WEB APPLICATION BASED WIRELESS HOME AUTOMATION SYSTEM

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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 titled **"Web Application Based Wireless Home Automation System"**, submitted by Solaiman Rabby Id: 152-15-569, Mohammad Faisal ID: 152-15-544 and Mohitul Islam ID: 152-15-542 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 (BSc) and approved as to its style and contents. The presentation has been held on September 18, 2019.

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DECLARATION

We hereby declare that this project has been done by us under the supervision of **Name Tania Khatun, Sr. Lecturer, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

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ABSTRACT

Nowadays everything dependents on Technology. The home automation system achieved great popularity and it increases the comfort and quality of life. In this paper, we propose a web application using which the fan, light, and door can be controlled over the internet. The important feature of the web application is once you run the web application in raspberry pi then you can access our web application for controlling home appliances all over the whole world. The web application has a security feature that only enables certain users to access the web application who registered the web application. Another security feature is the application has an entry status page, only the admin can delete this entry status list

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CHAPTER 1

INTRODUCTION

1.1 Introduction:

In recent years, IoT is the most popular platform. Making something that can controlelectrical applications of a house or office easily only web portal and using raspberry pi 3 **and** internet connections. We are using the webserver user-friendly interface for the see the home appliance is on or off (like bulbs, lights, doors, etc). All these electronic components are controlled by the raspberry pi 3. Using the webserver, users can communicate the electronic equipment by the controller (raspberry pi 3). Here we are controlling fan, light and door lock system. We are using the QR code for the door lock system.

1.2 Motivation:

In this present world, we rely on innovation and the internet. In the last couple of years, many home/office/industrial owners have started to implement the automation system on their properties to control electrical appliances. You can control different rooms just stay inside your own room. It will decrease your apparatus' bill cost. it's useful for handicap individuals or sick individuals. This easy to use control of appliances won't just make our day by day life easy however it will also lessen the unnecessary consumption of electricity.

1.3 Objectives:

We are working on the IoT based home automation system. In this project, we remotely control home electrical appliances using raspberry pi 3 and web portal. Suppose you are going somewhere and you forgot to turn off the lights or fans of your room then you can easily turn off your home appliances using that system. That's why you can save the electric bill cost. That's why many office/industrial owners can control their properties in fewer persons. It decreases the owner's cost. we are using the raspberry pi camera to capture an image of QR code. if the QR code matches then the door will be open otherwise the door will not open. in this project, we are using a local terminal. For this reason, you will control this web site a different network.

1.4 Expected Outcome:

We are working on the IoT based home automation system. In this project, we remotely control home electrical appliances using raspberry pi 3 and web portal. In this project, we control light, fan, door, etc. we can control home electrical appliances through the internet worldwide using our web application.

CHAPTER 2

BACKGROUND

2.1: Introduction

In this paper [1] discuss in Bluetooth based home automation. They control the home using Arduino. They are passed information by means of a smartphone and they construct an association among smartphone and Arduino using Bluetooth. On the off chance that you pursue this technique, at that point, you can control the home appliances within the home not outside the home.

In this paper [2] the home automation system(HAS) designed on the Android platform has been interfaced with an 8-piece microcontroller, for example, Arduino to control the home appliances using a hand-off. Bluetooth has been used as the most solid and proficient innovation for short-go communication.

This paper [3] proposed a minimal effort solution using the shell components to lessen cost and open-source software to get requirement software. An Arduino controls sensors and actuators that monitor a defined area and makes a move based on specified parameters like ambient light, temperature, and so forth. The Arduino can also send alerts on the off chance that it detects an abnormality. The voice acknowledgment schema allows the user to use voice commands to control his house.

This paper [4] use of existing GSM engineering to control the home appliances. Initially designed APK is installed on smartphones and messaging is done through SMS service which uses GSM engineering. The SMS is gotten by the GSM modem which is interfaced with the Arduino board. In agreement with SMS, the specific gadget will be turned ON or OFF through transfer board.

2.2 Related Works

On the internet, there are lots of resources paper of the home automation system. Those papers describe several processes of the home automation system like wifi, Bluetooth, GMS, etc.

2.3 Comparative Studies
Purpose:

The purpose of this paper is controlled home electrical appliances via the internet in the whole world. We are trying to create a home automation project. In this case, we are creating a web application for controlling a home anywhere you want.

Design/Methodology/Approach:

Nowadays, IoT is the most popular interesting and demandable platform. We are creating a smart home automation system controlling the home appliances via the internet. In this project, we are using python for creating a web application and we are controlling home appliances using Raspberry Pi 3. Raspberry Pi 3 is a single board computer. Raspberry Pi 3 had a built-in wifi system. For this reason, you can easily connect your Raspberry Pi 3 to your home router. Using the web application, you can control your home appliances.

Originality/Value:

In this project, we are controlling home electrical appliances using the internet in the whole world. You can access or control your appliances anywhere you want. It decreases your time for controlling appliances and also electrical bill. It mostly helps the oldest person.

2.4 Challenges

In several home automation system projects, they are using Bluetooth, wifi (for the same network), SMS, etc. In this project, we are trying to something new. We are trying to create a web application for you can access your home appliances using a different network or same network.

