

SMART IRRIGATION IN AGRICULTURE

BY

Most. Momtaj Jahan Akhi

ID: 171-15-9380

Amatur Usmi

ID: 171-15-9336

Masura Jahan Era

ID: 171-15-9353

This Report Presented in Partial Fulfillment of the Requirements for the Degree
of Bachelor of Science in Computer Science and Engineering

Supervised By

Mst. Eshita Khatun

Lecturer

Department of CSE

Daffodil International University

Co-Supervised By

Md. Abbas Ali Khan

Sr. Lecturer

Department of CSE

Daffodil International University



**DAFFODIL INTERNATIONAL UNIVERSITY DHAKA,
BANGLADESH December 2020**

APPROVAL

This Research based Project titled “ Smart irrigation in agriculture” , submitted by *Most. Momtaj Jahan Akhi* and *Amatur Usmi* and *Masura Jahan Era* to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 28-01-2021.

BOARD OF EXAMINERS



Dr. Touhid Bhuiyan

Professor and Head

Department of CSE

Faculty of Science and Information Technology Daffodil

International University



Md. Tarek Habib

Assistant Professor

Department of CSE

Faculty of Science and Information Technology

Daffodil International University



Saiful Islam

Senior Lecturer

Department of CSE

Faculty of Science and Information Technology

Daffodil International University



Dr. Md Arshad Ali

Associate Professor

Department of CSE

Hajee Mohammad Danesh Science and Technology University

Chairman

Internal Examiner

Internal Examiner

External Examiner

DECLARATION

We hereby declare that, this project has been done by us under the supervision of Mst. Eshita Khatun, Lecturer, Department of CSE Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

Supervised by:



Mst. Eshita Khatun

Lecturer

Department of CSE

Daffodil International University

Submitted by:

Most. Momtaj Jahan Akhi

ID: 171-15-9380

Department of CSE

Daffodil International University

Masura Jahan Era

ID: 171-15-9353

Department of CSE

Daffodil International University

Amatur Usmi

ID: 171-15-9336

Department of CSE

Daffodil International University

ii

ACKNOWLEDGEMENT

First, We express our heartiest thanks and gratefulness to almighty God for His divine blessing makes us possible to complete the final year project successfully.

We really grateful and wish our profound our indebtedness to **Mst. Eshita Khatun, Lecturer**, Department of CSE Daffodil International University, Dhaka. Deep Knowledge & keen interest of our supervisor in the field of “ IO

T” to carry out this project. Her endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior drafts and correcting them at all stage have made it possible to complete this project.

We would like to express our heartiest gratitude to **Dr. Yousuf Mahbubul Islam, Hon’ ble Vice Chancellor**, and to **Professor Dr. Touhid Bhuiyan & Head, Department of CSE**, for his kind help to finish my project and also to other faculty member and the staff of CSE department of Daffodil International University.

We would like to thank our entire course mate in Daffodil International University, who took part in this discuss while completing the course work. Finally, We must acknowledge with due respect the constant support and patients of our parents.

iii

ABSTRACT

With this project, We tend to achieve thriving results by testing out the queries asked at the beginning of the paper. The aim of the smart agriculture system for giant or tiny scale and create it smarter and simpler. Different sensors (Soil moisture sensor,

Temperature and Humidity) with totally different another device (Water pump, NodeMCU,L298N motor driver, LED) are wont to create this project. Using Arduino proved profitable, it's able to serve numbers of various sensors, at constant time and the markets supply numerous sort and sizes of sensors. The mobile application is to regulate the system remotely. Which permit a user to observe the whole system and if there's any downside or passing of water user will cut the system through this application. In our project we create two part that' s are auto mood and manual mood. If the soil is dry the NodeMCU will send email to the user and if user give the access of automation then the L298N motor driver will started irrigation automatically but if user doesn' t want to irrigate that time then user can handle it manually by switching On or Off the motor it will save water and electricity and the main part was saving our crops.

TABLE OF CONTENTS

CONTENTS	PAGE
Board of examiners	2
Declaration	3
Acknowledgement	3
Abstract	4

CHAPTER CHAPTER 1: INTRODUCTION **1-5**

1.1 Introduction	1
1.2 Motivation	2
1.3 Purposes	3
1.4 Outcome and Desired Expectation	.4
1.5 Problem Statemen	4
1.6 Report Layout	5

CHAPTER 2: BACKGROUND **6-7**

2.1 Introduction	6
2.2 Comparative Studies	6
2.3 Scope of this Project	6
2.4 Challenges	7
2.5 Process	8

CHAPTER 3: REQUERMENTS **9-21**

3.1 Functional Requirements	9
3.2 Components List	9
3.3 NodeMCU Microcontroller	10
3.4 DHT11 Temperature and Humidity Sensor	13
3.5 YL 69 Moisture Sensor	14
3.6 Water Pump	15
3.7 L298N DC Motor driver	16
3.8 5M LED Light	17
3.9 APTECHDEALS-830 point Bread Board	18
3.10 Connecting wire	18
3.11 Software Requirements'	19
3.12 Arduino Software (IDE)	20

3.13 Thinger.io	21
-----------------	----

CHAPTER 4: DESIGN AND SPECIFICATION 22-26

4.1 Front-end-Design	22
4.2 Coding	23
4.3 Flow Chart	24
4.4 Circuit Diagram	24
4.5 Our Project Instruments	25
4.6 Cost of Instruments	26

CHAPTER 5: IMPLEMENTATION AND TESTING 27-29

5.1 Implementation of Database	27
5.2 Test Result and Report	28
5.3 Result and Discussion	29

CHAPTER 6: CONCLUSION AND FUTURE SCOPE 30-32

6.1 Future Scope	30
6.2 Safety and Security	30
6.3 Conclusion	31

APPENDIX	31
----------	----

REFERENCE	32
PLAGARISM REPORT	33
LIST OF FIGURES	33

FIGURES	PAGE NO.
Figure 3.3.1 NodeMCU ESP8266	10
Figure 3.4.1 DHT11 Temperature and Humidity Sensor	12
Figure 3.5.1 Moisture Level Check Sensor YL 69	13

