Seminar Report

On

Automatic Irrigation System

By

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Under the guidance
of

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Marathwada Mitra Mandal's
College of Engineering
Karvenagar, Pune
Accredited with 'A' Grade by NAAC

CERTIFICATE

This is to certify that **Dalal Satyam Suhas** from **Third Year Computer Engineering** has successfully completed his seminar work titled **"Automatic Irrigation System"** at Marathwada Mitra Mandal's College of Engineering, Pune in the partial fulfillment of the Bachelors Degree in the Engineering.

Date:
Place:

S. N. Shekapure	Dr. H. K. Khanuja	Dr. S.M.Deshpande
Guide	Head of the Department	Principal

Acknowledgment

I take this to express my deep sense of gratitude towards my esteemed guide Prof. Ms. S. N. Shekapure for giving me this splendid opportunity to select and present this seminar and also providing facilities for successful completion.

I thank Dr. H. K. Khanuja, Head, Department of Computer Engineering, for opening the doors of the department towards the realization of the seminar, all the staff members, for their indispensable support, priceless suggestion and for most valuable time lent as and when required. With respect and gratitude, I would like to thank all the people, who have helped me directly or indirectly.

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Abstract

In this project an automation of farm irrigation and soil moisture control by Arduino using soil moisture sensor and L293D module. This automatic irrigation system senses the moisture content of the soil and automatically switches the pump when the power is on. A proper usage of irrigation system is very necessary because the main reason is the shortage of land reserved water due to lack of rain, spontaneous use of water as a result large amounts of water goes waste. For this reason, we use this automatic plant watering and soil moisture monitoring system and this system is very useful in all climatic conditions. India is the agriculture based country. Our most of peoples are completely depended on the agricultural harvesting. Agriculture is a source of employment of majority Indians and has great impact on the economy of the country. In dry areas or in case of lacking rainfall, irrigation becomes difficult. So, it needs to be automated for proper watering a plant and handled remotely by farmer. When soil goes dry pump will start watering. The aim of the implementation is to reduce water use and automatic irrigation can be used for save time and low power monitor device. The aim of the implementation this project was to demonstrate that the automatic plant irrigation can be used to reduce water use, and save your time.

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Chapter 1

Technical Keywords

1.1 Domain Name

Internet of things

1.2 Technical Keywords

- Automatic Watering System
- Arduinoboard
- sensors
- relay
- motor
- Internet of things

Chapter 2

Introduction

2.1 Domain Description

IoT is short for Internet of Things. The Internet of Things refers to the ever-growing network of physical objects that feature an IP address for internet connectivity, and the communication that occurs between these objects and other Internet-enabled devices and systems.

2.2 Problem Definition

Irrigation of plants is usually a very time consuming activity to be done in a reasonable amount of time, it requires a large amount of human resources. Traditionally, all the steps were executed by humans. Nowadays,some systems use technology to reduce the number of workers or the time required to water the plants. With such systems the control is very limited, and many resources are still wasted. Water is one of those resources that are used excessively. Technology is probably a solution to reduce costs and prevent loss of resources.

1. To develop an Auto Irrigation system to water the plants according to the nature of soil like dry or wet.
2. If the value of Sensor(DOUT)= 0,then nature of soil will be dry.

2.3 Motivation

For continuously increasing demand and decrease in supply of food necessities, its important to rapid improvement in production of food technology. Agriculture is only the source to provide

this. This is the important factor in human societies to growing and dynamic demand in food production. Agriculture plays the important role in the economy and development, like India. Due to lack of water and scarcity of land water result the decreasing volume of water on earth, the farmer use irrigation. Irrigation may be defined as the science of artificial application of water to the land or soil that means depending on the soil type, plant are to be provided with water.