CHAPTER 3

REQUIREMENT SPECIFICATION

3.1 Business Process Modeling

Different notations are used for business process modeling such as UML Activity diagrams, IDEF, ebXML BPSS or Business Process Modeling Notation (BPMN). The common characteristics of these notations are their capability for modeling the sequence of activities, the participants involved in the process and the data or messages interchanged between them.
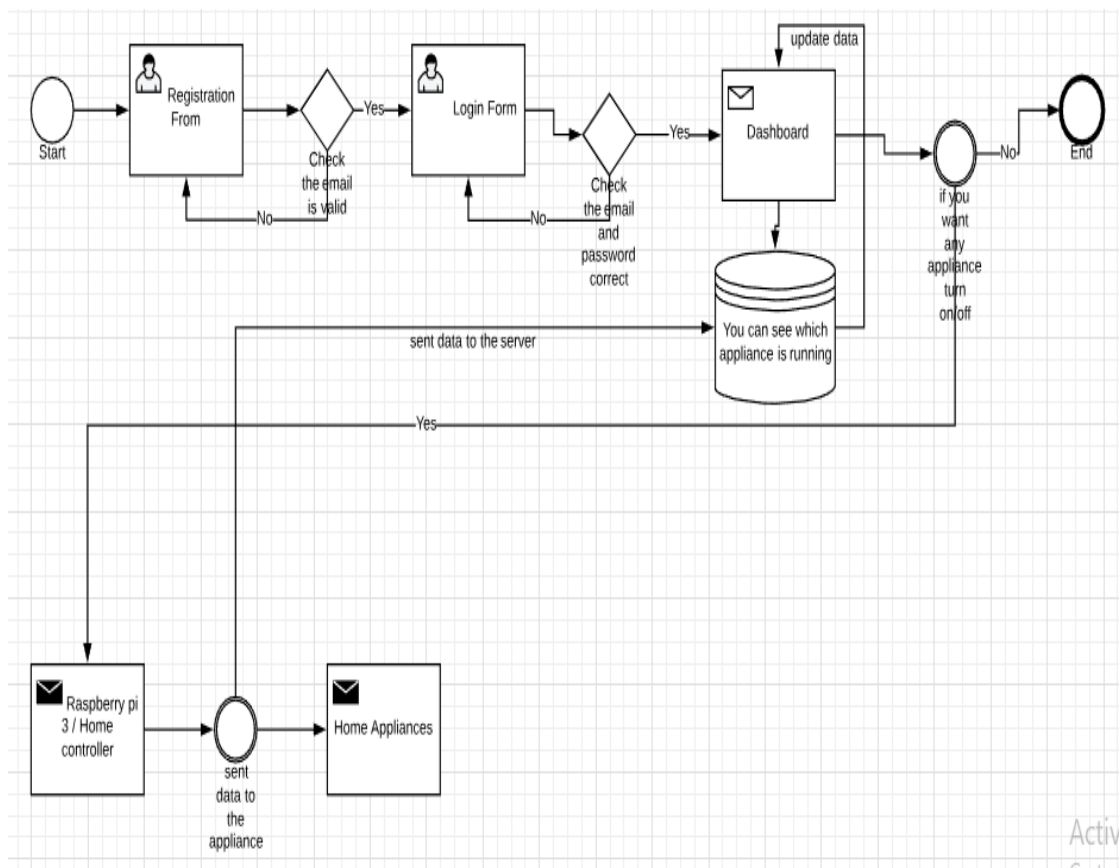

Figure 3.1.1: Business Process Modeling.

3.2 Requirement Collection and Analysis:

This is the "Smart Home Automation System Based on Wireless Application". This project is created and developed according to the requirements. Requirements of the project classified into two categories: Software and Hardware Requirements.

3.2.1 Software Requirements:

Table 3.2.1.1: Software Requirement

OS	Raspbian Stretch Version: November 2018
Browser	Firefox,Chrome...etc

3.2.2 Hardware Requirements

Table 3.2.2.1: Hardware Requirement

Raspberry Pi	**Soc:** BCM2837 **CPU:** Quad Cortex A53 @ 1.2GHz **RAM:** 1GB SDRAM **Storage:** micro-SD **Ethernet:** 10/100 **Wireless:** 802.11n / Bluetooth 4.0 **Video Output:** HDMI / Composite **Audio Output:** HDMI / Headphone **GPIO:** 40
Relay	8 Channel 5V Relay Module. **Input:** VCC, GND, IN1-IN4 **Output:** Connect a load, DC, AC
Wire	Male to Male, Male to Female, Female to Female
Light	Any
Motor	Servo motor.
Mobile, Desktop, Laptop	Any

3.2.3: User Requirements

If someone wants to access the smart home automation system, then he/she must have an account in this system. If he/she has not a valid user account then cannot enter the system, for this reason, create an account in the system. For creating an account, you have to need valid email id, user name, and password. If all information is correct then you (he/she) create an account for this system. Then you can log into the application. Now you can access and control whatever we create in the application.

