**A**

**MINI PROJECT REPORT**

**ON**

**“Home Automation with Voice Assistance”**

**Submitted by**

**Dhyey Badheka (19IT450)**

**Harsh Majithiya (19IT453)**

**Dhrumil Prajapati (19IT462)**

**Prof. Prachi Shah**

**Faculty Guide**

****

**Information Technology Department**

**Birla Vishvakarma Mahavidyalaya Engineering College**

**(An Autonomous Institution)**

**AY: 2021-22, Semester II**

|  |  |
| --- | --- |
| **http://bvmengineering.ac.in/images/BVM%20Logo-1.png** | **Birla Vishvakarma Mahavidyalaya Engineering College**  **(An Autonomous Institution)**  **Information Technology Department**  **AY: 2021-22, Semester II** |

**CERTIFICATE**

This is to certify that project entitled with **“Home Automation with Voice Assistance”** has been successfully carried out by **Dhyey Badheka(19IT450), Harsh Majithiya(19IT453) & Dhrumil Prajapti(19IT462)** for the subject of **3IT31- Mini Project** under my guidance during the academic year 2021-22, Semester II. The Mini Project work carried out by the students of 6th semester is satisfactory.

**Date:**

|  |  |  |
| --- | --- | --- |
| **Prof. Prachi Shah**  Faculty Guide  IT Department  BVM | **Dr. Nilesh Prajapati**  Course Coordinator  IT Department  BVM | **Dr. Keyur Brahmbhatt**  Head of the Department  IT Department  BVM |

## ACKNOWLEDGEMENT

We thank all who in one way or another contributed in the completion of this project. We give deep thanks to the Professors and lecturers at the Birla Vishvakarma Mahavidyalaya.

We are extremely grateful to **Dr. Indrajit Patel**, Principal, Birla Vishvakarma Mahavidyalaya Engineering College and **Dr. Keyur Brahmbhatt**, Head of the Information Technology Department, for providing all the required resources for the successful completion of our project. Our special and heartily thanks to our Faculty Guide, **Prof. Prachi Shah** who encouraged and directed us. Also, she provided required her guidance, patience and support making this project a success. Her challenges brought this work towards a completion. It is with her supervision that this work came into existence.

We also want to show our sincere gratitude to our Course Coordinator, **Dr. Nilesh Prajapati** for coordinating this course as this course will be much helpful to us for our learning purpose.

Furthermore, we are thankful to **Prof. Hiren Patel** who helped us at every stage when we needed him and faced difficulties.

We would also like to thanks our batchmates, our family members and our well-wishers whose constant support helped us out during our whole project.

## LIST OF FIGURES

|  |  |  |
| --- | --- | --- |
| Sr. No. | Figure Description | Page Number |
| 1 | Timeline Chart | 5 |
| 2 | Use Case Diagram | 8 |
| 3 | ER Diagram | 9 |
| 4 | State Diagram | 11 |
| 5 | Class Diagram | 13 |
| 6 | Sequence Diagram | 15 |
| 7 | System Diagram | 16 |
| 8 | Database Relation Diagram | 18 |
| 9 | Circuit Diagram | 19 |
| 10 | Final Model of project | 20 |
| 11 | IFTTT Website’s UI | 22 |
| 12 | Blynk Website’s UI | 22 |
| 13 | Blynk App UI | 23 |
| 14 | Blynk App UI | 23 |
| 15 | Blynk App UI | 23 |
| 16 | Google Assistant’s UI | 23 |
| 17 | Google Assistant’s UI | 23 |
| 18 | Google Assistant’s UI | 23 |
| 19 | After Logging in successfully with IFTTT | 24 |
| 20 | After Logging in successfully with Blynk Console | 25 |
| 21 | After Connecting Google Assistant with provided Gmail Account | 25 |
| 22 | User controlling his device using Google Assistant | 26 |
| 23 | User controlling his device using Google Assistant | 26 |
| 24 | Opening Blynk Web Application Dashboard and selecting any device | 27 |
| 25 | Switching off previously selected device | 27 |
| 26 | Switching on our previously selected device. | 28 |
| 27 | Opening Blynk Mobile Application Dashboard | 28 |
| 28 | Selecting our device from dashboard. | 28 |
| 29 | Controlling the device which was selected from dashboard | 28 |

## LIST OF TABLES

|  |  |  |
| --- | --- | --- |
| Sr. No. | Figure Description | Page Number |
| 1 | Comparison with existing projects | 4 |
| 2 | Data Dictionary:User\_registration | 17 |
| 3 | Data Dictionary:devices | 17 |
| 4 | Data Dictionary:room | 18 |
| 5 | Data Dictionary:digital\_assistant | 18 |

## ABSTRACT

The IOT based home automation system focuses on controlling home electronic devices whether user is inside or outside their home.

In this home automation, as the user gives commands to the Google assistant, home appliances like Bulb, Fan and Motor etc., can be controlled accordingly. It will reduce human effort and power efficiency. A home appliance is a device or instrument designed to perform a specific function, especially an electrical device, such as a refrigerator, for household use.

On providing voice commands for switching various appliances, it will be easier and more reliable to the user like disable people then they will be benefited from our system. It will become the best system for the disabled people and for the elderly people to use their mobile phone and control the home utilities.

