MID SEM REPORT

Smart irrigation system

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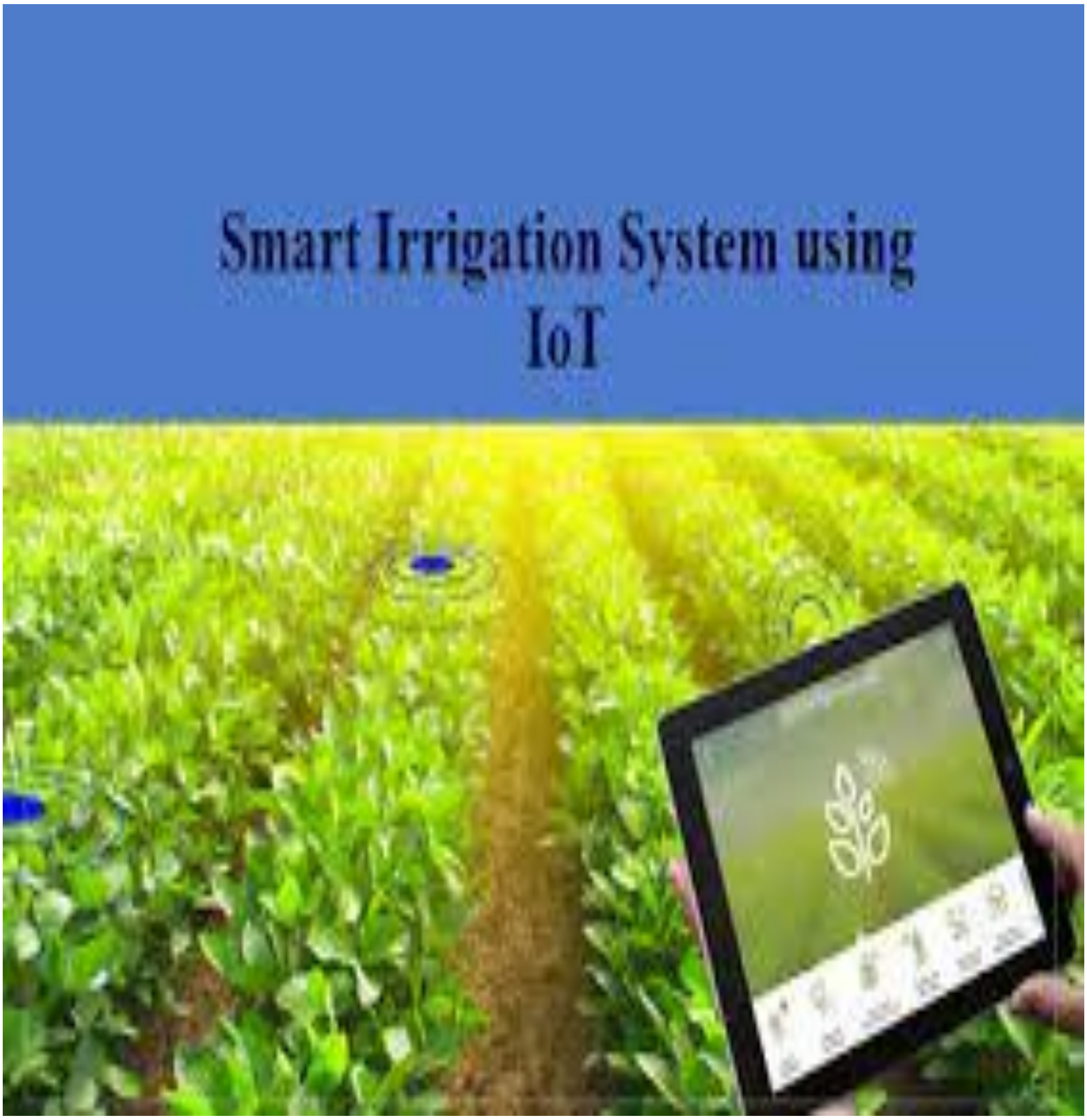
Smart Irrigation System using
IoT

SYNOPSIS

CONTENT:

About the Project:

In the agriculture field, sensors are used like soil moisture. The information received from the sensors is sent to the Database folder through the Android device. In the control section, the system is activated using the application, this is finished using the ON/OFF buttons in the application. Also, this system is automatically activated when the soil moisture is low, the pump is switched ON based on the moisture content.

The application has a feature like taking some time from the user and water the agriculture field when the time comes. In this system, there is a switch used to turn off the water supply if the system fails. Other parameters such as the moisture sensor demonstrate the threshold price and the level of water in the soil.

Motivation:

For continuously increasing demand and decrease in supply of food necessities, it's important to rapid improvement in production of food technology. Agriculture is only the source to provide this. This is the important factor human societies to growing and dynamic demand in food production . Agriculture plays the important role in the economy and development, like India . Due to lack of water and scarcity of land water result the decreasing volume of water on earth , the farmer using irrigation.

Future Scope:

Our project can be improvised by adding a Webscaper which can predict the weather and water the plants/crops accordingly. If rain is forecasted, less water is let out for the plants. Also, a GSM module can be included so that the user can control the system via smart phone. A water meter can be installed to estimate the amount of water used for irrigation and thus giving a cost estimation. A solenoid valve can be used for varying the volume of water flow. Furthermore, Wireless sensors can also be used.

