SmartGarden

IoT Project

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Agenda

- Why SmartGarden
- How – IoT aspects of SmartGarden
- Conclusions & Questions

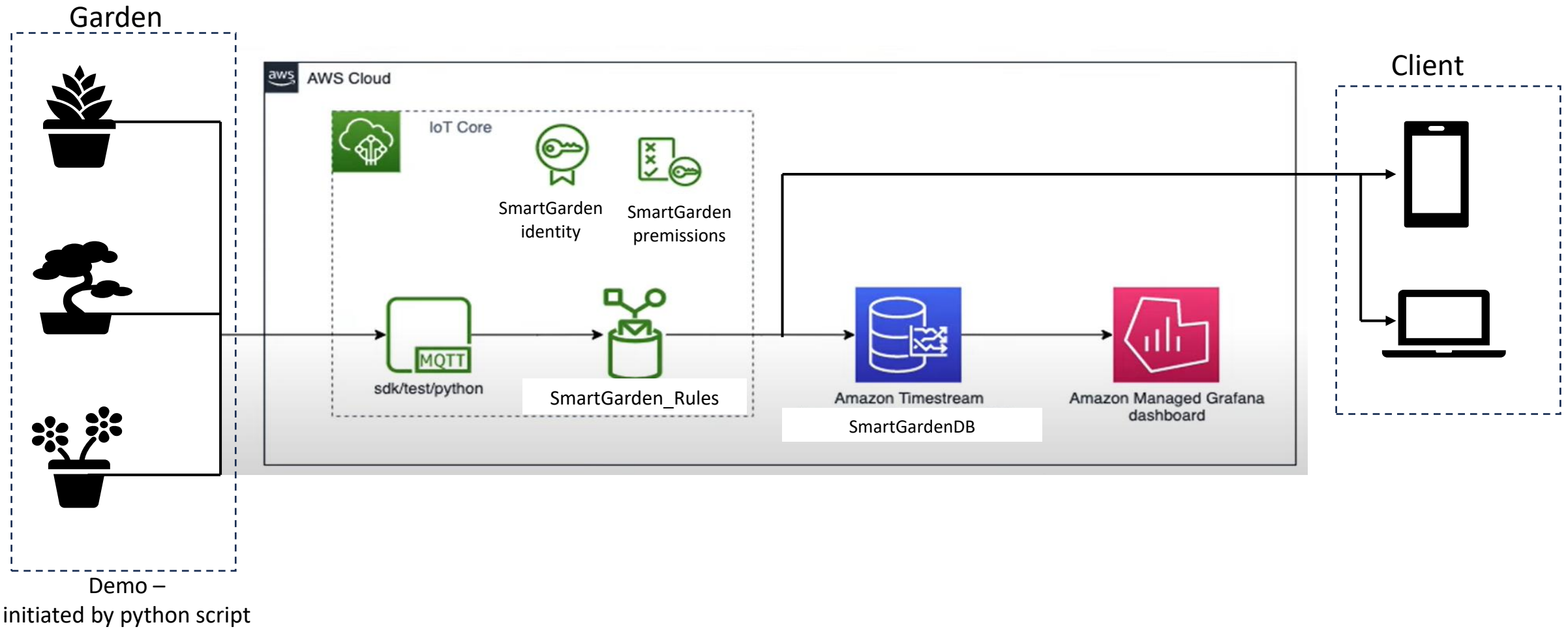
Why SmartGarden

- No more dead plants due to neglection
- Better management for Non-gardeners
- Flourishing garden with minimal effort

How – IoT aspects of SmartGarden

- Plant sensors collect data (humidity, illuminance, etc.)
- Data analyzed via python script
- AWS cloud receives Analyzed data via MQTT messages
- AWS cloud Visualizes data using Grafana and sends notifications to user

SmartGarden IoT Flow



MQTT messages

▼ sdk/test/python March 04, 2024, 11:47:59 (UTC+02:00)


```
{
  "Mint_Temperature": 43,
  "Mint_Humidity": 46,
  "Mint_Illuminance": 1619,
  "Tomatos_Temperature": -23,
  "Tomatos_Humidity": 86,
  "Tomatos_Illuminance": 3375,
  "Bonsai_Temperature": 14,
  "Bonsai_Humidity": 92,
  "Bonsai_Illuminance": 2113,
  "Cucumbers_Temperature": 40,
  "Cucumbers_Humidity": 112,
  "Cucumbers_Illuminance": 4509,
  "basil_Temperature": 50,
  "basil_Humidity": 61,
  "basil_Illuminance": 1306
}
```


The data is received via MQTT protocol.

