SAMARA UNIVERSITY

COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

COMPUTER AND COMMUNICATION ENGINEERING STREAM

Final Year Project On

Advanced Plant Irrigation System For Samara University

Submitted To : Department of Electrical and Computer Engineering

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Declaration and approval

We declare that the project comprises our own work. We have acknowledged and refereed all materials used in this work. We understand that non-adherence to the principles of academic honestly and integrity. Misrepresentation of any idea will constitute sufficient ground for disciplinary action by the institute and can also evoke penal action from the sources which have not been properly cited or acknowledged.

In doing so, we assure that we agree with all written above with our signature as follows.

Group member	ID.No.	sign
1. DEJENE TESFAYE	SU1100290	……..
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This project has been approved by our advisor :

Miss. Zemzem Hibet

Signature : ……..

Examiner signature :

……

Acknowledgment

First of all, we would like to thank God for helping us to complete this project successfully. We would like to extend our heartfelt thanks to our Adviser Miss. Zemzem Hibet , who supported us in many ways while she brought us new ideas for the project. On the other hand, even though we come from different streams, we would like to express our gratitude to Mr. Edris , the head of the department, who understood our ideas and accepted them and allowed us to work together. In continuation, we would like to extend our heartfelt thanks to Mr. Mohammad Siraj and Mr. Worku who provided us with the materials we needed to make the hardware and who facilitated the work space. We have a big thank you to Mr Wendimagegnew for showing us the technical aspects and some of the use of materials. We would like to thank you all for your support in this project.

Abstract

The paper propose to design and implement advanced plant drip irrigation system for Samara university. An advanced irrigation system is an automated system that uses sensors, weather data, and other information to determine when and how much water to apply to plants or crops. The system can be programmed to adjust watering schedules based on factors such as soil moisture levels, rainfall, temperature, and humidity. This helps to conserve water by avoiding over-watering and ensures that plants receive the right amount of water at the right time for optimal growth. They can be controlled remotely using a computer application, making it easy to monitor and adjust their watering schedules from anywhere.And a system use a drip irrigation system is a method of watering plants by delivering water directly to the roots through a network of tubes or pipes with small holes or emitters. This system is designed to conserve water and reduce evaporation by delivering water slowly and precisely to the plant's root zone.

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List of Acronyms

AC :- Alternating current

C# :- C-Sharp

DC :- Direct Current

DHT11:- Digital Humidity and Temperature

GND :- Ground

IDE :- Integrated Development Environment

LCD :- Liquid Crystal Display

USB :- Universal Serial Bus

Chapter One

Introduction

Plantation is one of the mechanism to create cool environment. It also have various uses, such as the source of food, medicine, and to protect the beauty of the environment. Samara University is located in Afar regional state of Ethiopia in Samara city, Samara is characterized by hot climate so there is a severe water shortage. As a result, it is difficult to take care of the plants. In order to create a good and attractive environment in the university, plantation is an inevitable issue. According to this, the university have been work different kinds of tasks regarding to this issue. In addition to this, the irrigation system currently used by the university is completely operated by human power, and plants do not get the required amount of water with in specific period of time. Due to improper application of water the water logging is commonly feasible through the surrounding of the trees.[1]

It is necessary to use a better and Advanced irrigation system in order for plants to grow properly. We select drip irrigation system in order to increase the system efficiency. Different design calculations of the system are included such as emitter spacing, lateral line design, main and sub main line design, pump pressure requirement and source of energy to operate the system. Additionally, irrigation schedule also adjusted using impute data such as T^o, humidity, soil type, plant type, plant water requirement. T^O In this project we use different sensors these are soil moisture sensor, temperature sensor, and rain sensor. soil moisture sensor by sensing the moisture level of the soil, if the amount of water in the soil is lower than the plants need this sensor will provide them water automatically. If the soil moisture sensor stops working, the temperature sensor calculates the temperature of the environment and delivers the water to plants according to their needs. Rain sensor is the other type of sensor that we want to use. In rainy day there is no need of irrigation water so our rain sensor detect rain and if there is rain, the system will stop automatically, which will avoid water wastage. If these sensors inoperative or stop working the time schedule (Irrigation schedule) is take responsible to supply water to the plants.

It will also have a desktop application where we can control our system and see its status. And we use visual studio software and C# programming language to make this application.

1.1 Background Study

Samara university is one of 2nd generation universities in Ethiopia. This institution works a lot of works to create good environment to university society. Planting and caring trees is a part of the university work, and this is done by delivering an unknown amount of water to the trees and using human resources. This process is done by taking the water from the tanker and giving to each tree. It is known whether the water is enough or not when the water is overflowing around the plants.

A

B

Figure 1.1 water under flowing around the plants

A

B

Figure 1.2 water overflowing around the plants

1.2 problem statement

In our advanced plant irrigation system we try to solve the limitation of traditional plant irrigation system. Here some disadvantages of traditional plat irrigation system.

- The irrigation system currently in operation at Samara University causes a lot of water loss.
- Since the system is completely man-powered fatigue and boredom will result in the workers.
- Because the plants get unbalanced water, it affects their growth.
- Non existence of Scheduled irrigation system
- Non existence of Automated system
- Non existence of Well designed irrigation system in it.

Advanced plant irrigation system solves many problems and it works through temperature and moisture sensors. The moisture sensor measures the dryness of the soil and provides water to the plants, which allows the soil to receive water immediately when it needs it.

In this project the water holding capacity of the soil and how much water the plant needs will be calculated ,so the minerals in the soil that are important for the plants will not be eroded by water. If the moisture sensor suddenly stops working, the temperature sensor takes into account the temperature of the environment and makes sure that the plant gets the amount of water they need.

1.3 Significance of the System

- ✓ Highly sensitive.
- ✓ Works according to the soil condition.
- ✓ Low cost and reliable circuit.
- ✓ Complete elimination of manpower.
- ✓ System can be controlled by application whenever required.
- ✓ Display the status of temperature, humidity and moisture level

1.4 Objective

1.4.1 General Objective Of The Project

The general objective of the project is to establish an automated plant irrigation system for Samara University.

1.4.2 Specific Objective Of The Project

- ➢ Minimize the current overall use of irrigation water.
- ➢ Provide the necessary water by working the soil moisture level.
- ➢ Provide balanced water to the plants by considering the temperature of the environment
- ➢ Identify the temperature of the environment and the problem faced by the system.
- ➢ Deliver calculated amount of water in each irrigation season.
- ➢ Control our system and display its status from our desktop.

1.5 Scope Of The Project

Trees has given unreserved benefits to humans and animals like;as a source of O_2 gases,as a source of food for both animals and humans,as an agent of balancing global warming,create fresh and cool environment.So the must be protect,well scheduled application of water in order get the desired benefits from them.

the system enabled to create a beautiful and good learn and learning environment for the university society by applying an appropriate,scheduled,calculated irrigation water for each plants as they requires.Since this system is automated system it reduced the labour cost that the university previously paid.

Chapter Two

Literature Review

2.1 Introduction

Before starting to solve a problem, it is ideal to have a clear picture on the origin of the problem. we tried to look at different projects that have similar ideas to the project we thought about. We have also taken input from various peoples for our project, which we think will enable our project to be efficient and perform well.

2.3 Existing system

The current irrigation system at Samara University is completely done by human power. The system makes sure that the plants get more or less water than they need. When they get more than the amount of water they need, the important minerals are absorbed by the soil. When they get less than the amount of water they need, the plants dry up.

2.4 Proposed system

Our advanced irrigation system will has four features those are moisture sensor irrigation system, time schedule with temperature sensor, rain sensor and desktop applications. moisture sensor calculates the moisture level of the soil and gives the plants water. If the moisture sensor stops sensing, the time schedule system and temperature sensor programmed on the system will water the plants according to the programmed time by calculating the temperature of the environment. The rain sensor detects rain and stops the motor, which reduces water wastage. And by desktop application control our systems from our office and we can display the systems status.

