Project work

on

IOT irrigation monitoring and controller System

Submitted in partial fulfillment of the

requirement for the award of the degree of

Bachelor of Technology in Computer Science Engineering

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Under The Supervision of
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CERTIFICATE

The Final Thesis/Project/ Dissertation Viva-Voce examination of Nidhi Sahani 18SCSE1010567 has been held on 20/08/2021 and her work is recommended for the award of Bachelor in computer science and engineering

Signature of Examiner(s)

Signature of Supervisor

Signature of Project Coordinator

Signature of Dean

Date: December,2021
Place: Greater Noida

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CANDIDATE'S DECLARATION

[W]e hereby certify that the work which is being presented in the [the]sis/project/dissertation, entitled **"IOT IRRIGATION MONITORING AND [CO]NTROLLER SYSTEM"**in partial fulfillment of the requirements for the [aw]ard of the Bachelor Degree Submitted in the School of Computing Science and [E]ngineeringof Galgotias University, Greater Noida, is an original work carried out [du]ring the period of july, 2021 to December and 2021, under the supervision of Dr. [A.]Suresh Kumar, Professor, Department of Computer Science and Engineering, of [S]chool of Computing Science and Engineering , Galgotias University, Greater [N]oida

The matter presented in the thesis/project/dissertation has not been submitted by [m]e/us for the award of any other degree of this or any other places.

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This is to certify that the above statement made by the candidates is correct to [t]he best of my knowledge.

Dr. A.Suresh Kumar(Professor)

Acknowledgement

I would like to express my special thanks as a graduate to my teacher Dr. A.Suresh Kumar, who gave me the golden opportunity to do this wonderful project of IOT IRRIGATION MONITORING AND CONTROLLER SYSTEM.

Who also helped me in completing my project. I came to know about so many new things. I am really thankful to them. Secondly I would also like to thank my parents and friends who helped me a lot in finalizing this project within the limited time frame.

Abstract

In this digital era, Improving current agriculture practices using modern technologies is very important for a better Agriculture System. Farmers usually grow different types of crops on a large portion of land that is not possible for one person to keep track of the entire field of Agriculture all the time. Sometimes farmers who face the given patch of land receive more water leading to waterlogging, or it might be possible to receive far less or no water. In these cases, farmers who face the crops can get damaged and suffer losses.

We propose an “IoT Irrigation Monitoring & Controller System Project” for the solution of Irrigation in Agriculture. This project is helpful for the farmers and the farmer can monitor and control the supply of water. In this project, we connect many devices through the internet which describes the Internet Of Things(IoT). Instead of irrigation, there are so many other features that are also available like monitoring temperature, humidity, and ph level of the agriculture field through the sensor. The transfer of data from sensor to web server database using wireless transmission. We will control all the operations through any remote or computer connected to the internet.

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Acronyms

B.Tech.	Bachelor of Technology
M.Tech.	Master of Technology
BCA	Bachelor of Computer Applications
MCA	Master of Computer Applications
B.Sc. (CS)	Bachelor of Science in Computer Science
M.Sc. (CS)	Master of Science in Computer Science
SCSE	School of Computing Science and Engineering

INTRODUCTION

In the whole world, Agriculture has an important role for human living. It also provides large employment opportunities to the people and plays a vital role in the growth of a country's economy.In this system two important things, first to get information of fertility of soil and second measure moisture level in soil. In this system water pumps are placed in water and soil moisture sensors are placed at the root of the plant near the module. Irrigation is usually used in areas where rainfall is irregular or dry times or drought is expected. There are many types of irrigation systems, in which water is supplied to the entire field uniformly.

1.1 IOT Concept and Definition

The term IOT consists of two words Internet and Things .Things in IOT refers to various IOT devices having unique identities and having capabilities to perform remote sensing ,activating and live monitoring of certain data. The other term internet is define as Global communication Network connecting Trillions of computers across the world enabling sharing of data .The IOT can be defined as :"A dynamic Global Network Infrastructure with self arrangement capabilities based on standard and able to exchange and make use of information communication to protocol where physical and virtual things have identities, physical attributes ,and virtual personalities and use of integrated and interfaces into the information network ,often communicate data associated with user and their environment."

