SMART HOME: WI-FI BASED HOME AUTOMATION SYSTEM

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APPROVAL

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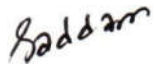

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We hereby declare that, this project has been done by us under the supervision of **Masud Rabbani, Lecturer, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted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

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ABSTRACT

It represents smart home automation system which implemented. Using wifi we create this system. User can locally control and manage this system. Arduino codes are use to implement this system. Connect the Arduino with Node MCU. Then the apps connect with this module. Then the power supply to the device. The system control wirelessly. Then using android cellular phone, wecontrol the system around the wifi range. The control of all home appliances by using this technology. To develop the Internet of Things(IOT) this system can be very popular. The system can be very easier and popular to the users. The designed and prototype implementation of smart home automation system that uses wifi technology as a network infrastructure connecting its parts. The device controlled for the automation process in the project is a Node MCU esp8266 module.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

It represents smart home automation system which implemented. Using WI-FI we create this system. User can locally control and manage this system. Arduino codes are use to implement this system. Connect the Arduino with Node MCU. Then the apps connect with this module. Then the power supply to the device. The system control wirelessly. Then using android cellular phone, we control the system around the wifi range. The control of all home appliances by using this technology. The device controlled for the Automation process in the project is a node MCU esp8266 moduler. Sent the data are collected from device over the WI-FI technologies will be received by Wi-Fi module connected to Node MCU esp8266 [1].

1.2 Motivation

Using wireless network, mobile device and smartphone to connect with wifi and it can automate around the wifi range.

- Now the age of information technology system, so we want to make those type of application.
- We think future demand will increase, so we want to do this.

1.3 Objective

- To Remotely control of home appliances using Blynkapp.
- Our goal is to develop this work thus the user can easily maintain this system.
- We can Automation this system and it has ability to control Arduino UNO through the mobile application.
- Our system is work in office or household appliances.
- This system saves the power and time.

1.4 Expected Outcome

- This system is control light, fan ON and OFF, and also control door lock and unlock by using wifi.
- It controlled by an android Blynkapps.
- The apps connected with both wifi and the Arduino software.

1.5 Report Layout

- **Chapter 1: Introduction**
  In this chapter we have talked about the motivation of our project, objectives, implementation and expected outcome of this project.

- **Chapter 2: Background**
  In this chapter we tried to discuss about different circumstances of our project. Related works, comparison with some other candidate systems and scope of the problem and challenges of the project.

- **Chapter 3: Requirement Specification**
  In this chapter we talked about business process modelling, requirement collection and analysis, use case modeling, logical data model and design requirements

- **Chapter 4: Design Specification**
  This chapter is all about the designs of the project. This chapter includes font-end design, back-end designs and UX implementations.

- **Chapter 5: Implementation and Testing**
  This Chapter we tried to include all the information about database, implementation of database, designs, test implementations and results.

- **Chapter 6: Conclusion and Future Scope**
  This chapter contains conclusion and future scope for developments.

CHAPTER 2

BACKGROUND

2.1 Introduction

The project is Arduino Software and Blynk app based system. Arduino is software where we write the code for project implementation. According to this code the project run. Arduino software is basically platform of physical computing. Then it connects with blynk apps which controlled by Arduino software.

Our project is basically Arduino Software and Blynkapp based Wi-fi system. It can be produces wifi based smart home project by simply dragging and dropping widgets. Usingthis apps we control the total smart home system.

2.2 Related Works

There are various system related to our system. Here light and door controlled by apps using wifi. Connect the Arduino software with wifi and Wifi is also connect with this apps. Then we can control the system locally or globally. Developing the IOT(Internet of Things), people now try to led their life comfortably. So, this project can helpfull for us. Just connect the wifi to their mobile apps and control the appliances. In this case, the Blynk controller are easily controlled house hold all system in our every life. Smart living in this process can be organized to our life more effectively conceive smart controllers.

We can easily used this Blynk app for wifi controlling process. In this time to used be a login into blynk app.

Screenshot of our project First Blynk app open [1]in figure (2.1):

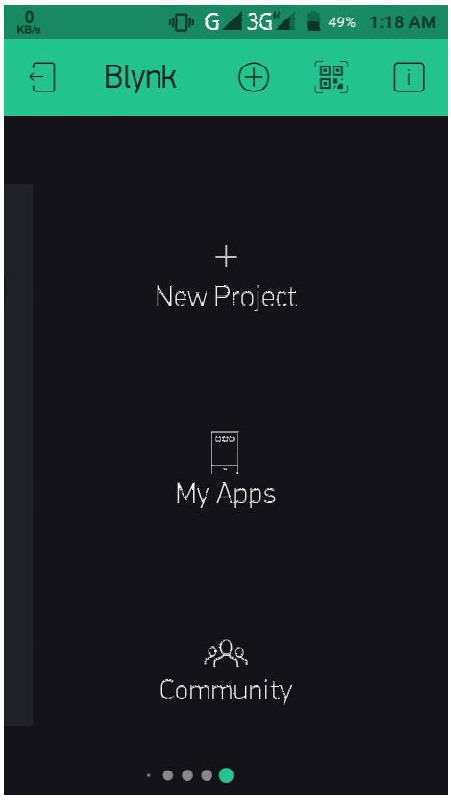


Figure 2.1: Screenshot of our project Blynk app open.

- **Features:**
  1. Need to login for full feature.
  2. Generate Blynk Auth token code.
  3. Online Arduino items list.
  4. Project creates to our apps.

- **Problems:**
  1. Wifi connection must needed.
  2. Don't provide all in one application system.
  3. Not so much enough power.
  4. Some security issues.

Arduino software is open first and some libraries and tools are installed to be software location files. Its cab be provides us the file setup in this case are optional tools and stack settings. Stack option is given manual libraries setting and tools are also given the what do we used Node MCU models types.

So, now take a Screenshot of Arduino Software Open [2] in figure 2.2:

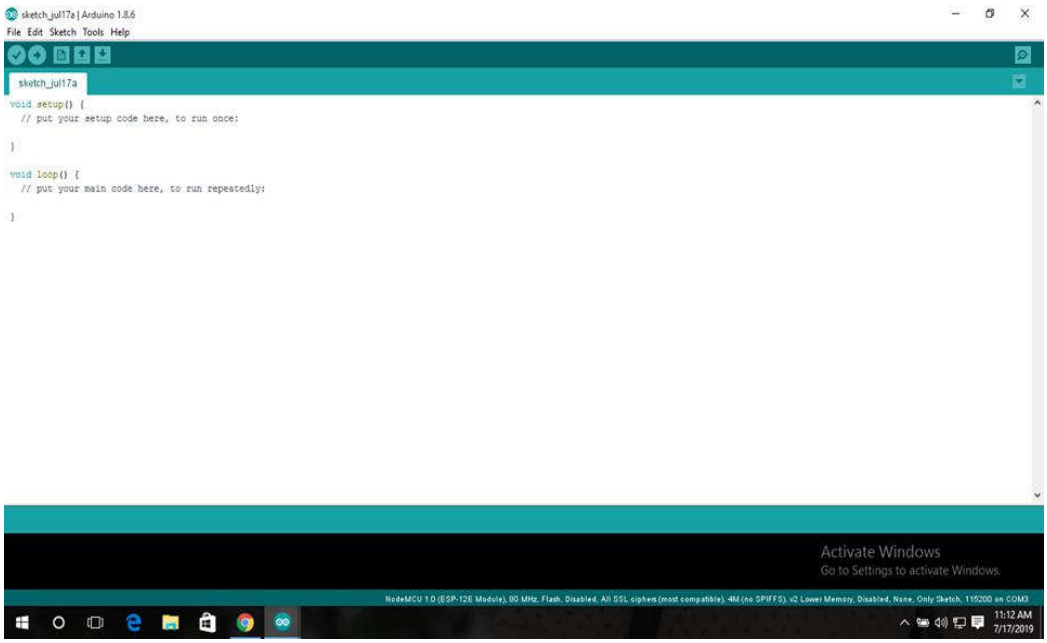


Figure2.2:Screenshot of Arduino Software.

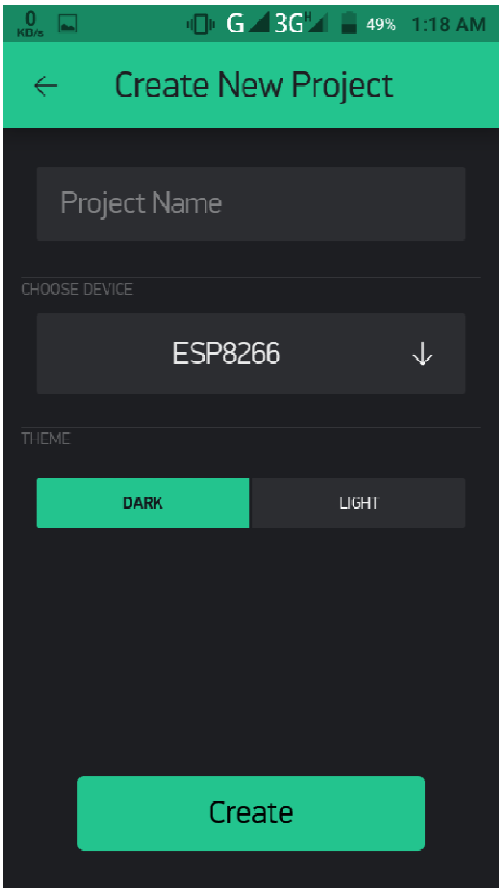
- **Features:**
  1. Automated all process.
  2. Blynk project related coding system.
  3. Some libraries & tools installed.
  4. Codes running serial monitor.

