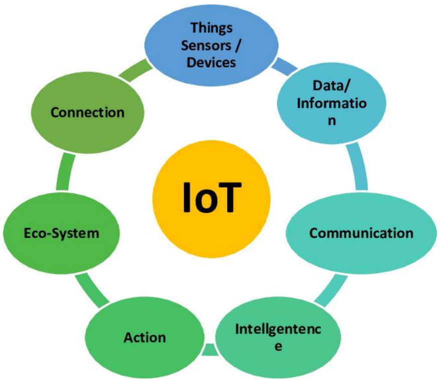
EXPERIENTIAL LEARNING ACTIVITY

REPORT ON

IOT BASED SYSTEM



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Final Report on IoT-Based System ELC ACTIVITY

1. Introduction

On April 8th, 2024, we took part in the ELC Activity focused on developing an IoT-Based System. This session centered around creating a basic IoT system using the Blynk platform, Arduino IDE, and the ESP32 microcontroller. The main goal was to control an LED and perform various tasks utilizing the ESP32 and Blynk cloud platform. This activity offered valuable insights into the real-world applications of IoT and provided hands-on experience in interfacing sensors and actuators with embedded systems. These tasks helped us grasp the fundamental principles of IoT systems, such as device-to-cloud communication, sensor interfacing, and real-time control. The practical applications of these skills are extensive, covering areas like smart home automation, industrial automation, and environmental monitoring systems.

2. Objective of Activity

The objectives of this activity were:

1. Grasp the fundamental concepts of the Internet of Things (IoT).
2. Learn how to interface various sensors and actuator modules with embedded systems.
3. Design IoT-based applications and analyze their performance.
4. Implement basic IoT applications on an embedded platform..
5. Use simple and readily available electronic sensors/devices to understand the practical applications of IoT by creating a functional circuit (for this activity, we utilized Blynk, Arduino IDE, and ESP32).

3. Circuit Diagram

Below is the circuit diagram for the two tasks performed during the session.

Task 1: Simple LED Blinking using Blynk and ESP32

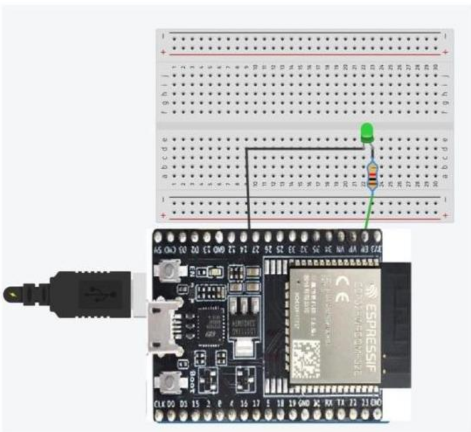
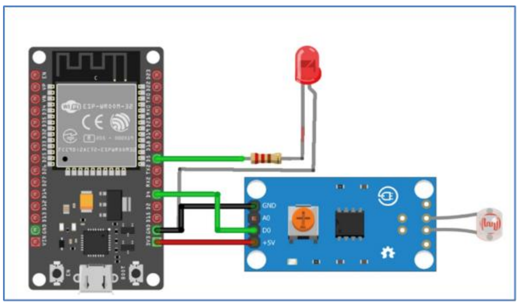


Fig: Illustrative Circuit Diagram

Task 2: Advanced LED Control using LDR Sensor and ESP32



4. Steps Performed

Task 1: Simple LED Blinking

Setup ESP32 and Blynk along with Arduino IDE:

- Gather the necessary components: Breadboard, ESP32 microcontroller, LED, resistor, and connecting wires.
- Download and install the Arduino IDE software on the computer, then set up the Blynk Cloud Dashboard.
- Create a new template in Blynk by naming it and configuring the appropriate settings.
- Set up the datastream by assigning Digital Pin 2 of the ESP32 as the LED pin and setting it as output.
- Create the Web Dashboard to control the datastream, selecting a switch to turn the LED on and off, and link it to the datastream.
- Go to Devices, create a new device, and obtain the authentication token and the relevant code.
- Configure the Arduino IDE by including the Blynk library and selecting the appropriate board.
- In a new window, modify the code by entering your WiFi SSID and password, then paste the previously obtained template code.
- Connect the ESP32 to a computer and upload the code to connect it with the Blynk cloud using the provided token.

Circuit Assembly:

- Connect the positive end of the LED to Pin 2 of the ESP32 with a resistor in between for protection, and connect the negative end of the LED to the GND of the ESP32.
- Complete the circuit by connecting the ESP32, LED, and necessary resistors on a breadboard.

Programming:

- Install drivers and configure the correct Board and Port settings for the ESP32.
- Upload the code to the ESP32 to toggle the LED on and off using the Blynk app.

Task 2: Advanced LED Control using LDR Sensor

Setup LDR Sensor:

- Add an LDR sensor to the existing circuit.
- Connect the LDR sensor to the ADC pin of the ESP32.

