INTERNET OF THINGS
SMART WEATHER INFORMATION
FINAL PROJECT REPORT

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INFORMATION TECHNOLOGY STUDY PROGRAM

FACULTY OF COMPUTER SCIENCE

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Table of Content

I. Project Description

a. Project Title

"**Smart Weather Information**"

b. How the Project Works

For our final project, we create **"Smart Weather Information"** with **"Blynk App"** for Manage all Information about the weather information includes Temperature (BMP180), Altitude (BMP180), Pressure (BMP180), information on the state of the day (sunny, cloudy, dark) (LDR Sensor), Rain Information (Rain Sensor).

The project we are creating has the following flow: when the rain sensor detects water, the NodeMCU will send data to the Blynk application. Then, the Blynk application will display a notification to inform the user that it is raining. In addition, the buzzer will also be activated as an alarm to warn the user that it is raining.

Another feature is the detection of weather conditions on a particular day, whether it is sunny, cloudy, or dark. An LDR sensor will detect the brightness level of the day and categorize it as sunny, cloudy, or dark. If the sensor detects a sunny weather condition, the data will be sent to the Blynk application and display information that it is a sunny day. However, if the weather condition is cloudy or dark, the Blynk application will display information that it is a cloudy or dark day, and the buzzer will be activated to warn the user about the possibility of rain so that the user can prepare if it does rain.

The main idea and objective of this project is to assist users in detecting rain. For example, if a user is drying clothes and is inside a room, so they cannot determine the real-time weather conditions whether it is sunny or rainy, this project will help users by providing notifications if it is raining so that the user can quickly take their clothes off the line to avoid getting wet in the rain.

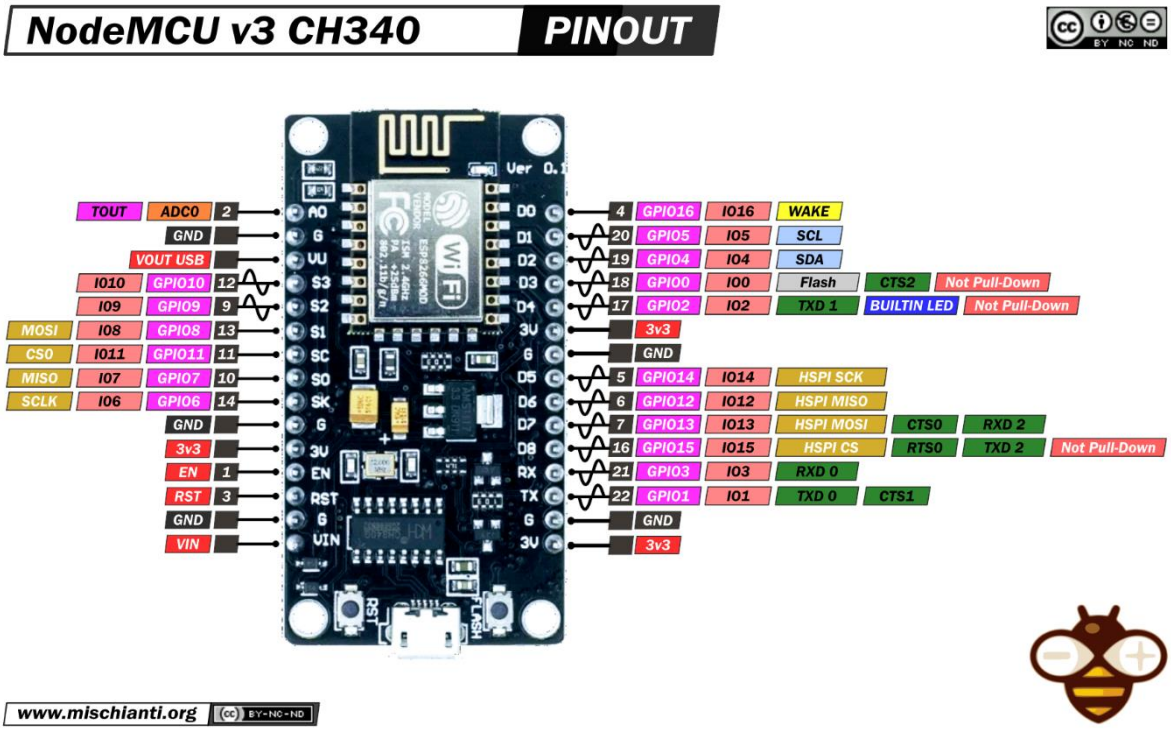
II. Circuit Diagram

a. List of the Devices

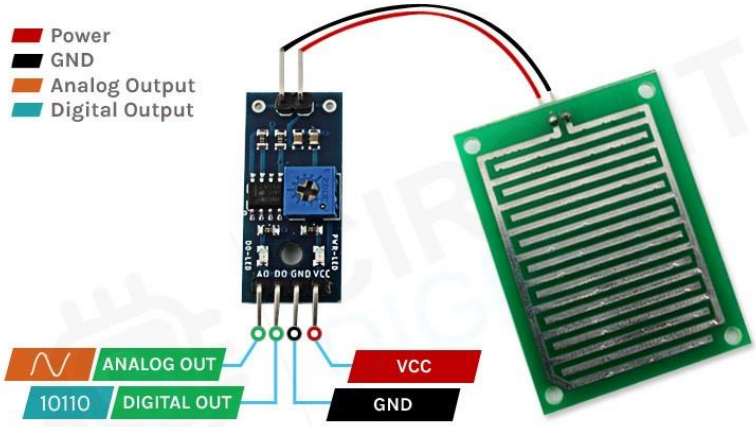
- NodeMCU V3 CH340 Lolin
- Rain Sensor
- LDR Sensor
- BMP180 Sensor
- Buzzer
- LCD 16X2 With I2C Module
- Breadboard

