**Edge Computing Lab**

Class: TY-AIEC

**School of Computing, MIT Art Design Technology University**

Academic Year: 2024-25

**Experiment No. 3**

**Title**

DHT11 Sensor and Alert System using Blynk IoT

Objective:

The goal of this project is to create a system with a DHT11 sensor interfaced with a Raspberry Pi that monitors humidity levels and sends alerts via the Blynk IoT platform when humidity exceeds 70%.

Materials:

- Raspberry Pi (any model with GPIO pins)

- DHT11 Temperature and Humidity Sensor

- Breadboard and jumper wires

- Resistors (typically 10kΩ for DHT11 pull-up)

- Blynk Mobile App

- Internet connection

**Procedure:**

Task 1: Connect a DHT11 to the Raspberry Pi

**1. Initial Setup**: Ensure your Raspberry Pi is set up with the latest version of Raspbian OS and is connected to the internet.

**2. Wiring:** Connect the DHT11 sensor to the Raspberry Pi GPIO pins.

- VCC pin to a 5V pin on the Raspberry Pi.

- Data pin to a GPIO pin (e.g., GPIO4).

- GND pin to a ground pin on the Raspberry Pi.

- Place a 10kΩ resistor between VCC and the Data pin (this acts as a pull-up resistor).

Task 2: Program the Raspberry Pi

**1. Install Libraries:** Install the DHT11 Python library by running `sudo pip install dht11` in the terminal.

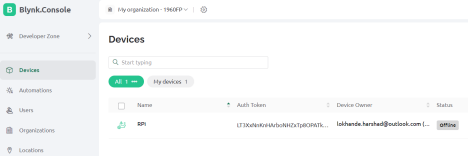
**2. Coding:**

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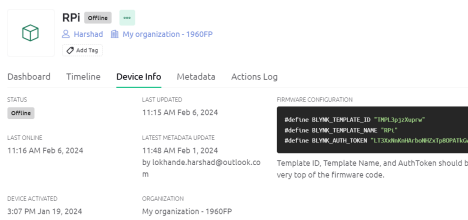
- Write a Python script that reads humidity and temperature from the DHT11 sensor. - Include a conditional statement to check if the humidity is greater than 70%. - If the condition is true, use the Blynk library to send a notification.

Task 3: Configure the Blynk IoT

**1. Blynk App Setup:** Download and install the Blynk app on your mobile device or desktop. **2. Create a New Project:**

- Open the app and create a new project.

- Select the device as Raspberry Pi and the connection type as Wi-Fi.

- An authentication token will be sent to your email, which will be used in your Python script. 

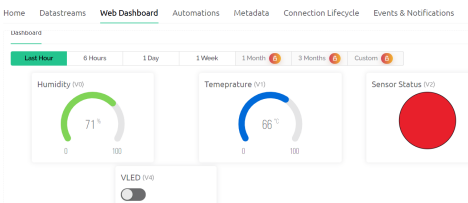
Task 4: Generate the GUI on Mobile / Desktop

**1. Adding Widgets:**

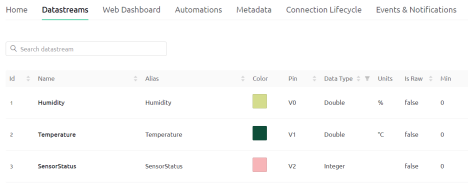
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- In the Blynk app project, add a Gauge widget for displaying humidity.

 - Add a Notification widget that will be used to send alerts.

- Add the DataStream



Task 5: Apply Analytics for Alert Generations in Blynk IoT

**1. Script Enhancement:**

- Modify the Python script to send data to Blynk using the Virtual Pins.

- Use Blynk’s `eventor` feature to set up the logic for alert generation based on the humidity value. **2. Data Logging:** Use Blynk’s Super-Chart widget to log and display humidity data over time. **Execution:**

1. Run the Python script on the Raspberry Pi.

2. Ensure that the script is reading the DHT11 sensor data correctly.

3. Monitor the Blynk app dashboard for real-time data.

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**Code:**

**import time**

**import Adafruit\_DHT**

**import BlynkLib**

**# Replace with your Blynk Auth Token**

**BLYNK\_AUTH\_TOKEN = '\_XnsCg95jOshh7O2jiBuMq7oWbVA6iCr'**

**# Set the sensor type and the GPIO pin**

**DHT\_SENSOR = Adafruit\_DHT.DHT11**

**DHT\_PIN = 4 # GPIO pin number where the sensor's data pin is connected**

**# Initialize Blynk**

**blynk = BlynkLib.Blynk(BLYNK\_AUTH\_TOKEN)**

**# Function to read DHT11 data and send it to Blynk**

**@blynk.on("connected")**

**def read\_and\_send\_data():**

**humidity, temperature = Adafruit\_DHT.read(DHT\_SENSOR, DHT\_PIN)**

**if humidity is not None and temperature is not None:**

**print(f'Temperature: {temperature}C, Humidity: {humidity}%')**

**blynk.virtual\_write(1, temperature) # Send temperature to virtual pin V1**

**blynk.virtual\_write(0, humidity) # Send humidity to virtual pin V2**

**else:**

**print('Failed to retrieve data from sensor')**

**# Main loop**

**while True:**

**read\_and\_send\_data() # Read and send data**

**blynk.run() # Keep Blynk connection alive**

**time.sleep(1) # Wait for 10 seconds before reading again**

**Results:**

- The system should accurately read the humidity levels from the DHT11 sensor. - The Blynk app should display real-time humidity data.

- Upon reaching the 70% humidity threshold, the system should send a notification alert. **Discussion:**

- Potential issues could include inaccurate readings from the DHT11 sensor, which may require calibration.

- Network instability could affect the performance of the Blynk app notifications.

**Conclusion:**

The system successfully integrates a DHT11 sensor with a Raspberry Pi to monitor humidity levels and uses the Blynk IoT platform to send alerts when thresholds are exceeded, demonstrating the viability of IoT for home automation and monitoring tasks.