Project Report

Soil Moisture controlling device

Introduction:

The Internet of Things (IoT) is a network of physical devices, vehicles, home appliances, and other objects embedded with electronics, software, sensors, and connectivity, enabling these objects to collect and exchange data. The IoT has the potential to transform every aspect of our lives, from the way we work to the way we live and play. At the heart of this transformation are sensors, which are small devices that can detect and measure physical phenomena, such as temperature, humidity, pressure, and motion.

Sensors are the building blocks of the IoT, providing the data that makes it possible for objects and devices to become smart and interconnected. There are many types of sensors, ranging from simple temperature sensors to complex environmental sensors that can measure a wide range of physical parameters. Some sensors are designed to detect specific phenomena, such as the presence of toxic gases, while others are more general-purpose, such as motion sensors.

One of the key benefits of sensors is that they can provide real-time data about the environment around us. For example, temperature sensors can detect changes in temperature, allowing for the automatic adjustment of heating and cooling systems. Similarly, motion sensors can detect movement, allowing for the automatic activation of lights or other devices. These capabilities not only make our lives more convenient but can also help to conserve energy and reduce costs.

Soil moisture:

Measuring soil moisture is very important in agriculture for several reasons:

- **Plant growth: Soil moisture directly affects plant growth and crop yields. Plants require a certain amount of water to grow, and if the soil is too dry or too wet, plant growth can be stunted or even completely inhibited. Measuring soil moisture helps farmers determine when to irrigate their crops and how much water to apply.**
- **Water management: Measuring soil moisture is crucial for efficient water management. By monitoring soil moisture levels, farmers can avoid over- or under-irrigation, which can waste water, damage crops, and increase costs.**
- **Nutrient availability: Soil moisture affects the availability of nutrients in the soil. When the soil is too dry, nutrients may become concentrated and unavailable to plants. On the other hand, when the soil is too wet, nutrients may leak away. Measuring soil moisture helps farmers ensure that nutrients are available to plants when they need them.**
- **Disease prevention: Soil moisture affects the growth of disease-causing organisms in the soil. Measuring soil moisture helps farmers identify conditions that are conducive to disease growth and take preventative measures, such as adjusting irrigation schedules or using fungicides.**

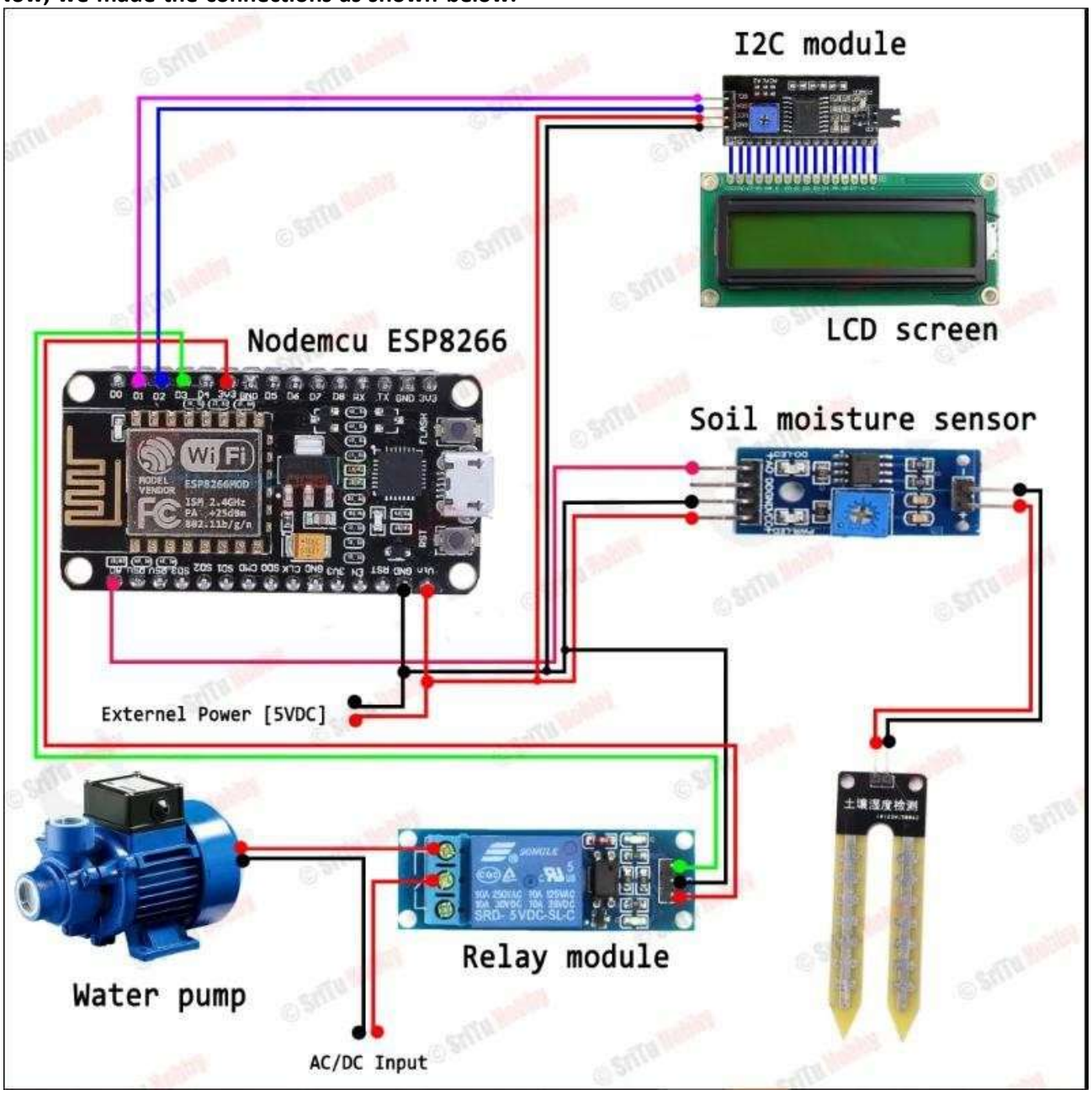
Overall, measuring soil moisture is an essential part of modern agriculture. By monitoring soil moisture levels, farmers can make informed decisions about water management, nutrient management, and disease prevention, which can help maximize crop yields, reduce costs, and promote sustainability.

