Project

Report on

A SMART IRRIGATION SYSTEM

Submitted in partial fulfilment of the
Requirements for the award of the Degree
of

BACHELOR OF ENGINEERING
IN
INFORMATION TECHNOLOGY

By

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DECLARATION BY THE CANDIDATE

I, **ANTHATI KARTHIK ,** bearing hall ticketnumbers **1602-19-737-310**, hereby declare that the project report of entitled **"A SMART IRRIGATION SYSTEM".** Department of Information Technology, VCE, Hyderabad, is submitted in partial fulfilment of the requirement for the award of the degree of **Bachelor of Engineering** in **Information Technology**.

This is a record of bonafide work carried out by me and the results embodied in this project report have not been submitted to any other university or institute for the award of any other degree or diploma.

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BONAFIDE CERTIFICATE

This is to certify that the project entitled **"A SMART IRRIGATION SYSTEM"** being submitted by **ANTHATI KARTHIK** bearing hall ticket numbers **1602-19-737-310**, in partial fulfilment of the requirements for the award of the degree of Bachelor of Engineering in Information Technology is a record of bonafide work carried out by him/her under my guidance.

Mrs. Chaya Devi
Assistant Professor
Dept. of IT

ACKNOWLEDGEMENT

With immense pleasure, we record our deep sense of gratitude to our guide Mrs. Chaya Devi, Assistant Professor, Vasavi College of Engineering, Hyderabad, for the valuable guidance and suggestions, keen interest and thorough encouragement extended throughout the period of the project work. I consider myself lucky enough to be part of this project. This projectwould add as an asset to my academic profile.

We express our thanks to all those who contributed for the successful completion of our project work.

ABSTRACT

Most of the farmers use large portions of farming land and it becomes very difficult to reach and track each corner of large lands. Sometime 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 is helpful and leads to ease of farming.

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 DHT11 Sensor 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 Blink 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 environmental condition such as Moisture, Temperature and Humidity.

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2.INTRODUCTION

Appropriate soil moisture level is a necessary pre-requisite for optimum plant growth. Also, waterbeing an essential element for life sustenance, there is the necessity to avoid its undue usage.

Irrigation is a dominant consumer of water. This calls for the need to regulate water supply forirrigation purposes.

The ultimate goal is increasing the quality and quantity of the crops while optimizing the human labor used.

2.1. OVERVIEW

When the soil loses its moisture to less than 50% then Motor pump will turn on automatically to sprinkle the water and it will continue to sprinkle the water until the moisture goes upto 55% and after that the pump will be turned off. The sensor data will be sent to blink Server in defined interval of time so that it can be monitored from anywhere in the world.

For programming the ESP8266 NodeMCU module, only the DHT11 sensor library is used as external library. The moisture sensor gives analog output which can be read through the ESP8266 NodeMCU analog pin A0. Since the NodeMCU cannot give output voltage greater than 3.3V from its GPIO so we are using a relay module to drive the 5V motor pump. Also the Moisture sensor and DHT11 sensor is powered from external 5V power supply.

METHODOLOGY

Smart irrigation system will not only automatically irrigate the water based on the moisture level in the soil but also send the Data to blynk 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 environmental condition such as Moisture, Temperature and Humidity.

In this project, we have used the NodeMCU ESP8266 is used. After receving the information about soil moisture from each sensor, the sensor checks whether the soil moisture contentis less than 50% or not. If it is less than 50%, then the NodeMCU controls and sprinkles water onto the soil for approximately 10 seconds.

The data about soli moisture in sent to Blynk app where we can find the temperature, humidity and soil moisture values.

ABOUT BLYNK:

With Blynk, we can create smartphone applications that allow us to easily interact withmicrocontrollers or even full computers such as the Raspberry Pi.

The main focus of the Blynk platform is to make it super-easy to develop the mobile phone applications. Developing a mobile app that can talk to Arduino is as easy as dragging a widget andconfiguring a pin.

Figure 1.1 blynk app

IMPORTANCE TO SOCIETY:

This project is important to the society in many aspects.

- Prevents wastage of water
- Healthier crops in the long run
- Prevents over watering of plants.

