoPin, returns the sound wave travel time in microseconds
duration = pulseIn(echoPin, HIGH);
```

```
// Calculating the distance
distance= duration*0.034/2;

safetyDistance = distance;
if (safetyDistance <=50){
  digitalWrite(buzzer, HIGH);
  digitalWrite(ledPin, HIGH);
}
else{
  digitalWrite(buzzer, LOW);
  digitalWrite(ledPin, LOW);
}
// Prints the distance on the Serial Monitor
Serial.print("Distance: ");
Serial.println(distance);
}
```