2.5 Related work

A. Automatic Plant Watering System

This project uses Arduino board, which consists of ATmega328 Micro-controller. It is programmed in such a way that it will sense the moisture level of the plants and supply the water when require. Micro-controller ATMEGA328P-PU is programmed such that it gives the interrupt signals to the motor via the relay. Soil sensor is connected to the Arduino board which senses the moisture content present in the soil. Whenever there is a change in the moisture content of the soil, the sensor senses the change, giving signal to the micro-

controller so that the pump(motor) can be activated. This concept can be used for automatic irrigation system.(March 2019, Manisha Mayuree).[2]

B. Automatic Irrigation System with Temperature Monitoring

This project is designed to develop an automatic irrigation system which switches the motor pump ON/OFF on sensing the moisture content of the soil and monitors the real time temperature of the farm. The advantage of using this method is to reduce human intervention and still ensure proper irrigation. In this project the Moisture sensor, Temperature sensor, LCD, Motor pump are interfaced with Atmega16. Moisture sensor and temperature sensor provides analog signal to Atmega16 micro-controller. Micro-controller needs to convert this analog signal into digital value. The status of the water pump , soil moisture and temperature is displayed on the LCD, which is interfaced to the micro-controller. Thus, this automatic irrigation system depends on the output of the moisture sensor. When the moisture sensor sense the soil is dry then the micro-controller turn ON the motor pump and if moisture sensor senses the soil is not dry then micro-controller turn OFF the motor pump.(March 2014, Abdul Karim Gizzini).[3]

C. Plant Moisture Monitoring System

The system timely monitors the moisture level of the soil.if at the time of monitoring The system timely monitors the moisture level of the soil. If at the time of monitoring it comes to know that the moisture level of the soil is lower that recommended then it will raise an audio-visual alert. An LED is used to give visual alarm and a Buzzer is used to give audio alarm to the care taker of the plant. Thus, in this project with the help of a simple combination circuit and a sensor can help to save a plant by maintaining the moisture level of the soil of the plant, thus keeping the plant healthy. This alert is then received by the care tacker of the plant. When care taker waters the plant the alarm goes off and the monitoring cycle continues.(May 2021,Labib Sharrar).[4]

2.5 comparison

The table below shows the differences and similarities between the related work to our system and our current Advanced Plant Irrigation System, and shows our system is how much better than the previous related works .

system	moisture sensor	Temperature sensor	Rain sensor	Self-irrigation	Scheduling irrigation	Desktop application
Automatic plant Watering System	yes	yes	no	yes	no	no
Automatic Irrigation System with Temperature Monitoring	yes	yes	no	yes	no	no
Plant Moisture Monitoring System	yes	no	no	no	no	no
Advanced irrigation system for Samara university	yes	yes	yes	yes	yes	yes

Table 2.1 Comparison Table

Chapter Three

System Design And Analysis

3.1 Introduction

System design is the process and focuses on decomposing the system into manageable parts. During requirements analysis we concentrated on the purpose and the functionality of the system design. During system design we focus on the processes data structures, and software and hardware components necessary to implement it.

Also, some of the things we'll cover in this section are what software and hardware we used to do this project and what they were used for. On the other side, we tried to show how the components are structured and how they work. And we've tried to show how the system works.

3.2 System Requirement

3.2.1 Hardware Requirement

A. Soil Moisture sensor

Soil moisture sensors measure or estimate the amount of water in the soil. These sensors can be resistive or capacitive moisture sensors. We choose a resistive moisture., here are some advantages of resistive soil moisture sensors over capacitive ones:[5]

Cost: Resistive soil moisture sensors are generally less expensive than capacitive sensors.

Simplicity: Resistive sensors are simpler in design and operation than capacitive sensors.

Durability: Resistive sensors are more durable and can withstand harsh environmental conditions.

Accuracy: Resistive sensors can provide accurate readings of soil moisture levels

Compatibility: Resistive sensors can be used with a wider range of soil types and conductivities.

Calibration: Resistive sensors are easier to calibrate than capacitive sensors.

Stability: Resistive sensors are more stable over time and do not require frequent re calibration.

Maintenance: Resistive sensors require less maintenance than capacitive sensors.

Soil Moisture Sensor Has the Following Specifications

Name	Specification
Vcc power supply	3.3V or 5V
Current	35mA
Signal output voltage	0-4.2V
Digital Outputs	0 or 1
Analog	Resistance (Ω)
Panel Dimension	3.0cm by 1.6cm
Probe Dimension	6.0cm by 3.0cm
GND	Connected to ground

Table 3.1 Soil Moisture Sensor Specifications

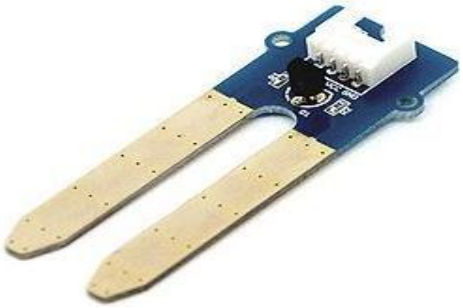

Figure 3.1 resistive soil moisture sensor

B. Temperature and humidity sensor

There are many types of temperature and humidity sensor, but we chose HDT11 among them. DHT11 sensor has a better resolution and a wider temperature and humidity measurement range. However, it's a bit more expensive and you can only request readings with 2 seconds interval.[5]

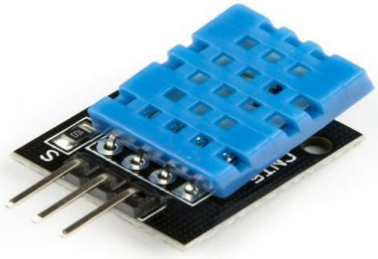

Figure 3.2 dht11 temperature and humidity sensor

C. Arduino

Arduino is a software as well as hardware platform that helps in making electronic projects. It is an open source platform and has a variety of controllers and microprocessors. The Arduino is a single circuit board, which consists of different interfaces or parts. The board consists of the set of digital and analog pins that are used to connect various devices and components, which we want to use for the functioning of the electronic devices. There are various types of Arduino boards used for various purposes. We choose Arduino mega 2600, because it have Larger memory space to accommodate the bigger codes and More processing power to operate multiple sensors at a time.

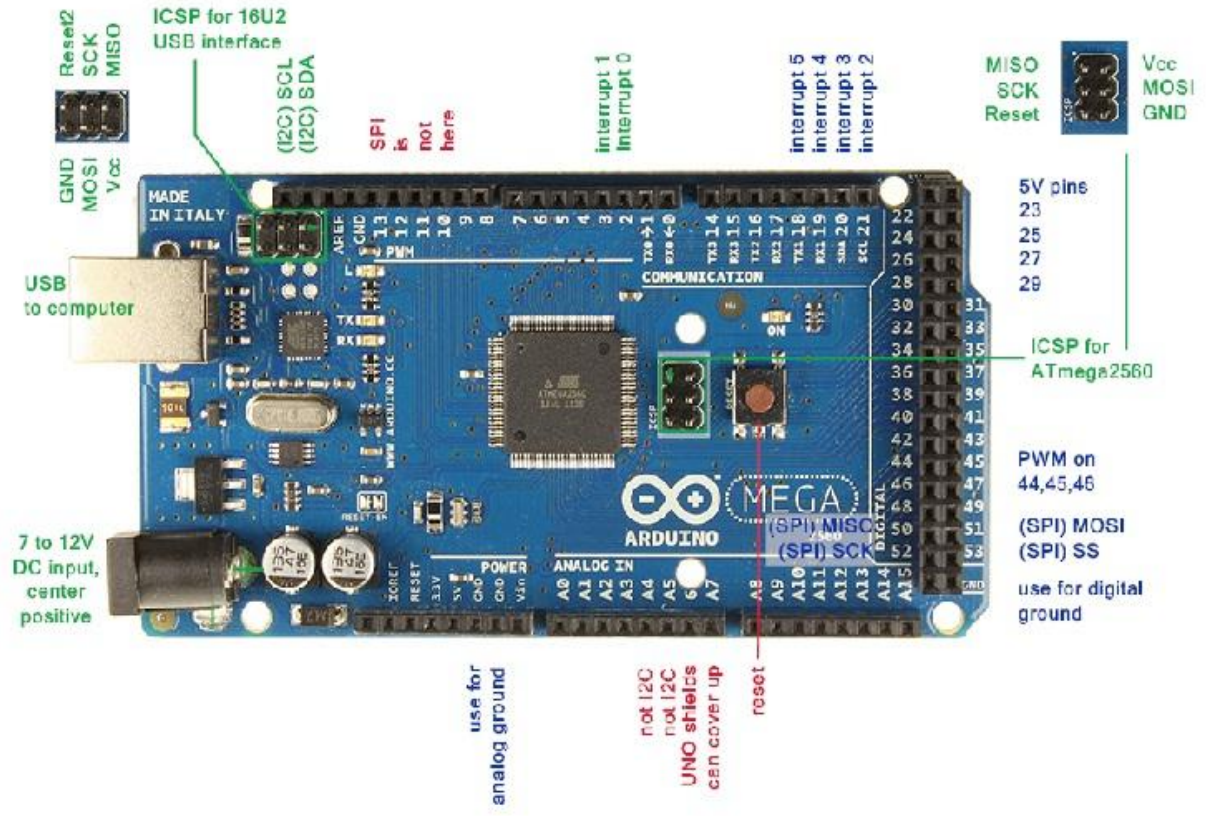

Figure 3.3 Arduino

D. Relay Module

Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. It can be used as a single chip module for appliance control and work with both DC or AC signals where we can control the 220V AC load.

