SMART IRRIGATION SYSTEM

BY

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

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APPROVAL

This Project titled **"SMART IRRIGATION SYSTEM",** submitted by Jannatul Ferdousi Disrty ID No: 181-15-971to 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 01 February 2023.

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Aliza Ahmed khan, 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.

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ABSTRACT

The irrigation system can be fully automated using the intelligent irrigation system's extensive range. Here, we use the ESP32 SIM800L microcontroller, a motor, an AC light, and solar power to create an Internet of Things-based irrigation system. It will send information to the Blynk app to track soil conditions in addition to automatically irrigating the area with water based on the amount of soil moisture present. The system will be made up of a water pump that will irrigate the soil in accordance with the environmental factors affecting the soil.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This undertaking is all approximately a smart irrigation system. As we all recognize irrigation is the software of imparting managed amounts of water to vegetation at needed periods. It allows developing agricultural crops, preserving landscapes, soil, and consolidation and vegetating disturbed soils in dry areas and at some point of periods of less than average rainfall. The objective of our task is to design an automated irrigation gadget that is cost powerful and time saving the use of Node microcontroller. The NodeMCU (Node Microcontroller Unit) is an open supply software program and hardware improvement surroundings this is constructed around a totally cheaper system-on-a-Chip (SoC) called the ESP8266.The proposed device will robotically water the plants when the soil moisture sensor detects inadequate quantity of moisture in soil the usage of as the Centre core. We also aim to attach the machine with internet so that it can additionally manually be operated with the aid of phone app from everywhere-every time.

The concept of this mission is to allow the proprietors of fields to manipulate and have a look at the boom in their flora of their farms. This is done by using a smart platform of IoT and solenoid valves to manipulate the go with the flow of water based at the moisture of the soil and offers actual time surveillance to the owners who stay a ways away from the farms. This mission also lets in surveillance at the employees and their vegetation a good way to no longer occur losses. It is straightforward to apply for anybody with a smartphone and doesn't require renovation as soon as set up.

This task has been designed for surveillance of irrigation structures in farms with out the need of manual checking of irrigation systems. as an instance, in case you are staying in Bangalore, and feature your farm in Andhra Pradesh or some other place and it is not viable so that you can visit the farms whenever to maintain a tab on the plants. as an alternative, this undertaking permits you to check up in your plants the use of a easy IoT machine. The high quality a part of this venture is that, the node used to attach the machine for your smart device, additionally controls the float of water from the pump and additionally the timing intervals in between the irrigation cycles. on this paper we will be discussing all approximately the mission as to how it is constructed and how it works.

1.2Motivation

- 1 Many gardens use a traditional irrigation system:
    - Measure the water content of the soil by hand.
    - Treat different fruit trees in the same way.
    - Treat different soils similarly.
    - Irrigation technology is set-specific.
- Irrigation is not just spraying water. It requires a lot of knowledge from different fields
    - Botany: Fruit, growth stage, rooting depth.
    - Agronomy: Soil texture, soil water content, allowable soil erosion.
    - Climatology: Precipitation, Evaporation.
- We need smart irrigation systems that know when to water the garden.

1.3Objectives

- This system work by sensing soil moisture levels.
- Information gathered with help of sensors and shipped through Blynk app.
- It's inexpensive to build and reliable.

1.4 Expected Outcomes

These phases of said process are as follows:

- Next, this same project scope will just be thoroughly examined in order to design the proposed water quality and water level management system using themobile applications system. It will be used to finalize the specifications of the necessary physical devices.
- The racetrack circuit example will be created next. Information is collected using the Console.
- A section of track is then applied on a breadboard and tested in the research group.
- This same proposed method will be checked in an experiment.

1.5 Report Layout

Everything about this project is written here in chapter 1. Why I chose this project, how this project will be completed, motivation, objective, expected result etc. briefly discussed.

In Chapter 2 Discuss the background of the project. Related work for this project is briefly discussed here. Also discuss the benchmarking studies, scope of the problem, and challenges for this project.

In Chapter 3, we discuss the specification requirement here. Here we also briefly discuss business process modeling, requirements gathering and analysis, Bolck diagram and circuit diagram, logical data model, and design requirements.

In Chapter 4 here briefly discuss about front-end design, back-end design, interaction design and UX, implementation requirements.

In chapter 5 here we discuss about Database implementation, Front-end design implementation, Interaction implementation, Testing implementation, Test results and brief report.

In Chapter 6 here we discuss the topic Impact on Society, Impact on the Environment, Ethical Aspects.

In Chapter 7 we discuss the discussion and conclusions, the scope of further development.

CHAPTER 2

BACKGROUND

2.1 Introduction

“Smart” water technology removes the human element from the equation. Smart sensors and controllers display weather and other online conditions on the website and adjust irrigation systems to apply the right amount of water at the right time. Water-saving nozzles and pressure reducers follow exactly where water is needed. Together, these technologies can reduce outdoor water use by up to 20-40% annually while maintaining a healthy and beautiful landscape.

SWAT develops overall performance test plans for specific categories of irrigation products. These “protocols” outline strategies based on technical expertise to assess whether products meet relevant water efficiency standards. Protocols are written by irrigation experts and publicly commented on before being revised and followed.