IOT devices have different forms like wearable devices (smart watches), smart health devices etc.

1.2 IOT Enabling Technologies

IOT has various enabling Technologies:-

Wireless Sensor Network:-It consists of various sensors which are integrated to monitor various data.

Cloud Computing: Cloud Computing: This is also known as on-demand computing. Cloud computing is also a type of Internet based computing device which issues shared resources and data.

Communication Protocols:- Communication Protocols form the backbone of IoT based systems to enable the connectivity and coupling to applications and these protocols clear the way for exchange of data over the network as these protocols allow data exchange formats, data encoding and addressing.

Embedded System:-This is a computer system which consists of hardware and software to perform particular tasks. It includes microprocessor/ microcontroller, I/O units, storage devices, RAM/ROM and networking components.

Web Services:-This is a method of communication between two electronic devices over a network. It is a software function provided at a network address over the Web with the service always-on as in the concept of utility computing.

Chapter 2

2. HARDWARE DESCRIPTION:

2.1 NodeMCU

Figure 1-NodeMCU

NodeMCU is an internet of Things (IOT)-focused open-source Lau-based firmware and development board. It includes software for Espressif System ESE8266 WI-FI SoC as well as hardware for the ESP-12 module. The major argument for choosing this is that it is cheap and includes a built-in WI-FI module [10]. Because it is similar to Arduino, it can be programmed using the Arduino

IDE software. It has ten General Purpose Input/Output pins for connecting to external devices. A standard NodeMCU, complete with pin numbers.

