Smart Irrigation system using IOT

Submitted 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/internship titled **"Smart Irrigation System using IoT"**, submitted by Name: Md. Samiul Islam, ID No: 162-15-7855, Name: Saria Alam**,** ID: 162-15-7832 and Name: S.M Rakibul Islam, Id: 162-15-8100 to 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 28/01/2021.

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Fahad Faisal, Assistant Professor, 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. [**Font-12**]

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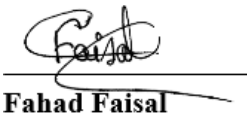

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Finally, I must acknowledge with due respect the constant support and patients of my parents.

Abstract:

our country is an agricultural country. Agriculture is the most important profession in our country. Most of the family's dependent in this profession. Main source of agriculture is water. For water supply irrigation is the best method. on the other hand, farmers have been in problem to checking proper soil conditions for safe crops and also check to supply water every time, check temperature also check when stop water supply. Farmers also have to take advice from agricultural experts paying extra money them when they need proper direction. So in this case we proposed project smart irrigation system using IOT to safe water and time. In our project we used different types of sensors like Arduino, micro controller, temperature, humidity, soil moisture sensor which collect various data of the soil and depends on soil moisture value. Land automatically irrigated by ON/OFF of the motor. Smart irrigation system project I s used for farmers and nursery workers and roof top garden workers

Keyword: internet of thing (IOT), temperature sensor, soil moisture sensor and humidity sensor

LIST OF FIGURES

Chapter-1

Introduction

1.1. Introduction:

Agriculture is the largest employment sector in Bangladesh. The execution of this division has an overpowering effect on major macroeconomic goals like business era, destitution easing human asset advancement, nourishment security etc.

The agriculture of Bangladesh largely depends on the monsoon which is not sufficient source of water. The smart irrigation system can provide water to the land measurement their moisture and soil types. Farmers follow the schedule for watering for different crops. Excessive water causes plants disease even the plants die.

The main goal of the project is to save water and reduce human intervention in the agricultural sector. Monitor the sensors and create signals to take the necessary steps. In this process, the output of the sensor is obtained and water is provided correspondingly through the switch of the motor for crop planting.

On the other hand, agriculture industry become more sustainable by improving the irrigation system. The proper irrigation is not possible in the dry area. In this dry area we can provide sufficient water by using smart irrigation. By this we can safe efforts of farmer's considerations of water and time.

1.2. Motivation:

Smart Irrigation system projects are also useful for the environment. The design and research of the project focused on the soil condition of a certain grass area and determining when plants need to get enough water soil moisture is essential for monitoring plant growth.

soil moisture determines the moisture content of the soil. we will develop a device determine the soil moisture content of the soil.

The project is inspired by countries that are economically dependent Agricultural and climatic conditions cause insufficient rainfall and water shortages. we The country mainly relies on agriculture. Even if the farmland has A water pump that requires manual intervention by farmers to turn the pump on/off as long as needed. The purpose of this project is to use sensors to detect the dryness of the soil and provide appropriate water for plants. This project helps to maintain the plants very easily. We are testing soil moisture and irrigation needs.

1.3 Aim and Objective

1.3.1 Aim:

The main purpose of this project is to create an Arduino-based device that can also communicate with the factory. This helps us monitor humidity, temperature, light, and irrigation conditions when the humidity is below the level. Especially this research aims to,

Use the microcontroller to develop a program for our project that will process the data from the sensors and control the entire irrigation system.

The purpose of our project is to minimize this artificial interference. By the farmer. automated The irrigation system will achieve the following goals:

1) There is no unplanned water, so a lot of water can be saved.

2) Irrigate only when there is insufficient water in the soil and there is no water in the soil The sensor determines when to turn on/off the pump. This can save a lot of time Farmers. In addition, this provides a much-needed break for agricultural workers because they do not have to manually turn on/off the pump.

1.3.2 Objectives:

Saving farmers' time, money and strength through smart irrigation systems is the main goal of the project. Water saving is also an important feature because it is necessary to reduce water loss and maximize the efficiency of use. Power consumption must be monitored. The various sensors can be used in the smart irrigation system. Continuously the sensor checks the water level then the sensor gives the information to the farmer by text message or cellular phone. Farmers control the motor using phones without going in the field. And then, when the water is enough for the soil the motor automatically off.

1.4. Expected outcome:

For our project, the irrigation system is simple and cheap. Labor intensive and wasteful water. If water is manually introduced into the system, a lot of manual input is required. in On the other hand, it’s important to check the system and improve production and avoid The plantation loses water. In addition, water bills and increasing water demand, Gardeners need to pay attention to protection.

1.5 Report Layout

looks is the most important part of anything we present. So the report layout is very important to represent our project report. We try to represent our project report paper according to the chapter by chapter. Every information about the project describes here. There are one to six chapters where represent from initial to final development process chapter one discuss only our project instruction, chapter two depends on background, chapter three represents the requirements model, chapter four is the design part, chapter five represent implementation and testing, chapter six we discuss conclusion and our future scope. We add some references where we take help for our project.

Chapter 2

Background

2.1 : Introduction

People need to learn small things before achieving a big one. Success always depends on hard work. We have completed a satisfactory project that will helpful for the future. Our course is completed; we need to all previous knowledge to fulfill our project. Arduino based smart irrigation system is a development project for the farms. We need to study and accurate ideas about the system design, embedded system. Electronic circuit design and so on digital electronics for a better knowledge of the materials of our project. We are very grateful to our course teacher. They make us understood the basic knowledge of this course.

