

# **SMART PLANT CARE**

**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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**DAFFODIL INTERNATIONAL UNIVERSITY**

**DHAKA, BANGLADESH**

**DECEMBER, 2019**

## **APPROVAL**

This Project titled “**Smart Plant Care**”, submitted by Md. Riead Ahmed Bhuiyan, ID No: 152-15-5795 and Md. Farhad Hossain, ID No: 152-15-5651 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 05 December, 2019.

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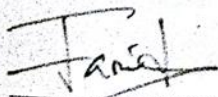
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## DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Dr. SHEAK RASHED HAIDER NOORI**, Associate Professor and Associate Head, Department of CSE, Faculty of Science and Information Technology, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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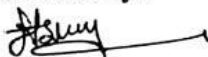


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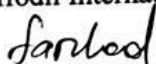
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We really grateful and wish our profound our indebtedness to **Dr. SHEAK RASHED HAIDER NOORI**, Associate Professor and Associate Head, Department of CSE, Faculty of Science and Information Technology, Daffodil International University. Deep Knowledge & keen interest of our supervisor in the field of “*IOT*” to carry out this project. His endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior draft and correcting them at all stage have made it possible to complete this project.

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Finally, we must acknowledge with due respect the constant support and patients of our parents.

## **ABSTRACT**

Many of us have a hobby of gardening. Most of the citizen of Dhaka city have come from outside of Dhaka city. So, there has a tiny space they have for gardening. So, they try to plant such kind of plant that can be helpful or valuable to them. Such kind of tree is Bonsai. Bonsai is a tree which is a little size of tree but its age is more as its size. So it needs proper treatment as it should be. But in festival vacation most of the house owners go to village/outside of Dhaka city to enjoy their vacation. In that case the Bonsai tree does not get proper water, and if the vacation last long and the owner come after few days the Bonsai might die in that days because of lack of water. Then the owner has only one option, either he/she has to carry this bonsai tree with them or has to stay in Dhaka.

**Smart Plant Care** will get rid of this such kind of problem. In this system there will be smart devices system that will measure the temperature of the soil, moisturizer of soil. If the soil become so dry then it will automatically give water to the plant and if rains come there has a smart Shade that will keeps the plant from over water.



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# CHAPTER 1

## INTRODUCTION

### 1.0 Introduction

As a tree lover someone might think that if they had enough space of land they can harvest some vegetable or plant some bonsai tree or some beautiful flowers tree. Although most of us dream like that if I had a huge space of land it would plant this tree or that vegetable. But in Dhaka we don't have sufficient space for harvest fresh vegetable or plant some bonsai tree. We just have space at our balcony. In this tiny space we can't plant sufficient plants. So, we try to plant only these trees or plants which will be good for us and which plant we like most. But in some cases like long term festival vacation we usually go here and there and in that case we can't take these trees with us. So *Smart Plant Care* system can help us in this situation and this can relief from this matter.

### 1.1 Motivation

Our main motivation of this project is put our eyes only on smartly tree care. Now a days people have become so much busy and in their busy life there they get a little bit scope for fulfill their gardening hobby. In this little leisure time, the want to spent their time with their family or in such kind of work that they love most. So, tree lovers spend their most of the leisure times in their garden or taking care of their plants. But in some cases like long term festival vacation they usually go here and there and in that case they can't take their trees with them.

From this idea we decided to do some demo project that will smartly take care of their trees. And this idea encouraged us to make a project *Smart Plant Care*.

### 1.2 Objectives

- This will take care of your plant smartly.
- Measure the soil condition of your plant.
- Monitor the temperature of weather and soil.
- Monitor the moisturizer of soil properly.

- If it rains then the system will automatically open smart Shade.

### **1.3 Expected Outcome**

- This is such kind of system that will take care of plant digitally.
- In this system there has some sensors that will measure the weather humidity.
- This system can give the proper measurement of soil moisturizer, soil temperature.
- If the soil temperature is going down then the system will turn on the motor automatically and give water to the plant.

This project is a great solution for taking care of our loving trees smartly. No need to worry about if it is hot summer day or not, if there is so much rain or not. Both in hot summer day and raining day the *Smart Plant Care* can be able to take proper plan of our plant.

## 1.4 Report Layout

The report is broadly organized into five chapters. Each chapter serves with the different aspects of "Smart Plant Care". Each chapter's various parts has been explaining in detail:

- **Chapter 1: Introduction**

This section we have been talking about the initial matters, abstract, summery, acknowledgement, table contents, list of tables, list of figures, other lists and the Preface etc.