Technology Used:

a) Hardware:

- Soil Moisture Sensor
- Temperature Sensor
- Relay
- Servo Motor and Rotating Platform

b) Software:

- Arduino
- Blynk app

c) Language Used:

- Python programming language

Advantages Of The System:

This technology is recommended for efficient automated irrigation systems and it may provide a valuable tool for conserving water planning and irrigation scheduling which is extendable to other similar agricultural crops. Maximum absorption of the water by the plant is ensured by spreading the water uniformly using a servo motor. So there is minimal wastage of water. This system also allows controlling the amount of water delivered to the plants when it is needed based on types of plants by monitoring soil moisture and temperature.This project can be used in large agricultural area where human effort needs to be minimized. Many aspects of the system can be customized and fine tuned through software for a plant requirement.

Conclusion:

In the present era, the farmers use irrigation technique through the manual control, in which the farmers irrigate the land at regular intervals [5].This process seems to consume more water and results in water wastage. Smart Irrigation System DOI: 10.9790/2834-10323236 www.iosrjournals.org 36 | Page Moreover in dry areas where there is inadequate rainfall, irrigation becomes difficult. Hence we require an automatic system that will precisely monitor and control the water requirements in the field. Installing Smart irrigation system saves time and ensures judicious usage of water. Moreover this architecture uses microcontroller which promises an increase in system life by reducing power consumption.

Reference:

www.goggle.com
www.tutorialspoint.co
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ABSTRACT

India is mainly an agricultural country. Agriculture is the most important occupation for the most of the Indian families. It plays vital role in the development of agricultural country. In India, agriculture contributes about 16% of total GDP and 10% of total exports. Water is main resource for Agriculture. 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 automatic irrigation system using IoT. In this proposed system we are using various sensors like temperature, humidity, soil moisture sensors which senses the various parameters of the soil and 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 user android application.

KEYWORDS: Internet of things (IoT), Arduino, Temperature sensor, Soil moisture sensor, And Humidity sensor.

INTRODUCTION

Agriculture is the major source of income for the largest population in India and is major contributor to Indian economy. However, technological involvement and its usability have to be grown still and cultivated for agro sector in India. Although few initiatives have also been taken by the Indian Government for providing online and mobile messaging services to farmers related to agricultural queries and agro vendor's information to farmers. Based on the survey it is observed that agriculture contributes 27% to GDP, and Provides employment to 70% of Indian population

IoT is changing the agriculture domain and empowering farmers to fight with the huge difficulties they face. The agriculture must overcome expanding water deficiencies, restricted availability of lands, while meeting the expanding consumption needs of a world population. New innovative IoT applications are addressing these issues and increasing the quality, quantity, sustainability and cost effectiveness of agricultural production.

Agriculture is the backbone of Indian Economy. In today's world, as we see rapid growth in global population, agriculture becomes more important to meet the needs of the human race. However, agriculture requires irrigation and with every year we have more water consumption than rainfall, it becomes critical for growers to find ways to conserve water while still achieving the highest yield. But in the present era, the farmers have been using irrigation technique through the manual control in which they irrigate the land at the regular interval.

The Internet of Things (IoT) is a technology where in a mobile device can be used to monitor the function of a device. The Internet of Things (IoT) is concerned with interconnecting communicating objects that are installed at different locations that are possibly distant from each other. Internet of Things (IoT) is a type of network technology, which senses the information from different sensors and makes anything to join the Internet to exchange information.

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DECLARATION

I hereby declare that the project work entitled "Smart irrigation system" submitted to the GLA University Mathura, is a record of an original work done by me under the guidance of Mr. Amir khan

Signature of Candidate:

Name of team members: Akshat Dwivedi , Prakhar Srivastava , Simran Gupta , Sristi Shukla , Aviral abel Willy

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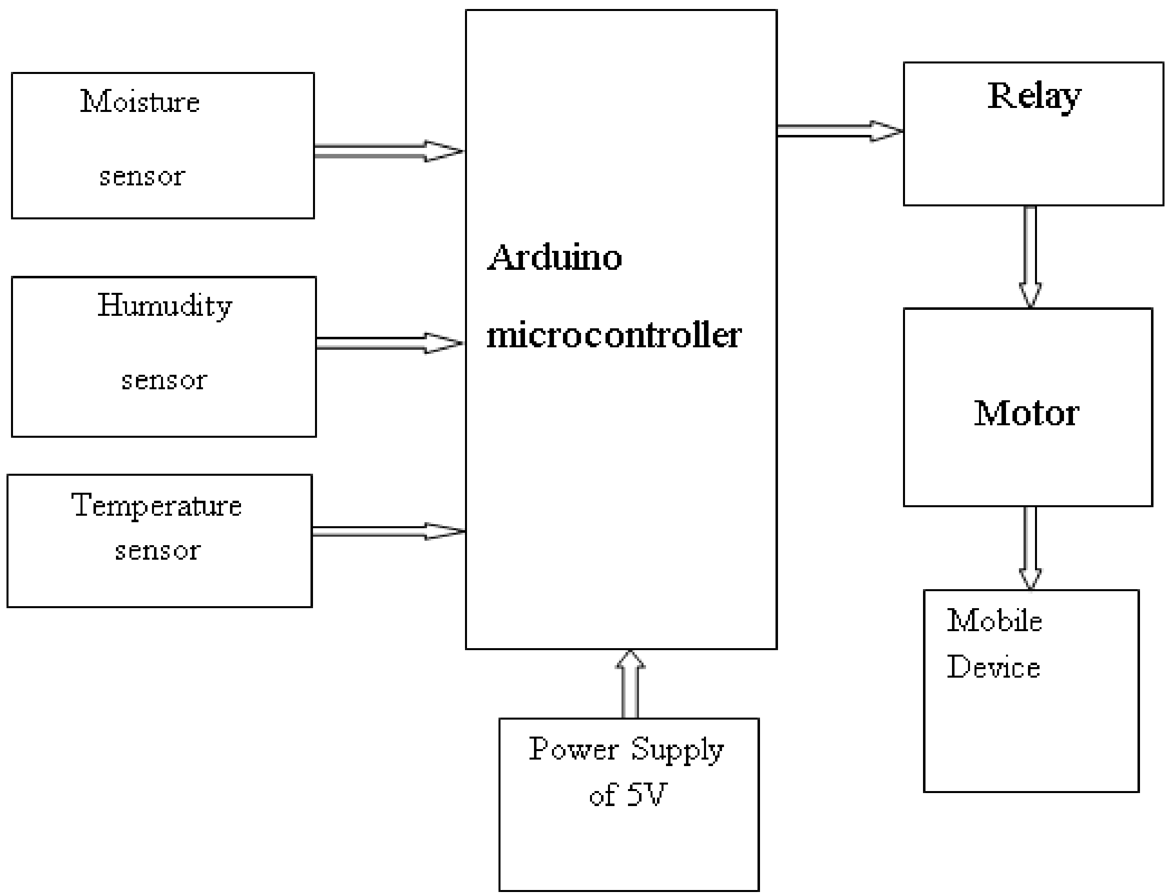
Course: Computer Science and Engineering

