IoT Based Smart Parking System

A Mini Project Submitted in Partial Fulfilment of the requirement for

The Completion of 3rd semester of

MASTER OF COMPUTER APPLICATION

Of

Visvesvaraya Technological University

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CERTIFICATE

This is to certify that **DHAKSHAYINI BV** and **RAMAN PANJIKAR** with Register No. **1BY20MC018 and 1BY20MC038** respectively has successfully completed the Third Semester MCA IoT mini-Project titled **"Balcony Garden Soil Irrigation System"**, towards partial fulfilment of the requirements for the completion of 3rd semester of the Degree in "**Master of Computer Applications"**, awarded by **Visvesvaraya Technological University**, during the Academic Year **2021-2022.**

Project Guide **Co-Guide** **Head of Department**

Examiners

1. _____ **Examination Centre: _____**

2. _____ **Date of the exam: _____**

DECLARATION

We, **DHAKSHAYINI BV** and **RAMAN PANJIKA,** Student of 3rd semester of MCA, **BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT** Yelahanka, Bangalore

560064, bearing **1BY20MC018** and **1BY20MC038,** hereby declare that the project entitled **"Balcony Garden Soil Irrigation System"** has been carried out by us under the supervision of guide Dwarakanath G.V and co-guide Reshma C R, submitted in partial fulfilment of the requirements for the Completion of 3rd semester of the Degree of Master of Computer Applications by the Visvesvaraya Technological University during the academic year 2021-2022. This report has not been submitted to any other Organization/University for any award of degree or certificate.

DHAKSHAYINI BV **RAMAN PANJIKAR**

Date: **Date:**

Signature: **Signature:**

ACKNOWLEDGEMENT

The development of IOT project is generally bit complex and time consuming task. The goal of developing the project "**Balcony Garden Soil Irrigation System**" could not be archived without the encouragements of kindly helpful and supportive people. Here by we convey our sincere thanks for all of them.

We take this opportunity to express my gratitude to people who had been instrumental in the successful completion of this project.

We are thankful to our management trustee for providing us an opportunity to work and complete the project successfully.

We wish to express thank you to our **principal** for his support to the project work. We would like to acknowledge my gratitude to our HOD of Master of Computer Applications. **Dr. Ganesh P** for his encouragement and support. Without his encouragement and guidance this project would not have materialized.

The guidance and support received from our guides **Prof**. **Dwarakanath.G. V and Prof. Reshma C R** who contributed to this project, was vital for the success of the project. We are grateful for their constant support and help.

ABSTRACT

Land and water are the basic needs for agriculture and economic development of the country. According to International Water Management Institute (IWMI), one-third of the world's population will face absolute water scarcity by the year 2025. Agriculture which consumes more than 80% of the country's exploitable water resources. The overall development of the agriculture sector and the intended growth rate in GDP is largely dependent on the judicious use of the available water resources. Hence, this Scheme on Micro Irrigation (MI), which aims at increasing the area under efficient methods of irrigation viz. drip irrigation. Hence, this Scheme on Micro Irrigation (MI), which aims at increasing the area under efficient methods of irrigation viz. drip irrigation It also permits the utilization of fertilizers, pesticides and other water-soluble chemicals along with irrigation water resulting in higher yields and better quality produce. Drip irrigation system is regarded as solution for many of the problems in dry land agriculture and improving the efficiency in irrigated agriculture. Keeping all these in view, the present study was designed to study the extent of benefits derived from drip irrigation in horticultural crops and to identify the constraints encountered by farmers in adopting the drip irrigation for horticultural crops. The results revealed that majority of drip irrigation farmers had expressed the advantages like saving of water, saving in labor cost for irrigation, increased yield, water saving, labor saving, increased quality of produce, reduced weed growth, extended self-life of produce and uniform application of water. The constraints encountered by the farmers had, problem of non-availability of quality material, no follow up services by drip agencies, high initial investment cost, lack of capital to cover maximum holding under drip irrigation, delay in sanction of loan, leakage in the present drip system. Hence, it is clear from the study, drip irrigation agencies, financing institutions and others to supply adequate standard spare parts and other appropriate measures to ensure the satisfactory situation for proper adoption of drip irrigation method.

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1. INTRODUCTION

1.1 OVERVIEW:

Irrigation is making use of water to the land artificially. water is one of the precious useful resource and important factor for farming. underwatering is starting the water cycle too late and running it for no longer enough period due to this the crop may be damaged and it impacts the manufacturing. overwatering is beginning the water cycle too early and going for walks it for longer length than what it is essential by using doing this exercise the crop can be broken and manufacturing reduces. If human intervention is greater than this under and over watering takes vicinity due to small human errors. the primary object of this paper is to reduce human intervention and growth the irrigation performance by automating the irrigation system the use of sensors. The trouble with modern-day irrigation system is (a)shortage in water and energy definitely required for plant boom. (b) traditional methods of farming are accompanied requiring-a great deal man-power and electricity consumption.

- Clever irrigation answers are the evolving trend in each day lives.
- The usage of present day Wi-Fi networks and the use of the hardware's is one important gain for clever agriculture.
- Smart irrigation can reduce the excess water usage and can increase the crop yield.