Figure 3.6.1 Mini water pump	14
Figure 3.7.1 L298N DC Motor Driver	15
Figure 3.8.1 5m LED Light	17
Figure 3.9.1 APTECHDEALS 830 Point Breadboard	17
Figure 3.10.1 Connecting Wire	19
Figure 3.12.1 Arduino Software IDE	20
Figure 3.13.1 Thingier.io	21
Figure 4.1.1 Front-end-Design	22
Figure 4.1.2 Front-end-Design	22
Figure 4.2.1 Coding	23
Figure 4.3.1 Flowchart of our Project	24
Figure 4.4.1 Circuit diagram	24
Figure 4.5.1 Our Project View	25

CHAPTER 1 INTRODUCTION

1.1 Introduction

Smart Gardening is a functional part of agriculture. Smart Gardening not only works in gardens it also works on crops field and helps to the agricultural system of our country. Bangladesh is an agriculture based country, almost in every season of a year people over here do various agricultural work to make their livelihood. People all over the country are directly or indirectly depend upon agriculture. The gricultural system and works in our country is quite difficult and hard, the farmers of our country need to work hard to do various agricultural duties. The main purpose of smart gardening is to reduce the difficulties and make the farmers work easy, mostly helps in the agricultural system of our Country. Smart Gardening includes the features of auto irrigation through moisture level detection that helps the farmer to irrigate in yields. Introducing Computer Program and modern technology to agriculture and make the agricultural function easier is the main purpose of this report. Nowadays automation rules our world. With the thought of IoT we create sensor to contact with each other which are capable in automation. Almost 20 billion digital devices interconnected over the internet in 2020. IoT provides solution for various types of problems. Its allows things to controlled remotely by network. IoT is that which saves cost and ensure safety of everyone. IoT is a skill of using computer, mobile phone, digital devices in monitoring and controlling some parameters which we use in your daily life. Data transferring is the key of IoT.IoT brings the thought of smart industry and generate many research sectors. Our proposed system integrates all sensors and instrument for a real time use here data communication is done by a wireless system. Bangladesh is an agricultural country and its base on agricultural sector. Our mobile application is developed to check the status of the garden of watering. Soil and other sensors are integrated over Arduino that collect the values of soil and transfer the information to the NodeMCU by using built-in wifi facility.

We presented an irrigation system which we made according to six seasonal environmental factors of our country. The temperature sensor, humidity sensor, and

NodeMCU are integrated to develop the project .The system senses the moisture and humidity level of plants and provides water accordingly.

The paper is divided into six sections, and every section elaborates on the aspect of this research. Section 2 discusses the background of our research, along with future scope, challenges etc. Section 3 is discusses about all the instruments we use. Garden monitoring system with hardware. Section 4 shows design and discusses about software tools of our project. Section 5 concludes the implementation and result testing and the last part was about the future direction, security and conclusion.

1.2 Motivation

The main motivation of this report is to irrigation through moisture level detection with the help of a sensor and irrigate the crops field when it need water.The system is planned through different types of technologies such as Moisture Level Sensor, codings, arduino board and code set up, Mobile Application and others. These source nodes are connected to the master node through ZigBee. The master node is of msp432 with sim card enable so that it will receive data from all sensor nodes, store data on the cloud and it will get displayed on smartphone and which can automatically detect the level and irrigate the field.

1.3 Purposes

The main objective of this project is to introduce the computerized agricultural system to the new world. As the world is becoming smarter in every sector it is now only the difference of time that the overall agricultural system will be computerized within a few

years. The smart system through various computer programme is already getting involved in agricultural system, this project is also one of them. Our report will help to make a functional development in agricultural; it will reduce physical effort, save time money and water. The goals of this study are to find the superb automation technique for irrigation system mechanically controlled through the software system during a means that permits the user to observe all data and manage the device directly from mobile and can make out an effective result in agricultural.

The major objectives are:

- Make the agricultural function as ordinary simple work.
- Save energy, that permits the applying of a sensible irrigation system
- Save a huge amount of water
- Save almost half of the money on irrigation.
- Introduce computer programme and software to the farmers as blessings of modern science.

1.4 Outcome and Desired Expectations

That is an easy process to place and operate as that is auto operated. Resources and Energy is saved in a great deal. Distribution of associate equal quantity of water at the correct time by automatic irrigation to farm and nurseries. To avoid extra of overwatering at the inaccurate time of the day, this reduces saturated soils which may

improve crop performance. It also include a system that make the motor on and off automatically. It may be also effective in Greenhouse vegetable production.

1.5 Problem Statement

Developing the Smart Irrigation based on IoT, may face some difficulties to operate. In order to make the proper utilization of this device and take help from this report, the vital characteristics just like the appropriate amount of electricity furthermore as water for the crops that the crop actually needed or not.

The proper supply of these vital components have major role in successful performance of this device. Farmers face problems in meeting these standards, notably those living in financial condition.

This project looks into developing associate degree automatic irrigation system which may be controlled through a mobile application and that may be become a problem for the farmers to bear such a costly smartphone and it will also difficult for them to operate the smartphone as the maximum amount of farmers are not well educated.

1.6 Report Layout

This smart gardening project is controlled via a mobile application that helps to irrigate in various agricultural works. This report contains some benefits like save water and energy and great deal of helps for farming. It has some drawbacks that further research may resolve. This thesis contains a large scale of opportunity to practice automation

feature. In this modern era automation can make our life so easier and it is also time saving for our farmer. Here we use a threshold system by which user set the moisture level for any individual crops.

