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**MID-COURSE PROJECT**

1.AIM:

To simulate a smart intrusion detection system in Wokwi such that it:  
(a) continuously detects human movement in a restricted area using a PIR sensor,  
(b) provides real-time alerts to security personnel via the cloud when motion is detected, indicating unauthorized access.

2.PROBLEM STATEMENT:

The growing need for effective and responsive home security systems calls for smart intrusion detection solutions that can be remotely monitored and controlled. Traditional systems lack real-time alerts, automation, and integration with cloud-based platforms. This project aims to simulate a **Smart Intrusion Detection System** using **Wokwi** (a virtual electronics simulator) integrated with **Blynk Cloud**, enabling remote notifications and real-time control via a smartphone app. The system leverages a **PIR motion sensor**, **LED**, **buzzer**, **relay**, and **servo motor** to detect motion and respond actively, simulating real-world security scenarios.

3.SCOPE OF THE SOLUTION:

A. **Scalability to Smart Home Ecosystems:**

* Integration with other IoT devices such as cameras, door sensors, or smart locks.
* Expansion into multi-sensor, multi-zone security systems.

B. **Advanced Cloud Analytics & AI Integration:**

* Use of machine learning for behaviour-based intrusion detection.
* Cloud-based analytics dashboards for activity logs and pattern recognition.

C. **Cross-platform Compatibility:**

* Support for multiple IoT platforms (e.g., Home Assistant, Node-RED, IFTTT).

D. **Real-time Automation & Notifications:**

* Faster and more customizable alerts via SMS, push notifications, or emails.
* Event-triggered automation (e.g., turning on lights or locking doors).

E. **Energy-efficient and Sustainable Design:**

* Simulation of low-power designs for real-world deployment in off-grid or solar-powered setups.

4.REQUIRED COMPONENTS OF THE SOLUTION:

A.ESP 32 Board

B. A Standard Micro Servo Motor

C. Electrically operated switch

D. A piezoelectric buzzer

E. Passive Infrared (PIR) motion sensor

F. 2 Standard 5mm LEDs.

G. Connecting Wires

H. Blynk platform is used as cloud environment

5.FLOWCHART OF THE CODE:

Start

Initialize PIR sensor, LED, buzzer, relay, servo

Motion detected ?

NO

YES

Wait for 1 second

End

i)Turn off LED and buzzer

ii)Deactivate relay

iii)Move servo back to 0 degrees

i)Turn on LED and buzzer

ii)Activate relay

iii)Move servo to 90 degrees

iv)Print “Motion Detected” to Serial Monitor

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6.SIMULATED CIRCUIT:

Before Movement Detection:

A computer circuit board with wires

AI-generated content may be incorrect.

After Movement Detection:

A computer circuit board with colorful wires

AI-generated content may be incorrect.

7.VIDEO OF THE DEMO:

<https://drive.google.com/file/d/1FRTv2N_Bbnz871tWvrnXHuObL0WiEzWT/view?usp=drive_link>

This link contains the demo of the wokwi simulation.