1.2 OBJECTIVE:

During the literature survey, we came to know that there was not a dedicated system for balcony gardens. As in the modern time the Multistorey buildings are common, the need for balcony garden is more compared to previous times. During the survey, we found out that many systems are using components that are not important for the system. It was increasing the cost and complexity of a project. Hence our objective is to create an irrigation system with minimal cost and complexity. The reduced complexity will help users to use this system without any difficulties. The cost-cutting is done to provide this system at a cheaper rate which will in turn increase the scalability of the irrigation system

2. LITERATURE SURVEY

Literature survey:

- Soil Monitoring with IoT – Smart Agriculture (Blog)
- AUTOMATION OF IRRIGATION SYSTEM USING IoT by Pavan Kumar Naik
- Remote Monitoring in Agricultural Greenhouse Using Wireless Sensor and Short Message Service (SMS). In this paper they are sending data via SMS but proposed system sends the values to mobile application.
- "Irrigation Control System Using Android and GSM for Efficient Use of Water and Power" this system made use of GSM to control the system which may cost more so to overcome that proposed system used Node Mcu esp8266 board which already consist of in build Wi-Fi module**.**

[1] **An IoT Based System for Remote Monitoring of Soil Characteristics**

Author: Abdullah Na, William Isaac, Shashank Varshney, Ekram Khan.

[2] **Asian Journal of Computer Science and Technology (AJCST)**

Author: P. Sindhu, G. Indirani

[3] **Soil Monitoring with IoT – Smart Agriculture (Blog)**

Soil Monitoring with IoT uses technology to empower farmers and producers to maximise yield, reduce disease and optimise resources. IoT sensors can measure soil temperature, NPK, volumetric water content, photosynthetic radiation, soil water potential and soil oxygen levels. Data from the IoT sensors are then transmitted back to a central point (or the cloud) for analysis, visualisation and trend analysis. The resultant data can then be used to optimise farming operations, identify trends and make subtle adjustments to conditions to maximise crop yield and quality. The use of IoT in agriculture is known as Smart Agriculture (or Smart Farming), and IoT is a central component of Precision Farming.

2.1 EXISTING SYSTEM:

Most of the existing system include extra sensors like temperature and humidity sensor. This increases overall budget of the project. The increased complexity with the extra components makes the irrigation system more complex and difficult to use. Most of the existing system uses temperature sensor, air pressure sensor which doesn't directly play a major role when irrigation is concerned.

2.2 PROPOSED SYSTEM:

We are specifically targeting the Balcony Garden drip irrigation project. It uses Node Mcu esp8266 as micro controller as well as wifi module. The irrigation system is designed to reduce the implementation cost of the project. With a smaller number of components, it is very user friendly as it doesn't require a lot of maintenance cost. It can be accessed from anywhere in the world as long as we are connected to internet. The Blynk app used to control this system is very easy to use through which we can control the irrigation system.

3. METHEDOLOGY

Methodology:

The working of the Balcony Garden Soil Irrigation System when the moisture sensor detects the moisture level of soil. The implementation of this system can be understood through following steps:

(1) Moisture sensor: Moisture sensor detects the moisture level of soil. Data gathered through moisture sensor is then sent to node mcu.

(2) Node MCU: Esp8266 is a wi-fi module as well as micro controller. The data received from moisture sensor is then send to blynk server.

(3) Blynk App: Through blynk server we can visualize the data in blynk app. On basis of moisture level, it will send a notification to owner about the moisture level and will ask for switch on the motor. When the moisture level is good enough it will send notification to switch off the motor.

4. REQUIREMENT SPECIFICATION

4.1 FUNCTIONAL REQUIREMENTS:

4.1.1 Blynk app:

Blynk platform powers low-batch manufacturers of smart home products, complex HVAC systems, agricultural equipment, and everyone in between. These companies build branded apps with no code and get the full back-end IoT infrastructure through one subscription. device provisioning, sensor data visualization, remote control with mobile and web applications, Over-The-Air firmware updates, secure cloud, data analytics, user and access management, alerts, automations

4.1.2 Volte Battery

The 9 volt HW battery is an EMF source using to supply DC power.

4.1.3 Soil Moisture Sensor

The moisture of the soil plays an essential role in the irrigation field as well as in gardens for plants. As nutrients in the soil provide the food to the plants for their growth. Supplying water to the plants is also essential to change the temperature of the plants. The temperature of the plant can be changed with water using the method like transpiration. And plant root systems are also developed better when rising within moist soil. Extreme soil moisture levels can guide to anaerobic situations that can encourage the plant's growth as well as soil pathogens. This article discusses an overview of the soil moisture sensor, working and its applications.

4.1.4 NodeMCU

NodeMCU is a IoT Module based on ESP8266 Wi-Fi Module. NodeMCU uses Lua Scripting language and is an open source Internet of Things (IoT) platform. This module has CH340g USB to TTL IC

4.1.5 Mini water pump

Micro DC 3-6V Micro Submersible Pump Mini water pump For Fountain Garden Mini water circulation System DIY project. This is a low cost, small size Submersible Pump Motor which can be operated from a 3 ~ 6V power supply. It can take up to 120 liters per hour with very low current consumption of 220mA. Just connect tube pipe to the motor outlet, submerge it in water and power it. Make sure that the water level is always higher than the motor. Dry run may damage the motor due to heating and it will also produce noise.

4.16 5V Relay

This is 1 Channel 5V Relay Board Module for Arduino PIC AVR DSP ARM. A wide range of microcontrollers such as Arduino, AVR, PIC, ARM and so on can control it. Each one needs 15mA - 20mA driver current and equipped with high current relay: DC 5V / 10A, AC 250V / 10AStandard interface that can be compatible with microcontroller.

4.2 NON-FUNCTIONAL REQUIREMENT:

Non-functional requirements are required, which specify criteria that can be used to judge the operation of a system, rather than specification behaviours.