2.2 Related work:

Before doing our project, we have seen some projects which is related with our project.

- Irrigation system
- Watering
- Automatic watering system
- Solar based auto irrigation system

2.3. Comparative studies:

When we are thinking about a farm-related project we want to do something for the farm which helps our farms take this opportunity and they have done their work very easily. So we research farms related projects and we find out some problems. We found out some irrigation system which is not the smart system. Some project has a smart system which controls smart phone but in that case farm have to attend in the land. But we won't try such kinds of a system which is controlled automatically. If in a case farm cannot go his land but irrigation will continue according to the need of land. So we develop that project.

2.4. Scope of problems:

We realize that the irrigation framework is more focused on work. In addition, it wastes water. Regardless of whether the water is physically introduced into the framework, this needs to be high Work input. The ultimate goal is to recognize the inspection framework and Increase creation on the manor and avoid the misfortune of water.

2.5 Challenges:

In our daily lives, water is very important to us. It is considered Individuals, creatures, plants, etc. That's it, water shortage now Has become one of the most serious problems in our country. There should be an answer This kind of problem. It is water protection. Farmers use their own normal Irrigation system. But in this system the loss of water and the loss of time, so we solved this problem and it is easy to make this system.

We face some challenges that we complete our project. They are given below:

1.significant amounts of manual labor required to turn irrigation on and off.

2. very time consuming and costly.

3. some landscape under-watered and even more water.

5.more plant health suffered, erosion occurred.

6.wasted water and money for it.

Chapter 3

Requirement Statement

3.1. Works Processing Modeling:

It refers to formulating regular business processes and finding ways to improve them. Analytical representation provides process modeling and makes them more effective. This is the standard way of describing the process.

There are some benefits of business process modeling:

- Everyone can see how the framework functions.
- Provides consistency.
- Controls the entire procedure.
- Identifies redundancies
- Eliminates wasteful aspects.

The modeler is one of the most important things in BMPS.

Incredible modeling instruments ought to be:

- Easy to learn for the business department.
- Simple for communicating with other departments
- Less expensive.
- The capability of simulating workflow before implementing.
- Gives a well defined
- beginning and completion of the procedure.

- Helps clients bunch comparable processes together and envision how they

work.

How they ought to be completed to accomplish better outcomes.

3.2 Requirement Collection:

Used many requirements to complete our project. Some of them are given below:

- Battery 12V, 7.5AH stores charge.
- Motor AC 220V, 50HZ, 15W serve water
- Relay channel connects equipment.
- Soil moisture sensor uses for water level.
- Arduino Uno R3 for control of the whole project.
- LCD display to show output and input.
- AT mega 328p Microcontroller for program saving.
- The wire used for connecting one device to another device

3.3 Block Diagram and Description:

In our project the Arduino is main part.it is a open source microcontroller which used to control all the sensors connect with USB cable. In our diagram the soil moisture sensor all pins connected to the Arduino and DHT11 and LM35 all pins connected to Arduino.

Then relay, SIM900A also connected with Arduino. Received all the signals the Arduino produces an output that guides relay and water pump. Here LCD is used to showing what ever going on the server. Then the server Decide when motor Turn on or off.