**INDEX**

**Chapter 1: Introduction ………………………………………………………………… 1**

* 1. Aim of the Project
  2. Project Scope
  3. Project Objective
  4. Project Modules
  5. Project basic requirements

**Chapter 2: Analysis, Design Methodology and Implementation Strategy …………… 4**

* 1. Comparison of Existing Applications with your Project
  2. Project Feasibility Study
  3. Project Timeline chart
  4. Detailed Modules Description
  5. Project SRS
     1. Use Case Diagrams
     2. Data Flow Diagrams
     3. Entity Relationship Diagrams
     4. Event Trace Diagram
     5. State diagram
     6. Class diagram
  6. Database design and Normalization
  7. Database Relation Diagram
  8. Template Design

**Chapter 3: Implementation and Testing …………………….………………………… 21**

* 1. Software and Tools
  2. User Interface and Snapshot
  3. Testing using Use Cases

**Chapter 4: Conclusion and Future work …….……………………………………….. 29**

4.1 Conclusion

4.2 Future work

**References ……………………………………………………………………………... 31**

* Websites
* Research Papers
* Blogs and Useful Links

**Progress reports ………………………………………………………………………… 33**

**Chapter 1: Introduction**

Internet of Things (IOT) is a concept where each device is assigned to an IP address and through that IP address anyone makes that device identifiable on internet. Basically, it started as the “Internet of Computers.” Research studies have forecast an explosive growth in the number of “things” or devices that will be connected to the Internet. The resulting network is called the “Internet of Things” (IoT). The recent developments in technology which permit the use of wireless controlling environments like, Bluetooth and Wi-Fi that have enabled different devices to have capabilities of connecting with each other.

Automation is today’s fact, where things are being controlled automatically, usually the basic tasks of turning ON/OFF certain devices and beyond, either remotely or in close proximity. But the fact is monitoring less devices and safety is less also more power consumption. So, we have use automation with less power here we proposed a system that consist of a computer server with internet connection, an Blynk used to connecting the server to the external network. Save the electric power and human energy. The idea behind Google assistant home automation is to control home devices with voice.

Android-based application for controlling the home utilities has certainly an incredible effect on the society, where it can also cause the elimination of discrimination towards the daily life objects when all people will get the same ease of managing utilities.

* 1. **Aim of the Project**

The main aim of this system is to build a perfect companion for someone to be at home. Generally, home automation research targeted many needs like applications that provide the luxury and smart requirements while some threw light on the special needs for elderly and disabled etc. This system is a computer-based system that can accept voice to direct commands and process them. The system provides us switching any device ON/OFF. This is a practise-based project in which we are coming up with the physical object. This IoT technology will result in controlling home utilities with the voice command produced by the user on its Android phone which will contain that software application.

* 1. **Project Scope**

In order to achieve the objective of this project, several scopes had been identified. The scope of this project includes the use of the voice recognition system together with the WIFI functionality contained in an android device in other to turn on and off household power points .The project covers the working together of WIFI and voice recognition system interfaced to work wirelessly with an ESP 8266 microcontroller board, this includes writing a program to give the ESP8266 WIFI functionality via the WIFI hardware as well as the necessary codes needed for the microcontroller to be able to function properly as desired(control power output points wirelessly). The system can be implemented in homes, small offices and malls as well, being in-charge of control of the electrical appliances. For remote access of appliances in internet or intranet. The appliances in the above-mentioned environment can be controlled in intra-network or can be accessed via internet.

Another reason is that remote device is hard to carry when user is outside from home but user’s personal phone is always with him. So, users can easily control home automation appliances and security-based system through one application through their android mobile phone.

* 1. **Project Objective**

The commands given through the Google assistant are decoded and then sent to the microcontroller, the microcontroller in turn control the relays connected to it. The device connected to the respective relay can be turned ON or OFF as per the users request to the Google Assistant. The microcontroller used is ESP8266 and the communication between the microcontroller and the application is established via Wi-Fi (Internet).

If we put the things in more short and logical form, following are some of the major aims and objectives of this project.

* This project is designed to use the voice recognition technology to control home utilities i.e., light and fan
* Google voice recognition facility will be utilised to input voice.
* Android phone will be used for the application software which will be connected to the google voice command input.
* Application software will be responsible for converting the voice command into the text format.
* Ultimately application software will transfer that command in the text format to the ESP8266 via Wi-Fi module.
* This microcontroller ESP8266 is intelligent enough to convert the text command executable according to the programming that is involved as per requirement.
* And after execution, the action will be performed.
* Commands which we have included are lights on/off, fan on/off, tv on/off and all on/off
* Major home utilities for this project are light, fan and TV. Each of them follows the certain command that is programmed.
* Controlled by any device capable of Wi-Fi (Android, iOS, PC) To achieve flexibility in control of the home appliances, and device capable of Wi-Fi connectivity will be able to obtain a secure control on the HAS (Home Automation System).
  1. **Project Modules**
* User Registration
* Device Set up with Digital Assistant like Google Home and Google Assistant
* Connecting Device with WIFI
* Controlling Devices
  + With using voice assistant (Google)
* Manually using normal switches
* With using switches in app

### Project Requirements

### Hardware

* + - ESP8266 KIT
    - 2-channel 5V SPDT Relay Module
    - Amazon Echo Dot (optional)
    - Google Nest Mini (optional)
    - USB Cable
    - Bulb
    - Fan
    - Smartphone
    - 9V DC supply
    - Connecting wires.