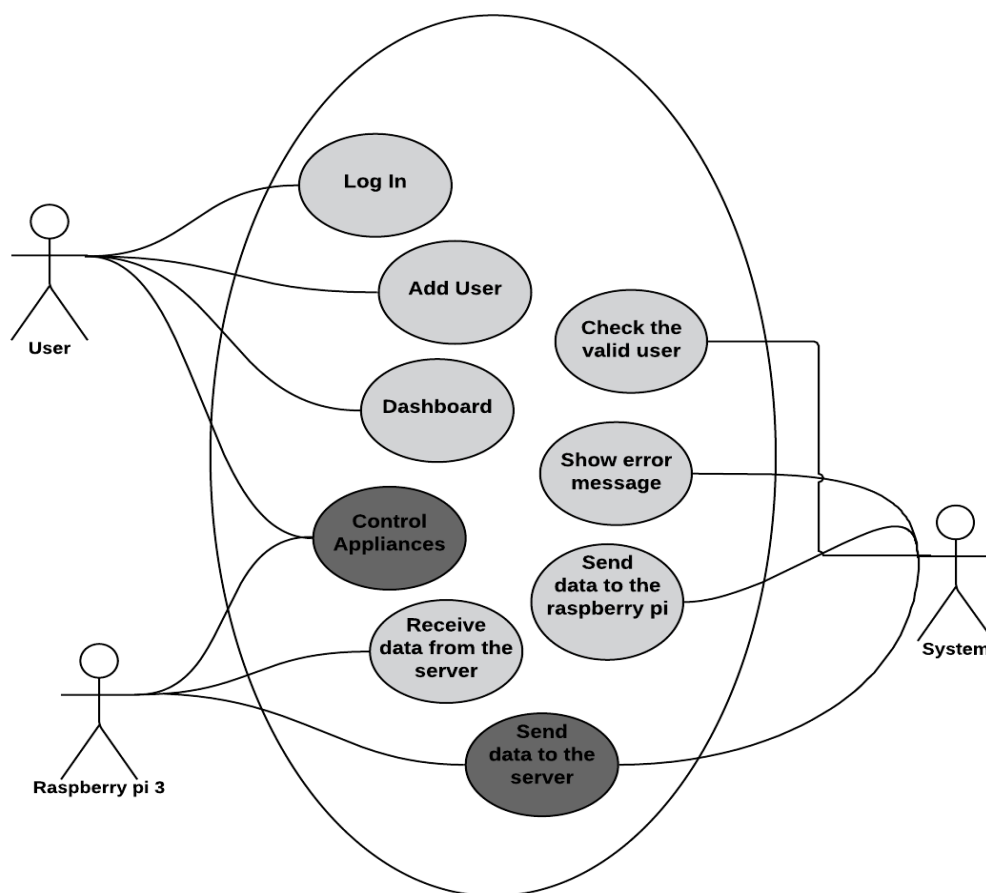## 3.3 Use Case Modeling and Description:

Figure 3.3.1: Use Case Diagram

Table 3.3.1: Use Case 1

Use Case Id:	1
Use Case Name:	Log In
Created By:	Mohitul Islam, Solaiman Rabby, Mohammad Faisal
Date Of Creation:	23-03-2019
Description:	This use case will allow the user to log in to the system. The user can easily enter the system and see whatever want to see.
Primary Actor:	The user
Secondary Actor:	None
Precondition:	The email must be valid and unique.
Postcondition:	The system will display the Dashboard page

Table 3.3.2: Use Case 2

Use Case Id:	2
Use Case Name:	Add User
Created By:	Mohitul Islam, Solaiman Rabby, Mohammad Faisal
Date Of Creation:	23-03-2019
Description:	If the user wants to add user/users to enter the system and control home appliances.
Primary Actor:	user
Secondary Actor:	None
Precondition:	If the user wants to add a user like family members etc.
Postcondition:	None

Table 3.3.3: Use Case 3

Use Case Id:	3
Use Case Name:	Dashboard
Created By:	Mohitul Islam, Solaiman Rabby, Mohammad Faisal
Date Of Creation:	23-03-2019
Description:	This use case will allow the user to see which service is on or off
Primary Actor:	The user
Secondary Actor:	None
Precondition:	If the user wants to access this system then the user must log in to the system.
Postcondition:	None

Table 3.3.4 Use Case 4

Use Case Id:	4
Use Case Name:	Check the Valid User
Created By:	Mohitul Islam, Solaiman Rabby, Mohammad Faisal
Date Of Creation:	23-03-2019
Description:	This Use Case use to check the valid-user
Primary Actor:	System
Secondary Actor:	None
Precondition:	The user must be registered.
Postcondition:	If the user wants to enter the system it will check the user is registered or not.

Table 3.3.5 Use Case 5

Use Case Id:	5
Use Case Name:	Control Appliances
Created By:	Mohitul Islam, Solaiman Rabby, Mohammad Faisal
Date Of Creation:	23-03-2019
Description:	If the user clicks any button then code pass the boolean data to the raspberry pi and the pi receive and pass to the home appliances.
Primary Actor:	The user.
Secondary Actor:	Raspberry Pi.
Precondition:	The user must be registered and Log In
Postcondition:	None

Table 3.3.6 Use Case 6

Use Case Id:	6
Use Case Name:	Show error message
Created By:	Mohitul Islam, Solaiman Rabby, Mohammad Faisal
Date Of Creation:	23-03-2019
Description:	If any error comes to the system then the system sent the error message to the user.
Primary Actor:	System
Secondary Actor:	None
Precondition:	The user must be registered and Log In and also triggered any functions.
Postcondition:	None

Table 3.3.7 Use Case 7

Use Case Id:	7
Use Case Name:	Receive the data from the server
Created By:	Mohitul Islam, Solaiman Rabby, Mohammad Faisal
Date Of Creation:	23-03-2019
Description:	When the user clicks a button for fire any function then the server sent a signal to raspberry pi for control home appliances.
Primary Actor:	Raspberry Pi
Secondary Actor:	None
Precondition:	If the user triggered any functionality.
Postcondition:	None

Table 3.3.8: Use Case 8

Use Case Id:	8
Use Case Name:	Sent data to the raspberry pi
Created By:	Mohitul Islam, Solaiman Rabby, Mohammad Faisal
Date Of Creation:	23-03-2019
Description:	In this case, the system carries the data from the client for the raspberry pi.
Primary Actor:	System
Secondary Actor:	None
Precondition:	Receive boolean data when the user triggered any function on the web.
Postcondition:	None

Table 3.3.9 Use Case 9

| Use Case Id:	9
Use Case Name:	Sent data to the server
Created By:	Mohitul Islam, Solaiman Rabby, Mohammad Faisal
Date Of Creation:	23-03-2019
Description:	When raspberry pi passes the signal to the relay then the home appliances status and raspberry pi sent the data to the server the latest update status into boolean data.
Primary Actor:	Raspberry Pi
Secondary Actor:	System
Precondition:	If the raspberry pi updates the home appliances status.
Postcondition:	None