- **Chapter 2: Background**

This parts takes about the background and also some scope of future and some challenges.

- **Chapter 3: Requirement Specification**

This part talks about the requirements of the project. Here we have defined the circuit diagram and design requirement.

- **Chapter 4: Design Specification**

This section specify the front end and back end design of the project.

- **Chapter 5: Implementation and Testing**

This part talks about the Implementation of the whole project and we have tested every section weather the system is as expected or not.

- **Chapter 6: Conclusion and Future Scope**

This section talks about the conclusion and scope for future development of our task.

## **CHAPTER 2**

### **BACKGROUND**

#### **2.0 Introduction**

Nowadays people are getting very much attracted on planting tree. If they get any space of land they try to plant there some vegetables or some flowers tree. In this chapter we described in details work presentation, related work done before, comparative analysis with other works.

Our target and challenged that we faced also has been discussed in this section.

#### **2.1 Related Works**

Basically this project is unique idea for smart plant care. Related work like *Smart Plant Care* project had never done before. There had done few project or research that is being called only personal course project. But *Smart Plant Care* is the unique project for plant care.

#### **2.2 Comparative Studies**

“Smart Plant Care” project is very unique project. Never before this type of project has done. There is the best project for smartly care of our plants. Before this project, there had been done some projects separately which are the small parts of our project like Soil Moisturizer [2], Temperature Sensor project [8], Water Sensor project [3], Humidity Sensor [5], Real Time Clock [9]. But this is the combination of all these project and the output of our project is enthralling. We do such a thinks that it will do many works alone. At the same time this system will check the weather moisturizer, soil temperature, soil moisturizer, environment temperature, if it is rain dropping or not, percentages of daylight in details. If it founds that soil moisturizer is going down then it will turn on the motor automatically what is installed and programmed in this system.

There has an advanced system for saving the tree from rain. If it rains then there has a smart Shade that will open automatically and save the tree from rain water.

### **2.3 Scope of the Problem**

Here we implement such kind of project that will take care of plant smartly. The main theme of this project is to make an interaction between modern science and human. Most of us become busy day to day life, so sometime we forget to give water of our plant. So, this modern system will get relief us for such kind of problems.

### **2.4 Challenges**

There has challenges in all the work. There is no work that done successfully without challenges. Similarly, we had faced some problems and challenges in this project. First we faced the problem was what will be the components of our project. We never have had any experience in this type of project. Then the second things came that how to connect each other with these materials.

There has a part for electric connections in our project and we just have a little basic knowledge of electric connection and embedded system parts what we have learn from our varsity course “Embedded System”.

The third problem and the major problem was connect every parts of this project with each other to run the project. Our safety issue also in our head because we are going to deal with 220 volt electricity.

The other challenges that we faced like,

- Working with electricity 220 volt
- Setup adapter to convert 220 volt into 9 volt
- Using transistor to convert 9 volt to 3 volt for Arduino Mega

## **Chapter: 3**

### **Requirement Specification**

#### **3.0 Requirement Collection and Analysis**

##### **3.0.1 Software Requirements**

To implement our project, we used following Software:

- Operating System: Windows
- Language: C/C++
- Tools: Arduino IDE
- Circuit Diagram Draw: Fritzing[6]

##### **3.0.2 Hardware Requirements**

Our project mostly based on Hardware parts. There we used many hardware part to implement our project [1]. Our Hardware Requirements:

- Arduino Mega
- Jumper wire
- Water Detector sensor
- Servo
- Soil Moisturizer sensor
- DHT11(Humidity sensor)
- Water pump
- LDR
- LED lights
- Keypad
- RTC module
- LCD(I2C module)
- LM35
- Transistor
- Adapter

### 3.1 Design Requirements

- Real time show [8]
- Display soil moisturizer and soil temperature [2]
- Daylight percentage display [7]
- Humidity percentage display [5]
- LED turn on at low level of daylight [7]
- When it rains smart Shade should be open [3]

### 3.2 User Module and Description

#### 3.2.1 System Feature

- Soil moisturizer [2]
- Soil Temperature [10]
- Humidity check [5]
- Daylight check [7]
- If it rains or not check [3]
- Give real day time correctly [8]
- LED lights are on at low level light [7]

#### 3.2.2 User Module

User can perform the below operation in this project system.

