Smart Irrigation System

(IoT)

Final Report

Department of Computer Engineering &Application

Institute of Engineering & Technology

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CERTIFICATE

This is to certify that Project Report entitled **"Smart Irrigation System"** which is submitted by Himanshu Singh , Ayushi Kolay and Jatin Seth, in partial fulfillment of the requirement for the award of degree B.Tech in Department of Computer Science and Engineering of GLA University, is a record of the candidate own work carried out by him under my supervision. The matter embodied in this thesis is original and has not been submitted for the award of any other degree.

DECLARATION

I hereby declare that the Project Report entitled "Smart Irrigation System" submitted by me to GLA University, in partial fulfillment of the requirement for the award of the degree of B.Tech in Computer Science Department is a record of bonafide project work carried out by me under the guidance of Mr. Vaibhav Deewan. This submission is my own work and that, to the best of my knowledge and belief , it contains no material previously published or written by another person and not be submitted, either in part or in full, for the award of any other degree or diploma in this university or any other.

Date: Signature of Student

Acknowledgement

It gives us a great sense of pleasure to present the synopsis of the Mini Project (Smart Irrigation System) undertaken during Btech IIIrd Year, this project itself is going to be acknowledgement to the inspiration, drive and technical assistance will be contribute to it by many individuals.

We owe special debt of gratitude to Mr. Vaibhav Diwan (Assistant Professor Department of CEA) for providing us with an encouraging platform to develop this project which thus helped us in shaping our abilities towards a constructive goal and for his constant support and guidance to our work. His sincerity, thoroughness and perseverance is being a constant source of inspiration for us. We believe that he will shower us with all his Extensively experienced ideas and insightful comments at different stages of the project & also taught us about the latest industry-oriented technologies.

We also do not like to miss the opportunity to acknowledge the contribution of all faculty members of the department for their kind guidance and co-operation.

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ABSTRACT

Agriculture remains the sector which contributes the highest to India's GDP. But, when considering technology that is deployed in this field, we find that the development is not tremendous. Irrigation is one method to supply water but in some cases there will be lot of water wastage. So in this regard to save water and time we have proposed project titled **Smart Iirrigation Ssystem** under the use of technology **IOT**. In this proposed system we are using various sensors like humidity, soil moisture sensors which senses the various parameters of the soil based on soil moisture value land gets automatically irrigated by ON/OFF of the motor.

These sensed parameters and motor status will be displayed on Blynk application.

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Introduction

The smart irrigation system is an IOT based device which is capable of automating the irrigation process by analyzing the moisture of soil. The smart irrigation system has wide scope to automate the complete irrigation system. Here we are building a IOT based irrigation system using different tools.

Tools to be used in this project are :-

- Node MCU
- Soil moisture sensor
- Jumper wires
- Bread board
- DC Motor
- DHT 11 Sensor

The **Smart irrigation System** has wide scope to automate the complete irrigation system. Here we are building a **IoT** based Irrigation System using **NodeMCU** Module and **DHT11 Sensor**. It will not only automatically irrigate the water based on the moisture level in the soil but also send the data to Server to keep track of the land condition.The system will consist a water pump which will be used to sprinkle water on the land depending upon the land environment condition such as Moisture, Temperature and Humidity.

Most of the farmers use large portions of farming land and it becomes very difficult to reach and track each corner of large lands. Sometimes there is a possibility of uneven water sprinkles. This result in the bad quality crops which further leads to financial losses. In this scenario the Smart Irrigation System using Latest IoT technology is helpful and leads to ease of farming.

