

OBSTACLE DETECTOR

Abstract:

This project describes a basic obstacle detection system using an Arduino microcontroller, an ultrasonic sensor, and a buzzer. The system emits an audible alert when an object approaches within a user-defined distance threshold.

Key Components:

Hardware:

1. Arduino Uno (or similar board)
2. Ultrasonic Sensor (HC-SR04)
3. Piezoelectric Buzzer
4. 10 kΩ Resistor
5. Breadboard
6. Jumper Wires

Software:

1. Arduino IDE

Implementation:

1. Hardware Setup.

1. Connect the HC-SR04 sensor's TRIG pin to an Arduino digital output pin (e.g: pin 9).
2. Connect the ECHO pin to an Arduino digital input pin (e.g: pin 10).
3. Connect the buzzer to an Arduino digital output pin (e.g :pin 3) with a 10kΩ resistor in series.

2. Software Development

1. The Arduino code defines variables for the connected pins (TRIG, ECHO, buzzer).
2. The SETUP function configures the pin modes for proper operation.
3. The LOOP function continuously:
 - Triggers the ultrasonic sensor with a short pulse.

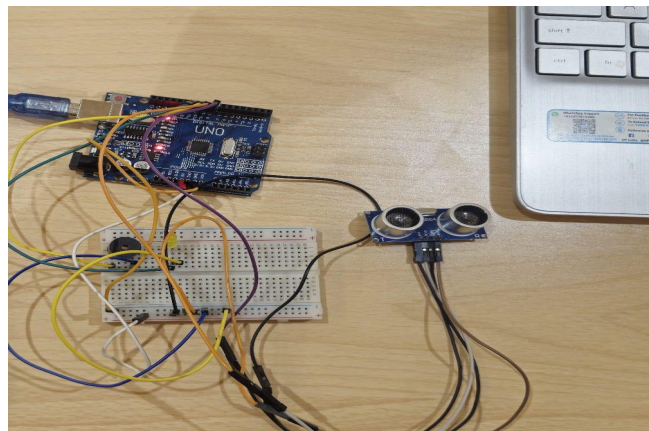
- Measures the echo pulse duration to calculate the object's distance.
- Compares the measured distance to a predefined threshold.
- Activates the buzzer if the object is closer than the threshold.

Code Implementation:

```
int const trigPin = 10;    // Defines the data pins of the ultrasonic
int const echoPin = 9;
int const buzzPin = 2;    // Defines the buzzer pin
void setup()
{
  Serial.begin(9600);
  pinMode(trigPin, OUTPUT); // sets trig pin to have output pulses
  pinMode(echoPin, INPUT);  // sets echo pin to be input and get the pulse width
  pinMode(buzzPin, OUTPUT); // sets buzz pin as output to control the sound
}
void loop()
{
  int duration, distance; // The Duration will be the input pulse width and distance will be the distance to the obstacle in centimeters
  digitalWrite(trigPin, HIGH); // The output pulse with 1ms width on trigPin
  delay(1);
  digitalWrite(trigPin, LOW);
  duration = pulseIn(echoPin, HIGH); // Measures the pulse input in the echo pin
  distance = (duration/2) / 29.1;    // Distance is half the duration divided by 29.1 (from datasheet)
  // if the distance is less than 0.5 meter and more than 0 (0 or less means over range)
  if (distance <= 50 && distance >= 0) {
    // It will trigger the Buzzer
    digitalWrite(buzzPin, HIGH);
  } else {
    // Will no Sound
    digitalWrite(buzzPin, LOW);
  }
  Serial.print("Distance: ");
  Serial.print(distance);
  Serial.println(" cm");
  // Waits 50 milliseconds
  delay(1000);
}
```

Conclusion:

This project demonstrates a simple yet effective approach to obstacle detection using readily available components and Arduino programming. By adjusting the distance threshold and exploring additional features, this project can be adapted for various applications requiring object proximity detection.



CERTIFICATE:

Secured first place in the Intra-departmental technical symposium “**COMNET 2K24**” conducted by Government College of Engineering, Salem.