- Cost of the components: The cost of the components cannot be determined in advance.
- Availability: The amount of time that it is operational and available for use, system I designed with a maximum uptime, so the system is highly available.
- Flexibility: System is planned in such way that it must be flexibility in terms of functionality of the software thought some additional features are added in future
- Reliability: The system should be trustworthy and reliable in providing the functionalities. Once a user has made some changes, the changes must be made visible by the system. The changes made by the Programmer should be visible both to the Project leader as well as the Test engineer.
- Scalability: The system should be scalable enough to add new functionalities at a later stage. There should be a common channel, which can accommodate the new functionalities.
- Maintainability: The system monitoring and maintenance should be simple and objective in its approach. There should not be too many jobs running on different machines such that it gets difficult to monitor whether the jobs are running without errors.

5. SYSTEM ANALYSIS AND DESIGN

5.1 System analysis and Design:

System Analysis is the process of understanding the problem and its domain. The main objectives of analysis are to capture a complete, ambiguous and consistent picture of the requirements of the system and what the system must do to satisfy the user needs and requirements. System design is an interactive process through which the requirements are translated into a "blue print" for constructing the system. And it is the first step in moving from the problem domain to solution domain. The design must implement all the explicit requirements contained in the analysis mode, and it must accommodate all of the implicit requirements desired by the user.

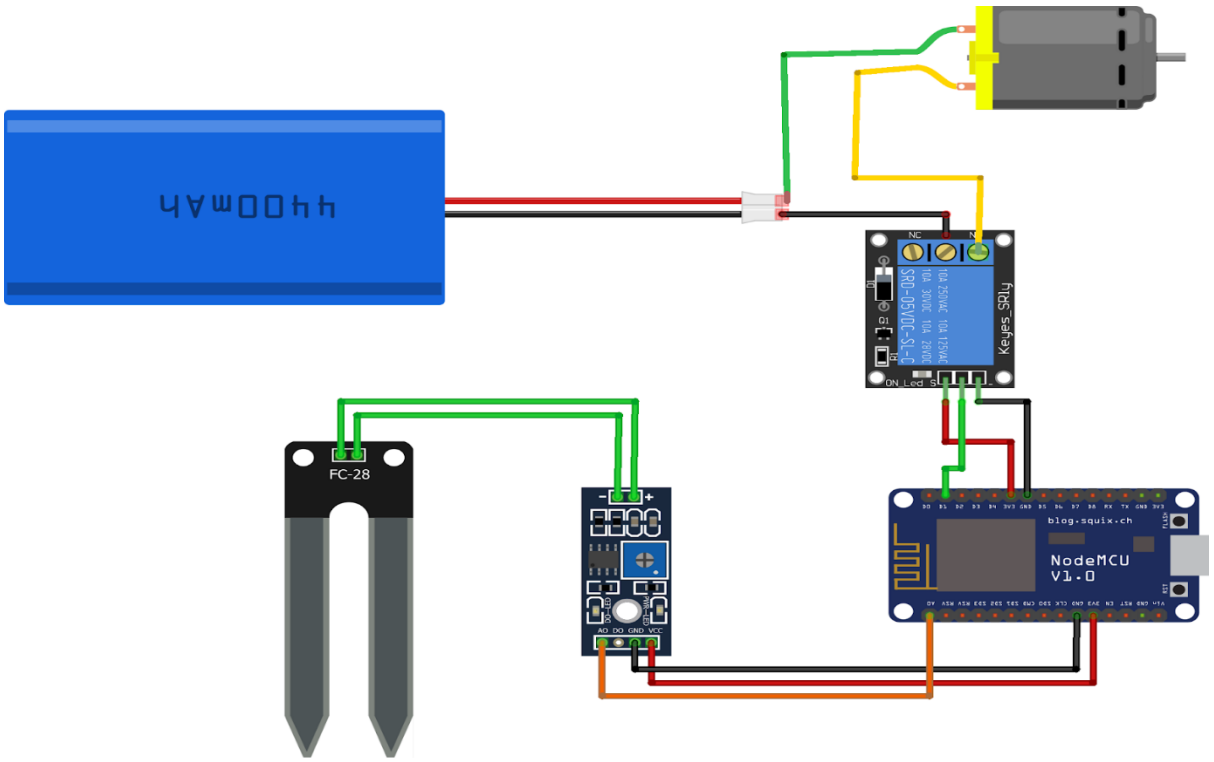

Fig 5.1 shows the integrated system of all components.

The overall system operation of the proposed system is depicted as a flow chart in the figure 5.2