Applications

- It can be used in agricultural fields, lawns and as drip irrigation system
- It can be used for cultivation purpose
- It can be used to provide water in nursery planting arena
- It can be used for wide range of crops as one can customize reference required for different kind of crops
- Pond water management and water transfer

Advantages

- Water conservation :
  Soil moisture sensor allow for water use only when and where needed

- Real time data give:
  Farmers can visualize water levels and soil moisture in real time and remotely to accelerate decision making process

- Lowered operation cost
- Efficient and saves time
- Increase in productivity
- Reduce soil erosion and nutrient leaching

Hardware and Software Requirements

Hardware Requirements:-

- Node MCU
- Soil moisture sensor
- Jumper wires
- Bread board
- DC motor
- Pipe
- Plant

Software Requirements:-

- Arduino IDE
- Blynk Application

Problem Statement

In the case of traditional irrigation system water saving is not considered. Since, the water is irrigated directly in the land, plants under go high stress from variation in soil moisture, therefore plant appearance is reduced. The absence of automatic controlling of the system result in improper water control system. The major reason for these limitations is the growth of population which is increasing at a faster rate. At present there is emerging global water crisis where managing scarcity of water has become a serious job. This growth can be seen in countries which have shortage of water resources and are economically poor. So this is the serious problem in agriculture area. So we want to design an Smart Irrigation System to help the society.

Objective

Water is one of the essential elements of human existence. It is not always to get water supply from natural sources. Here comes the model of irrigation system. Irrigation is the man-made means of supplying water. The main objectives of irrigation supply are given below-

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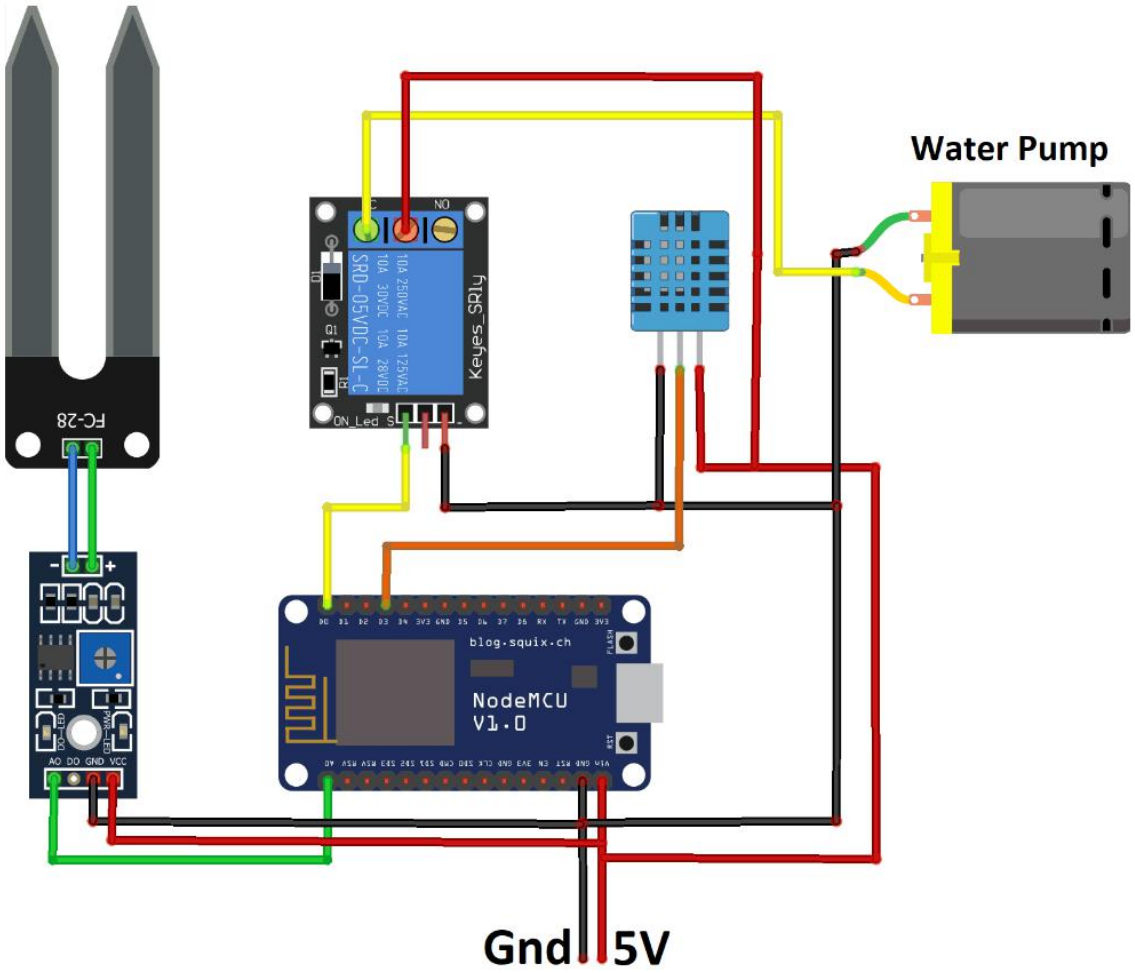
- Ensure enough moisture essential for plant growth.
- Cool the soil and atmosphere to provide a suitable surrounding
- To develop a smart irrigation system in order to get a significant saving in the consumption of water to irrigate the crops and to provide sufficient flow capacity to meet the irrigation demand