b. Schematic of Wire Configuration

- NodeMCU PINOUT



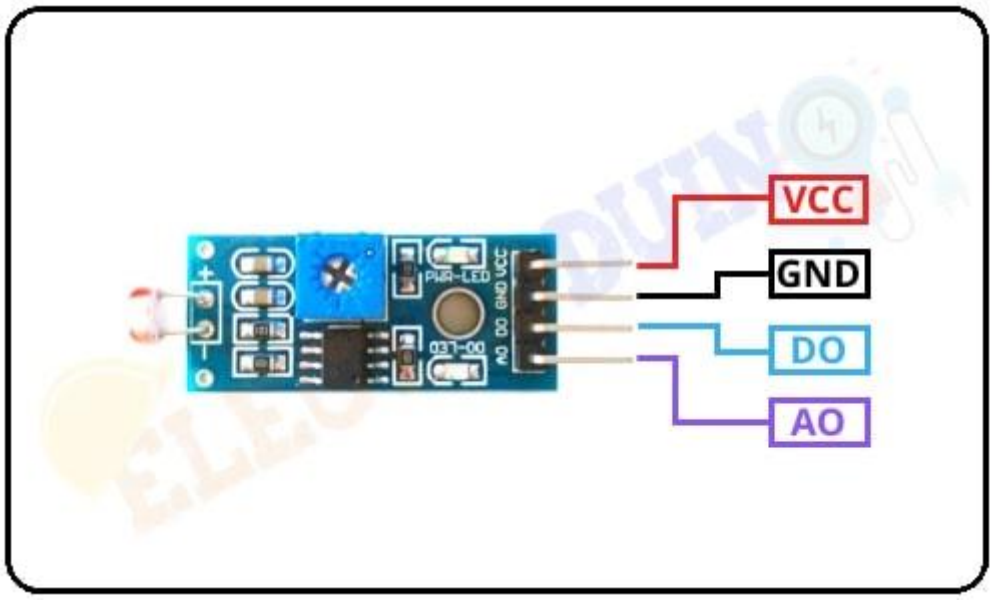
- Rain Sensor Configuration



Rain Sensor → NodeMCU (Rain sensor pin connect directly to NodeMCU)

- VCC → 3V
- GND → GND
- DO → TX (GPIO1)

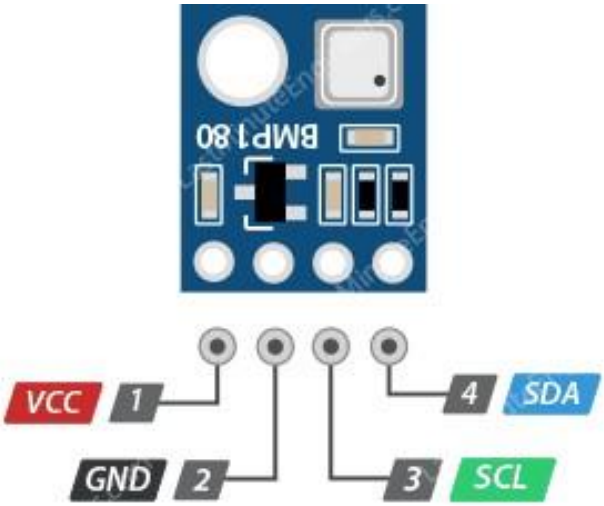
- LDR Sensor Configuration



LDR Sensor → NodeMCU (Ldr sensor pin connect directly to NodeMCU)

- VCC → 3V
- GND → GND
- AO → AO

- BMP180 Sensor Configuration



BMP180 → NodeMCU (BMP180 sensor pin connect directly to NodeMCU)

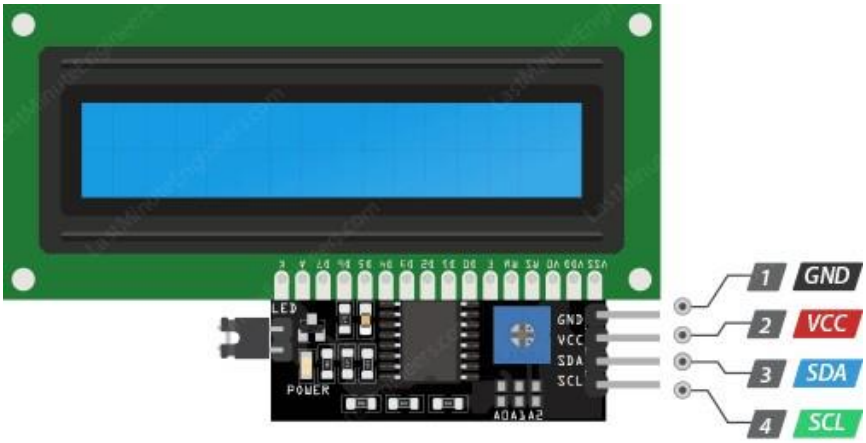
  - VCC → 3V
  - GND → GND
  - SCL → D1
  - SCL → D2

- Buzzer Configuration

Buzzer → Breadboard → NodeMCU (Because our group doesn't have jumper cable Female to Female, so we use breadboard to link Buzzer with NodeMCU)

- Negative (-) → GND (NodeMCU)
- Positive (+) → D5 (GPIO14 NodeMCU)

- LCD 16X2 With I2C Module Configuration

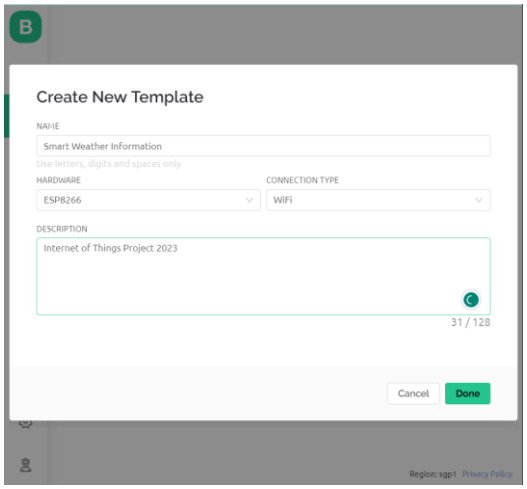


LCD → Breadboard ← NodeMCU (Because our group doesn't have jumper Female to Female, so we use breadboard to link LCD with NodeMCU)