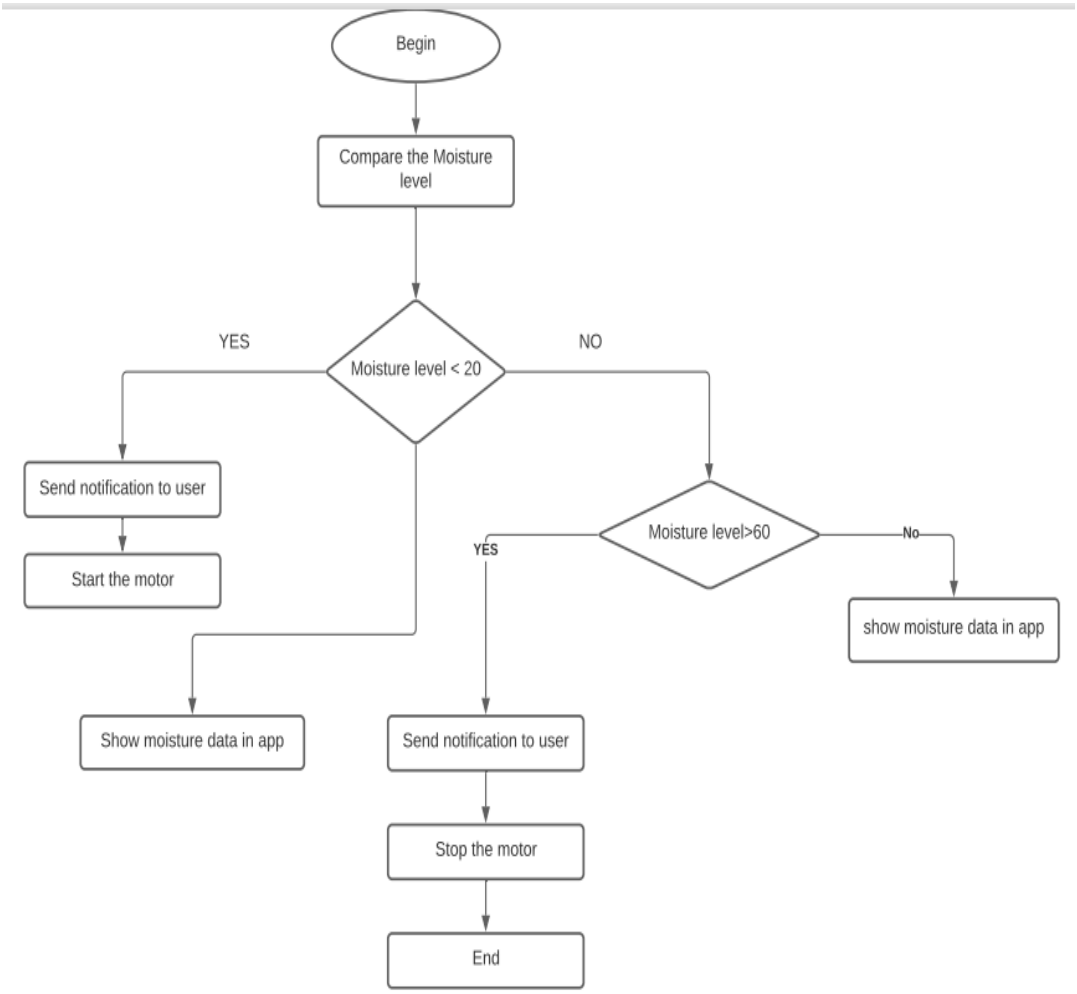

Figure 5.2 Flow chart for overall working of the system

5.2 CIRCUIT DIAGRAM:

A circuit diagram (electrical diagram, elementary diagram, electronic schematic) is a graphical representation of an electrical circuit. A pictorial circuit diagram uses simple images of components, while a schematic diagram shows the components and interconnections of the circuit using standardized symbolic representations. The presentation of the interconnections between circuit components in the schematic diagram does not necessarily correspond to the physical arrangements in the finished device. Circuit diagrams are used for the design (circuit design), construction (such as PCB layout), and maintenance of electrical and electronic equipment. In computer science, circuit diagrams are useful when visualizing expressions using Boolean algebra.

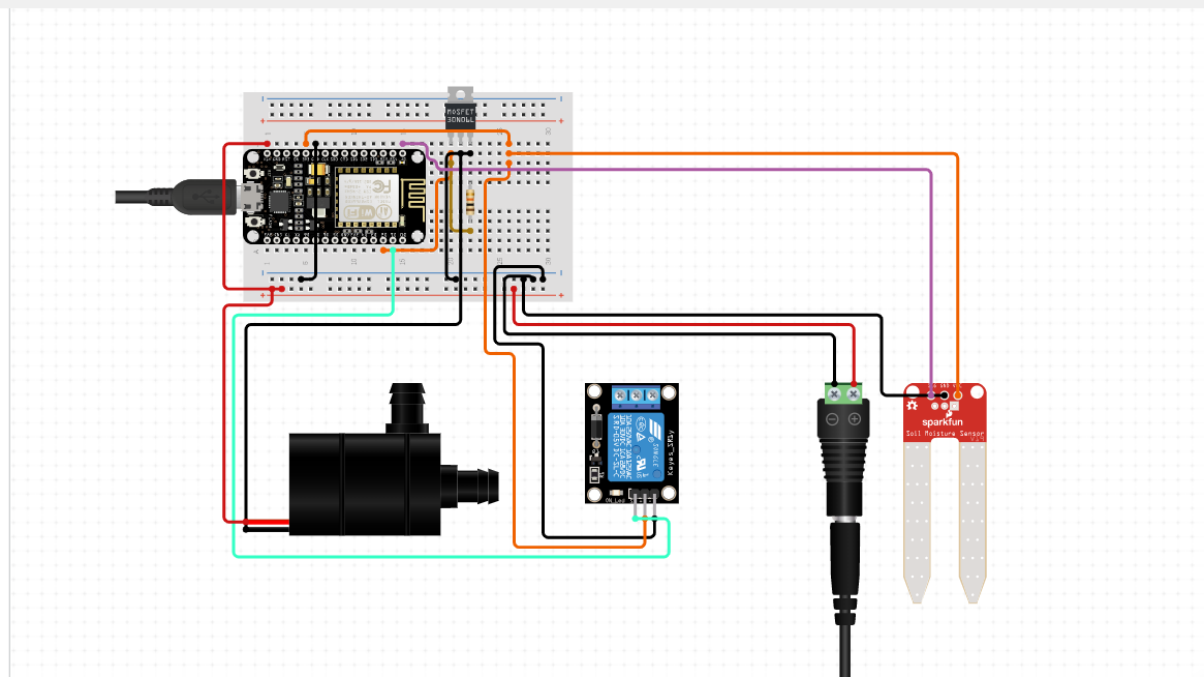

Fig 5.3 CIRCUIT DIAGRAM

6. IMPLEMENTATION

Implementation:

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus, it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective. The implementation stage involves careful planning, investigation of the existing system and it's constraints on implementation, designing of methods to achieve changeover and evaluation of changeover methods.