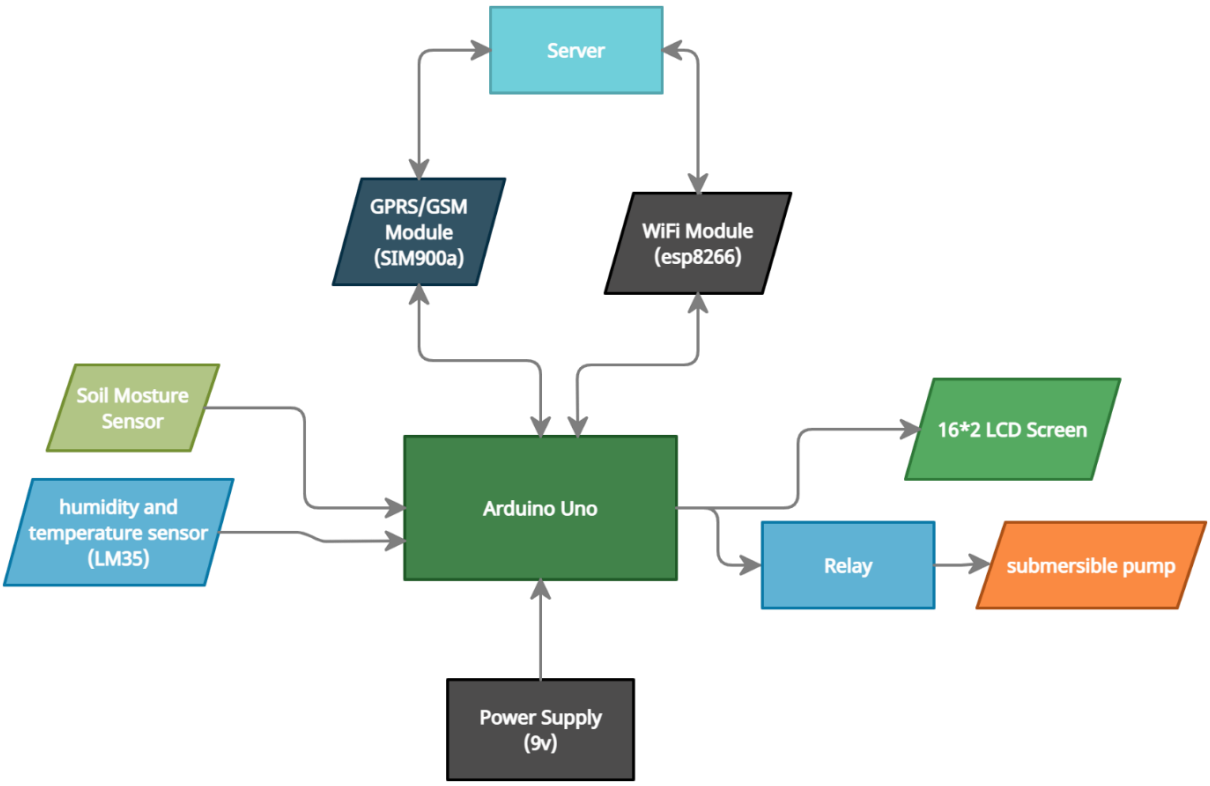


Fig-3.3: Block Diagram of Smart Irrigation System

3.4 Circuit Diagram:

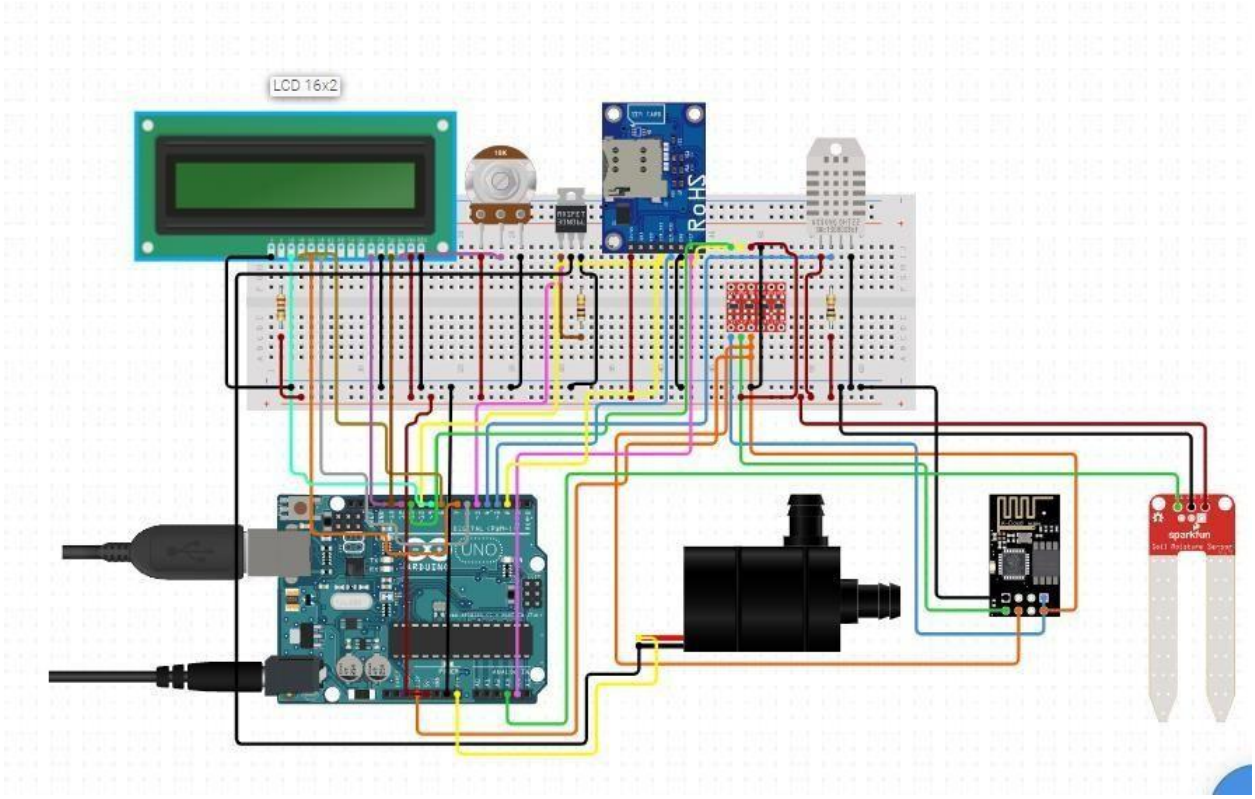


Fig 3.4: C Diagram of Smart Irrigation System

3.5 Logical Data Model

Logical data model refers to the detailed description of data, regardless of how it will be physically implemented in the circuit. It is a technology that graphically represents data architecture and organization. It provides information about various circuit relationships. There are some features of the logical data model:

1.There are all connections and relationships between them.

3.Include all attributes of each entity specified.

3.A humidity sensor is specified for each entity.