Chapter 3

Literature Survey

3.1 Literature Survey

Literature Review

Sr.no.	IEEE PAPER ABSTRACT
1.	ICICCS2017 paper of Automatic Irrigation System using Arduino UNO Irrigation is most important for high yield of the farm. Now a days its a challenge to improve development of plant in respect of its growth and to reduce costs which leads to an innovative idea of using an automated irrigation system which will further help in better management of water and human resources. An automated irrigation system has been developed using sensors technology with Arduino to efficiently utilize water for irrigation purpose. The system has soil moisture sensor inserted into the soil of the plants and a water level sensor placed in a water container from where water will be pumped to plants for irrigation. An algorithm has been built out with threshold values of soil moisture sensor to control the water quantity in soil and also a water level sensor has been implemented to measure the water level in tank. This project requires Arduino board. This project is need of the hour to convert manual irrigation into an automated irrigation which with the help of soil moisture sensor will detect dankness content of soil leading to turn ON/OFF of pumping motor. Human efforts can be reduced using this technique and increase saving of water by efficiently irrigating the plants. The design has been made with better resource management and low power consumption.[1]
2.	- In daily operations related to farming or gardening Watering is the most important cultural practice and the most laborintensive task. No matter whichever weather it is, either too hot and dry or too cloudy and wet, you want to be able to control the amount of water that reaches your plants. Modem watering systems could be effectively used to water plants when they need it. But this manual process of watering requires two important aspects to be considered: when and how much to water. In order to replace manual activities and making gardener's work easier, we have create automatic plant watering system. By adding automated plant watering system to your garden or agricultural field, you will help all of your plants reach their fullest potential as well as conserving water. Using sprinklers drip emitters, or a combination of both, we can design a system that is ideal for every plant in our yard. This project uses the ATmega328 microcontroller. It is programmed to sense moisture level of plants at particular instance of time, if the moisture content is less than specified threshold which is predefined according to particular plant's water need then desired amount of water is supplied till it reaches threshold.Thus, the microcontroller is programmed to water plants two times per day.[2]

Sr.no.	IEEE PAPER ABSTRACT
3.	-An micro irrigation system was developed to optimize water use for agricultural crops. The system has a distributed wireless network of soil-moisture and temperature sensors placed in the root zone of the plants. In addition, a gateway unit handles sensor information, triggers actuators, and transmits data to a web application. An algorithm was developed with threshold values of temperature and soil moisture that was programmed into a microcontroller-based gateway to control water quantity. The system had a duplex communication link based on a cellular-Internet interface that allowed for data inspection and irrigation scheduling to be programmed through a web page. The micro system was tested in a sage crop field for 136 days and water savings of up to 90traditional irrigation practices of the agricultural zone were achieved. Three replicas of the micro system have been used successfully in other places for 18 months. Because of its energy autonomy and low cost, the system has the potential to be useful in water limited geographically isolated areas.[3]
4.	-ICCS2017 paper of Automatic Plant Irrigation System using Arduino In the present era, food scarcity and water scarcity occurs due to the increase in population. So, to avoid this problem we have to promote the agriculture sector. But water wastage is more in this sector in the form of water logging while watering the agricultural fields through irrigation. Therefore, an automatic plant irrigation system has to be designed for the proper water supply in the fields. This paper deals with an automatic plant irrigation system which automatically senses the moisture content of the soil and decide whether irrigation is needed or not and how much water is needed for soil. This system uses AtMega328 microcontroller. It is programmed to sense the moisture content if the soil over a period of time. When the moisture content is less than the limit which is predefined, it will start supplying the desired amount of water till it reaches the limit. So, when the soil is dry the pump will automatically water the fields and when the soil is wet the pump will automatically switch off, there by eradicate the need of manpower and conserve the time[4]

Table 3.1: Literature Review

Chapter 4

Proposed System Architecture

4.1 System Architecture

4.1.1 Soil Moisture Sensors Equation

A soil moisture sensor is a device that measures the volumetric water content (VWC) of soil. Mathematically VWC, , is given as follows;

$$\theta = \frac{V_w}{V_T}$$

Figure 4.1:

Where: Vw is the water volume and VT is the total volume (soil volume + water volume).

Soil moisture sensors are classified according to how they measure the soil moisture content. Two methods are used in determining the volumetric water content (VWC); direct and indirect. The direct method entails drying a known volume of soil in an oven and weighing it. The direct method of measuring VWC is done using the following mathematical notation:

$$\theta = \frac{m_{\mathbf{wet}} - m_{\mathbf{dry}}}{\rho_w \cdot V_b}$$

Figure 4.2:

Where:

a. Mwet is soil sample before drying in the oven

b. Mdry is soil sample after drying in the oven

c. w is water density

d. Vb is the volume of soil sample before

4.1.2 Steps for Using Arduino IDE

Step 1

Arduino microcontrollers come in a variety of types. The most common is the Arduino UNO, but there are specialized variations. Before you begin building, do a little research to figure out which version will be the most appropriate for your project.