3.4 Logical Data Model
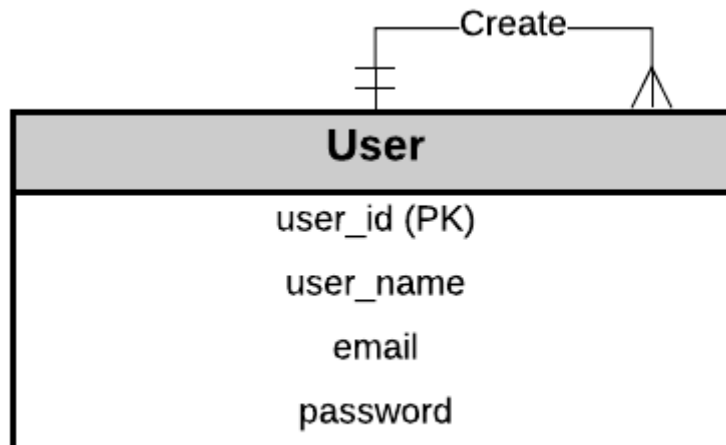
Figure 3.4.1: Logical Data Model

3.5 Design Requirement

In this smart home automation system, we are designing a house, design a user-friendly web interface, the back-end design we use flask python framework and MySQL for database design.

CHAPTER 4
DESIGN SPECIFICATION

4.1 Front-end Design

For finishing front-end design, we are using materialize CSS Framework. Using this framework, we can use HTML5, CSS, and JavaScript.

4.1.1: Hypertext Markup Language

Hypertext Markup Language revision 5 (HTML5) is a markup language for the structure and presentation of World Wide Web contents. HTML5 supports the HTML and XHTML-style syntax and other new features in its markup, New APIs, XHTML and mistake handling.

4.1.2: Cascading Style Sheet

CSS describes how HTML elements are to be displayed on the screen, paper, or in other media. Elements of an equivalent class or id (both are label traits). In CSS, these standards begin with a spot (.) and hash (#) for classes and ids, separately, e.g. ". list" and "#examplebtn".

4.1.3: JavaScript

Javascript is a scripting language that enables you to create dynamically updating content, control multimedia, animated images, and pretty much everything else. (Okay, not everything, but it is amazing what you can achieve with a few lines of JavaScript code. Javascript is interpreted programming language generally used at the client-side to control user input, control browser action, triggered functions make change the DOM.

4.2 Back-end Design:

In the background, we are using the python "Flask" web framework. Flask is a small and powerful framework for python.

Python:

We are using python 3 for this project. Python is a general-purpose interpreted, object-oriented, and high-level programming language. Python 3.0 was released in 2008. Python 3 is supposed to be backward-incompatible, later on, many of its important features have been backported to be compatible with version 2.7.

MySQL:

MySQL is a fast, easy-to-use RDBMS being used for many small and enormous businesses. MySQL is created, marketed and supported by MySQL AB, which is a Swedish company. MySQL is released under an open-source license. So you don't have anything to pay to use it. MySQL is an incredible program in its very own right. It handles a huge subset of the usefulness of the most expensive and incredible database packages.

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation of Database

We are using SQLite 3 databased. Firstly, connect the database then we create a login and an add user page. We check the user inputs, an email address is valid using sqlite3 databased and also check the user password match in the sqlite3 database table for the login session.
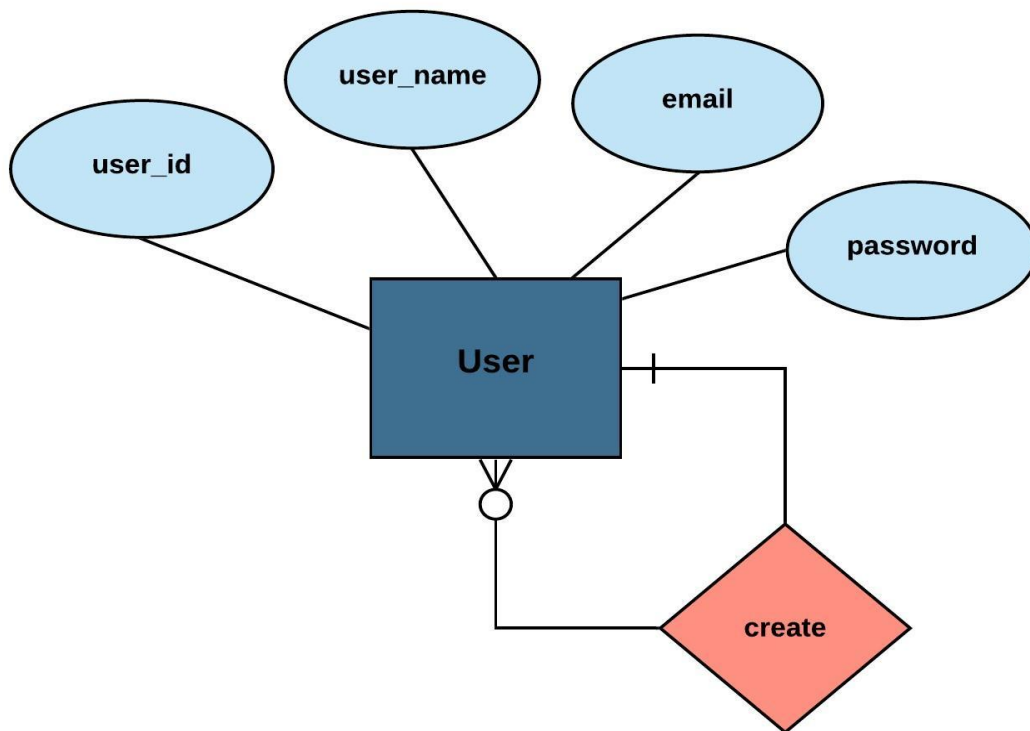
5.1.1 Entity Relationship

