SMART IRRIGATION AND PLANT MONITORING SYSTEM

A MINI PROJECT REPORT

Submitted by

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in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

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VELAMMAL ENGINEERING COLLEGE
CHENNAI -66

BONAFIDE CERTIFICATE

Certified that this Project report **"SMART IRRIGATION AND PLANT MONITORING SYSTEM"** is the bonafide work of "**BALAJI S, KRISH KUMAR GUPTA , PRADNESH S"** whocarried out at the project work under my supervision.

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Velammal Engineering College	Velammal Engineering College
Chennai – 600 066	Chennai – 600 066

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CERTIFICATE OF EVALUATION

COLLEGE NAME : VELAMMAL ENGINEERING COLLEGE

BRANCH : COMPUTER SCIENCE AND ENGINEERING

SEMESTER :VI

Sl. No	Name of the student who has done the project	Title of the Project	Name of supervisor with designation
1 2 3	BALAJI S KRISH KUMAR GUPTA PRADNESH S	SMART IRRIGATION AND PLANT MONITORING SYSTEM	C.SRUTHINATH, AssociateProfessor

This report of project work submitted by the above students in partial fulfillment for the award of Bachelor of Computer Science and Engineering Degree in Anna University was evaluated and confirmed to be reports of the work done by the above students and then assessed.

Submitted for Internal Evaluation held on .....

Internal Examiner External Examiner

ABSTRACT

As we can see in today's world only some devices like PC's and mobiles are connected to internet. Now-a-days world is fully overtaken by the internet and internet of things. Internet is use for basic need of all human beings. The Internet of Things (IOT) is the network of physical objects. It simply means to monitor a physical device or machine or it is inter-networking of physical devices which is embedded with electronics, sensors, software and network connectivity to enable it to achieve greater value and services by exchanging data with the manufacturer IOT permits objects to be sensed or controlled remotely across the network infrastructure. The result improves accuracy, economic benefits, efficiency and reduces intervention of human.

Internet of things is one of the most easily accessible form of connectivity. It can be used for a plethora of applications. Proper irrigation is still a challenge in most of the agriculture practices. Improper supply of water can affect both the soil and the crops. A feasible monitoring or controlling system can be of great use to overcome this problem. In this project, IOT is employed to create a smart monitoring system for the crops. This can help in improving the yield without affecting the soil quality. Measuring the features like temperature, humidity and soil moisture is the key aspect of the system.

ACKNOWLEDGEMENT

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CHAPTER 1

1.1 INTRODUCTION

The concept of a network of smart devices was introduced in 1982, with modified coke machine that becomes the first internet connected appliance. Between 1982 to 1999 many companies are working on IOT. But in 1999 IOT is introduced by British technology pioneer Kevin Ashton coined the term in his work at Procter and gamble. But the term IOT did not step up till 2011 later in 2014 it reached mass market. IOT allow the objects that will connect through the internet with RFID (Radio Frequency Identification) communication method that include wireless technology and sensors which can identify themselves uniquely. In the world of internet information play important role in everyone life. Plant plays a vital role in maintaining the ecological cycle and forms the foundation of a food chain pyramid and thus to maintain the plant's proper growth and health adequate monitoring is required. Hence the aim at making plant monitoring system smart is using automation and Internet of Things (IOT) technology. This topic highlights various features such as smart decision making based on soil moisture real time data. Nomenclature Arduino NodeMCU ESP8266, Temperature and Humidity Sensor, Soil Moisture Sensor, Relay 5v .

1.2 LITERATURE SURVEY

In India about 35% of land was under reliably irrigated. And the 2/3rd part of land is depending on monsoon for the water. Irrigation reduces dependency on monsoon, improves food security and improves productivity of agriculture and it offers more opportunities for jobs in rural areas. Farmers are facing problems related to watering system that how much water has to supply and at what time? Sometimes overwatering causesthe damage to crops and as well as waste of water. Hence for avoid such damage we need to maintain approximate water level in soil. In this paper, humidity sensor, moisture sensor, temperature sensors placed in root zone of plant and gateway unit (ESP8266) handles the sensor information and transmit data to a android application. This application is developed for measure approximate values of temperature sensor, humidity sensor and moisture sensor that was programmed into a microcontroller to control water quantity.

CHAPTER-2

2.1 PROBLEM STATEMENT

For the problem statement that discovered, the absence of a system which helps client to monitor soil moisture, humidity and temperature of area. Water is an important factor in plant development. Soil moisture sensors are very useful in determining water levels, greatly simplifying user efforts and reducing costs.

- As it can be seen, without keeping moisture levels stable the situation can turn unfavorable both ways. This is why soil moisture sensors for agriculture are indispensable farming tools. Less use of more effective technology
- Client use less modern technology.
- Weather effects such as rainy and hot seasons affect productivity.
- The used of pesticide may affected human health and degrade the soil.

2.2 PROJECT OBJECTIVE

The main aim of this project is to make a system that can monitor soil conditions More specifically the principle objective of this project are:

1. To make automatic watering for plant.

2. To monitor real-time condition soil moisture, humidity and temperature of area using the device.

3. To control pam manually using application (interrupt).

2.3 PROJECT SCOPE

This project focuses on making a smart system control on the phone which will provide information to customer. The main controller is using ESP-8266. The project scope in this project are:

1. To make smart system control on the phone which will provide information to client regarding:

i. Information related to soil moisture, soil temperature and humidity.

ii.Amount of water to be provided according to soil moisture.

iii. To provide cost effective and user friendly system.