2.2 Soil Moisture Sensor

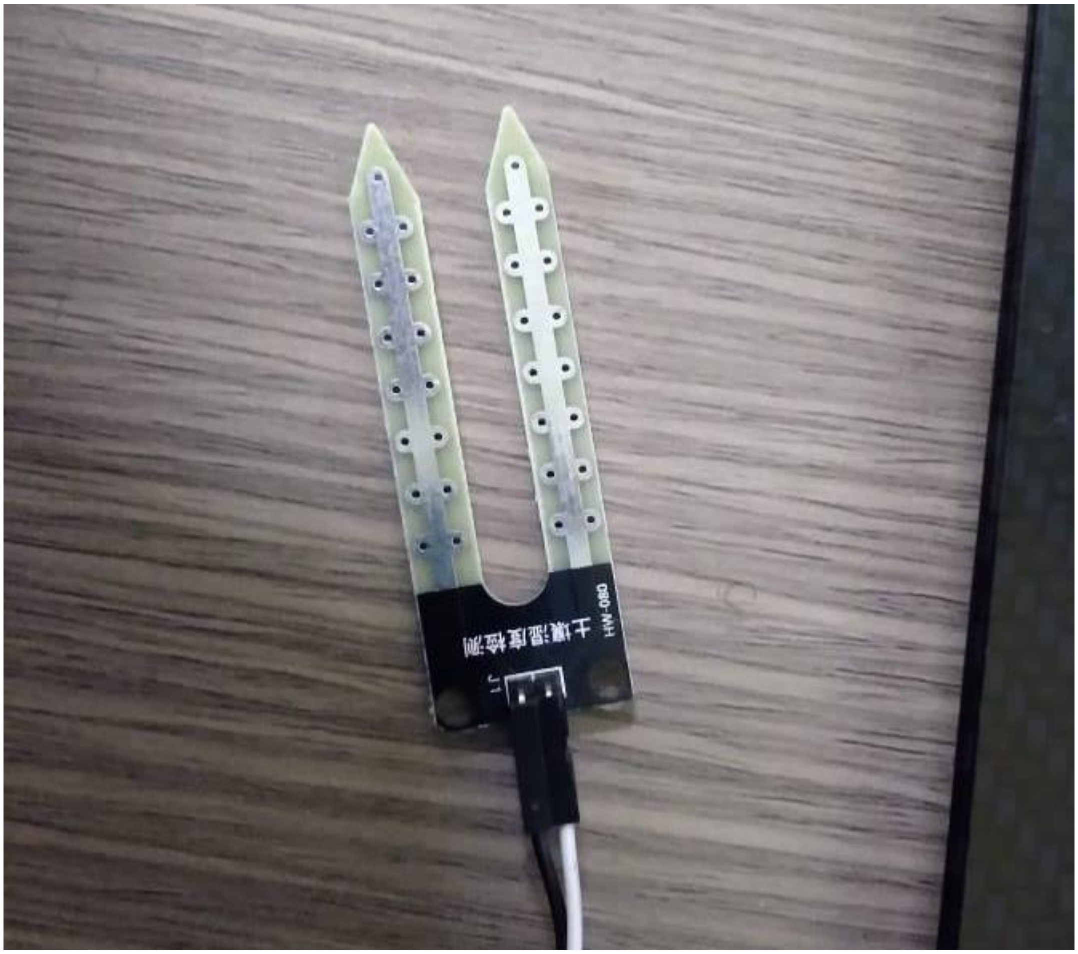

Figure 2-Soil Moisture Sensor

The Soil Moisture Sensors is a straightforward breakout for determining the moisture content of soil and other similar materials. The soil moisture sensor is simple to set up and operate. The sensor’s two big exposed pads serve as probes, and combined they operate as a variable resistor. The greater the amount of water in the soil, the better the conductivity between the pads will be, resulting in a lower resistance and a larger SIGout. It’s commonly used in greenhouses to regulate water supply and other bottle enhancements. Experiments in biology to track the amount of water in the soil.

2.3 DHT 11

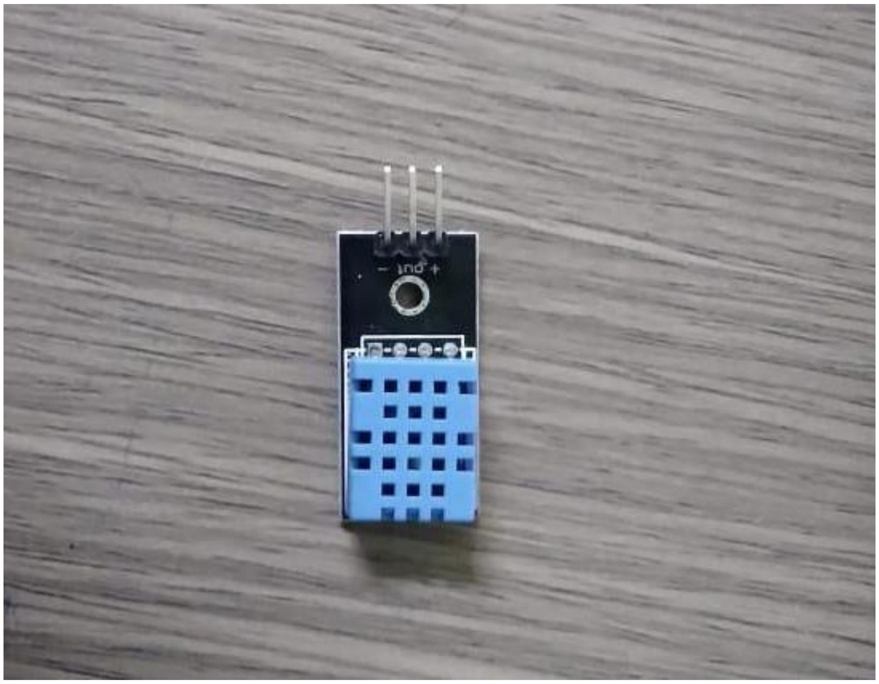

Figure 3- DHT 11

The dht11 sensor, which combines a temperature and humidity sensor, typically outputs either digital or analog data. It contains information about the temperature around the plant if it needs extra sunshine and the degree of humidity in the surrounding environment. Water vapor is detected by measuring the electrical resistance between the two electrodes. The humidity sensing component consists of the electrode and the substrate, which is responsible for retaining moisture while in contact with the surface. Ions are released by the substrate. The conductivity between the electrodes rises as soon as water vapour is absorbed by it. The calibration result of the dht11 sensor is quite accurate. Because of its small size and low power consumption, the DHT11 sensor has a wide range of uses. It also transmits signals over a distance of up to 20 meters. The product we used was a four-pin single row pin box.