Relay Module Pin Description

Pin Number	Pin Name	Description
1	Relay Trigger	Input to activate the relay
2	Ground	0V reference
3	VCC	Supply input for powering the relay coil
4	Normally Open	Normally open terminal of the relay
5	Common	Common terminal of the relay
6	Normally Closed	Normally closed contact of the relay

Table 3.2 Relay Module Pin Description

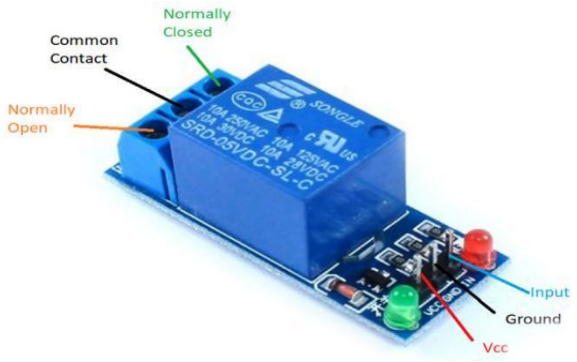

Figure 3.4 relay module

E. Rain Sensor

A rain sensor or rain switch is a switching device activated by rainfall. There are two main applications for rain sensors. The first is a water conservation device connected to an automatic irrigation system that causes the system to shut down in the event of rainfall.Rain sensors are useful for conserving water in irrigation systems by preventing them from operating during rainfall.[5]

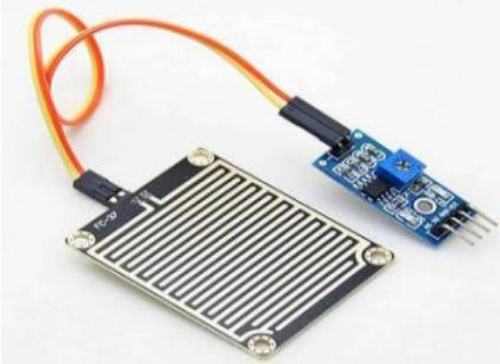

Figure 3.5 rain sensor

F. LCD

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. The LCD (Liquid Crystal Display) is a type of display that uses the liquid crystals for its operation. Here, we will accept the serial input from the computer and upload the sketch to the Arduino. The characters will be displayed on the LCD.

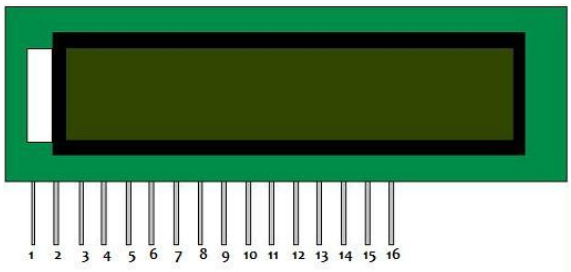

Figure 3.6 LCD

G.Water Pump

The water pump is used to artificially supply water for a particular task. It can be electronically controlled by interfacing it to a microcontroller. It can be triggered ON/OFF by sending signals as required.

Figure 3.7 water pump

3.2.2 Software requirement

A. Proteus

Proteus software is a powerful tool for designing and simulating electronic circuits. It is a comprehensive software package that includes a variety of tools and features to help users design, test, and debug their circuits. With Proteus, users can create schematics, design circuit boards, and simulate the behavior of electronic components in a virtual environment.

One of the key features of Proteus software is its extensive library of electronic components. This library includes thousands of components, ranging from simple resistors and capacitors to complex microcontrollers and sensors. Users can easily add these components to their designs and simulate their behavior to ensure that they are working correctly.[6]

Proteus software also includes a powerful simulation engine that can simulate the behavior of circuits in real-time. This allows users to test their designs before they are physically built, saving time and money. The simulation engine can also be used to test for errors and faults in the circuit, allowing users to identify and correct problems before they become more serious.

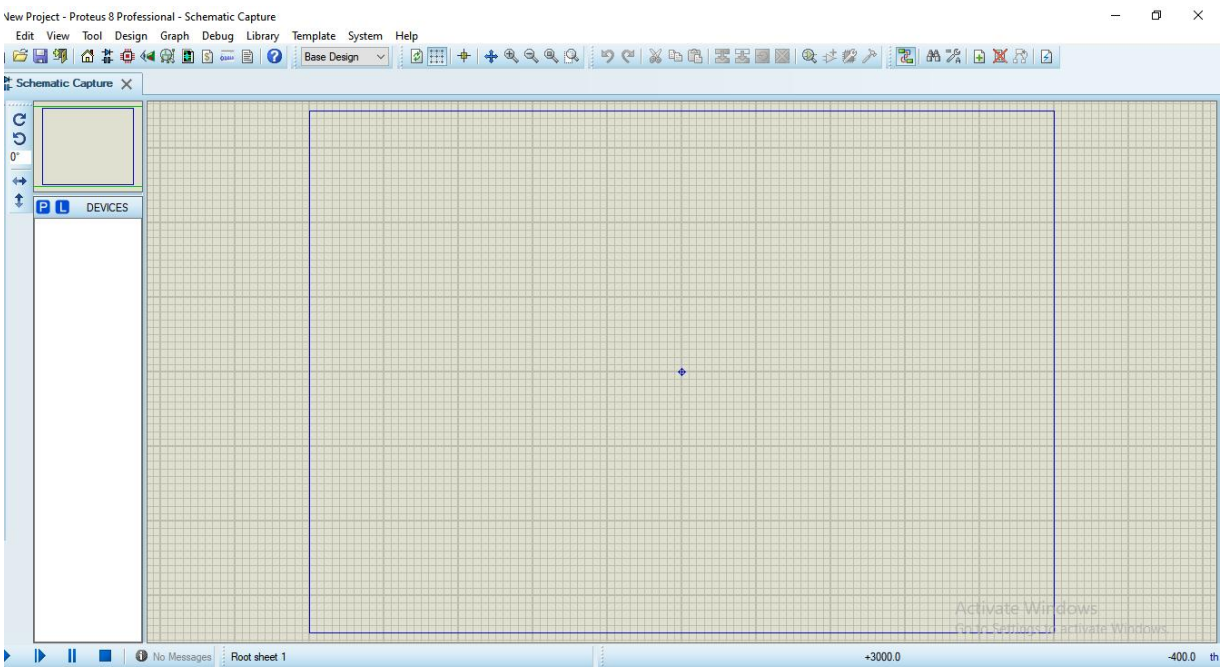

Figure 3.8 Proteus software workspace

B. Arduino IDE

Arduino IDE is a software development environment used to create and upload code to Arduino microcontrollers. It is an open-source platform, meaning that the source code is available for anyone to view, modify, and distribute.

The Arduino IDE provides a simple and user-friendly interface for writing, compiling, and uploading code to Arduino boards. It includes a text editor with syntax highlighting, a serial monitor for debugging, and a library manager to easily add external libraries to your project.

One of the key features of the Arduino IDE is its ability to support a wide range of microcontrollers. This allows users to choose the best microcontroller for their specific project requirements. The IDE also supports a variety of programming languages, including C and C++, making it easy for users to write code in their preferred language.[7]

C. visual studio

Visual Studio is a software development environment created by Microsoft. It is used to create a wide range of applications, including desktop, mobile, web, and cloud-based applications. Visual Studio provides a comprehensive set of tools for building, testing, and deploying software applications.One of the key features of Visual Studio is its support for multiple programming languages, including C++, C#, and Python. This allows developers to choose the best language for their project requirements and easily switch between languages as needed. Visual Studio also includes a code editor with syntax highlighting, code completion, and debugging capabilities.