Step 2

To begin, you'll need to install the Arduino Programmer, aka the integrated development environment (IDE).

Step 3

Connect your Arduino to the USB port of your computer. This may require a specific USB cable. Every Arduino has a different virtual serial-port address, so you'll need to reconfigure the port if you're using different Arduinos.

Step 4

Set the board type and the serial port in the Arduino Programmer.

Step 5

Test the microcontroller by using one of the preloaded programs, called sketches, in the Arduino Programmer. Open one of the example sketches, and press the upload button to load it. The Arduino should begin responding to the program: If you've set it to blink an LED light, for example, the light should start blinking.

Step 6

To upload new code to the Arduino, either you'll need to have access to code you can paste into the programmer, or you'll have to write it yourself, using the Arduino programming language to create your own sketch. An Arduino sketch usually has five parts: a header describing the sketch and its author; a section defining variables; a setup routine that sets the initial conditions of variables and runs preliminary code; a loop routine, which is where you add the main code that will execute repeatedly until you stop running the sketch; and a section where you can list other functions that activate during the setup and loop routines. All sketches must include the setup and loop routines.

Step 7

Once you've uploaded the new sketch to your Arduino, disconnect it from your computer and integrate it into your project as directed.

Step 8

Upload the program now; simply click the "Upload" button in the environment. Wait a few seconds - you should see the RX and TX lids on the board flashing. If the upload is successful, the message "Done uploading." will appear in the status bar.

