EMBEDDED SYSTEMS - [19CSE303]

PLANTATION MONITORING SYSTEM BASED ON IOT

TEAM-16

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ABSTRACT

One of the many issues that farmers face on a daily basis is the constant need to monitor over-irrigation. The farmer frequently has to travel numerous kilometers to reach their farms and irrigation pumps. As a result, a large amount of time and effort is expended daily in a farmer's life to irrigate the field when this time could be spent on other farms such as animal husbandry, which requires much more continuous observation and care. This paper aims to present a system which can relieve the farmer from continuous and constant inspection of the field, that is to say, reduce the human involvement in irrigation.

It would not only help the farmer by easing his job of irrigating the field but will also ensure a good quality yield. Due to the precise sensing of the sensors, wastage of water will be prevented, which is a growing concern all over the world especially in India.

The proposed system eliminates the need for the farmer to monitor the field because irrigation occurs automatically as needed. To set up the network and complete the task, a wireless sensor network will be used.

Keywords: Moisture sensor, Temperature Sensor, Arduino, Micro-controller, NodeMCU, Internet of Things.

INTRODUCTION

Now a day's water is becoming very precious due to scarcity in obtaining clean water for domestic purpose including irrigation. Also, automation in agricultural systems is a necessity to optimize water usage, reduce water wastage, and to implement modern technology in agriculture systems. This is a micro-controller based control system used for data processing.

The Internet of Things (IoT) allows objects to be identified and controlled from a distance using existing network infrastructure, opening up new possibilities. greater efficiency, accuracy, and financial benefit through more direct contact between the actual and virtual worlds and computer-based systems. In order to maximize water consumption and maintain a green environment, it is important to irrigate more effectively as water supplies become increasingly scarce and polluted. The sensors collect and evaluate data regarding changing weather and soil moisture levels before sending timely warnings to the user's Android phone.

This Project deals about the Plant Monitoring System Mechanism. It gives the Information about the Temperature, Humidity and soil moisture. This can be done by using various sensors like DTH11 sensor, soil moisture sensor. It is suitable for plant which may help to start a better growth of plant and also it may support to control the usage of water. When the soil moisture is very less then motor ON and pump the water to the plant after that soil moisture increases and then motor OFF Automatically. The parameters Temperature, Humidity, Soil Moisture can Display on Blynk IoT App.

METHODOLOGY

The Procedure is introduced by using NodeMCU that is connected by different Sensors and the data is transferred through a Wi-Fi module that is Available in ESP8266 Wi-Fi module. The data is transferred directly to the application by using power supply and Wi-Fi. The network part is the main point for Operating the device.

DTH11 Sensor are used to detect the Exact status of heat and Humidity. Soil moisture detect the moisture of soil. These two Sensors are used to Analyse the real time data of plants and this help us to get the overview of plant Environment.

By using this information user can Detect which part of the plant is affected in the garden and recover the plant by these effects and improve the plant growth. Power supply is given to the circuit board through Battery then the circuit board that uses it transfer the dc power to sensors for working properly. The display unit can generate the output. Here we use Blynk IoT app for this project to the display outputs.

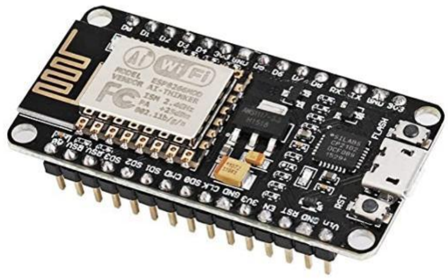
The Steps for Flow Of Method

1. When we give the power supply the NodeMCU activate. Then also sensors get ON.
2. When sensors are ON It reads the data from soil and also from Surroundings.
3. Based on the values which are detected by Sensors motor will be turn to ON/OFF State.
4. The value of Threshold is less than the Moisture then the Motor turned ON.
5. If it Detects high moisture level the motor is in OFF position.
6. The Sensor only collects all the values and sends it to ESP8266 Wi-Fi protocol.
7. The Information Display on the Blynk App.
8. Then the user can easily control the motor by using Blynk App

COMPONENTS USED

NodeMCU

NodeMCU is an Internet of Things (IoT)-focused open-source Lua-based firmware and development board. It includes software for Espressif Systems' ESP8266 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. 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.