Visual Studio includes a wide range of integrated tools for building applications, including a graphical user interface designer, a database designer, and a web designer. It also includes tools for testing and debugging applications, including a debugger, pro filer, and unit testing framework.Visual Studio is highly extensible, with a large community of developers creating add-ons and extensions to enhance its functionality. [7]

D. Virtual Serial Port Emulator

Virtual serial port is a software solution that allows you to create virtual communication ports and connect them to each other using software based virtual null modem cable or connect them to different serial applications and virtual devices via named pipes. We use this software to connect our Project simulation to our desktop application by USB port.

3.2.3 programming language

A. C Sharp (C#)

C Sharp (C#) is an object oriented programming language from Microsoft that enables developers to build applications that run on the .NET platform. C# has roots from the c

family and the language is close to other popular languages like C++ and JAVA. It is used for mobile application, desktop application, web application and so on.

B. CPP (C++)

C++ is the programming language used to write code for Arduino boards. Arduino is an open-source electronics platform based on simple software and hardware. It consists of a microcontroller board and a software development environment used to write and upload code to the board.[7]

3.3 Application design

We have used various software and programming languages to develop this application. One of them is Visual Studio, which we used to develop the front-end and back-end of the application and to write our programming code. And the other thing we used was C# programming language, which we used to integrate the front-end and back-end of our application.

3.3.1 Activity Diagram of Application

This activity diagram helps the users how to use the application and to show after one click what is the system display for the users. As we can see in the image below, it shows the actions performed by the user or the administrator and the response of the system.

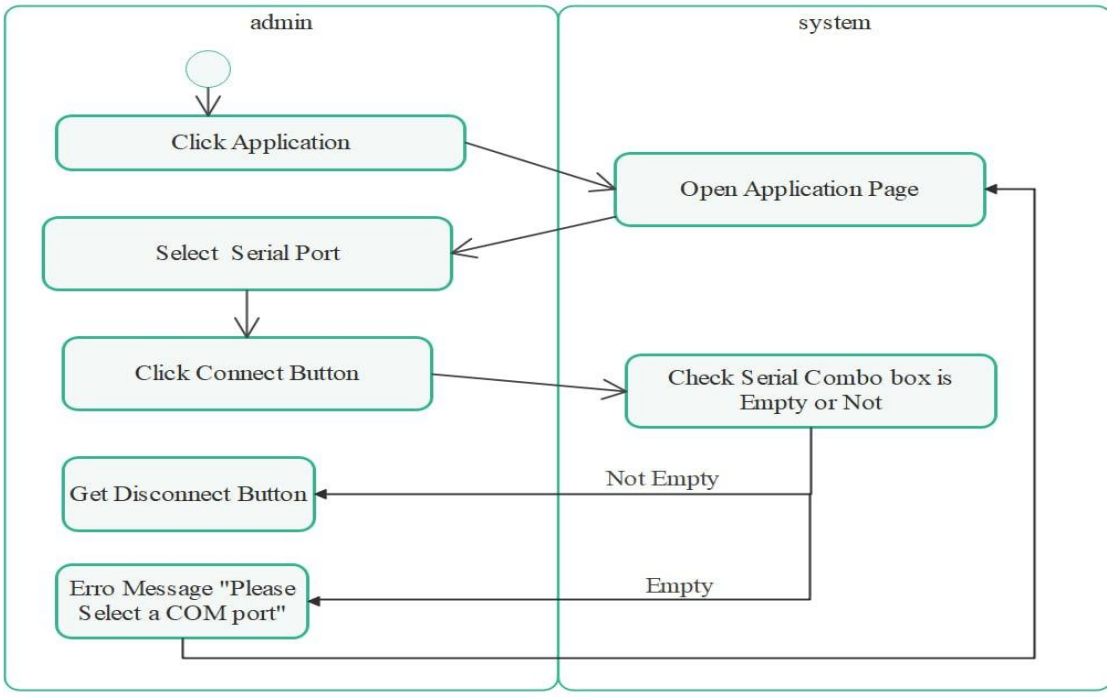

Figure 3.9 Activity Diagram of Application

3.4 System Block diagram

The block diagram we thought this project would have is as shown in the image below. In this block diagram, the soil moisture through the moisture sensor, whether it is raining through the rain sensor, and the ambient temperature and humidity through the temperature and humidity sensors are sent data to the Arduino. The arduino takes into account the data obtained from the moisture, rain, temperature and humidity sensors and turns the water pump on or off and displays the data on the LCD.

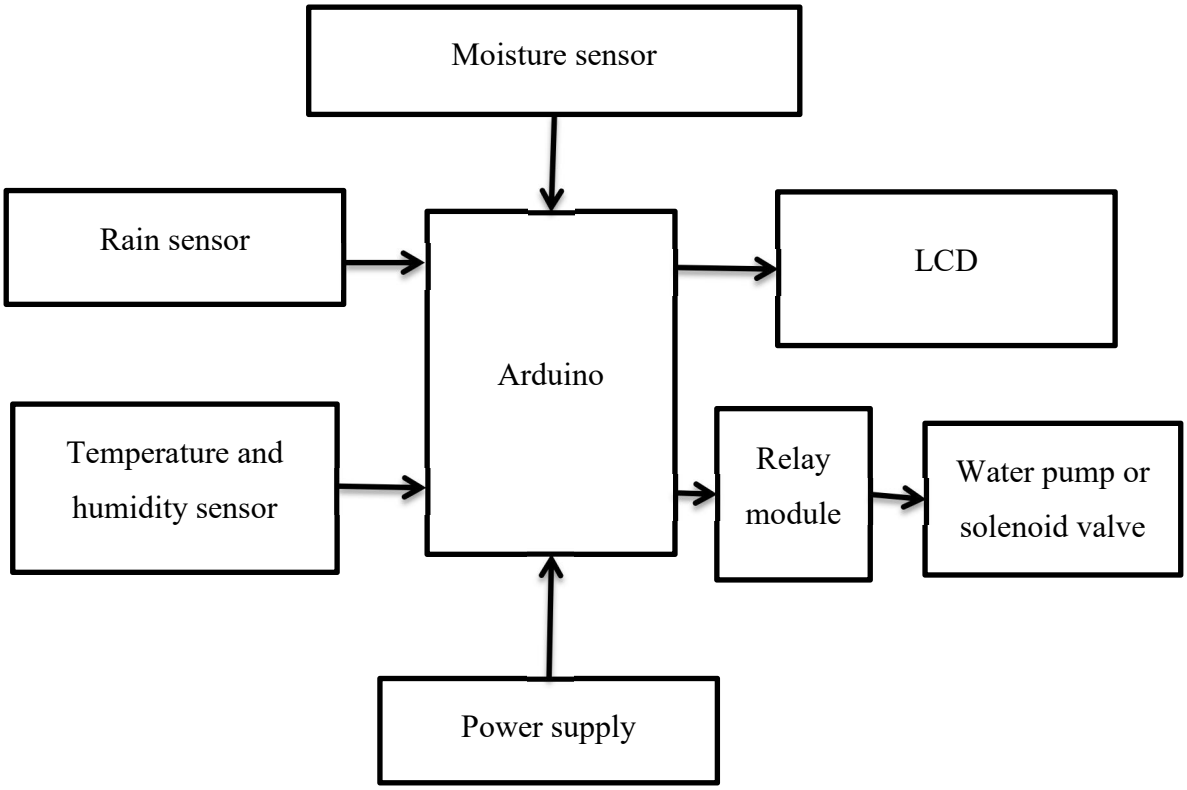

Figure 3.10 Block diagram of the system

3.5 Flow Chart Of The System

The way our project works is illustrated in the diagram below.The system starts from the rain sensor. The rain sensor senses the presence of rain. If there is rain, the system will stop, but if there is no rain, the moisture sensor will be active. The moisture sensor calculates the moisture level of the soil and if it is < 700, it turns on the motor and makes the plants get water. If the soil's moisture level is below 700, the soil will absorb enough water to turn off the motor. If the moisture sensor stops working and if no rain is detected, the temperature

sensor calculates the temperature of the environment and makes sure that the plants get enough water through the programmed time schedule.