Once the SWAT protocol is complete, a third of Birthday companies will use it to determine whether irrigation products submitted by manufacturers actually retain water. Many water utilities use these test results as the basis for offering rebates and incentives to customers upgrading their sprinkler systems. In some cases, this protocol is also used by the Water Sense initiative in the United States. Environmental Safety Business Enterprise was used to develop product labeling standards. SWAT:

Defines irrigation and water management best practices and develops protocols and assessments. Enable water supply management partnerships between water distributors, irrigation contractor representatives, government agencies and landscapers. Inform stakeholders about the water saving potential of good irrigation techniques.

Recently, great efforts have been made to integrate the Internet of Things and cloud computing [1], [3], [4] they found that the Internet of Factors could be combined with cloud computing to further enhance its benefits. The role of cloud IOT schemes for precision agriculture is studied in [2].However, actuator components are now ignored. Similarly, [5] considered irrigation optimization methods without discussing monitoring and management. A literature review suggests that current views on IoT adoption are limited to tracking and gathering facts. To our knowledge, a final check involving optimization of aids has not been considered in the literature. This article integrates IOT sensors and network capabilities with cloud interfaces, uses facts to investigate superior irrigation prices, and conducts calculated drift bids through the control of solenoid valves.

The result is a total solution that includes discovery, networking, management and optimization. To our understanding, no such technique has been proposed for agricultural irrigation purposes.

The main contribution of this object is an intelligent irrigation system that uses internet of elements and cloud connectivity to collect and store facts, an optimization model to calculate the optimal irrigation parameters, and an application via solenoid valves. Is the final control set to be?

2.2 Related Work

When implementing IoT devices, the communication technology used can be considered a key and essential point for successful operation. Communication technology can also be used judiciously, depending on the environment in which it is used [6]. The main technologies used in IoT for irrigation can be divided into two categories. It could be a device that acts as a node and transmits or transmits small amounts of data over short distances with low power consumption. Other devices are therefore devices that can transmit large amounts of data over long distances and are energy intensive devices. Various wireless standards are available for communicating with IoT devices. IoT devices can be broadly classified as devices that communicate over long distances or short distances [7].

Wi-Fi is recognized as one of the most widespread and effective communication technologies due to its accessibility potential. Additionally, most of today's low-cost devices for IoT support Wi-Fi. [8]

The Global System for Mobile Communications (GSM) allows long-distance communication and requires only a cellular plan from a service provider operating and operating in that particular region. It is also recognized as the broadest wireless technology available. Two of his recent notable technologies are Long Range (LoRa) and Message Queuing Telemetry Transport (MQTT). LoRa offers a very long range, making this technology very viable and useful in remote areas without service. On the other hand, MQTT is also a widely used protocol due to its low overhead and low power consumption, but it is not yet widespread. used in irrigation systems [10].

2.3 Comparatives Analysis

If you want to save water during drought but want to irrigate your landscape with optimal efficiency, smart irrigation systems leave traditional irrigation methods behind. Increase so why use smart irrigation instead of conventional irrigation methods?

Conventional irrigation systems are manually preset to turn on and off with timers. It doesn't matter if an unexpected torrential downpour hits on a scheduled day or the surface is supersaturated so deep that you can't see it. This timer is preset to water each scheduled day. rain or shine. This is clearly not the most efficient or cost-effective way to manage landscape irrigation during periods of drought.

Studies show that 70% of global water consumption is used for irrigation. of which half is wasted due to inefficient and traditional irrigation practices. The best way to manage watering and care for your landscape is to know how much water your plant's roots need on a given day, or if your scheduled watering is too much is that today's cloud-based smart irrigation does the work for you. It continuously collects and records real-time weather data at a specific location, so you can control the watering of plants and landscapes and adapt by the hour, every day. Using this intelligent technology, deeply embedded in the roots of plants, a highly sensitive soil moisture sensor electronically transmits the measured soil moisture content to a smart controller, which is needed to plant roots. Automatically supplies the perfect amount of water. To keep plants above ground healthy and prosperous.

Intelligent irrigation system saves water, time and money. Studies show that cloud-based intelligent irrigation systems can save up to 50% of water consumption in landscape irrigation. As a result, intelligent systems typically save water within two years. Smart irrigation is not only cost-effective, but also responsible.

2.4 Scope of the Problem

Irrigation Scope of the problem

- Rainfall and water availability are causing large regional imbalances in world countries.
- Farmers suffer from sub-optimal use of facilities built.
- Bangladesh irrigation efficiency is very poor.

- Our groundwater policy is wrong.
- Competing water demand is increasing rapidly.

2.5 Challenges

Water is very important in our daily life. It can be individuals, organisms, plants, etc. That's it Water shortage is currently one of the most serious problems in our country. You must have an answer such a problem. This is water protection. Farmers use their regular irrigation systems. But in this system, there is a loss of water and a loss of time, so we can solve this problem and easily build this system. There were several difficulties in completing the project. They are listed below.

- Turning irrigation on and off requires significant manual effort.
- Very time consuming and expensive.
- Some landscapes are waterlogged and even submerged.
- Some trees that suffer from health problems have decayed.
- Waste of water and therefore money.

CHAPTER 3
REQUIREMENT SPECIFICATION

3.1 Business Processing Modeling

This includes formalizing normal business processes and finding ways to improve them. Analytical representation provides process modeling and makes it more efficient. This is the standard way of describing the process.

Business process modeling has many benefits.

- Anyone can see how the framework works.
- Check consistency.
- Controls the entire process.
- Duplicate detected.
- Delete unwanted faces.

Modelers are one of the most important things in BMPS.

