

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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DHAKA, BANGLADESH

April 2019

APPROVAL:

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DECLARATION:

We hereby claim that this undertaking has been accomplished with the aid of us below the supervision of Tania Khatun, Lecturer, Department of CSE, Daffodil International University. We also declare that neither this undertaking nor any part of this project has been submitted someplace else for an award of any diploma or diploma.

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ACKNOWLEDGMENT:

Firstly, we specific our heartiest thank you and gratitude to Almighty God for his blessing that makes us feasible to complete our final year protection mission.

We would like to express gratefulness to our honorable supervisor, Tania Khatun, for his tremendous support, endurance, and encouragement throughout our final defense project. He always listens to our problem, and also gives a solution to our problem. His educational advice was very much helpful to our final defense project. He also provides all type of resources that are needed to complete our project.

We give special thanks to Dr. S.M. Aminul Haque, Assistant Professor, and Associate Head, Department of Computer Science and Engineering, Daffodil International University for his support to finish our final year task and also all school member and personnel of CSE department of Daffodil International University.

We would like to thank our entire course mate at Daffodil International University for their cooperation while completing our final year project.

Finally, we must confess with due respect the constant help, support and patience of our parents with us.

ABSTRACT:

Nowadays everything depends on Technology. Home automation systems have achieved great popularity and they increase the comfort and quality of life. So what if we make something artificial like home automation that can be controlled anywhere on the internet just using a web app. We build a system like that that can be controlled remotely using the web application and make life easier. The proposed system consists of major components: the first component is the server (internet server), which presents the device code that manages, controls and video display units users home. The 2nd component is the hardware interface module, which presents the precise interface to sensors or actuators of the home automation device. In this hardware part controller, we are using Raspberry Pi 3. It allows controlling of home appliances simultaneously.

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CHAPTER 1

INTRODUCTION

1.1 Introduction:

In recent years, IoT is the most popular platform. Making something that can control electrical applications of a house or office easily only web portal and using raspberry pi 3 and internet connections. We are using the web server user-friendly interface for the see the home appliance is on or off (like bulbs, lights, doors, etc) and all these electronic components are controlled by the raspberry pi 3. Using the web server, users can communicate the electronic equipment by the controller (raspberry pi 3).

1.2 Motivation:

In this current world, we depend on technology and the internet. The previous few years, many home/workplace/business owners have started to enforce the automation device on their houses to control electrical appliances. you can control other rooms just stay inside your own room.

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 owners cost.

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 data via a smartphone and they build a connection between smartphone and Arduino using Bluetooth. If you follow this procedure then 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 8-bit microcontroller i.e. Arduino to control the home appliances using a relay. Bluetooth has been used as the most reliable and efficient technology for short-range communication.

This paper [3] proposed a low-value answer the usage of the shell components to lessen price and open source software program to get requirement software. An Arduino controls sensors and actuators that display a described place and take action based on certain parameters like ambient mild, temperature, and so on. The Arduino also can send signals if it detects an abnormality. The voice recognition schema allows the user to use voice commands to control his residence.

This paper [4] use of present GSM architecture to manipulate the home home equipment. Initially designed APK is installed on Smartphone and messaging is performed via SMS carrier which uses GSM architecture. The SMS is obtained through GSM modem that is interfaced to Arduino board. In accordance with SMS specific tool might be grew to become ON or OFF via relay board.

2.2 Related Works:

On the internet, there are lots of resources paper of the home automation system. Those paper 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. In Raspberry Pi 3 had 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 the business process modeling such as UML Activity diagrams, IDEF, ebXML BPSS or Business Process Modeling Notation (BPMN). The common characteristics of this notations are their capability for modeling the sequence of activities, the participants involved in the process and the data or messages interchanged between them.