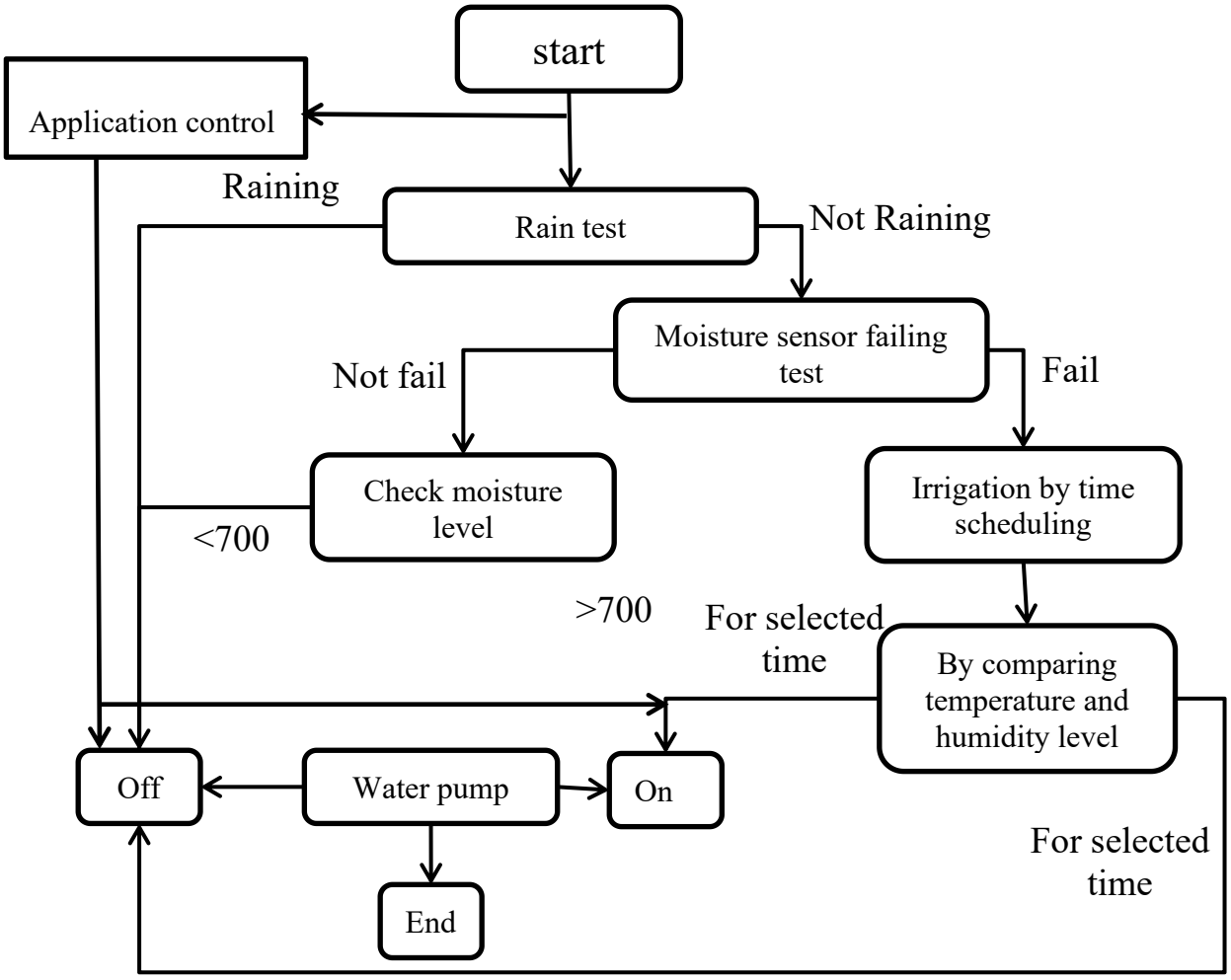

Figure 3.11 flow chart of the system

Chapter Four

Result and Discussion

4.1 Simulation Result

simulation is done by Proteus software and all devices are properly connected to Arduino. According to the program installed on the Arduino, the motor is turned on and off. This means that the motor is turned off or on with the help of the data sent by the moisture sensor. time schedule works in a system. It is possible to control the system by using a desktop application.

A. Overall system Design

The overall system design includes various components such as a soil moisture sensor, rain sensor, Arduino board, LCD display, relay, and water pump motor. The system is designed to automate the watering of plants by measuring the moisture level in the soil and detecting whether it is raining or not.The system design is efficient and reliable, as it ensures that plants are watered only when necessary and not during rainy weather. The addition of a timer or scheduling function can further improve the system's efficiency by controlling when the water pump motor turns on and off.and also the system is successfully controlled by the application.

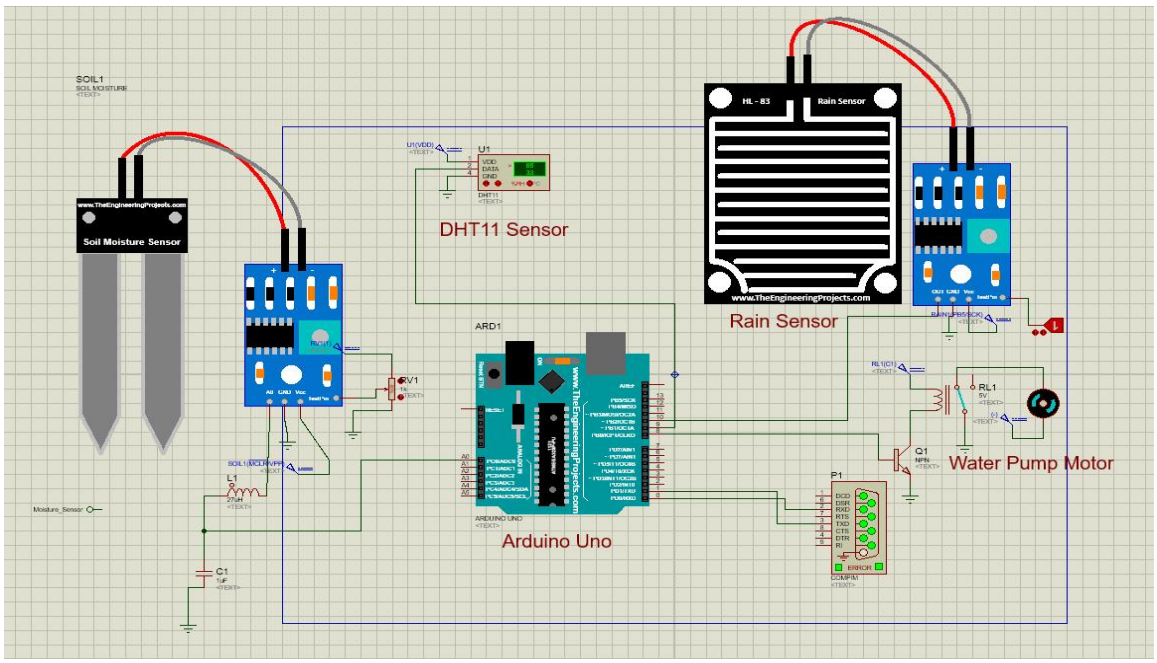

Figure 4.1 Overall system Design

B. Application motor off status

The picture below shows the status where the motor is off and the moisture sensor has read 97% moisture level and rain has been detected and the motor is off because of this application has taken this data from Arduino and displayed it.