Soil Moisture Sensor

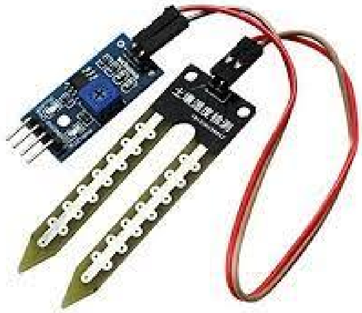
The Soil Moisture Sensor is a straightforward breakout for determining the moisture content of soil and other similar materials.

The soil moisture sensor is simple to set up and operate. The sensor's two 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.

It consists of a probe consisting of moisture sensors which can be inserted in the soil, in order to measure the moisture content of the soil. When the field is in dry condition, the sensor device senses the condition of the soil and the signal is transmitted to the micro controller. which in response makes the motor ON. Now, the water is pumped and the irrigation is done at the dry places only. This is done by moisture sensor device. Where there is moisture present in the soil, irrigation process will stop and vice-versa. Soil moisture sensors measure the water content in soil.

Specifications:

- Working voltage: 5V
- Working current: <20 mA
- Interface: Analog
- Working Temperature: 10°C~30°C



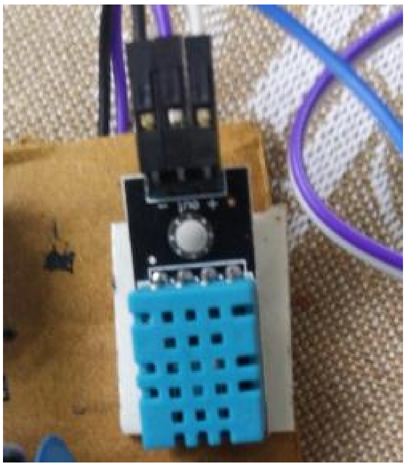
DHT 11

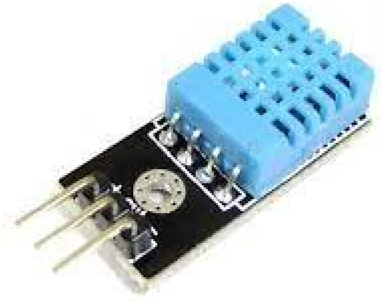
The dht11 sensor, which combines a temperature and humidity sensor, typically outputs either digital or analog data. It contains information about the temperature around the plant if it needs extra sunshine and the degree of humidity in the surrounding environment. Water vapor is detected by measuring 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 can also transmit signals over a distance of up to 20 meters. The product we used was a four-pin single row pin box.

Specification:

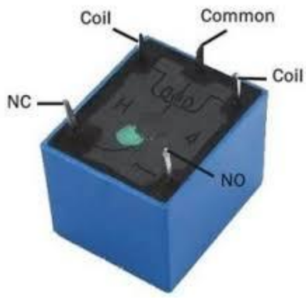
- Temperature range: 0 to 50° C error of + 2° C.
- Humidity: 20-90% RH + 5% RH
- Interface: digital





Relay

Within a relay, there is a core with copperwire 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. Furthermore, it can manage even greater voltages and amperes with the assistance of amplification.



5V DC Water Pump

The water pump works using water suction method which drain the water through its inlet and released it through the outlet. You can use the water pump as exhaust system for your aquarium and controlled water flow fountain.

9V Battery

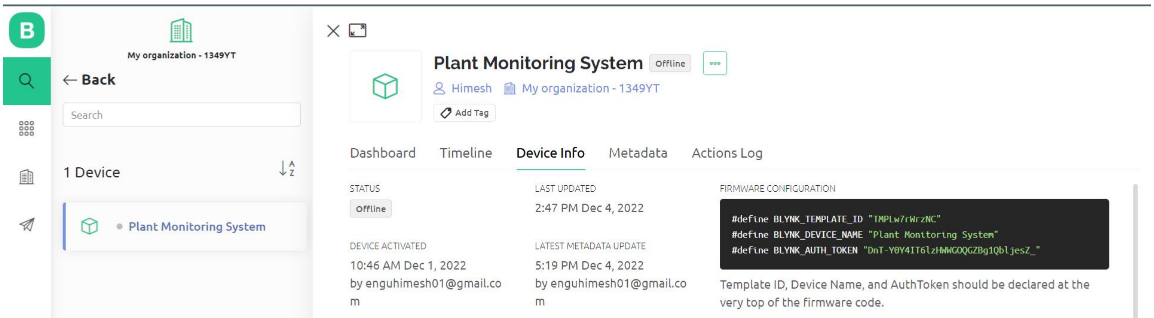
The 9-volt battery, is an electric battery that supplies a nominal voltage of 9 volts. Actual voltage measures 7.2 to 9.6 volts, depending on battery chemistry. Batteries of various sizes and capacities are manufactured; a very common size is known as PP3, introduced for early transistor radios.