3.6 Design Requirement:

To design our project, we use lots of material. Some of them are given below:

3.6.1. Arduino Uno:

Arduino is a single board microcontroller and microcontroller kit used to build advanced gadgets and intuitive objects that can detect and control objects in the physical and computerized world. It uses various microprocessors and controllers. The digital and analog input/output (I/O) pins of the board set. Regulated power supply, used to power the microcontroller and other components on the board. Arduino Uno is a microcontroller board based on the 8-bit ATmega328P microcontroller. It is also used to provide analog input in the 0-5V range.

Fig: 3.6.1. Arduino Uno

3.6.2. Soil Moisture Sensor:

Soil moisture sensors can measure the volumetric water content in the soil mud. We realize that the properties and soil dampness must be reliable and may be diverse Depends on characteristic components such as soil sort, temperature or power Conductivity. Then, the

reflected microwave radiation is affected by dirt Damp. Similarly, it is also used for remote detection in hydrology and agriculture. Water supply to plants is also crucial to changing the temperature of plants. You can use methods such as transpiration to change the temperature of plants with water. When growing in moist soil, the root system of the plant also develops better. Extreme soil moisture can lead to anaerobic conditions, thereby promoting plant growth and soil pathogens

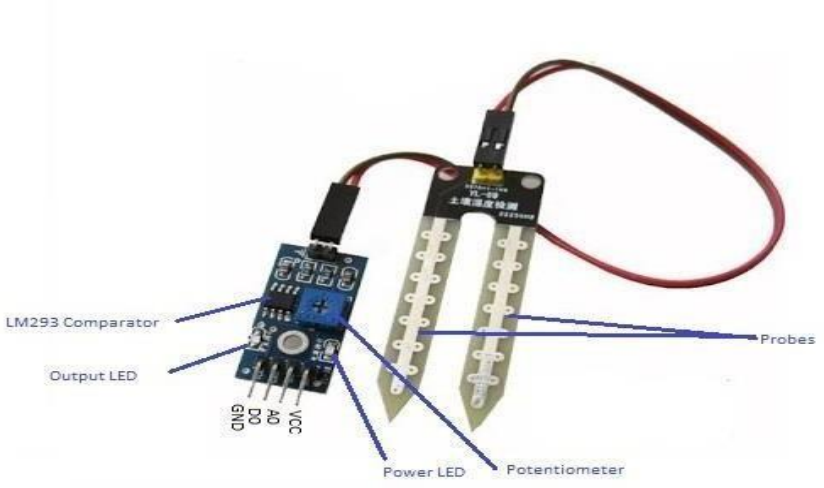


Fig-3.6.2: Soil Moisture sensor

3.6.3. Relay:

The hand-off is an electric switch. The switch can have any number of contacts in an assortment of contact shapes, such as making contacts, breaking contacts, or a combination thereof. Relays are utilized in circumstances where free low-power flag control circuits are

required, or different circuits must be controlled by one flag. The transfer was, to begin with utilized as a flag in a long-distance transmit circuit

Fig-3.6.3: Relay

3.6.4 Humidity and Temperature Sensor:

Humidity Sensor:

The humidity sensor is the presence of water in the air. The amount of water vapor in the air can affect human comfort as well as many manufacturing. It measures both air temperature and moisture.

Temperature sensor:

Temperature sensor is a device typically a thermocouple or RTD, which is provided for temperature through an electrical signal.

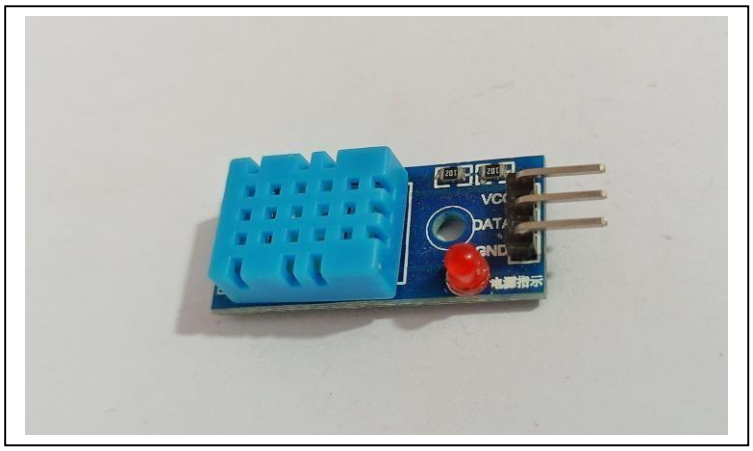


Fig-3.6.4: LM35

3.6.5 water pump:

Water pumps are used to manually supply water for specific tasks. It can be electronically controlled by interfacing with a microcontroller. The on/off can be triggered by sending a signal as needed.

Fig-3.6.5: 12vSubmersible pump

3.6.6 LCD:

LCD is a liquid crystal display that produces visible images. Used to display input and output LCD display is more useful and effective. what ever the process going on that should be display done the LCD. All the information we get in this display. When water need and when water level is enough or when temperature is less or high this showing in display.