Methodology

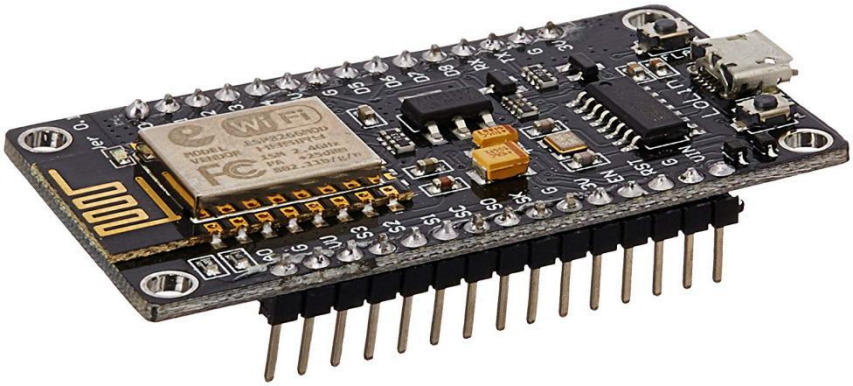
The outmoded irrigation technique has been replaced with automated technique. Many smart irrigation systems have been devised. A smart irrigation system, contrary to a traditional irrigation method, regulates supplied water according to the needs of the fields and crops. The feedback mechanism of a smart irrigation system is a moisture sensor. This moisture sensor is placed at a specific location on the irrigation field. Based on its value the water is being pumped to corresponding area up to a predetermined time.

The smart irrigation system has wide scope to automate the complete irrigation system. Here we are building a IoT based irrigation System using ESP8266 NodeMCU Module and soil moisture Sensor. It will not only automatically irrigate the water based on the moisture level in the soil but also send the data to Blynk app to keep track of land condition. The system will consist a water pump which will used to sprinkle water on the land depending upon the land environmental condition such as moisture and humidity.



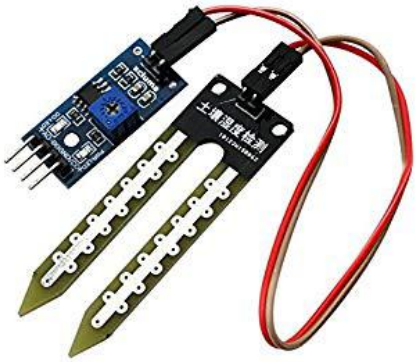
6.Implementation Details

NODE MCU:-



NODE MCU is an open source IoT platform.It includes firmware which runs on the ESP 8266 WIFI SoC and hardware which is based on the ESP 12 module. It is a low cost Wi-Fi module chip that can be configured to connect to the internet for Internet of Things.