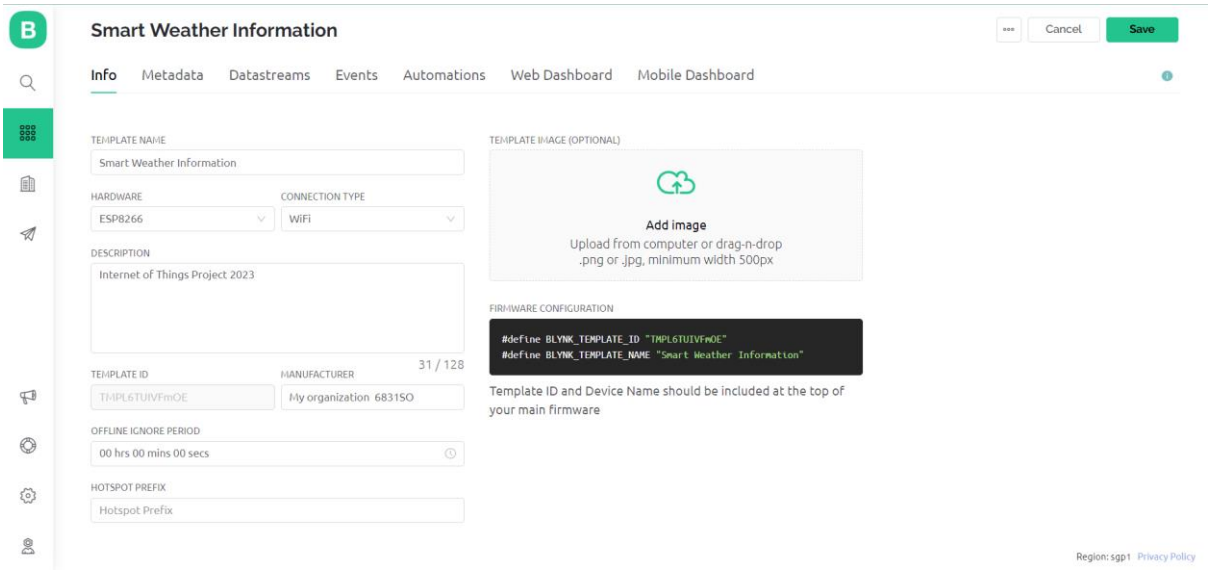
- GND → (-) Breadboard ← GND (NodeMCU)
- VCC → (+) Breadboard ← 5V (NodeMCU)
- SDA → Breadboard ← D2 (SDA Pin NodeMCU)
- SCL → Breadboard ← D1 (SCL Pin NodeMCU)

c. Blynk App Configuration

- First make configuration in Web App Blynk
- Create Project Template

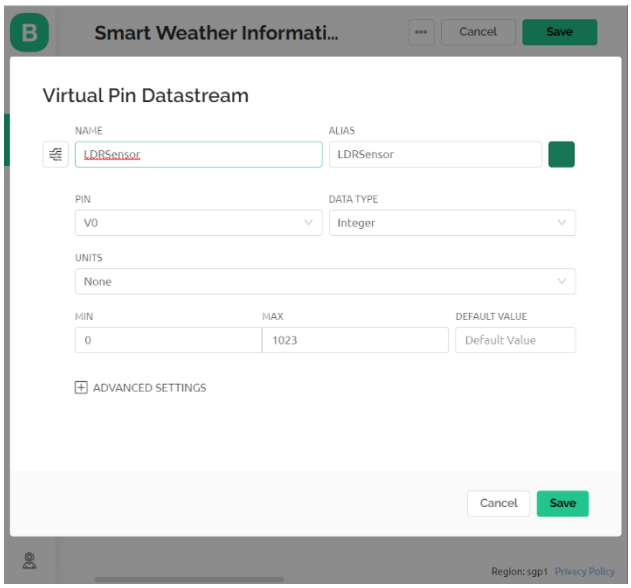


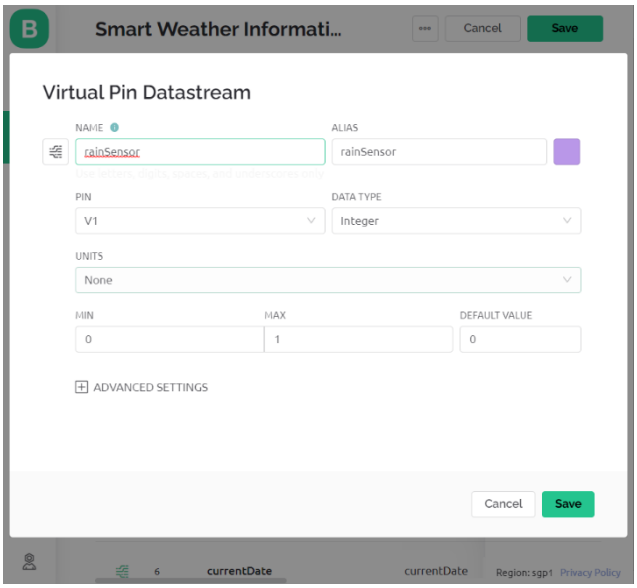
- Click done

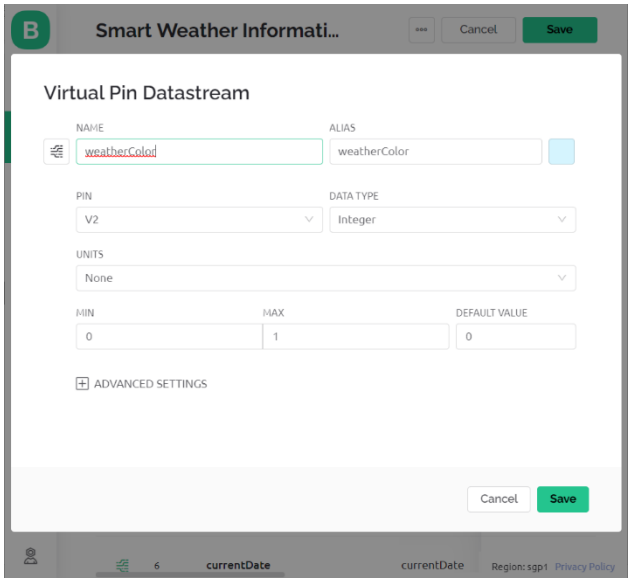


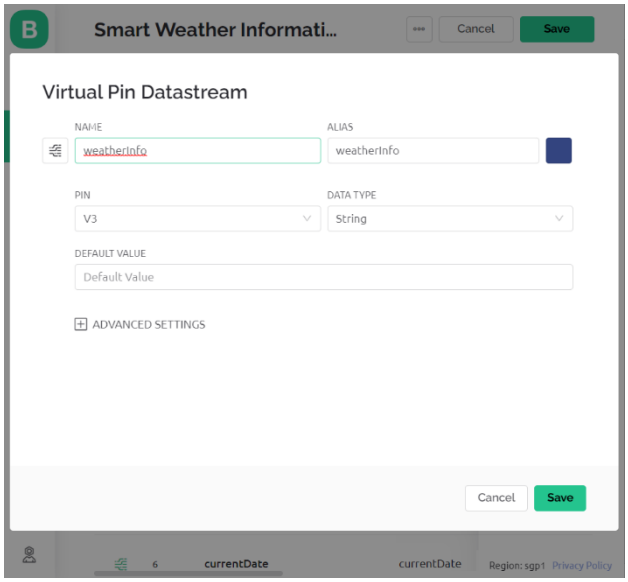
- Click Datastreams → New Datastream → VirtualPin