2.4 RELAY

Within a relay, there is a core with copper wire wrapped around it (the coil). Under normal conditions, the switch (armature) remains in contact with the normally closed (NC) terminal. An electromagnetic field is generated when power is applied to the coil, and the coil begins to function as a magnet, attracting the armature to the normally open terminal (NO). At their most fundamental level, relays are nothing more than that. Aside from that, there are a variety of other types of relays, such as solid state and thermal relays, all of which have distinct functioning processes but serve the same purpose. This portion is used to regulate the small dc pump, which is used to water the plants automatically, and the flow is regulated by a relay. Relays are used to switch control circuits that handle lower currents.

Figure 4-RELAY

2.5 **Power Supply**

In this model Project, we use batteries for a short time period for power supply.For the long time period we use rechargeable battery. so, it will not contribute to pollution of the environment. The sealed lead-acid (SLA) 12V, 9Ah rechargeable battery is rated at a 5-hour (0.2) and 20-hour (0.05C) discharge. Longer discharge times produce higher capacity readings because of lower losses.The lead-acid performs well on high load currents. This battery acts as an internal power supply for the whole circuit.

fig.5 Power Supply

2.6 **Water Pump**

fig.6 water pump

3-6V Mini Water pump submersible:- This pump is very easy and simple to use. Connect a suitable pipe to the outlet and immerse the pump in water and power the motor with 3 to 6V to start pumping water

Chapter 3

3.SOFTWARE DESCRIPTION

3.1 Arduino IDE:

Fig.7-ARDUINO IDE

The Arduino Integrated Development Environment or Arduino Software (IDE) – contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

Fig.8-Blynk Server

Blynk is an Internet of Things Platform aimed to simplify building mobile and web applications for the Internet of Things. Easily connect 400+ hardware models like Arduino, ESP8266, Raspberry Pi similar MCUs and drag-n-drop IOT mobile apps for IOS and Android in 5 minutes.

Chapter 4

Working Of Projects

In the diagram, two sensors are used namely DHT11 for temperature and humidity, Soil moisture sensor, a relay circuit to control the water pump. The soil Moisture Sensor is a straightforward breakout for determining the moisture content of soil and other similar materials. The soil moisture sensor is simple to set up and operate. The sensor's two big exposed pads serve as probes, and combined they operate as a variable register. The dht11 sensor, which combines a temperature and humidity sensor, typically outputs either digital or analog data. It contains information about the temperature around the plant. All these sensors are interfaced to an open source Node-MCU (ESP8266) which will act as a microcontroller. This microcontroller is also interfaced with power supply. When the power supply is ON, the input module of sensors starts to activate. When sensors get ON it will read the data from soil and from surroundings. According to the values that are detected by sensors, the motor will turn ON/OFF. If Moisture and Humidity is below threshold value, then the motor is turned ON. If moisture and humidity level is high, then it will stop the motor and water supply will also stop.

4.1 Algorithm

Step 1: Start

Step 2: Initialize power supplied to GSM.

Step 3: Check the moisture level means it is less than or more than the reference value.

Step 4: If the moisture level is more than a fixed value, there is no need for irrigation

Step 5: If moisture level is less than a fixed value, Start irrigation

Step 6: Initialize the pump and rain gun.