Soil moisture Sensor:-



The soil moisture sensor is used to measure the volumetric water content of soil. It is used to monitor soil moisture content to control irrigation. A moisture sensor is used to sense thelevel of moisture content present in irrigation field. It has a level detection module in which we can set a reference value.

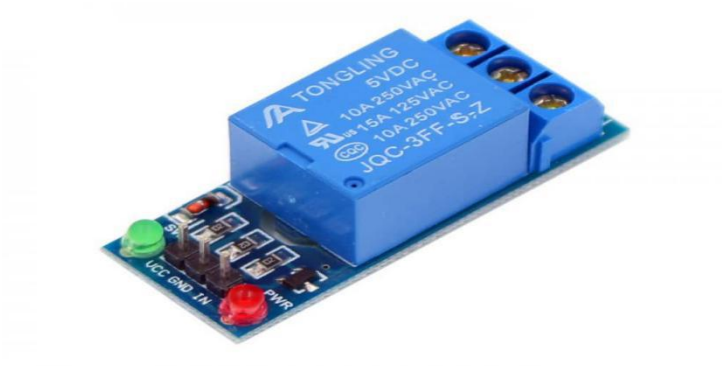
DC MOTOR PUMP :-

DC powered **pumps** use direct current from motor, battery, or solar power to move fluid in a variety of ways. Motorized **pumps** typically operate on 6, 12, 24, or 32 volts of **DC** power.

Humidity Sensor:-

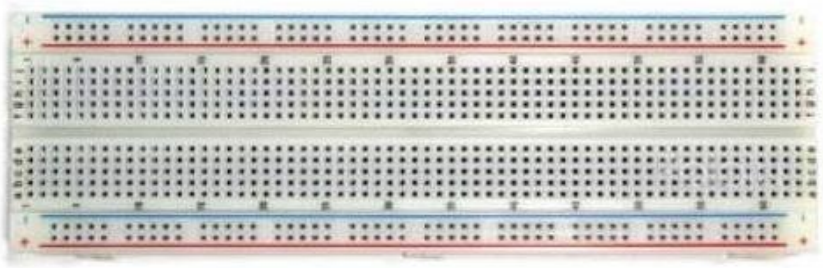
The temperature and humidity sensor is necessary to reduce the watering frequency. That is when the weather gets cooler, less water is needed whereas vice versa in the other case.

Relay:-



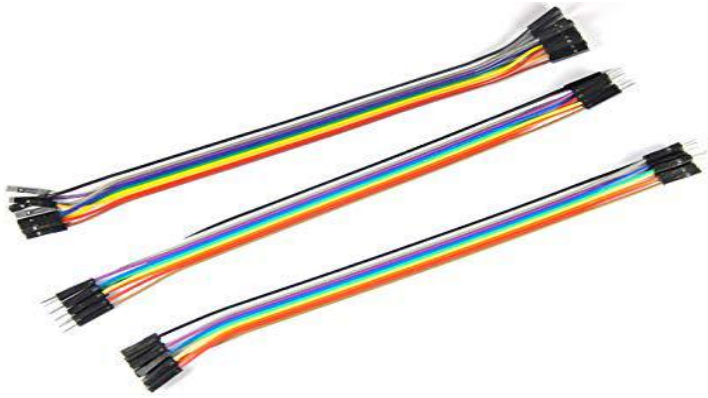
A relay is an electrically operated switch . It consists of a set of input terminals for a single or multiple control signals and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms.

BREADBOARD:-



A breadboard is a solder-less device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate.