- **Problems:**
  1. Blynk Auth token code must need.
  2. All libraries & tools must installed.
  3. Wifi connection must needed.

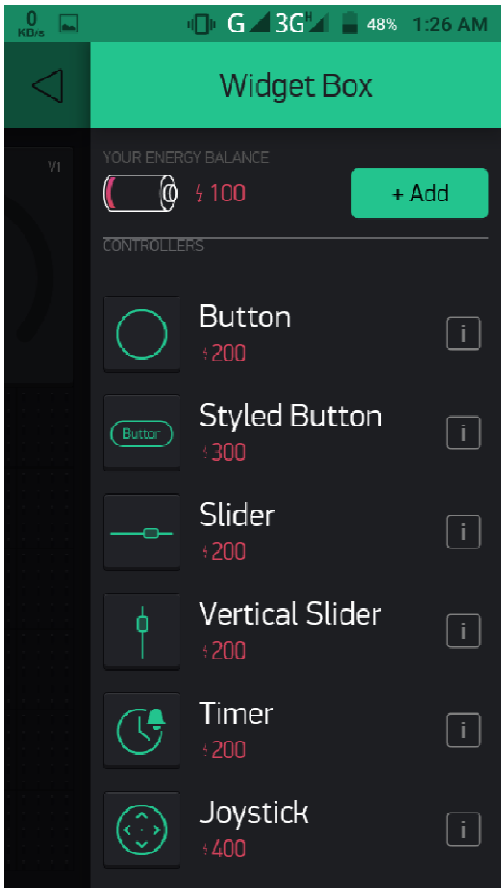
This figure 2.3 shows us, the Blynk app is to be a generated new blynk controller wifi connection esp8266 modules can be used in fig (a). Then then fig (b) is also creatives projects materials of Widget Box system. Its can also generate project power. This system can be given power of materials uses of button or others can be provides us fig (c) and fig (d).

Now, some Screenshot set up in this page of Blynk project create system:

[3] in figure2.3:

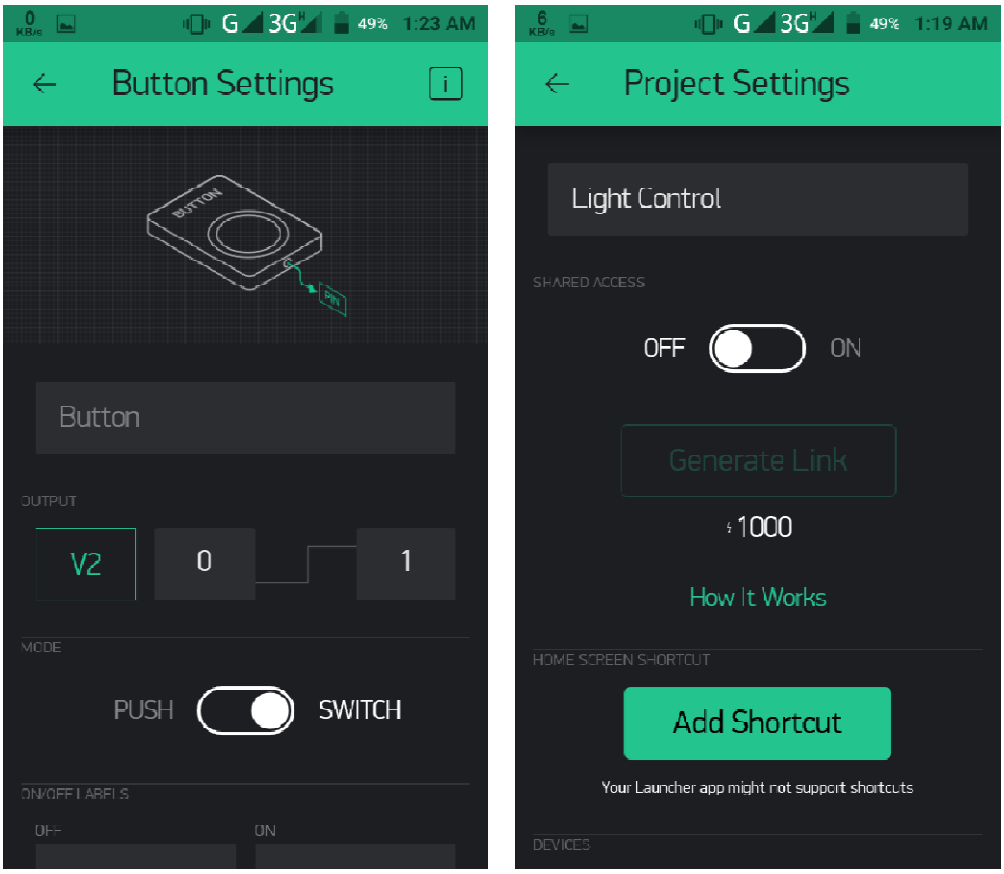


(a) Create project wifi



(b) Widge Box

To be continued..



(c) Button settings blynk (d) project settings power

Fig: 2.3Screenshot of project create system.

2.3 Comparative Studies

The device which we use in home automation are associate to ADK(Android Development Kit).The establishment of the connection between the Android device and ADK(Android Development Kit). The links into the portsas input/output of the board. Then it pass to the ADK(Android Development Kit).The USB host connection associated with Android Phone. Arduino software issues to do this process. It is capable of maintaining the system, set up and configuration. The system is too good than the offensively generate smart Automation home system because of the flexible points of creatorview. This application has been installed on a Android smartphone. On this process of hard ware interface of esp8266 modules are connected with blynk app and Arduino software. It can be through to the directly wires connection. The hardware interfaces module has capable to controlled energy management systematic process.

The proposed systematic way can be controlled of many appliances:

(1) Light ON/OFF
(2)Fan ON/OFF &
(3) Door CLOSED/OPEN.

2.4 Scope of the project

In recent time the Internet of Things (IOT) is very popular in the worlds. In types of project is very demandable for our digital world. For this project we used Arduino software and Blynk app. Then connect these with Node MCU which is connected with Wifi module esp8266.Then all the appliances can control locally with wifi using this Blynk app. Day by day, these types of system will be developed and in future it's demandable process will be increasing.

2.5 Challenges

(1) Reliability: For successful home automation, the developer consideration of regarding the sensible device which ancient home appliances and equipment.

(2) Use: How it uses appropriately, it also the challenge of crate this type of system.

(3)Data transformation and integration: It is difficult. The software tools which provides are interact with particular products. It connects to devices from other manufacturers.

(4)Liability: Give the solution to smart device problems. Then it updates and patches.

CHAPTER 3

REQUIREMENT SPECIFICATION

3.1 Requirement Collection and Analysis

An IOT require many things to establish a system. The requirements are software wise and hardware wise.

- Software IDE:
    1. Arduino Software.
    2. Blynk App.
- Hardware:

    1. Breadboard.
    2. Node MCU.
    3. Servo Motor.
    4. Relay.
    5. Android Phone.
    6. Wires.
    7. Bulb.
    8. Fan.
    9. Door lock.

Analysis:

For tool developers the requirements produce guidelines. The requirements provide solution to developers (e. g, home owners) with little effort. This system face some problem like poor manageability, achieving security. Implementing the system as the cheap of usable node MCU and Blynk controller wifi app based home Automation systems which control most of the house appliance through Wifi.

3.2 USE-CASE Modeling and Description

In this model a user can enable system using user's app. Then the user have to log in his/ her account. After log in user can light and fan can be on or off using wifi module which connected with Node MCU. Then user can also open and close the door similarly. At last the user can disable the system.

