

**Experiment 3:** Develop a program to deploy an intrusion detection system using Ultrasonic and sound sensor.

**Pin Connections:**

| Component  |            | ESP32 Pin | <i>Arduino UNO Pin</i> |
|------------|------------|-----------|------------------------|
| Ultrasonic | TRIG       | GPIO 13   | <i>D9</i>              |
|            | ECHO       | GPIO 12   | <i>D10</i>             |
| Buzzer     | Buzzer pin | GPIO 15   | <i>D7</i>              |

**Code:**

```
// Pin definitions
const int trigPin = 9;
const int echoPin = 10;
const int buzzerPin = 7;
long duration;
int distance;

void setup() {
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  pinMode(buzzerPin, OUTPUT);
  Serial.begin(9600);
}

void loop() {
  // --- Ultrasonic sensor distance measurement ---
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
  duration = pulseIn(echoPin, HIGH);
  distance = duration * 0.034 / 2; // Convert to cm
```

```
// --- Intrusion Detection Condition ---  
if (distance < 50) {    // Threshold: 50 cm  
    digitalWrite(buzzerPin, HIGH); // Alarm ON  
    Serial.println("Intrusion Detected!");  
} else {  
    digitalWrite(buzzerPin, LOW); // Alarm OFF  
}  
  
// Print distance for debugging  
Serial.print("Distance: ");  
Serial.print(distance);  
Serial.println(" cm");  
delay(500);  
}
```