Procedure:

The components we have used for the project are

- **Node MCU- ESP8266**
- **Breadboard**
- **Relay module- A relay module is an electronic device that is used to control the flow of electrical current. It is commonly used in a variety of applications, such as home automation, industrial automation, and robotics. The main purpose of a relay module is to control high voltage, high current devices using low voltage, low current signals.**
- **Submersible water pump**
- **Soil moisture sensor**
- **Jumper wires**

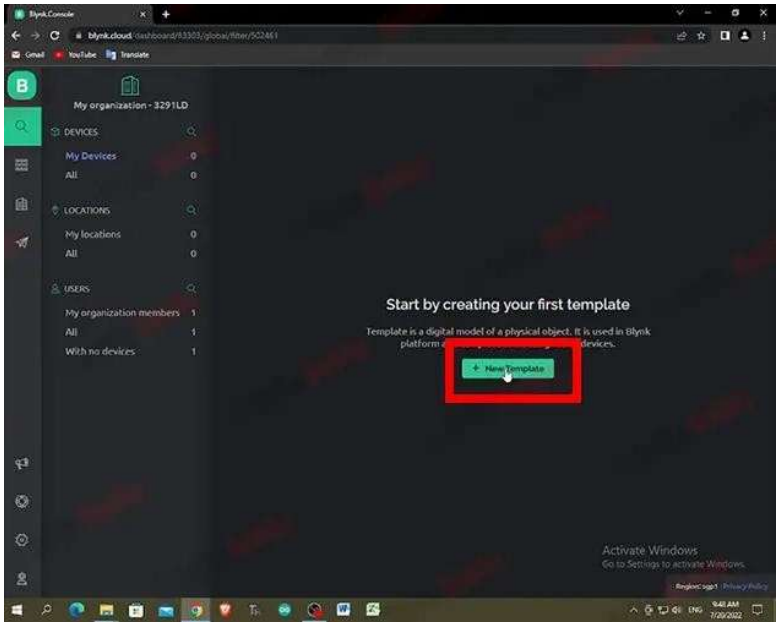
Now, we made the connections as shown below.

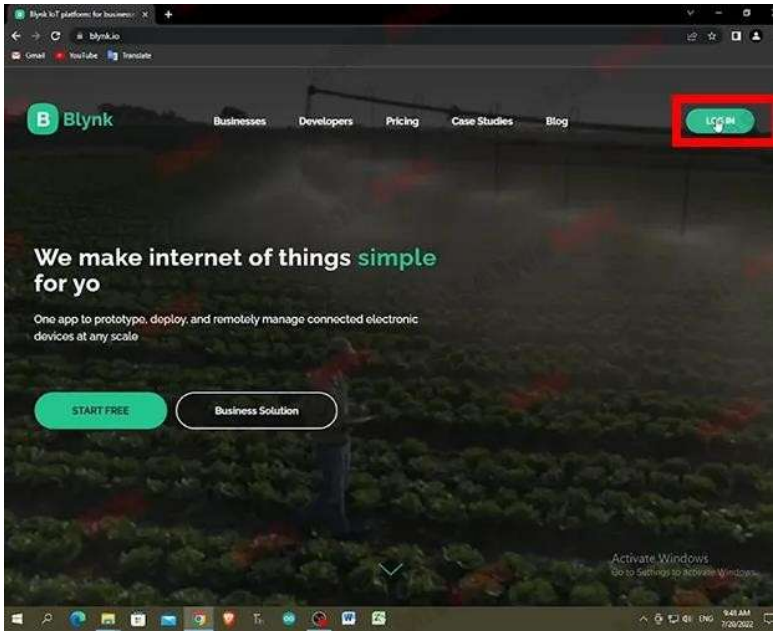


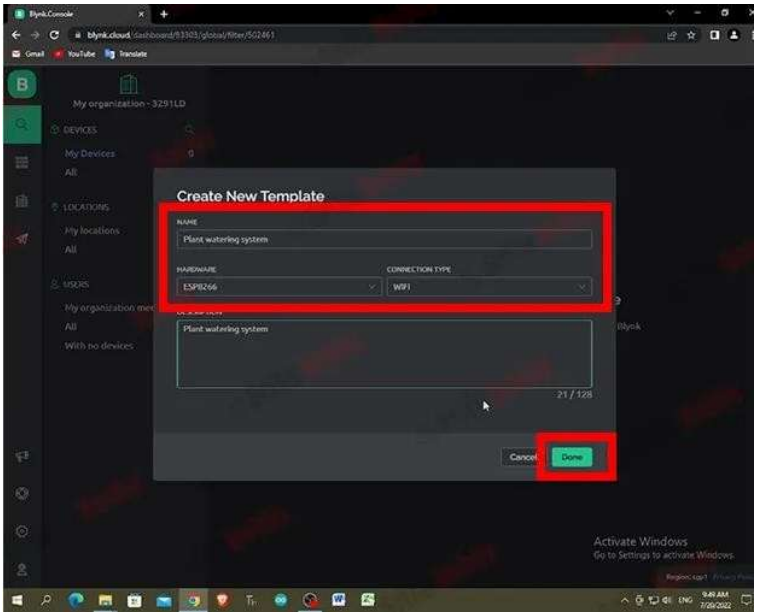
Step 1

Now, let's create the Blynk web dashboard for this project. For that, follow the steps below

First, go to the Blynk website and create a new account using your Gmail address. And then, sign in to your account and click the new Template button. Next, enter your project name as you like and click the done button.