Figure5.1.1.1: Entity Relationship

5.2 Implementation of Front-end Design

We are finishing the front-end design using materialize CSS Framework. HTML5, CSS, and Javascript include in this framework
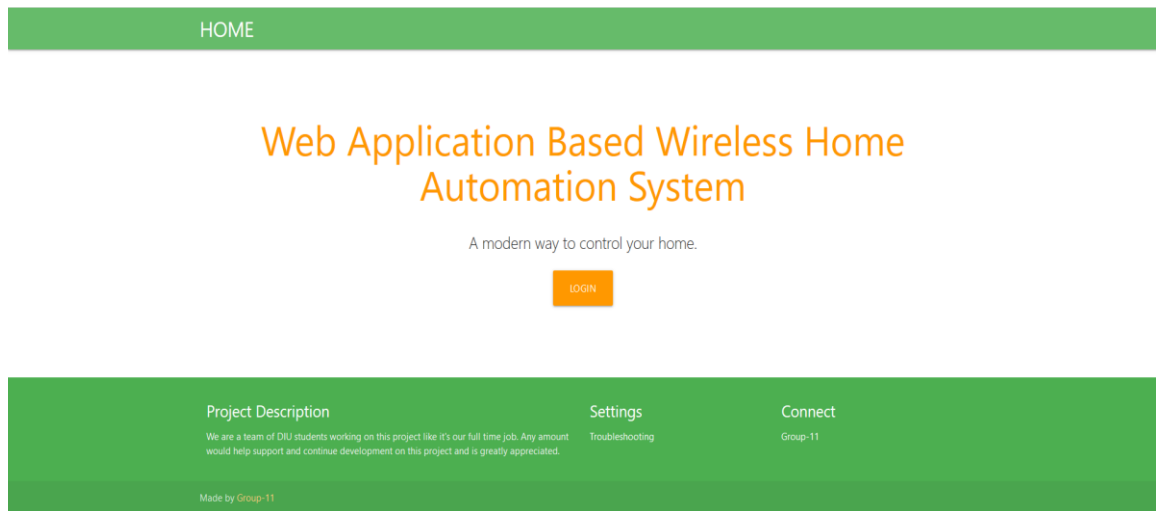
5.2.1 Image of Front-end Design:

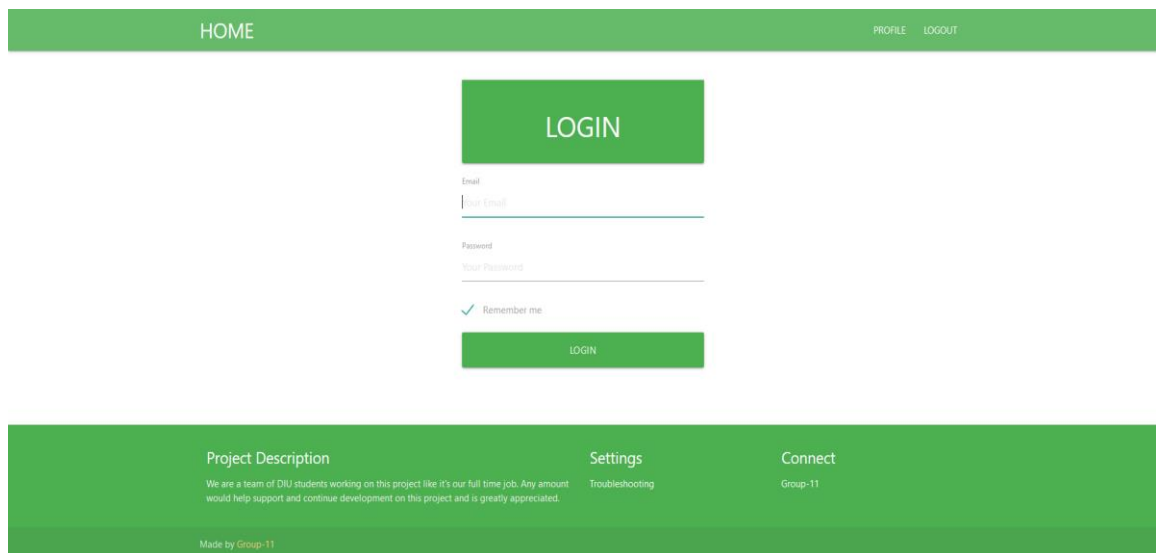Figure 5.2.1.1: First Page of Application

Figure 5.2.1.2: Login Page

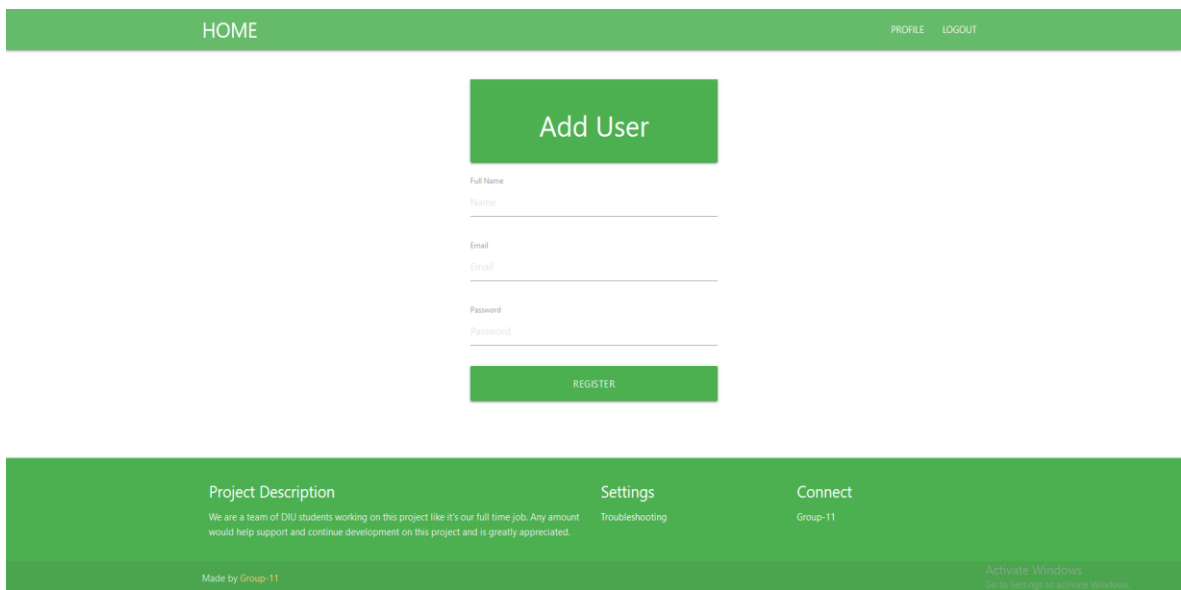# Web Application Based Wireless Home Automation System