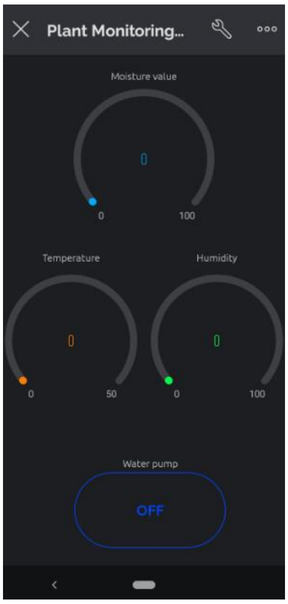
Jumper Wires

A jumper wire is an electric wire that connects remote electric circuits used for printed circuit boards. By attaching a jumper wire on the circuit, it can be short-circuited and short-cut (jump) to the electric circuit.

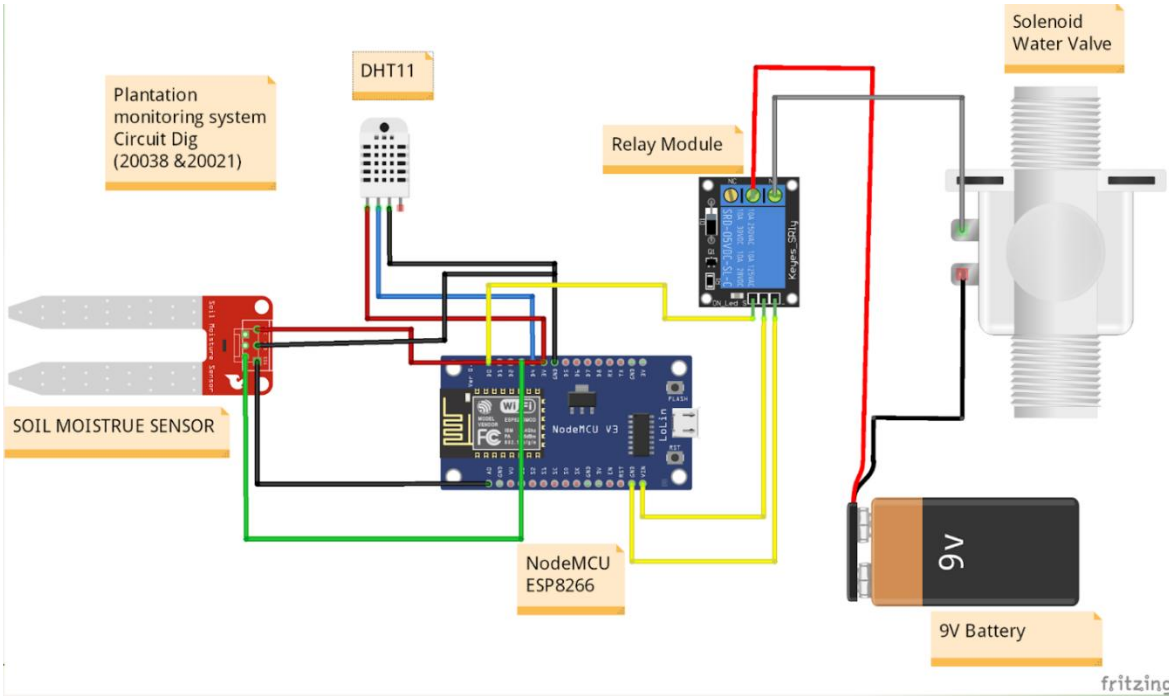
Blynk APP

Blynk is a platform that allows you to control Arduino, Raspberry Pi, and other devices via the Internet using IOS and Android applications. It’s a digital dashboard where you may drag and drop widgets to create a graphic interface for your project. Blynk is a programme that allows you to create your own apps. It can be applied to a single project or a number of them. Virtual LED's, buttons, value displays, and even a text terminal, as well as the ability to interact with one or more devices, may be incorporated in any project.