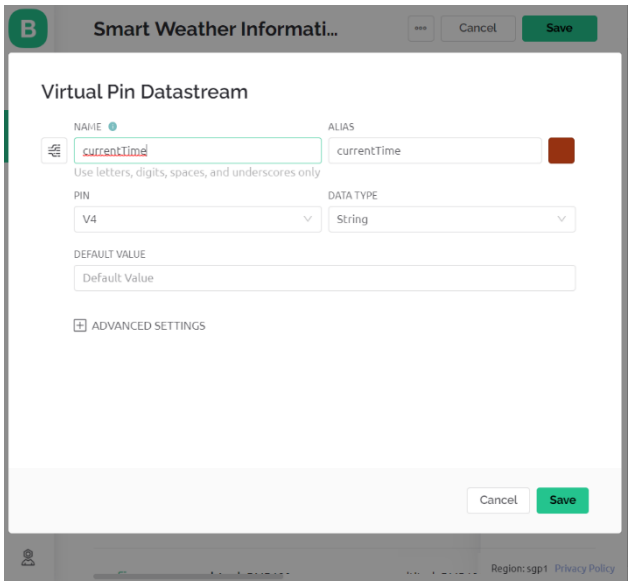
  Datastream is an important platform component that allows to configure the way data is sent between the device and Blynk.Cloud. We use virtual pin, so the data that we have will send to the pin that we configure for the sensor.

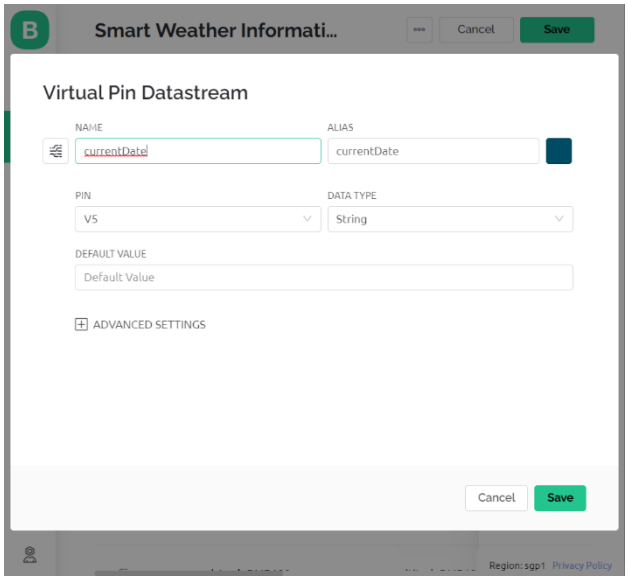


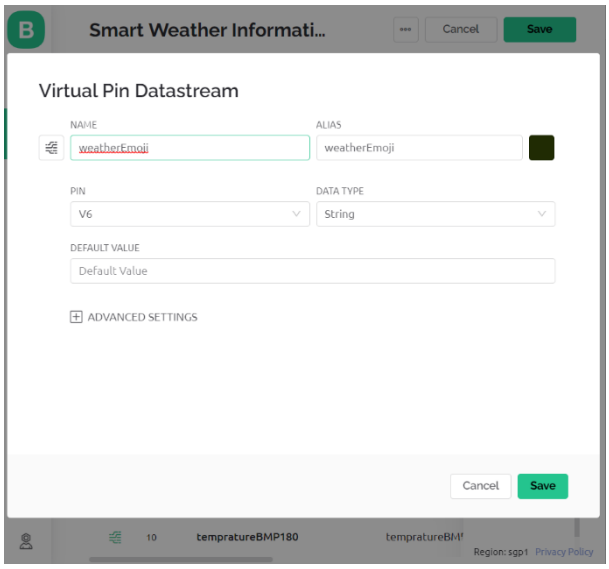


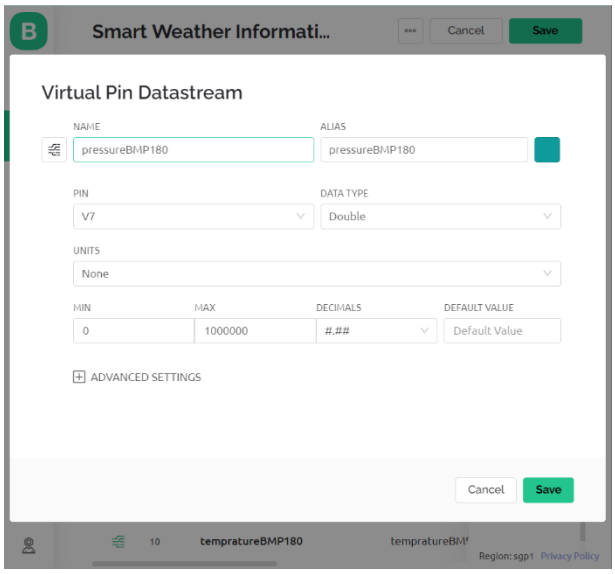

Smart Weather Informati...
Cancel
Save
Virtual Pin Datastream
NAME
weatherColor
ALIAS
weatherColor
PIN
V2
DATA TYPE
Integer
UNITS
None
MIN
0
MAX
1
DEFAULT VALUE
0
ADVANCED SETTINGS
Cancel
Save
currentDate
Region: sgp1
Privacy Policy

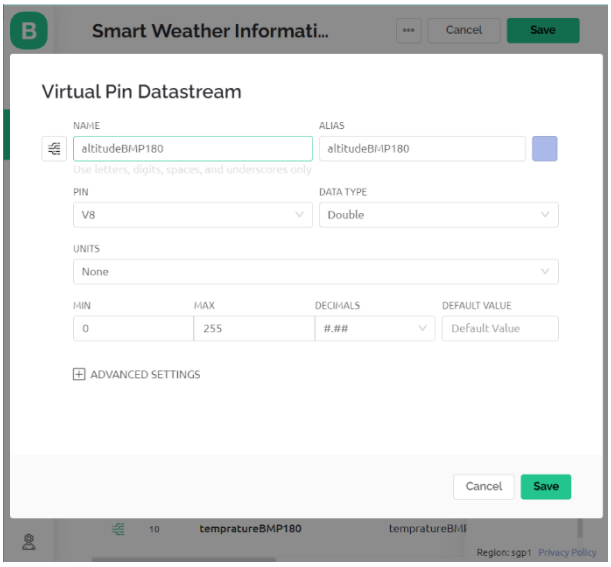

Smart Weather Informati...
Cancel
Save
Virtual Pin Datastream
NAME
weatherInfo
ALIAS
weatherInfo
PIN
V3
DATA TYPE
String
DEFAULT VALUE
Default Value
ADVANCED SETTINGS
Cancel
Save
currentDate
Region: sgp1
Privacy Policy