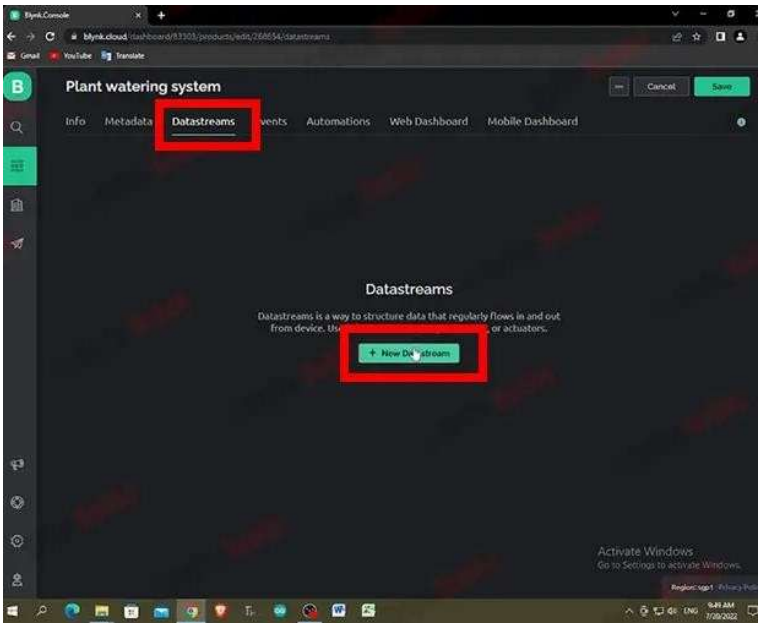


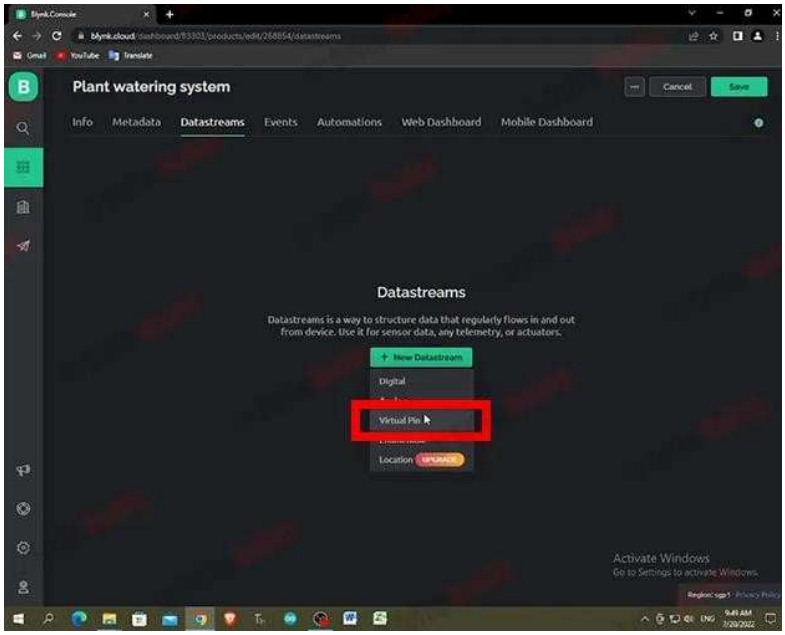


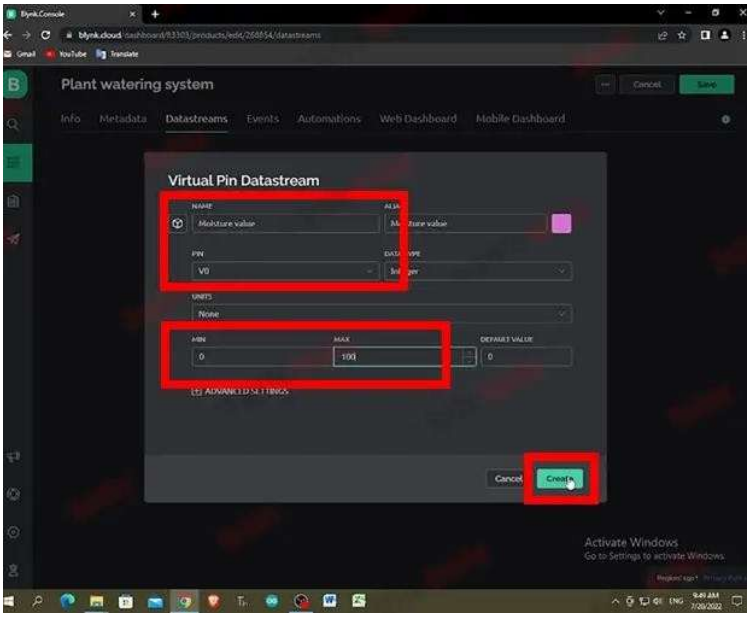
Now, click the “Datastreams” tab and create two data streams for that. Use the information below.

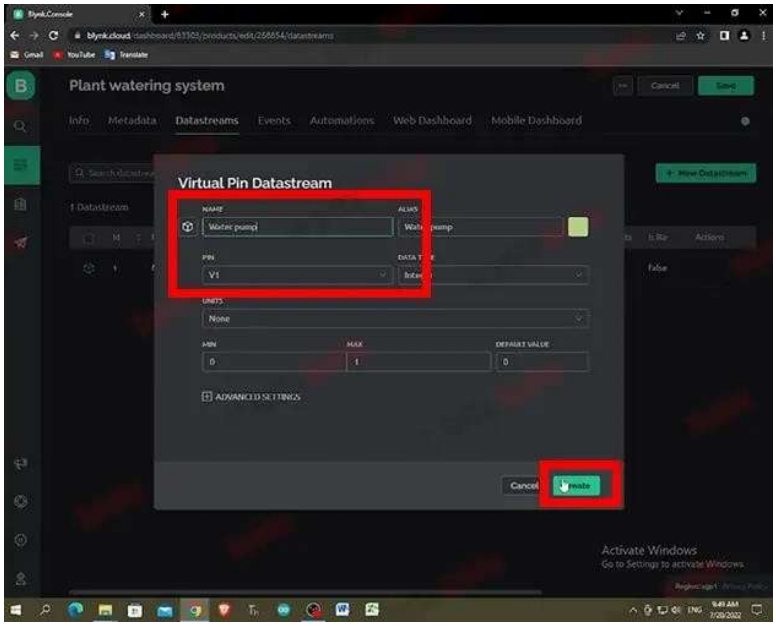
Virtual PIN –> Name – Moisture value / PIN — V0 / MIN — 0 / MAX — 100