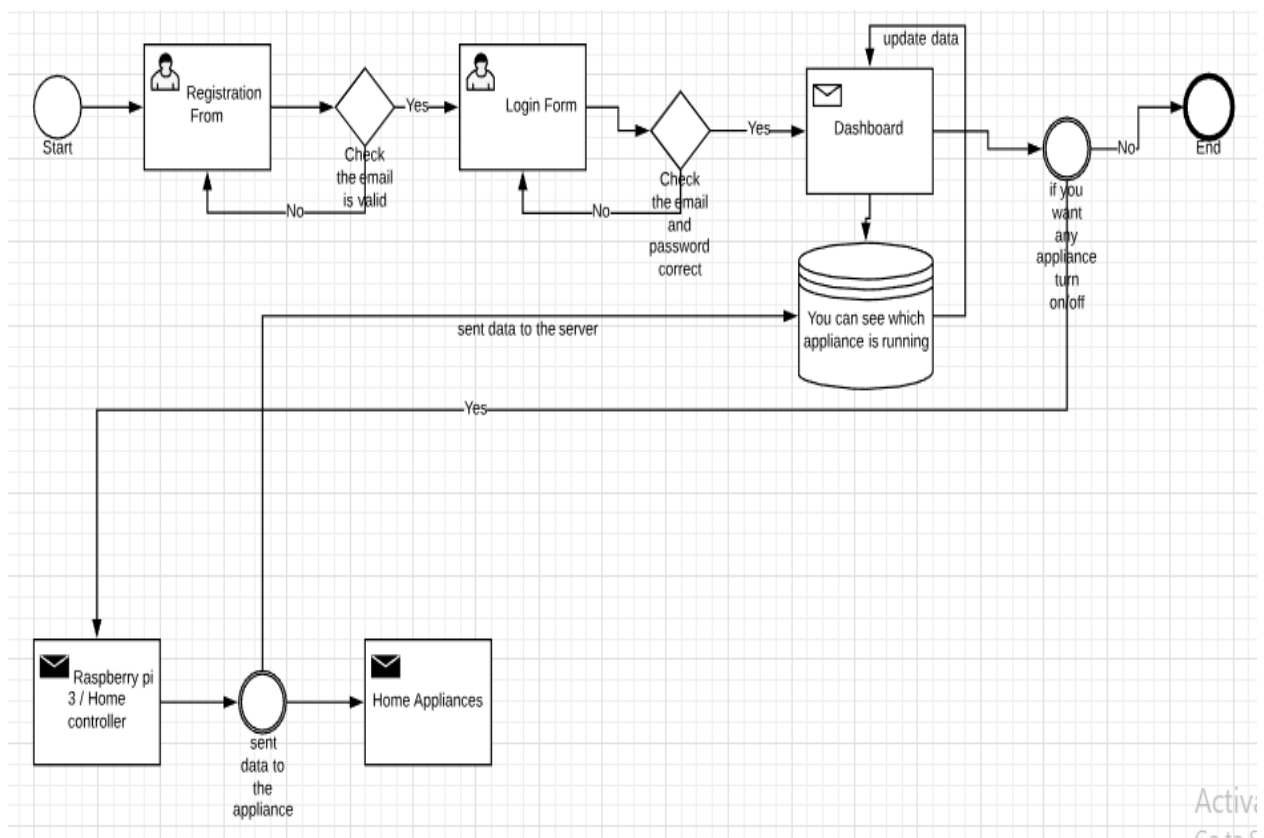


Fig 1: Business Process Modeling.

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 in two categories: Software and Hardware Requirements.

3.2.1 Software Requirements:

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

Table 1: Software Requirement.

3.2.2 Hardware Requirements:

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 Audio Output: HDMI / Headphone GPIO: 40
Relay	4 Channel 5V Relay Module. Input: VCC, GND, IN1-IN4 Output: Connect a load, DC, AC
Light	Any
Motor	Dc motor
Mobile, Desktop, Laptop	Any

Table 2: Hardware Requirement.

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 needs 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:

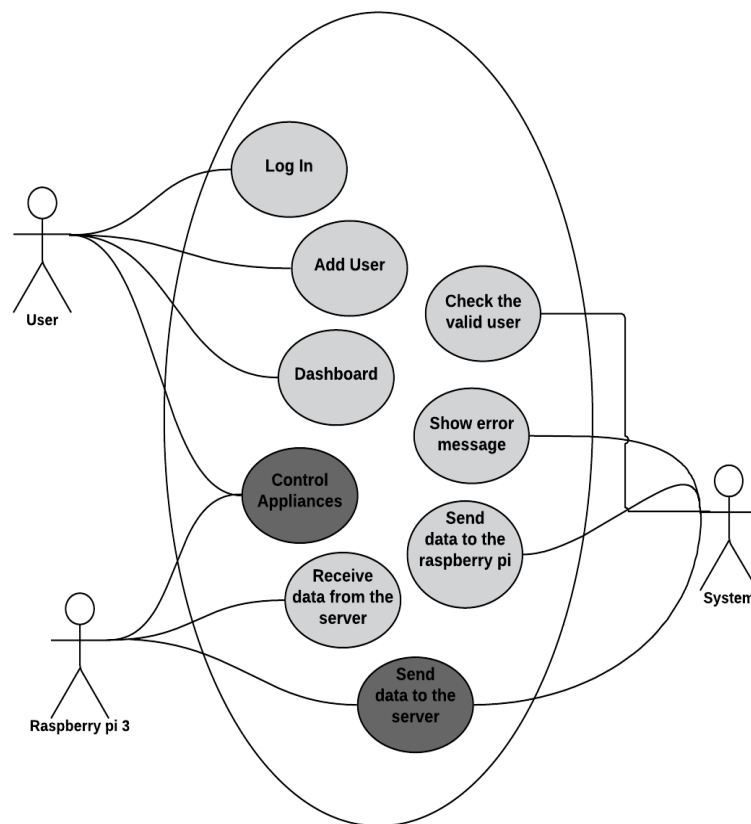


Fig 2: Use Case Model.

Table 3.3 Use Case for Log in

Id:	1
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 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 3.4 Use Case for Add User

Id:	2
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 3.5 Use Case for Dashboard

Id:	3
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 the system.
Postcondition:	None

Table 3.6 Use Case for Check the Valid User

Id:	4
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 3.7 Use Case for Control Appliances

Id:	5
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 3.8 Use Case for If any error then show the error message

Id:	6
Name:	If any error then show the 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 3.9 Use Case for Receive the data from the server

Id:	7
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 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 4.0 Use Case for Sent data to the raspberry pi

Id:	8
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 4.1 Use Case for Sent data to the server

Id:	9
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 change the home appliances status and raspberry pi sent the data to the server the latest update status convert 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:

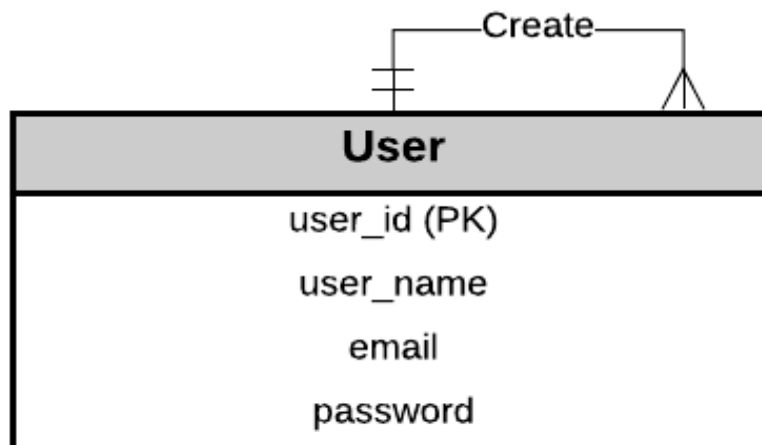


Fig 3: Logical data Model

3.5 Design Requirement:

In this smart home automation system, we are designing a house, design user-friendly web interface, the back-end design we use flask python framework and sqlite3 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 five (HTML5) is a markup language for the shape and presentation of World Wide Web contents. HTML5 helps the HTML and XHTML-style syntax and other new capabilities in its markup, New APIs, XHTML and blunders managing.

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 allows you to create dynamically updating content, manipulate multimedia, animated snap shots, and quite much the whole thing else. (Okay, now not the whole lot, however it is great what you could attain with some traces of JavaScript code. Javascript is interpreted programming language generally used at 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 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 preferred-purpose interpreted, object-oriented, and excessive-level programming language. Python 3.0 changed into released in 2008. Python three is supposed to be backward incompatible, in a while, lots of its essential features have been backported to be well suited with version 2.7.

SQLite:

SQLite is a C library that gives a light-weight disk-primarily based database that doesn't require a separate server manner. The sqlite3 module presents a SQL interface compliant with the DB-API 2.0.