New message is received every second in simulation.

In real life, we want to receive one message per day.

Notification Rules

SQL statement

```
SELECT Basil_Humidity, "need to water Basil" as
messege FROM 'sdk/test/python' WHERE Basil_Humidity <
15
```

SQL statement

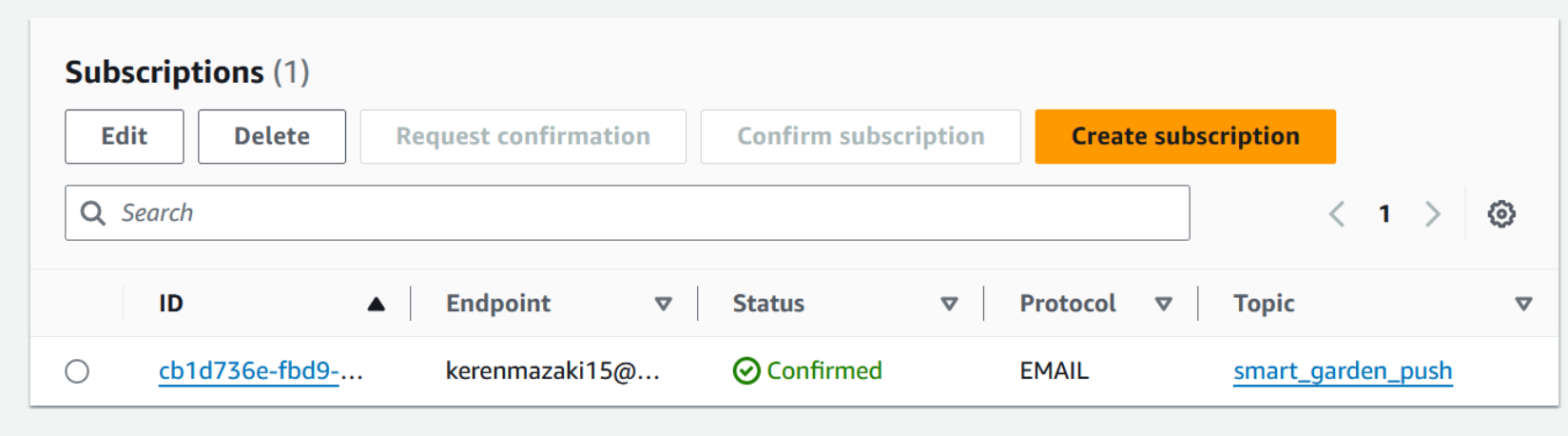
```
SELECT Basil_Temperature, "move to a shadowed area"
as messege FROM 'sdk/test/python' WHERE
Basil_Temperature > 40
```