Now, the Use case Models in our project is generate user interface to be shows the Screenshot of this [4]figure 3.1:

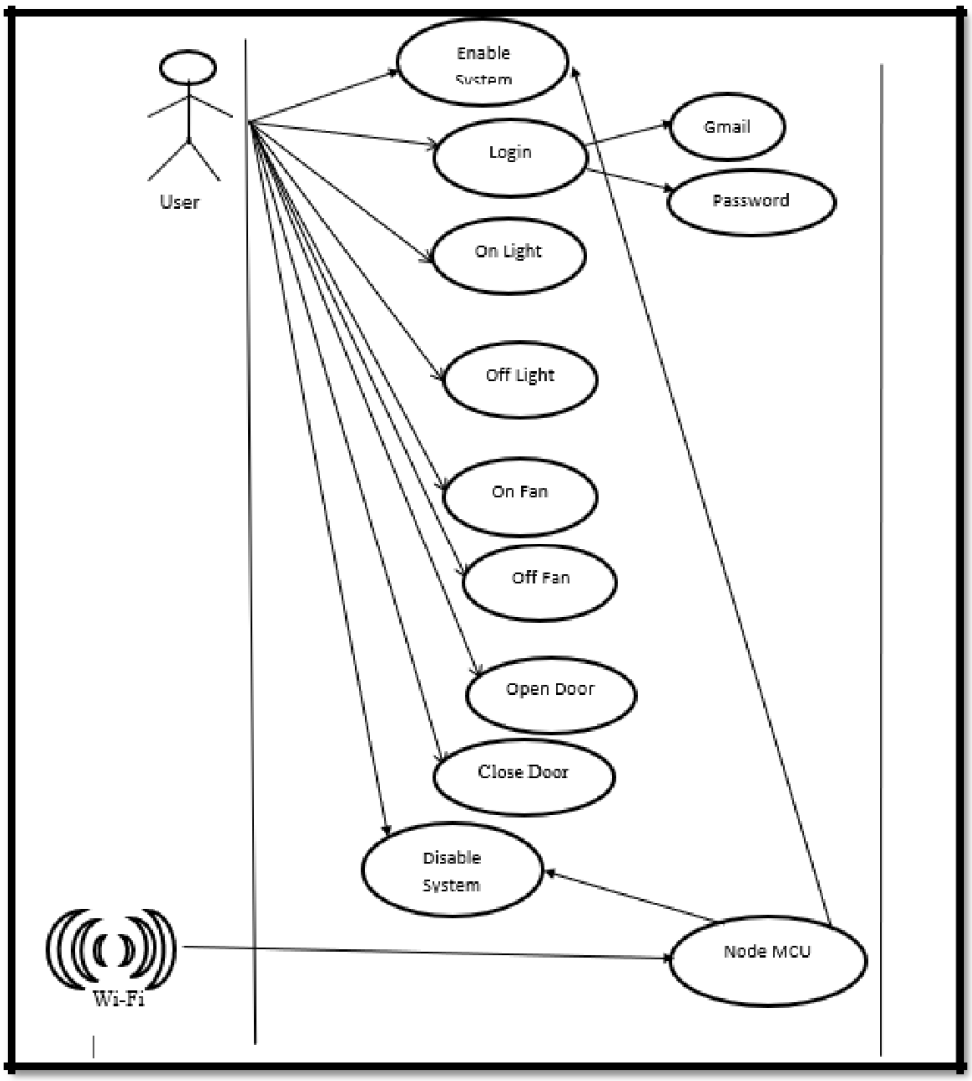


Fig: 3.1Screenshot of our project Use case Model.

3.3 Logical Data Model

In this diagram A smart home system has light,fan and door.A Node MCU connected with wifi and servomotor. The wifi have name and password. The Node MCU connected with Relay. The relay connected with fan and light. The angles of servo motor connected with the door lock. The wifi connected with Arduino software. This software compiled the codes. According to this code the system will work. Then the Arduino connected with Blynk app.
Then the power supply to the system. Using this app we can easily control the light, fan and door lock system

Now, this ERD model Screenshot is given below in this [5] figure 3.2:

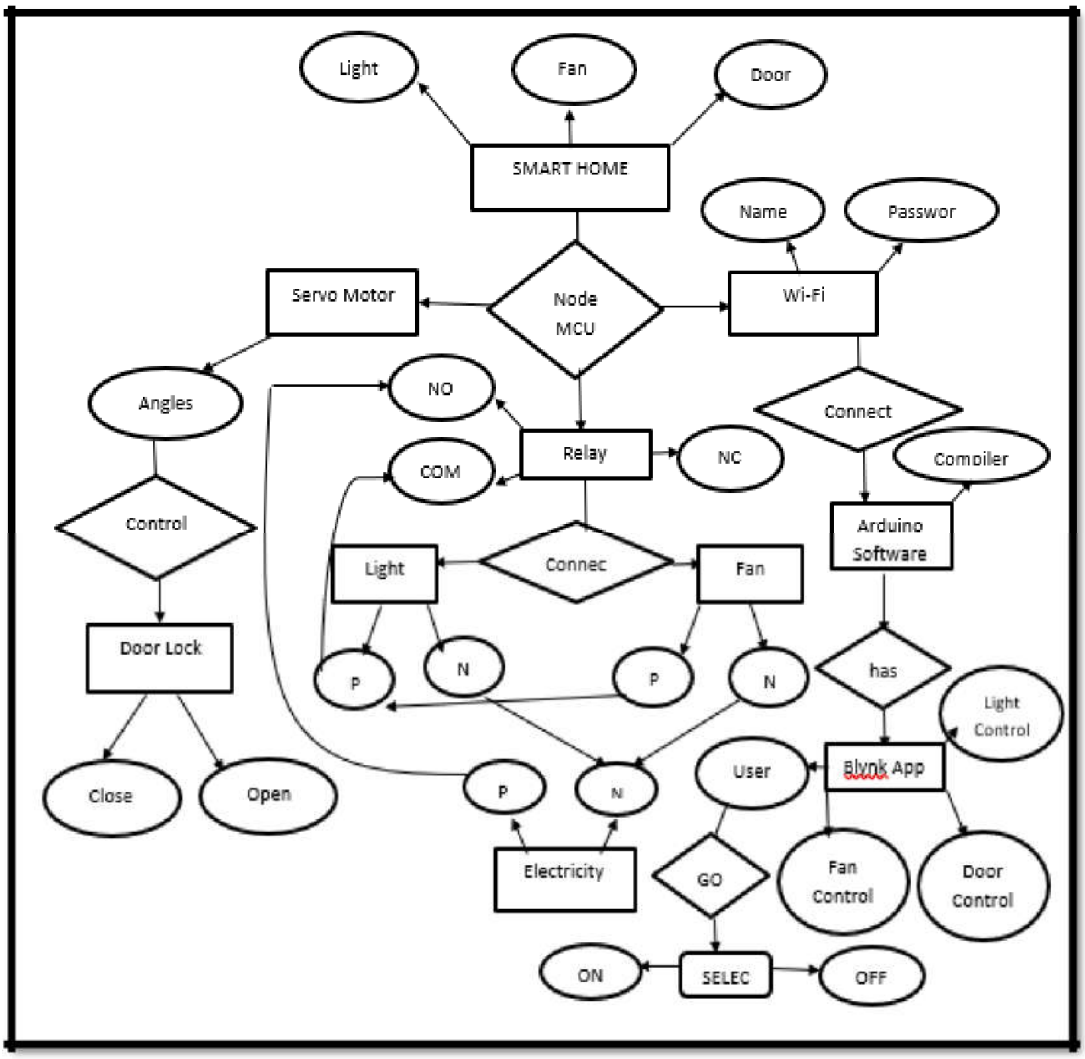


Fig: 3.2Screenshot of our project ER Diagram.

3.4 Design Requirements

To make a perfect design, some things need to keep in mind. the following things are:

- **Make the system simple for user**

In this system user is simply controlled over their process in achieving for better objectives of activities.

- **Make the system compatible**

It can be perfect in the total systematic of household process, future the maintenance of smart living purposed.

- **Efficiency**

In this case, the smart living of people thing is, the systematic way will be effective.