CHAPTER 2 BACKGROUND

2.1 Introduction

The Background data always states the previous similar attempts and similar works done on it. There have enough data from different sources. This project made through the help of various thesis papers and it functionally created with a cheaper cost and make available to the farmers.

2.2 Comparative Studies

There have a lot of works done with smart irrigation in different countries like India, Pakistan, Nepal, Bhutan and other countries. With the help of smart applications and smart tools with connected to smartphone the irrigation system and other agricultural functions become much easier. Microcontroller and various Arduino UNO are used with some sensors that help to farming and also help in building various devices. There have many devices made with the sensors in different countries that introduces the computer technology to the farming and irrigation.

2.3 Scope of this Project

This device has a lot of opportunity and a great deal of scope. By making the succession of this device that may have a great impact and effect over the irrigation system. This device helps to indicate the soil wetness and the required water for the soil. The automation process helps to make the soil wet through the helps of the water supply and after that when the soil got its desired amount of water and become wet the moisture sensor detects that condition and sends signal to the other portion and stops the water pump as a result water supply become stopped. This device may widely used in various agricultural firm and various agricultural fields in the agrarian countries like India, Nepal, Bhutan, Pakistan and others. We can use this system in our country for doing better cultivation. If we implement this system in our real life and can able to make understand our farmers about this system it will bring a great development in our agriculture. Our system will be able to amplify the production of our crops.

2.4 Challenges

This device works on mainly two ways of the soil condition that when the soil is wet and when the soil is dry. Under this two condition this begins to work, when the soil is dry the device starts its work and when the soil is wet the device stopped. This starting and switching off procedures done through the resistance level that is when the resistance level is high the device starts to supply water and when the resistance level become low the device stopped to supply water. Measuring the resistance and get the

preferred output is one of the major challenge in this device that sensor level mainly works through measuring the resistance but it is not easier to maintain the resistance level stable.

This device is mainly run through the internet and the supply of internet connection. Without Internet this device can not perform its work and function and it is quiet tough to supply internet in the rural area where the agricultural fields are mainly situated its was big problem.

2.5 Process

Steps:

Step 1: Start the method.

Step 2: Power and Battery set up for electric connection.

Step 3: Check the desired level and mark that for different uses.

Step 4: If the level is higher then it will stop supply, that is no water for irrigation.

Step 5: When the wetness level is below the desired level the device starts working, and irrigate the agricultural field

Step 6: Set up the pump and supply line of water.

Step 7: After complete the process it goes on the initial stage

Step 8: Stop the method

CHAPTER 3 REQUIRMENTS

3.1 Functional Requirements

There have some functional equipment required for this device like Soil moister sensor, L298N DC Motor which is mandatory to operate the device. Arduino software (IDE) is needed to upload the code in the board and we need a another apps to which name is thinger.io that' s used to monitor or controlling the irrigation system.

3.2 Hardware Components List

The components used in this device are

1. Node MCU Microcontroller
2. DHT11 Temperature and humidity sensor
3. Moisture Level Check Sensor YL 69
4. Mini Water Pump ESP (3-6V) dc
5. L298N DC Motor Driver
6. Battery 9V
7. 5m LED Light
8. APTECHDEALS 830 point Breadboard
9. Connecting Wire

3.3 NodeMCU Microcontroller:

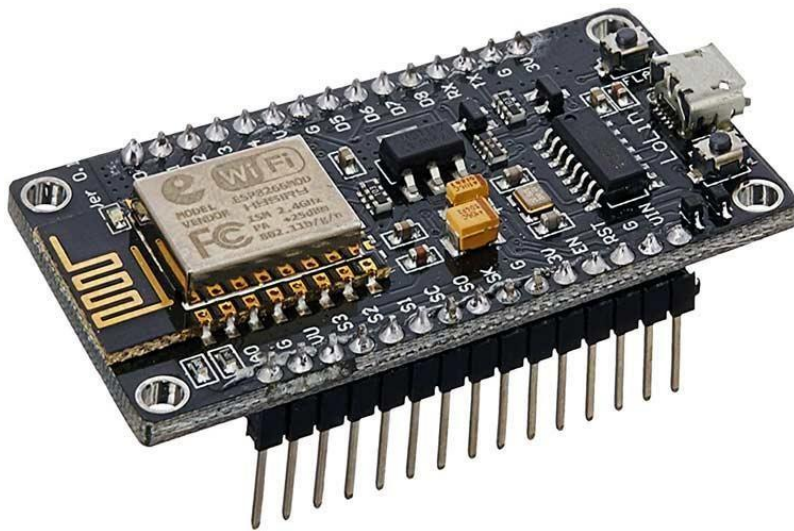


Figure – 3.3.1 NodeMCU ESP8266

NodeMCU ESP8266 Specifications:

In figure 3.3.1, NodeMCU is a joint term of node and MCU where the NodeMCU works as a hub. The "NodeMCU" is worked here as a development tool. This NodeMCU is an open source which performs within ESP8266 wifi SoC. This is one kind of microcontroller which works with built-in wifi and other sections, we used the NodeMCU in our project to transmit and receive the wifi signal and send information for further uses. The NodeMCU8266 carries various specific instructions, it can be widely used in many ways. With the help of the NodeMCU all the functional programmes are done in our project. We have made the connection of NodeMCU with

the Breadboard and inputted all the necessary equipments. The overall necessary function like coding, Connecting electrical equipment, and sending the signal are mainly done by the NodeMCU.

The pin set up of NodeMCU with the Breadboard is one of the major function of our project. We have connected all the pins with a intensive care. Without the proper pin set up and proper connection of board with the NodeMCU, any perform will not be occurred and there will be a failure of the overall system.

We have tried to connect the pin with connecting wire that made the connection easy for users. Connected the wire with the breadboard and also make connection to the others electrical equipments are important for proper function of our project.

We have connected the NodeMCU with the breadboard and the pin set up are done within proper instruction. We have connected the LED, L298L Motor Driver, DT11 Temperature sensor, YL69 Humidity sensor with the NodeMCU.