Year: III

Semester: VI

PROPOSED SYSTEM

This below Figure is a overall block diagram of arduino based automatic irrigation system which consist of three sensors which are connected to controller and sensed values from these sensors are send to the mobile application



Block Diagram of Automatic Irrigation System

Figure shows the block diagram of smart irrigation system with IoT. Farmers start to utilize various monitoring and controlled system in order to increase the yield with help of automation of an agricultural parameters like temperature, humidity and soil moisture are monitored and control the system which can help the farmers to improve the yield.

This proposed work includes an embedded system for automatic control of irrigation. This project has wireless sensor network for real-time sensing of an irrigation system. This system provides uniform and required level of water for the agricultural farm and it avoids water wastage. When the moisture level in the soil reaches below threshold value then system automatically switch ON the motor. When the water level reaches normal level the motor automatically switch OFF. The sensed parameters and current status of the motor will be displayed on user's android application

OBJECTIVE OF THE PROJECT

The main objective of this project is to provide an automatic irrigation system therebysaving time, money & power of the farmer. The traditional farm-land irrigationtechniques require manual intervention. With the automated technology of irrigation the human intervention can be minimized.

DESIGN

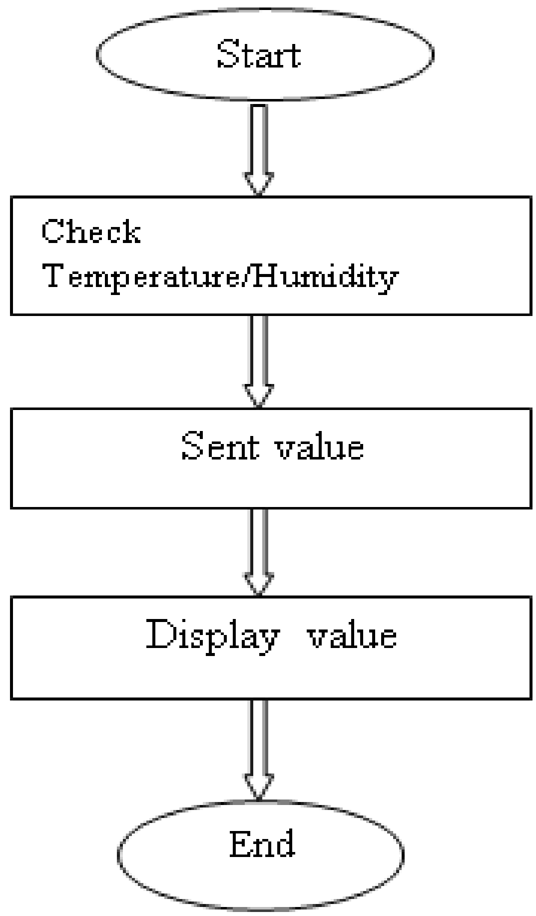
Design of a system explains temperature, humidity and soil moisture values usingflow chart.

FLOW CHART

A flowchart is a graphic representation of a logic sequence, work or manufacturing process, organization chart, or similar formalized structure. The flowchart is a means to visually present the flow of data through an information processing systems.

TEMPERATURE AND HUMIDITY SENSOR

This below Figure shows the sensed values of temperature and humidity.