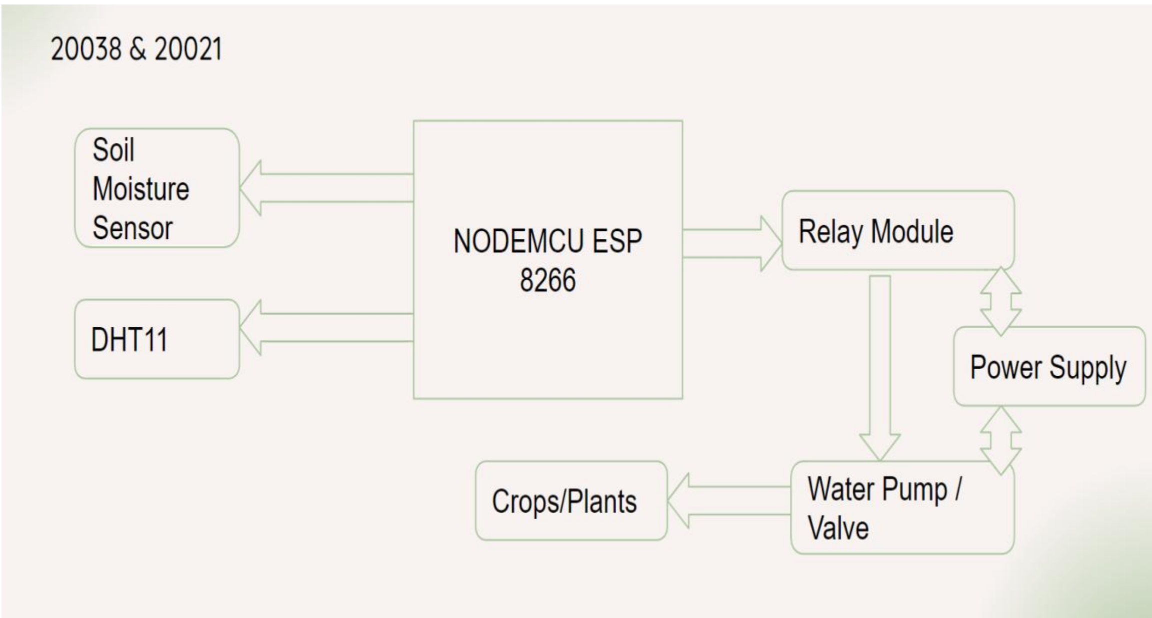




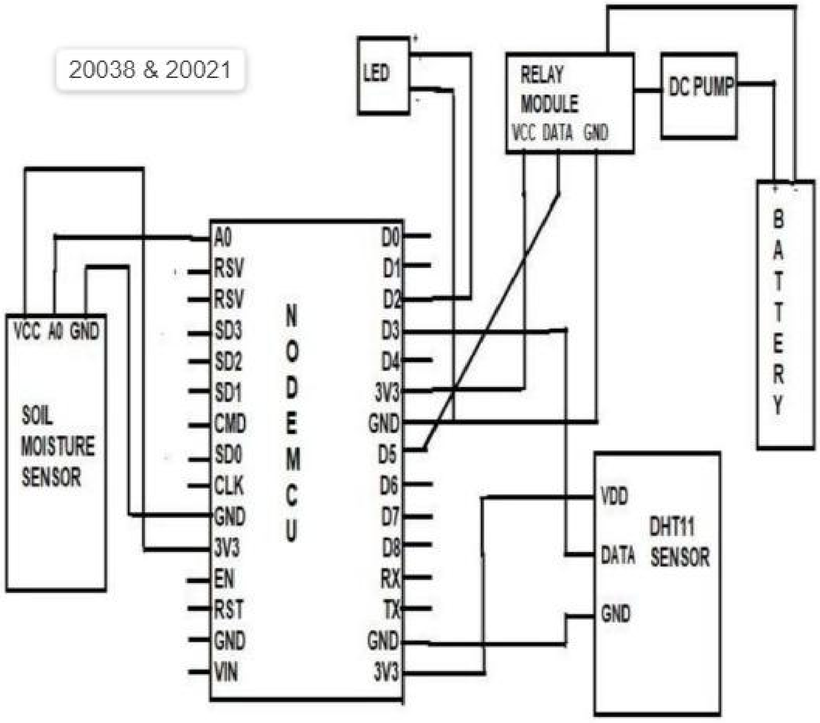
CIRCUIT DIAGRAM



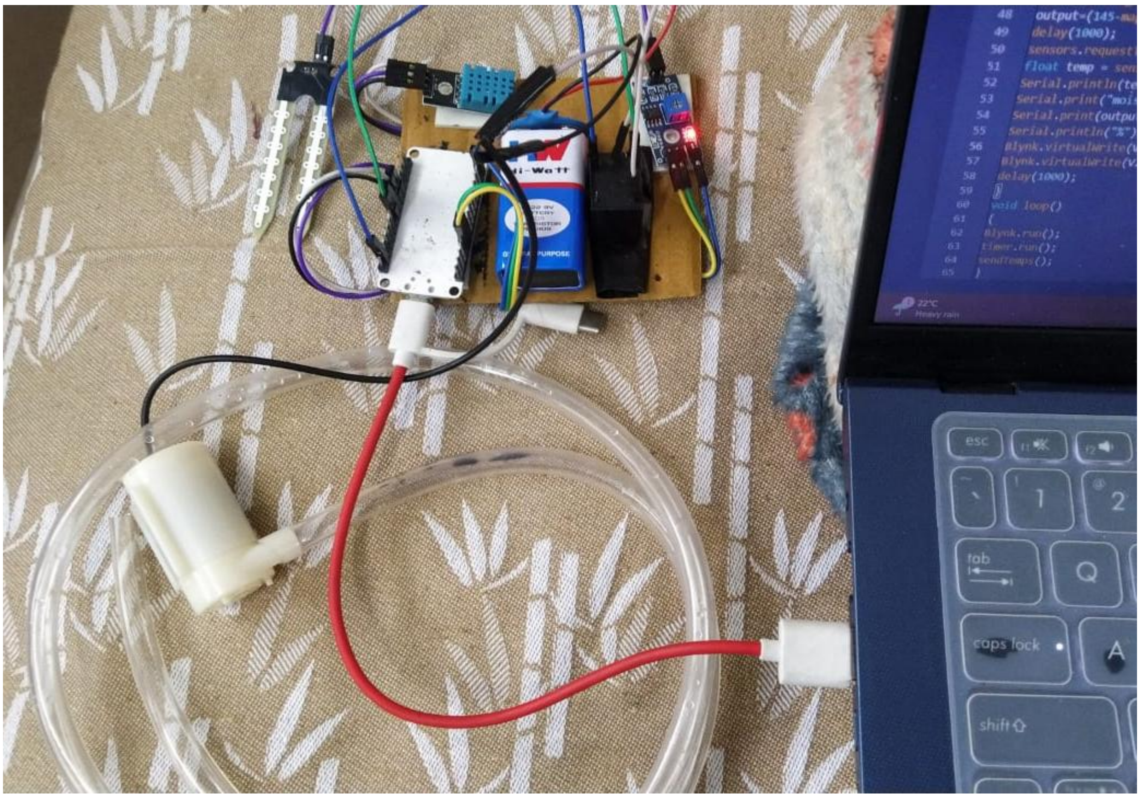
BLOCK DIAGRAM



CONNECTION



Connecting node MCU to the Laptop



CODE

Worked in Arduino IDE

```
#define BLYNK_PRINT Serial
#include <OneWire.h>
#include <SPI.h>
#include <BlynkSimpleEsp8266.h>
#include <DHT.h>
#include <DallasTemperature.h>
#include <ESP8266WiFi.h>

#define ONE_WIRE_BUS D2
OneWire oneWire(ONE_WIRE_BUS);
DallasTemperature sensors(&oneWire);
char auth[] ="DnT-Y0Y4IT6lzHWWGOQGZBg1QbljesZ_";    //Entering Auth Token from Blynk APP
char ssid[] = "Amrita_CHN2";    //Entering WiFi Name
char pass[] = "amrita@321";   //Entering Password
```

```
#define DHTPIN 2
#define DHTTYPE DHT11
DHT dht(DHTPIN, DHTTYPE);
SimpleTimer timer;
void sendSensor()
{
float h = dht.readHumidity();
float t = dht.readTemperature();
```