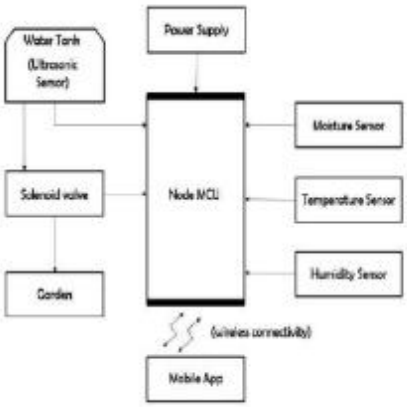
2. We are developing a hardware system that will be easily obtained for the grower.

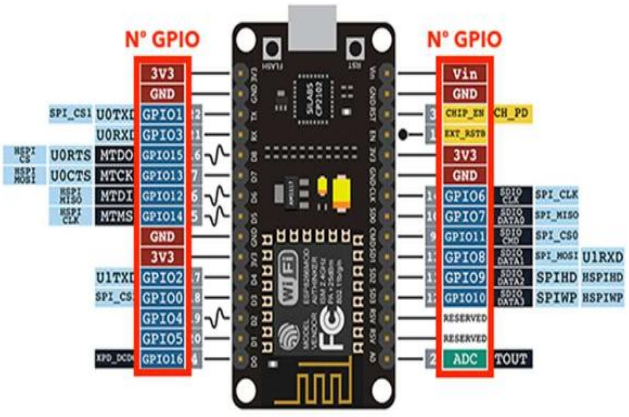
CHAPTER-3

3.1 HARDWARE INTERFACE

1. Node MCU :

NodeMCU is an open-source Lua-based firmware and development board designed specifically for Internet of Things (IoT) applications. It comprises software that operates on Systems' ESP8266 Wi-Fi module. The key argument for choosing this is that it is affordable and includes a built-in Wi-Fi module . 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. Diagram depicts a standard NodeMCU with its pin numbers.



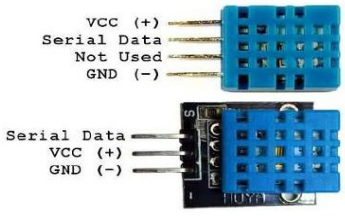


2. DHT 11 :

The dht11 sensor, a combination of temperature and humidity sensor generally gives digital or analog output . It includes information about the temperature around the plant whether it requires more sunlight or not as well as It deals with the humidity present in the environment around the plant. The electrical resistance in between the

two electrodes is used to detect the water vapor. The electrode along with the substrate which is responsible for holding moisture when in contact with the surface acts as the

humidity sensing component. As soon as water vapor is absorbed by the substrate, it releases ion, resulting in an increase in conductivity between the electrodes. The dht11 sensor's calibration result is quite accurate. The DHT11 sensor offers a wide range of applications due to its compact size and low power consumption. It also has a signal transmission range of up to 20 meters. The device we chose is a 4 pin single row pin package, which is suitable for breadboard connections. There are two versions of the dht11 sensor: the sensor and the module. The DHT 11 sensor is shown in diagram.



3.Soil Moisture Sensor :

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 huge exposed pads serve as probes, and combined they work 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 delivery and in other improved bottle Biology studies to track water content in the soil. A typical soil moisture sensor is seen in Figure 5, and its characteristics are listed below.

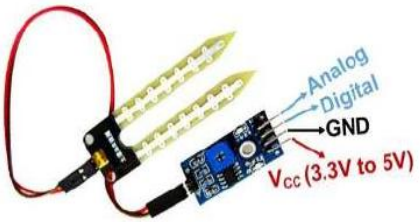
Specifications:

Working voltage: 5V

Working current: <20Ma

Interface: analog

Working temperature: 10°C~30°

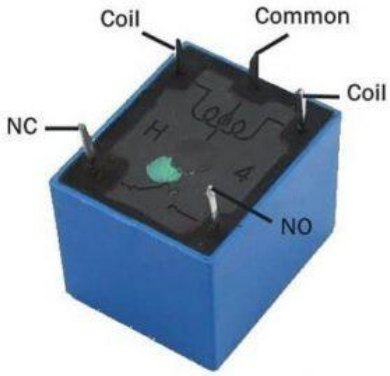


4. **Mini dc water pump :**

A pump is basically a device which uses mechanical action to transfer fluid (liquids). The mechanism used in a pump is mainly reciprocating or rotary and in order to do this mechanical work, they also consume some energy. Pumps are available in varying sizes ranging from smaller pumps used for medical purposes to larger ones used in industries.

4. Relay :

Inside a relay, there is a core with copper wire wound around it (the coil). Under normal conditions, the switch(armature) remains in contact with the normally closed (NC) terminal. But when voltage is applied through the coil, electromagnetic field is generated and the coil starts to act as a magnet, pulling the armature towards itself to the normally open terminally (NO). That's all there is to relays at the most basic level. Other than that there are many other types of relays, such as solid state and thermal relays, with different operating mechanisms, but all of them have the same common purpose. Here this part is use to control the mini dc pump for automatically watering plant and the flow is controlled by relay. In general, control circuit handling smaller currents are switched by relays. In addition, with the help of amplification even larger voltage and amperes can be controlled by it . Relay used in the projects shown below .