### Software

* + - IOT Platform (Blynk)
    - IOT Application Development Platform (Arduino IDE)
    - Google Assistant

**Chapter 2: Analysis, Design Methodology and Implementation Strategy**

* 1. **Comparison of Existing Applications with your Project**

|  |  |
| --- | --- |
| Our Project | Existing Projects |
| * This project focuses on Wi-Fi technology which is latest as per now. | * Several projects have been previously made by Bluetooth or infra-red technology. |
| * We have made this project using ESP8266 which have inbuilt WIFI module. | * Other projects are prepared using Arduino for which Ethernet Shield is required separately for Internet Connectivity. |
| * ESP8266 is highly compact in size as compared to Arduino and other traditional boards. | * Arduino a based project on home automation requires more space for their working model. |
| * This project can be efficiently controlled by Voice assistance using facility provided by Google. | * Traditional methods like app or manual switches and push-buttons were only used for controlling of appliances. |
| * We have used Blynk facility for connectivity of application with our board. | * Other projects have been done using Sinric Pro, Ubidots, etc. for connection, but does not have as better features as Blynk. |
| * Our project can control the devices running on AC as well as DC sources. | * Several projects have been made that can control only AC devices only. |

**Table 1: Comparison of Existing Applications with this Project**

* 1. **Project Feasibility Study**

It is the crucial part of the project which includes the various factors and reasons that causes the system to be accepted by the public and other firms and corporations. Following are the main feasibility concern of this project:

* + 1. **Economic feasibility**

Affordability and long-term sustainability of this project make it more acceptable. Looking around for cost-benefit analysis and risk assessment, we concluded that the invested cost will bring up with a positive outcome. Shifting of the manual process of controlling home utilities into voice-based system can totally transform the people way of interaction. Investment and cost will definitely pay off.

* + 1. **Technical feasibility**

The ease of using this Android-based application is a big advantage for special people. All it uses the Google voice recogniser and rest of the things take place through the internet. So, basically all it required having the application installed and availability of internet connection at every time. These things really make this system feasible to be accepted and promoted.

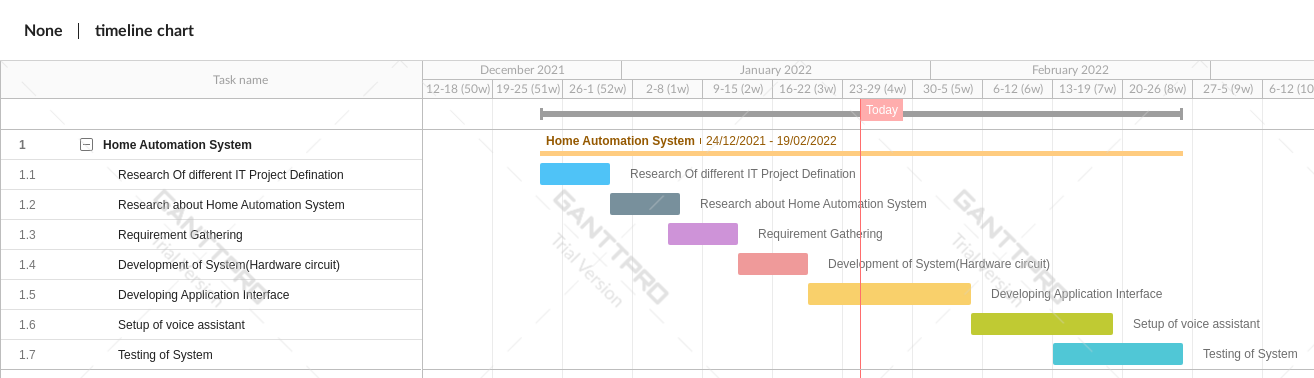
* + 1. **Market feasibility**

By carefully considering the advantages of this voice-based home automation system, a deep public interest is expected over its implementation on the commercial level. Due to its huge demand, it can capture media attention and ultimately this will lead to the evolution of huge marketing strategy of this system. As the project really focuses on the disable and special people, so we are considering this project quite feasible.

* + 1. **Time Based**

Due to connection of this project is directly with internet, we can have a real-time application for this project. In no time, we can switch on/off the light or fans using any of the ways i.e., Voice control or through app, we can see real-time changes on the configured devices.

* 1. **Project Timeline chart**



**Figure 1: Timeline chart of Project which shows the deadlines and duration of time taken for each module of the project to be completed.**

* 1. **Detailed Modules Description**
* **User Registration**

The user will have to register himself with Blynk Application from the website. Also, user will have to create templates (in general rooms) and will have to add devices like light, fan, etc. to the Blynk App.

Also, the user will have to copy the Blynk ID and Blynk Password and have to set in the code which is to be uploaded in ESP8266.

* **Device Set up with Digital Assistant like Google Home**

The user will have to download the Google Assistant App in his/her Android Smartphone. After installing these apps, the user will have to add his/her google account which was earlier configured with Blynk App. So, after this step, the user can give commands which will be decoded and will be sent to IFTTT server. In the IFTTT server, user will have to create different applets which will have to direct his voice commands to Blynk server.

* **Connecting Device with WIFI**

The code written in C++ language on the platform of Arduino IDE to control the devices will consist of Blynk ID, Blynk password as well as WIFI Name and WIFI Password. So as soon as it gets to WIFI network in close range, it will get connected to it and can perform the actions. Also, we must provide a constant power supply to Microcontroller board-ESP8266 via USB cable connected to a PC or Mobile Charger Adapter. Hence all the commands to control the device originated from Blynk Application will be decoded to ESP8266 through internet connection via WIFI Hotspot Service.