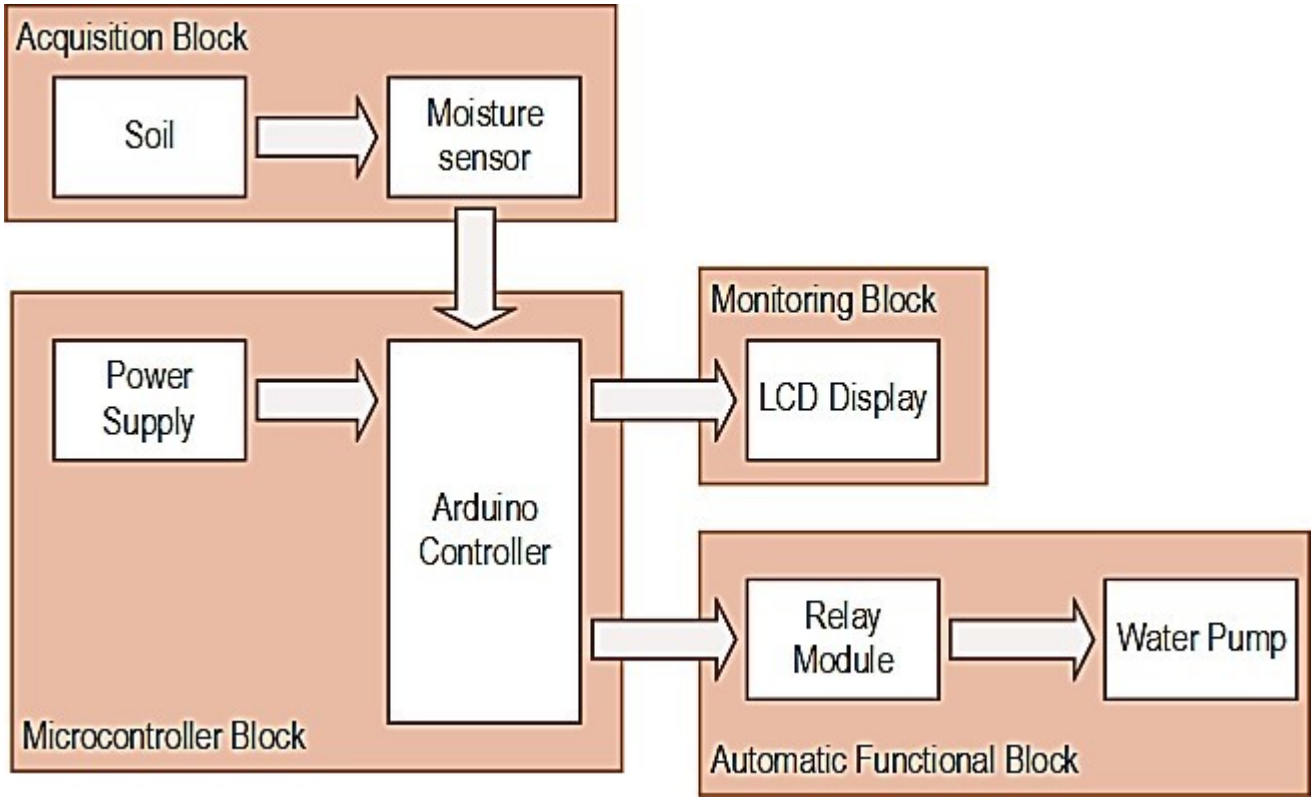

Figure 4.3: block diagram

The given block diagram shows that how an Automatic Irrigation System works.The moisture of the soil detect by moisture sensor is controlled by Arduino Controller and according to that it will pump the motor on and off

4.2 Design with UML Diagrams

4.3 Implementation/Working Principle

An automatic plant watering system using arduino microcontroller ATmega328P is programmed such that gives the switching signal on/off to the motor via relay. Soil sensor is connected to the

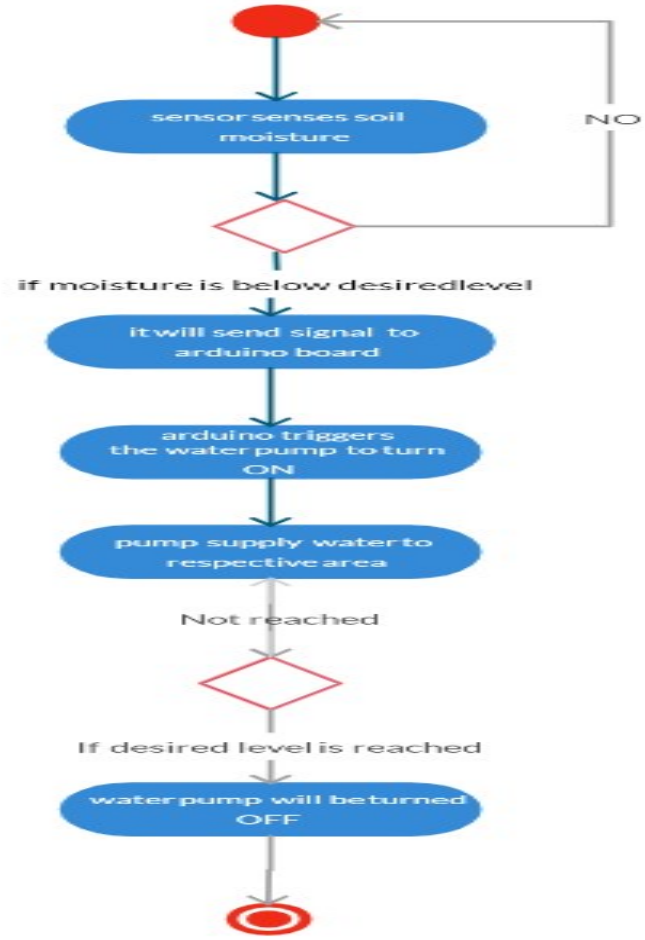

Figure 4.4: Activity Diagram

arduino board which senses the moisture content present in the soil. Whenever there is change in the moisture content of the soil, the sensor senses the change, giving signal to the microcontroller so that the pump/motor can be used for automatic irrigation system.

First we give supply to arduino than from arduino board (no.8) digital pin to soil moisture sensor and for relay (no.13) pin and both terminal of pump will be connected to relay for switching purpose. for pump we put 12v battery when there is 0 at that time soil will not have moisture than relay will switch on and pump will start and when set limit of the temperature comes automatically pump will stop and when there is 1 at that time soil will have moisture than relay will not switch on the pump when moisture will low than d.c motor pump will suction water from the bucket and give too plants