Circuit Assembly:

- Ensure the LDR sensor is properly connected to sense changes in light intensity.
- Connect an LED to another GPIO pin on the ESP32 for control based on LDR readings.

Programming:

- Upload the code to the ESP32 to read values from the LDR sensor.
- Implement logic to turn on the LED when the LDR sensor detects a decrease in light intensity (e.g., when blocked by a hand).

5. Conclusion

The IoT-based system session provided a thorough introduction to IoT concepts and practical experience using the ESP32 microcontroller and the Blynk platform. This activity gave us hands-on experience in interfacing and programming sensors and actuators with embedded systems. We successfully controlled and blinked an LED via the Blynk cloud service and developed a simple interface where the LED responded to changes in light detected by an LDR sensor.

In Task 1, we set up a basic LED blinking system controlled through the Blynk app. This task gave us a foundational understanding of connecting an ESP32 to the Blynk cloud, configuring a cloud dashboard system to interact with hardware, and programming the ESP32 for remote control operations.

Task 2 expanded on this by introducing an LDR sensor to create a light-sensitive LED control system. This task enhanced our understanding of deploying a sensor whose input/output is sent to the board for triggering actions.

By the end of the session, we learned about:

- Controlling interfaced sensors and other modules through the cloud.
- Various ways to monitor and control IoT-based appliances at home, office, and industry.
- Developing prototypes to monitor and control applications such as smart home security systems, autonomous farming equipment, and industry-oriented applications using mobile phones and cloud repositories.

6. Photographs from the Session

<u>Task 1:</u>

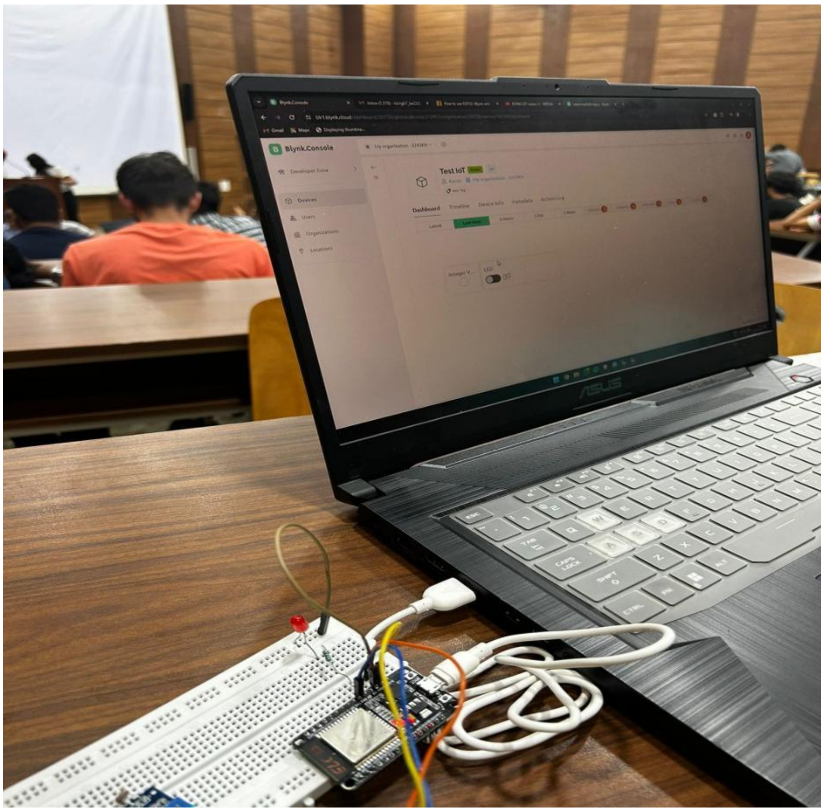


Fig: LED OFF in Task 1 (the Switch is kept at OFF hence LED does not Glow)

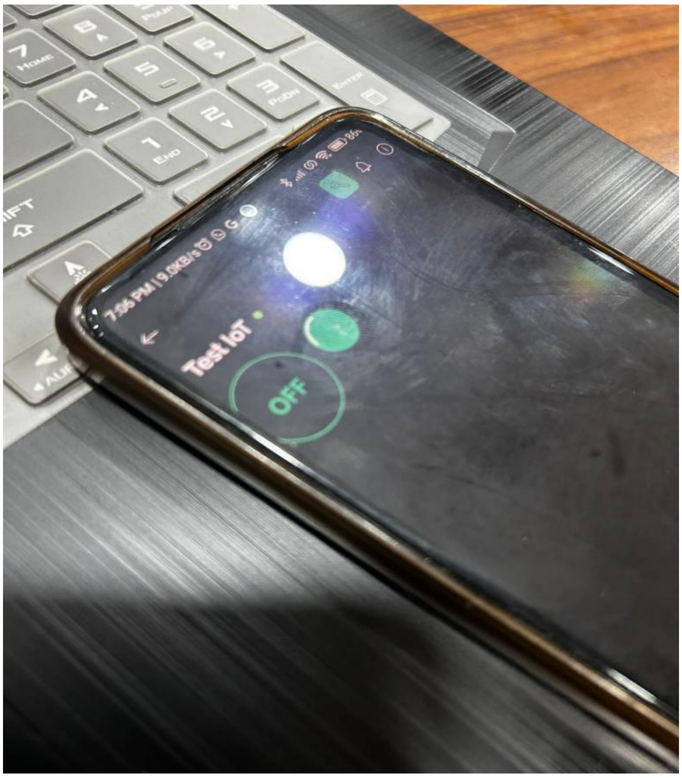


Fig: LED OFF in Task 1 (the Switch is kept at OFF hence LED does not Glow)