SQL statement

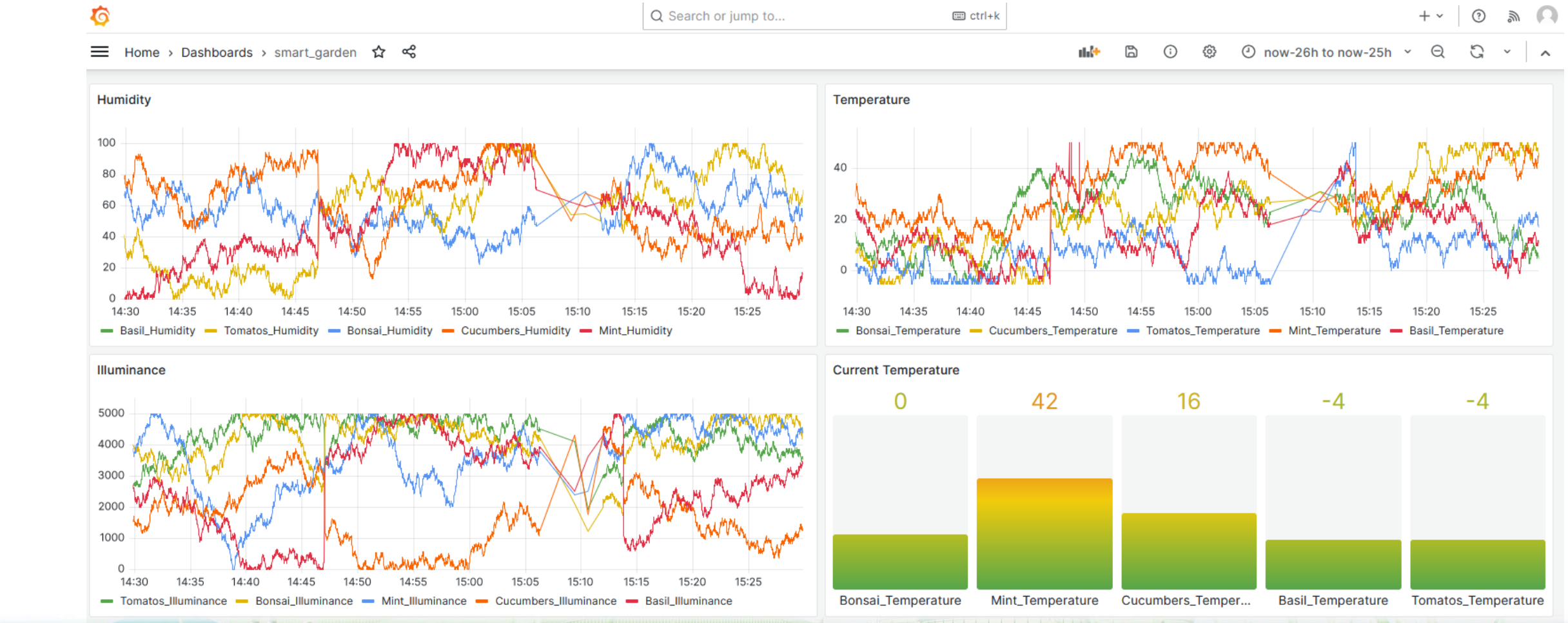
```
SELECT average_Basil_Illuminance, "move basil outside
to get some sunlight" as messege FROM 'sdk/test/
python' WHERE average_Basil_Illuminance < 2000
```

- when humidity is under 15 percent, send “need to water basil”
- when temperature is over 40°, send “move to a shadowed area”
- When average luminosity of last 5 days is under 2000 lux, send “move plant outside to get some sunlight