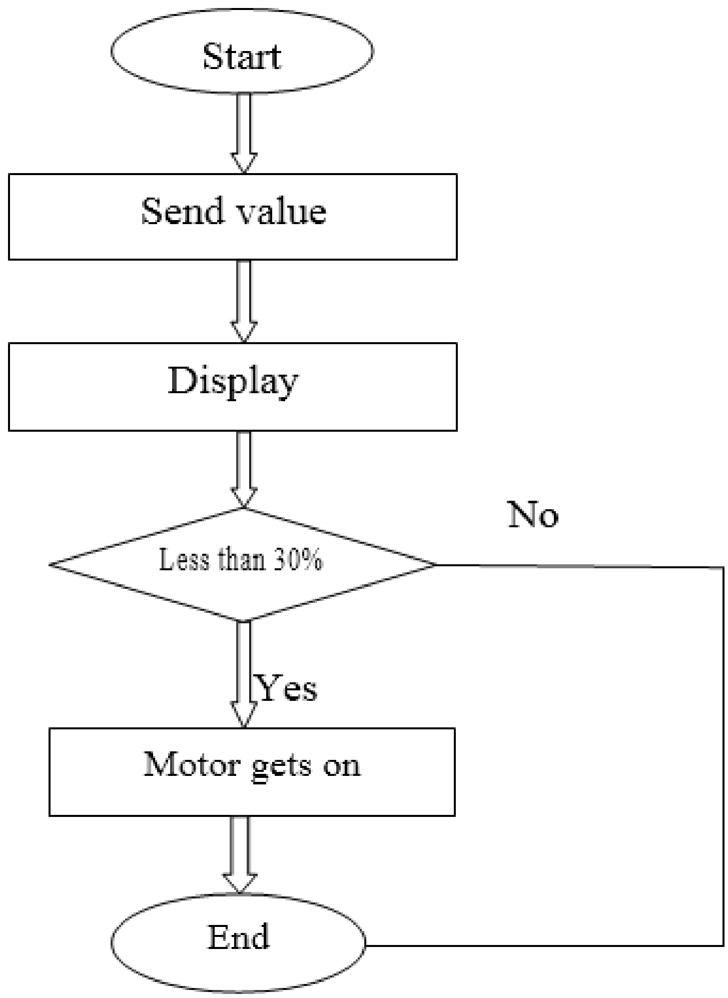


Flowchart of Temperature/Humidity Sensor

The DHT11 is a basic, digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin(no analog pins needed).It is simple to use, but requires careful timing to grab data. Humidity sensors are used for measuring moisture contentin the atmosphere. Then current temperature, humidity values are send to the microcontroller, those values will display in the users android app.

SOIL MOISTURE SENSOR

This below Figure shows the procedure of displaying soil moisture value



Flow chart of Soil moisture sensor

Soil moisture sensors measure the water content in soil. Moisture in the soil is an important component in the atmospheric water cycle . Sensor module outputs a high level of resistance when the soil moisture is low. It has both digital and analog outputs. Digital output is simple to use, but it is not as accurate as analog output basedon moisture level motor gets turn on/off automatically

IMPLEMENTATION

The proposed agricultural system is designed to solve to find an optimal solution tothe water crisis. The design implements IoT technology using an android device, a main controlling unit (MCU), sensors to measure various parameters and a water pump, which will be used to supply water to the farm.

PROGRAMMING TECHNIQUES

This programming technique includes explanation about THINGSPEAK web server and it uses JSON format to convert stored data into human readable form.

THINGSPEAK

According to its developers, "ThingSpeak is an open source Internet of Things(IoT) application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. ThingSpeak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates". ThingSpeak was originally launched by ioBridge in 2010 as a service in support of IoT applications. ThingSpeak has integrated support from the numerical computing software Matlab from Math works. Allowing ThingSpeak users to analyze and visualize uploaded data usingMatlab without requiring the purchase of a Matlab license from Math works. ThingSpeak has a close relationship with Math works. In fact, all of the ThingSpeak documentation is incorporated into the Math works' Matlab documentation site and even enabling registered Math works user accounts as valid login credentials on the ThingSpeak website. The terms of service and privacy policy of ThingSpeak.com are between the agreeing user and Math works.

JSON FORMAT

In computing, **JavaScript Object Notation** or **JSON** is an open-standard file format that uses human-readable text to transmit data objects consisting of attribute– value pairs and array data types (or any other serializable value). It is a very common data format used for asynchronous browser/server communication, including as areplacement for XML in some AJAX-style systems.

JSON is a language-independent data format. It was derived from JavaScript, but as of 2017 many programming languages include code to generate and parse JSON-format data. The official Internet media type for JSON is application/json.

JSON filenames use the extension .json. Douglas Crockford originally specified the JSON format in the early 200