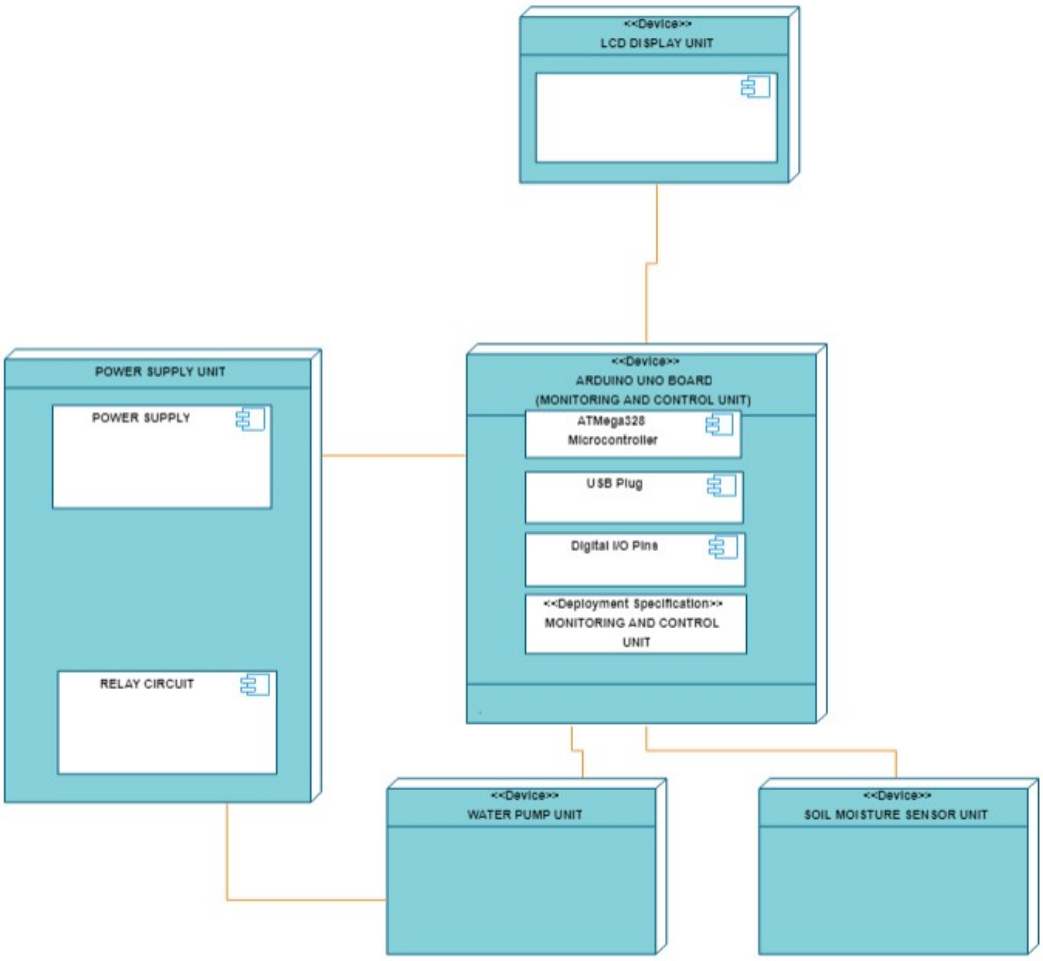

Figure 4.5: Deployment Diagram

4.4 Components Used:

4.4.1 Arduino Uno:

The arduino uno is an open source microcontroller board based on the microchip Atmega 328P microcontroller and developed by arduino CC. the board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The boards has 14 digital pins, 6 analong pins and programmable with arduino IDE (integrated development environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, through it accepts voltages between 7 and 20 volts.

It is also similar to the arduino nano and Leonardo. The hardware reference design is distributed under a creative commons attribution share-alike 2.5 license and protection is available on the

arduino uno on the arduino website. Layout and production files for some versions of the hardware are also available.

Figure 4.6: Arduino uno

4.4.2 Soil moisture sensor :

Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensor measures the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. The relation between the measured property and soil moisture must be clabrirated and may vary depending on environmental factors such as soil type, temperature or electric conductivity. Reflected microwave radiation is affected by the soil moisture and is used for remote sensing in hydrology and agriculture. Portable probe instruments can be used by farmers or gardeners.