**i. Soil Moisturizer**

After setup this project user can see the soil moisturizer percentage of the soil [2]

**ii. Soil Temperature**

User can see the temperature of the soil in his garden. [10]

**iii. Daylight Measurement**

User can measurement the daylight percentage [7]

**iv. Humidity Measurement**

User can see the percentages of the humidity of his surrounding weather [5]

**v. Real Day and Time**

User can check the read date and time in this project [8]

**vi. Check water sensor**

If it rains the user can check the usability of smart Shade that protect the plant from flooded or not [3]

**vii. LED ON/OFF**

When the day light is become low the user can see that the LED light is turned on [7]

**viii. Setting Daylight Time**

User can also time setting for LED light on period [8]

## CHAPTER 4

### DESIGN SPECIFICATION

#### 4.0 Interaction Design and UX

Interaction design of an application by which user can interact with the system or applications of a project. The UX design makes a project more attractive to the users. This design is the development of the application for users. It should be attractive and users should not feel uneasy or annoyed in time of using the application.

##### 4.0.1 Activity Display of the system

Here is the display parts of this project. In this design user can see the soil moisturizer, soil temperature, daylight percentages and humidity percentage.



Figure 4.0.1: Activity Display of the system

#### 4.0.2 LED Lights ON at Low Level of Daylight

Here is the demonstration that the LED lights are ON when the daylight is low.