Incredible Modeling Tools should be:

- Easier for business to learn.
- Easy to communicate with other departments.
- Low cost.
- Ability to simulate a workflow before implementation.
- A well-defined
- Procedure start and end.
- Helps customers summarize comparable processes and visualize how they work.

3.2 Requirement Collection

We used multiple requests to complete the project. Some of them are listed below.

- Battery Stores 8V, 7.5AH charge.
- Motor AC 3 to 6V, 2.5 to 6V Power supply Water.
- Relay Connect devices with 2 channels.
- Soil moisture sensor for water level.
- ESP32+SIM800L to control the whole project.
- Flash third-party apps to show output and input.
- A cable used to connect one device to another.

3.3 Block Diagram and Circuit Diagram

Block Diagram:

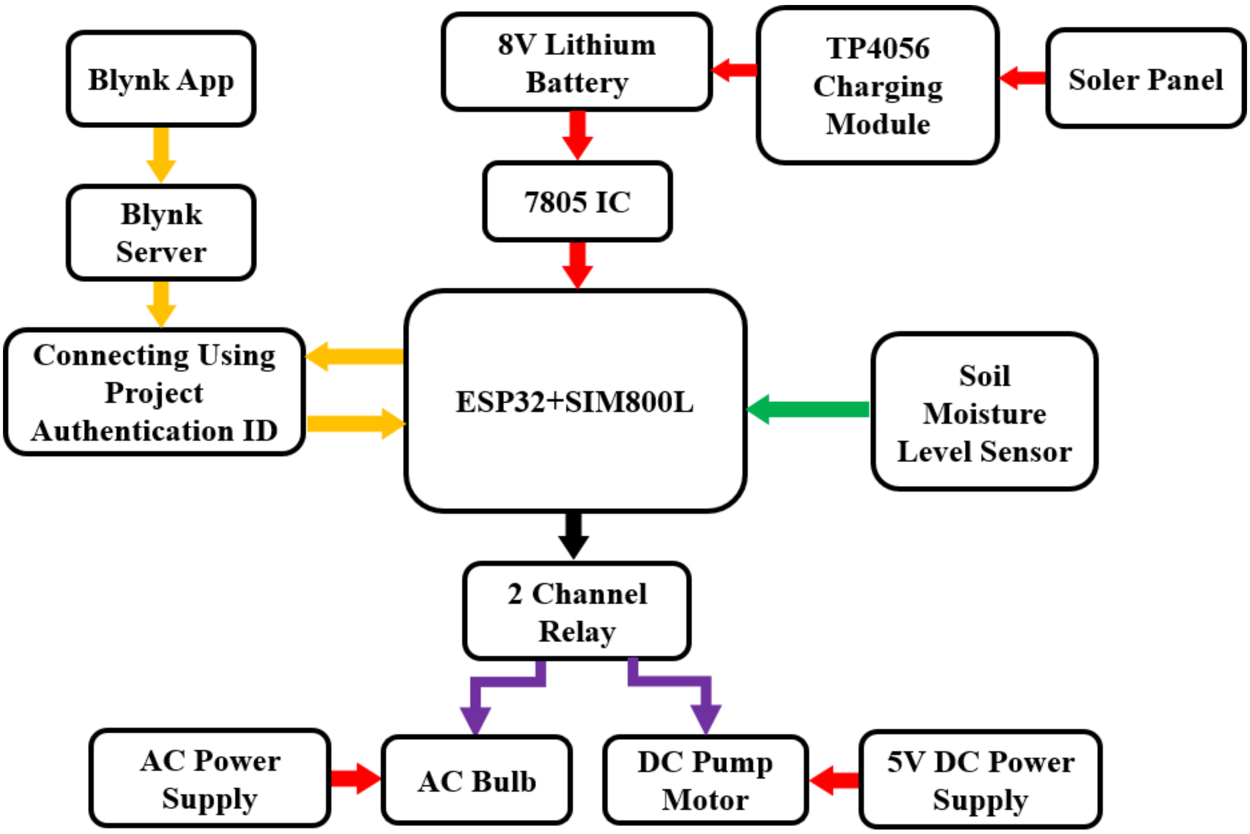

Fig. 3.1: Smart Irrigation System Block Diagram.

Circuit Diagram:

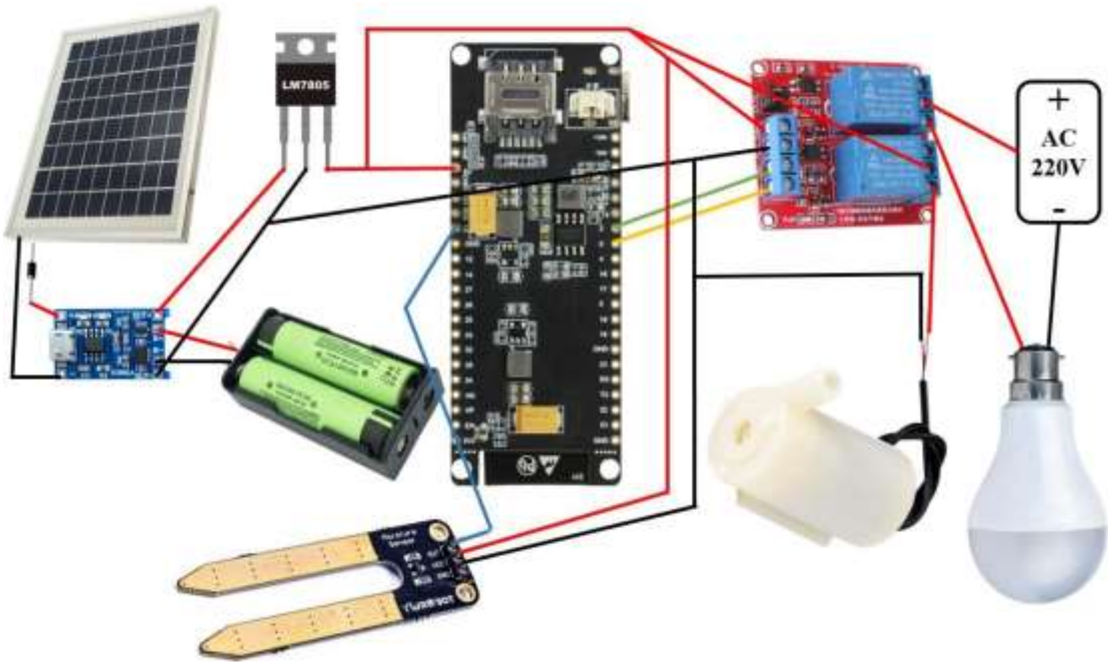

Fig. 3.2: Circuit Diagram.

3.4 Logical Data Model

A logical data model represents a detailed description of data regardless of how that data is physically implemented in a schema. It is a technology that graphically expresses the structure and composition of data and provides information about various relationships between circuits. A logical data model has several characteristics.

1. All connections and relationships exist between them.

3. Includes all attributes of each specified object.

3. Each object has a humidity sensor.

3.5Design Requirement

We use many materials to design our projects. Some of them are listed below.

3.5.1 ESP32+SIM800L

TTGO T-call is a new ESP32 expansion board that combines the SIM800L GSM/GPRS module. Just like Bluetooth, you can talk to this esp32 card via SMS or phone calls and use your SIM card's data plan to connect to the internet.

Fig. 3.3: ESP32+SIM800L.

3.5.1.A ESP32+SIM800L Pin Out Details

- The T-Call ESP32 SIM800L board is in deep sleep mode.
- Wake up from sleep mode and connect to the Internet using the data plan on your SIM card.
- Send sensor readings to server and sleep again

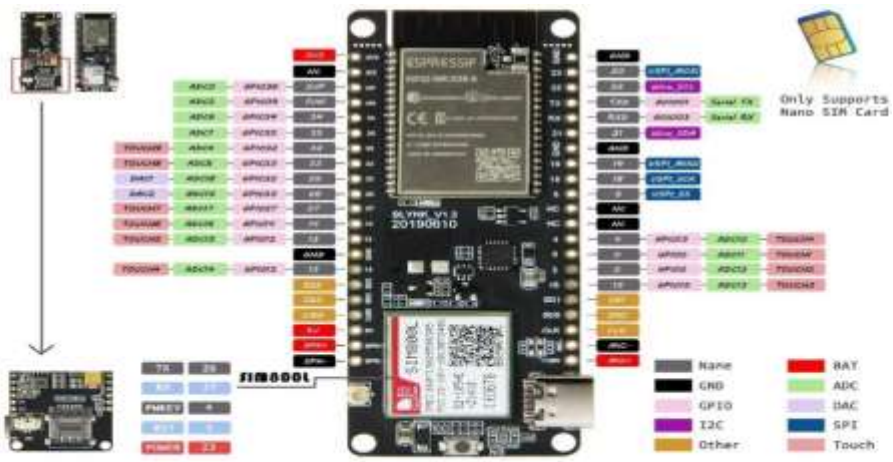

Fig. 3.4: ESP32+SIM800L Pin Out Details.

3.5.2 Soil Moisture Sensor

This module is a easy humidity sensor, it makes use of the measurement of humidity and humidity resistance modifications, the greater the soil is dry, the output voltage is decrease.

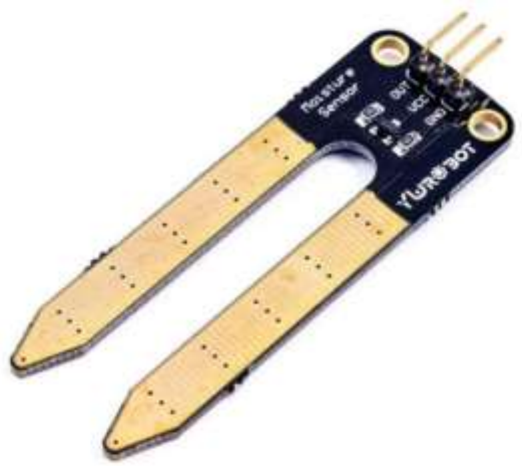

Fig. 3.5: Soil Moisture Sensor.

3.5.3 Channel Relay Module

This module incorporates two relays electrically isolated from the manipulate input. Relays may be used to switch better voltage and present day masses than a microcontroller can historically accomplish.

Fig. 3.6: 2 Channel Relay Module.

3.5.4 IC7805

Boost converters are frequently used in computer chips. They supply sustained dc output for variable efforts. In our case IC 7805 is a well-known regulatory IC that you apply to most projects. The name 7805 indicates the meaning of two, "78" indicates that it is indeed a hopeful rectifier, and "05" indicates that now it outputs 5v supply As a result, our 7805 will produce a time and energy + 5V efficiency.