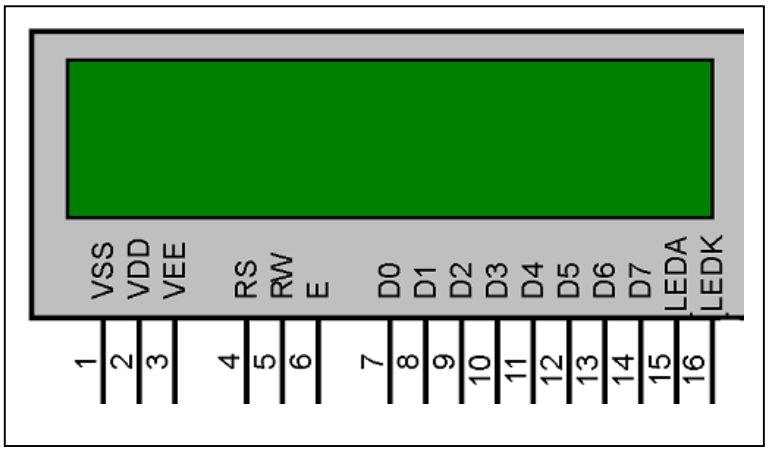


Fig-3.6.6: 16*2 LCD

3.6.7 SIM900A Modem:

SIM900A is also called GPRS. In our project we are using GPRS Internet, otherwise we can use the wi-fi module also for sending data.SIM900A mainly use in this project to get SMS alert or email alert. If something should be happened we will get SMS s alert or email alert by this SIM900A.

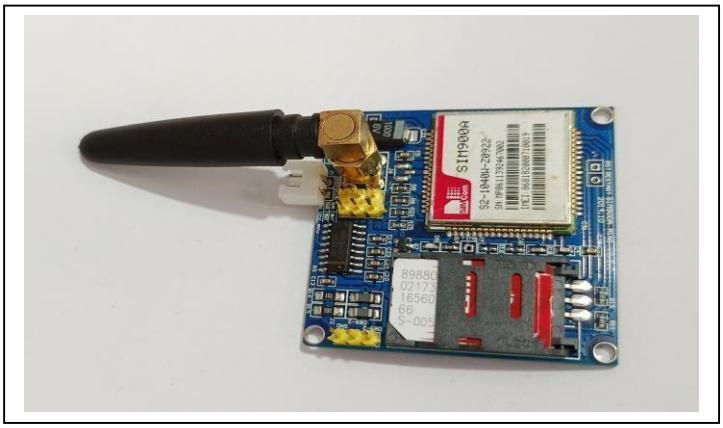
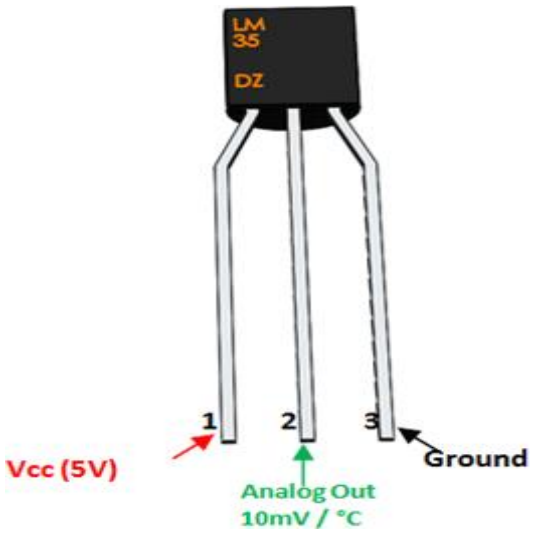


Fig-3.6.7: SIM900A GSM/GPRS Module

3.6.8..LM35:

LM35 is a temperature measurement device with an analog output voltage proportional to temperature. It provides output voltage in degrees Celsius. It does not require any external calibration circuit.



LM35 temperature sensor

Chapter :4

Design Specification

4.1. Software Description:

our project system contains two major piece of software, the first one is the Arduino software and the second one is for the android application. The Android application is mindful of showing sensor information values to the client and planning client ask commands to the microcontroller through the internet. The microcontroller executes those commands and reacts to a client ask by passing appropriate commands to solenoid valves or sensors and pass information between components of the framework and the android application.

4.2. Android Application :

We conducted some tests, as shown in the screenshot below, to see if the system requirements are met. There are soil moisture, humidity sensor, and temperature sensor on the first interface of the android application.

In another picture, here we can see two modes. One is the automatic mode and other is the manual mode. Automatic mode is used to control the pump automatically. The pump turned On automatically every day at a particular time.

Manual mode is used to manually control the water pump without the farmers' personal involvement. A user controls all the sensors and mode by using the android app

