

**Robotics**

**Task 2: Smart Lock**

1. **Objective**

* The objective of this project was to design and implement an ESP32-based embedded system capable of automating a door mechanism using an analog IR sensor for person detection and an SG90 servo motor for door operation. The system detects the presence of a person using the IR sensor, triggers the servo motor to open the door (rotating from 0° to 180°), and automatically closes the door (returning to 0°) after a specified delay or when no person is detected. This simulates a real-world smart door system for applications like home automation, security, or access control.

1. **Components Used**

* ESP32 Development Board
* SG90 Servo Motor
* Breadboard
* Analog IR Sensor
* Jumper Wires

1. **Circuit Setup**

* **IR Sensor:**
* Connected to GPIO 34 for analog input to read distance values.
* VCC pin connected to the ESP32’s 5V pin (VIN).
* GND pin connected to the ESP32’s GND pin.
* **SG90 Servo Motor:**
* Signal pin connected to GPIO 13 to control the servo’s position.
* VCC connected to the ESP32’s 5V pin (VIN).
* GND connected to the ESP32’s GND pin.
* **Power:**
* Initially powered via a USB connection from the computer
* Later switched to a 5V 1A+ USB wall adapter to provide sufficient current for the servo motor, avoiding brownouts and upload issues.

1. **Execution and Testing**

* **Code Compilation and Upload:**
* The code was successfully compiled and uploaded to the ESP32 using PlatformIO.
* Initial upload attempts failed with the error "Packet content transfer stopped (received 8 bytes)" due to the servo drawing too much current from the computer’s USB port.
* Disconnecting the servo’s VCC during upload resolved this issue, and later switching to a 5V 1A+ USB wall adapter allowed stable uploads with the servo connected.
* **Serial Monitor:**
* The Serial Monitor was used to display real-time IR sensor readings and debug system states
* Initial garbled output was fixed by setting the Serial Monitor baud rate to 115200 (matching Serial.begin(115200) in the code) via platformio.ini (monitor\_speed = 115200).
* **IR Sensor Testing:**
* The IR sensor was tested independently by printing its analog values (0-4095) to the Serial Monitor.
* Values changed predictably with distance (200 when far, 800 when close), confirming the sensor was working correctly.