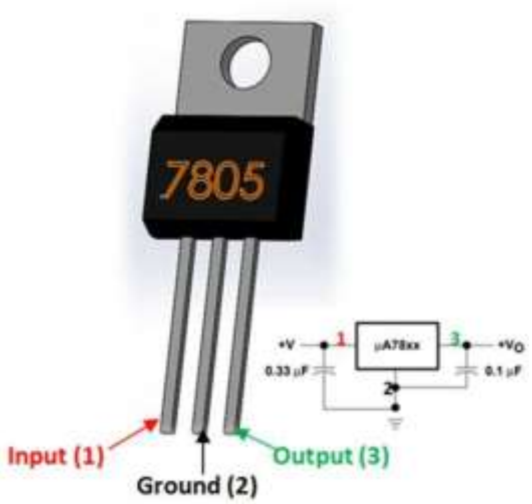

Fig. 3.7: IC7805.

Its throughput channel has a maximum current of 1.5A. Even so, the IC suffered from terrible skin irritation and is thus advised to sink heat for higher present levels works. For instance, if the power factor is 12V and you use 1A, (12-5) *1=7W. It will be destroyed by the hot water of 7 w.

3.5.4.a IC7805 Features

- Continuous Current Control board 5V
- The lowest power factor is 7V.
- The output current initiative is 25 volts.
- This same present process (IQ) is set to 5mA.
- There's more heat structure but instead latest halts useable.
- 125°C is the air temperatures interplay.

3.5.5 DC Pump Motor

This DC 3-6V mini micro submersible water pump is a cheap and small length submersible pump motor which can be pushed through 2.5 ~ 6V energy deliver. it is able to absorb to 120L in keeping with hour with a totally low present day intake of 220 mA.

Fig. 3.8: DC Pump Motor.

3.5.6 Lithium Battery Power Supply

- Battery Rated Voltage: 3.7 V
- Battery Form Factor: 18650
- Battery Feature: Rechargeable
- Battery Chemistry: Li-Ion
- Battery Capacity (MFG Rated): 3000 mAh

Fig. 3.9: Lithium Battery Power Supply.

3.5.7 Solar Panel

- Peak Power: 5W
- Production Tolerance: 0-3%
- Maximum Power Current: 0.27A
- Maximum Power Voltage: 18.36V
- Short Circuit Current: 0.29A
- Open Circuit Voltage: 22.00V

Fig. 3.10: Solar Panel.

3.5.8 PCB Board

The breadboard (PCB) or oriented strand committee (PWB) is indeed an engineered wood bread composed of resistive and protecting tiers.

Fig. 3.11: PCB board.

3.5.9 PVC Board

PVC board panel, known as Chevron Board or Andy Board, is widely used for both internal and external applications. It contains chemical installation, PVC, which is usedin industries, furniture, construction and advertising.

Fig. 3.12: PVC Board

3.5.10 Jumper Wire

Cables were indeed that was with electrical connections upon every close which can be used to always go without work piece. Relays were being commonly used by circuits as well as other equipment to make it simple to start changing a controller as considerednecessary.

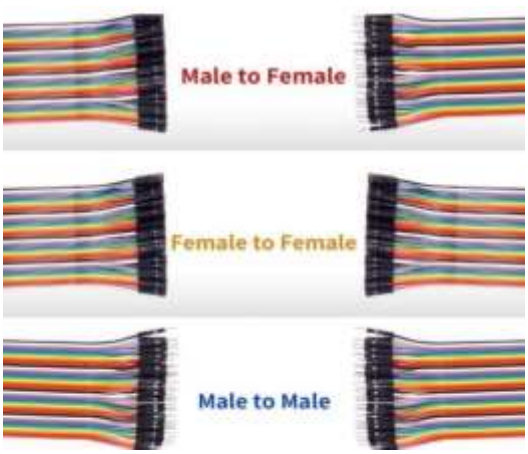

Fig. 3.13: Jumper Wire.

CHAPTER 4
DESIGN SPECIFICATION

4.1 Font-end Design

A list of application requirements was provided in the previous discussion. At this stage you can name almost every requirement of your project.

Software Description:

Our project system contains two main software components. The first is for the Arduino software and the second is for the Android application. The Android application is a dedicated application that displays client sensor information values and schedules client polling commands to the microcontroller over the internet. The microcontroller executes these commands and responds to requests from clients by passing appropriate commands to solenoid valves or sensors and passing information between framework components and Android applications.

Hardware Requirements:

- ESP32+SIM800L.
- Soil Moisture Sensor.
- 2 Channel Relay Module.
- IC7805.
- Battery.
- AC Light.
- TP4056 Lithium Charging Module.
- Bulb Holder
- Plastic Pipe.
- Diode.
- Lithium Battery Power Supply.
- Solar Panel.
- PCB Board.
- PVC Board.
- Jumper Wire.

4.2 Back end Design

This discussion will cover the backend development of the project. Write a flowchart for your project. The design of the backend is shown in Figure 4.1