PROTOTYPE

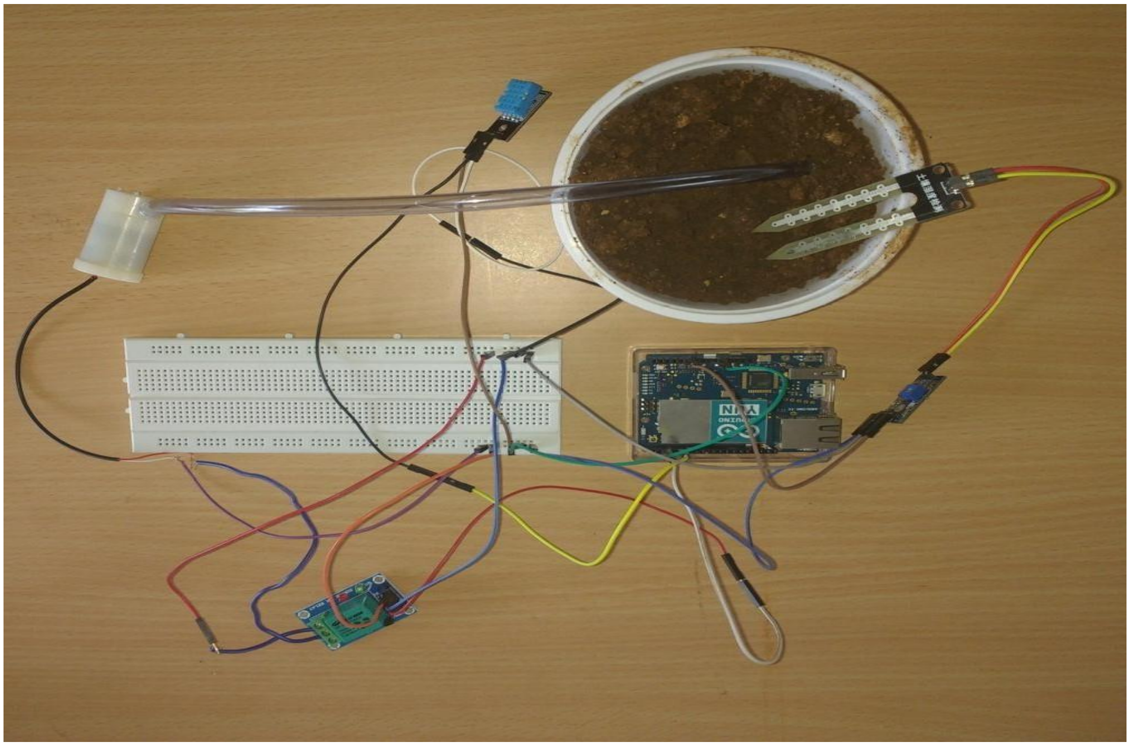


Figure shows the prototype of automatic irrigation system. The microcontroller arduino is connected to temperature sensor, soil moisture sensor, humidity sensor, relay and motor. These sensors sense the various parameter of the soil, motor is used to provide water to the land. And relay is used control the motor.

Material requied:

- NodeMCU ESP8266
- Soil Moisture Sensor Module
- Water Pump Module
- Relay Module
- DHT11
- Connecting Wires