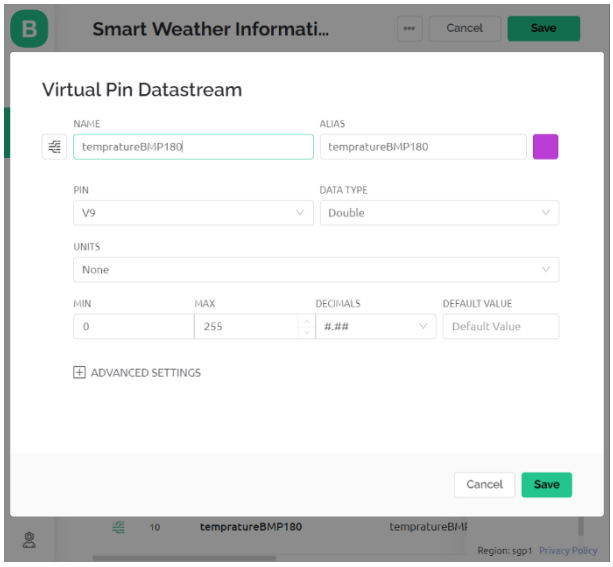

Smart Weather Informati...
Cancel
Save
Virtual Pin Datastream
NAME
currentTime
ALIAS
currentTime
Use letters, digits, spaces, and underscores only
PIN
V4
DATA TYPE
String
DEFAULT VALUE
Default Value
ADVANCED SETTINGS
Cancel
Save
Region: sgp1
Privacy Policy


Smart Weather Informati...
Cancel
Save
Virtual Pin Datastream
NAME
currentDate
ALIAS
currentDate
PIN
V5
DATA TYPE
String
DEFAULT VALUE
Default Value
ADVANCED SETTINGS
Cancel
Save
Region: sgp1
Privacy Policy

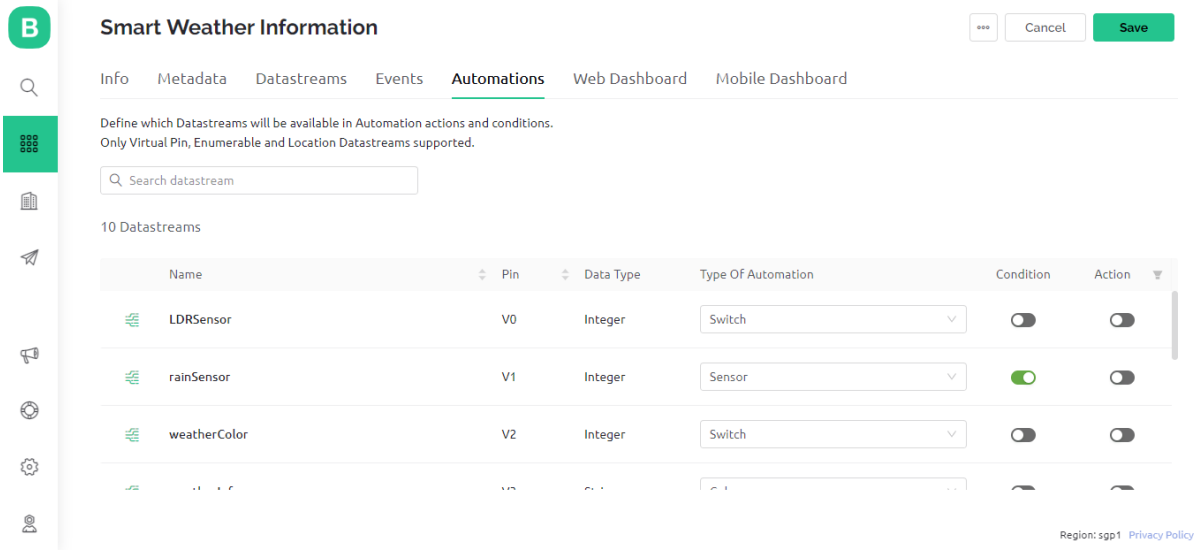

Smart Weather Informati...
Cancel
Save
Virtual Pin Datastream
NAME
weatherEmoji
ALIAS
weatherEmoji
PIN
V6
DATA TYPE
String
DEFAULT VALUE
Default Value
ADVANCED SETTINGS
Cancel
Save
temprature BMP180
Region: sgp1
Privacy Policy


Smart Weather Informati...
Cancel
Save
Virtual Pin Datastream
NAME
pressureBMP180
ALIAS
pressureBMP180
PIN
V7
DATA TYPE
Double
UNITS
None
MIN
0
MAX
1000000
DECIMALS
#.##
DEFAULT VALUE
Default Value
ADVANCED SETTINGS
Cancel
Save
temprature BMP180
Region: sgp1
Privacy Policy