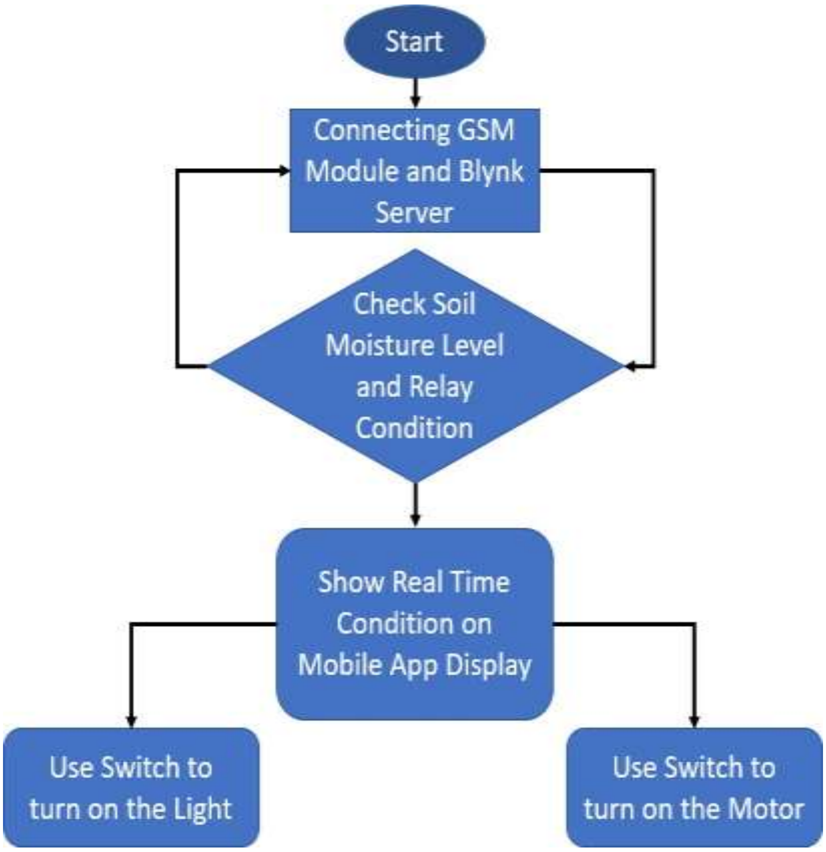

Fig. 4.1: Smart Irrigation System Flowchart Diagram.

4.3 Interacting Design and Description

Use Arduino programs in the backend language to implement the interaction of your application. With the help of ESP32 + SIM800L board, connect wire connections according to and announce pin numbers to create all kinds of interactive projects.

Once all procedures are completed according to this chapter, the IoT-based smart irrigation system will be ready to work. The main difficult thing about this chapter was to build a hardware connection on the behavior that work from this project based. A primary goal of this chapter was thus to comprehend the block diagram and even the linkage diagram.

4.4 Implementation Requirement

In previous discussions, this project was described in the Smart Irrigation System Project. To create the architecture of the IOT Smart Irregration System, we need to use computer language C embedded software (Aurdiuno IDE). Build code from Audino. My full project works according to this code and encoder. Here we use the 3rd party app Blynk to design Project Connected. Basically, the non-storage system is heavily used. So he also uses his Blynk app to ensure a smooth connection. An internet connection is required to use this He Blynk application. A user and her Blynk cloud his server can connect to the phone, but an internet connection is required as the user creates her authentication via her Blynk application. The combination and proper placement of hardware and software equipment make the application smarter.

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation of Database

In this work, we developed a smart irrigation system using IoT that helped us meet the automation required in our irrigation fields and plots by synchronizing the system with the BLYNK app for monitoring and control. system control. We don't use any database. But we save our program in microcontroller. We can say that microcontroller is our main features of database.

5.2 Testing Implements

Fig. 5.1: Final Project.

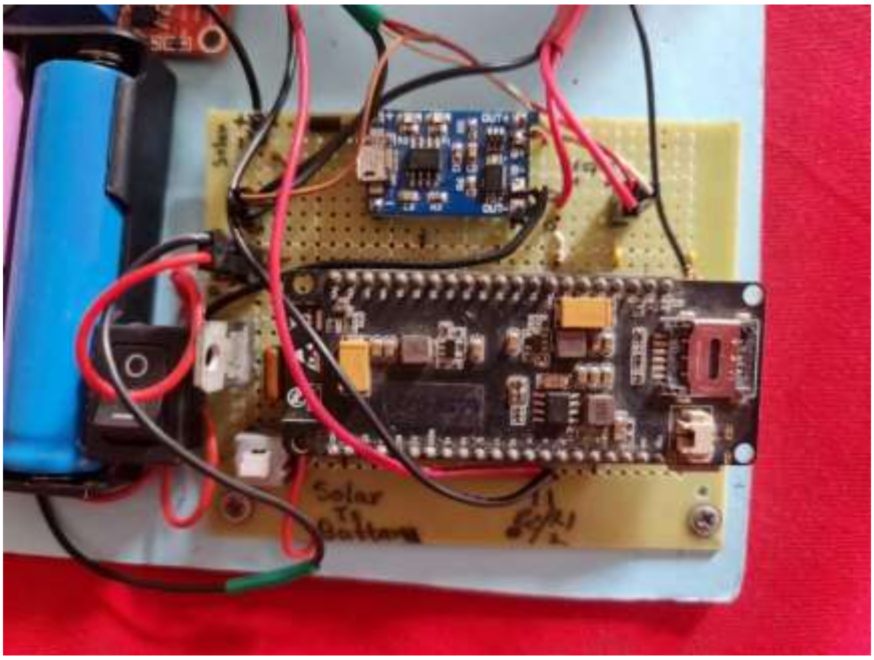

Fig. 5.2: Main Circuit Board.

❖ Using TP4056 Charging module to charge the lithium battery and circuit power supply and also Power switch for solar connection.