* **Controlling Devices**
  + **With using voice assistant (Google)**

The user will command in the Google Assistant app which will be interpreted and a request for the same will be passed to IFTTT server from which it maps accordingly with the applets created by us on IFTTT server and an appropriate request is sent to Blynk server. From Blynk server the command to control device is operated and sent to ESP8266 board.

* **With using switches in app**

The user can switch on or off the device using Blynk Mobile application after selecting the device from dashboard. Thus, this is the way where you can control the device from anywhere just using Android Smartphone.

* **With using switches in Website**

The user can switch on or off the device using Blynk website after selecting the device from dashboard. This is the way by which user can control the device through Blynk website.

* **Manually using normal switches**

The user can also switch on or off the device manually which is traditional way.

* 1. **Project SRS**
     1. **Use Case Diagram**

**System**  
Draw your system's boundaries using a rectangle that contains use cases. Place actors outside the system's boundaries.



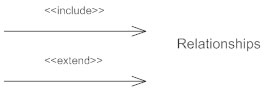
**Use Case**Draw use cases using ovals. Label the ovals with verbs that represent the system's functions.

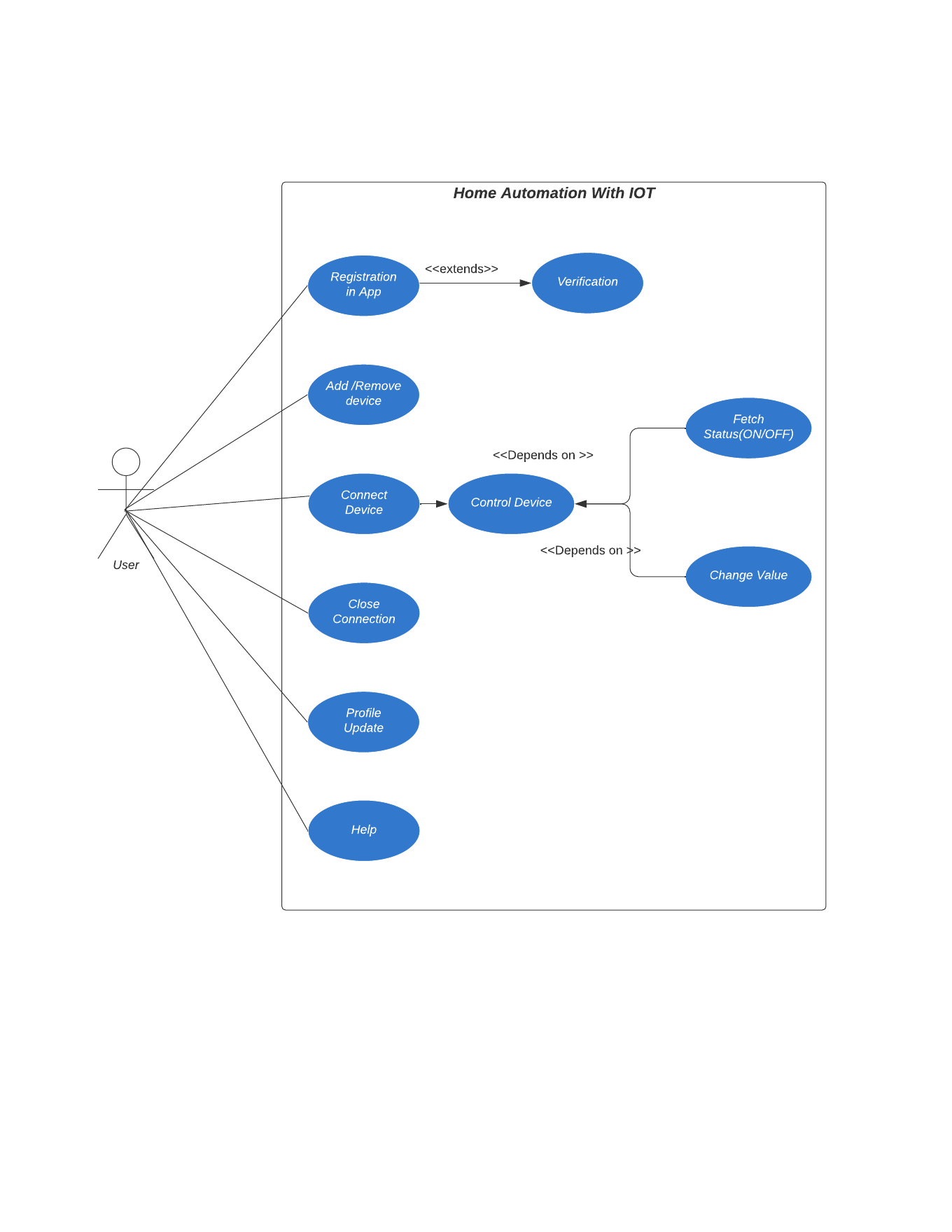
****

**Actors**Actors are the users of a system. When one system is the actor of another system, label the actor system with the actor stereotype.



**Relationships**Illustrate relationships between an actor and a use case with a simple line. For relationships among use cases, use arrows labelled either "uses" or "extends." A "uses" relationship indicates that one use case is needed by another in order to perform a task. An "extends" relationship indicates alternative options under a certain use case.