6.1 SELECTION OF PROGRAMMING LANGUAGE

The development of this project requires the coding in the C++ platform for implemented

C++:

C++ is a general-purpose programming language that was developed as an enhancement of the C language to include object-oriented paradigm. It is an imperative and a **compiled** language.

C++ is a middle-level language rendering it the advantage of programming low-level (drivers, kernels) and even higher-level applications (games, GUI, desktop apps etc.). The basic syntax and code structure of both C and C++ are the same.

SYSTEM INITIALIZATION:

- System need to be initialized first by connecting all pins and cables properly.
- Next need to supply power so that system gets started and update all library.
- Need to check all connectivity and test if all components are working.

6.2 Source Code:

```
#define BLYNK_PRINT Serial
 #include <ESP8266WiFi.h>
 #include <BlynkSimpleEsp8266.h>
 char auth[] = "QwoidxQ9W_2sW1YTo9ldedBYaAtHQIBg"; // blynk token
 char ssid[] = "Visitor";   //ssid//password
 char pass[] = "bmsit@560064";    //password
 int moisture;
 int data;
 void setup() {
          Serial.begin(9600);
          pinMode(A0,INPUT);
          Blynk.begin(auth, ssid, pass);
         ABA2B6CB3AA01EAF
                  }
 void loop()
 {
         Blynk.run();
         moisture = analogRead(0);       //Read Analog value of first sensor
         delay(100);
          data = map(moisture,500,1023,100,0);
         Serial.print("moisture = ");     //to the serial monitor
         Serial.print(data );
         Blynk.virtualWrite(V5, data );  // to Blynk server

  }

    }
```

6.3 SNAPSHOT:

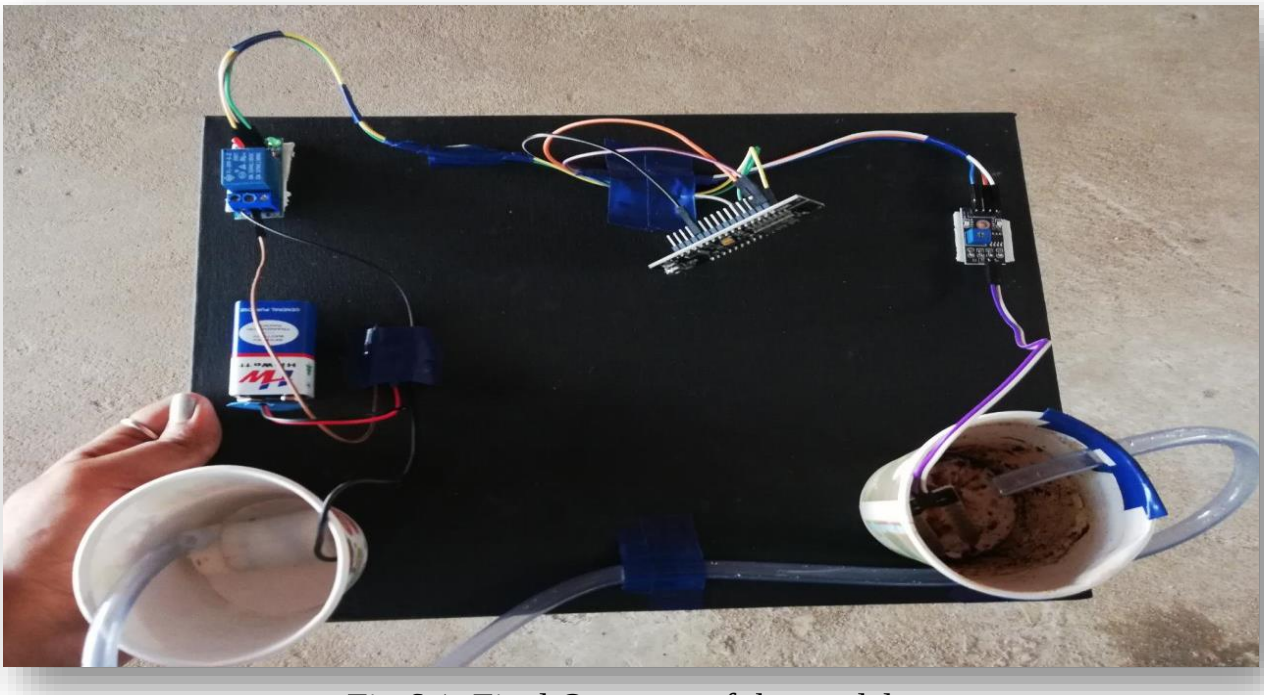

Fig 6.1: Final Outcome of the model.