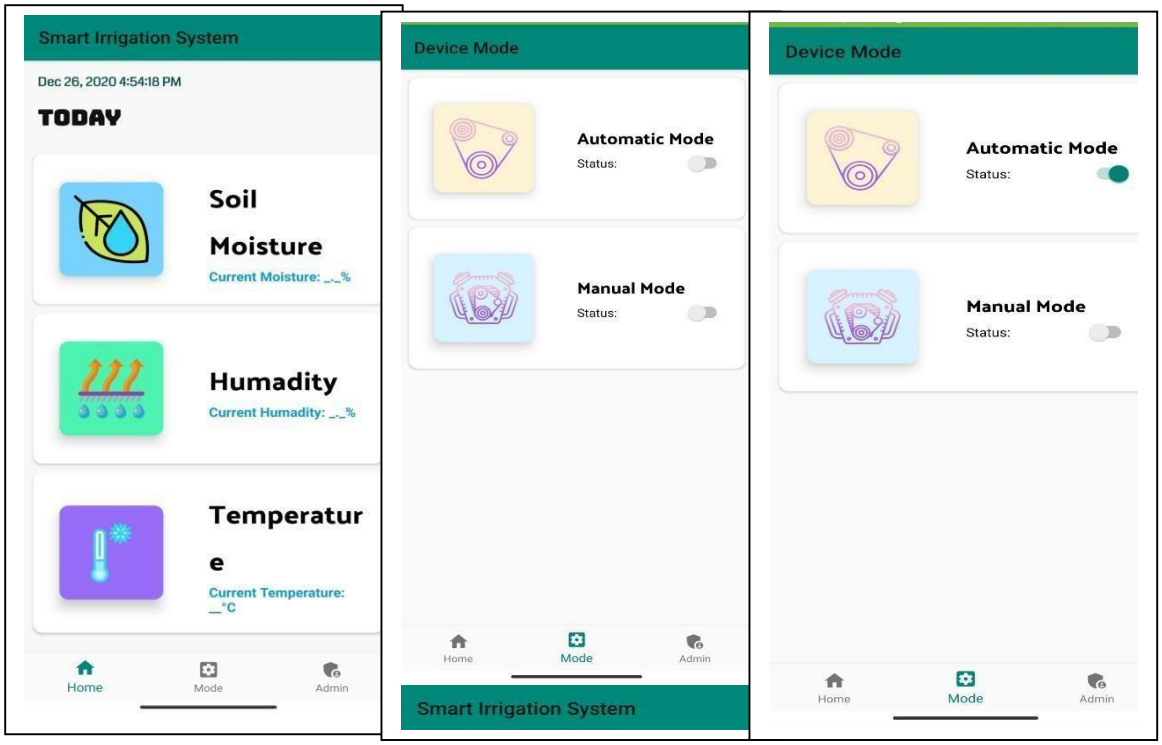


Fig-4.2: Android App UI design

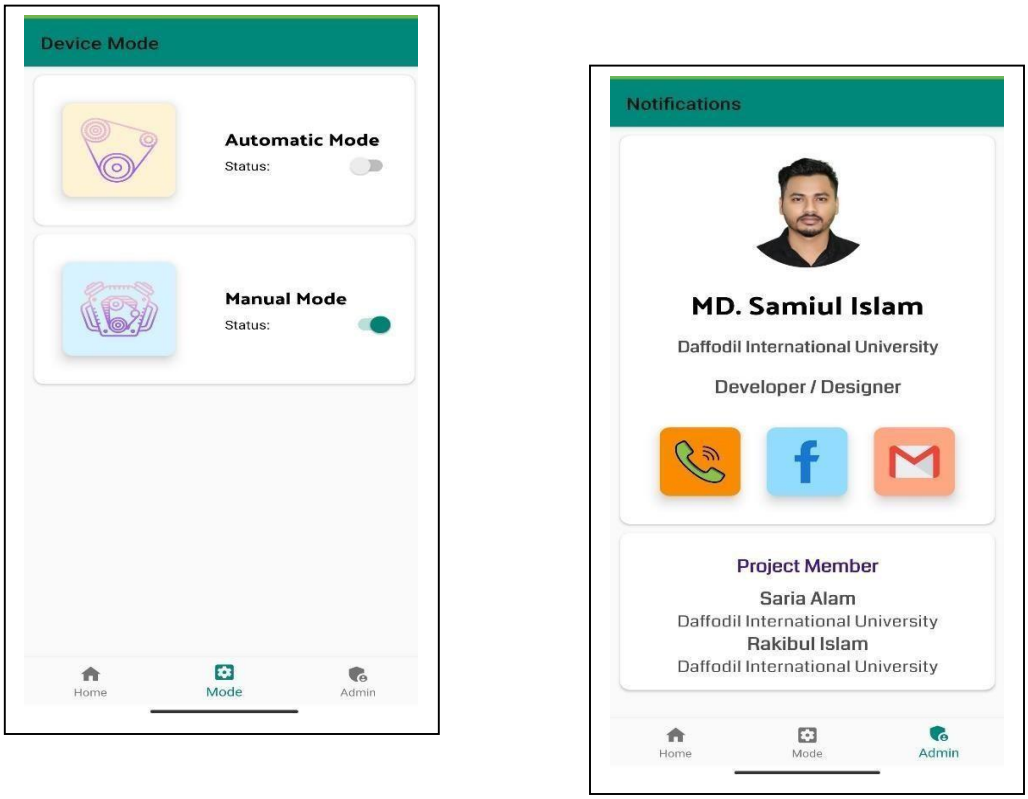
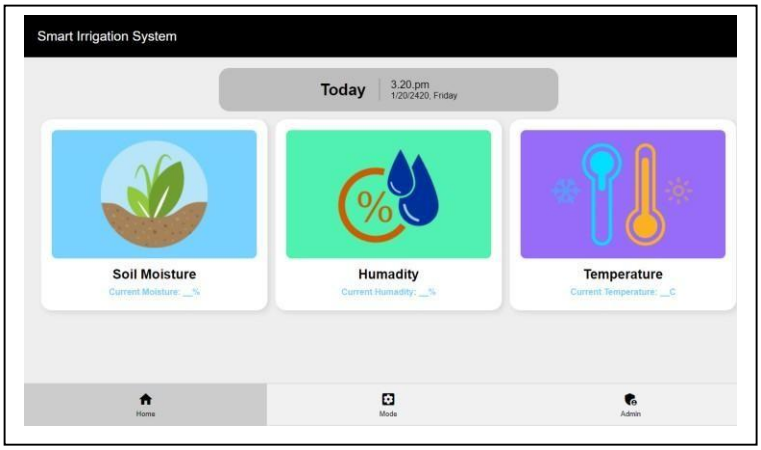
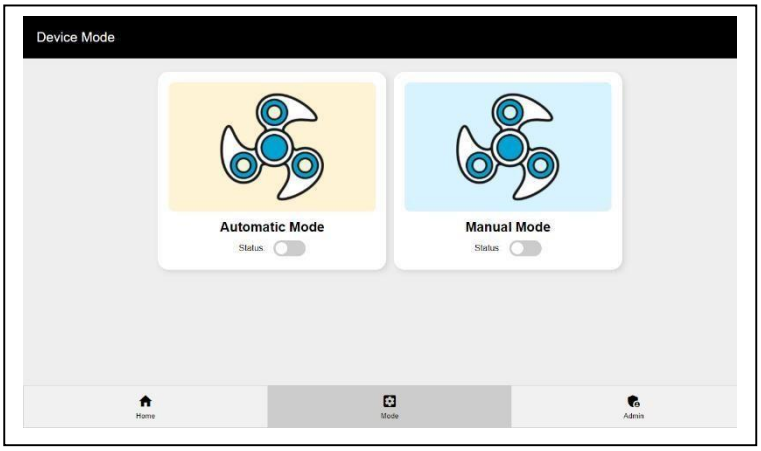