Virtual PIN –> Name – Water pump / PIN — V1 / MIN — 0 / MAX — 1

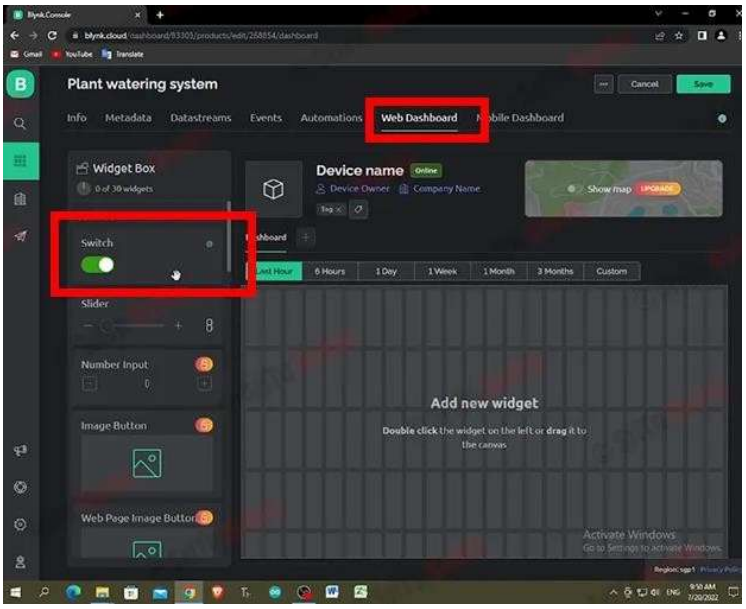


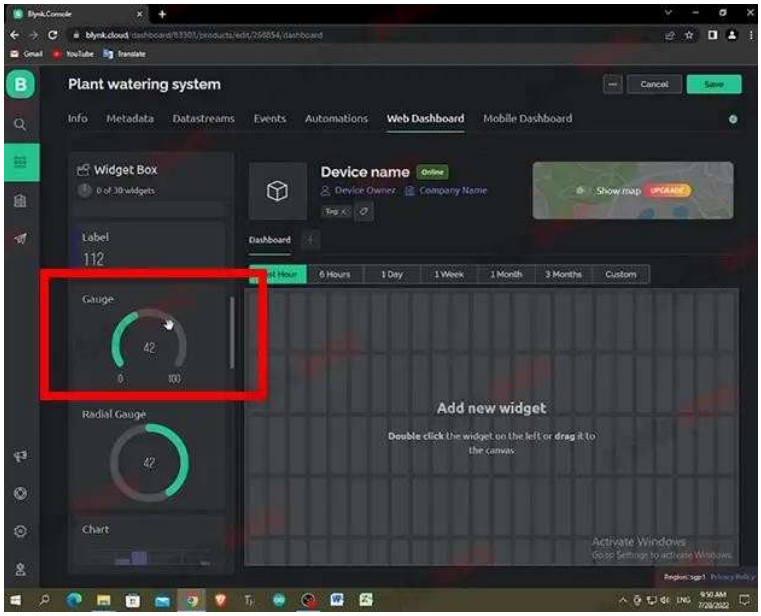

Plant watering system
Cancel
Save
Info
Metadata
Datastreams
Events
Automations
Web Dashboard
Mobile Dashboard
Datastreams
Datastreams is a way to structure data that regularly flows in and out from device. Use it for sensor data, any telemetry, or actuators.
+ New Datastream
Digital
Virtual Pin
Location
UPGRADE
Activate Windows
Go to Settings to activate Windows.

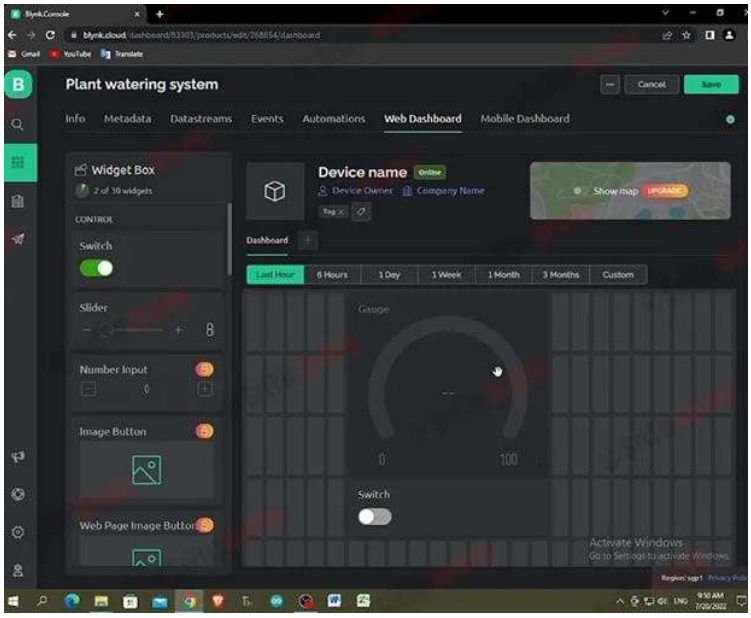

Plant watering system
Info
Metadata
Datastreams
Events
Automations
Web Dashboard
Mobile Dashboard
Virtual Pin Datastream
NAME
Moisture value
PIN
V0
UNITS
None
MIN
0
MAX
100
DEFAULT VALUE
0
ADVANCED SETTINGS
Cancel
Create
Activate Windows
Go to Settings to activate Windows.



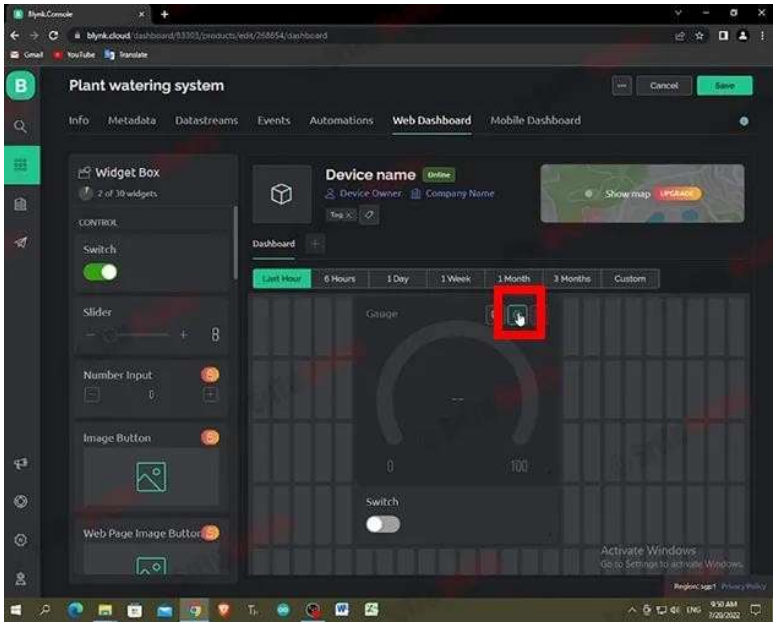
Next, click the "Web dashboard" tab and include the one button and one Gauge widget to the dashboard. And then, arrange these widgets as you like.