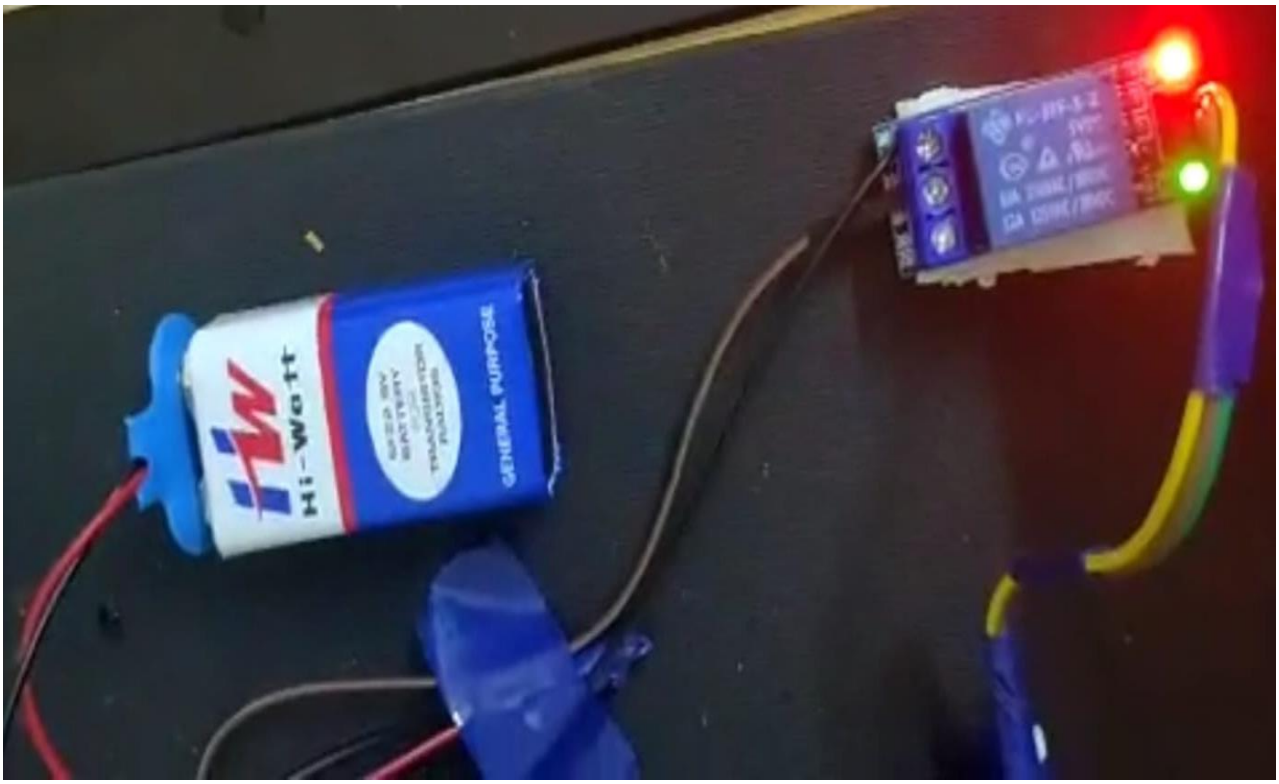

Fig 6.2

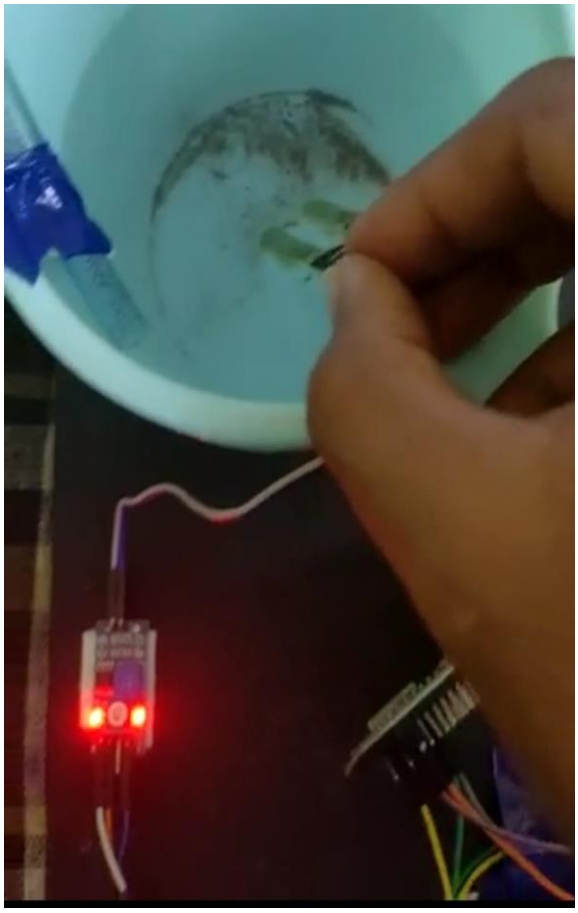

Fig 6.3: checking moisture level

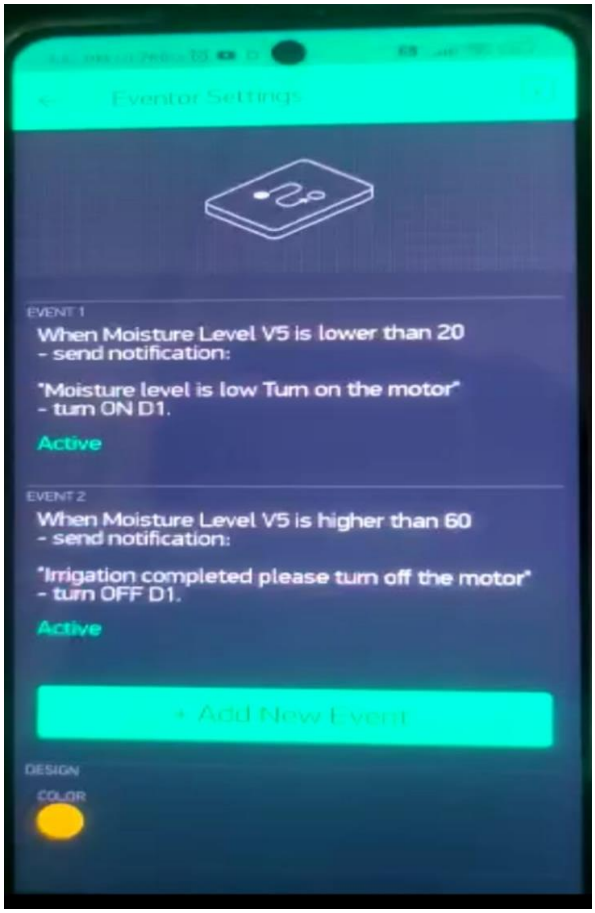

Fig 6.4: Blynk app eventer settings

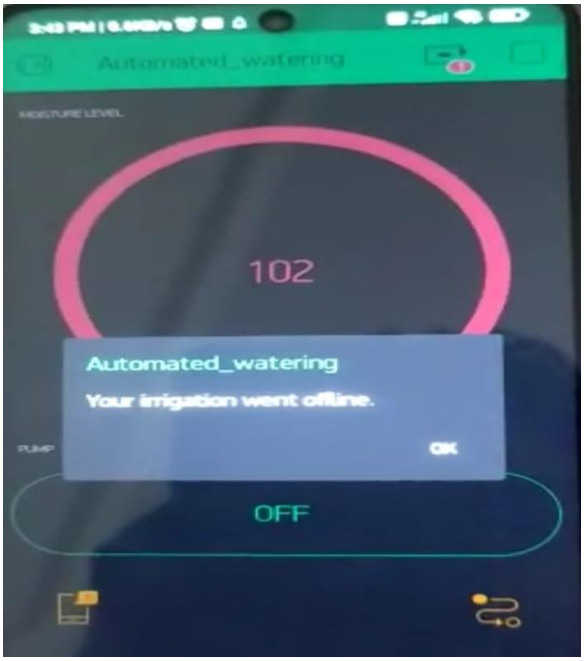

Fig 6.5: warning if the irrigation goes offline

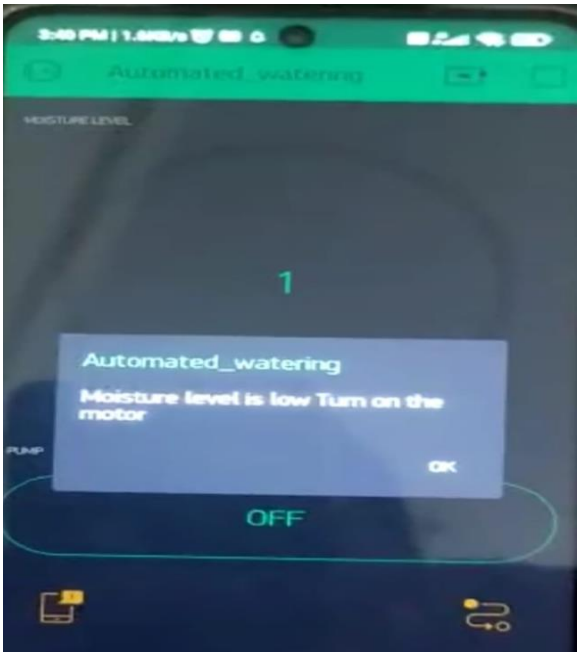

Fig 6.6: warning moisture level is low and indicates to turn motor

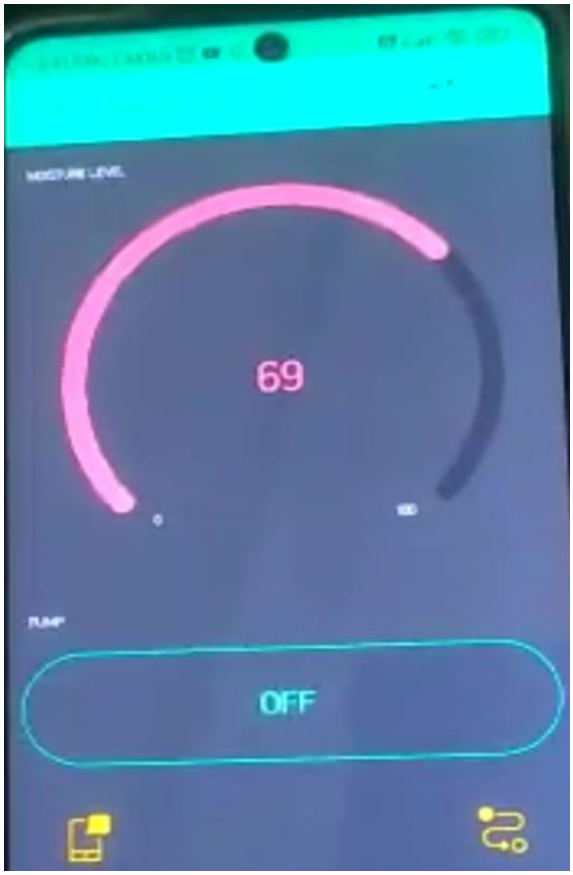

Fig 6.7: Good moisture level

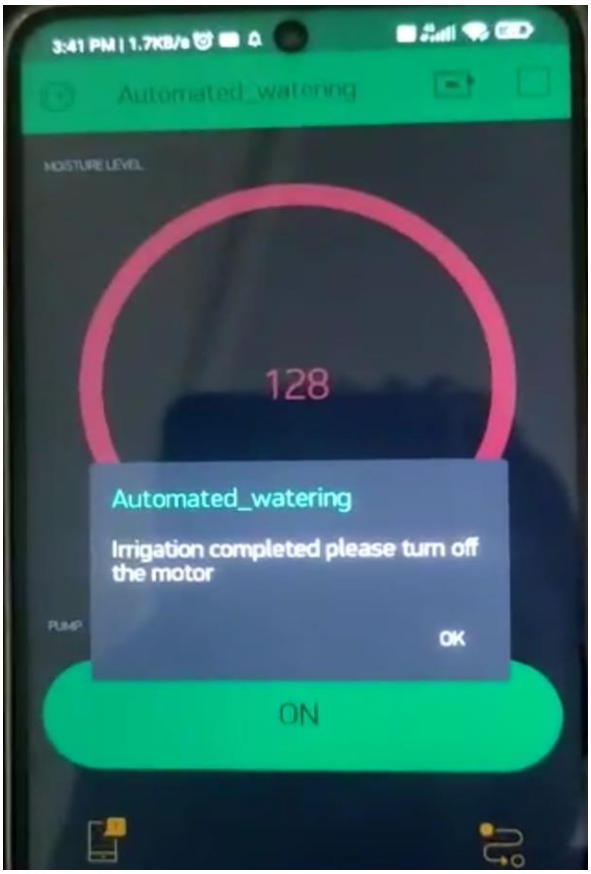

Fig 6.8: indicates irrigation and complete to turn off the motor

7. TESTING AND RESULT

Resulting and Testing:

Software testing is a critical element of software quality assurance and represents the ultimate service of specification design and coding. It provides a road map for the developer, the quality assurance organization and the customer, a roadmap that describes the steps to be conducted as path of testing, when these steps are planned and then undertaken and how much effort, time and resources will be required. It is not unusual for a software development to spend between 30 and 40 percent of total project effort in testing.

Testing demonstrates that software functions appear to be working according to specification and that performance requirements appear to have been met. In addition, data collected as testing is conducted provides a good indication of software. Testing can't show the absence of defects, it can only show that software errors are present.

7.1 AIM OF TESTING:

The main aim of testing is to analyse the performance and to evaluate the errors that occur when the program is executed with different input sources.

7.2 LEVELS OF TESTING CARRIED OUT:

7.2.1 UNIT TESTING:

The first level of testing is called unit testing. Here different modules are tested against the specifications produced during the design of the modules. Unit testing is done to test the working of individual modules. Unit testing comprises a set of tests performed by an individual programmer prior to integration of the units into a large system. A program unit is small enough that the programmer who developed if can test it in a great detail. Unit testing focuses first on the modules to locate errors. These errors are verified and corrected so that the unit perfectly fits to the project.