3.2 SOFTWARE INTERFACE

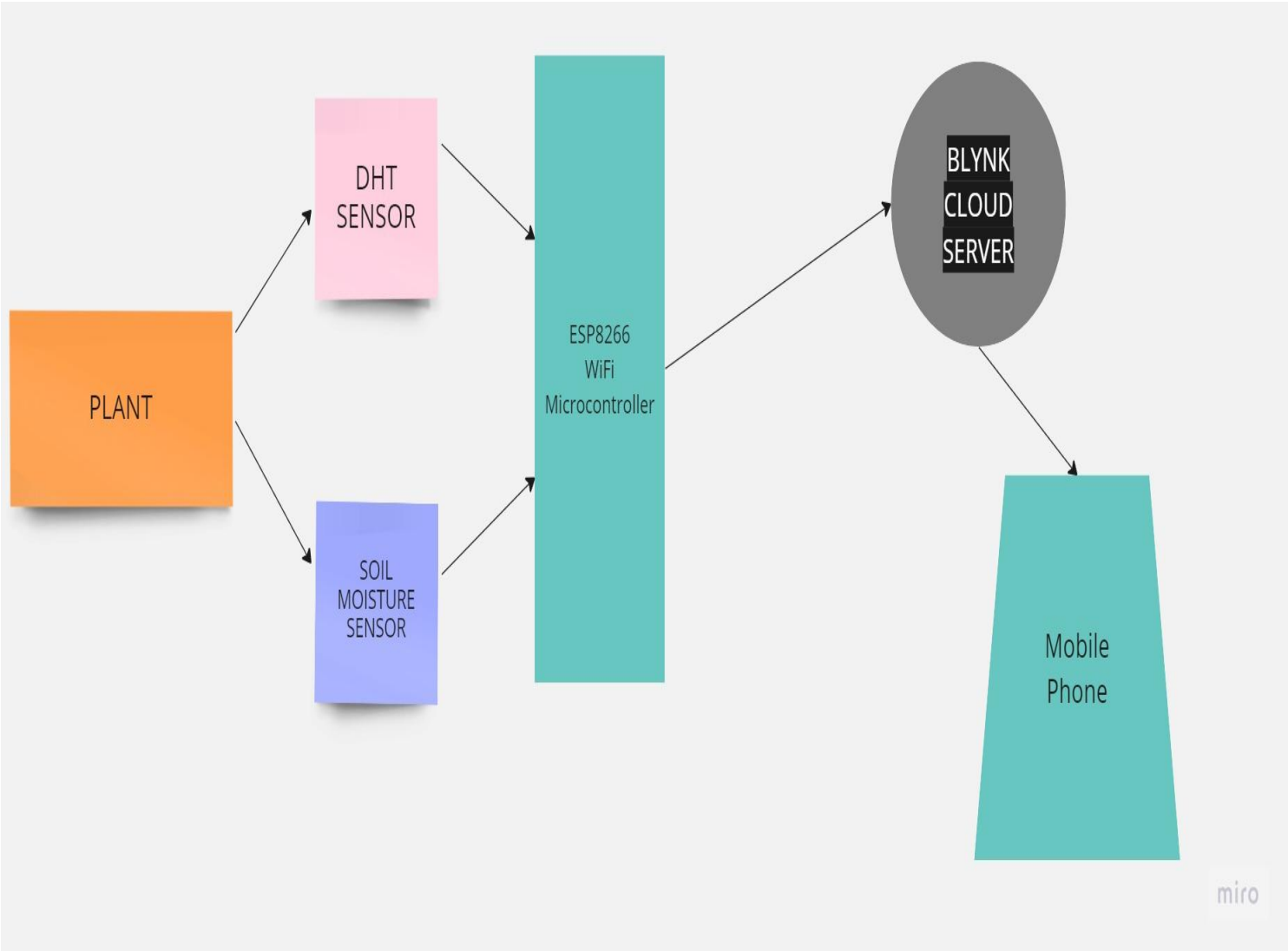
The software's flow when it's finished a structure that is placed on the creation of a software product is known as software development. The software used in this project is the ARDUINO IDE, which can be installed in any machine with its basic configuration.

Blynk app - Everything you need to build and manage connected hardware: device provisioning, sensor data visualization, remote control with mobile and web applications, Over-The-Air firmware updates, secure cloud, data analytics, user and access management, alerts, automations and much much more…Blynk platform powers low-batch manufacturers of smart home products, complex HVAC systems, agricultural equipment, and everyone in between. These companies build branded apps with no code and get the full back-end IoT infrastructure through one subscription.