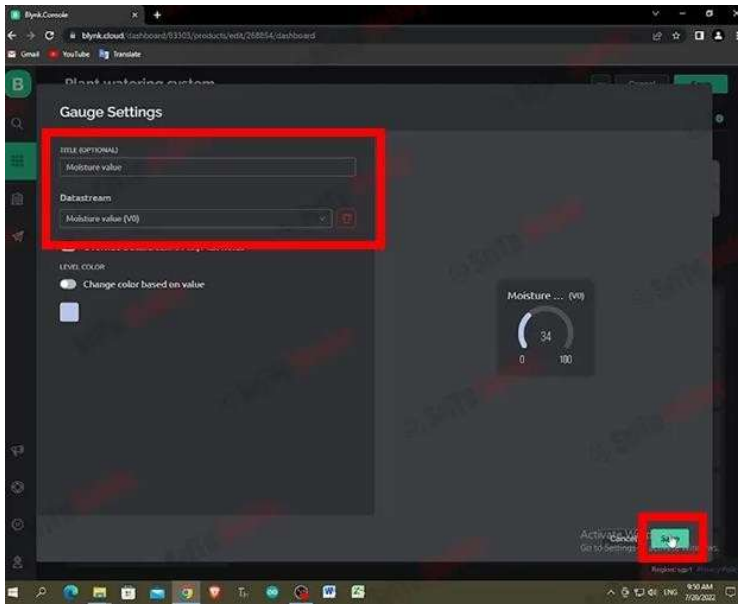


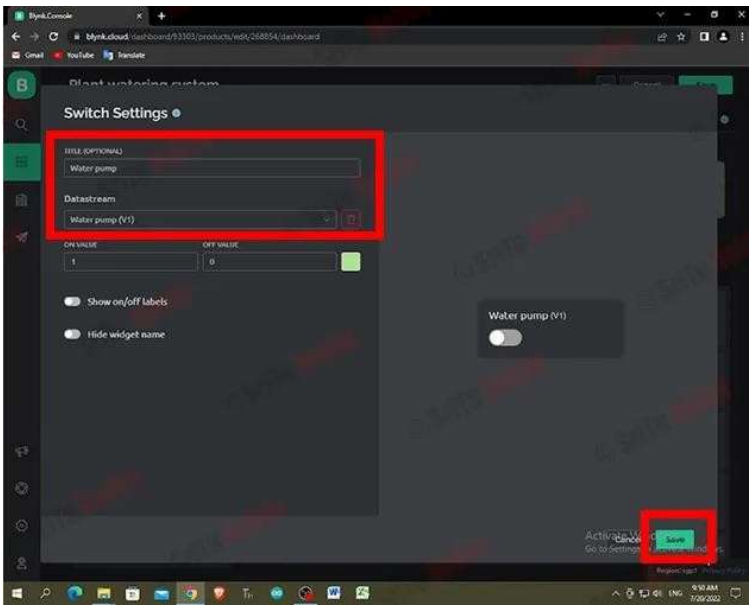


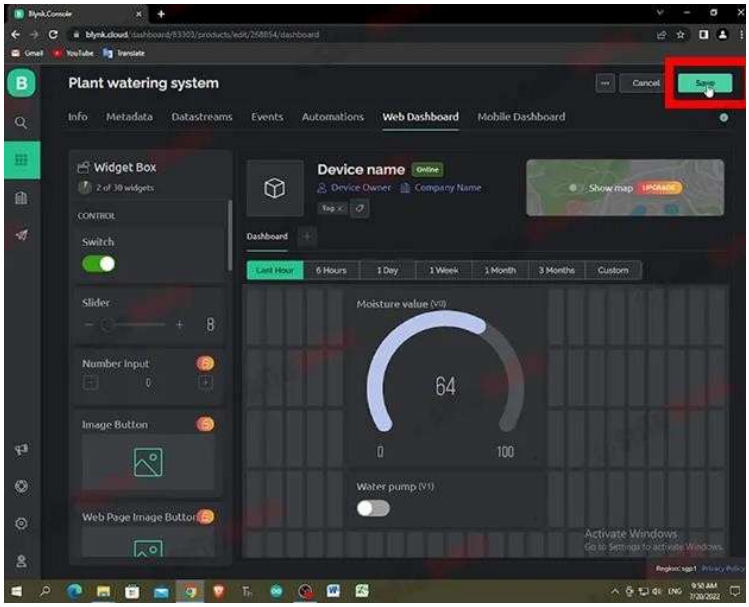


Now, click the one-by-one settings buttons on these widgets and select the data streams we created earlier. After, click the save button.

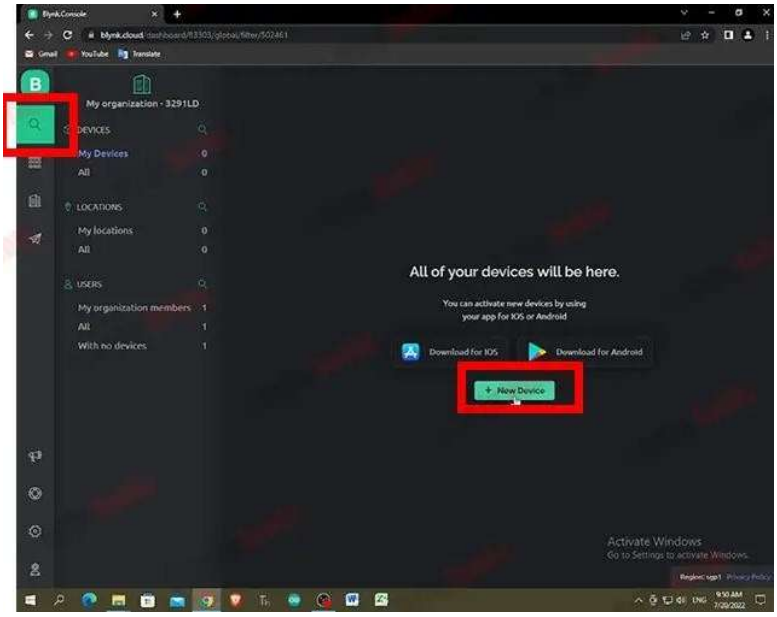

Plant watering system
Cancel
Save
Info
Metadata
Datastreams
Events
Automations
Web Dashboard
Mobile Dashboard
Widget Box
2 of 30 widgets
CONTROL
Switch
Slider
Number Input
Image Button
Web Page Image Button
Device name
Online
Device Owner
Company Name
Show map
UPGRADE
Dashboard
Last Hour
6 Hours
1 Day
1 Week
1 Month
3 Months
Custom
Gauge
0
100
Switch
Activate Windows