We have connected the pin D0 and Ground of the NodeMCU with an LED, The LED turns on when the board got electrical power. The LED also help to send signals when the board got coded.

We have also connected the DHT11 sensor with the D2 pin of the NodeMCU and the D2 pin is also connected with the DHT11 sensor's neutral wire. There are three main wire of the DHT11 sensor. The positive, Negative and the Neutral wire. The positive wire is connected to the V3 of the NodeMCU, which supply the input voltage to the DHT11 sensor. And we have connected the negative wire of the DHT11 sensor with the Ground of the NodeMCU. This set up will make the We have connected the Motor driver to the NodeMCU with the help of the D2 pin of the NodeMCU and the In2 pin of the Motor Driver. The In1 pin of the Motor driver also needed to connect with the NodeMCU on its D7 pin. Without the proper connection and proper supply of these pins the overall functions will not run properly. We have added the YL69 Humidity sensor with the NodeMCU with its 3 wire in one in the input Voltage portion, the neutral wire set on the D0 connection favorable performance of the overall DHT11 sensor and the NodeMCU. We have added a 10kilo ohm resistance in between the supply of voltage and the positive terminal of the DHT11 sensor.

of NodeMCU and the positive terminal is connected to the pin D3/D5 of the NodeMCU. This connection have a major effect because without the proper connection the device will not started as well the device will not send signals to the users. There also have various activities which can be set with the help of a coded NodeMCU. The NodeMCU has the largest achievement in the electro computerized program and devices.

Features:

- It is a type of microcontroller.
- It operated on 3.3 voltages
- It has digital input and output pin with also analog input pin
- It has a capacity of 4MB of flash memory
- It has SPIs 1
- It also has I2Cs 1
- It has SRAM of 64 KB
- It has unique Clock Speed of 80 MHz
- It Included on board enading plug in play with USB-TTL based on CP2102
- It comes with a PCB Antenna
- It is small in size abd fit in any IoT based project

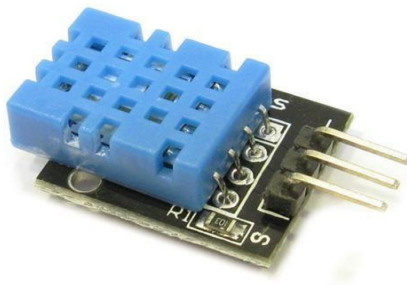
3.4 DHT11 Temperature and Humidity Sensor:

Figure – 3.4.1 DHT11 Temperature and Humidity Sensor

DHT11 Specifications:

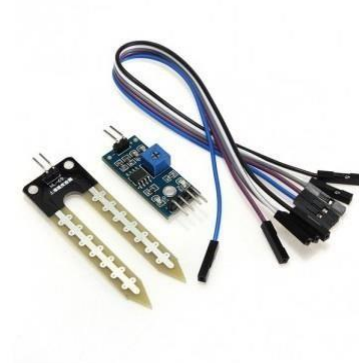
In figure 3.4.1, DHT11 Temperature and Humidity Sensor is used to measure the surrounding air. It outputs a digital signal on the data pin.

We have used DHT11 in our project for its special and unique features. The features of DHT 11 are below

- It is operated in between 3.5V to 5.5V voltage
- It is operated on 0.3mA of current
- In its Output we can get the Serial data
- It can perform within the 0°C to 50°C temperature
- It works under the Humidity of 20% to 90%
- Humidity and Temperature both are 16-bit
- It has the Accuracy $\pm 1^{\circ}\text{C}$ and $\pm 1\%$

3.5 Moisture

Level Check Sensor YL 69:



Check Sensor YL 69

Figure - 3.5.1 Moisture Level

In Figure 3.5.1, Moisture Level Check Sensor YL 69 We have used the moisture level sensor as YL69 which comes with some special benefits they are described below

Features:

It is a high quality product.

It has an specific water sensor, which mainly detects the soil moisture .

It has Dual output mode and the analog output is much more accurate.

It is very easy to install .

It has two type of power indicator that are red and green of digital switching .

It contains a LM393 comparator chip.

It has digital output interface that performs with 0 and 1.

It also have analog output system .

The Panel of PCB Dimension is 3 x 1.5 cm and The Soil Probe Dimension of 6 x 2 cm.

3.6 Mini water pump:



Figure - 3.6.1 Mini water pump

In Figure 3.6.1 The main part of our report deals with the supply of water and irrigation in the agricultural field and that can only possible with the help of the proper supply of water to the field, this job is functionally done by the water pump.

The source of water is also an important term from where the water is drawn from a fresh source and to which place it moved to is one of the major function for this device. When the water pump gets signal its starts operating and when again get signal to stop it immediately stops to perform. The major role of this device is to obey the instructions and supply the water to the specific area.