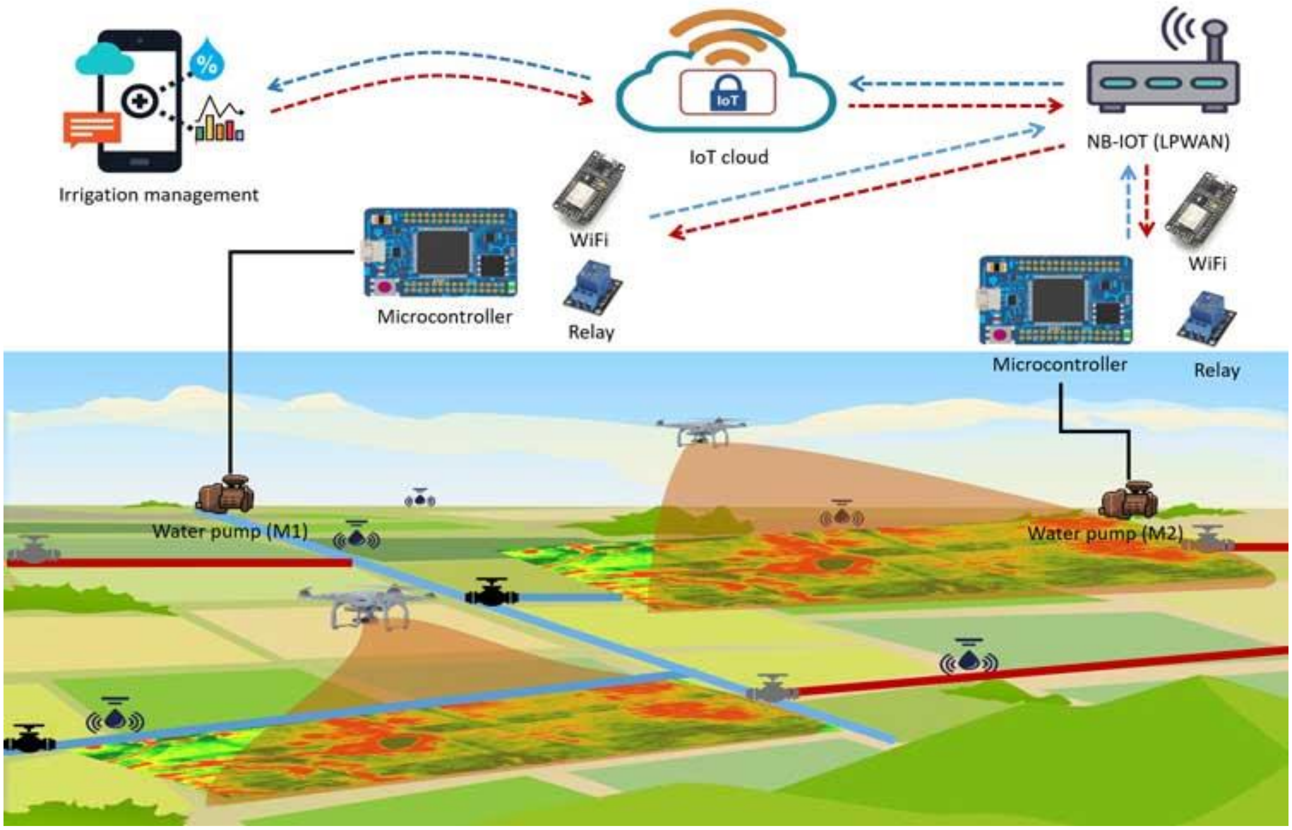
Data looks on ThingSpeak Dashboard

Program:

```
#include <DHT.h>
#include <ESP8266WiFi.h>
String apiKey = "X5AQ3EGIKMBYW31H";     //  Enter your Write API key
here
const char* server = "api.thingspeak.com";
const char *ssid =  "CircuitLoop";     // Enter your WiFi Name
const char *pass =  "circuitdigest101"; // Enter your WiFi Password
#define DHTPIN D3          // GPIO Pin where the dht11 is connected
DHT dht(DHTPIN, DHT11);
WiFiClient client;

const int moisturePin = A0;             // moisteure sensor pin
const int motorPin = D0;
unsigned long interval = 10000;
unsigned long previousMillis = 0;
unsigned long interval1 = 1000;
unsigned long previousMillis1 = 0;
float moisturePercentage;              //moisture reading
float h;                  // humidity reading
float t;                  //temperature reading

void setup()
{
  Serial.begin(115200);
  delay(10);
  pinMode(motorPin, OUTPUT);
  digitalWrite(motorPin, LOW); // keep motor off initally
  dht.begin();
  Serial.println("Connecting to ");
  Serial.println(ssid);
  WiFi.begin(ssid, pass);
  while (WiFi.status() != WL_CONNECTED)
  {
    delay(500);
    Serial.print(".");              // print ... till not connected
  }
  Serial.println("");
  Serial.println("WiFi connected");
}
```

```
void loop()
{
  unsigned long currentMillis = millis(); // grab current time

  h = dht.readHumidity();     // read humiduty
  t = dht.readTemperature();     // read temperature

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

  moisturePercentage = ( 100.00 - ( (analogRead(moisturePin) / 1023.00) *
100.00 ) );

  if ((unsigned long)(currentMillis - previousMillis1) >= interval1) {
    Serial.print("Soil Moisture is  = ");
    Serial.print(moisturePercentage);
    Serial.println("%");
    previousMillis1 = millis();
  }

if (moisturePercentage < 50) {
  digitalWrite(motorPin, HIGH);         // tun on motor
}
if (moisturePercentage > 50 && moisturePercentage < 55) {
  digitalWrite(motorPin, HIGH);        //turn on motor pump
}
if (moisturePercentage > 56) {
  digitalWrite(motorPin, LOW);          // turn off mottor
}

if ((unsigned long)(currentMillis - previousMillis) >= interval) {

  sendThingspeak();           //send data to thing speak
  previousMillis = millis();
  client.stop();
}

}

void sendThingspeak() {
  if (client.connect(server, 80))
```

```
  {
    String postStr = apiKey;              // add api key in the postStr string
    postStr += "&field1=";
    postStr += String(moisturePercentage);    // add mositure readin
    postStr += "&field2=";
    postStr += String(t);                 // add tempr readin
    postStr += "&field3=";
    postStr += String(h);                  // add humidity readin
    postStr += "\r\n\r\n";

    client.print("POST /update HTTP/1.1\n");
    client.print("Host: api.thingspeak.com\n");
    client.print("Connection: close\n");
    client.print("X-THINGSPEAKAPIKEY: " + apiKey + "\n");
    client.print("Content-Type: application/x-www-form-urlencoded\n");
    client.print("Content-Length: ");
    client.print(postStr.length());           //send lenght of the string
    client.print("\n\n");
    client.print(postStr);                      // send complete string
    Serial.print("Moisture Percentage: ");
    Serial.print(moisturePercentage);
    Serial.print("%. Temperature: ");
    Serial.print(t);
    Serial.print(" C, Humidity: ");
    Serial.print(h);
    Serial.println("%. Sent to Thingspeak.");
  }
}
```



Irrigation management
IoT cloud
NB-IOT (LPWAN)
WiFi
Relay
Microcontroller
WiFi
Microcontroller
Relay
Water pump (M1)
Water pump (M2)

SOFTWARE USED FOR MODULE DESIGN

PROTEUS

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

CONCLUSION

The application of agriculture networking technology is need of the modern agricultural development, but also an important symbol of the future level of agricultural development; it will be the future direction of agricultural development. After building the agricultural water irrigation system hardware and analyzing and researching the network hierarchy features, functionality and the corresponding software architecture of precision agriculture water irrigation systems, actually applying the internet of things to the highly effective and safe agricultural production has a significant impact on ensuring the efficient use of water resources as well as ensuring the efficiency and stability of the agricultural production.

With more advancement in the field of IoT expected in the coming years,these systems can be more efficient, much faster and less costlier. In the Future, this system can be made as an intelligent system, where in the system predicts user actions, rainfall pattern, time to harvest, animal intruder in the field and communicating the information through advanced technology like IoT can be implemented so that agricultural system can be made independent of human operationand in turn quality and huge quantity yield can be obtained.