Figure 4.0.2: LED lights are on at low level of daylight

## 4.1 Implementation Requirements

### 4.1.1 Connections of the Components

Here is the demonstration of the connections of the components

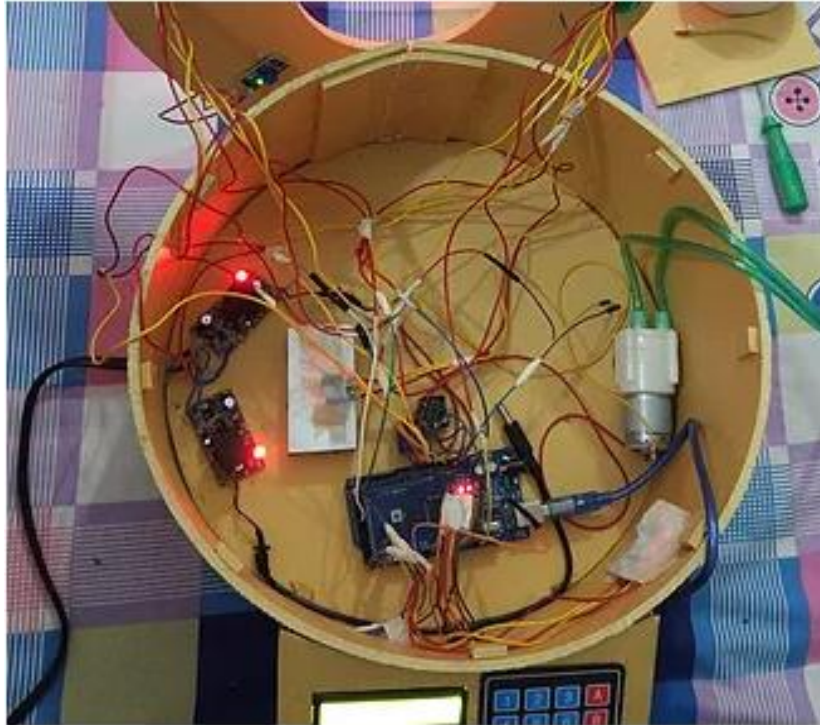


Figure 4.1.1: Ware Connections of the components

### 4.1.2 Installation of the Soil Moisturizer Sensor

Here is the demonstration of installation of soil moisturizer sensor



Figure 4.1.2: installation of soil moisturizer sensor

### 4.1.3 Installation of the Water Sensor

Here is the demonstration of installation of water sensor



Figure 4.1.3: installation of soil water sensor

## 4.2 Design Diagram

### 4.2.1 Circuit Diagram

Here is the Circuit Diagram of our project

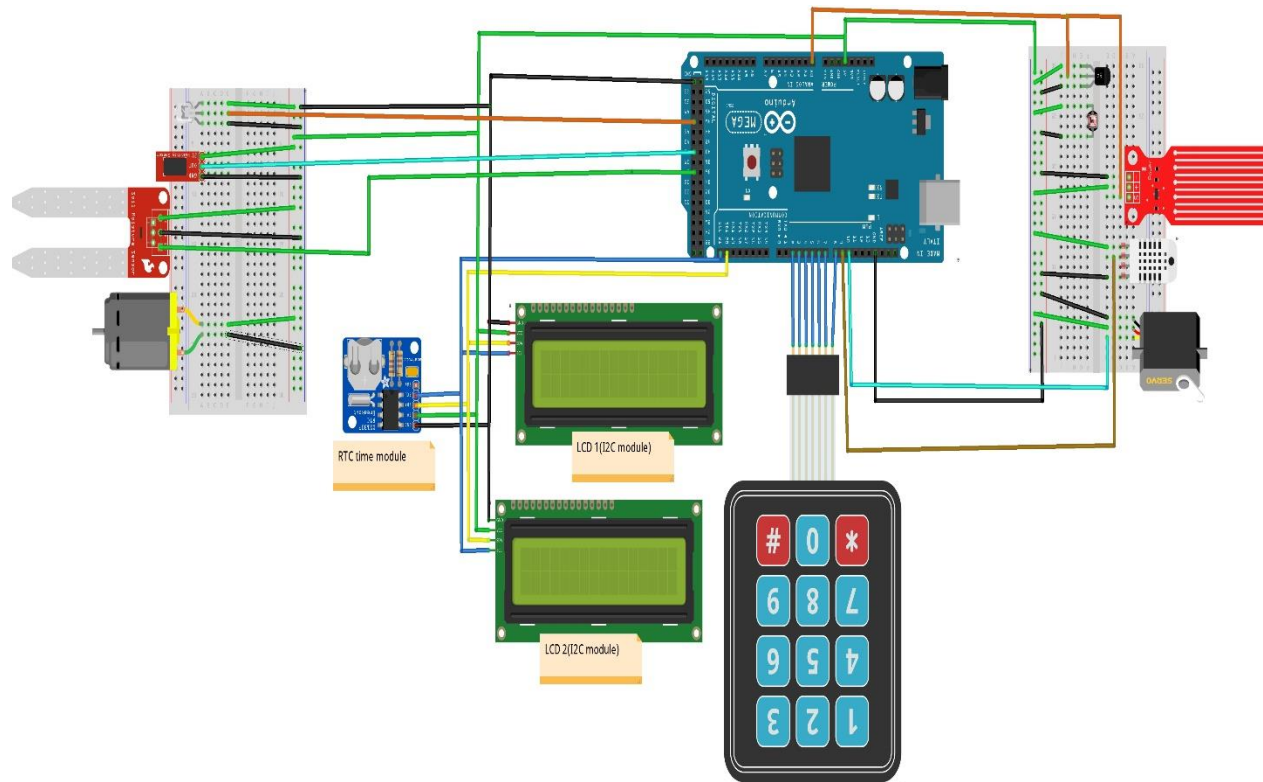


Figure 4.2: Circuit Diagram of project

## 4.2.2 Sketch Diagram

Here is the Sketch Diagram of our project

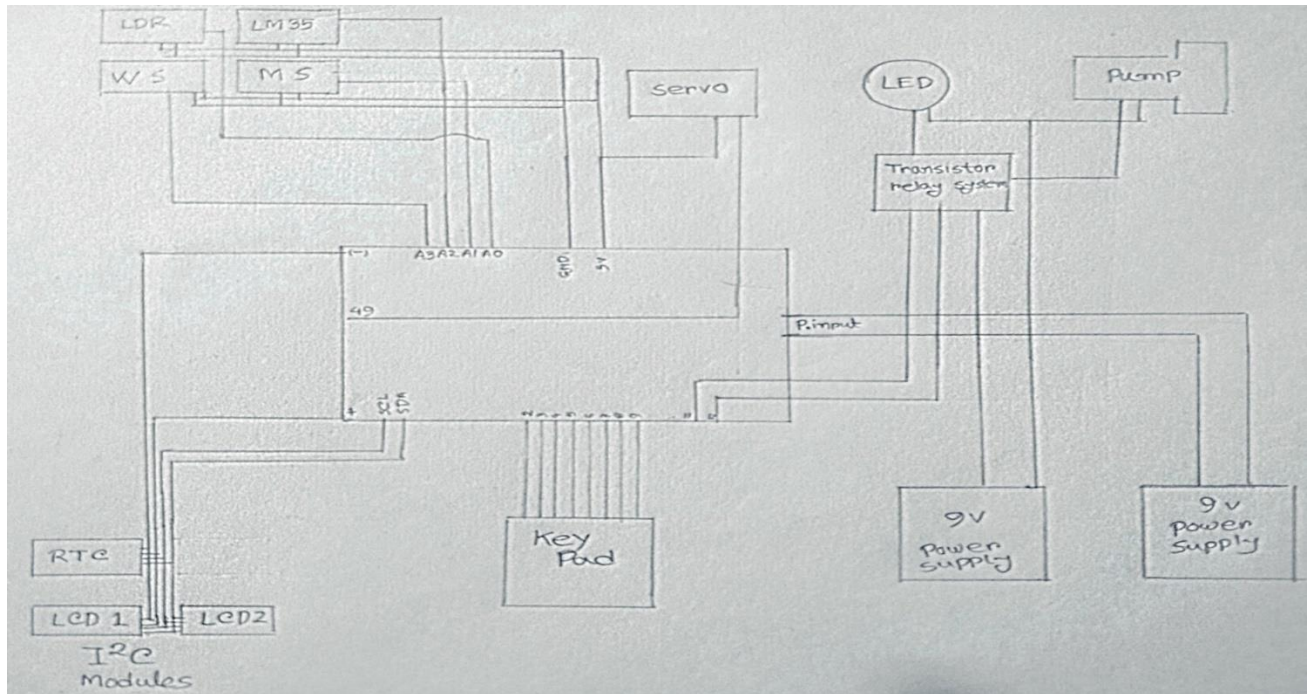


Figure 4.2.2: Sketch Diagram of project

## CHAPTER 5

### IMPLEMENTATION AND TESTING

#### 5.0 Implementation of Components

The implementations of interactions that shows how accuracy of our project is done. Every parts of the project is connected successfully and the output is as expected. We make this project is user friendly. We structured each and every components of this project such a handy way so that the user has no doubt to use it.

The satisfaction comes when the implementations of project works fine and users feel free to use it.

The output of out implementation components is here:



Figure 5.0: implementation components of project

## 5.1 Testing Implementation

When a system is implemented the test comes to verify its implementation. Some specifics implemented function is called implement testing. System testing Table 5.1 shows the result of system testing.

Table 5.1: System Testing Table

Test case	Test input	Expected outcome	Obtained outcome	Passed/Failed	Testing Period
Soil Moisturizer Sensor	Put the moisturizer sensor into soil	Moisturizer Percentage should display	Moisturizer Percentage displayed successfully	Passed	17-10-2019
Soil Temperature Sensor	Put the temperature sensor into soil	Temperature Percentage should display	Temperature Percentage displayed successfully	Passed	17-10-2019
Humidity Sensor	Humidity Sensor set into open space	Humidity Percentage should display	Humidity Percentage displayed successfully	Passed	17-10-2019
LDR Sensor	LDR Sensor set into open space	Daylight Percentage should display	Daylight Percentage displayed successfully	Passed	17-10-2019
Water Sensor	Water Sensor set into roof	Smart Shade should open	Smart Shade open successfully	Passed	17-10-2019