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:

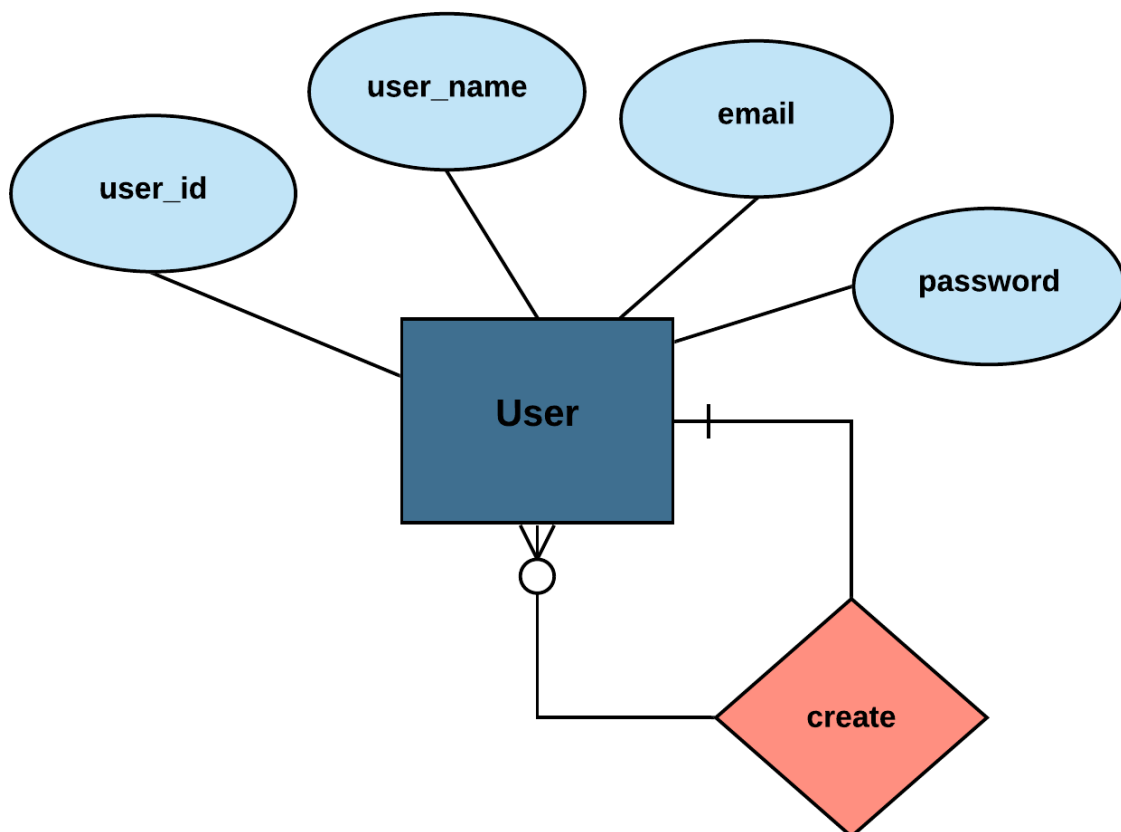


Fig 4: Entity Relationship

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 Images of Front-end Design:

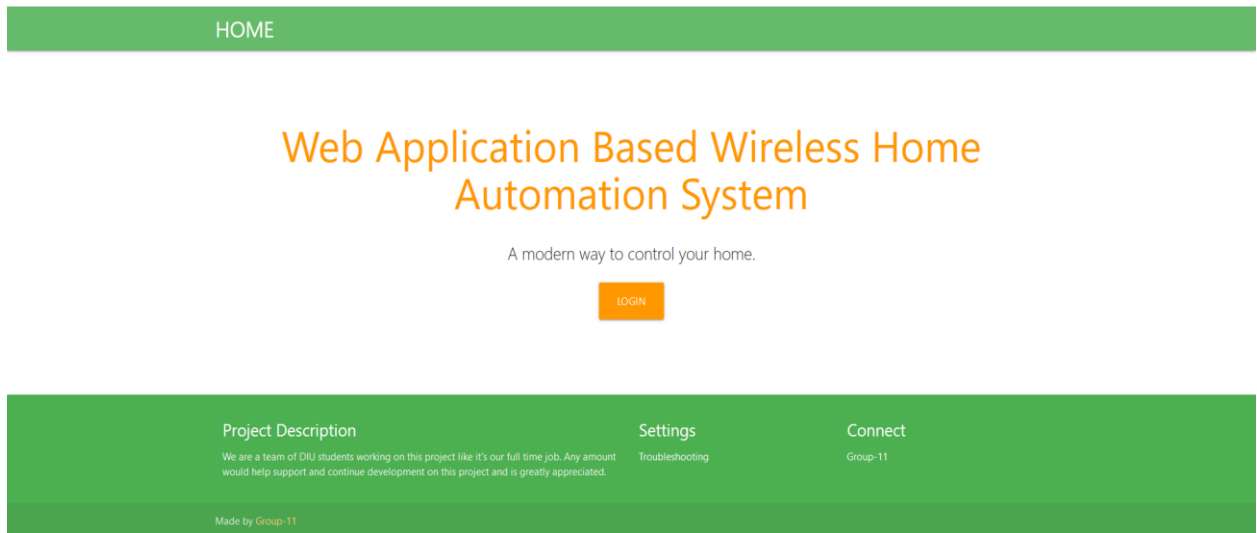


Fig 5: First page of application

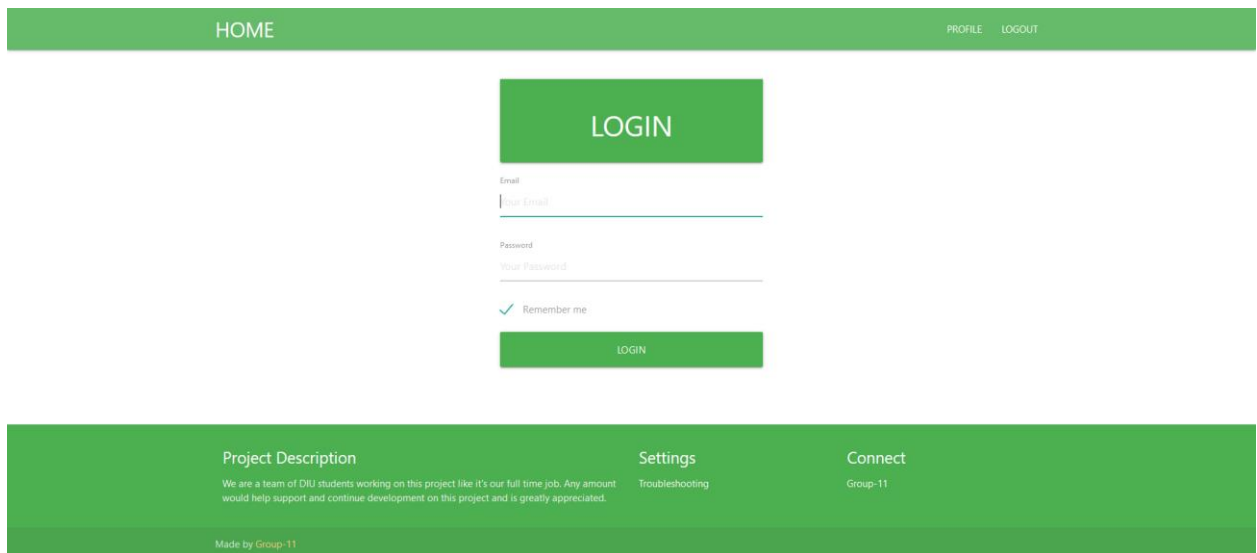


Fig 6: Login Page

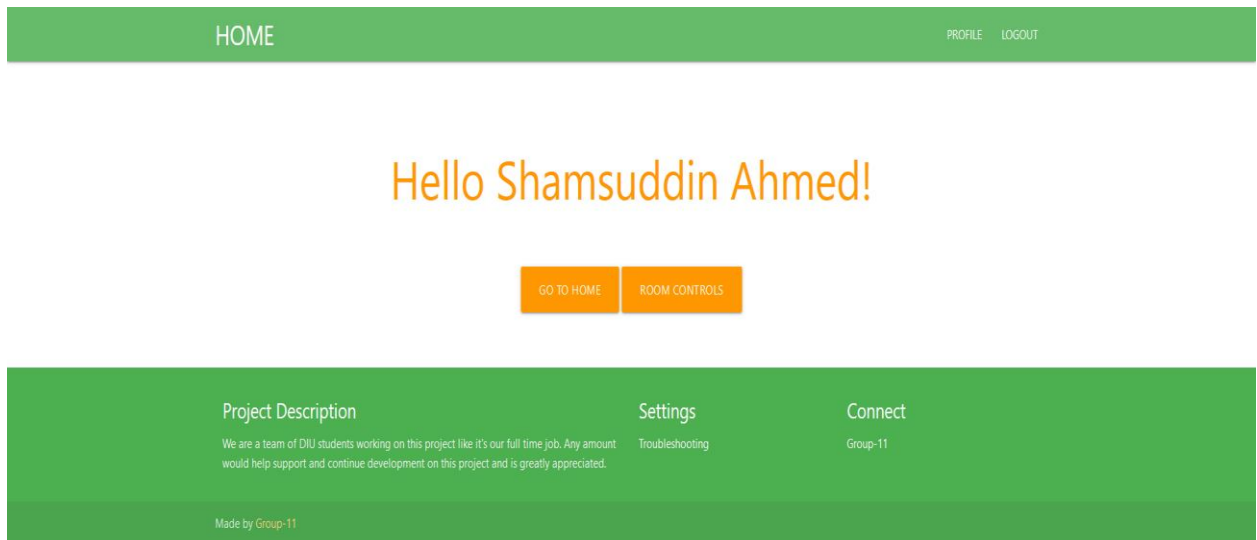


Fig 7: Home & Control page