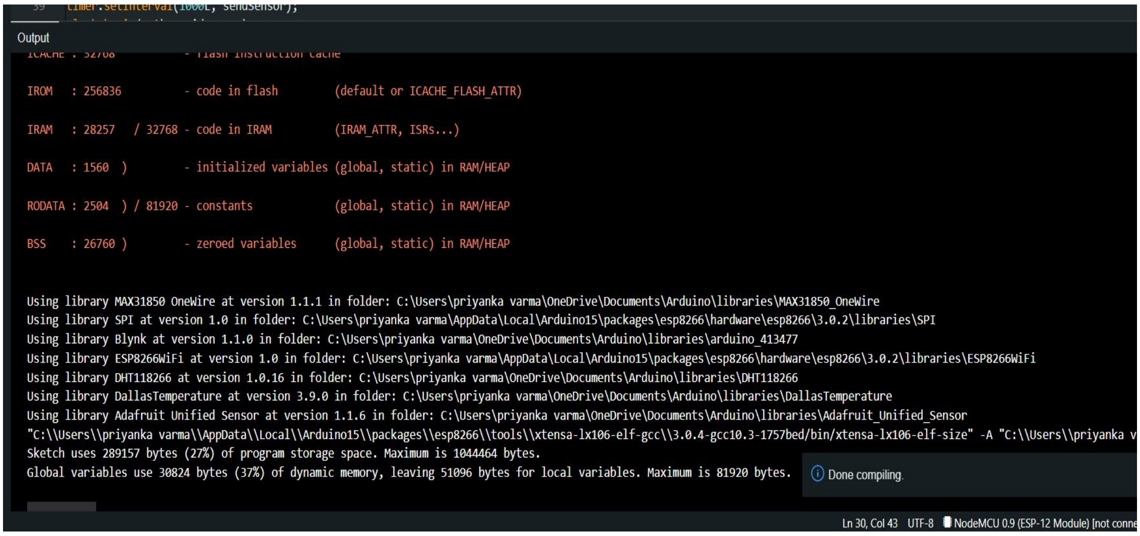
```
if (isnan(h) || isnan(t)) {
Serial.println("Failed to read from DHT sensor!");
return;
}
```

```
Blynk.virtualWrite(V5, h); //V5 is for Humdity
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));
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();
}
```

OUTPUT:

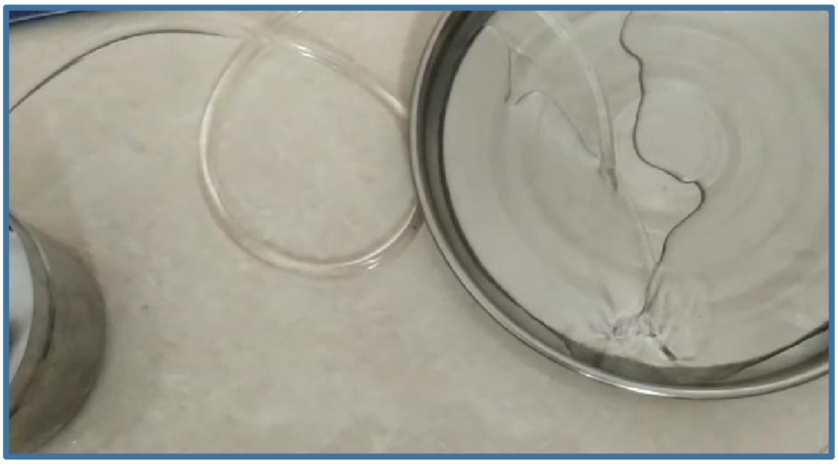


No errors Shown…

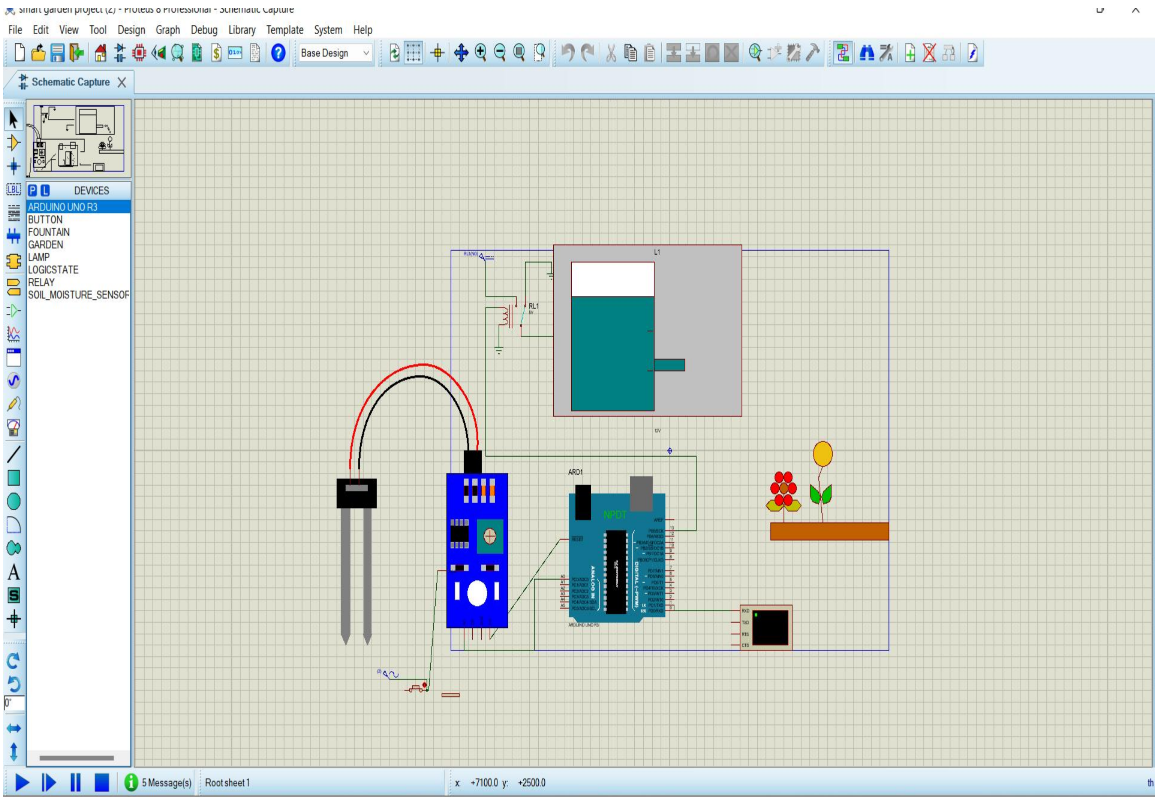
Done Uploading the code into NodeMCU…

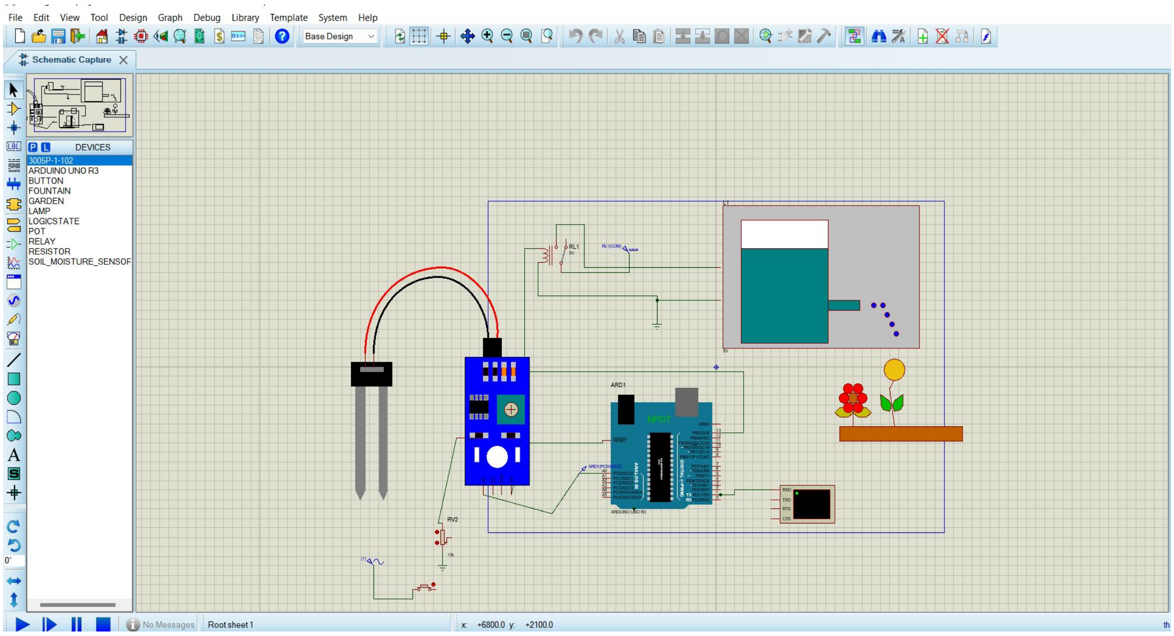
RESULTS

Water Flow From Water Pump



PROTEUS SIMULATION





CODE FOR PROTEUS

```
VOid setup() {
pinMode(13, OUTPUT);
Serial.begin(9600);


}
```

```
void loop() {
int y= analogRead(A0);
int u=map(y,0,1023,0,255);
Serial.println(u);
```

```
if(u>200)
{
  digitalWrite(13,HIGH);
  delay(1000);
}
```

```
if(u<200)
{
  digitalWrite(13,LOW);
  delay(1000);
```

```
}
```

RESULT

Using Internet of Things we can establish communication between various household devices to bring out automation. Automation in routine household chores can save a lot of time and also organize the lifestyle of an individual. Point of this project was to layout a circuit that comprise of sensors and utilizing idea of Internet of things that monitors and analyses the information provided by the sensors and notifies the user regarding the changes in the plant's conditions.

This plant monitoring systems a low cost system whose basic use is for the household purposes. Alongside it is kind of an interesting concept as the plant itself can call for water and protection whenever it needs it.The IOT system was thus developed using two major problems in context –to monitor and control the shade which inversely alters the amount of sunlight received by the plant. The catch of finding the correct shade time interval was crucial as too little sunlight would result in starvation due to lack of food preparation and too much would cause irreparable damage to the biological structure of it leading to eventual mortality

INDIVIDUAL CONTRIBUTION

Konduru Venkata Priyanka Varma

[CH.EN.U4CSE20038]

- Implementation of circuit
- Done Circuit diagram
- Literature Survey

Engu Himesh

[CH.EN.U4CSE20021]

- Coding on NodeMCU
- Connecting to Blynk App

Problem Faced

- Along the process of project completion, we encountered various problems and obstacles.