CHAPTER 4

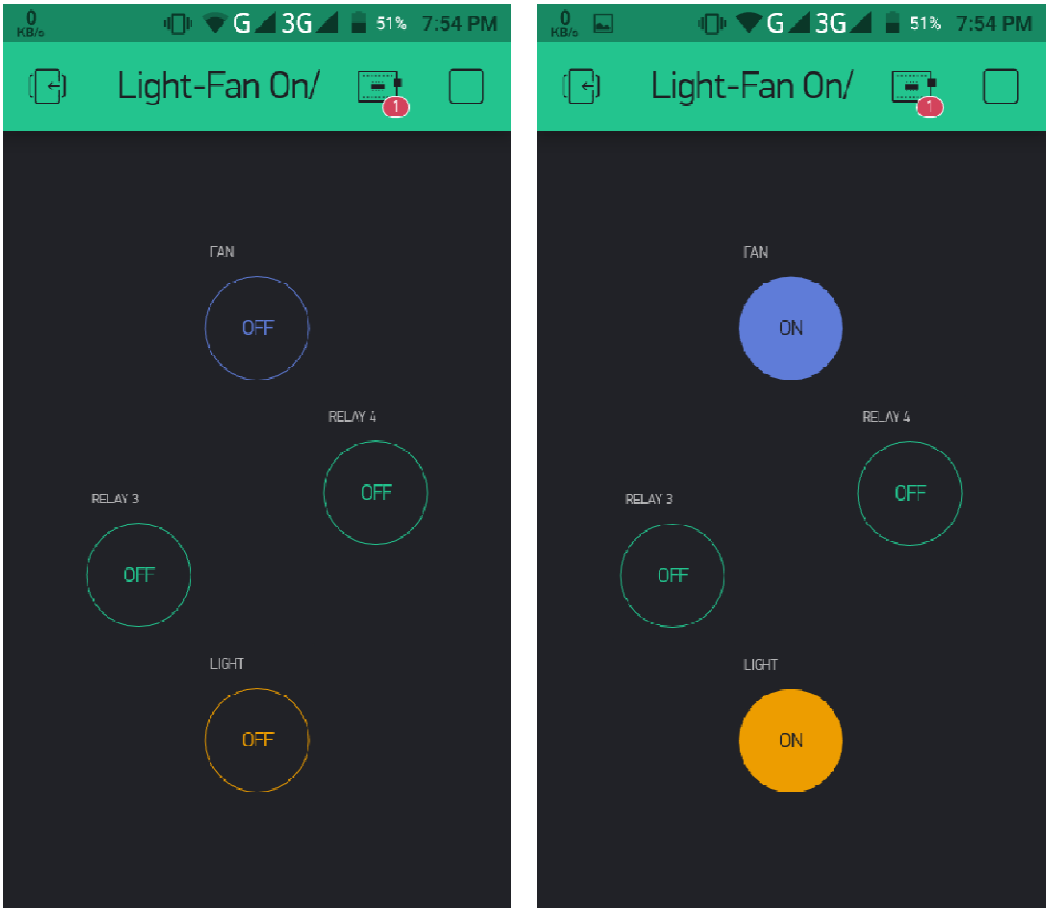
DESIGN SPECIFICATION

4.1 Font-End-Design

A mobile app developed for a mobile platform like, Android or iOS. It is visual part of blynk app applications. User can be interacts to the application by using it easily. And the font-end-design to be better thing of any user. It's easier and user friendly. When we build the blynk app, then we tried our best to makes the app user friendly processed. Then the user can uses comfortably.

Now, shows the Button design of Arduino software wise blynk app controller Light and Fan project app create process.

So, there were a lot of designing thing for Screenshot [6] given in figure 4.1

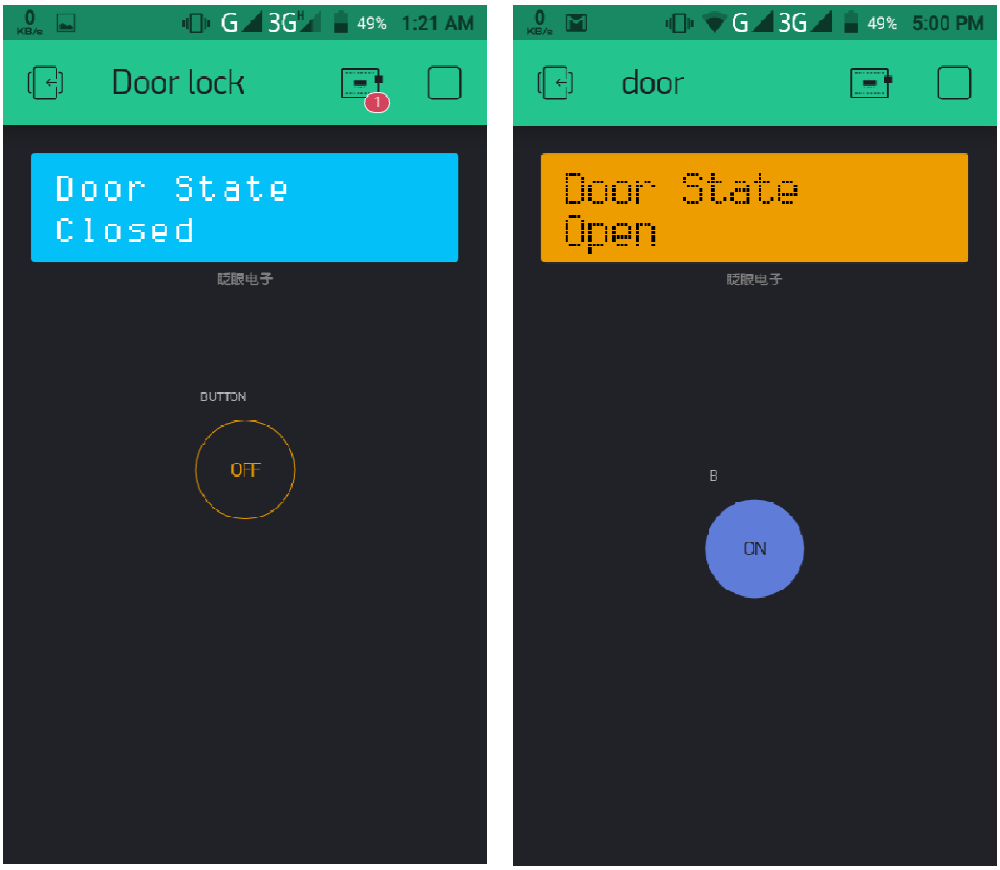


(a) Design off light and fan (b) design on light and fan

Fig: 4.1 Screenshot of our Fan Light app Button font Design.

Here is a part, it is Door controlling process. So similarly, we can be generated the door lock system Button designed of blynk app project.

So, this figure 4.2 (a and b) shows us, a lot of designing thing for Screenshot given in figure 4.2:



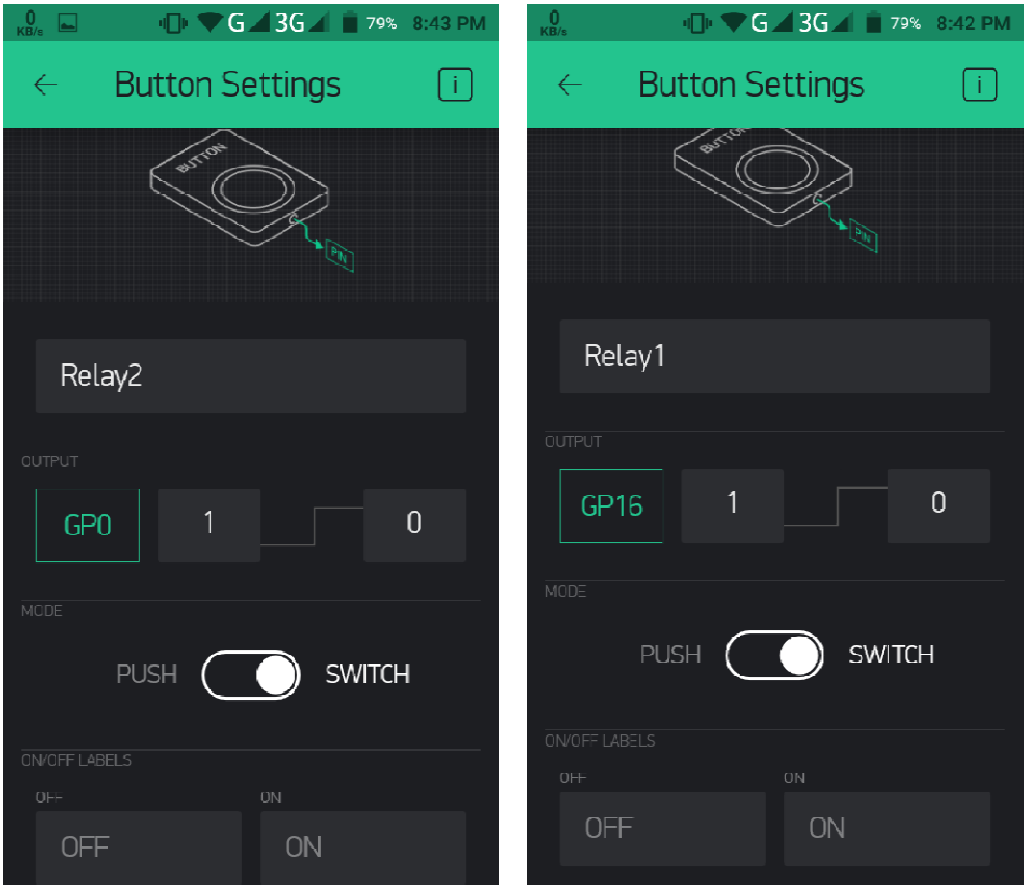
(a) Design door closed (b) design door open

Fig: 4.2Screenshot of our Door app font design.

4.2 Back-End Design

About another important things for developing an android application is Back-end design. In this part, the actual work happens in an app. The user can't interact with this part. It is the most crucial part of blynkapp. We generally use logics here. All logics work behind the application. The logic of displaying data from part to part is the work of back-end part. We think that, the front-end part is the heart but in reality, without using the back-end part we cannot do anything in an app. So, the developer work most of their time for designing back-end part in Arduino software programming codes.