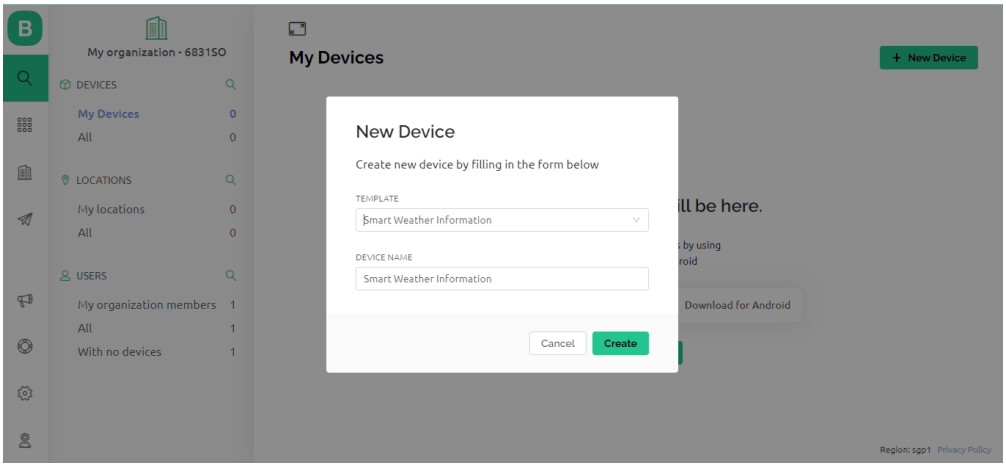


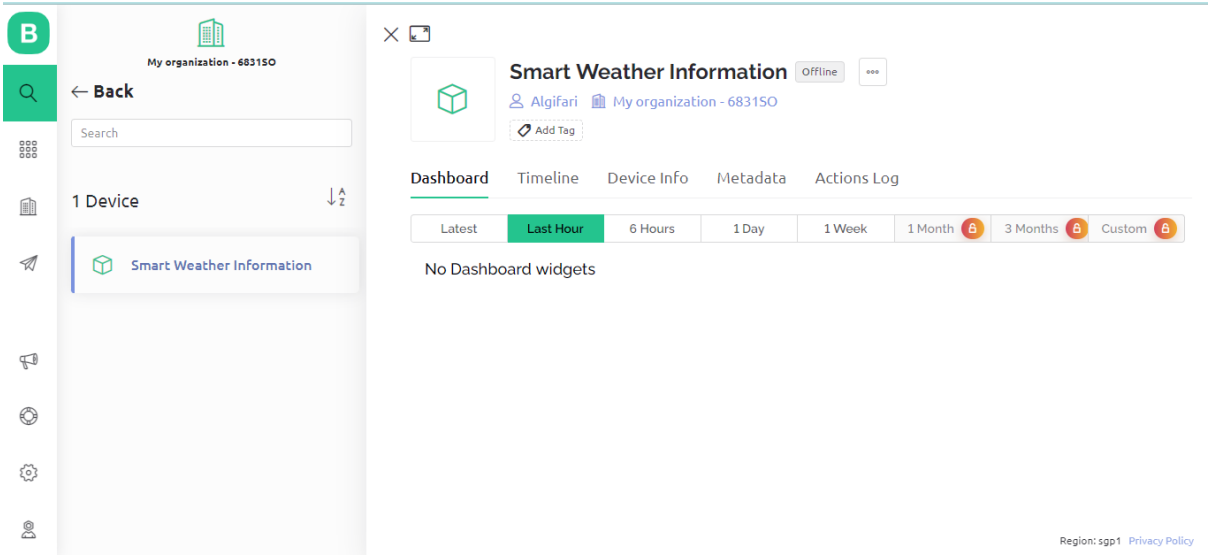


- After that Click the Automation. Automation is for show the notification
- Change Type of Automation to Sensor and the condition to on



- After that we go to search and klik Device and create device from the template that we already created before.





- In Device Info we can copy the FIRMWARE CONFIGURATION to our Code.

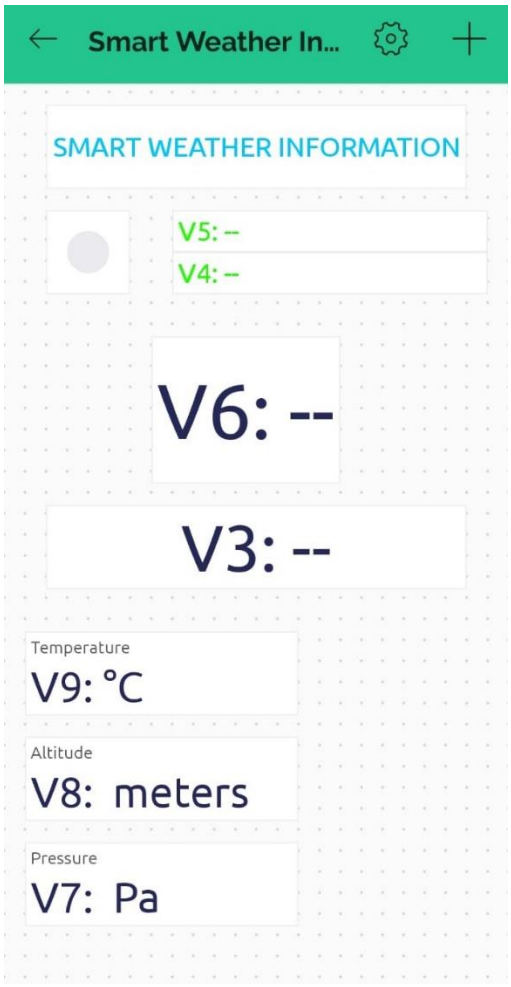
FIRMWARE CONFIGURATION

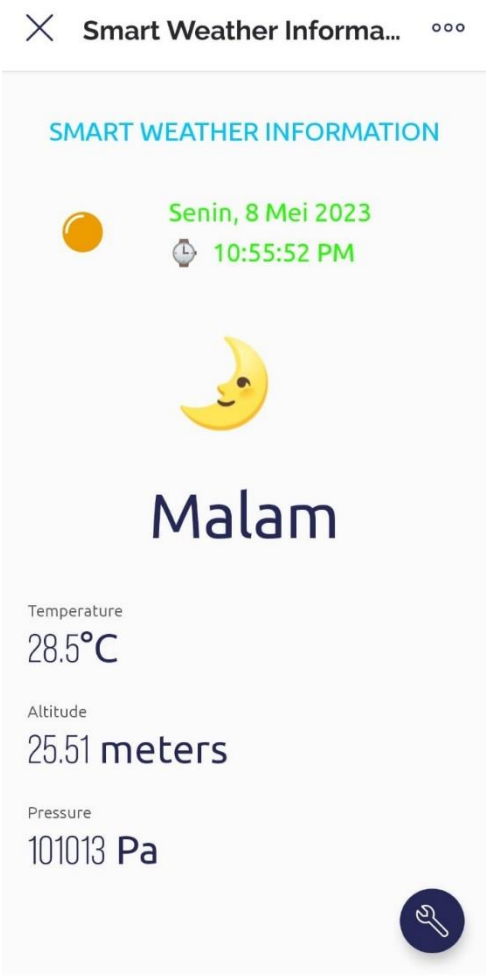
```
#define BLYNK_TEMPLATE_ID
"TMPL6TUIVFmOE"
#define BLYNK_TEMPLATE_NAME "Smart
Weather Information"
#define BLYNK_AUTH_TOKEN
"l7XFtoHgLFv3Z5nyRnsWw6zwAHdhUZKW"
```

Template ID, Device Name, and AuthToken should be declared at the very top of the firmware code.