Setting up SNS subscriptions

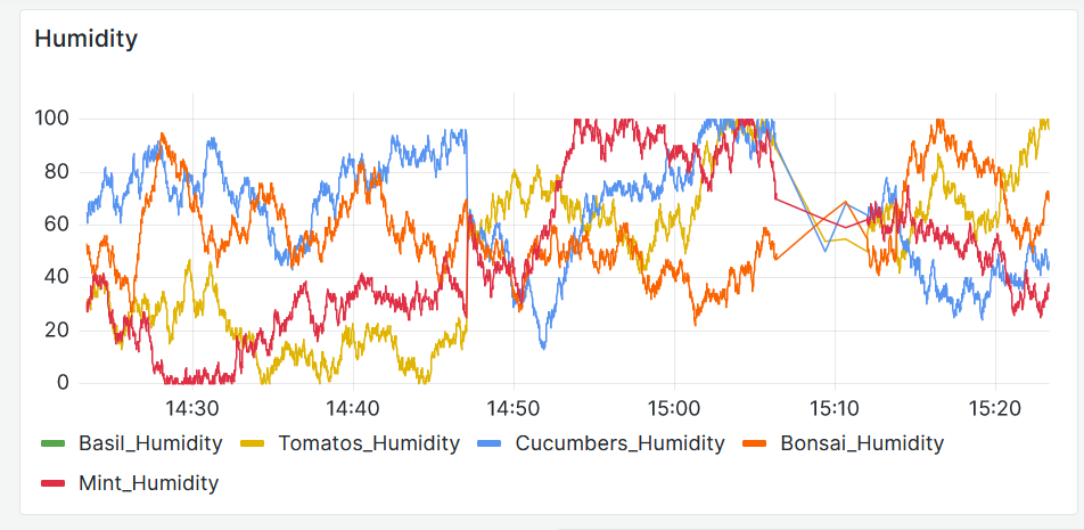


Creating a Grafana dashboard

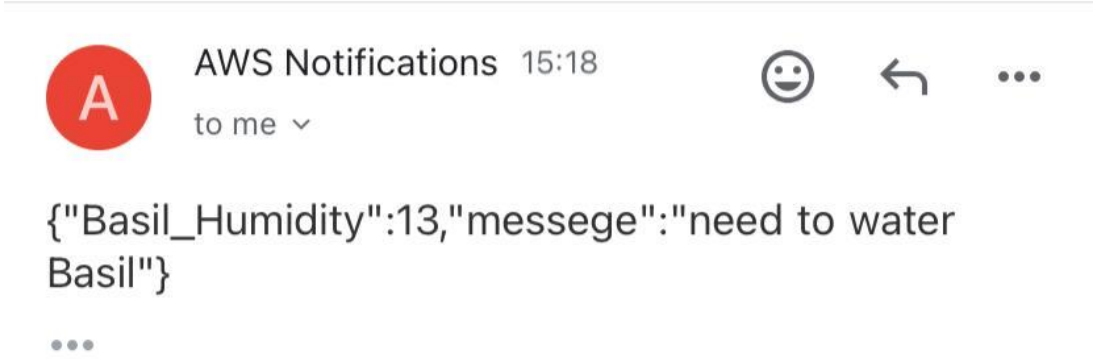


Results

Grafana timestream data of plant's Humidity

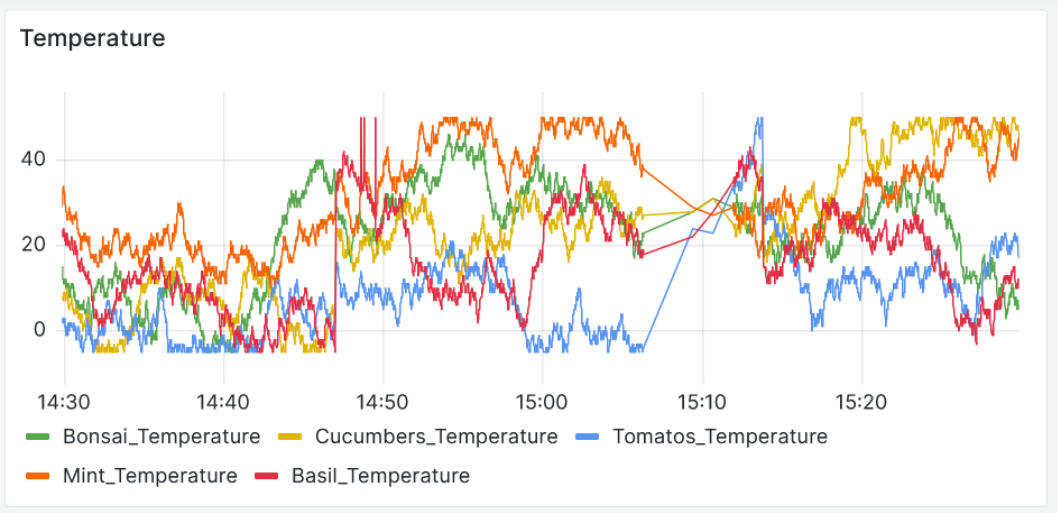


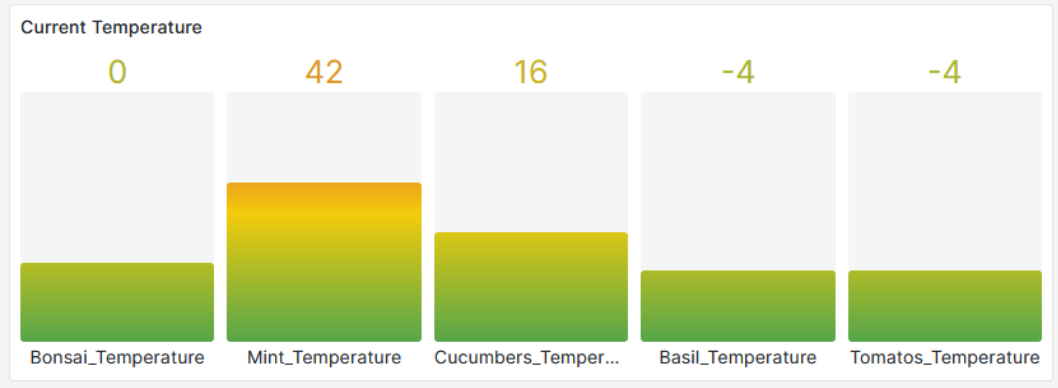
Example- Email sent to user when a plant needs water