Step 7: After the process is completed, it goes to original state

Step 8: Stop

4.2 CODE

```
#define BLYNK_TEMPLATE_ID "TMPLtEXqvzrf"
#define BLYNK_DEVICE_NAME "soil monitoring system "

#define BLYNK_PRINT Serial
#include <OneWire.h>
#include <SPI.h>
#include <BlynkSimpleEsp8266.h>
#include <DHT.h>
#include <DallasTemperature.h>
#define ONE_WIRE_BUS 'D2'
OneWire oneWire(ONE_WIRE_BUS);
DallasTemperature sensors(&oneWire);
char auth[] ={"BOsoqmyvsdJSenk51n6EplHN0jqela_aajwi"};
char ssid[] = {"Vk"};
char pass[] = {"12345678"};
#define DHTPIN 2
#define DHTTYPE DHT11
DHT dht(DHTPIN, DHTTYPE);
SimpleTimer timer;
void sendSensor()
{
float h = dht.readHumidity();
float t = dht.readTemperature();
if (isnan(h) || isnan(t)) {
Serial.println('Failed to read from DHT sensor!');
return;
}
Blynk.virtualWrite(V5, h); //V5 is for Humidity
Blynk.virtualWrite(V6, t); //V6 is for Temperature
}
```

```
void setup()
{
Serial.begin(9600);
dht.begin();
timer.setInterval(1000L, sendSensor);
Blynk.begin(auth, ssid, pass);
sensors.begin();

}
int sensor=0;
int output=0;
void sendTemps()
{
sensor=analogRead(A0);
output=(145-map(sensor,0,1023,0,100)); //in place 145 there is 100(it change with
the change in sensor)
delay(1000);
sensors.requestTemperatures();
float temp = sensors.getTempCByIndex(0);
Serial.println(temp);
Serial.print('moisture = ');
Serial.print(output);
Serial.println('%');
Blynk.virtualWrite(V1, temp);
Blynk.virtualWrite(V2,output);
delay(1000);
}
void loop()
{
Blynk.run();
timer.run();
sendTemps();
}
```

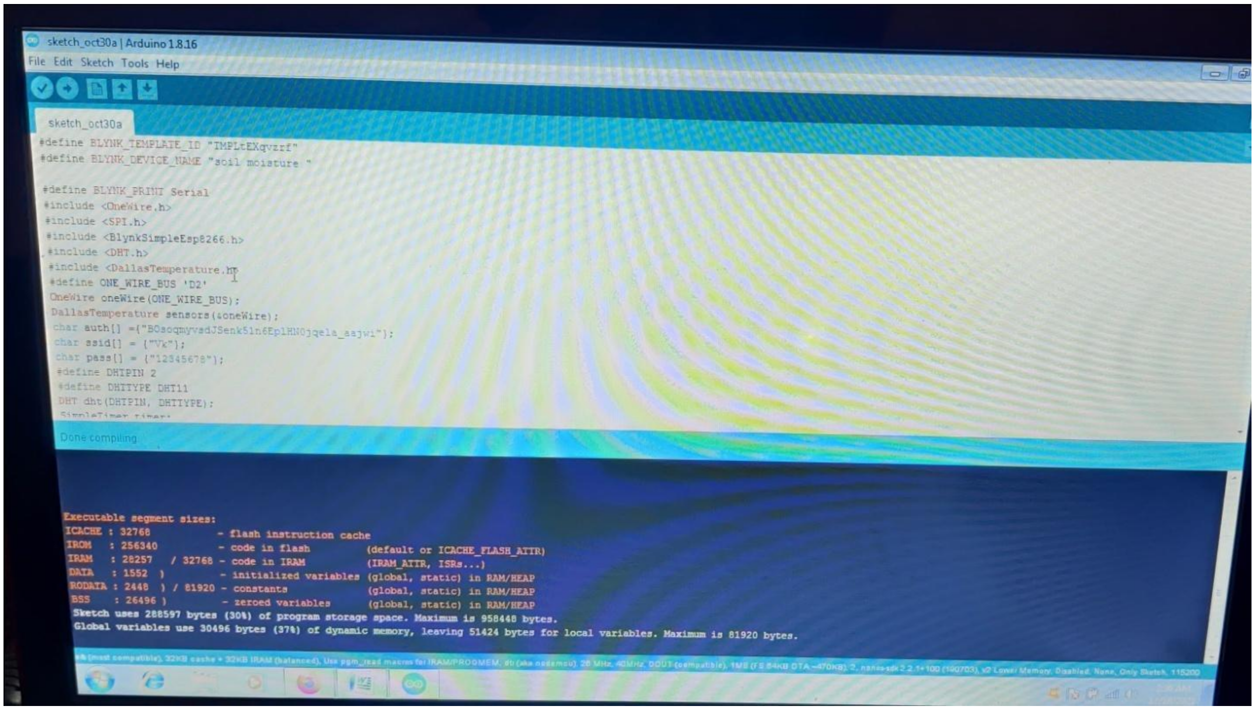

Figure 9-Code Result

CHAPTER-5

Results And Discussion

The Output of the proposed system is fast, accurate and secure. Hence, the experimental results show that the proposed system is easy to access and protects the plants from drought.