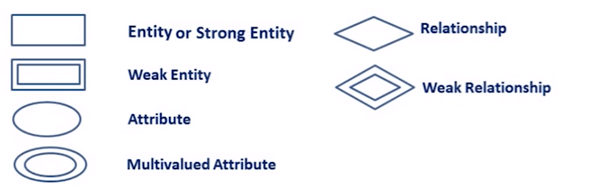
****

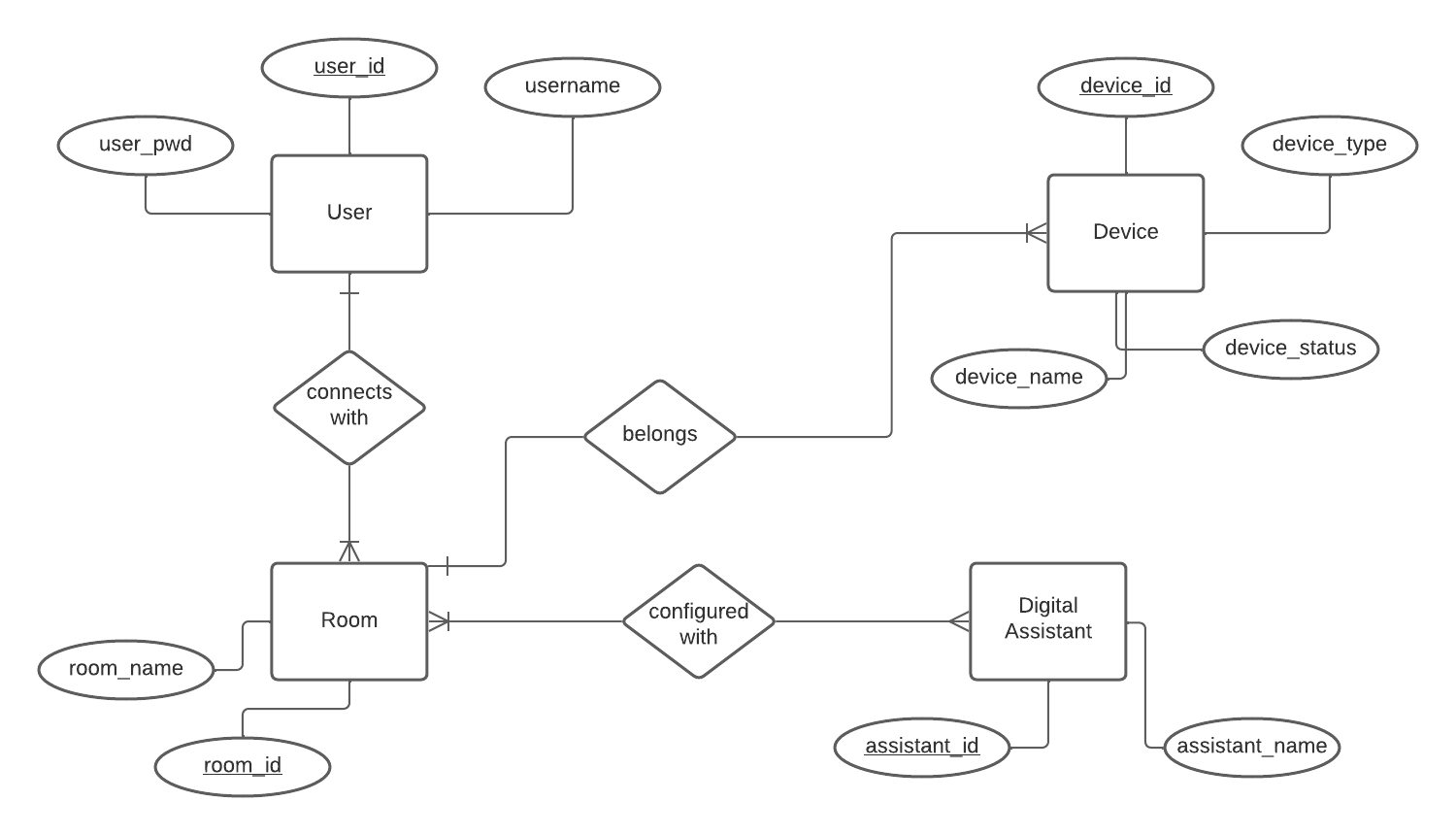


**Figure 2: Use Case Diagram shows the functionality of user and how he interacts with other components**

* + 1. **Entity Relationship Diagram**

**Rectangles:** This Entity Relationship Diagram symbol represents entity types **Ellipses:** Symbol represent attributes **Diamonds:** This symbol represents relationship types **Lines:** It links attributes to entity types and entity types with other relationship types **Primary key:** attributes are underlined **Double Ellipses:** Represent multi-valued attributes

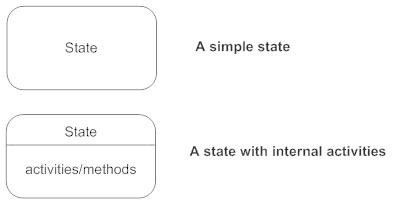




**Figure 3: ER Diagram which allows you to communicate with the logical structure of the database to users**

* + 1. **State diagram**

**States**  
States represent situations during the life of an object. You can easily illustrate a state in using a rectangle with rounded corners.



**Transition**  
A solid arrow represents the path between different states of an object. Label the transition with the event that triggered it and the action that results from it. A state can have a transition that points back to itself.