JUMPER WIRES :-

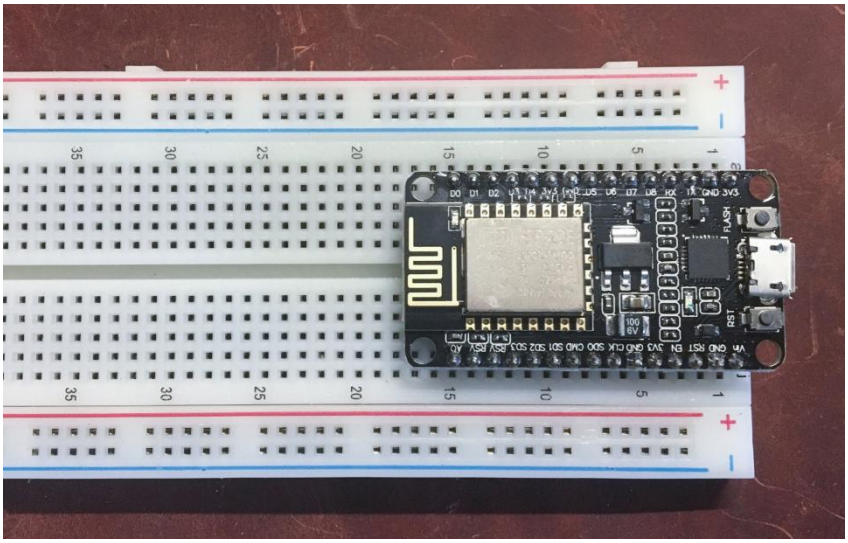


Jumper Wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed.

The implementing steps are:-

The smart irrigation system has wide scope to automate the complete irrigation system. Here we are building a IoT based irrigation System using ESP8266 NodeMCU Module and soil moisture Sensor. It will not only automatically irrigates the water based on the moisture level in the soil but also send the data to Blynk app to keep track of land condition. The system will consist a water pump which will used to sprinkle water on the land depending upon the land environmental condition such as moisture and humidity.

Step:-1 Firstly we will connect the Node MCU ESP8266 with the breadboard

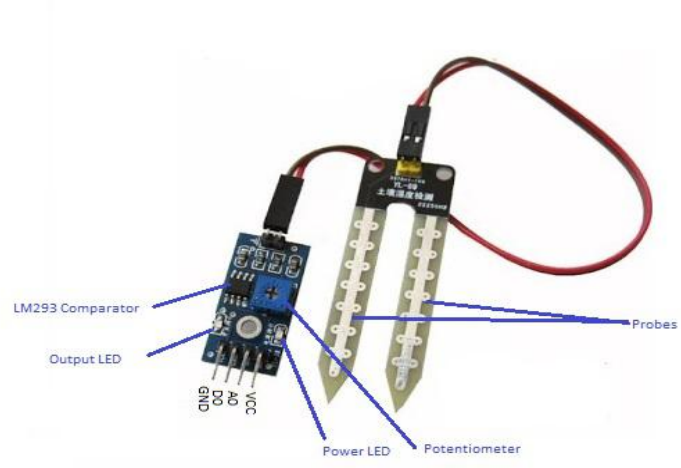


Step 2: Connecting the soil moisture sensor with the NodeMCU ESP8266. The pin connections are:-