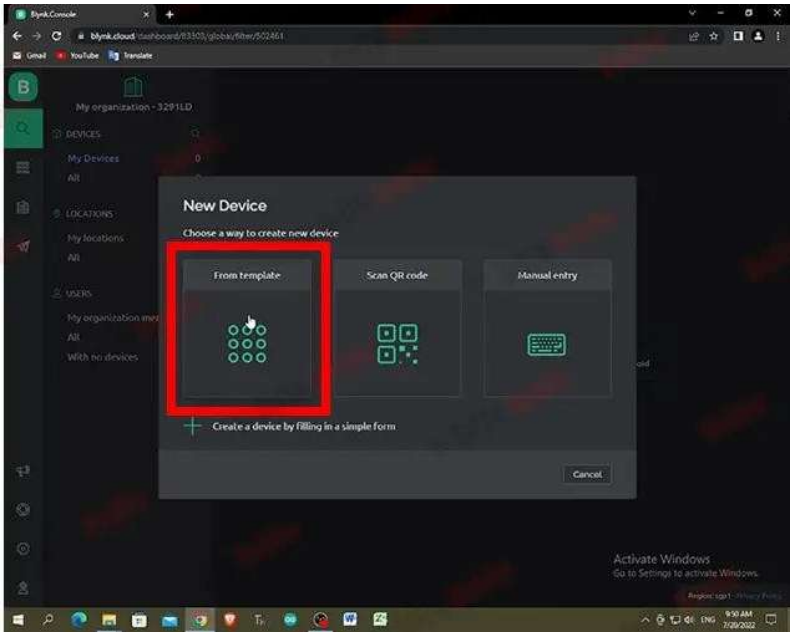

Gauge Settings
TITLE (OPTIONAL)
Moisture value
Datastream
Moisture value (V0)
LEVEL COLOR
Change color based on value
Moisture ... (V0)
34
0
100
Cancel

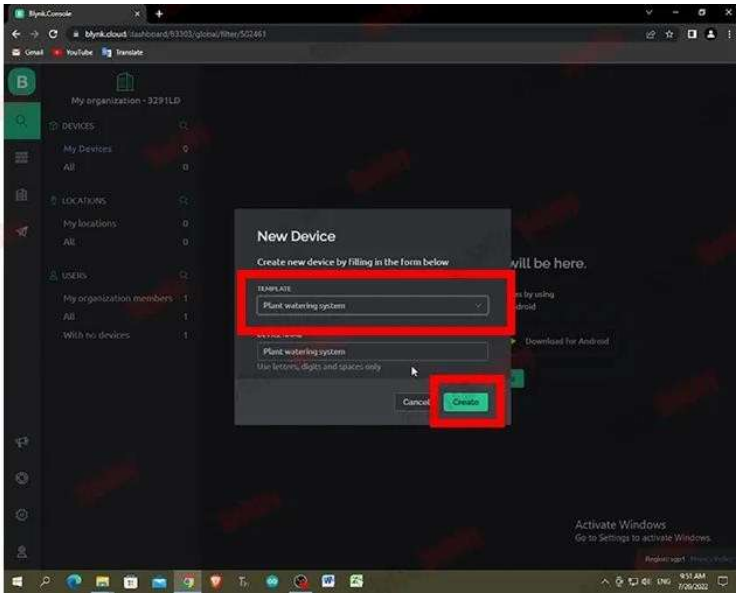

Switch Settings
TITLE (OPTIONAL)
Water pump
Datastream
Water pump (V1)
ON VALUE
1
OFF VALUE
0
Show on/off labels
Hide widget name
Water pump (V1)
Cancel
Save



Now, click the search icon button and create a "New device". For that, select the template you created earlier.







OK, the Blynk web dashboard has been created.

Step 2

Now, connect this project to the computer, and let's upload the program for this project. It's as follows.