Fig-4.2: Android App UI design

4.3. Web Application Development:

we completed some test as found in the screen captures above to check whether the framework necessities were satisfied. soil dampness, mugginess sensor, and temperature sensor existing in the landing page of the Web application on the other picture here we see two kinds of mode. one is the programmed mode and the other is manual mode. a client controls all the sensors and mode by utilizing the Web application





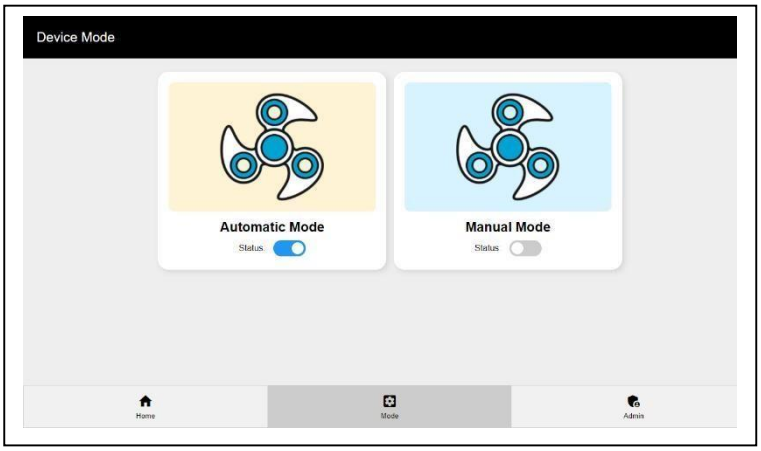
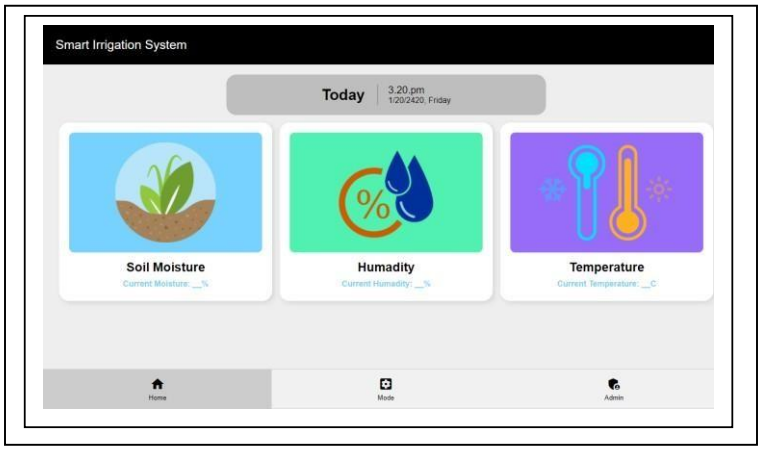


Fig-4.3: Web App UI design



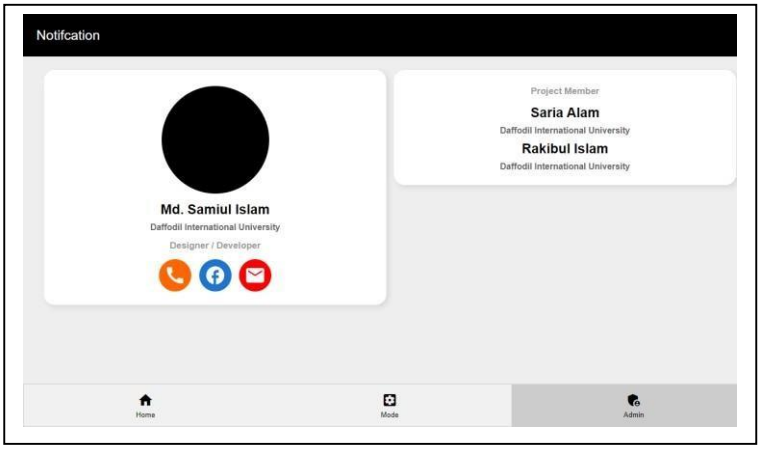


Fig-4.3: Web App UI design

Chapter 5

Implementation and Testing

Implementation and testing:

Here in this section there will be various test case which were done during finalizing the prototype. Testing is done to evaluate the system. It is performed on the basis of the output carried out by the system. Different test cases such as Unit and System testing with different sub heading have done with specific objective and the end results.