3.7 L298N DC Motor Driver:

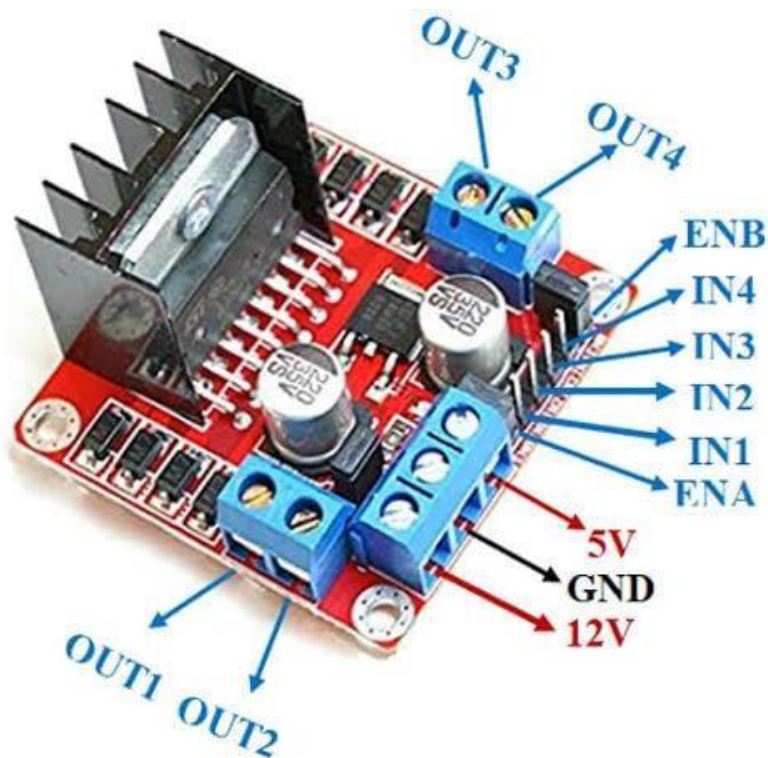


Figure 3.7.1 L298N Motor Driver

In Figure 3.7.1, The L298N motor driver we have used the circuit for our project, it is an integrated monolithic circuit which deals with a 15- lead Multi watt and PowerSO20.

It is consist of high voltage and high current dual full-bridge which designed for standard TTL logic level. This circuit has inductive loads such as relays, solenoids and stepping motor sand others. There are two enable inputs are provided to turn on or off the device and the device independently works through the i/o signals .The emitter and sensing resistor both performed with systematic functional need they both have the accuracy. In order to perform the logic at a lower voltage additional supply voltage is introduced. NodeMCU microcontroller and L298N motor driver is connected from the input1 portion to NodeMCU' s D6 point. L298N motor driver have four input and four output portion, a ground ,two enable and 5v supply for the water pump because our mini water pump need 5v electric supply.

3.8 5m LED Light:

In the below Figure 3.8.1, LED typically known as Light Emitting Diode is a type of circuit board which emits the lights as a signal or for other purpose. The LED lights are usually used in signal lighting, back lighting, lighting task, and for various decoration. We have used the 5m LED Light for this project, which emits and send signals when required. This LED have some unique features for that reason we used this 5m LED for this project

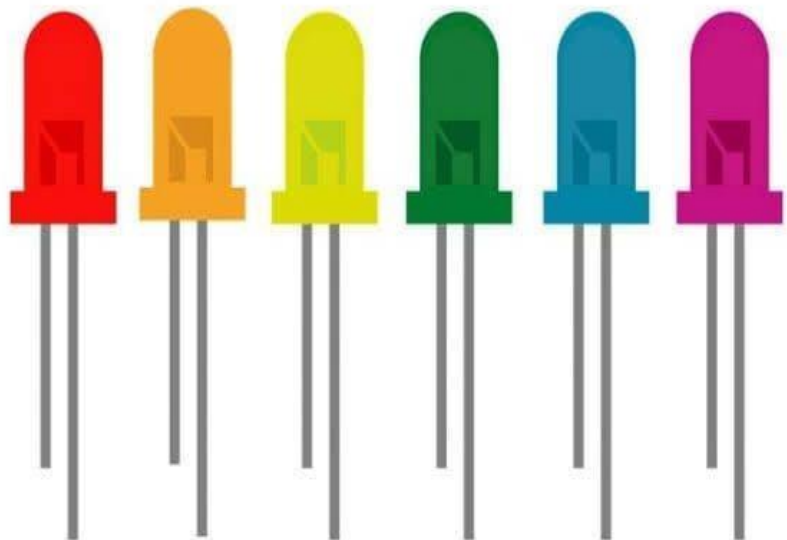


Figure 3.8.1 5m LED Light

3.9 APTECHDEALS 830 Point Breadboard:

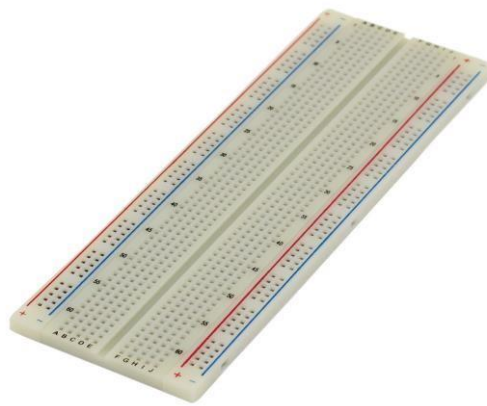


Figure 3.9.1 APTECHDEALS 830 Point Breadboard

APTECHDEALS 830 Point Breadboard:

In the figure 3.9.1, We have used the APTECHDEALS 830 point Breadboard for this project. This breadboard is one of best for this type of project and devices. This board is build for the testing and that test the circuits before finalizing the final circuit design.

It consists of a group of holes where ICs and resistors are inserted. With the help of the breadboard any change of connection can be done too quickly and can get the result immediately that is far better than soldering up the total circuit.

In various experiments this board is used as a hub to connect two or more devices and make the circuit success. In structure it is mainly two typed and can function with the both type at the same time.

3.10 Connecting Wire:

In the below figure 3.10.1, We have used some connecting wire to make the circuit connection. The wires usually used to connect the electrical sections, connection of motor to the circuit, all connection of breadboard. To make the connection successful and run the project successfully the connection of the wires are mandatory. Connecting wire are also known as jumper wire. Connecting wire is used to connect the point of breadboard and other instrument. Connecting wires come in three types and that's are :

- Male-to-Male
- Male-to-Female
- Female-to-Female

In the end point of the wire have the main difference of each connecting wire but some connecting wire have the same electrical connection at both side of the jumper wire or connecting wire.