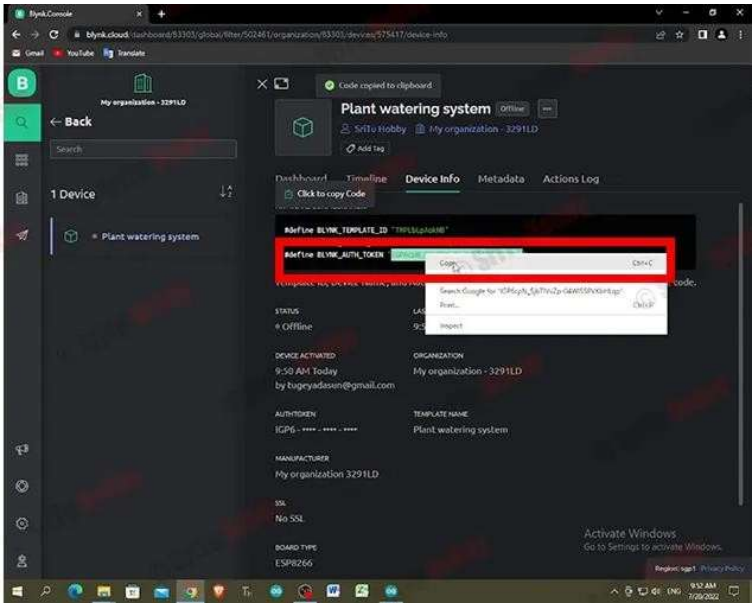
```
//Include the library files
#include <LiquidCrystal_I2C.h>
#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>

//Initialize the LCD display
```

```
LiquidCrystal_I2C lcd(0x27, 16, 2);

char auth[] = "";//Enter your Auth token
char  ssid[] = "";//Enter  your  WIFI name
char pass[] = "";//Enter your WIFI password

BlynkTimer timer;
bool Relay = 0;

//Define component pins
#define sensor A0
#define waterPump D3

void setup() {
  Serial.begin(9600);
  pinMode(waterPump,  OUTPUT);
  digitalWrite(waterPump,   HIGH);
  lcd.init();
  lcd.backlight();

  Blynk.begin(auth, ssid, pass, "blynk.cloud", 80);

  lcd.setCursor(1, 0);
  lcd.print("System Loading");
  for (int a = 0; a <= 15; a++) {
  lcd.setCursor(a, 1);
  lcd.print(".");
    delay(500);
  }
  lcd.clear();

  //Call the function
  timer.setInterval(100L, soilMoistureSensor);
```

```
}

//Get the button value
BLYNK_WRITE(V1) {
  Relay = param.asInt();

  if (Relay == 1) {
    digitalWrite(waterPump, LOW);
    lcd.setCursor(0, 1);
    lcd.print("Motor is ON ");
  } else {
    digitalWrite(waterPump, HIGH);
    lcd.setCursor(0, 1);
    lcd.print("Motor is OFF");
  }
}

//Get the soil moisture values
void soilMoistureSensor() {
  int value = analogRead(sensor);
  value = map(value, 0, 1024, 0, 100);
  value = (value - 100) * -1;

  Blynk.virtualWrite(V0, value);
  lcd.setCursor(0, 0);
  lcd.print("Moisture :");
  lcd.print(value);
  lcd.print(" ");

}

void loop() {
  Blynk.run();//Run the Blynk library
```

```
  timer.run();//Run the Blynk timer
}
```

Now, copy and paste the Blynk auth token. It's in the Blynk web dashboard.

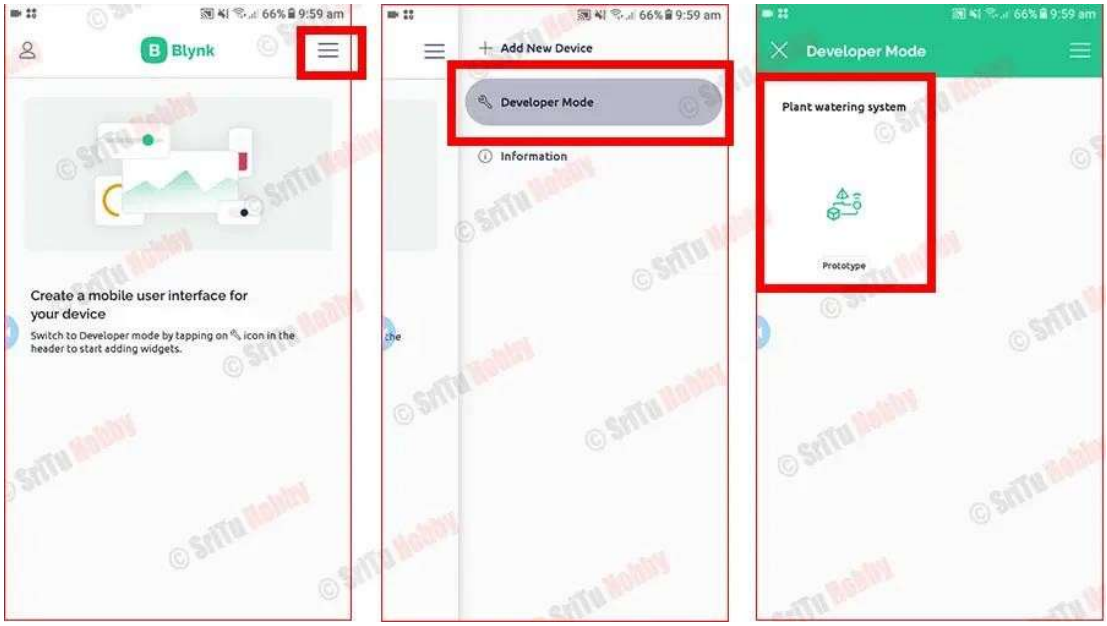


Next, enter your WIFI SSID and password. And then, select board and port. Finally, upload this code to the Nodemcu board.

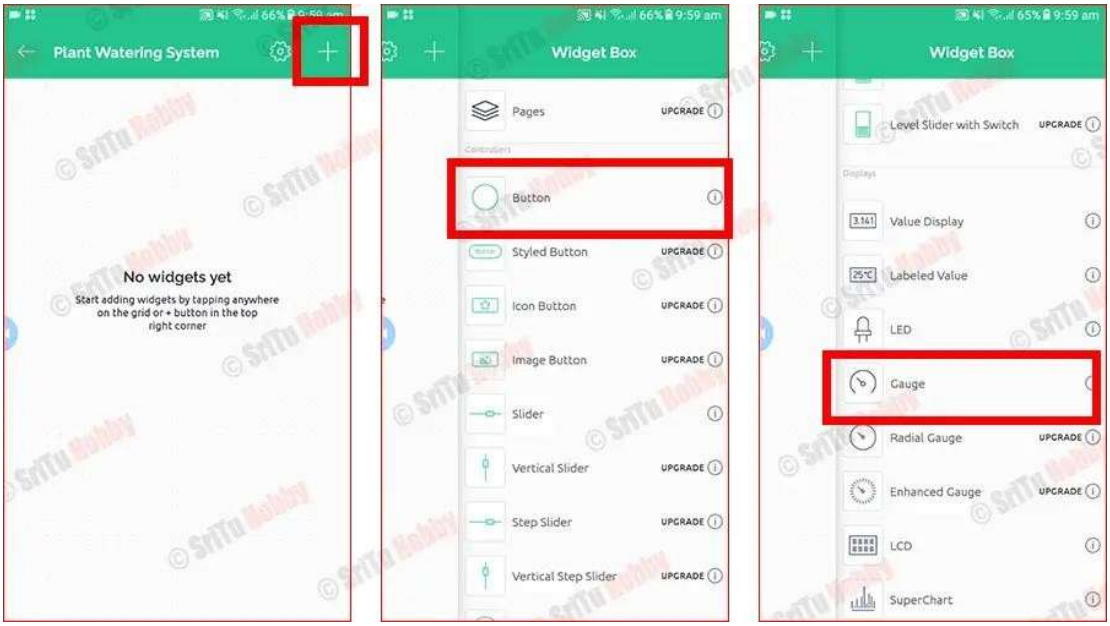
Step 3

Ok, now let's create the Blynk mobile dashboard. Follow the instructions for that.