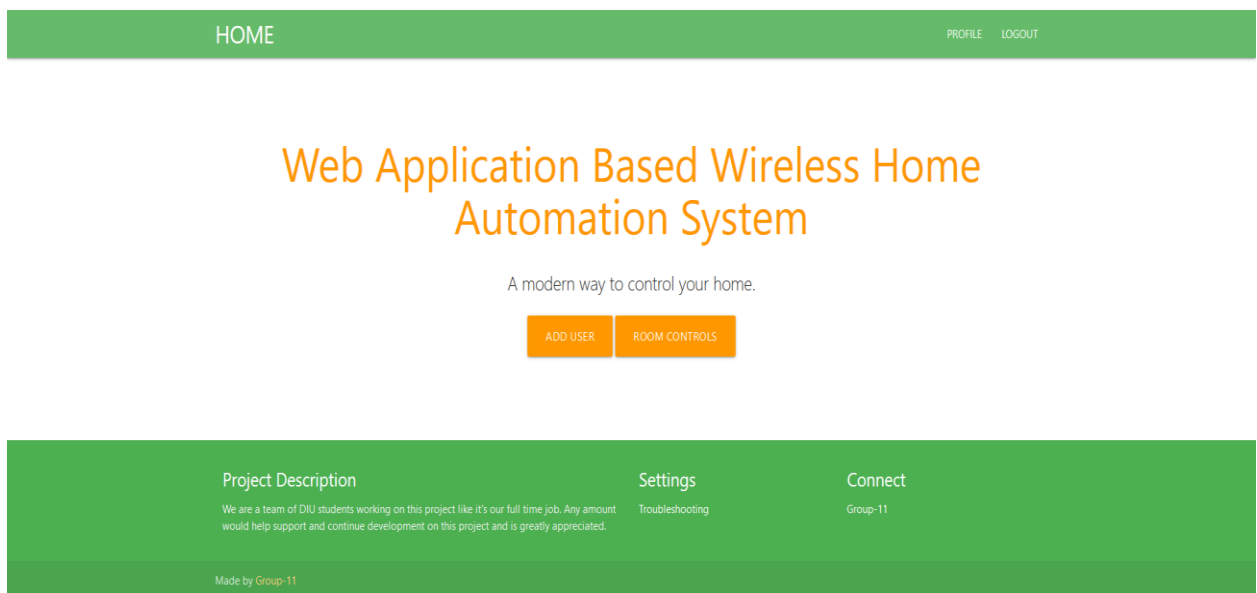


Fig 8: Profile page

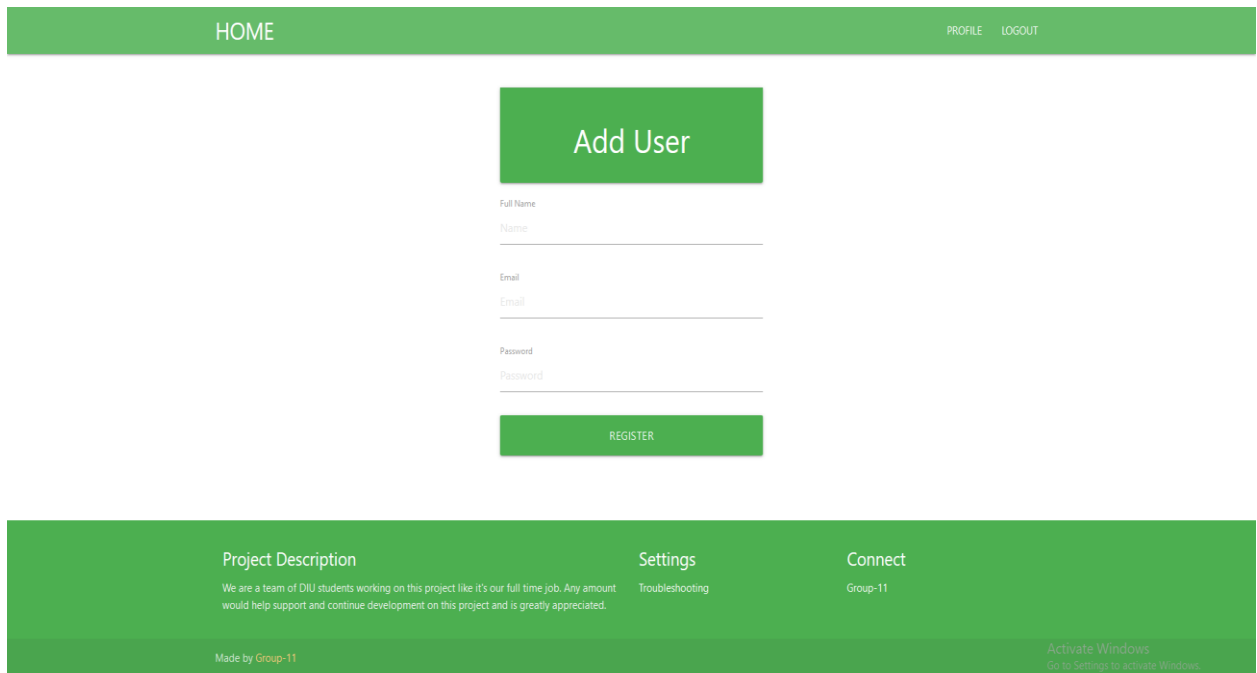


Fig 9: Add User Page

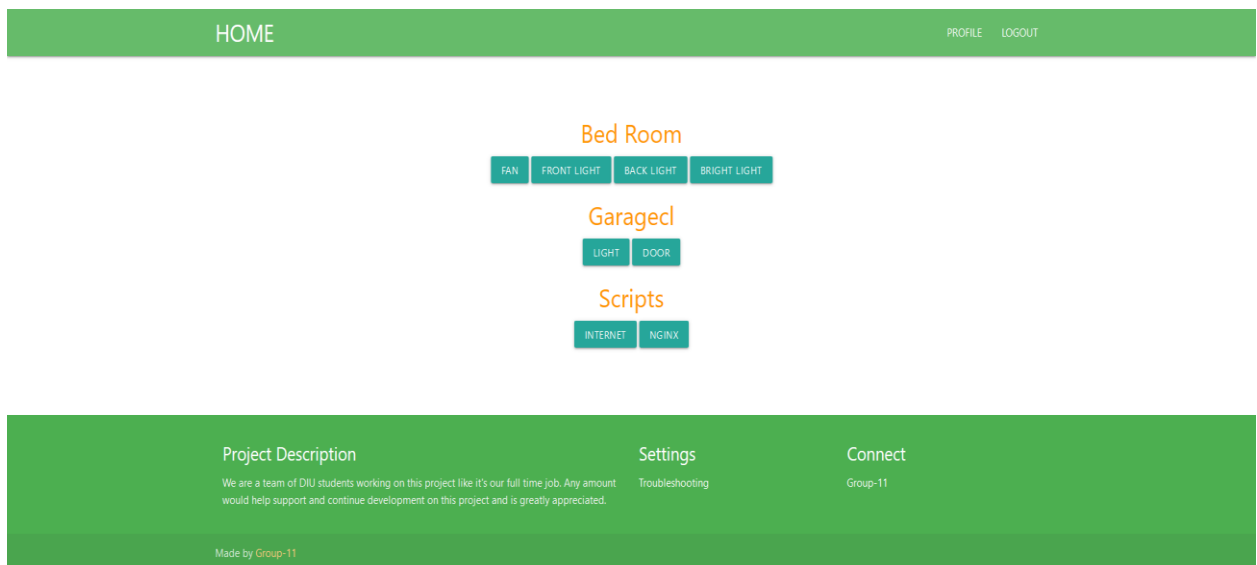


Fig 10: Index page

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 fire 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 build application for home automation. In this application we control the home appliance in the index page [Fig 10].