MODULE DESIGN LAYOUT

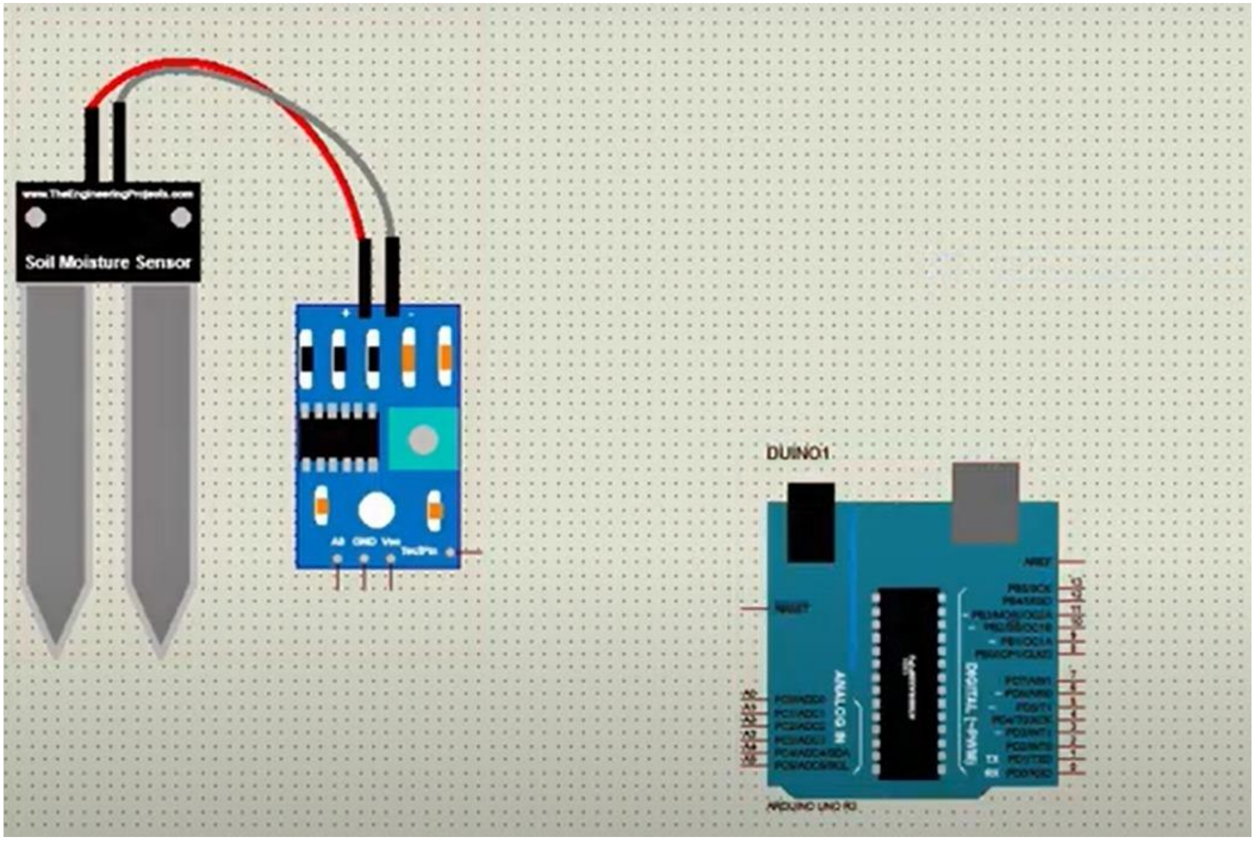
COMPONENTS –

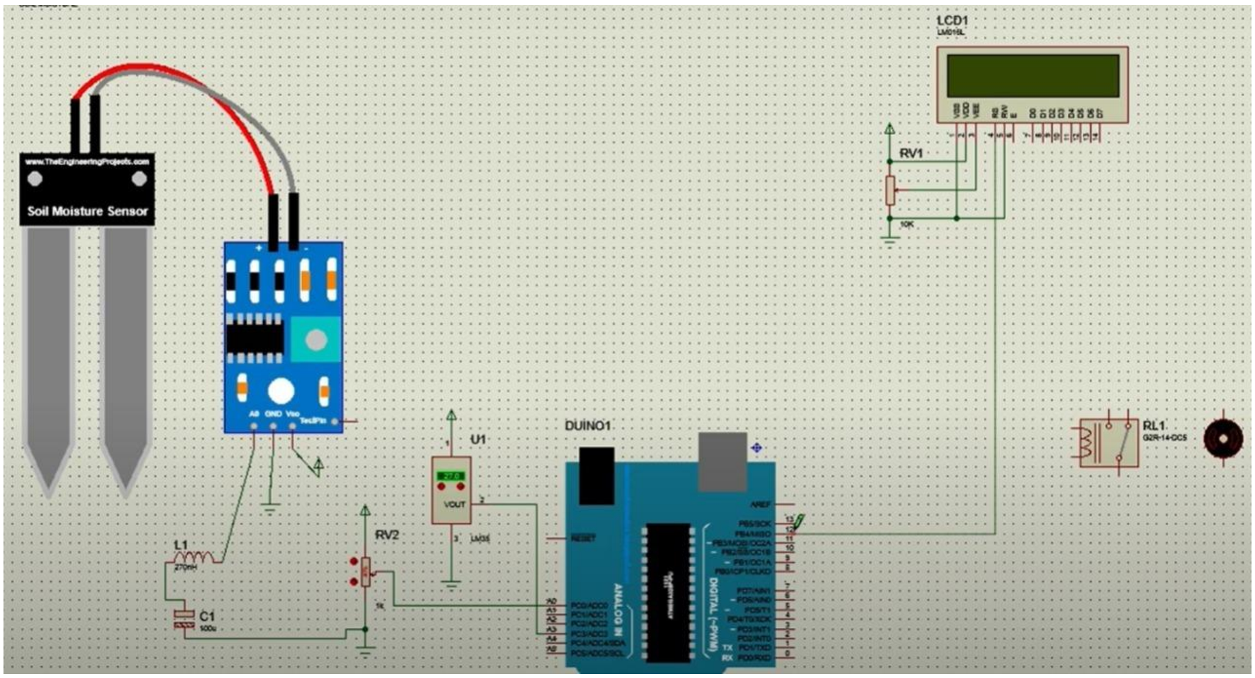
1.SOIL MOISTURE SENSOR

2.ARDUINO UNO

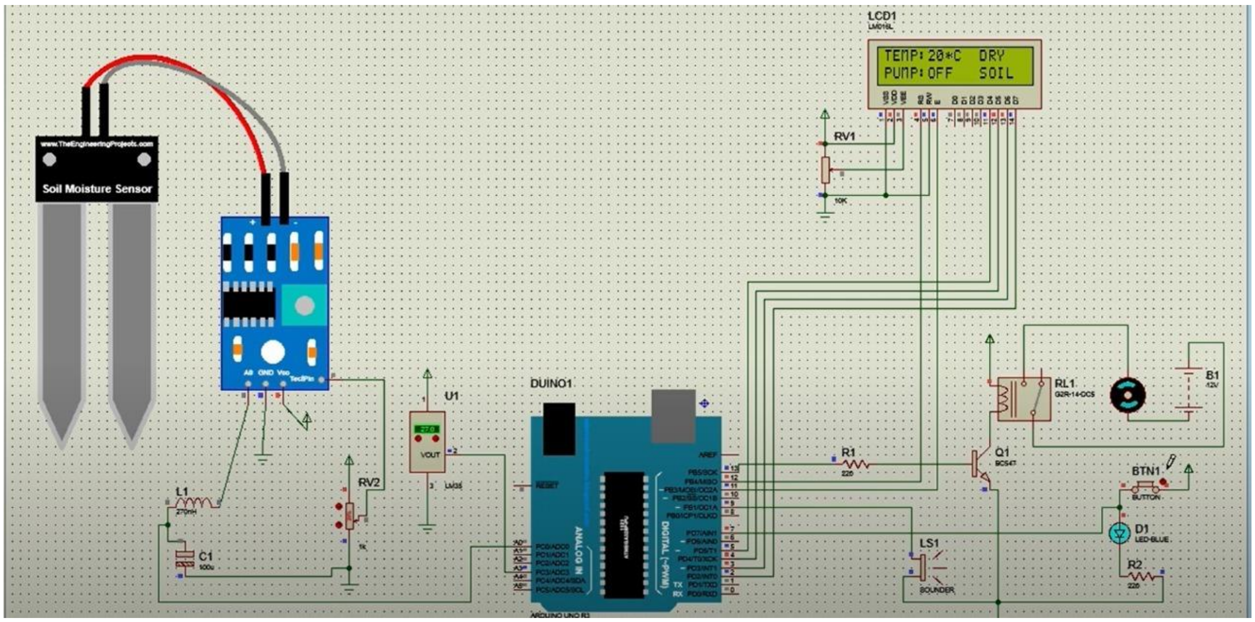
3.DHT 11

4.RELAY MODULE


www.TheEngineeringProjects.com
Soil Moisture Sensor
DUINO1



Soil Moisture Sensor
LCD1
RV1
10K
U1
VOUT
LM35
DUINO1
RESET
AREF
ANALOG IN
DIGITAL (~PWM)
RV2
L1
C1
RL1



LCD1
TEMP:20*C DRY
PUMP:OFF SOIL
RV1
Soil Moisture Sensor
U1
DUINO1
RL1
B1
R1
Q1
BTN1
D1
R2
L1
RV2
C1
LS1

SOURCE CODE

```
#include <LiquidCrystal.h> //LCD Library

#define NOTE_C4 262
#define NOTE_D4 294
#define NOTE_E4 330
#define NOTE_F4 349
#define NOTE_G4 392
#define NOTE_A4 440
#define NOTE_B4 494
#define NOTE_C5 523

int temp;
int T_Sensor = A3;
int M_Sensor = A0;
int W_led = 7;
int P_led = 13;
int Speaker = 9;
int val;
int cel;
```

```
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

void setup()
 {
   lcd.begin(16, 2);
   lcd.clear();
   pinMode(13,OUTPUT);
   pinMode(7,INPUT);
   pinMode(9,OUTPUT);

   val = analogRead(T_Sensor); //Read Temperature sensor value
   int mv = ( val/1024.0)*5000;
   cel = mv/10;




   lcd.setCursor(0,0);
   lcd.print("Project By");
   lcd.setCursor(0,1);
   lcd.print("SK GROUPS ");
   delay(1000);

}
```

```
void loop()
{

  lcd.clear();
  int Moisture = analogRead(M_Sensor); //Read Moisture Sensor Value