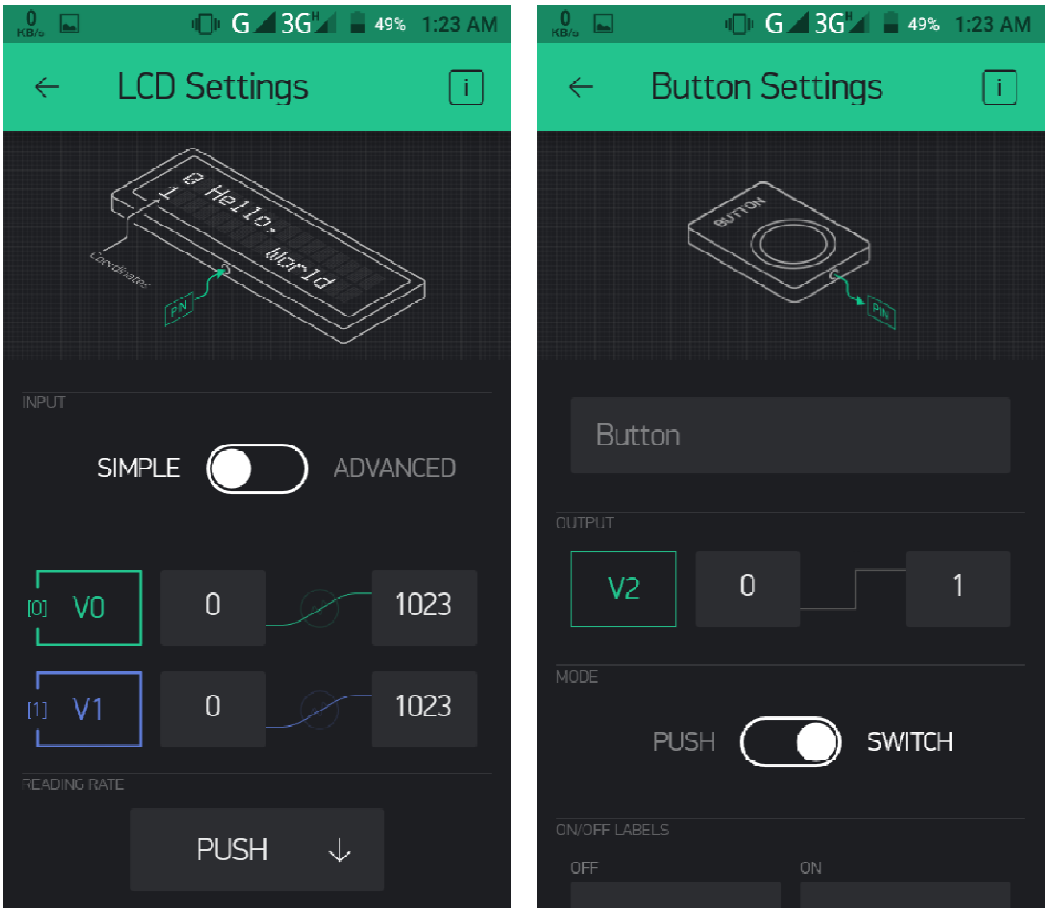
So, this figure 4.3 (a and b) shows us, a lot of designing thing for Screenshot given in [7] in figure 4.3:



(a) Button setting Light (b) Button setting Fan

Fig: 4.3Screenshot of our Fan Light app Button back Design.

We really think about that, the front-end part is the heart but in reality, without using the back-end designed part. So, we cannot do anything in LCD display an app for the activities of door system with servo motor.
Now, the door system back end process blynk app Screenshot given [8] in figure 4.4:



(a) LCD display setting (b) Door button setting

Fig: 4.4Screenshot of our Door app back design.

4.3 Interaction Design and UX

Interaction Design is the interaction of user with android application. It is very important for user. It process various types of issues. It focus on Arduino software. Arduino software interact with UX. It is very important for Arduino. Blynk app also create according to this structure. To create any application, it have to be follow. For developing and upgrading any application, the developer should give a good emphasis on it. Then it can achieve a great review from user Interaction.

4.4 Implementation Requirements

The designing methodology implementation requirements of the system has two major portions: software design and hardware design. The hardware is designed by arranging Node MCU platform of household system and actuators whereas software design includes Arduino Blynk programming that is written and uploaded in the Arduino Software. Now here, we will discuss about the implementation requirements that we need to complete this application process.

- **Node MCU Pin**

Node MCU is an most important thing in our project work. The Wifi connect through Node MCU.It isa hardware base module. All the equipment of our project connected with Node MCU. Arduino software at first connect with Node MCU. Then the Node MCU connect with blynk app, which control the full system.

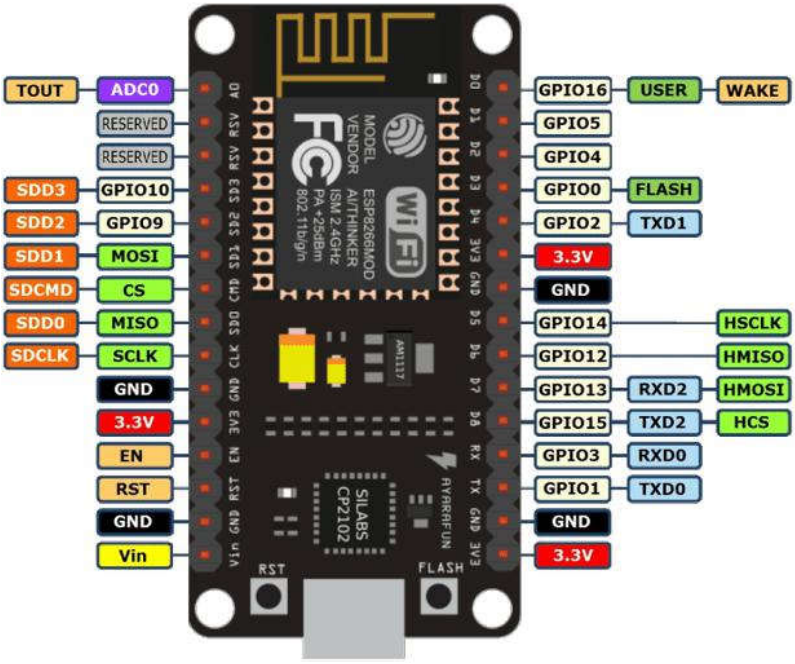


Fig: 4.5Online collected Image Node MCU Pin.

- **Servo Motor**

Servomotor is a motor which can rotate any things. It is a hardware device which is important any mechanical thing. In our project work we use it for door lock and unlock system. It connected with Node MCU and using wifi it can control by blynk apps. This motor is close-looped.

There are various types of servomotors. We use continuous rotation servomotor MG 996R for our project work.

Fig: 4.6 Image of our Servo Motor.

- **Relay**

Relay is as which operated electrically. It open and close circuits electronically. when we need to controlled a circuit by low power signal, we use four channel 5v relay module for our project work. Now shows the Relay in figure 4.7:

Fig: 4.7 Image of our 4 channel Relay module.

- **Breadboard**

A breadboard is a solder less device which is use as a construction base. It also prototypes electrons and test circuit design. It can be reusable. It is easy to create temporary prototypes. when we learning how to build circuits, it is the most fundamental piece to use.

So, this figure 4.8 shows us, a image of our project uses Breadboard is given in figure 4.3

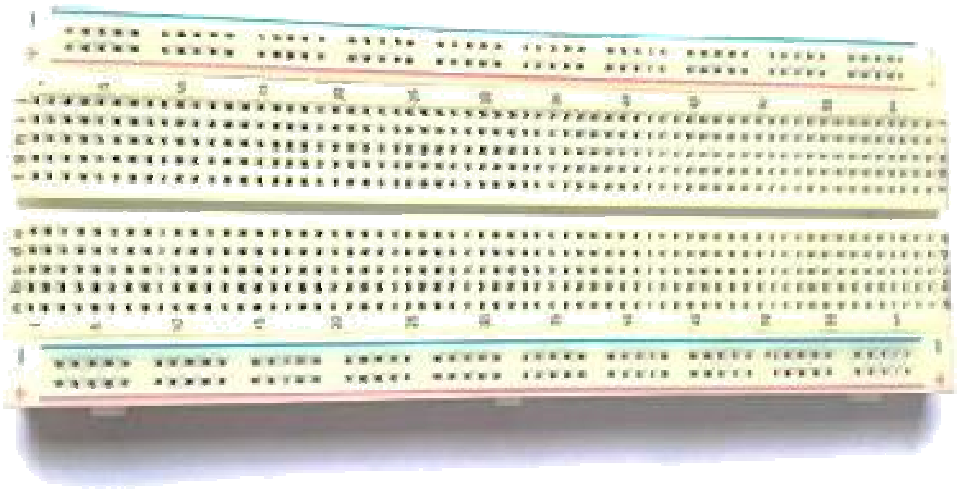


Fig: 4.8Image of our Breadboard.

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation and Database

Node MCU is an open-source IOT platform. It is simple & smart, interactive, programmable & Wi-Fi enabled. Its a hardware processing. The sole reason for using Node MCU over Raspberry Pi is that the Node MCU has inbuilt Wi-Fi. This reduces the cost and hence Node MCU is cheaper than other devices available in the market. Inbuilt Wi-Fi helps in remote access. The device can be physically handled as well. The intended device can be powered ON or OFF using for Light and Fan the above application. And the servo motor with connected to the Node MCU and controlled the door device application.