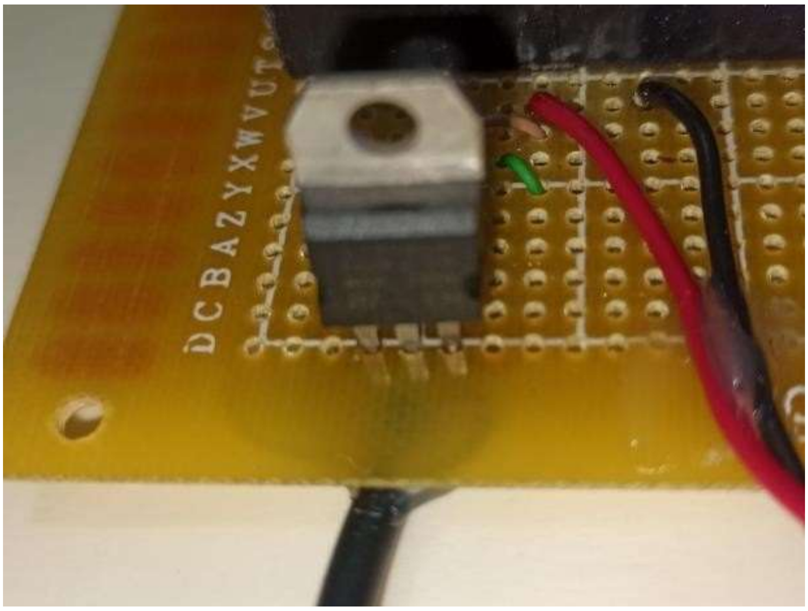

Fig. 5.3: 7805 IC.

❖ 7805 IC for supply 5V to the circuit.

Fig. 5.4: Water Pump.

❖ 5V pump motor use to fill up the water level.

Fig. 5.5: Blynk Mobile App.

Login Test:

Device test is the first step to test My Smart Integration System Project. Developers can easily find errors and bugs by running unit tests. System processes and expected results should validate and invalidate inputs. Table 5.1 shows the unit tests for the active system.

Table 5.1: Device testing for login System

Device	Value	Expected result	Result
Open ESP32+SIM800L Connected with Blynk Apps	Login Blynk Apps and Password Setup Verify Password	Login successfully. Device Connect Full Device	Pass

Device Test:

Once the device test is complete, functional testing will begin to test the development. A system application tests each sub-function in a functional test. A functional test is run for the entire run task with the expected result. Functional tests are shown in Table 5.2

Table 5.2: Device testing for different user role.

.

Device	Attribute value	Expected result	Result
AC Bulb	Connect With Blynk Apps Connected And When turned on from mobile.	Blub is On.	Pass
Soil Moisture sensor	Connect With Blynk Apps Connected And When turned on from mobile.	Soil Moisture sensor is On.	Pass
DC Motor	Connect With Blynk Apps Connected And When turned on from mobile.	DC Motor is On.	Pass

5.3Test Result and Reports

This is the final step of testing. Testing the Arduino program, equipment, and management is a gradual process throughout the usage process. Arduino programming setup is normally completed by a licensed wiring shop testing the connections. Check if the pump motor works properly. Next, check the humidity sensor and its level. Check the solar panels and their Positions and check the connection so fall elements.

CHAPTER 6

IMPACT ON SOCIETY, ENVIROMENT AND SUSTAIBILITY

6.1 Impact on Society

Agriculture is the main backbone of Bangladesh's economic growth. The most important obstacle encountered in traditional agriculture is climate change. The number of climate change impacts includes heavy rains, severe storms and heat waves, and rainfall. These cause the to be the least productive. Climate change also increases environmental impacts such as seasonal changes in plant life cycles. To increase productivity and minimize barriers in the agricultural sector, innovative technologies and practices called Internet of Things must be used. Technological advances in their field are gaining momentum, which means keeping track. The most important aspects of smart agriculture are environmental measurement and water management. The reason is that environmental and water management affect plant growth .This paper aims to make agriculture intelligent using automation and his IoT technology. Outstanding features of this document include intelligent control intelligent irrigation based on real-time field data. Second, temperature maintenance, humidity maintenance and other environmental parameters. Finally, smart farming recommendations for farmers.

Intelligent agriculture using automation and sensor technology will bring the following Impact to society.

- Conserving water
- Optimizing energy resources.
- Improved yield
- Prevention of contamination
- Elimination of human error
- Time saving, accurate Diagnosis of nutritional deficiencies
- Automation with low power consumption Components

Analytical and automated control systems

6.2 Impact on Environment

In addition to wasting water, over-irrigation can have serious consequences for the environment. Runoff from flooded fields depletes topsoil, leading to soil erosion, nutrient loss, and water pollution. Meanwhile, the depletion of water resources such as rivers and aquifers is accelerating desertification in some parts of the world. Ironically, over-irrigation can also make life harder for farmers: not only does it cost money to pump water, but too-wet soil can stunt crop growth and promote disease. tree.

As global water supplies decrease each year, finding solutions to over-irrigation is more urgent than ever. Now, an Armenian tech startup is leveraging its country's unique intellectual property (IP) laws to provide such a solution.

6.3 Ethical Aspects

With the development of wireless technology, physical lenses can be connected via the Internet. There are many new risks and vulnerabilities arising from transferring data between different electronic devices, many of which relate to ethical issues. The vast data provided by various sensors is beyond user ethics. It is unethical if the sensor reads the wrong value.