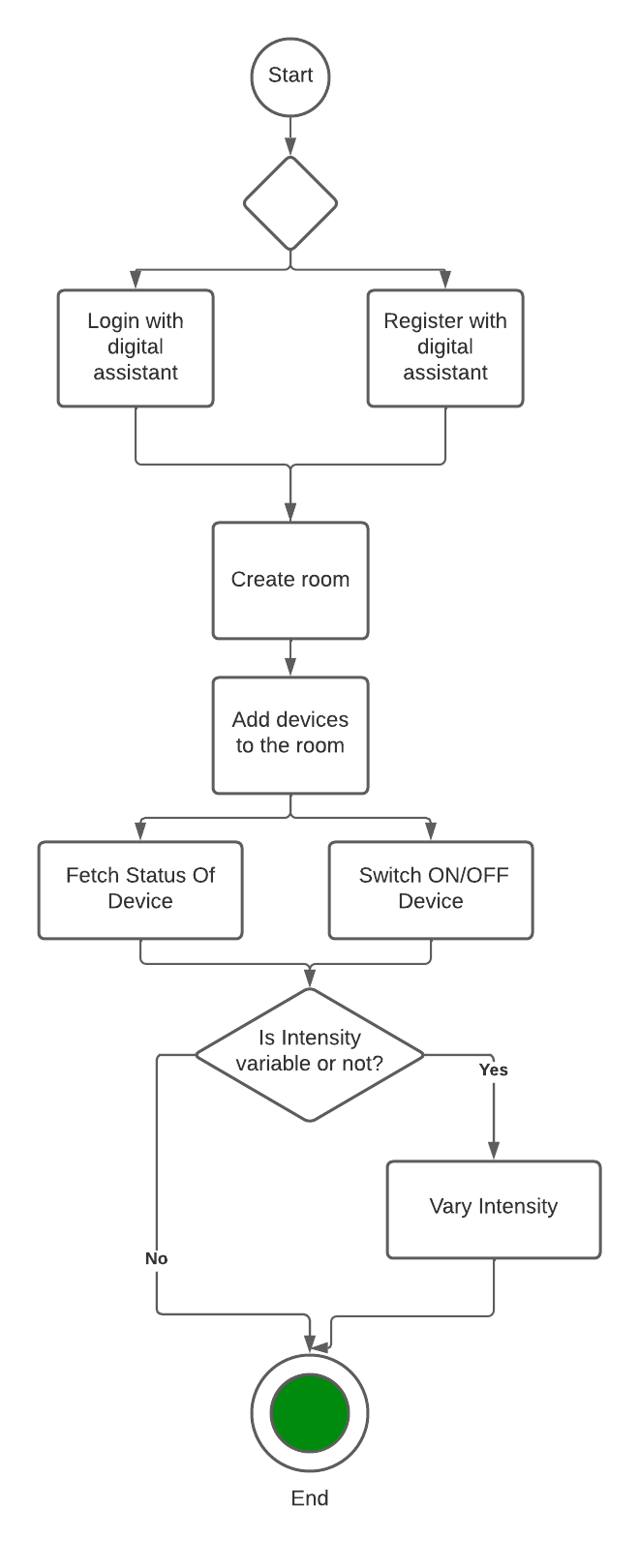
Transitions - State diagram

**Initial State**  
A filled circle followed by an arrow represents the object's initial state.

Inititial state - State diagram

**Final State**  
An arrow pointing to a filled circle nested inside another circle represents the object's final state.

Final state - State diagram



**Figure 4: State Diagram which behaviour of classes in response to external stimuli.**

* + 1. **Class diagram**

#### Visibility

Use visibility markers to signify who can access the information contained within a class.



#### Associations

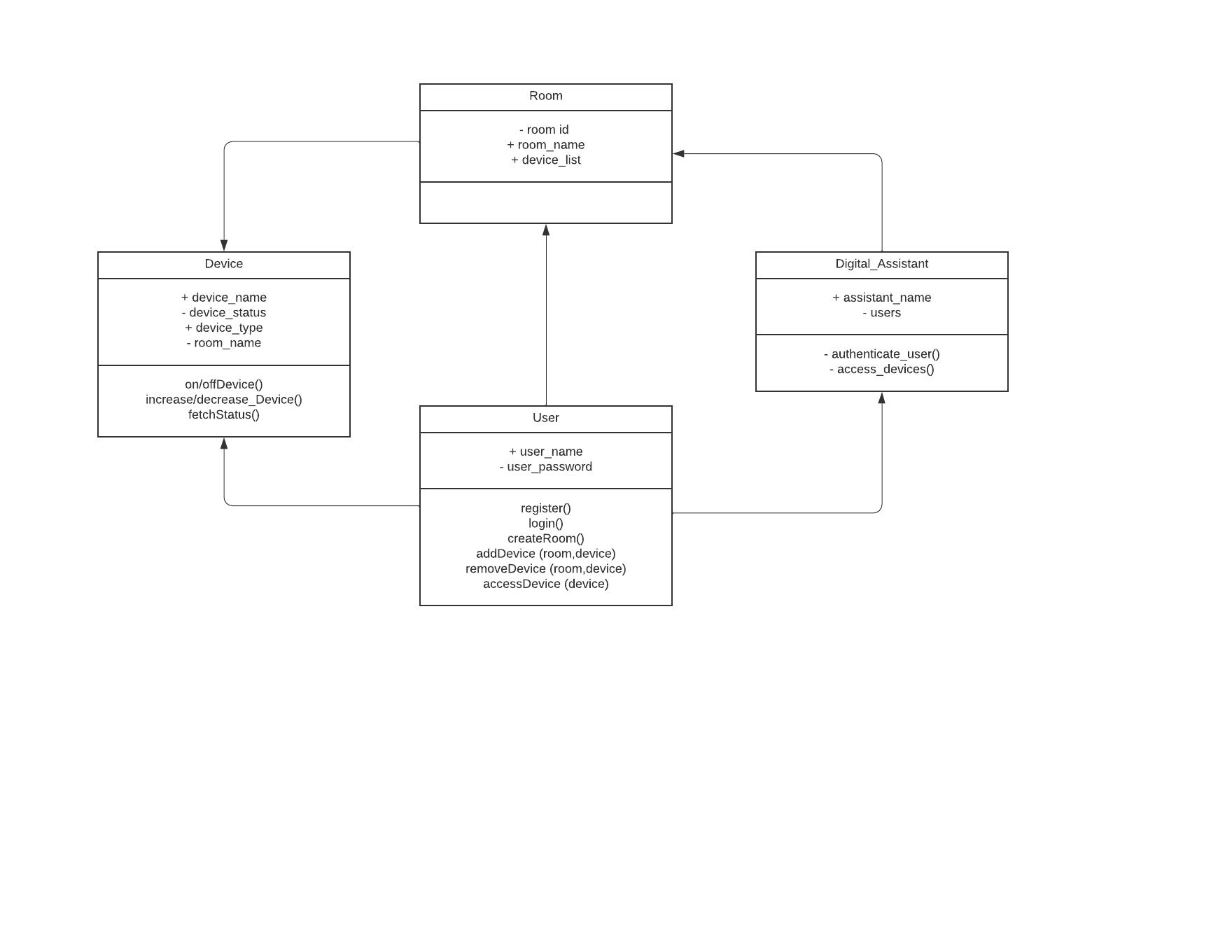
Associations represent static relationships between classes.