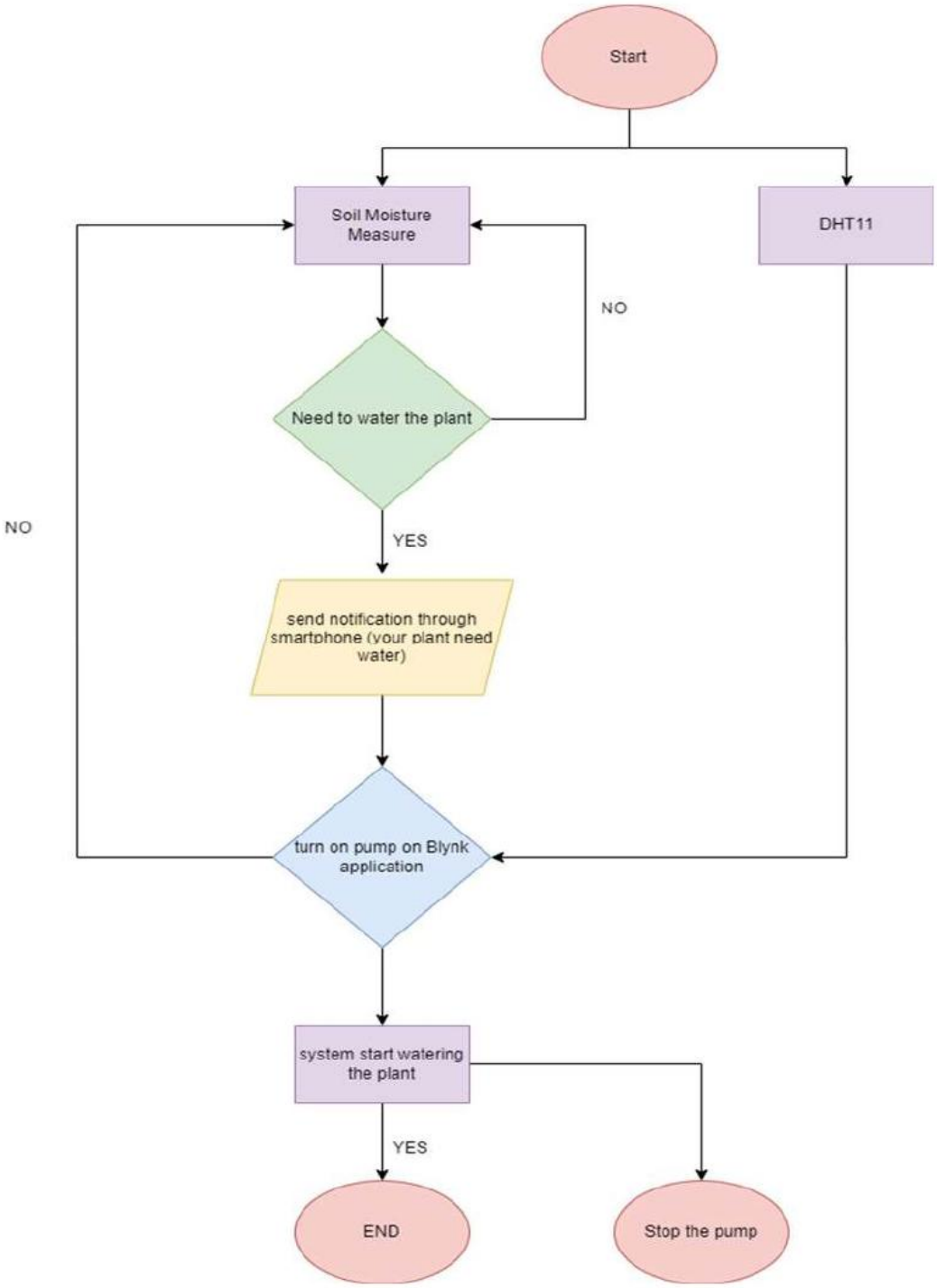
Arduino IDE - The Arduino Integrated Development Environment (IDE) is a cross platform application that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards.

CHAPTER 4

4.1 BLOCK DIAGRAM



4.2 FLOW CHART



CHAPTER 5

5.1 SUMMARY

This initiative will benefit society, particularly those who are busy with tight schedules and do not have time to water their plants on the field, as well as those who frequently forget to water the plants. Aside from that, this research suggested a solution by giving a technique and system to assist humans in the process of watering plants.

Further research on the system's techniques and methods may be utilized to enhance them so that they are usable in a wide range of situations, such as watering a plantation with a big number of crops. This project also provides researchers with ideas for developing watering and irrigation systems utilizing the Arduino technology.

CHAPTER 6

FUTURE WORK

- The performance of the system can be further improved in terms of the operating speed, memory capacity, and instruction cycle period of the microcontroller by using other high end controllers. The number of channels can be increased to interface more number of sensors which is possible by using advanced versions of controllers.
- The system can be modified with the use of a data logger and a graphical LCD panel showing the measured sensor data over a period of time.A speaking voice alarm could be used.The device can be made to perform better by providing the power supply with the help of renewable source. Time bound administration of fertilizers, insecticides and pesticides can be introduced.