- Not everything that we had planned went smoothly during the project development span.
- Also, we had a limited amount of time for its completion so we were under a certain amount of pressure as well.
- We had to start from the research phase at the beginning and needed to gain knowledge on all the devices and components that we had intended to use for our project.
- Other phases of the project included coding, debugging, testing, documentation and implementation and it needed certain time for completion so we really had to manage the limited time available to us and work accordingly to finish the project within the schedule.

Future Scope

- The performance of the system can be further improved in terms of the operating speed, memory capacity, and instruction cycle period of the micro-controller 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.

CONCLUSION

The implementation of Plantation Monitoring 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, temperature.

Using an automated Plantation Monitoring system based on IOT reduces the farmers presence for irrigation which is the major part of the practice of farming and optimizes the usage of water by reducing the wastage of water. The proposed controller eliminates the manual switching mechanism used by the farmers. The system can also be designed for temperature sensor-based cooling systems for temperature-sensitive plants. The use of this system will be able to contribute to the socio-economic development of the nation.

It is a fast response and a user-friendly system. The accurate measurement and watering improve yield obtained because of the accuracy of nutrients provided(through water) to field as a balanced diet for plants at various levels of their growth(seed germination, sapling, full- fledged plant, etc. This can be an industrial revolution for the methods of farming irrigation.

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