In the context of our project:

1. soil moisture level testing

2. Automatic water irrigation system

3. online and offline indicator notification

7.2.2 SYSTEM TESTING:

The next level of testing is system testing. This testing is done to check if the system has its requirements and to find the external behaviour of the system.

7.2.3 INTEGRATION TESTING:

In integration testing, all the modules units on which unit testing is performed are integrated together and tested. Test case data is prepared to check the control flow of all the modules and to exhaust all possible inputs to the program. This testing strategy dictates the order in which modules must be available, and exerts strong influence on the order in which the modules must be written, debugged and unit tested.

7.3 TEST PLAN:

A test plan is a document that contains a complete set of test cases for a system, along with other information about the testing process. The test plan should be returned long before the testing starts. Test plan identifies

1. A task set to be applied as testing commences
2. The work products to be produced as each testing task is executed
3. The manner, in which the results of testing are evaluated, recorded and reuse when regression testing is conducted.

In some cases, the test plan is indicated with the project plan. In others the test plan is a separate document. The test report is a record of the testing performed. The testing report enables the acquirer to assess the testing and its results. The test report is a record of the testing performed.

The testing report enables the acquirer to assess the testing and its results.

7.3.1 HARDWARE COMPONENTS TESTING:

Hardware	Description	Working
Blynk app	Blynk platform powers low-batch manufacturers of smart home products	yes
9 volte Battery	The 9 volt HW battery is an EMF source using to supply DC power.	yes