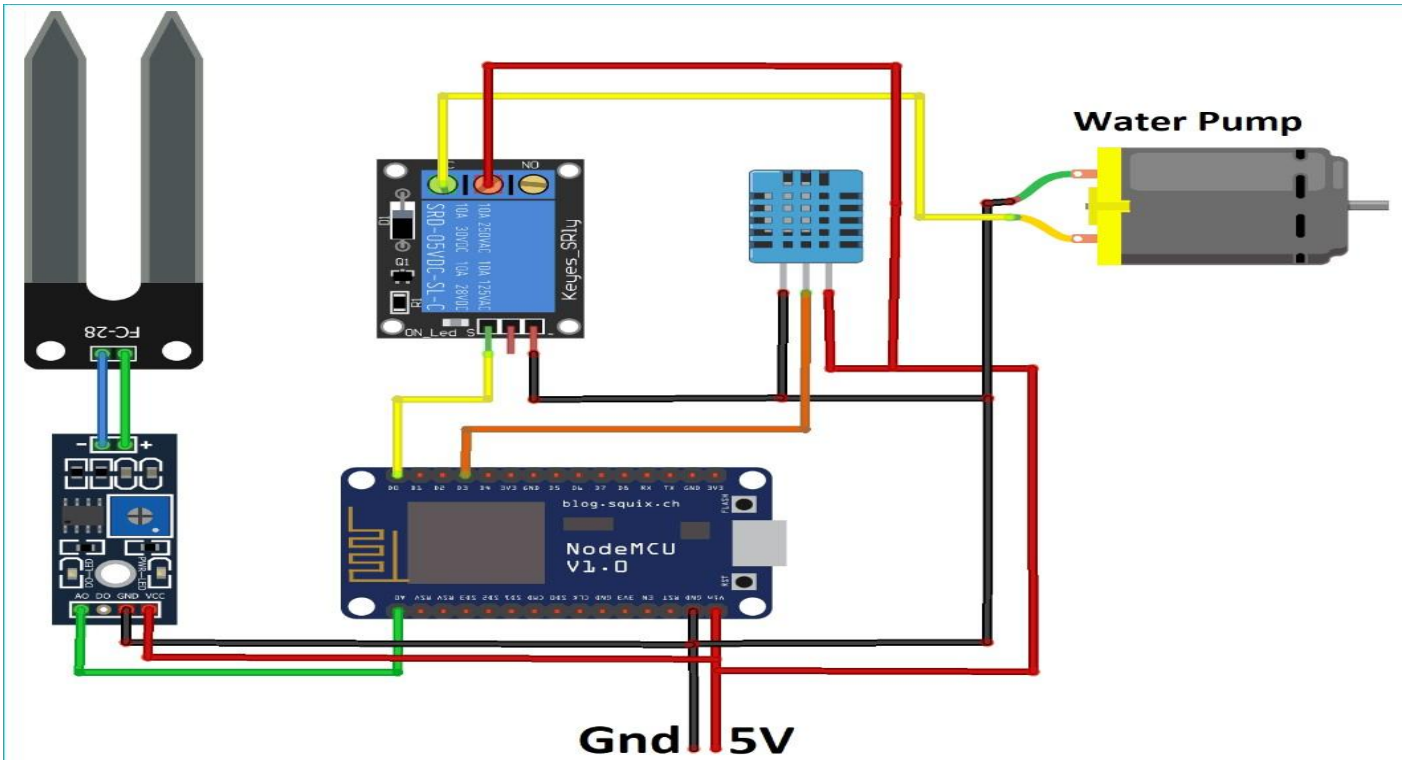
CHAPTER 7

CONCLUSION

- The implementation of Smart Garden system using the Internet of Things has been verified to satisfactorily work by connecting different parameters of the soil to the cloud and was successfully controlled remotely through a mobile application. The system designed not only monitors the sensor data, like moisture, humidity and temperature but also actuates other parameters according to the requirements. The initial cost and the installation of this system are cheap and hence it can be implemented anywhere. With the development of sensor technology, the system can be elevated to the next level which helps the users to utilize their investment in an economic manner. If soil nutrient sensors can be installed, then the system can be modified to supply fertilizers to the garden precisely. This system saves manpower and efficiently utilizes the water resources available ultimately leading to more profit. The feedback provided by the system will improve the implementation of the gardening process A system to monitor temperature, humidity, moisture level in the soil was designed and the project provides an opportunity to study the existing systems, along with their features and drawbacks. Agriculture is one of the most water-consuming activities. The proposed system can be used to switch the motor (on/off) depending on favourable condition of plants i.e sensor values, thereby automating the process of irrigation. Which is one of the most time efficient activities in farming, which helps to prevent over irrigation or under irrigation of soil thereby avoiding crop damage. The farm owner can monitor the process online through a android App. Therfore this project can be concluded that there can be considerable development in farming with the use of IOT and automation.

CHAPTER 8

8.1 CIRCUIT DIAGRAM



CHAPTER 9

APPENDICES

9.1 MILESTONE

Month	Activity
January	Research work.
February	Gaining knowledge about the hardware.
March	Software coding.
April	Integration of code with the hardware.
End of April	Finished project.

9.2 CODING

```
#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[] = “SSID”;

char pass[] = “PWD”;

#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();
}
```