Figure 3.10.1 Connecting Wire

3.11 Software Requirements

1. Arduino Software (IDE)
2. Thinger.io

3.12 Arduino Software (IDE):

In the figure 3.12.1, .Arduino is an open source platforms. This open-source Arduino Software makes so easier to write the code and upload the code to the arduino board. Arduino Software can be used in any Arduino UNO board. C++ is the language of arduino . It has a lot of built in code especially in its hardware part so it is different from some C++ varieties.



Figure 3.12.1 Arduino Software (IDE)

3.13 Thinger.io

In figure 3.13.1, Thinger.io also and open source platforms like Arduino software. Its created to simplify Internet of Things developments. Any device from any sector can easily connected with Thinger.io platforms and fully works with every type of devices. To connected a device and start controlling its works with NodeMCU Thinger.io platform is needed. Many devices can be connected in a easy and simple way with Thinger.io. User can create customize dashboards within a couple of time. It is a affordable and easy way that' s allows all the real-time data.



Figure 3.13.1 Thinger.io

CHAPTER 4

DESIGN AND SPECIFICATION

4.1 Front-end-Design

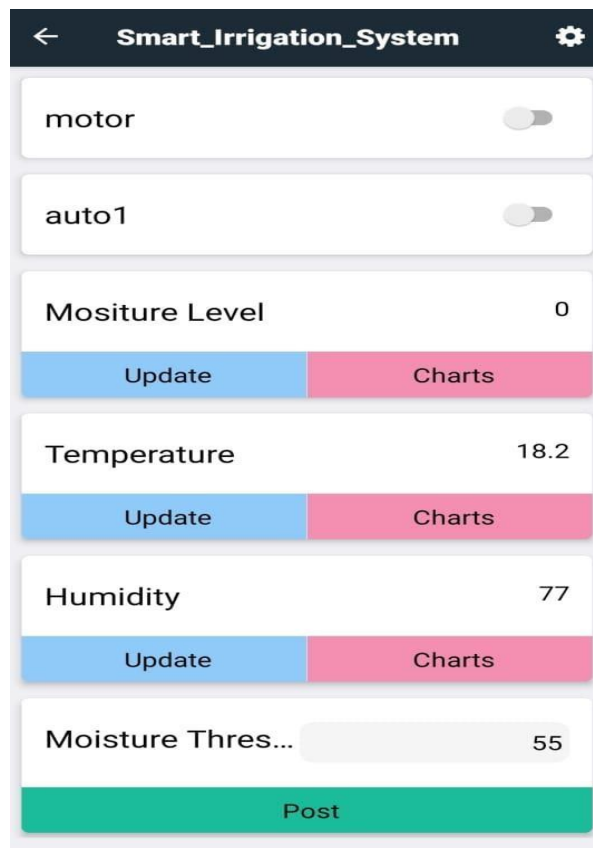


Figure 4.1.1 Front-end-Design

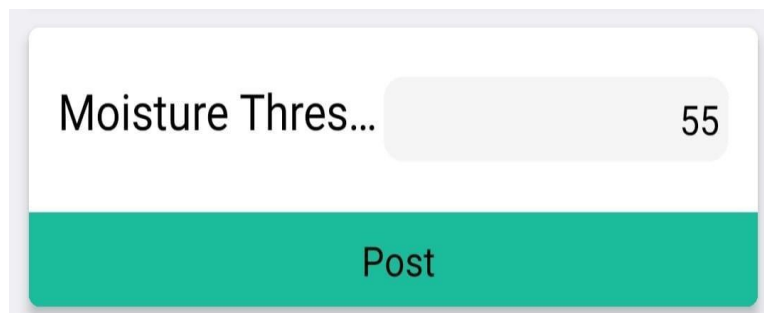
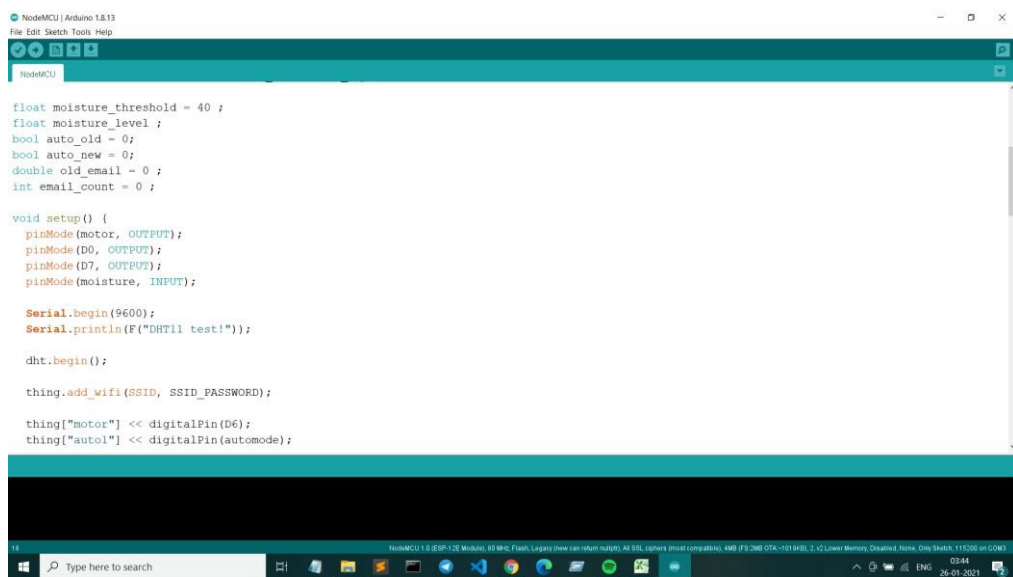


Figure 4.1.2 Front-end-Design

In figure 4.1.1 and figure 4.1.2 We can see in our project we have added a thresholding system by which user can set the moisture level value for any individual crops.