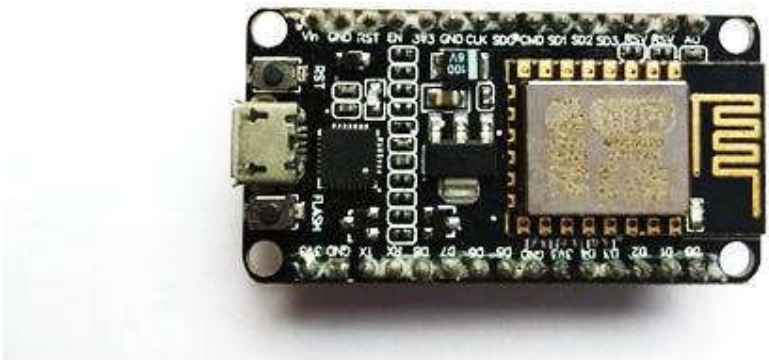


Fig: 5.1 Image of our Node MCU.

5.2 Implementation in font-end-design

The implemented system performs three functions. light on/off, Door open/close and controlling on/off fan function. It takes action to switch door open/close by pressing button in blynk app. In case the door is on when user gets a notification in his phone which informs him about the door system activities. To control the on/off process of fan and light user checks his application for all mechanism. And also control the servo motor usable process in door closed or open system. User presses proper buttons in his app to adjust the controlled of fan and light. The designed system provides a two-level controlling mechanism.Fig.5.2 and 5.3 shows the Circuit diagrams.

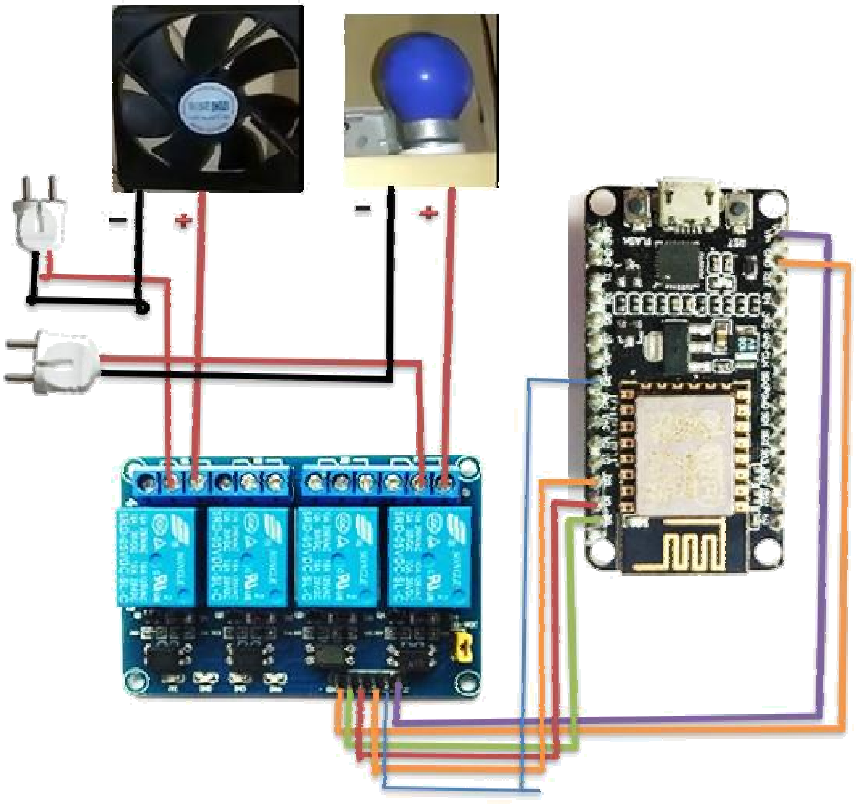


Fig: 5.2Screenshot Image of Light and Fan circuit diagram.

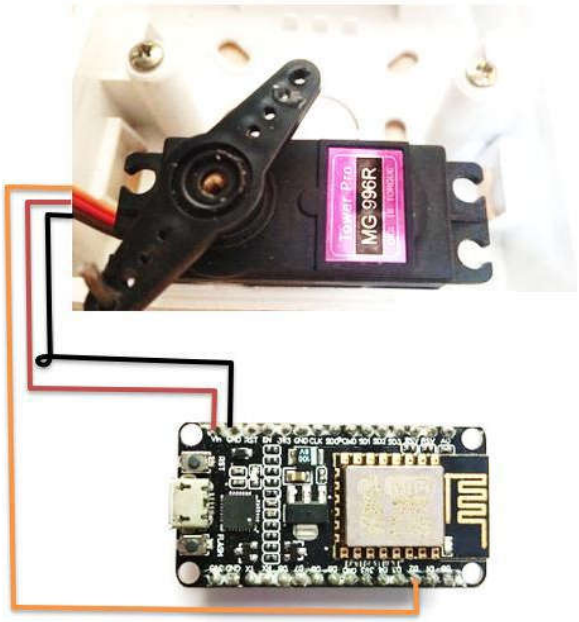
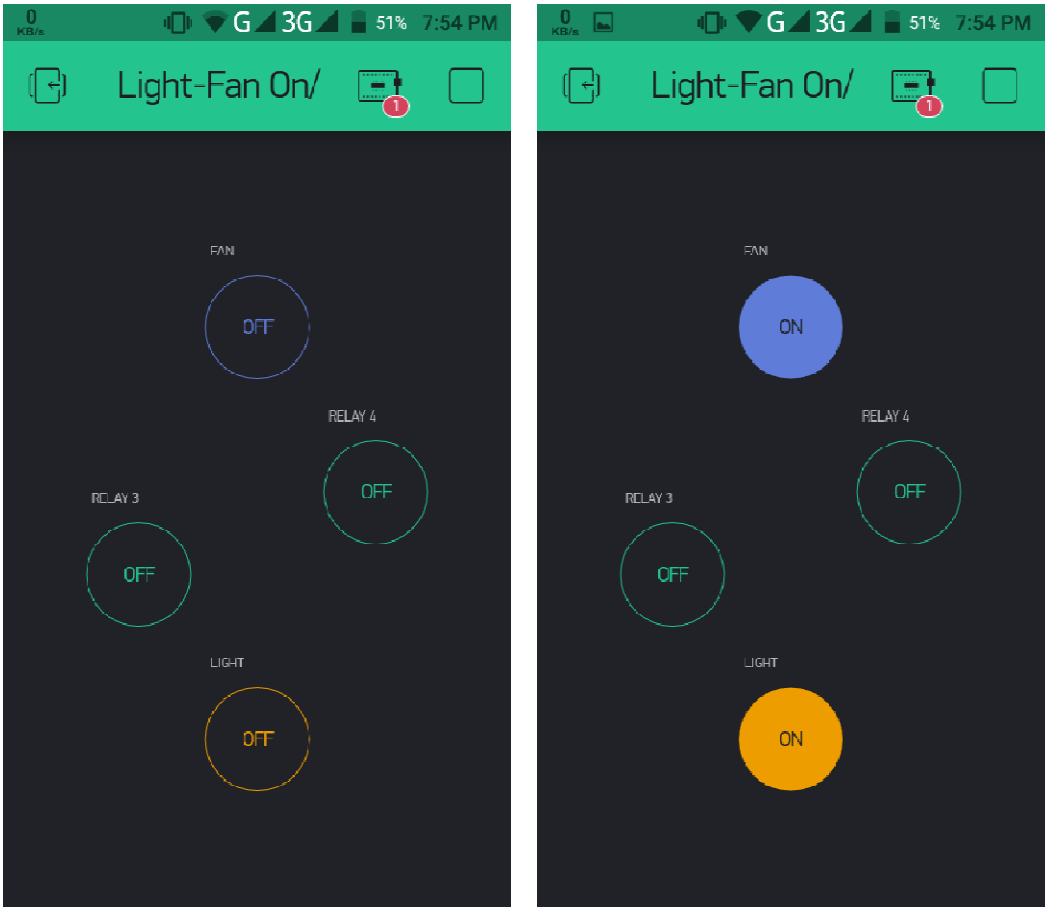


Fig: 5.3Screenshot Image of Servo Motor Circuit Diagram.

Now, implemented setup [9] in figure 5.4 (A and B) shows us, this Circuit diagram completed then the Light and Fan implemented uses blynk app connection. Their Light and Fan are also to connect their negative and positive sites. Its can be provides to electricity activities with No and Com process from Relay.