Results

Grafana timestream data of plant's Temperature

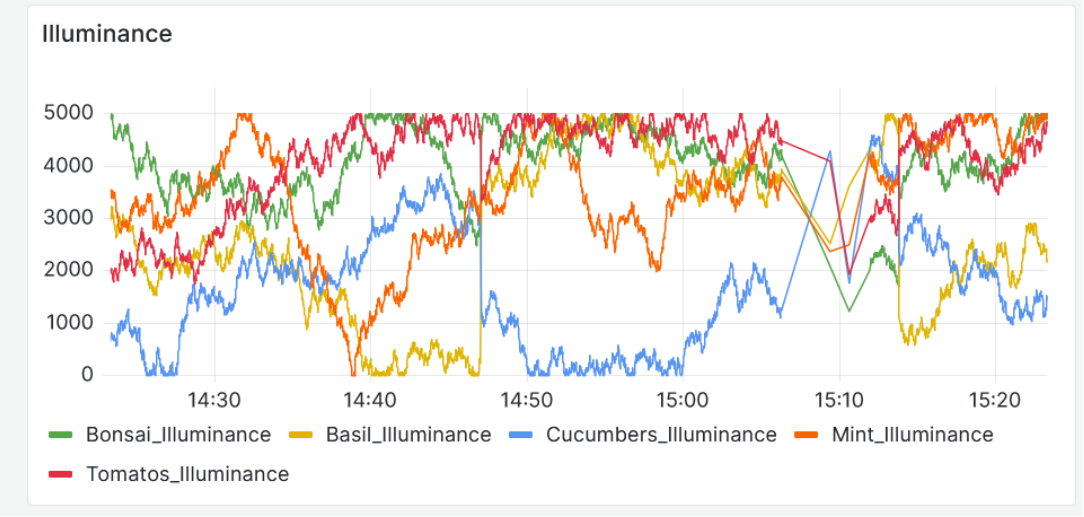




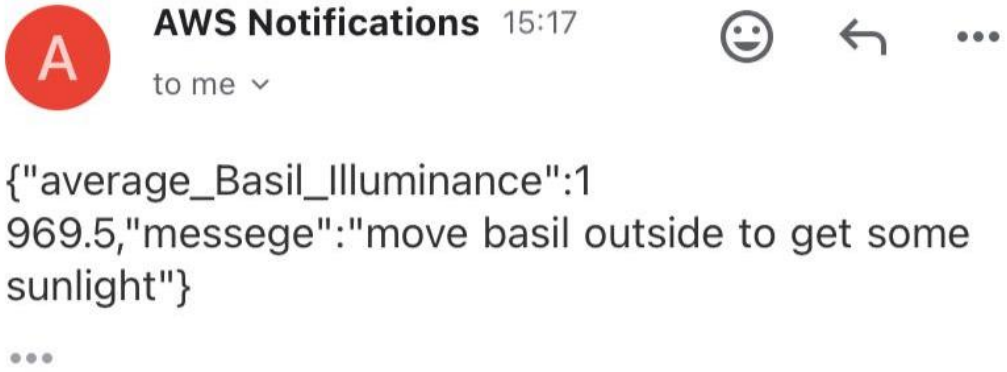
Example- Email sent to user when a plant's temperature is too high

Results

Grafana timestream data of plant's luminosity rate



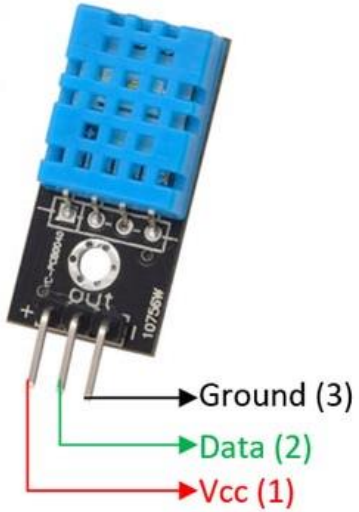
Example- Email sent to user when a plant has been too long in the shade