4.4.3 DC Motor Pump :

A pump is a devices that move fluids (liquid or gases), or sometimes slurries, by mechanical action. Pumps can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity pumps. Pumps operate by some mechanism (typical reciprocating or rotary) and consume energy to perform electrical work moving the fluid. Pumps operate via many energy sources, including manual operation, electricity, engines, or wind power, come in many sizes, from microscopic for use in medical application to large industrial pumps.

Mechanical pumps serve in a wide range of application such as pumping water from wells, aquarium filtering, pond filtering and aeration, in the car industry for water-cooling and fuel

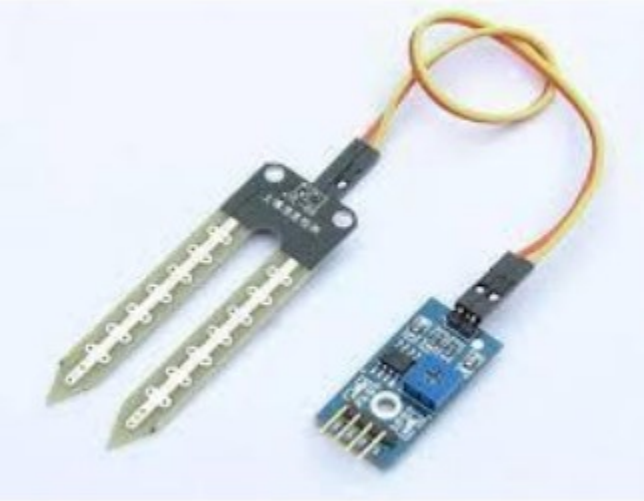

Figure 4.7: Soil Moisture Sensor

injection, in the energy industry for pumping oil and natural gas or for operating cooling towers.

Figure 4.8: DC Motor Pump

4.4.4 Two Channel Relay Module :

A relay is an electrically operated device. It has a control system and (also called input circuit and output circuit contactor). It is frequently used in automatic switch to controlling a high current circuit with a low current signal the advantages of a relay lie in its lower inertia of the moving,

stability, long term reliability and small volume.

It is widely adopted in devices of power protection, automatic technology, sport, remote control, reconnaissance and commutation, as well as in devices of electro mechanics and power electronics. Generally speaking, a relay contains an induction part which can reflect input variable like current, voltage, power, resistance, frequency, temperature, pressure, speed, and light etc. It also contains an actuator module (output) which can organize or de- energizes the connection of controlled circuit.

Figure 4.9: Two Channel Relay Module

4.4.5 Circuit Diagram :

4.5 Results:

When the power supply is given the Led glows & the relay starts working on which the water pumps out only if the soil is detected as Dry.

When th soil is detected as Wet the motor stops & no water is pumped out.

4.6 Important Source Code

```
#include <LiquidCrystal.h> // include the library code

int water; //random variable
LiquidCrystal lcd(12, 11, 5, 4, 3, 2); // initialize the library with the numbers of the i

void setup() {
pinMode(3,OUTPUT); //output pin for relay board, this will sent signal to the relay
pinMode(6,INPUT); //input pin coming from soil sensor
lcd.begin(16, 2);  // set up the LCD's number of columns and rows
}
```

```
void loop() {
lcd.setCursor(0, 1);  // set the cursor to column 0, line 1 ; (line 1 is the second row, si
water = digitalRead(6);  // reading the coming signal from the soil sensor
if(water == HIGH) // if water level is full then cut the relay
{
digitalWrite(3,LOW); // low is to cut the relay
lcd.print("Soil is Wet"); // Print a message to the LCD
}
else
{
digitalWrite(3,HIGH); //high to continue proving signal and water supply
lcd.print("Soil is Dry");// Print a message to the LCD
}
delay(400);
}
```