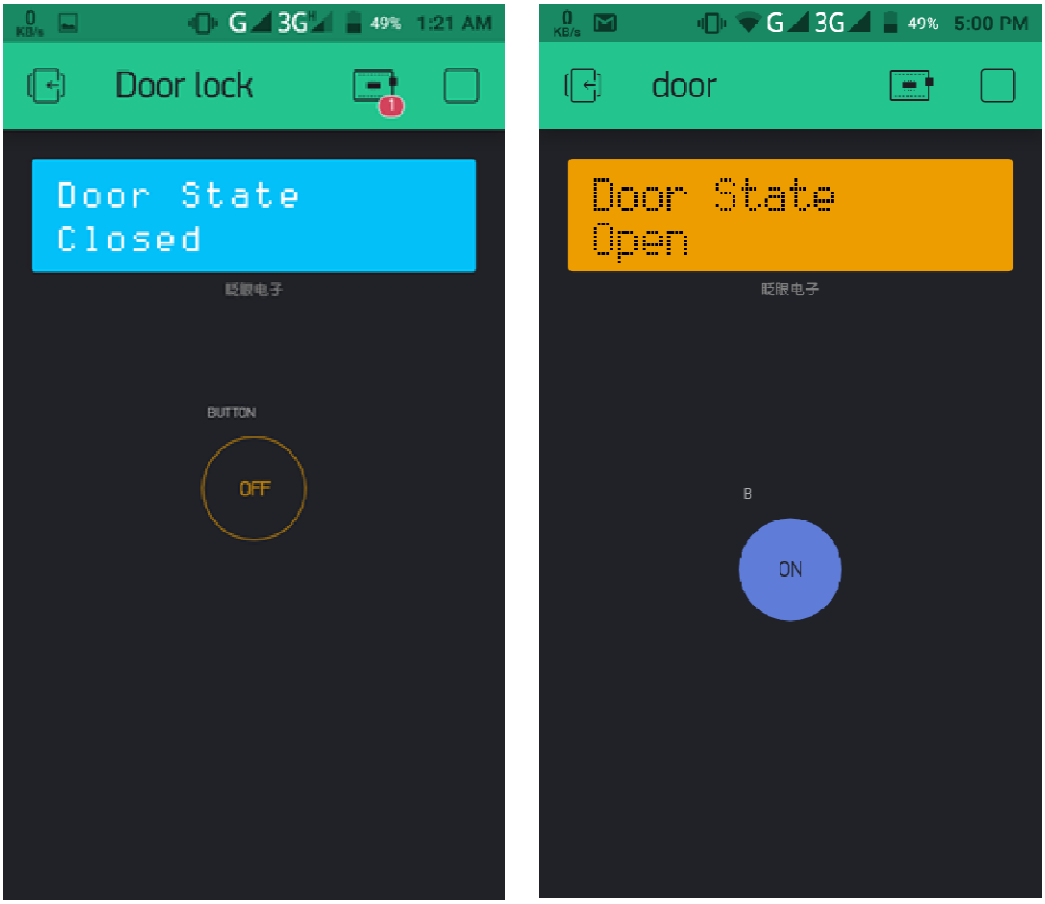


(A) When Light and fan both off. (B)When Light and fan both on.

Fig: 5.4 Screenshot of Light and Fan controlled.

In case, this figure 5.5 (a and b) shows us, their process are also to connect uses door control system servo motor connect to Vin, D2 and GND connection from Node MCU. It can be provides to be angles of servo activities with door locker system implementation.

Then, the Door system is implemented blynk app connection.



(a) When Door off (b) when door open

Fig: 5.5 Door Controlled.

5.3 Implementation of Interactions

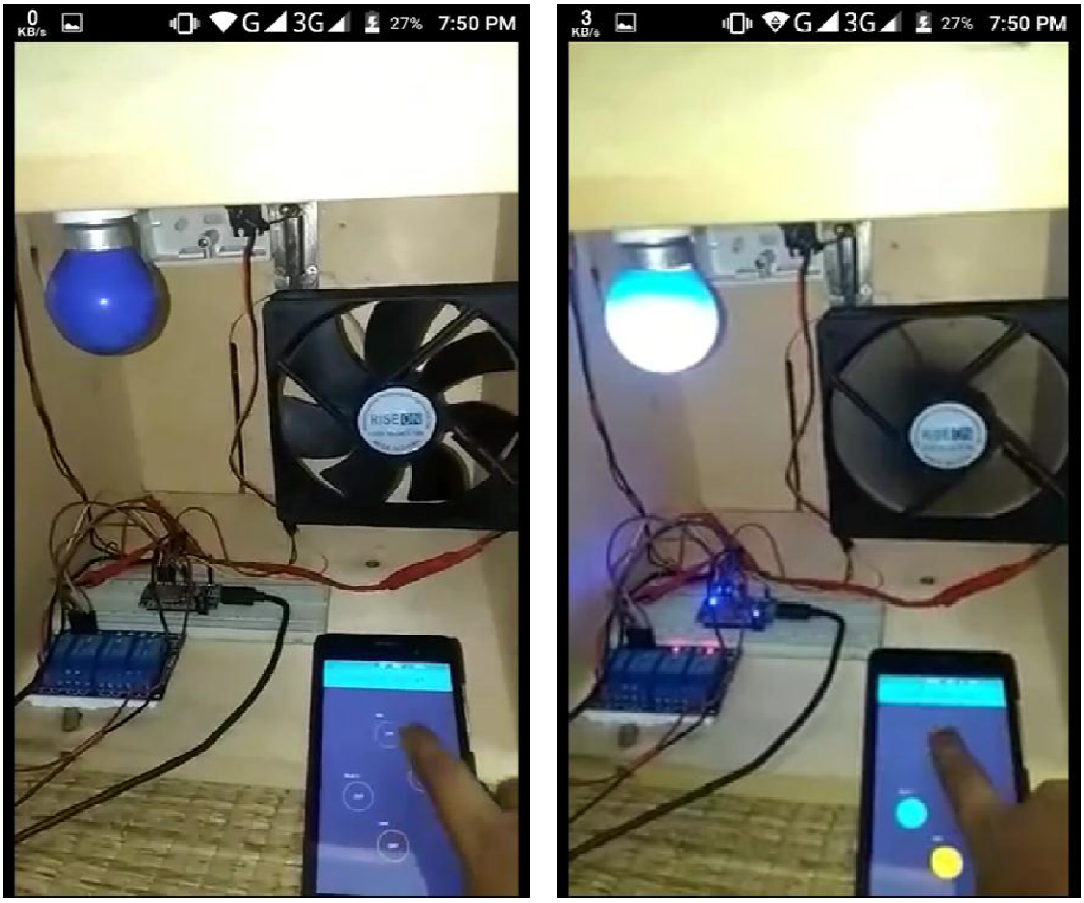
All Automation applications should be interactive. The more automation process is interactive WiFi connection of the more it is used Node MCU. For a system, it is best to use good design with user selective system. For a system, it is best to use good design, which includes good icon, good and beautiful text font with some good button and LCD display with a good design.

We have tried our best to make our wifi based smart home more interactive to the users. So, we made the system responsive for a better user experience. For better interface we have used all those things mentioned in the above. Like, good icons with good text font and well design button.

5.4 Test Results and Reports

The Blynk application provides the facility to WiFi data and control appliances easily. For three appliances there are two different tabs namely relay controlled (for light and fan), Door lock (with Servo Motor). In each tab there is a display widget which shows lcd monitor reading presently fetched from node MCU via Blynk server and the button widget is selected to change the state of appliances. The present state (on/off) system of appliance appears on the button widget. User turns light on/off by pressing the button. Similarly, User turns fan ON/OFF using button. The screenshots captured in mobile while using the application show the results of controlling different appliances.

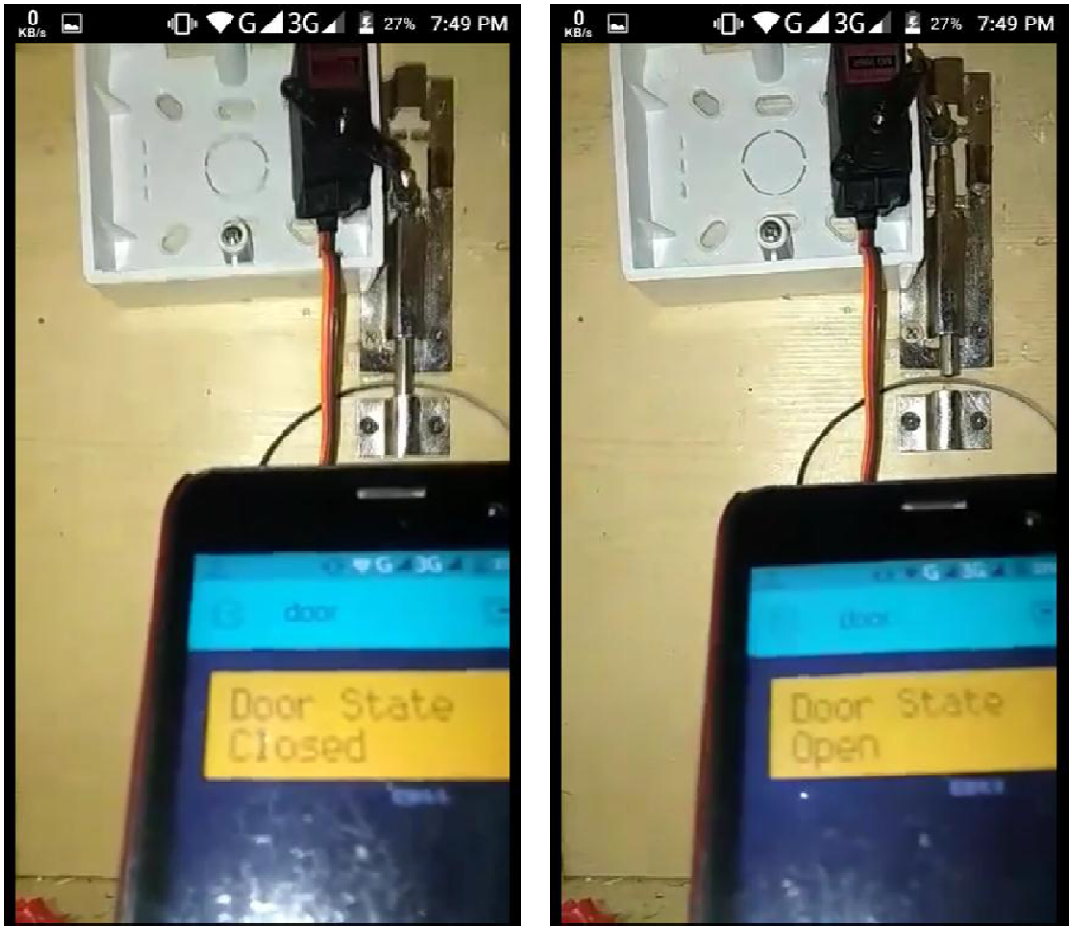
Now, Given Screenshot of Implementation processing ON/OFF light and Fan [10]:



(a) Implementation light-fan off (b) Implementation light-fan on Fig: 5.6Screenshot of our Implementation Light and Fan.