A modern way to control your home.

ADD USER   ROOM CONTROLS

ENTRY INFO

Project Description
This project only for learning purposes and every learner who interested in this topic please contribute and try something best for this projectS.

Settings
Troubleshooting

Connect
Daffodil International University

Made by Group-11

Figure 5.2.1.3: Home Page

Add User

Full Name
Name

Email
Email

Password
Password

REGISTER

Project Description
We are a team of DIU students working on this project like it's our full time job. Any amount would help support and continue development on this project and is greatly appreciated.

Settings
Troubleshooting

Connect
Group-11

Made by Group-11

Activate Windows
Go to Settings to activate Windows

Figure5.2.1.4: Add User Page

DOOR

Bed Room

FAN FRONT LIGHT

Scripts

INTERNET NGINX

Project Description

This project only for learning purposes and every learner who interested in this topic please contribute and try something best for this projectS.

Settings

Troubleshooting

Connect

Daffodil International University

Made by Group-11

Figure 5.2.1.5: Control Page

Entry List

Person Name	Entry Time
Rabbi	9/9/2017 5:03PM
Faisal	8/9/2017 2:13PM

Project Description

This project only for learning purposes and every learner who interested in this topic please contribute and try something best for this projectS.

Settings

Troubleshooting

Connect

Daffodil International University

Made by Group-11
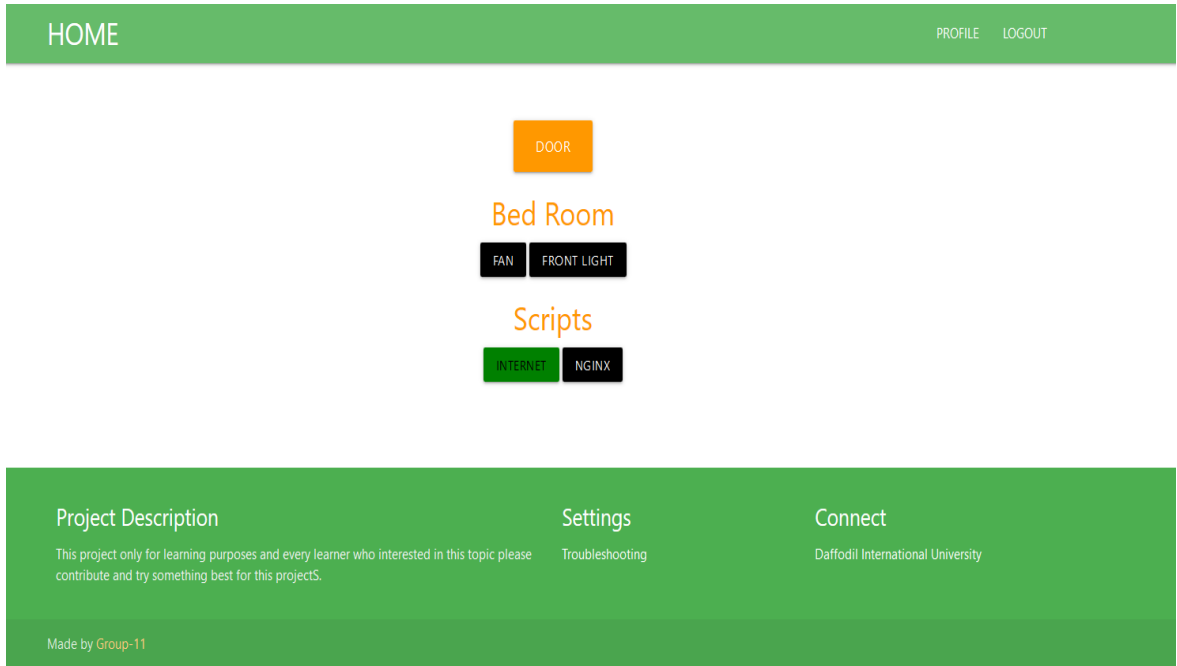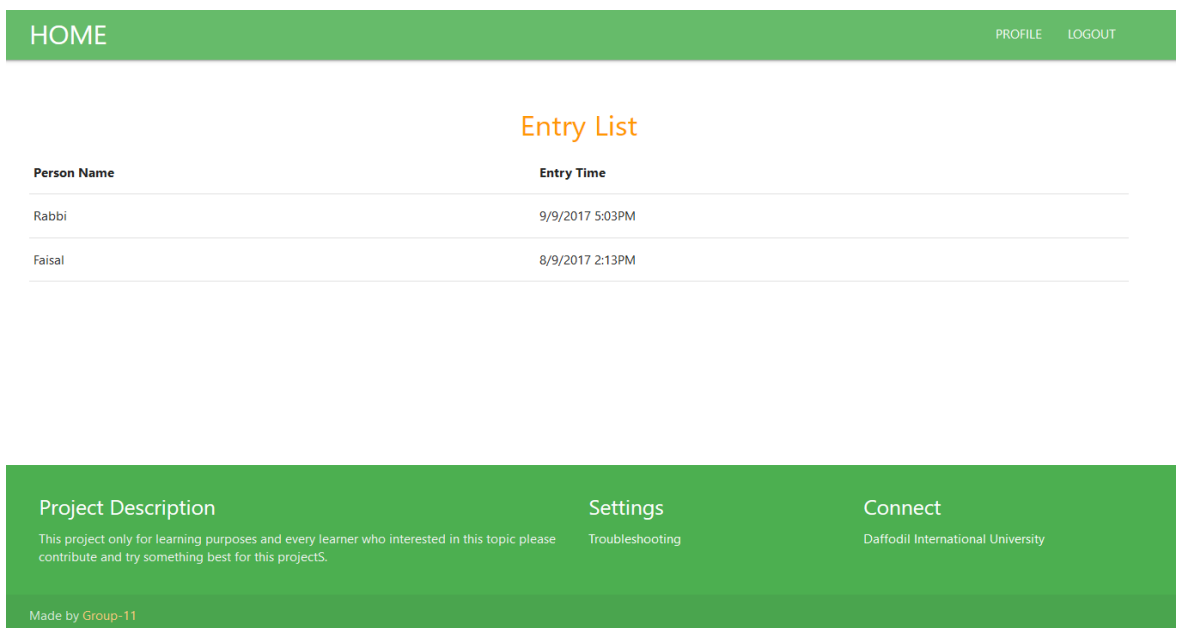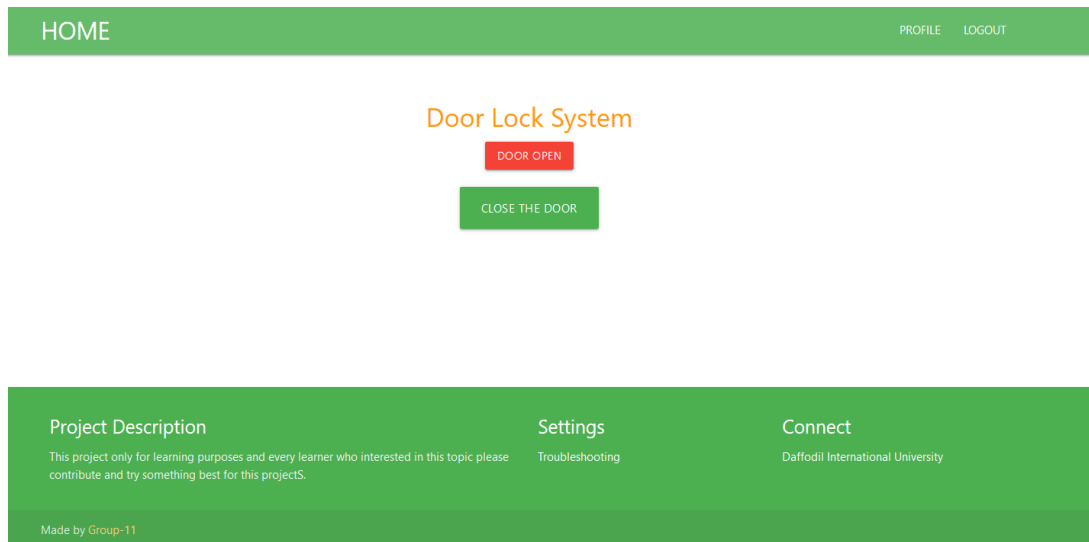
Figure 5.2.1.6: Entry List Page