4.7 Result screenshot, tables and Analysis

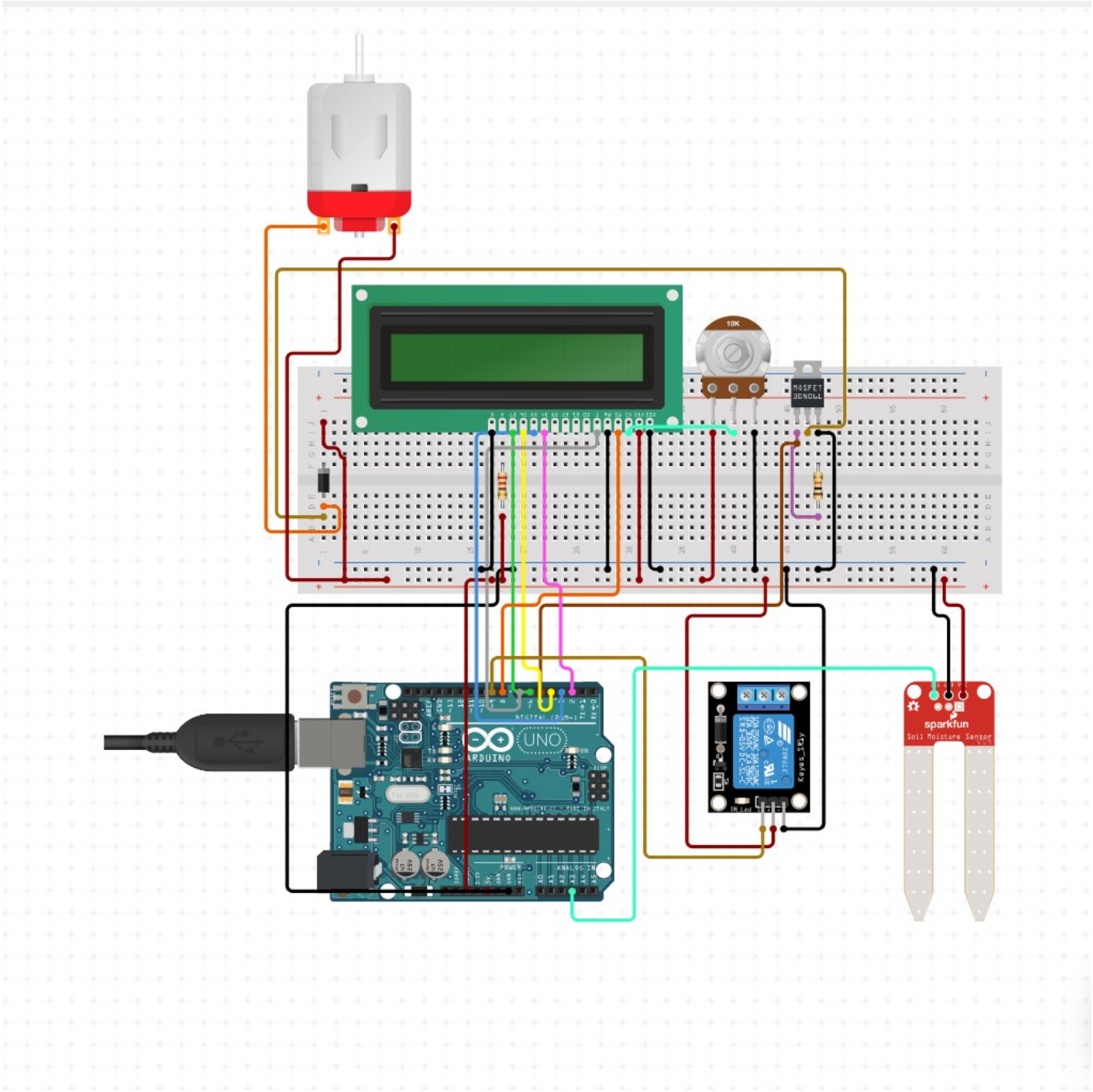

Figure 4.10: Circuit Diagram

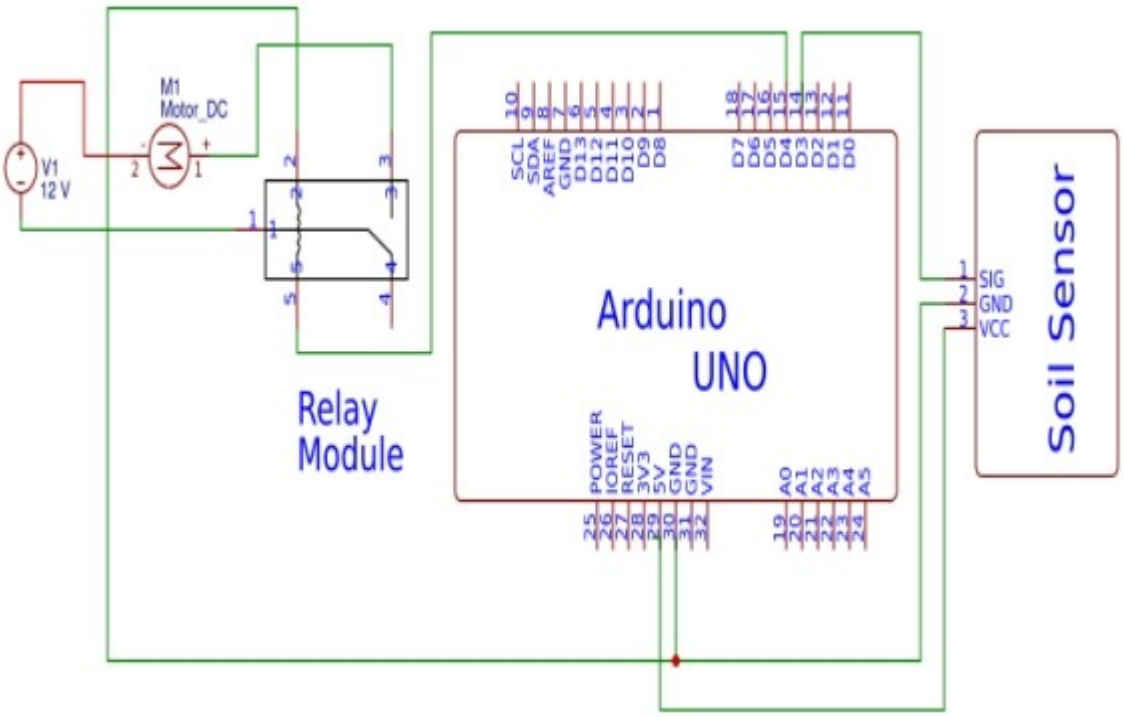

Figure 4.11: Schematic Diagram

Chapter 5

Advantages / Disadvantages

5.1 Advantages

- Highly sensitive, low cost and reliable circuit.
- Works according to the soil condition.
- Maximum elimination of manpower.
- System can be switched into manual mode whenever required.

5.2 Disdvantages

- The system can be very expensive.
- Self help compatibility is very low with big scale systems, which are very complex.
- Most automated irrigation systems need electricity.
- For crops like rice we cannot use this same project because of excess need of water. We will used DTMF technique in the fields where large amount of water is needed.

Chapter 6

Applications

- It can be used in agricultural fields, lawns and as drip irrigation system.
- It can be used to provide water in nursery planting arena.
- It can be used for wide range of crops as one can customize reference required for different kind of crops.
- Pond water management and water transfer.

Chapter 7

Conclusion

- This project has a high social impact. As it is already dealt, the system is non existing, and still majority of the farmers use the traditional human intervention based irrigation, due to which there is huge loss in cultivation