CHAPTER 10

10.1 METHODOLOGY

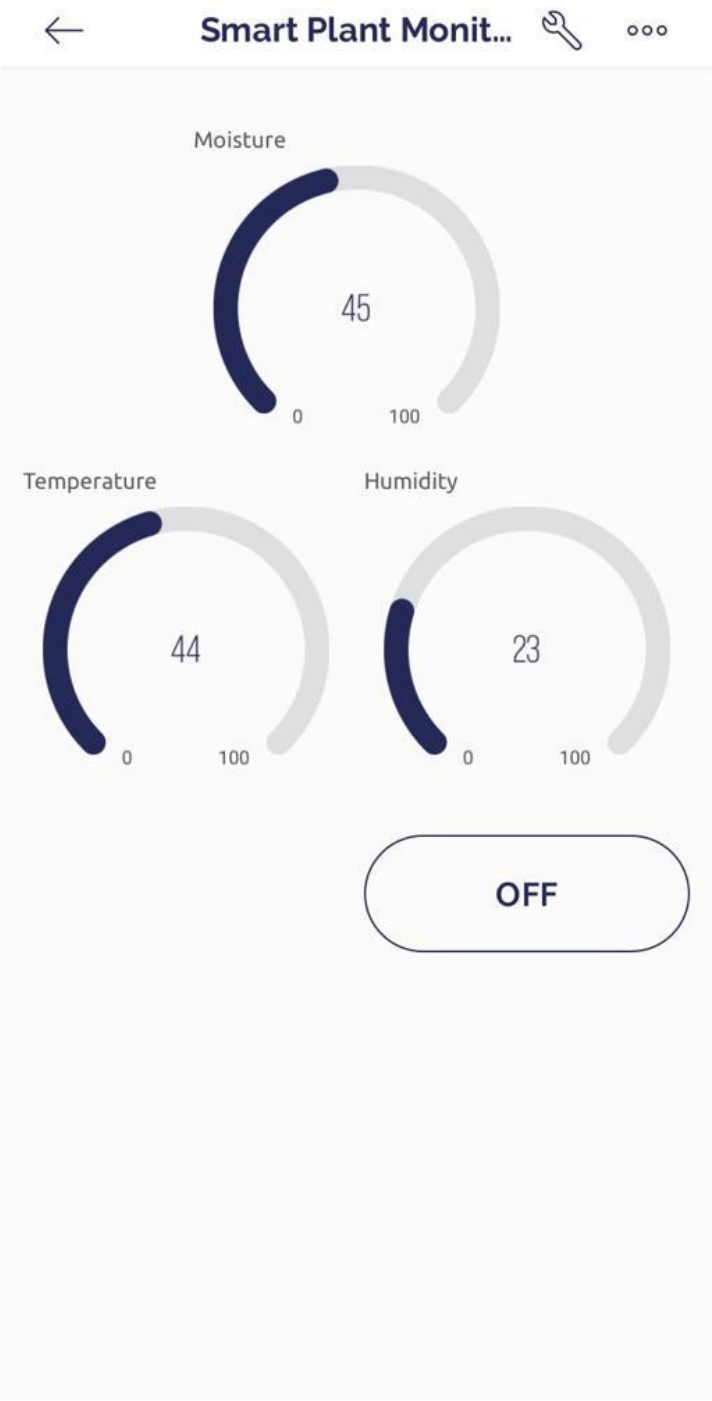
- The proposed Plant Monitoring System uses NodeMCU as microcontroller. NodeMCU comes with the inbuilt ESP8266 WiFi module which connects our system to blynk app using WiFi. The program which controls the functioning of the whole system is fed into the microcontroller using Arduino IDE which is an environment which integrates code with the hardware. Soil moisture sensor continuously detects the level of moisture in the soil and displays it on the Virtual LCD widget on the Blynk app. If the water content in the soil is less than what is required by the plant,he/she can switch ON the button widget in Blynk app which will turn ON the water supply. Real time values from the DHT11 temperature sensor are also displayed on the virtual LCD.
- Excessive heat from the sun can be harmful for plants to prevent them from dying we introduced a green shade which will automatically be drawn over the plant with the help of two DC motors which rotate clockwise and anti-clockwise to help movement of the shade. Temperature more than 30 ?C can cause shriveling of plant.
- When temperature increases this limit the motor rotates and cause the shade to move automatically. The user is notified about each and every step through the notification feature of the Blynkapp. Hence, this system monitors and controls the plant?s requirements remotely.