#### Active Classes

Active classes initiate and control the flow of activity, while passive classes store data and serve other classes.





**Figure 5: Class Diagram shows relationships between classes, objects, attributes, and operations.**

* + 1. **Sequence Diagram**

**Lifeline**represents each instance in an interaction.



**Activate** is used to denote participant activation. Once a participant is activated, its lifeline appears.



**Message** is an element that defines a specific kind of communication between instances in an interaction.

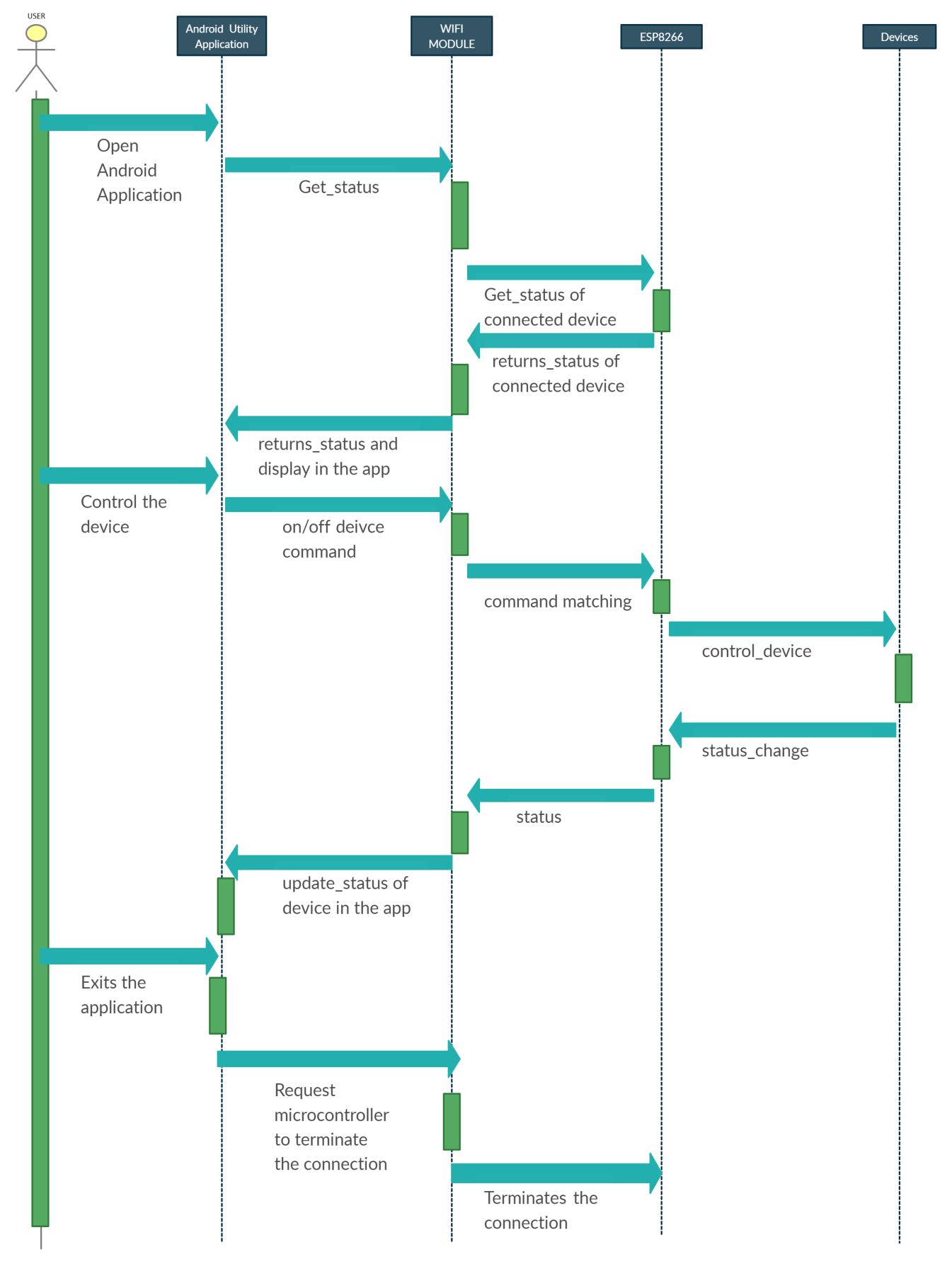