CHAPTER 7
CONCLUSION AND FUTURE SCOPE

7.1 Discussion and Conclusion

Its primary purpose of this challenge is to screen the water resource tests via growing a clever groundwater tracking device that could discover physical houses of water and is applied in a web - of - matters platform system. The capability is the Wi-Fi communication between the system and the sensor community on a unmarried-chip answer. This equal structure for tracking reliability and practicability changed into performed by way of checking 4 water parameters. The postpone for measuring waterways can be changed primarily based on the want. On this sustainability practices, time is performed however also prices are particularly.

7.2 Scope for Further Developments

The proposed method for sensible irrigation monitoring is based totally on cell computing, microcontroller, ESP32 + SIM800L and net of factors. It provides actual-time statistics on the environmental elements of the garden, in order that neighborhood users and gardeners deal with their garden or farm well. The effects are introduced through a cell app. smart garden with net of factors (IoT) based ESP32 + SIM800L module can be designed with numerous hardware and software program additives in order that it can be organized into a smart lawn machine which is managed with the Blynk Android app as intended.

There are a few obstacles that were decided ultimately in our undertaking. considering the truth that our task is primarily based on the internet, our home equipment are absolutely managed by internet get entry to. As we control the complete on line machine, we want to affirm the excessive pace of the internet. otherwise, device delays will arise because of the truth the Ethernet guard will now not art work as a community company for the circuit.

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Appendix

Program Code:

```
// TTGO T-Call pin definitions
#define MODEM_RST            5
#define MODEM_PWKEY          4
#define MODEM_POWER_ON       23
#define MODEM_TX             27
#define MODEM_RX             26
#define I2C_SDA              21
#define I2C_SCL              22

#define BLYNK_PRINT Serial
#define BLYNK_HEARTBEAT 30
#define TINY_GSM_MODEM_SIM800

#include <TinyGsmClient.h>
#include <BlynkSimpleSIM800.h>

#include <Wire.h>
// #include <TinyGsmClient.h>
#include "utilities.h"

// Set serial for debug console (to the Serial Monitor, default speed 115200)
#define SerialMon Serial

// Hardware Serial on Mega, Leonardo, Micro
#define SerialAT Serial1


const char apn[]  = "internet";
const char user[] = "";
const char pass[] = "";

// You should get Auth Token in the Blynk App.
// Go to the Project Settings (nut icon).
const char auth[] = "vnwCm4MQ-5LnavGrFPASwns07xoIdtSz";

TinyGsm modem(SerialAT);

const int soilSensor = A0;
int motorPin = 2;
int lightPin = 0;
int pinValue;

BLYNK_WRITE(V0)
{
  pinValue = param.asInt();
}

void setup()
{
  // Set console baud rate
  SerialMon.begin(115200);
```

```
delay(10);

pinMode(soilSensor, INPUT);
pinMode(lightPin, OUTPUT);
pinMode(motorPin, OUTPUT);
digitalWrite(lightPin, LOW);
digitalWrite(motorPin, LOW);

// Keep power when running from battery
Wire.begin(I2C_SDA, I2C_SCL);
bool   isOk = setPowerBoostKeepOn(1);
SerialMon.println(String("IP5306 KeepOn ") + (isOk ? "OK" : "FAIL"));

// Set-up modem reset, enable, power pins
pinMode(MODEM_PWKEY, OUTPUT);
pinMode(MODEM_RST, OUTPUT);
pinMode(MODEM_POWER_ON, OUTPUT);

digitalWrite(MODEM_PWKEY, LOW);
digitalWrite(MODEM_RST, HIGH);
digitalWrite(MODEM_POWER_ON, HIGH);

// Set GSM module baud rate and UART pins
SerialAT.begin(115200, SERIAL_8N1, MODEM_RX, MODEM_TX);
delay(3000);

// Restart takes quite some time
// To skip it, call init() instead of restart()
SerialMon.println("Initializing modem...");
modem.restart();

String modemInfo = modem.getModemInfo();
SerialMon.print("Modem: ");
SerialMon.println(modemInfo);

// Unlock your SIM card with a PIN
//modem.simUnlock("1234");

SerialMon.print("Waiting for network...");
if (!modem.waitForNetwork(240000L)) {
  SerialMon.println(" fail");
  delay(10000);
  return;
}
SerialMon.println(" OK");

if (modem.isNetworkConnected()) {
  SerialMon.println("Network connected");
}

SerialMon.print(F("Connecting to APN: "));
SerialMon.print(apn);
if (!modem.gprsConnect(apn, user, pass)) {
  SerialMon.println(" fail");
  delay(10000);
  return;
```

```
 }
 SerialMon.println(" OK");

 Blynk.begin(auth, modem, apn, user, pass, "blynk.iot-cm.com", 8080);
 // Blynk.begin(auth, modem, apn, user, pass);
 //Blynk.begin(auth, modem, apn, user, pass, "blynk-cloud.com", 8080);
}

void loop()
{
 Blynk.run();

 if (pinValue == HIGH)
 {
  getPirValue();
 }
}

void getPirValue(void)
{
 int soilValues = analogRead(soilSensor);
 Serial.print("Soil Values:");
 Serial.println(soilValues);

 if (soilValues <= 1000)
 {
  //Serial.println("MOTION DETECTED");
  //Blynk.notify("Motion detected");
  digitalWrite(motorPin, HIGH);
  Blynk.virtualWrite(V1, soilValues);
  //delay(500);
 }
 else if (soilValues <= 4095)
 {
  digitalWrite(motorPin, LOW);
  Blynk.virtualWrite(V1, soilValues);
  Blynk.notify("Water Full");
  delay(500);
 }
 else
 {
  digitalWrite(motorPin, LOW);
 }

}
```

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