CHAPTER 11

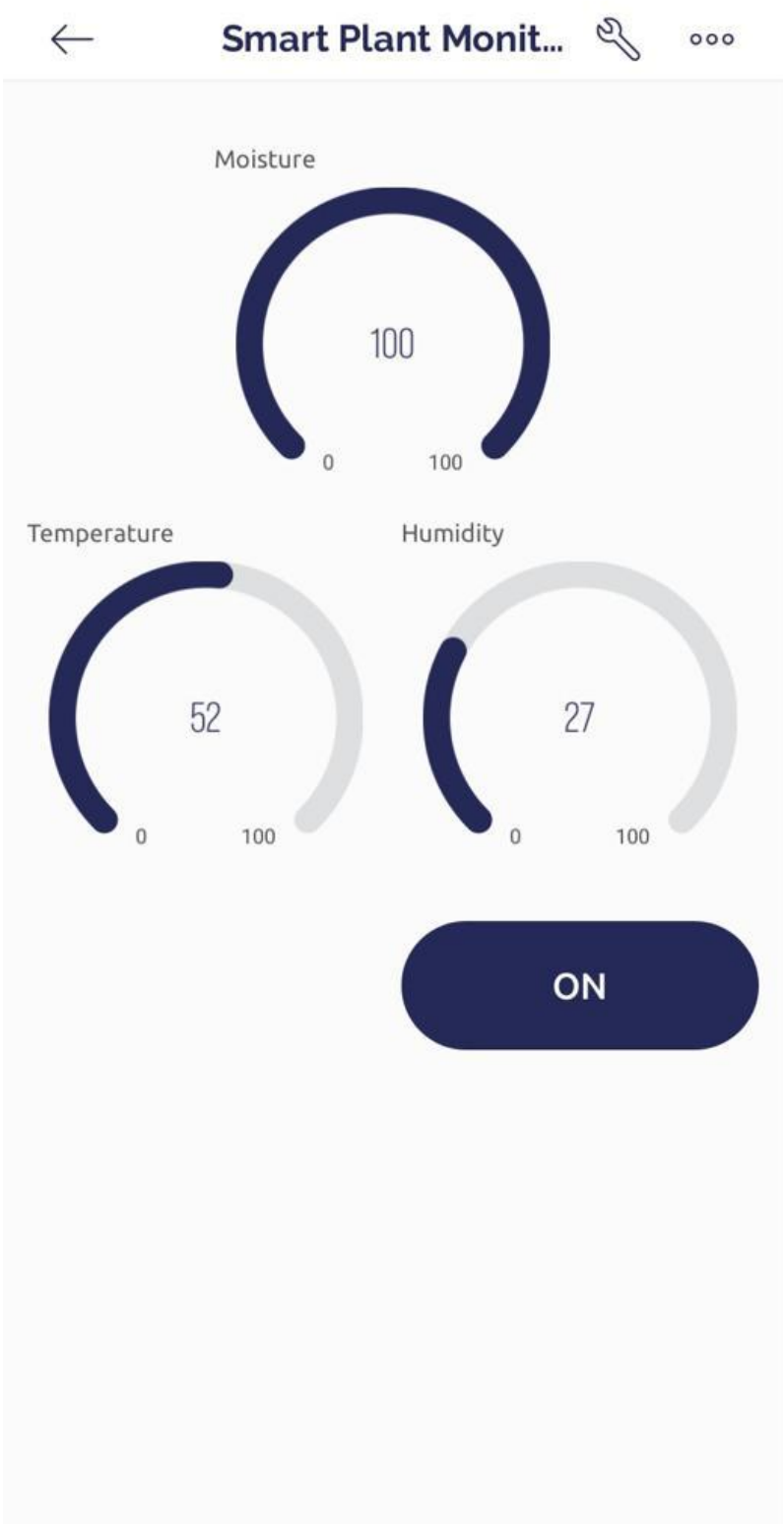
11.1 OUTPUT

WORKING OF THE PROJECT:IRRIGATING THE PLANT.