Hardware Output

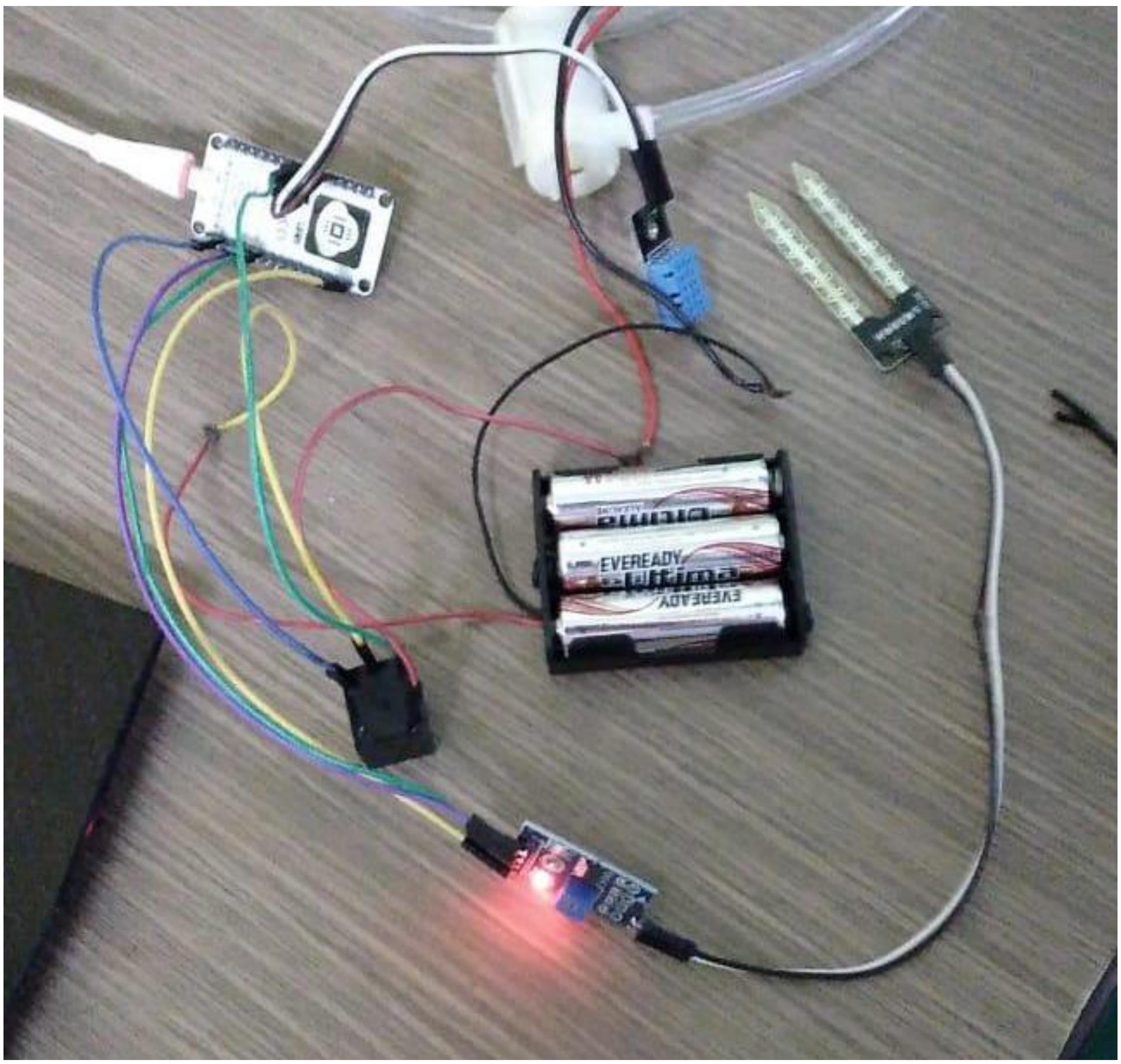

fig.10 overall circuit diagram

The hardware setup of the system includes Node-MCU as controller. The temperature sensor and the soil moisture sensor are connected to the handle lower currents. Furthermore, it can manage even greater voltages and amperes with the assistance of amplification. It is used to regulate the small dc pump, which is used to water the plants automatically, and the flow is regulated by a relay. Once the setup is complete, the next step is to link the device with the IOT server. The IOT server sends the control signals that control the on and off functions. It can be seen that the entire setup is simple, compact and very user friendly.