<u>Task 2:</u>

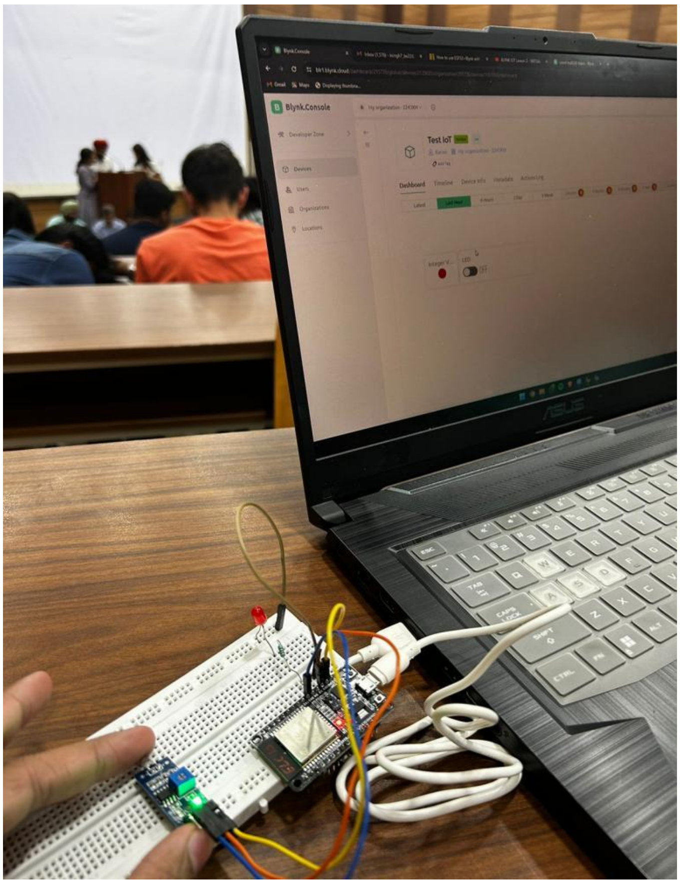


Fig: The LDR is ON and due to obstruction the LED is ON

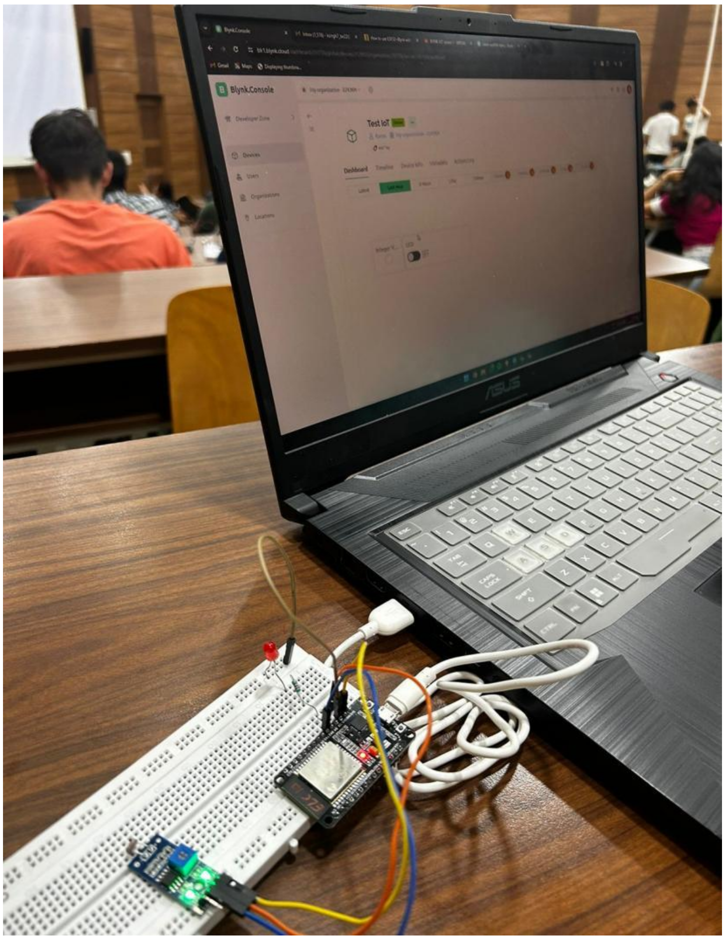


Fig: The LDR is ON but there is no obstruction hence LED is OFF