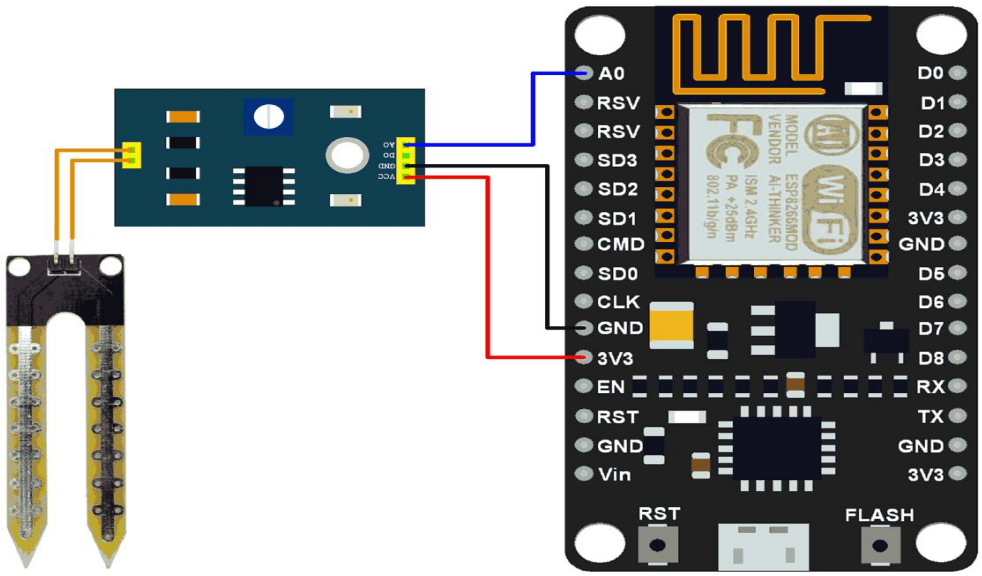
VCC pin of sensor with Node MCU VCC pin

Ao pin of sensor with Node MCU Ao pin

GND pin of sensor with Node MCU GND pin



Soil Moisture Sensor



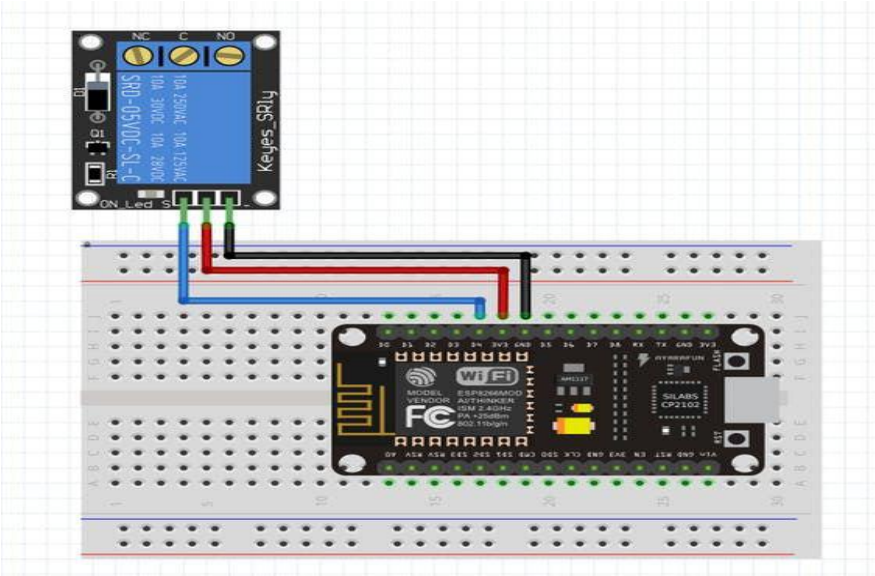
Moisture Sensor with Node MCU ESP8266

Step 3:- Connecting the relay module with NodeMCU. The pin connections will be:-

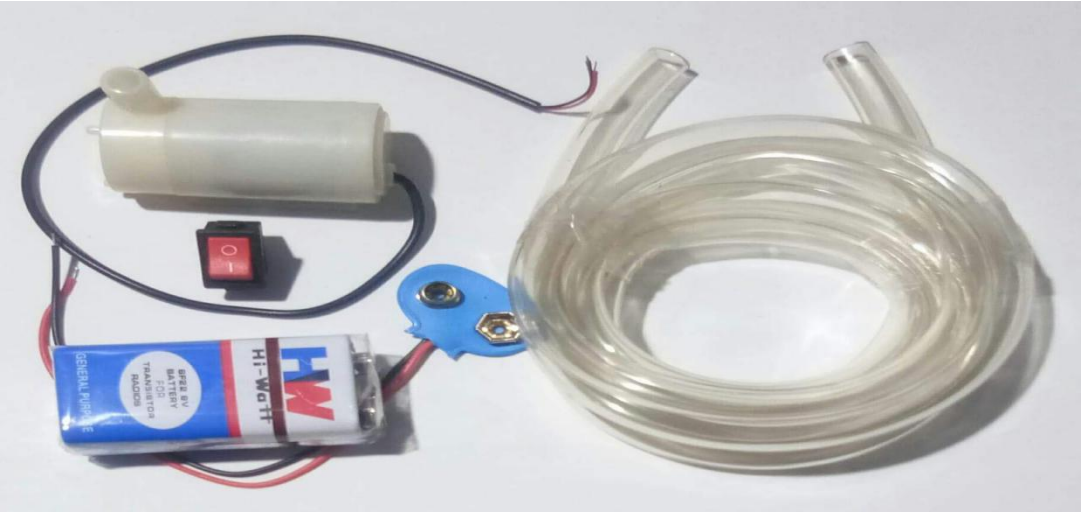
GND pin - GND pin

D0 pin with any data pin of Node MCU

VCC pin with 3V3



Step 4:- Here we are using 9V dc water pump, so we connect it with 9V battery for better performance.



Step:-5 . Now we connect the water pump with relay module and with battery.