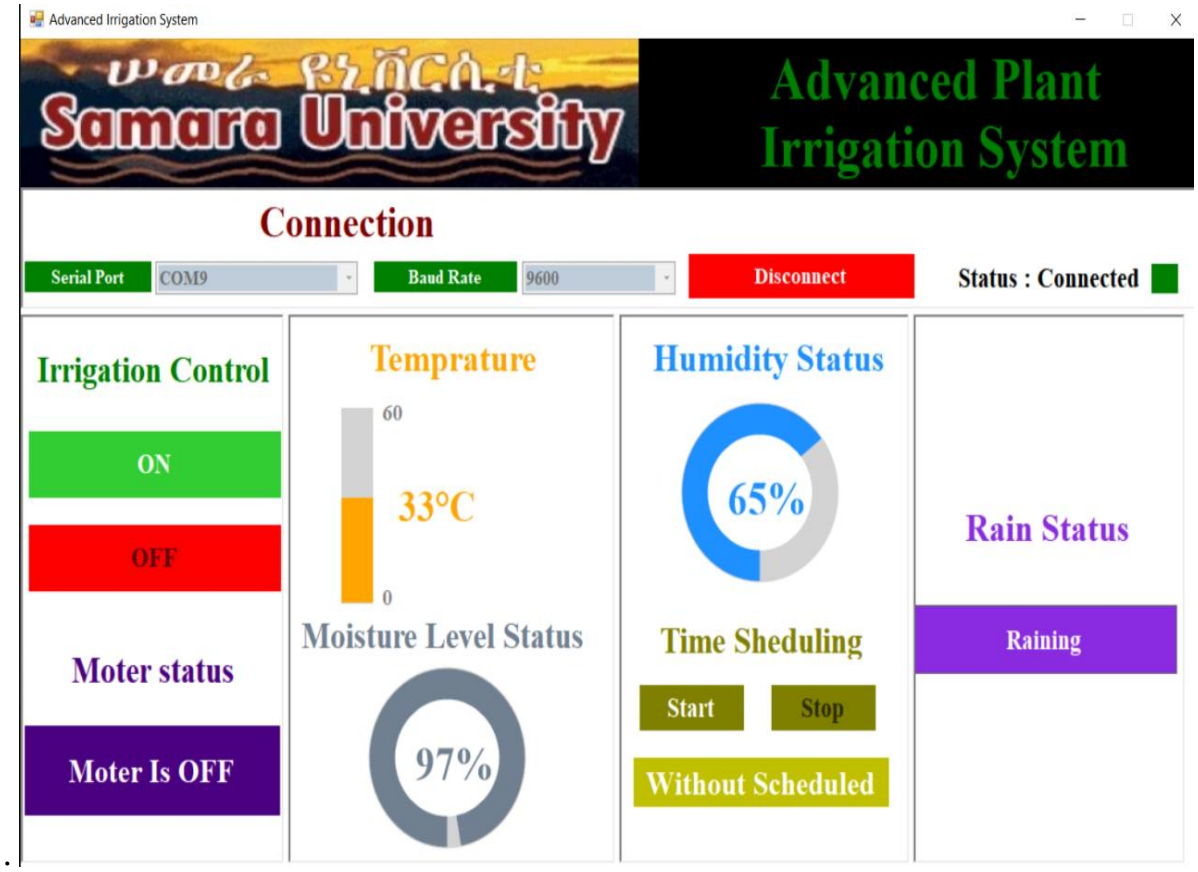

Figure 4.2 Application motor off status

C. Application Motor On Status

The picture below shows the status where the motor is on and the moisture sensor has read 9% moisture level and rain has been not detected and the motor is on because of this application has taken this data from Arduino and displayed it.

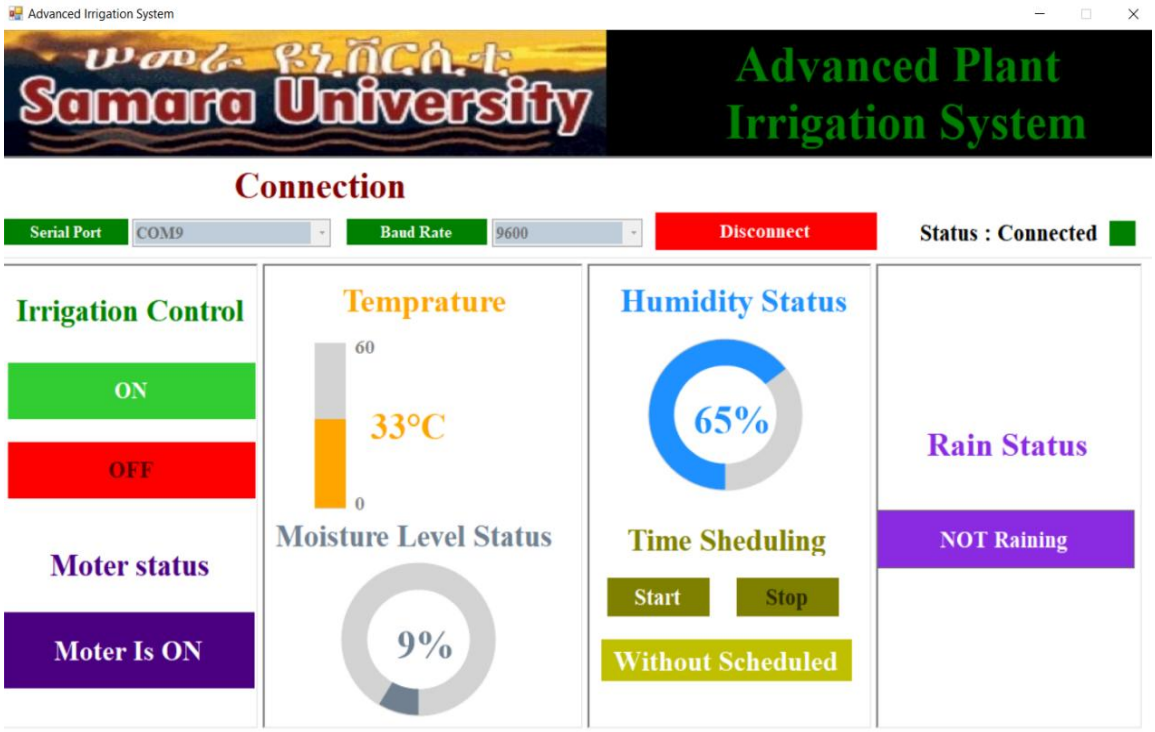

Figure 4.3 Application motor on status

4.3 Hardware Result

A. System Hardware

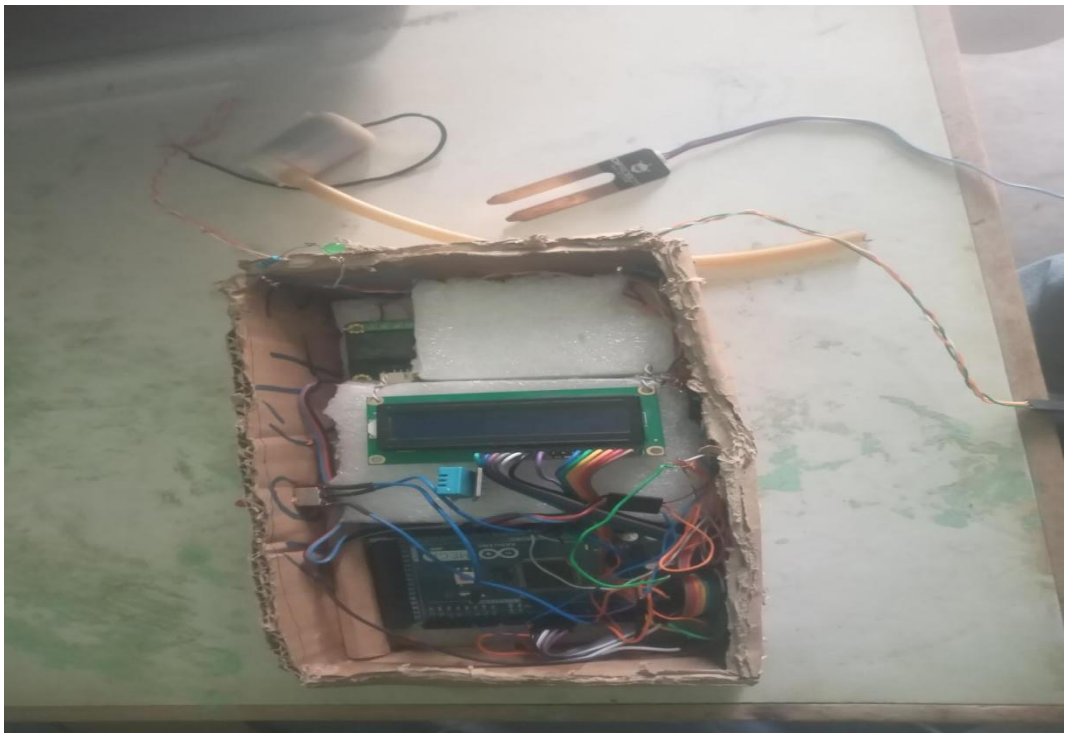

Figure 4.4 hardware view of the system

B. System Start

When the system is start it display advanced plant irrigation system and continue to the next process.

