

Exp no: 8

Cloud Application using Adafruit IO Cloud

Aim:

To connect a Raspberry Pi 4 with a DHT11 Temperature & Humidity Sensor and send real-time sensor data to Adafruit IO Cloud for monitoring and visualization.

Apparatus / Requirements

1. Hardware

- Raspberry Pi 4 with Raspbian OS installed
- DHT11 Temperature & Humidity Sensor
- Breadboard and Jumper Wires
- Internet connection

2. Software

- Python 3.x
- Adafruit IO account (<https://io.adafruit.com>)
- Python libraries (install using terminal): `pip3 install adafruit-io adafruit-circuitpython-dht adafruit-blinka`

Theory

In IoT, **cloud applications** enable devices to collect and transmit data for remote access and visualization. **Adafruit IO** is an IoT cloud platform that provides:

- **Feeds** → storage for sensor data
- **Dashboards** → visualization (charts, gauges)
- **Triggers & Automation** → notifications and actions

In this experiment, the **Raspberry Pi 4** reads **temperature and humidity** from the **DHT11 sensor** and sends it to Adafruit IO feeds using the **Adafruit IO Python client**. The data is displayed on an **Adafruit Dashboard** in real-time.

Circuit Connections:

- DHT11 VCC → 3.3V (Pin 1)
- DHT11 GND → GND (Pin 6)
- DHT11 DATA → GPIO4 (Pin 7)

Procedure

1. Create Adafruit IO account and note down:
 - Username
 - AIO Key
2. Create two feeds:
 - `temperature`
 - `humidity`
3. Write the Python Program on Raspberry Pi
4. Save the program as `dht_adafruit.py`.
5. Run it with:
`python3 dht_adafruit.py`
6. Go to Adafruit IO Dashboard, add Line Chart / Gauge blocks, and select the `temperature` and `humidity` feeds.
7. Observe real-time updates on the dashboard.

Result

Successfully read real-time temperature and humidity from the DHT11 sensor using Raspberry Pi 4 and uploaded the data to Adafruit IO Cloud for visualization.

Coding:

```
import time
import board
import adafruit_dht
from Adafruit_IO import Client

# Adafruit IO credentials
aio = Client("YOUR_USERNAME", "YOUR_AIO_KEY")

# Initialize DHT11 sensor on GPIO4
dht = adafruit_dht.DHT11(board.D4)

while True:
    try:
        # Read data from DHT11
        temp = dht.temperature
        hum = dht.humidity

        # Send data to Adafruit IO feeds
        aio.send("temperature", temp)
        aio.send("humidity", hum)

        # Print on terminal
        print(f'Sent -> Temperature: {temp} °C | Humidity: {hum} %')

    except Exception as e:

        print("Error:", e)

# Delay for 10 seconds
time.sleep(10)
```

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Default

| Feed Name | Key | Last value | Reco |
|-----------|-----|------------|------|
|-----------|-----|------------|------|

Loaded in 0.96 seconds.

Create a new Feed

Name

Maximum length: 128 characters. Used: 0

Description

[Cancel](#) [Create](#)

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Default

| Feed Name | Key | Last value | R |
|-----------|-----|------------|---|
|-----------|-----|------------|---|

Loaded in 0.96 seconds.

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"This is not the age of pamphleteers. It is the age of engineers. The spark-gap is mightier than the pen"
— Lancelot Hogben

Connect Feeds



The line chart is used to graph one or more feeds.

Choose multiple feeds you would like to connect to this line chart. You can also create a new feed within a group.

Search for a feed



Default

| Feed Name | Last value | Recorded |
|--|------------|----------|
| <input checked="" type="checkbox"/> humidity | 53 | 1 minute |
| <input type="checkbox"/> temperature | 33 | 1 minute |

Enter new feed name

0 of 5 feeds selected

< Previous step

Next step >

When checked, the x and y axis grid lines will be drawn.

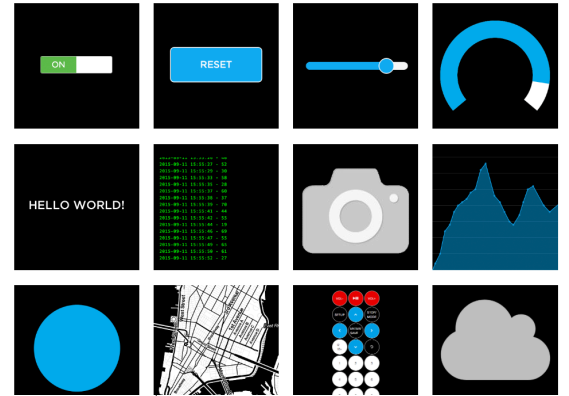
☐ Feed Key Legend

Use your feed key as the label, if your feed is in a group, it will be included. Example: kitchen.temperature

Create a new block



Click on the block you would like to add to your dashboard. You can always come back and switch the block type later if you change your mind.



< Previous step

Create block

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