

**Robotics**

**Task 1: ESP32-Based Light Detection and Buzzer Alert System**

1. **Objective**

* The objective of this project was to design and implement a basic ESP32-based embedded system capable of detecting light levels using an LDR sensor, visualizing the light intensity through an LED bar graph, and triggering a buzzer alert automatically (for low light) or manually (via a push button). The system simulates a real-world monitoring device for smart lighting or security purposes.

1. **Components Used**

* ESP32 Development Board
* LED
* 220-ohm Resistor
* 10k – ohm Resistor
* Breadboard
* Jumper Wires
* Push button
* Buzzer

1. **Circuit Setup**

* The LDR (Light Dependent Resistor) was connected to GPIO 35 to read ambient light levels through analog input.
* **Four LEDs were used to create a visual bar graph representing light intensity:**
* The anode (long leg) of each LED was connected to a GPIO pin on the ESP32.
* The cathode (short leg) of each LED was connected to GND through a 220-ohm resistor.
* LED1: GPIO 14, LED2: GPIO 12, LED3: GPIO 13, LED4: GPIO 26.
* A push button was connected to GPIO 25 with INPUT\_PULLUP configuration:
* One leg of the button was connected to GPIO 25.
* The other leg was connected to GND.
* A buzzer was connected to GPIO 27 to produce sound alerts.
* The ESP32 was powered via a USB connection from the computer.

1. **Execution and Testing**

* The code was successfully compiled and uploaded to the ESP32 using PlatformIO.
* The Serial Monitor was used to display real-time LDR readings and debug button states.
* The LED bar graph functioned as expected, lighting LEDs based on light levels.
* The buzzer activated automatically when light was below a threshold
* Pressing the push button manually triggered the buzzer for a short duration.
* The system consistently responded to both light changes and button presses.