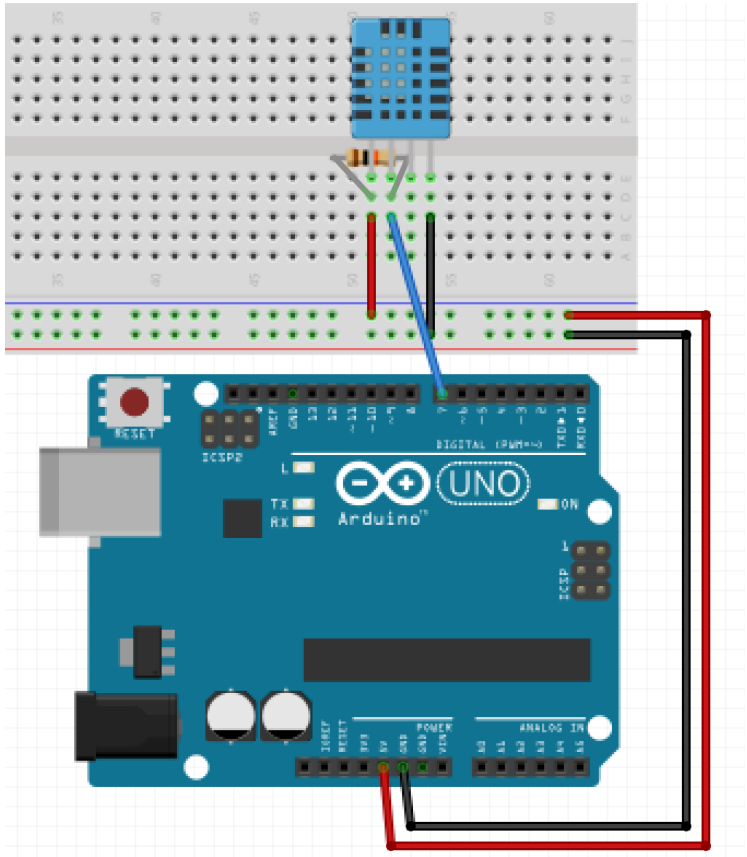


Hardware

Purchase link

Temperature sensor



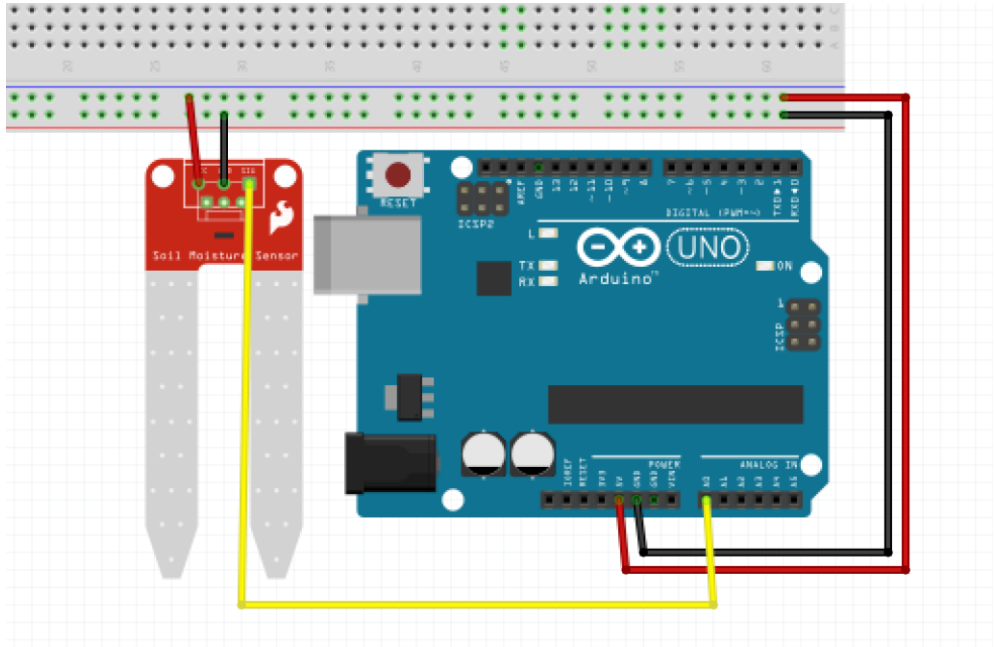


- DHT11 Temperature sensor with 8-bit microcontroller
- Voltage: 3.5-5.5 V
- Current: 60uA – 0.3mA
- Temperature range: 0°C to 50°C
- Accuracy: ±1°C and ±1%

Hardware

Purchase link

Soil moisture sensor



- Soil moisture sensor based on soil resistivity measurement
- 2.0 cm X 6.0 cm grove module
- Voltage: 3.3-5 V
- Current: 0-35 mA

Hardware

Purchase link

Light Dependent Resistor (LDR)

- Resistivity changes by light intensity
- made with photosensitive semiconductor materials

Conclusions & Questions