  lcd.setCursor(0,0);
  lcd.print("TEMP:");
  lcd.setCursor(5,0);
  lcd.print(cel);
  lcd.setCursor(7,0);
  lcd.print("*C");

 if (Moisture> 700)   // for dry soil
  {
       lcd.setCursor(11,0);
       lcd.print("DRY");
       lcd.setCursor(11,1);
       lcd.print("SOIL");
      if (digitalRead(W_led)==1) //test the availability of water in storage
      {
        digitalWrite(13, HIGH);
```

```
    lcd.setCursor(0,1);

    lcd.print("PUMP:ON");

  }

  else

  {

    digitalWrite(13, LOW);

    lcd.setCursor(0,1);

    lcd.print("PUMP:OFF");


      tone(Speaker, NOTE_C4, 500);

      delay(500);

      tone(Speaker, NOTE_D4, 500);

      delay(500);

      tone(Speaker, NOTE_E4, 500);

      delay(500);

      tone(Speaker, NOTE_F4, 500);

      delay(500);

      tone(Speaker, NOTE_G4, 500);

      delay(500);

  }

}


 if (Moisture>= 300 && Moisture<=700) //for Moist Soil
```

```
    {
     lcd.setCursor(11,0);
    lcd.print("MOIST");
    lcd.setCursor(11,1);
    lcd.print("SOIL");
    digitalWrite(13,LOW);
    lcd.setCursor(0,1);
    lcd.print("PUMP:OFF");
  }

  if (Moisture < 300)  // For Soggy soil
  {
   lcd.setCursor(11,0);
    lcd.print("SOGGY");
    lcd.setCursor(11,1);
    lcd.print("SOIL");
    digitalWrite(13,LOW);
    lcd.setCursor(0,1);
    lcd.print("PUMP:OFF");
  }
 delay(1000);
}
```