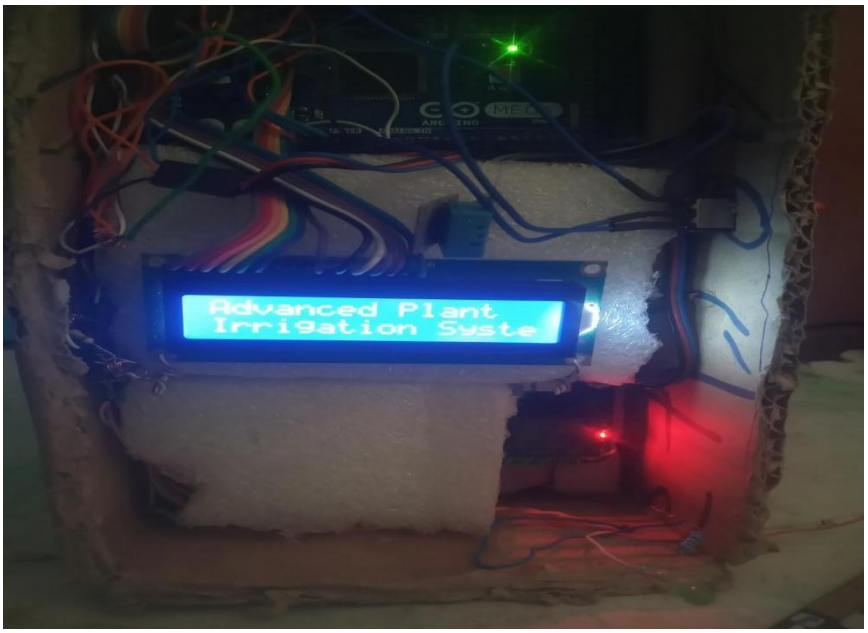

Figure 4.5 system start on

C. Low water level motor ON

When the moisture sensor sense low moisture level and rain is not detected the motor become ON.

Figure 4.6 LCD display motor ON

D. Time Schedule Start

When the moisture sensor is fail or stop working the motor is on and off by using time schedule.

Figure 4.7 time schedule started

Time schedule When the system starts, the engine is turned on or off not by the data coming from the moisture sensor, but by the programmed time interval. This time schedule system can be turned on through the application.

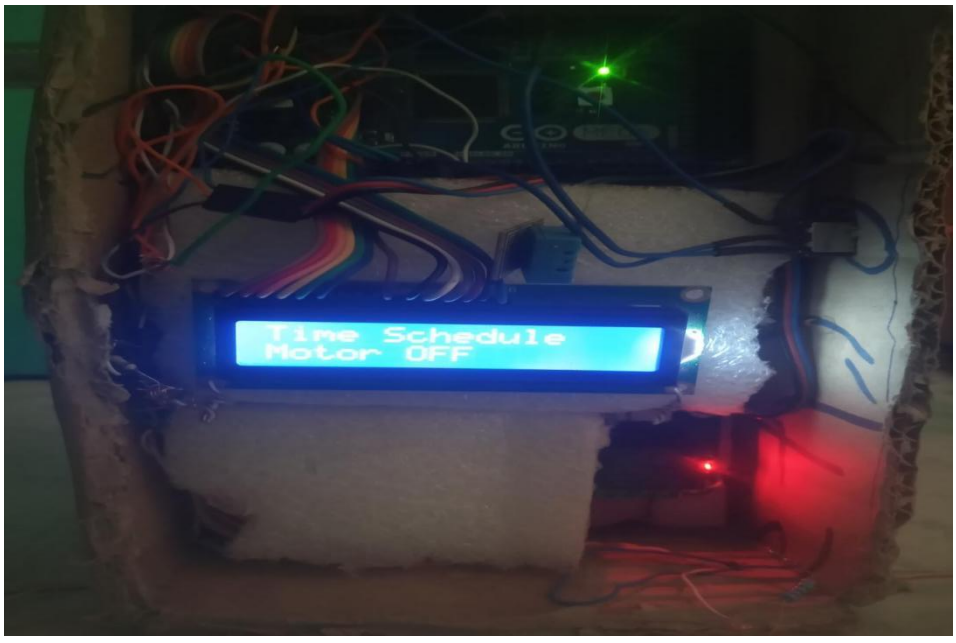

Figure 4.8 The motor off by time schedule

E. DHT11 Sensor

In the project the dht11 sensor is not working (stop sending data to the Arduino)

Figure 4.9 The dht11 sensor not working

F. Sufficient water level motor OFF

The moisture sensor calculates the moisture level of the soil and if the amount of water in the soil is sufficient or if the rain sensor detects rain, the motor is off.

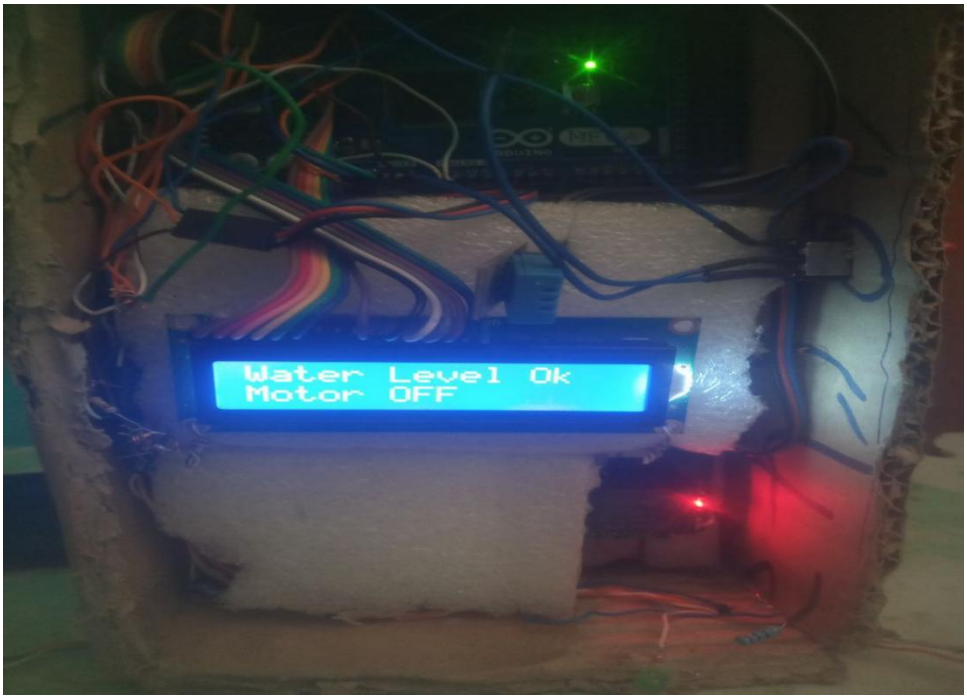

Figure 4.10 water level motor is off

G. Application Result

The designed application helps to turn the system on and off, and it also helps to know the temperature, humidity and moisture level remotely.