- Hence, this project serves as a motivation for farmers who are declining in number day by day due to lack of technology and sophistication.
- This system provides several benefits and can be operated with less manpower.
- Over-watering and under-watering affects the crop so proper amount of water should be supplied. By analyzing the soil parameters system waters the farm. So by this wastage of water reduced.
- It reduces the human resources. This irrigation system was found to be feasible and cost effective for optimizing water resources for agricultural production.
- The irrigation system can be adjusted to a variety of specific crop needs and requires minimum maintenance

List of Materials

Sr.no.	Name of Component
1.	Arduino Uno
2.	Connecting wires
3.	Metal wire
4.	LED
5.	Relay
6.	Moisture Sensor
7.	Pump Motor
8.	16X2 LCD display
9.	Resistors

Table 7.1: List of Materials

Chapter 8

Appendix

8.1 Log Report

Marathwada MitraMandal's
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DEPARTMENT OF COMPUTER ENGINEERING

ACADEMIC YEAR 2019-20 SEM-II

The Progress Report Format of the Seminar

Roll No. :- 259

Name of the Student:- Satyam Dalal

Name of the Guide :- Ms. S.N. Shekapure

Product Based Seminar Title :- Automatic Irrigation System

S. No.	Date	Time	Name of the topic discussed	Remark
1.	11/1/2020		Finalization of Topic	Yes,

Satyam
Student Signature

Guide Signature

Figure 8.1: Log Report

Bibliography

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