- Copy the firmware configuration (Blynk) above to the code (Arduino IDE)

- After that we make configuration of UI Blynk App in Smartphone





III. Sketch

a. Code Development

- Morning Condition

```
//Weather Info
// Morning, 00:00 AM sd 09:59 AM
if((hour() >= 0)&&(hour() < 10))
{
  if(rainSensorDigital==true) // Not Raining
  {

    if(ldrSensorAnalog <=349) //if the brightness is less than or equal 349
    {
      weatherInfo = "Sunny Morning"; //set the weather info to sunny morning
      Blynk.setProperty(V2, "color", "BLYNK_YELLOW"); //set a button wheather info to yellow
      Blynk.virtualWrite(V3, weatherInfo); //send and display weather info in v3 data
      Blynk.virtualWrite(V6, "\xF0\x9F\x8C\x9E "); //Unicode (UTF-8) Character for
    }
    if((ldrSensorAnalog >=350)&&(ldrSensorAnalog <=449)) //if the brightness is between 350 and 449
    {
      buzzer(); //set buzzer active
      weatherInfo = "Cloudy Morning"; //set the weather info to cloudy morning
      Blynk.setProperty(V2, "color", "#A4A4A4"); //set a button weather info to grey
      Blynk.virtualWrite(V3, weatherInfo); //send and display weather info in V3 data
      Blynk.virtualWrite(V6, "\xE2\x9B\x85 "); //Unicode (UTF-8) Character for
    }
    if(ldrSensorAnalog >=450) //if the brightness is greater than equal 450
    {
      buzzer(); //set buzzer active
      weatherInfo = "Dark Morning"; //set the weather info to dark morning
      Blynk.setProperty(V2, "color", "#000000"); //set a button weather info to black
      Blynk.virtualWrite(V3, weatherInfo); //send and display weather info in V3 data
      Blynk.virtualWrite(V6, "\xE2\x98\x81 "); //Unicode (UTF-8) Character for
    }
  }
```

```
  else //Raining
  {
    buzzer(); //set buzzer active
    weatherInfo = "Rainy Morning"; //set the weather info to rainy morning
    Blynk.virtualWrite(V3, weatherInfo); //send and display weather info in V3 data
    Blynk.virtualWrite(V6, "\xE2\x98\x94 "); //Unicode (UTF-8) Character for
    if(ldrSensorAnalog <=349) //if the brightness is less than or equal 349
    {
      Blynk.setProperty(V2, "color", BLYNK_YELLOW); //set a button wheather info to yellow
    }
    if((ldrSensorAnalog >=350)&&(ldrSensorAnalog <=449)) //if the brightness between 350 and 449
    {
      Blynk.setProperty(V2, "color", "#A4A4A4"); //set a button wheather info to grey
    }
    if(ldrSensorAnalog >=450) //if the brightness is greater than equal 450
    {
      Blynk.setProperty(V2, "color", "#000000"); //set a button wheather info to black
    }
  }
}
```

- Afternoon Condition

```
// Afternoon, 10:00 AM sd 05:59 PM
if((hour() >= 9)&&(hour() < 18))
{
  if(rainSensorDigital==true) // Not Raining
  {
    if(ldrSensorAnalog <=249) //if the brightness is greater than equal 249
    {
      weatherInfo = "Sunny Afternoon"; //set the weather info to sunny afternoon
      Blynk.setProperty(V2, "color", BLYNK_YELLOW); //set a button wheather info to yellow
      Blynk.virtualWrite(V3, weatherInfo); //display weather info in V3 data
      Blynk.virtualWrite(V6, "\xE2\x98\x80 "); //Unicode (UTF-8) Character for ☀
    }
    if((ldrSensorAnalog >=250)&&(ldrSensorAnalog <=449)) //if the brightness between 250 and 449
    {
      buzzer(); //set buzzer active
      weatherInfo = "Cloudy Afternoon"; //set the weather info to cloudy afternoon
      Blynk.setProperty(V2, "color", "#A4A4A4"); //set a button wheather info to grey
      Blynk.virtualWrite(V3, weatherInfo); //send and display weather info in V3 data
      Blynk.virtualWrite(V6, "\xE2\x9B\x85 "); //Unicode (UTF-8) Character for ⛅
    }
    if(ldrSensorAnalog >=450) //if the brightness greater than 450
    {
      buzzer(); //set buzzer active
      weatherInfo = "Dark Afternoon"; //set the weather info to dark afternoon
      Blynk.setProperty(V2, "color", "#000000"); //set a button wheather info to black
      Blynk.virtualWrite(V3, weatherInfo); //send and display weather info in V3 data
      Blynk.virtualWrite(V6, "\xE2\x98\x81 "); //Unicode (UTF-8) Character for ☁
    }
  }
```

```
  else //Raining
  {
    buzzer();  //set buzzer active
    weatherInfo = "Rainy Afternoon"; //set the weather info to Rainy Afternoon
    Blynk.virtualWrite(V3, weatherInfo); //send and display weather info in V3 data
    Blynk.virtualWrite(V6, "\xE2\x98\x94 "); //Unicode (UTF-8) Character for ☔
    if(ldrSensorAnalog <=249) //if the brightness is greater than equal 249
    {
      Blynk.setProperty(V2, "color", BLYNK_YELLOW); //set a button wheather info to yellow
    }
    if((ldrSensorAnalog >=250)&&(ldrSensorAnalog <=449)) ////if the brightness between 250 and 449
    {
      Blynk.setProperty(V2, "color", "#A4A4A4"); //set a button wheather info to grey
    }
    if(ldrSensorAnalog >=450) //if the brightness greater than 450
    {
      Blynk.setProperty(V2, "color", "#000000"); //set a button wheather info to black
    }
  }
}
```

- Evening Condition

```
// Evening, 06:00 PM sd 11:59 PM
if((hour() >= 18)&&(hour() < 24))
{
  if(rainSensorDigital==true) // Not Raining
  {
    weatherInfo = "Evening"; //set the weather info to Evening
    Blynk.setProperty(V2, "color", "#000000"); //set a button wheather info to black
    Blynk.virtualWrite(V3, weatherInfo); //send and display weather info in V3 data
    Blynk.virtualWrite(V6, "\xF0\x9F\x8C\x9B "); //Unicode (UTF-8) Character for 
  }
  else //Raining
  {
    buzzer(); //set buzzer active
    weatherInfo="Rainy Evening"; //set the weather info to Rainy Evening
    Blynk.virtualWrite(V3, weatherInfo); //send and display weather info in V3 data
    Blynk.virtualWrite(V6, "\xE2\x98\x94 "); //Unicode (UTF-8) Character for 
    if(ldrSensorAnalog >= 0) //if the brightness greater than or equal 0
    {
      Blynk.setProperty(V2, "color", "#000000"); //set a button wheather info to black
    }
  }
}
```