Fig 11: Room Number 1 Light



Fig 12: Room Number 2 Light



Fig 13: Room Number 1 Fan

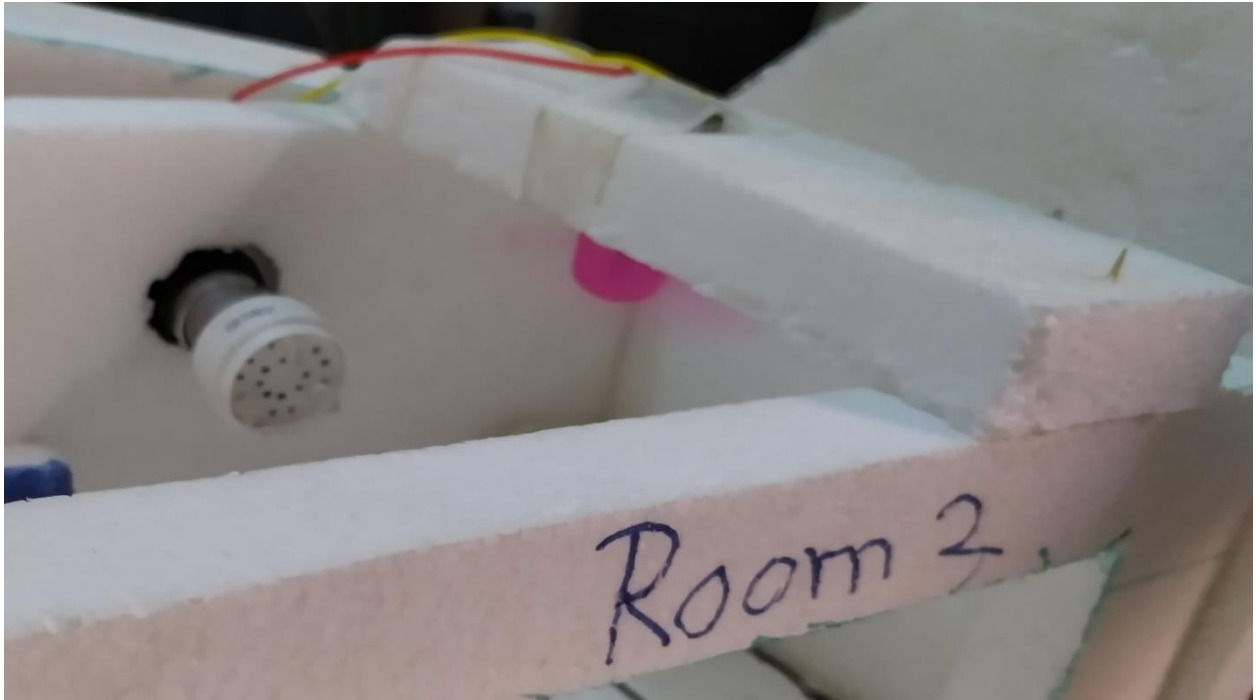


Fig 13: Room Number 3 Fan

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 network.

5.6 Scope for Further Developments:

In a further development, we shall try to build security in this project. We are trying to create a fingerprint door lock system. For this reason, without matching the fingerprint no one cannot enter your home or rooms. Suppose you create a web site, you can add one or more user but those user can not user. You can add or remove any user. We will add sensors for this reason we calculate temperature, human, matching for fingerprint etc.

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

6.1 Discussion and conclusion:

6.1.1 Discussion:

In this paper [1] discuss in Bluetooth based home automation. They control the home using Arduino. They are passed data via a smartphone and they build a connection between smartphone and Arduino using Bluetooth. If you follow this procedure then 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 8-bit microcontroller i.e. Arduino to control the home appliances using a relay. Bluetooth has been used as the most reliable and efficient technology for short-range communication.

This paper [3] proposed a low-value answer the usage of the shell components to lessen price and open source software program to get requirement software. An Arduino controls sensors and actuators that display a described place and take action based on certain parameters like ambient mild, temperature, and so on. The Arduino also can send signals if it detects an abnormality. The voice recognition schema allows the user to use voice commands to control his residence.

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6.1.2 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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[1

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