After all these steps, the entire hardware connections is prepared.

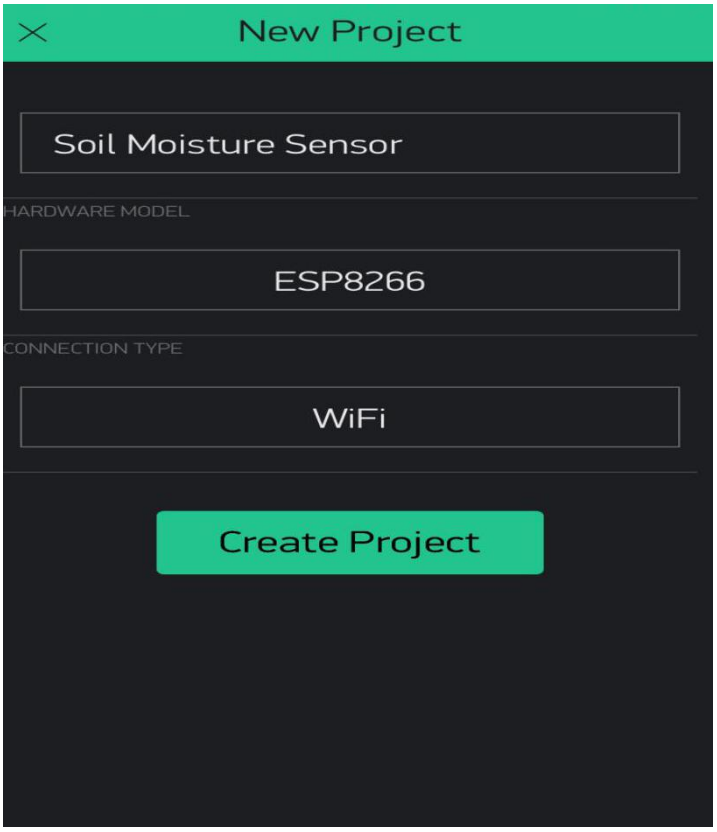
Software / Coding Part

Step 6:- Download the arduino Ide in your system and blynk application in your mobile.

In arduino ide we will upload and the program of the project and in Blynk app we will set up the moisture level gauge in which the moisture percentage present in soil will shown up.

Step 7:- We will connect the blynk with Node MCU through Wi-Fi module

```
char auth[] = "adpTxH70i5pdh86QbhXESeRO9T1Yrn9y"; // token id
    char ssid[] = "WIFI NAME ";
    char pass[] = "PASSWORD";
```