Lifeline

**Actor**specifies a role played by a user or any other system that interacts with the subject.

****

**Note**contains comments or textual information.

Note



**Figure 6: Sequence Diagram model the interactions between objects in a single use case.**

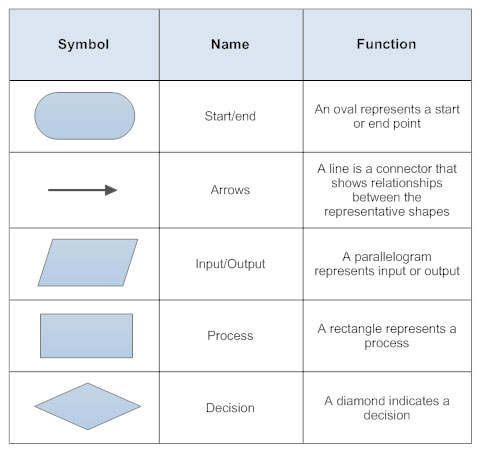
* + 1. **System Diagram**

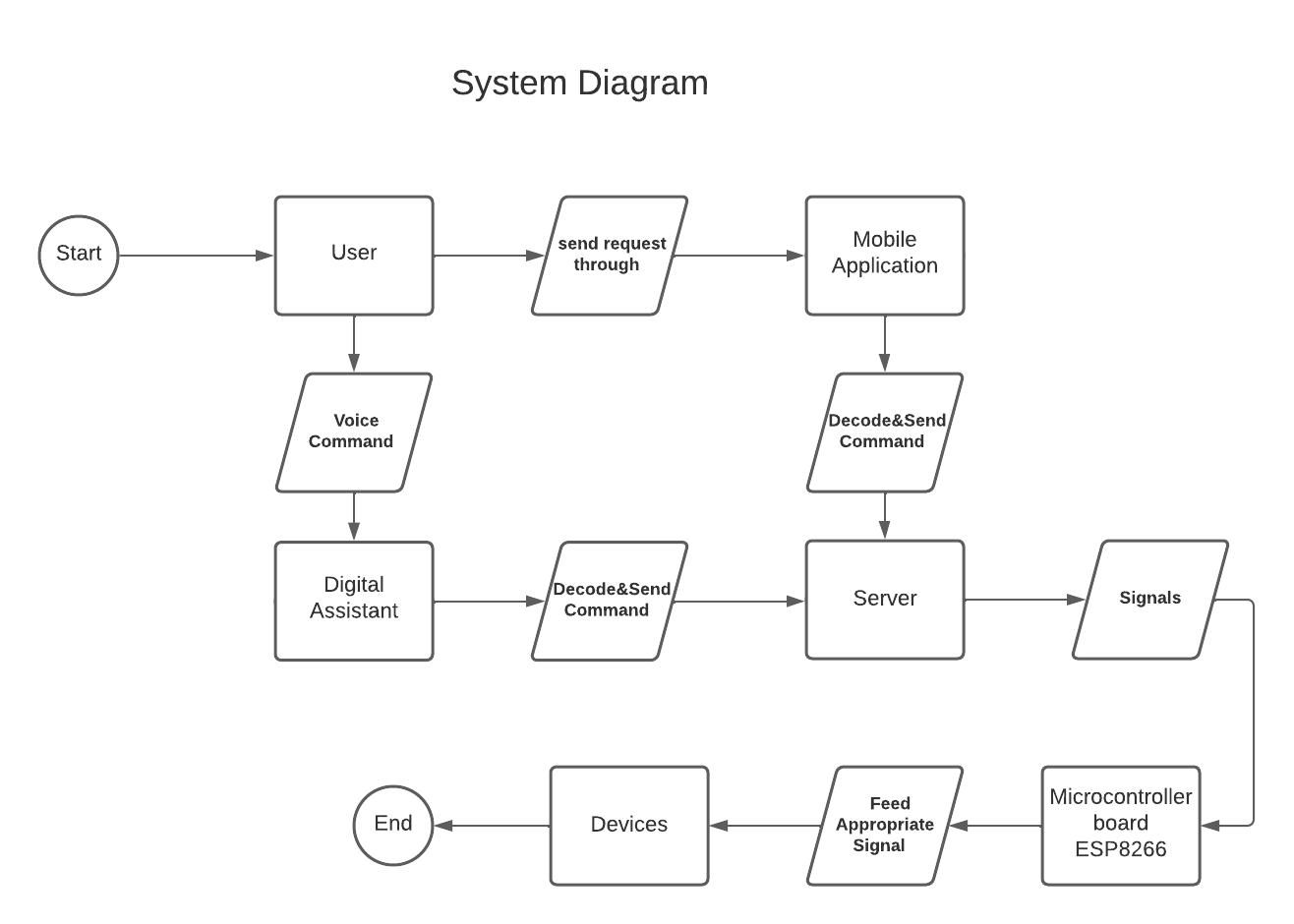
**Rectangle Shape** - Represents a process

**Oval or Pill Shape** - Represents the start or end

**Diamond Shape** - Represents a decision

**Parallelogram** - