Embedded Systems Project Report

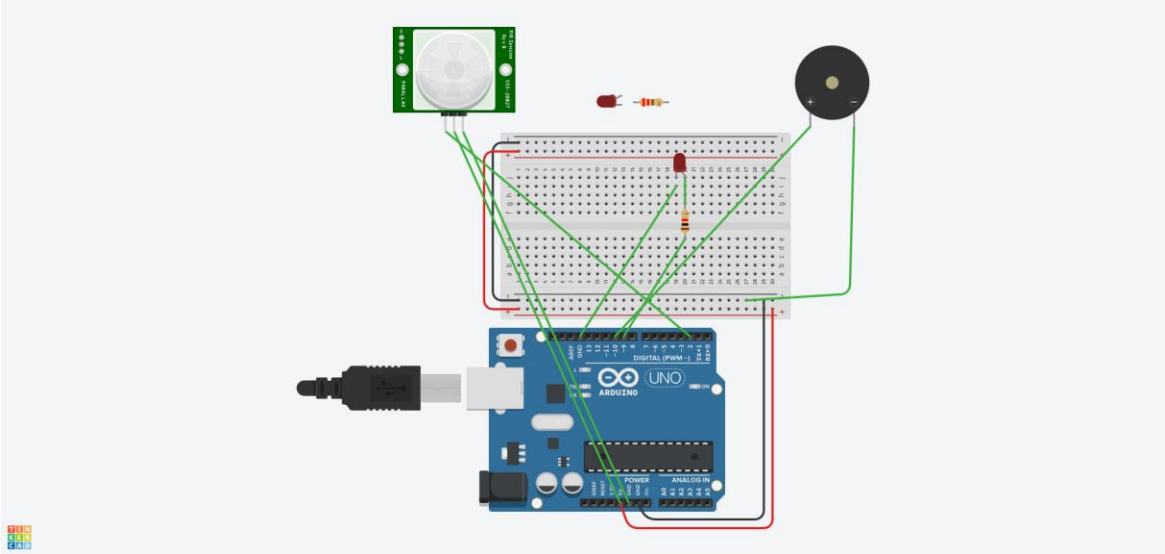
Introduction to Embedded Systems

An embedded system is a specialized computer system designed to perform dedicated functions within a larger mechanical or electrical system. Unlike general-purpose computers, embedded systems are built for specific tasks and are often constrained by power, memory, and processing capabilities.

Embedded systems are widely used in various real-world applications such as smart home devices, automotive control systems, medical equipment, industrial automation, robotics, and consumer electronics. They typically consist of a microcontroller or microprocessor, sensors, actuators, and supporting software.

Selected Project: Motion Detection Alarm System

Circuit Diagram



Tools Needed

Arduino/ESP32
PIR Motion Sensor
Buzzer
LED

Project Explanation

The Motion Detection Alarm System uses a PIR (Passive Infrared) motion sensor to detect movement in its surroundings. When motion is detected, the sensor sends a signal to the microcontroller, which then activates a buzzer and an LED as an alert. This system can be used for basic security and intrusion detection.

Applications

- Home security systems
- Office security monitoring
- Automated lighting control
- Restricted area monitoring

Source Code (Arduino Example)

```
// Motion Detection Alarm System
// -------- Pin Definitions --------

int pirPin = 2;     // PIR sensor signal connected to digital pin 2

int ledPin = 9;     // LED connected to digital pin 9 (through 220Ω resistor)

int buzzerPin = 10;  // Buzzer connected to digital pin 10


// -------- Setup Function (runs once) --------

void setup() {

  pinMode(pirPin, INPUT);     // Set PIR pin as input (it sends data to Arduino)

  pinMode(ledPin, OUTPUT);    // Set LED pin as output

  pinMode(buzzerPin, OUTPUT); // Set buzzer pin as output


  Serial.begin(9600); // Start serial monitor for debugging (optional)

}


// -------- Loop Function (runs continuously) --------

void loop() {


  // Read the PIR sensor output

  int motion = digitalRead(pirPin);
```

```
 // Check if motion is detected
 if (motion == HIGH) {
  // If motion detected:
  digitalWrite(ledPin, HIGH);    // Turn LED ON
  digitalWrite(buzzerPin, HIGH); // Turn buzzer ON

  Serial.println("Motion Detected!"); // Print message on Serial Monitor
 }
 else {
  // If no motion detected:
  digitalWrite(ledPin, LOW);     // Turn LED OFF
  digitalWrite(buzzerPin, LOW);  // Turn buzzer OFF

  Serial.println("No Motion");   // Print message on Serial Monitor
 }

 delay(500); // Small delay to stabilize readings
}
```