Pump Motor Start	Set Pump motor into dashboard	If soil moisturizer become low pump motor should start	Pump motor started successfully	Passed	17-10-2019
Setting Soil Moisturizer percentage	Keyboard use for setting	Soil Moisturizer should set	Moisturizer set successfully	Passed	17-10-2019

## **CHAPTER 6**

### **CONCLUSION AND FUTURE SCOPE**

#### **6.0 Discussion and Conclusion**

Finally, by the grace of almighty **Allah** we have successfully completed our project “**Smart Plant Care**” and documentation. After the long term of thinking, discussions and implantations we are happy to complete it. This project is for these people who really love trees and try to care them. The project is really easy to implement and too much user friendly.

In past, people had to check daily if the soil moisturizer become lower or not, if it needs to give water or not, if it rains comes or not so that the rain drop can't float away the tree. Now the **Smart Plant Care** has come and it's really can change the plant care system the way people think.

#### **6.1 Scope for Further Developments:**

- ❖ Adding PH sensor.
- ❖ Implementing it in larger scale for crop cultivation
- ❖ Implementing with an mobile phone application so that user get update data
- ❖ Implementing a Bluetooth system so that user can control it through mobile phone

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## APPENDICES

### **Appendices: Project Reflection**

Throughout the journey, since last year, we have acquired a tremendous experience. We are two in members in our team. Having a good relationship and strong bonding with each other, we have completed our project successfully. Our bonding was formed when we started to work together.

When we started the journey, we didn't know how to develop an embedded-system based project. So, it was so hard for us to know the proper steps of developing such a kind of project. But we didn't give up. Then we analyzed the requirements and made a proper plan that made us even more confident to make our dream successful. We faced several problems when we tried to connect the components with each other. The connections didn't work perfectly. But we never felt demotivated. We solved our problems together.

After a year of hard work, we have developed our project finally. We have experienced how to cooperate with each other throughout the journey. Now we have a belief that, if we work together, everything is possible to do. After all, we are grateful to The Almighty ALLAH and our respectable supervisor Dr. Sheak Rashed Haider Noori for his endless support and excellent guiding throughout the session.

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