Figure 5.2.1.7: Door status

5.3 Implementation of Interactions

In this smart home automation project, interaction means like a medium. If a user presses the light on the button, then the button fires a function this function takes the instructions and convert instruction into boolean data and the medium carries the data to the destination and update/match the data and back to the function with updated data. Then the function returns a value for change the web user interface. For this reason, the user easily understands effective change. So we can say the interaction in this project is the "medium or functions". The medium carries data between source and destination. For this reason, you can change internally something action on a function.

5.4 Implementation of Testing

We are building applications for home automation. In this application, we control the home appliances in the control page [Figure 8] and also use a pi camera for home security reasons.
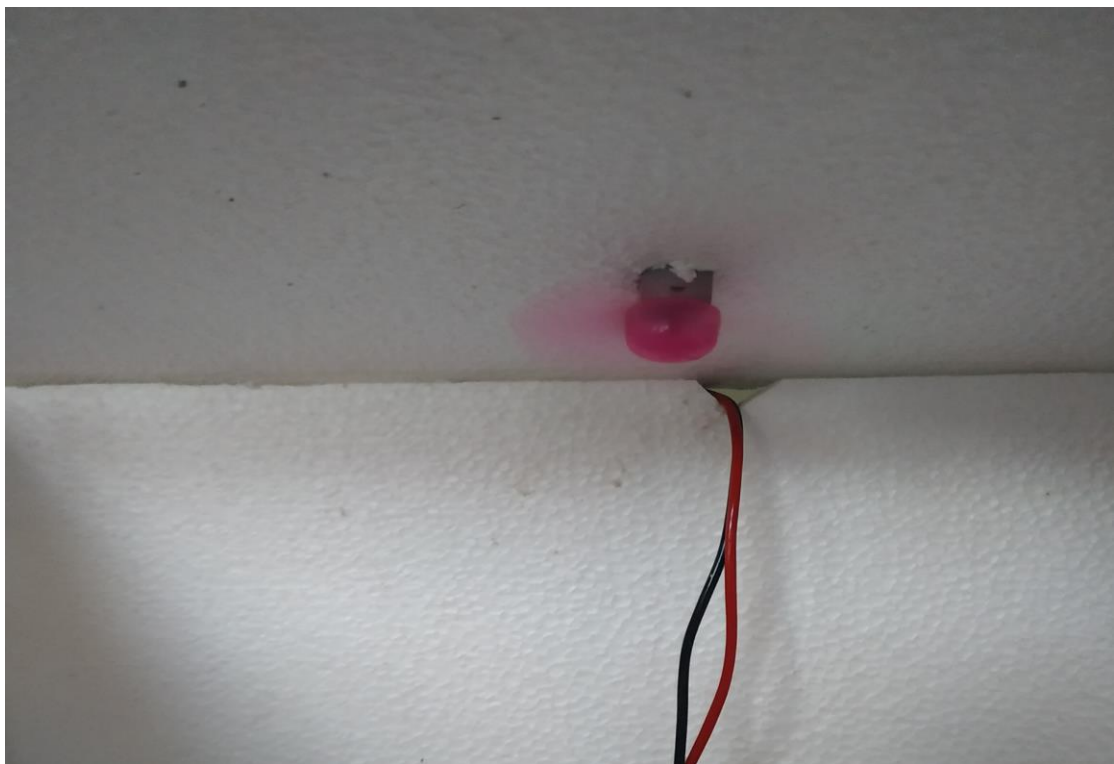
Figure 5.4.1: Room Light