This figure 5.7(a and b) shows us, A Servo motor be a action to switch door open/close by pressing switch button in blynk app. Servo angles to be a control this process with Blynk app wifi function. And its also to provides the Arduino software programs.

Now, Given Screenshot of Implementation process in OPEN/CLOSE Door:



(a) Implementation door closed (b) Implementation door open

Fig: 5.7Screenshot of our Implementation Door lock.

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

6.1 Discussion and Conclusion

This project work as individual system to control smart home automation system. It is made very cheaply and it's also low cost. We can control home appliances locally. The components packages as inconspicuous type. The smart system tested by us. It successfully controlled to the system like light control, fan control and door lock control. The system is very easy and flexible for users.

6.2 Scope for Further Developments

For developing this system, we try to add:

(1)Add globally control in this system.
(2)Add a server for this system.
(3)Add create a new Apps to control this system.

6.3 Limitation

Every system has some types of limitations though it is a very good system. In this system we can only control locally by using Wifi. When we control it, the wifi name and password have to be in Arduino Software application. And Blynk Auth token codes also set up this program. When we control it by different wifi then the different wifi name and password have to set in the Arduino programming codes. The apps also provide different codes for this control. The codes also will set in Arduino. Then we can control the smart home system by using wifi.

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APPENDIX

APPENDIX A: Project Reflection

The appendix is about project reflection. We start our work after our title defense. Our system is, to control home appliances using wifi.

By using this system, user can control home appliances locally. It will be helpful for user. So, we think and we also believe that our system "smart home system "will effect positively.

So, there were a programming codes thing for Screenshot given that in figure 0.1

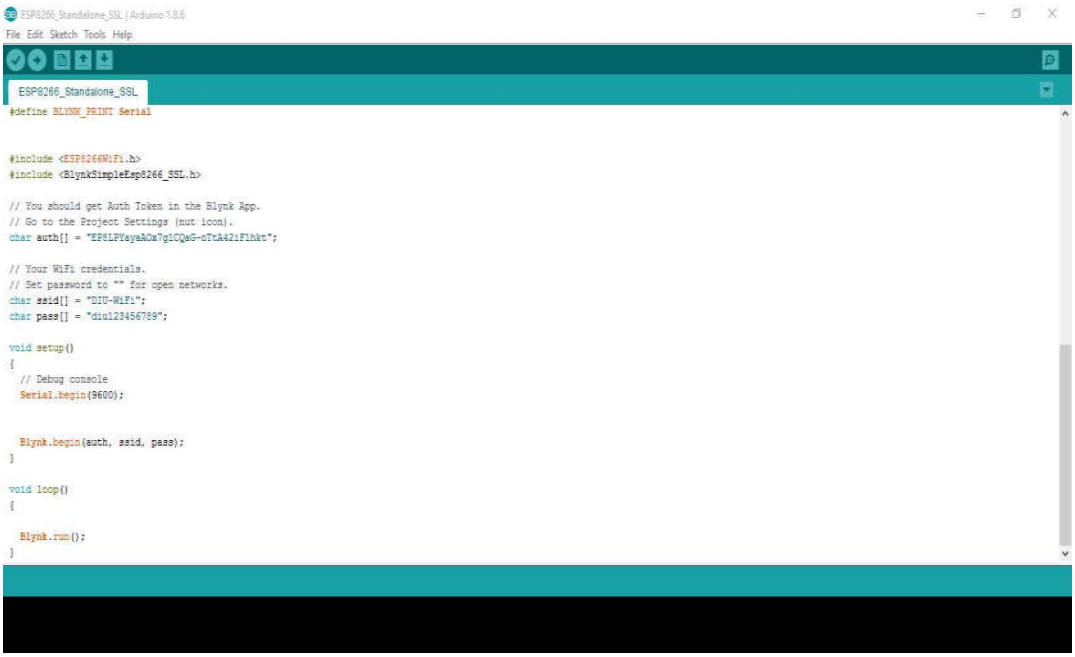

Fig: 0.1 Screenshot of our Light and Fan Arduino program.

About another Screenshot given for Door system in figure 0.2

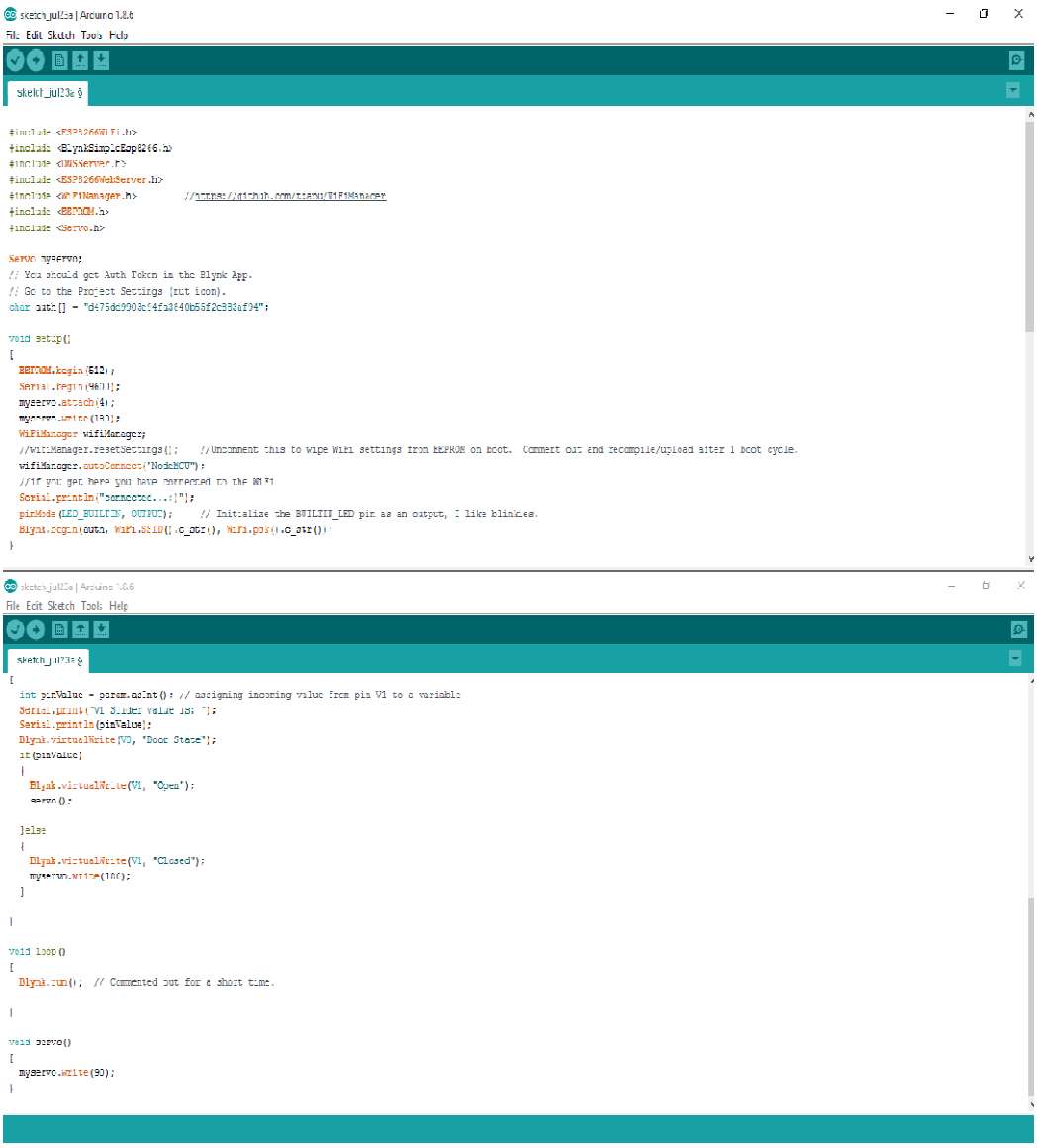

Fig: 0.2 Screenshot of our Door Lock Arduino program.

PLAGIARISM REPORT

SMART HOME: WI-FI BASED HOME AUTOMATION SYSTEM

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