Software design

The IOT server in the laptop displays the parameters like soil moisture, temperature and humidity. This helps in monitoring the current condition of the plant. A button is displayed with which system can be controlled. When the moisture level falls or when the temperature rises beyond room temperature, the water pump is turned on by clicking the button.

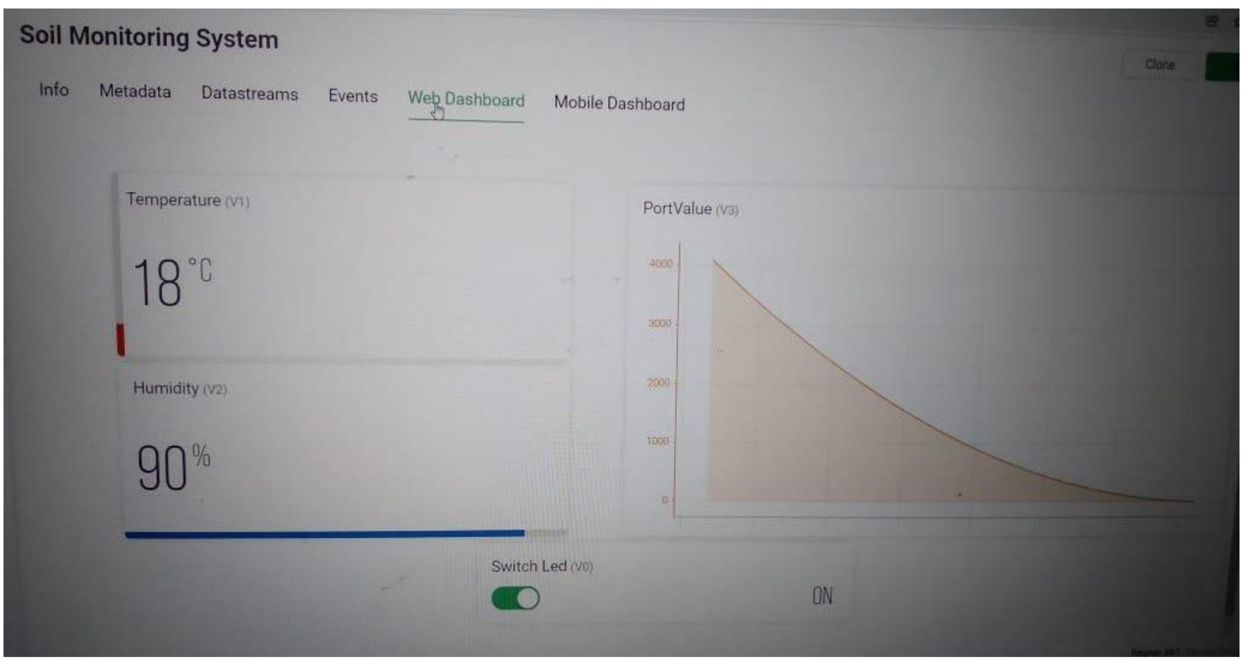

fig.11 Result obtained through Blynk Server website

Chapter 6

6.1 Conclusion

The proposed system can be used to switch the motor (on/off) depending on favorable conditions of plants i.e. sensor values, thereby automating the process of irrigation. This is a time efficient activity in farming, which helps to prevent soil thereby avoiding crop damage. System to monitor temperature, humidity, moisture levels in the soil was designed and the project provides an opportunity to learn the existing systems, along with their features and drawbacks.

6.2 Future Scope

- The first result is to help farmers to upgrade their agricultural technical knowledge.
- It will be used in future to measure the humidity, temperature and moisture of the plant root and make the plant grow in a well suitable environment.
- Making products compact so that they can be fitted anywhere.
- To add security to Device and Owners Account.

Reference

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