4.2 Coding

In figure 4.2.1, we can see a screenshot for our Arduino code



```
NodeMCU | Arduino 1.8.13
File Edit Sketch Tools Help

NodeMCU

float moisture_threshold = 40 ;
float moisture_level ;
bool auto_old = 0;
bool auto_new = 0;
double old_email = 0 ;
int email_count = 0 ;

void setup() {
  pinMode(motor, OUTPUT);
  pinMode(D0, OUTPUT);
  pinMode(D7, OUTPUT);
  pinMode(moisture, INPUT);

  Serial.begin(9600);
  Serial.println(F("DHT11 test!"));

  dht.begin();

  thing.add_wifi(SSID, SSID_PASSWORD);

  thing["motor"] << digitalPin(D6);
  thing["autol"] << digitalPin(automode);
}
```

Figure 4.2.1 Coding

4.3 Flowchart of our Project

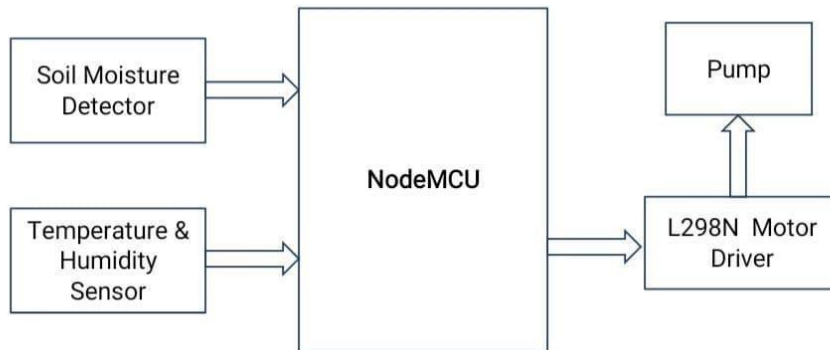


Figure 4.3.1 Flowchart of our Project

From this figure 4.3.1 we can see the YL 69 soil moisture sensor and DHT11 temperature & humidity sensor send the signal as input to the NodeMCU then NodeMCU will send the signal as input to the L298N motor driver and this motor driver will send signal to the pump to turn on or off the motor.

4.4 Circuit diagram

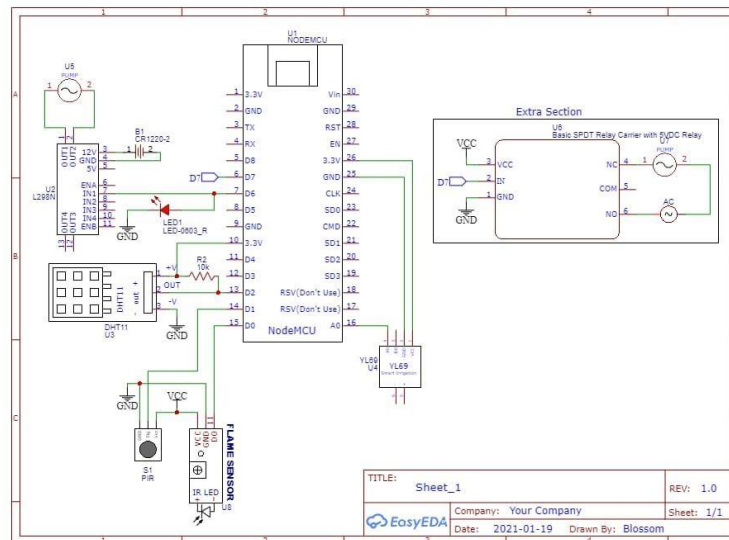


Figure 4.4.1 Circuit diagram

In the Circuit diagram figure 4.4.1, we can see the pin setup of our electrical part. Here we are showing how NodeMCU,DHT11 Temperature and Humidity sensor, YL 69 Moisture sensor,5M LED light,L298N motor driver and water pump are connected to each other and also we can see the 5V electric supply. Here we can see a extra section which is Relay module we can use it as alternative of L298N motor driver. In the circuit diagram we can see the connection of Relay module with NodeMCU and electric supply. Relay module is easier to use and connect.

4.5 Our Project View

In figure 4.5.1 , We give a view of our demo project.





Figure 4.5.1 Our Project View

4.6 Cost of our instruments

1. ESP8266 NodeMCU Microcontroller- 340tk
2. DHT11 Temperature and Humidity Sensor-120tk
- 3.YL-69 Soil Moisturizer Sensor-154tk
4. L298N DC Motor driver-150tk
5. 830 point breadboard-94tk
6. Mini water pump-160tk
8. 5m LED light -5tk
9. 1k ohm resistor -1tk
10. Connecting wire-40tk

11. Water Supply Pipes 1.5"- 28tk

Total Cost- 1092tk

As we can see the cost is very low. We can mention it as budget friendly and user friendly system also.

CHAPTER 5 IMPLEMENTATION AND TESTING

5.1 Implementation

After completing the setup and coding and connection with all the sensors with the mobile application the implementation process begins. In that portion the final test up took place where all the functional procedures are done. In that portion all the devices are connected and worked functionally. Firstly the pin set up on board are done and after that all the sensors are activated. After that a power supply is done to the device and the device started to measure the wetness of the soil and whenever the soil got dry the device started automatically and starts irrigate to the indicated field. And after finishing the irrigation the sensor detects the moisture level as wet it automatically turns it off. We have made this device and project with some unique database implementation. The database implement took place based on the data gathered by the YL69 humidity sensor and the DHT11 sensor. This both sensors send reports to the application and the application stored the data in its cloud, with the help of these data the overall supplementary elements may be determined. The supply of various supplementary elements will not to be done by the assumes. It will done automatically. Which type of soil need which type of supplement will be able mentioned through the average of the report.

The overall procedure will be done by the device and the irrigation will become simpler. The cost, effort and money will be saved if this project is implemented.