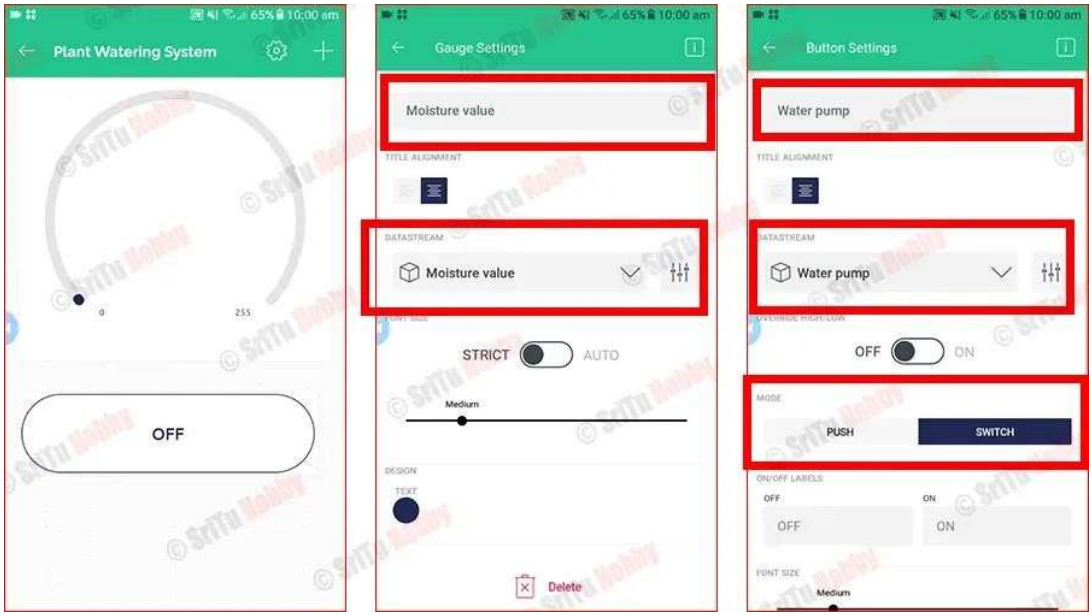
First, download and install the Blynk app on your phone. Then, sign in to your account and click the template you created in the Blynk web dashboard.



Now, add the widget to the dashboard. For that click the + icon at the top right corner. And then, add one button and one gauge widget to the dashboard.



After, arrange these widgets as you like. Now, click the one-by-one widget and select the data streams you created in the Blynk web dashboard.



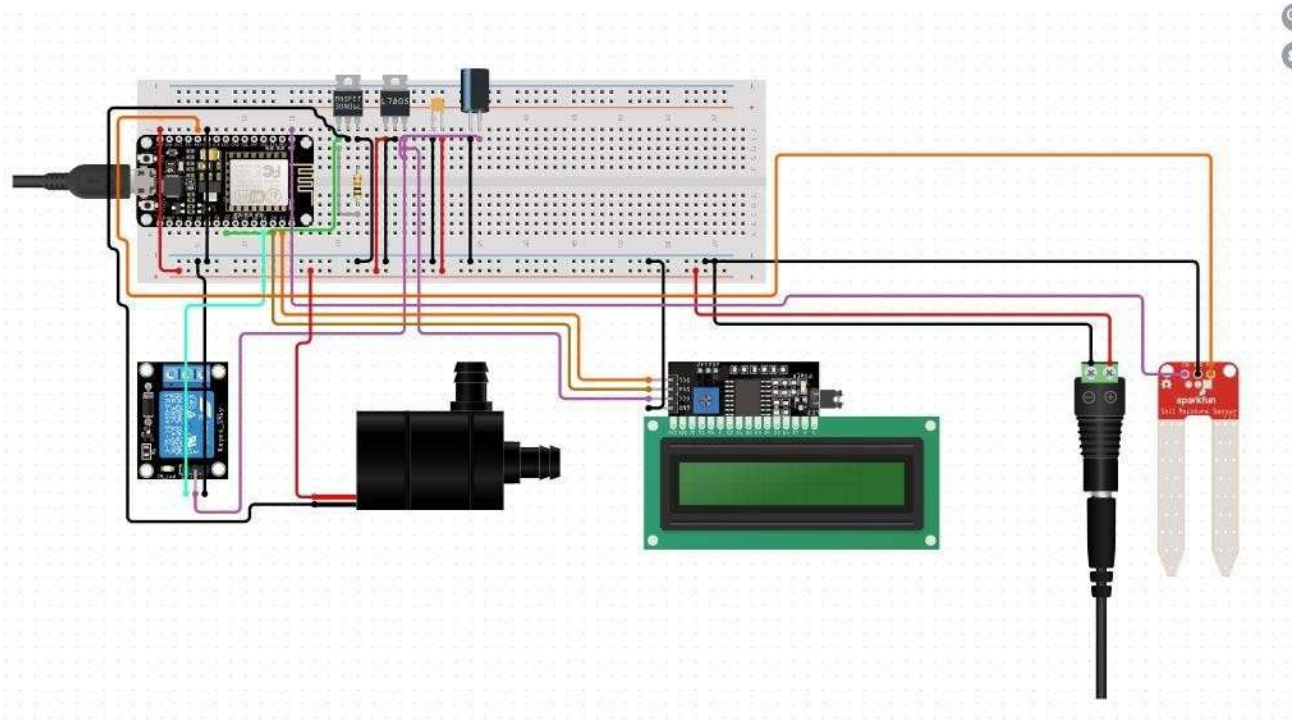
How to make a plant watering system with the Nodemcu ESp8266 board and the new Blynk update

OK, the Blynk mobile dashboard is ready for us.

Step 4

Finally, connect the water pump to the relay module. Use the circuit diagram above for that. Then, put the soil moisture sensor into the soil. (I used a 9v battery for operating the water pump)

Software simulation:



K.K.Charan Reddy