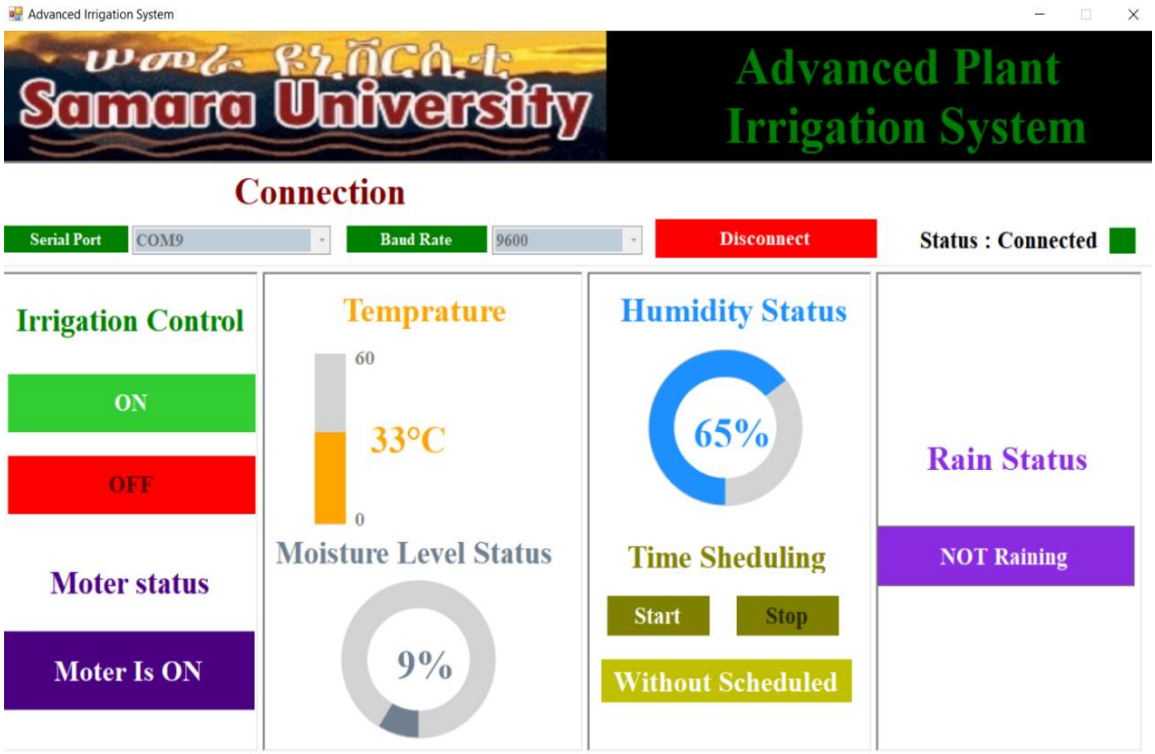

Figure 4.11 Application show the status of the system

Chapter Five

Conclusion And Recommendation

5.1 Conclusion

Thus, the “Advanced plant irrigation system” has been designed and tested successfully. It has been developed by integrated features of all the hardware components used. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Thus, the Advanced plant irrigation system Using Arduino mega has been designed and tested successfully. The system has been tested to function automatically. The moisture sensors measure the moisture level (water content) of the different plants. If the moisture level is found to be below the desired level, the moisture sensor sends the signal to the Arduino which triggers the Water Pump to turn ON and supply the water to respective plant . When the desired moisture level is reached, the system halts on its own and the Water Pump is turned OFF and also the the system is worked using time schedule and it controlled by application. Thus, the functionality of the entire system has been tested thoroughly and it is said to function successfully.

5.2 Recommendation

In this project we use different sensors these are soil moisture sensor, temperature sensor, and rain sensor. soil moisture sensor by sensing the moisture level of the soil, if the amount of water in the soil is lower than the plants need; this sensor will provide them water automatically. If the soil moisture sensor stops working, the temperature sensor calculates the temperature of the environment and delivers the water to plants according to their needs. Rain sensor is the other type of sensor that we want to use.In rainy day there is no need of irrigation water so our rain sensor detect rain and if there is rain, the system will stop automatically, which will avoid water wastage.If these sensors in operative or stop working the time schedule (Irrigation schedule) is take responsible to supply water to the plants.

The system was simple and cheap and helped plants grow uniformly. We recommend that Samara University use this system to create a comfortable learning environment. On the other hand, the university is to develop the system using high performance materials that increase the efficiency of the system.

Appendixes

Some Arduino code

```
#include "DHT.h"
#include <LiquidCrystal.h>
const int rs = 2, en = 3, d4 = 4, d5 = 5, d6 = 6, d7 = 7;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
const int relay_Pin = 8;
const int DHT11_Sesnor = 9;
const int moisture_sensor = A0;
const int rain_Sesnor = 10;
String data;
char dl = 'x';
char dt = 'z';

#define DHTTYPE DHT11
int moisture_sensor_value;
int rain_Sesnor_value;
float humudity_value, temprature_value;
DHT dht(DHT11_Sesnor, DHTTYPE);


void setup()
{
    Serial.begin(9600);
    pinMode(relay_Pin, OUTPUT);
    pinMode(rain_Sesnor, INPUT);
    digitalWrite(relay_Pin, LOW);
    lcd.begin(16, 2);
    lcd.print("Advanced Plant");
    lcd.setCursor(0,2);
    lcd.print("Irrigation System");
    dht.begin();
}
void loop()
```

```
{
    readDTH11_Sesnor();
    moisture_level_detected();
    b();
    delay(400);
}


void readDTH11_Sesnor()
{

    humudity_value = dht.readHumidity();

    temprature_value = dht.readTemperature();


        if (isnan(humudity_value) || isnan(temprature_value))
    {
        Serial.println("F");
    }
    else
    {
        Serial.print("H");
        Serial.println(humudity_value);
        Serial.print("T");
        Serial.println(temprature_value);
    }
}


void moisture_level_detected()
{
    moisture_sensor_value = analogRead(moisture_sensor);
    Serial.print("M");
    Serial.println(moisture_sensor_value);
}
```

Some application code

```
using System;
using System.Drawing;
using System.IO.Ports;
using System.Windows.Forms;
namespace Irrigation_System
{
    public partial class Form1 : Form
    {
        public Form1()
        {
            InitializeComponent();
        }
        private void comboBox1_DropDown(object sender, EventArgs e)
        {
            String[] portLists = SerialPort.GetPortNames();
            comboport.Items.Clear();
            comboport.Items.AddRange(portLists);
        }
        private void Form1_Load(object sender, EventArgs e)
        {
            panel1.Focus();
            CircularProgressBarHumidtiy.Value = 0;
            CircularProgressBarmoisture.Value = 0;
            PictureBoxPBTemp.Height = 0;
            comboBaud.SelectedIndex = 0;
            connect.Enabled = true;
            connect.BringToFront();
            statusconnect.SendToBack();
            statusdisconnect.BringToFront();
            pictureBox3.BackColor = Color.Red;
            button2.Enabled = false;
            button1.Enabled = false;
            disconnect.Enabled = false;
            disconnect.SendToBack();
            off.Enabled = false;
            on.Enabled = false;
            label12.Text = "";
```

```
        }
       private void on_Click(object sender, EventArgs e)
        {
            serialPort1.Write("cA");
            on.Enabled = false;
            off.Enabled = true;
        }
        private void connect_Click(object sender, EventArgs e)
        {
            if (comboport.SelectedItem == null)
            {
                MessageBox.Show("Pleas Select a COM Port!", "Message",
MessageBoxButtons.OK);
            }
            if ((comboport.SelectedItem != null) && (comboBaud.SelectedItem !=
null))
            {
                serialPort1.PortName = comboport.SelectedItem.ToString();
                int selecteditem = (Int32)comboBaud.SelectedItem;
                serialPort1.BaudRate = selecteditem;
                serialPort1.Open();
                timer1.Start();
                connect.Enabled = false;
                connect.SendToBack();
                disconnect.Enabled = true;
                disconnect.BringToFront();
                comboBaud.Enabled = false;
                comboport.Enabled = false;
                off.Enabled = false;
                on.Enabled = true;
                button1.Enabled = true;
                button2.Enabled = false;
                statusoff.BringToFront();
                statuson.SendToBack();
                statusconnect.BringToFront();
                pictureBox3.BackColor = Color.Green;
                serialPort1.Write("cx");
```

```
            label12.Text = "Without Scheduled";
        }
    }
    private void disconnect_Click(object sender, EventArgs e)
    {
        timer1.Stop();
        disconnect.Enabled = false;
        disconnect.SendToBack();
        connect.Enabled = true;
        connect.BringToFront();
        comboBaud.Enabled = true;
        comboport.Enabled = true;
        comboport.SelectedItem = null;
        statusoff.BringToFront();
        statuson.SendToBack();
        statusdisconnect.BringToFront();
        pictureBox3.BackColor = Color.Red;
        PictureBoxPBTemp.Height =0;
        LabelTemperature.Text ="00.00 °C";
        CircularProgressBarHumidtiy.Value = 0;
        CircularProgressBarHumidtiy.Text ="00%";
        CircularProgressBarmoisture.Value = 0;
        CircularProgressBarmoisture.Text ="00%";
        button2.Enabled = false;
        button1.Enabled = false;
        off.Enabled = false;
        on.Enabled = false;
        String[] portLists = SerialPort.GetPortNames();
        comboport.Items.Clear();
        comboport.Items.AddRange(portLists);
        serialPort1.Close();
    }
```

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