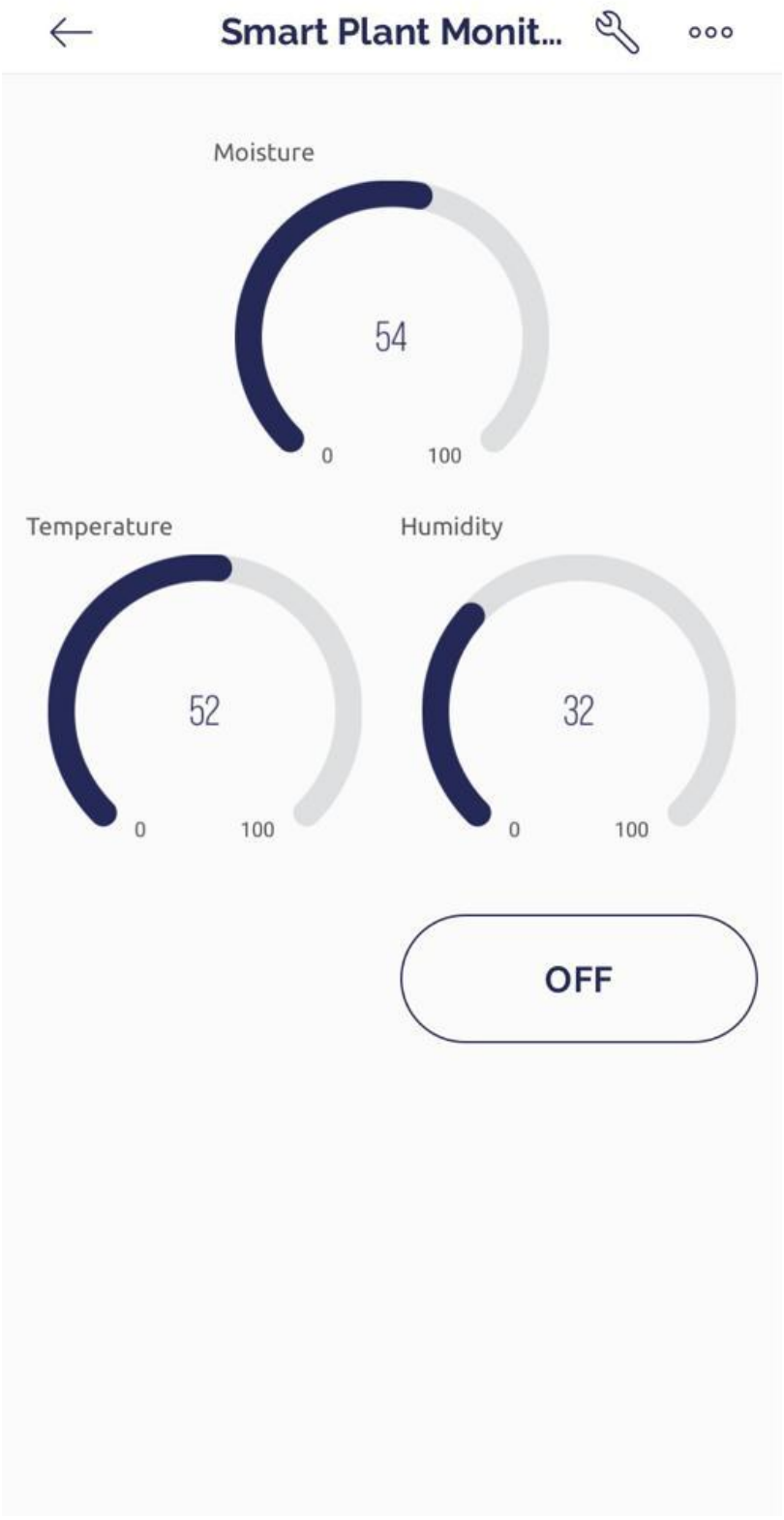
11.2 RESULTS AND DISCUSSION



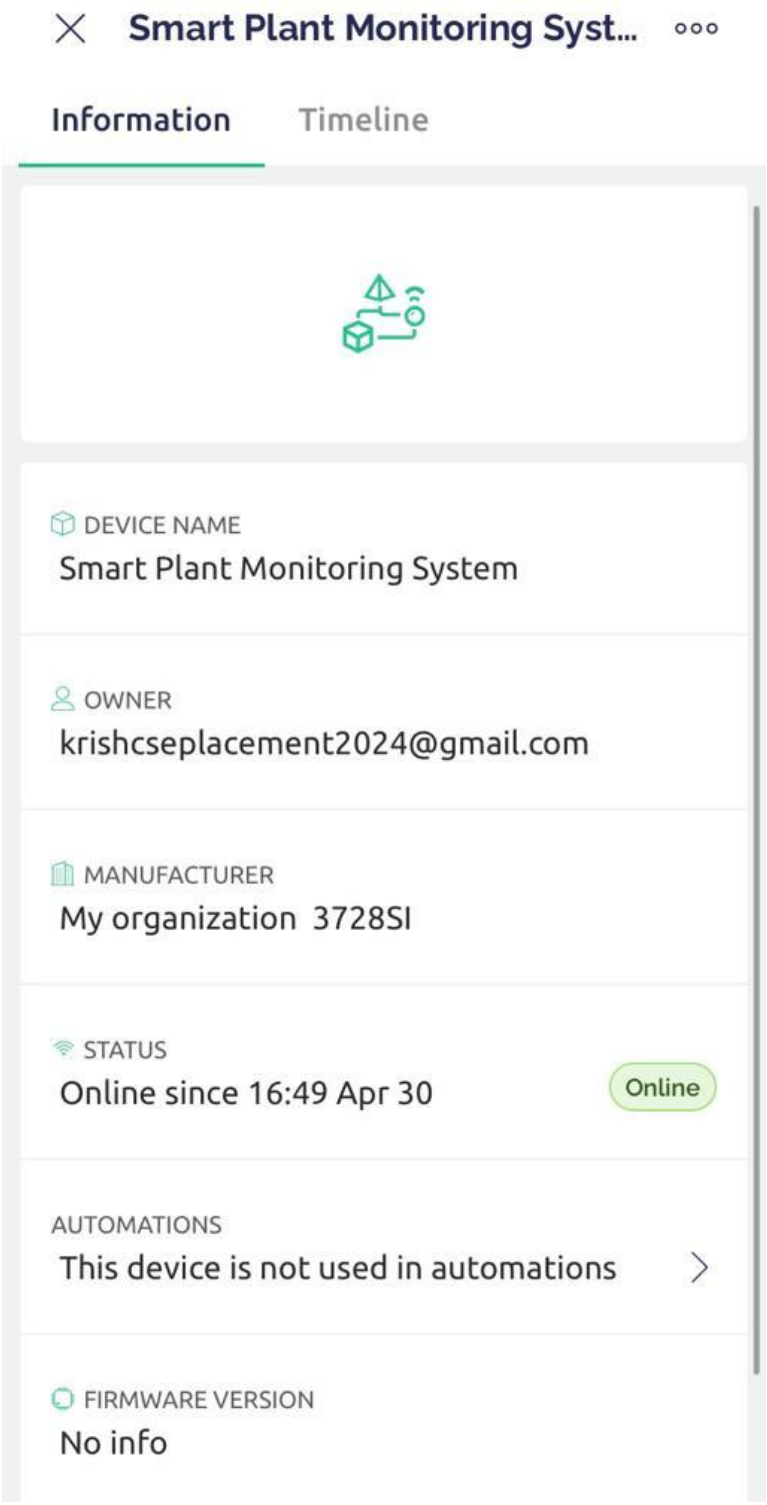
READINGS BEFORE THE PUMP IS SWITCHED ON.



READINGS WHEN THE PUMP IS WORKING.



READINGS AFTER IRRIGATION.


Smart Plant Monitoring Syst...
Information
Timeline
DEVICE NAME
Smart Plant Monitoring System
OWNER
krishcseplacement2024@gmail.com
MANUFACTURER
My organization 3728SI
STATUS
Online since 16:49 Apr 30
Online
AUTOMATIONS
This device is not used in automations
FIRMWARE VERSION
No info

BLYNK APP.

REFERENCE

Reference Book : Web Technologies, Black book, dreamTech Press.

Website: Online available:-

www.Wikipedia.org/Arduino

https//www.survivingwithandroid.com/iot-project-tutorial-smart-plansystem

https://www.researchgate.net/publication/342175470_IoT_Based_Plant_Monitoring_System