Soil Moisture Sensor	The moisture of the soil plays an essential role in the irrigation field as well as in gardens for plants	yes
NodeMCU	NodeMCU is a IoT Module based on ESP8266 Wi-Fi Module. NodeMCU uses Lua Scripting	yes
Mini water pump	Micro DC 3-6V Micro Submersible Pump Mini water pump For Fountain Garden Mini water circulation System DIY project.	yes
5V Relay	This is 1 Channel 5V Relay Board Module for Arduino PIC AVR DSP ARM. A wide range of microcontrollers such as Arduino	yes

Fig 7.3.1 HARDWARE COMPONENTS TESTING

7.3.2 TEST CASE:

Test Case	Test Case Name	Test Case Description	Expected Output	Actual Output	Result
TC01	Moisture sensor	Checks moisture level like high or low level in soil	High > 40-100 Low > 0 - 39	High > off irrigation Low> on irrigation	**PASS**
TC02	Notification	It indicates the network issue	Irrigation in online or offline	Irrigation online > it works Irrigation offline > it sends notification	**PASS**
TC03	Mini water pump	If the soil moisture level is low it fetches water from water resource and starts irrigating	Water will supplies automatically if moisture level is low	Mini water pump > garden irrigation	**PASS**
TC04	Garden area	Equipped with automated components and connected to net	Water irrigation, notification, water resources	Automatic irrigation on bases of soil moisture level	**PASS**

Fig 7.3.2 TEST CASE

8.Conclusion

Conclusion:

This project is intended to cut down the cost of implementation. Use of NodeMcu esp8266 provide flexibility. It servs as micro controller as well as wi-fi module. Balcony gardens doesn't require a lot of sensors as the plants growing there is not for eating or of great values. Hence cutting down the cost can increase the popularity of this project. This model is highly scalable, we can use a larger motor to fulfill our requirements with a better power source than the 9V battery used in this project. With the help of Blynk app the irrigation system becomes very easy to use. And the ability to connect to internet this project becomes highly accessible from anywhere in world.

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