5.2 Testing:

Testing provides an independent image of any software that's allow the business to appreciate and testing also understand the risks of software implementation. We have tested the total procedure and found it working and it can be effective and sufficiently usable for farmers. Its performs its functions within an acceptable time. After deducting some difficulties from it. like the internet connection, mobile

application the device may have a large impact on agriculture and irrigation. We have tested our project and have shown that our project is functionally working very smoothly. With the overall report we can get the when the Humidity level goes below 7% our device sends signals that the soil is dry and it needed to irrigate. Again when the sensor gets the humidity is above 40%, that means it is fully irrigated and the device got turned off automatically. If the auto Mode is off the user then needed to irrigate the field through the notification and the user can automatically turn on or off the motor using our application.

This application also took place in showing the overall report and the current humidity, temperature, moisture level of the indicated land.

5.3. Result and Discussion:

The output of this device is tremendous and our output can be used in a huge range. The overall result of this project may be considered as effective. The moisture level sensor can clearly identify the moisture level whether the soil moisture is dry or wet, the water pump can operate successfully, the application detects the overall condition through automation. When the moisture level is dry the device starts irrigation, and when it becomes wet the device stopped to irrigate. The overall each and every function of this device runs very smoothly but a strong internet connection is required for the best o

CHAPTER 6 CONCLUSION AND FUTURE SCOPE 6.1 Future Scope

The world is becoming smarter rapidly, with this rapid upgradation all the sectors got touched by the computer program. The automation process makes life easier than ever. This project can be used widely all over the world as a blessing of computer Engineering. With the help of required programming change this project and device may be used in various ways in agricultural sector. The countries dependent upon agriculture may take advantage from this type of project and device. It can be said that one day all of our Daily activities will be done through a computerized process and it

will make life easier as well it will save money, energy, and valuable time. Modern computer science Engineering will have a large scale of positive impact on agricultural production that will make the agrarian country a developed one and that will also be blessings for the nation of all over the world.

6.2 Safety and Security

Our system must be able to provide user authorization. Ensure the testing grade by quality control and optimization it's allowing us to keep a proper check and set the standards for commercial use. The user need to sign in the apps to access the data because the data will be send in user email address which can access by user only. By the authorization, the user can be able to watch the real-time readings result from the device and it also able to check the history what user done in the field

6.3 Conclusion:

In this paper we implement of detecting soil moisturizer level and a smart irrigation system. This research will help user to automatically monitor the parameters and ensure to maintain the agricultural feild. The implementation of smart gardening/ agriculture system using IoT has been proved to satisfactorily works by connecting various parameter of the soil and it was successfully controlled remotely by a mobile application. our system desginted for not only monitoring the sensor, humidity and temperature but also activates other parameters according to the user requirement. This system save ,man power. The feedback provided from our system will improve the implementation of the gardening process. Our system is aware of the different irrigation needs easily. This sector, which is one of the largest in Bangladesh, needs sustainable and advanced technology like Internet of Things. Farmers will be able to use the Internet of Things' smart devices to modernize their agricultural irrigation systems - providing

the right amount of water. Farmers will be able to know the soil condition through smart devices, which will enable them to protect their crops. This automation system can encourage our farmer for more cultivate.

APPENDICES

Project Reflection

It was hard to us know the proper steps of developing this project. But we were not hopeless. Then we analyzed the requirements and made a proper plan that made us even more confident to develop the application. we faced several problems when we developed the work in the project.

After a year of hard work, we have developed our application. we have gathered a lot of ideas about other platform of IOT. Now we have the belief that, if we work hard, everything is possible to do. After all, we are grateful to The Almighty ALLAH and

My respectable supervisor Mst. ESHITA KHATUN for her support and excellent guidance throughout this journey.....

References:

[1]Gerald W. Buchleiter ‘Irrigation System Automation’ [Online]. Available: https://www.researchgate.net/publication/279973921_Better_Irrigation_Automation_with_Proper_Cut_back_Time. [Accessed: 09- Sep- 2020].

[2] Software Engineering: A Practitioner's Approach by Roger S. Pressman [Online]. Available: <https://www.amazon.com/ISE-SOFTWARE-ENGINEERING-PRACTITIONERSAPPROACH/dp/1260548007>. [Accessed: 09- sep- 2020].

[3](PDF) A simple design software for drip irrigation system", ResearchGate, 2021. [Online]. Available: https://www.researchgate.net/publication/303844429_A_simple_design_software_for_drip_irrigation_system. [Accessed: 06- Dec- 2020].

[4] Software Test Automation: Effective Use of Test Execution Tools by Dorothy Graham and Mark Fewster [Online]. Available: <https://www.amazon.com/Software-Test-Automation-MarkFewster/dp/0201331403>. [Accessed: 09- Dec- 2020].

- [5] [PDF] Automation, Production Systems, and Computer-Integrated Manufacturing By Mikell P. Groover Book Free Download", EasyEngineering, 2021. [Online]. Available: <https://easyengineering.net/automation-production-systems-and-computer-integrated-manufacturing-by-groover/>. [Accessed: 08- Nov- 2020].
- [6] "Exploring Arduino: Tools and Techniques for Engineering Wizardry", Wiley.com, 2021. [Online]. Available: <https://www.wiley.com/enus/Exploring+Arduino%3A+Tools+and+Techniques+for+Engineering+Wizardry-p-9781118549360>. [Accessed: 23-Dec - 2020].
- [7] Collins et al., "The Internet of Things: Anywhere, Anytime, Anything – Gigaom", Gigaom.com, 2021. [Online]. Available: <https://gigaom.com/2010/07/26/the-internet-of-things-anywhere-anytimeanything/>. [Accessed: 10- Oct- 2020].
- [8] "Automation of Home using Internet of Things (IoT)", International Journal of Innovative Technology and Exploring Engineering, vol. 8, no. 12, pp. 256-259, 2019. Available: 10.35940/ijitee.l1071.10812s19 [Accessed 6 November 2020]

Plagiarism Report

Checked by Mst. Eshita Khatun Lecturer Department of CSE Daffodil International University	
--	--