5.1. Introduction:

We are already done with the requirement in chapter 4, now it's time to implement those in real-life environment stage. There is different planned decision should be made for successful

implementation of our project. The system should be reviewed from time to time for checking

that the implementation will successful and also prevent error.

5.2 Implementation of Database:

We don't use any database. But we save our program in microcontroller. We can say that

microcontroller is our main features of database.

5.3 Implementation of Front-End-Design:

For implementing front-end we use a hard-board for setup all elements.by the help of Arduino, soil moisture, humidity sensor, relay, motor, SIM900A, pipe, wire e we made our project more interactive from any other project.

5.4. Implementation of Interaction:

For implementing the interaction of our application we use the Arduino program in the back-end

language. With the help of the Arduino board, we connect our wire connection according to announce the pin number which is making any kind of interactive project.

5.5. Test Implementation:

System testing is the trying of a total and complete equipment item. The usage of the procedure is presumably the most basic phase of the undertakings it doesn't require an extraordinary, duty as far as labor and monetary assets, and can be very troublesome of the everyday task of the association.

5.6. Test Result and Reports:

This is the final step in testing. The testing of the Arduino program, equipment, administrations will be a progressive procedure all through the usage procedure. The establishment of Arduino programming will typically be completed by an authority cabling shop that will

test the links. We check the pump motor, is it properly works or not. Then we check the moisture sensor and its level. We check solar panel and their position and check the connection of all element.

5.7: Advantage of the project:

The most advantage of this venture is that it has quicker execution when compared to manual execution of the process.

1.It is basic, versatile, and gives tall execution.

2.It consumes less power

3. Dryness can be easily detected in soil.

4. Progresses efficiency by expanding work yield and progressing effectiveness.

5. Saves time in accomplishing the specific objectives.

6. This framework guarantees that the plants don't persevere from the strain or push of less and overwatering

5.8. APPLICATIONS OF PROJECT:

We propose an application to distinguish water insufficiency state in soil-based exclusively on sensor-provided data. In a smart Irrigation System, the most significant advantage is that water is supplied only when the moisture in the soil goes below a pre-set threshold value. This framework can be utilized in roof gardens in profoundly populated regions where the land is expensive and gardening on rooftops seems like the only viable option left.

The lawns of houses and public buildings can be maintained by these systems, thereby reducing the need for human monitoring. The most prominent application is in rural lands, where ranchers are helped greatly by this. There's no requirement for the rancher to really be shown amid operation.

Gardens that need to be monitored in the absence of homeowners require systems like APIS. Home gardens that are maintained with a large effort by homeowners require proper observation and maintenance. It can be provided by APIS.

The water system in parks has to be done indeed when individuals are not there to maintain the grass or trees. Discovery in this way is cheap, non-invasive, and can be connected on a population-wide scale. The nearness of innovation in all angles of life has empowered arrangements to genuine life problems that were either difficult or unfeasible.

5.9. Limitations:

The system requires two different power supplies. While implementing in large areas, mechanical supply can be utilized to run the engine. In small gardens, this may seem like a large wastage. Needs an expansive sum of detecting gear for exceptionally expansive water system zones. The system is not 100% reliable. Unexpected factors can cause errors, and it may in some cases, cause loss. In spite of being great, it must be physically checked and maintained once every few weeks.

Chapter:6

Conclusion and Future Scope

6.1. Conclusion:

Over the years, professionals involved in irrigation implemented manual methods of irrigation. The manual method has lots of drawbacks and is quite unreliable for the irrigation of big areas. Irrigation has a direct impact on the cost and production of the final product. This system aims to eradicate the fractional manual method of irrigation which needs to be improved over time. Moreover, the problem domain explains the requirement of plant communicator and irrigation systems that can be used by farmers and flower Nursery professionals. This testing phase of the project justifies that this project can be used in a real-time farming environment. Also, the project was developed after studying the market requirement which makes it extremely suitable in the context of present scenarios. The post-survey result provides that the system is useful in real-time scenarios and end-users are interested in using this system.

6.2. Future Scope:

Smart irrigation is going to be very useful in the future. The components required for this type of irrigation system are moisture sensors, relays, and a submersible type pump. Smart irrigation is supposed by sensing the soil condition as wet or dry. It is an effective use of water in the irrigation system. This is more effective for farmers. In the future, the advances in Nano innovation, the upgrades in the shrewd framework, and power gadgets have a viable job in executing sun-based vitality approaches. Our administration, Research and labs, different sun based associations are endeavoring to make this sun situated siphon set as all agrarian field and simple to utilize. Give us a chance to have an expectation so that in one fine day all ranch arrives in Bangladesh are furnished with sun-powered siphon sets

with SMS caution. In the Future we utilize IR sensors any protest going into fields can be identified and cautioned

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