COMPONENTS USED:

1. NODEMCU ESP8266

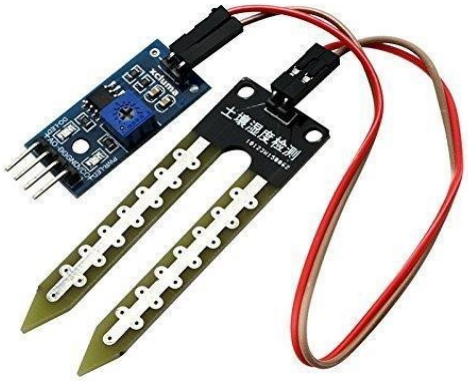
The NodeMCU (*N*ode *M*icro*C*ontroller *U*nit) is an open-source software and hardware development environment built around an inexpensive System-on-a- Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (WiFi), and even a modern operating system and SDK. That makesit an excellent choice for Internet of Things (IoT) projects of all kinds.

Fig 1.2 node mcu esp8266

2. SOIL MOISTURE SENSOR:

The moisture of the soil plays an essential role in the irrigation field as well asin gardens for plants.The soil moisture sensor is one kind of sensor used to gauge the volumetric content of water within the soil.

Fig 1.3 soil moisture sensor



3. 5V RELAY:

Relay is one kind of electro-mechanical component that functions as a switch.The relay coil is energized by DC so that contact switches can be opened or closed. A single channel 5V relay module generally includes a coil, and two contacts like normally open (NO) and normally closed (NC

Fig 1.4 5v relay

4.DHT 11:

The **DHT11** is a commonly used **Temperature and humidity sensor that** comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data.

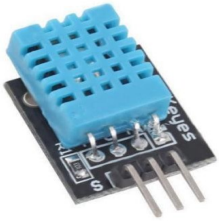


Fig 1.5 DHT sensor

4. WATER PUMP

Fig 1.6 water pump

PROBLEM STATEMENT

To design a cost effective, fully fucntional smart irrigation system that operates based on the real-time moisture content in the soil.

PROPOSED SOLUTION

This system installs low cost sensors to sense variables of interest such as soil moisture (as in thiscase). The data obtained can be monitored using a mobile/PC. If the obtained soil moisture content fails to acquire the minimum criteria, then the field is automatically irrigated using the solenoid valve.

ARCHITECTURE DIAGRAM

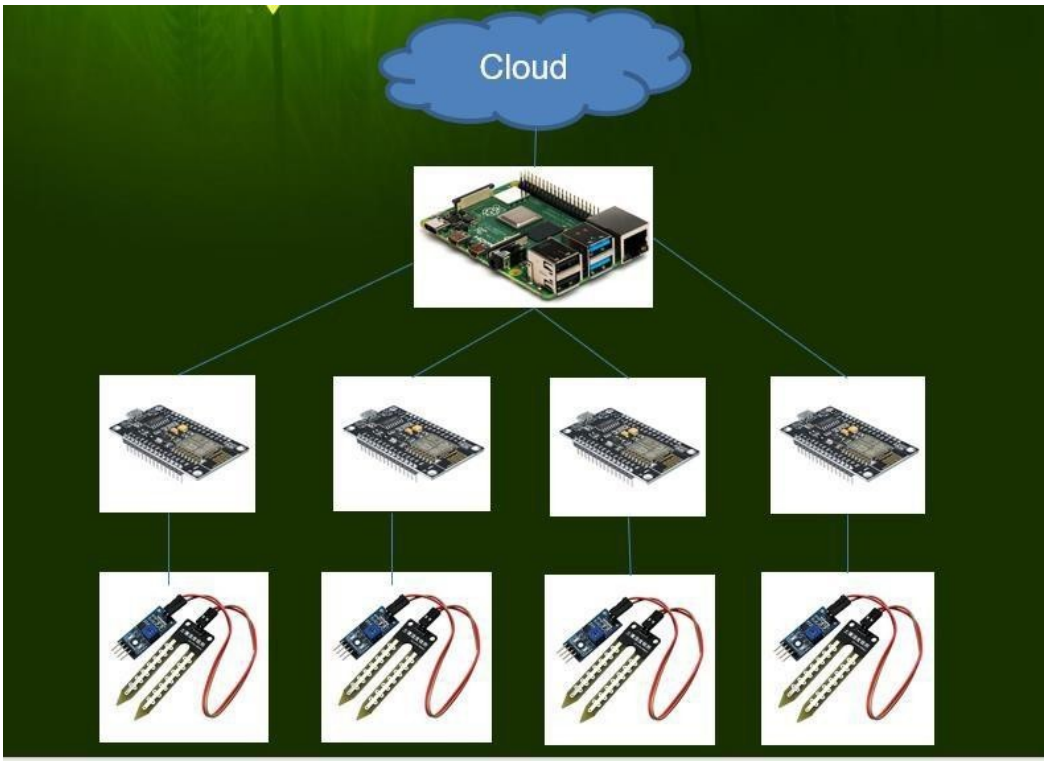


Fig 1.7 architecture diagram

CIRCUIT DIAGRAMS:

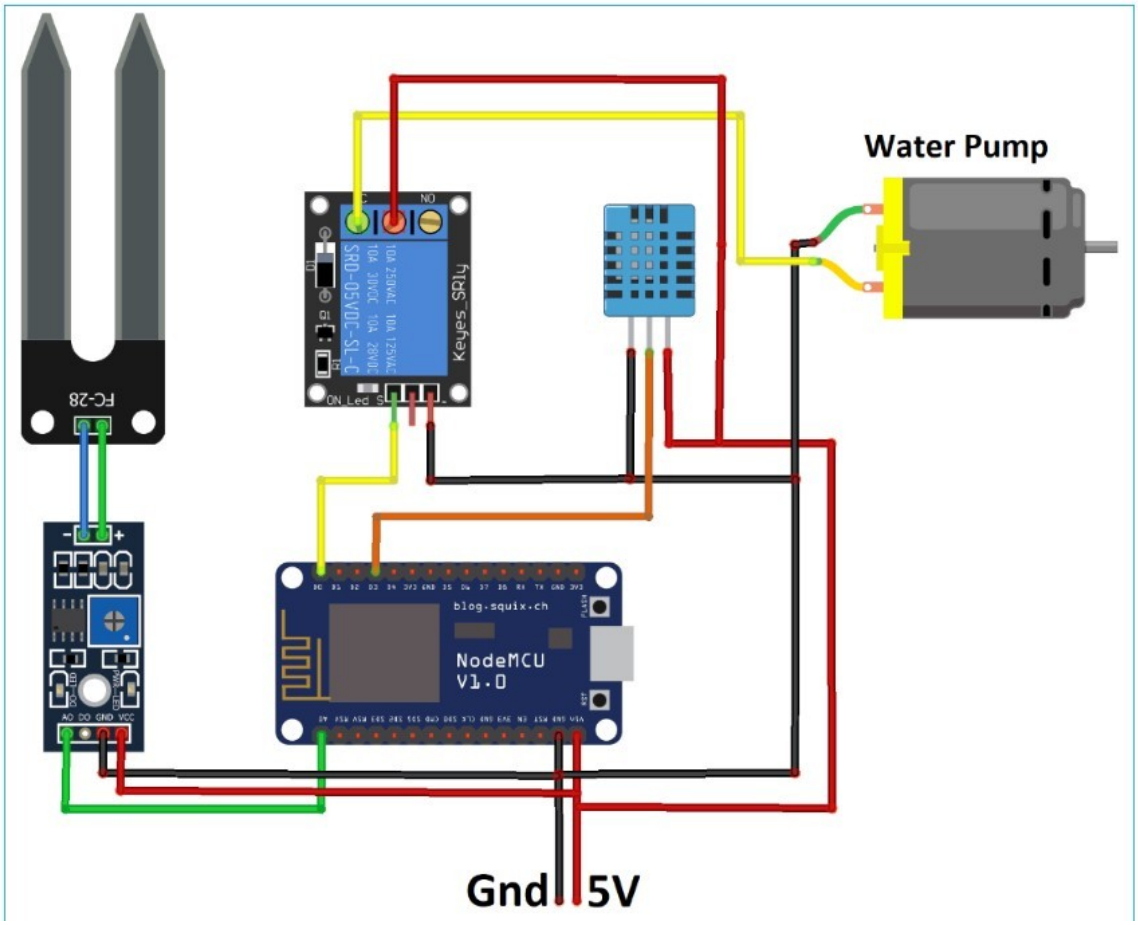


Fig 1.8 circuit diagram

3.SYSTEM REQUIREMENTS

HARDWARE:

- NodeMCU ESP8266
- Soil Moisture Sensor
- 5V Relay
- DHT Sensor
- Input devices: Mouse, Keyboard
- Output devices: Monitor
- Water Pump

SOFTWARE:

- Chrome 76.0 or above
- Windows 7 or above

IMPLEMENTATION:

```
#define BLYNK_PRINT Serial

#include <OneWire.h>

#include <SPI.h>

#include <BlynkSimpleEsp8266.h>

#include <DHT.h>

#include <DallasTemperature.h>

#define ONE_WIRE_BUS 4

OneWire oneWire(ONE_WIRE_BUS);

DallasTemperature sensors(&oneWire);

char auth[] = "qlB_tCeHM4Uyul3RVm1_-dT7IFV3p7hs";

char ssid[] = "Karthik";

char pass[] = "Karthik@123";


#define DHTPIN 2

#define DHTTYPE DHT11

DHT dht(DHTPIN, DHTTYPE);

SimpleTimer timer;

void sendSensor()
```

```
{
float h = dht.readHumidity();
float t = dht.readTemperature();

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

Blynk.virtualWrite(V5, h); //V5 is for Humidity
Blynk.virtualWrite(V6, t); //V6 is for Temperature
}
void setup()
{
Serial.begin(9600);
dht.begin();

timer.setInterval(1000L, sendSensor);
Blynk.begin(auth, ssid, pass);
```

```
sensors.begin();
}
int sensor=0;
int output=0;
void sendTemps()
{
sensor=analogRead(A0);
output=(145-map(sensor,0,1023,0,100));
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 SCREENSHOTS:

Fig 1.9 blynk app screenshot

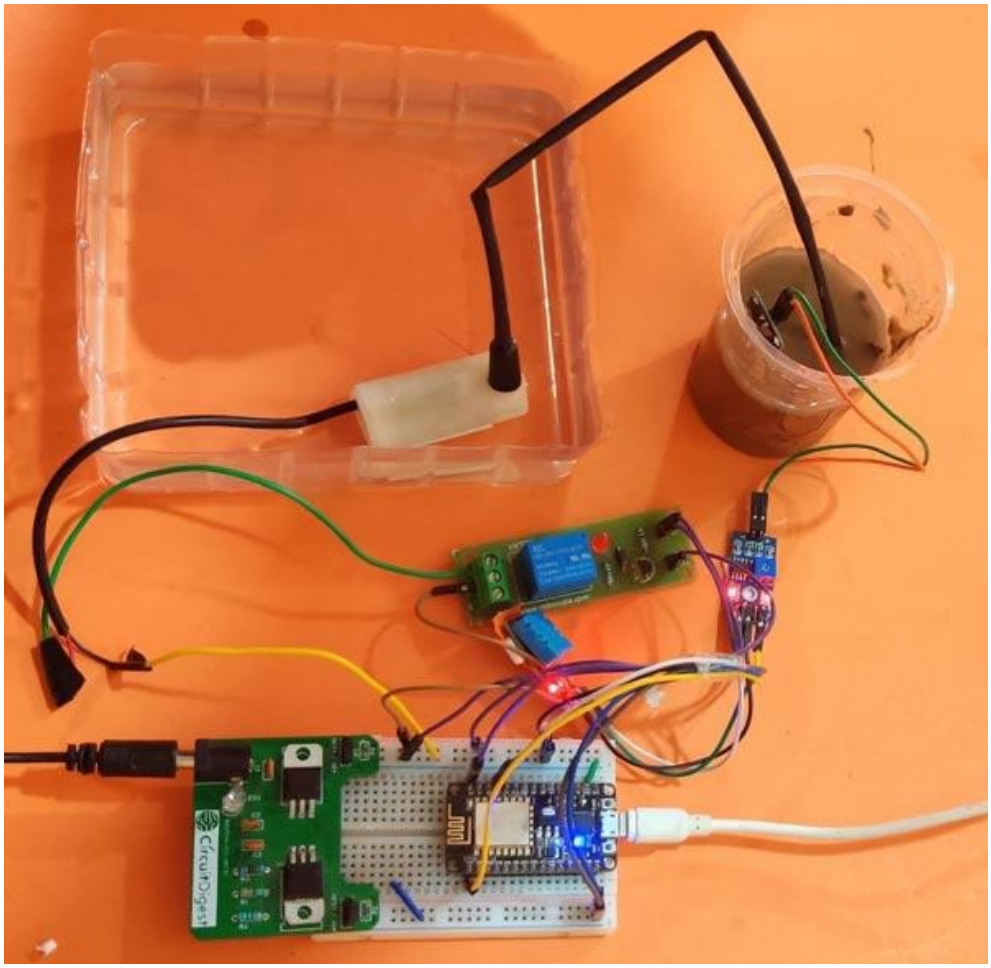


Fig 1.10 circuit output screenshot

6. CONCLUSION AND FUTURE WORK

The main aim of our project was to develop a cost effective, smart irrigation system that operates based on the real-time moisture content in the soil.

We would like to scale this project in the future so that this project can work accurately for a larger piece of land. This can be done by installing more number of NodeMCUs in the field, so that the moisture content in the soil can be detected and sent to the Blynk app for the automatic irrigation control.

7. REFERENCES

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