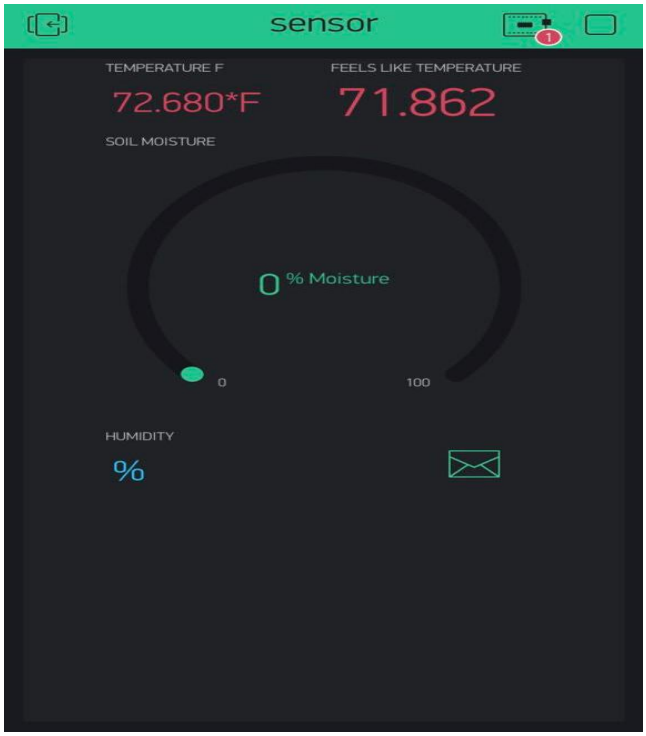


Step 8:- The water pump will automatically on/off with respect to moisture percentage present in soil which will be given by soil moisture sensor. If the moisture percent is low, then the motor will be on and the soil receives water until the moisture percent will reach the threshold value ,motor will be off.

```
BlynkTimer timer;


void pump()
{
  int value = analogRead(sensorpin);
  int value1=map(value,550,0,0,100);
  Blynk.virtualWrite(V1,value1);
  if (value1<20)
  {
    digitalWrite(moterpin, LOW);
  }
```

```
 else
  {
    digitalWrite(moterpin ,HIGH);
  }
}
```



Step 9:- We will connect the Node MCU ESP8266 with Arduino ide with cable. Upload the program in ide . After uploading the program the model will on. Below there is the code of our project. The model will start functioning

CODE

```
#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>

#define moterpin D7
#define sensorpin A0


int value1=0;
char auth[] = "XOIX3iZr5-eT7vRUuuztB80m7OQJxMFm";
char ssid[] = "AndroidAP";
char pass[] = "himanshu";

BlynkTimer timer;

void pump()
{
  int value = analogRead(sensorpin);
  int value1=map(value,550,0,0,100);
  Blynk.virtualWrite(V1,value1);
  if (value1<20)
  {
    digitalWrite(moterpin, LOW);
  }
  else
```

```
  {
    digitalWrite(moterpin ,HIGH);
  }
}
void setup()
{

  Serial.begin(9600);
  Blynk.begin(auth, ssid, pass);
  pinMode(moterpin,OUTPUT);
  digitalWrite(moterpin,LOW);
  pinMode(sensorpin,INPUT);
  timer.setInterval(1000L, pump);
      }
      void loop()
{
  Blynk.run();
  timer.run();


}
```

Step 10:- When the code will be uploaded in arduino ide, the system will operate. Soil moisture sensor reading will show in blynk and according to the moisture percentage, the motor will be on/off.

CONCLUSION

- The objective of this project is to avoid wastage of water and increase irrigation efficiency by using a NodeMCU based irrigation system with the help of moisture sensor.
- Smart Irrigation System control technology is easily deployable and can be controlled manually or automatically without physical presence at the system or field.
- The smart irrigation system is feasible and cost effective for optimizing water resources for agricultural productions
- It proves that the use of water can be diminished

FUTURE SCOPE

The project has tremendous scope in developing it and making it more user-friendly and with additional features like :-

- To capture the photos and webcam can be installed to the device, which can be sent to the database
- Implementation of speech based option for those who are unable to read
- A device with a GPS can be integrated to provide specific location of the farmer and more accurate weather reports of agriculture field and garden
- All the features on device end can be developed in the regional language, which helps in easy reading for the farmers

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