Figure 5.4.2: Room Fan
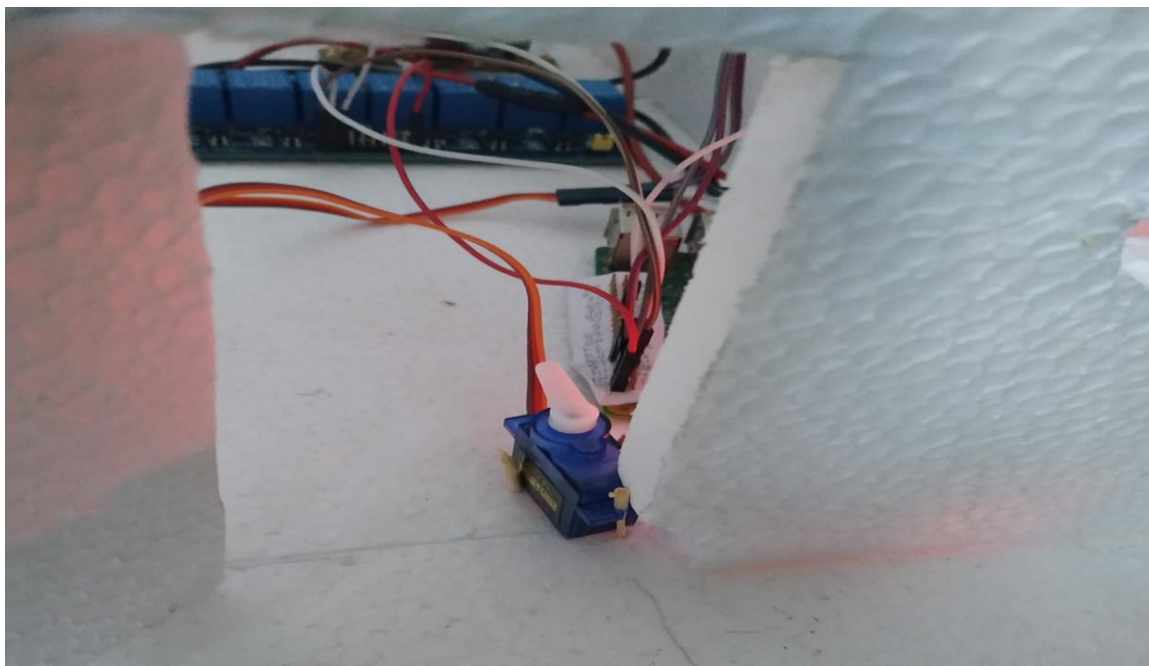
Figure 5.4.3: Servo Motor 90 degree

Figure 5.4.4: Servo Motor 180 degree

5.5 Test Result and Reports

The performance of the system was very near the expected result. We are successfully creating a web application to control home appliances. We can remotely access home appliances using the same or different networks.

5.6 Scope for Further Developments

We will be added PIR sensor for automatically light on, off and door security. this reason certain users will not use our application site to open the door. Add LM35 sensor for automatically on the fan switch. we will add more appliances.

CHAPTER 6

DISCUSSION AND CONCLUSION

6.1 Discussion

In this paper [1] discuss in Bluetooth based home automation. They control the home using Arduino. They are passed information by means of a smartphone and they manufacture an association among smartphone and Arduino using Bluetooth. In the event that you pursue this system, at that point, you can control the home appliances within the home not outside the home. In this paper [2] the home automation system(HAS) designed on the Android platform has been interfaced with an 8-piece microcontroller, for example, Arduino to control the home appliances using a hand-off. Bluetooth has been used as the most solid and productive innovation for short-extend communication. This paper [3] proposed a minimal effort solution using the shell components to diminish cost and open-source software to get requirement software. An Arduino controls sensors and actuators that monitor a defined area and makes a move based on specified parameters like ambient light, temperature, and so forth. The Arduino can also send alerts on the off chance that it detects an abnormality. The voice acknowledgment schema allows the user to use voice commands to control his house. This paper [4] use of existing GSM design to control the home appliances. Initially designed APK is installed on smartphones and messaging is done through SMS service which uses GSM engineering. The SMS is gotten by the GSM modem which is interfaced with the Arduino board. In agreement with SMS, the specific gadget will be turned ON or OFF through transfer board. Using a pi camera, we are controlling an entryway lock system. We are using the QR code security system for the entryway lock.

6.2 Conclusion

We are working on the IoT based home automation system. **In this(our) project,** we remotely control home electrical appliances using raspberry pi 3 and web portal. Suppose you are going somewhere and you forgot to turn off the lights or fans of your room then you can easily turn off your home appliances using that system. That's why you can save the electric bill cost.

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