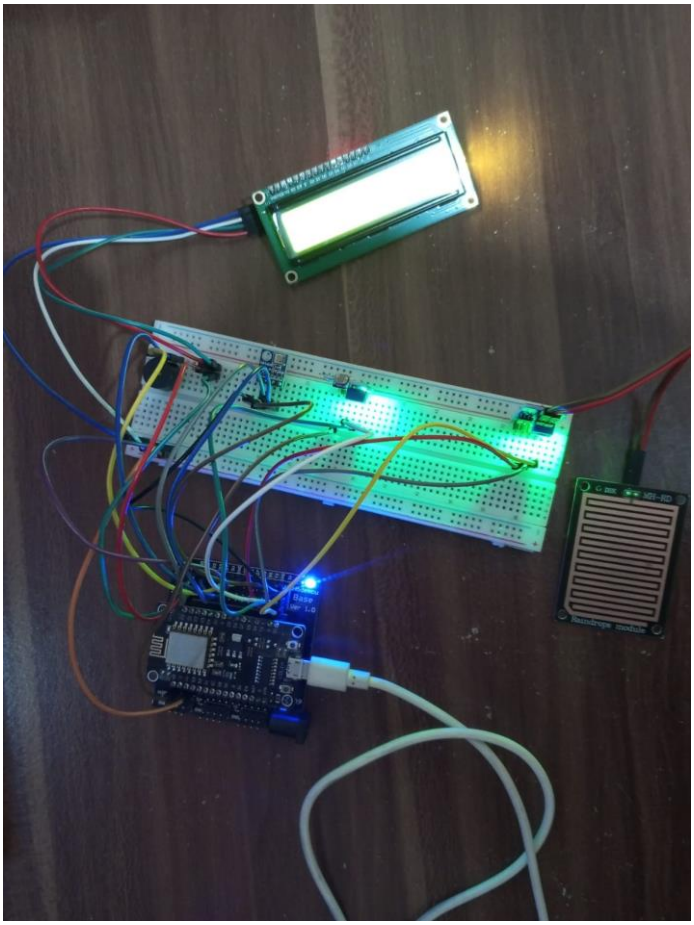
- Send The Data

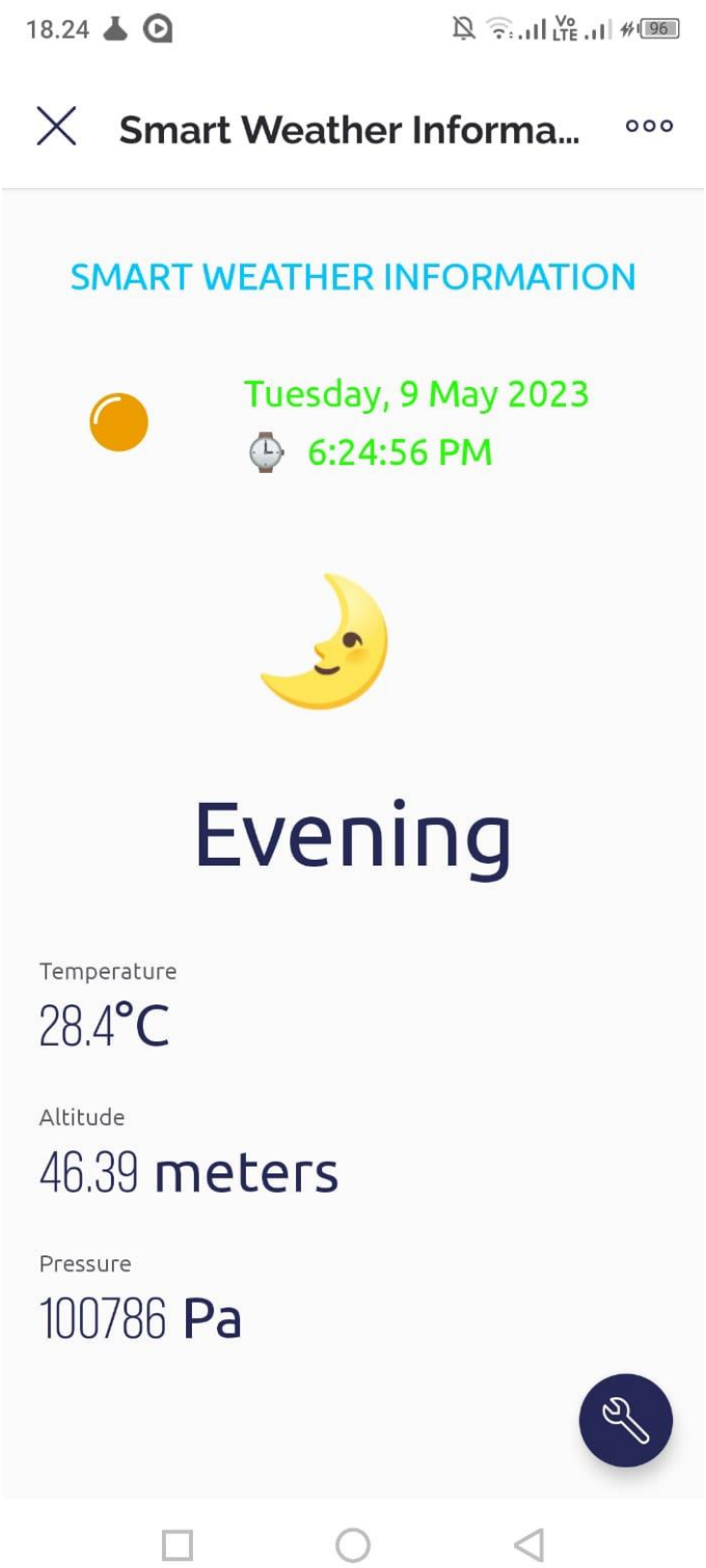
```
//send and display data values to virtual pins in the blynk app
Blynk.virtualWrite(V0, ldrSensorAnalog);
Blynk.virtualWrite(V1, rainSensorDigital);
Blynk.virtualWrite(V2, colorStation);
Blynk.virtualWrite(V4,"\xE2\x8C\x9A  ", currentTime);
Blynk.virtualWrite(V5, currentDate);
Blynk.virtualWrite(V7, bp);
Blynk.virtualWrite(V8, ba);
Blynk.virtualWrite(V9, bt);
```

- Below is the link for full code
  https://drive.google.com/file/d/12rlyKNOU-s3OsbTnA6gaqThDWTYmPJTH/view?usp=share_link

IV. Result

a. Photos of The Project





b. Video Demo Project
https://drive.google.com/file/d/1DVcV2LiFRu9CFhByelYMC9EXFa7o4kDH/view?usp=share_link

V. Worklog

- Algifari, Aarclaine, Hebrew → Make a Schematic of Wire Configuration
- Algifari, Ricky → Develop the code
- Algifari → Create the Report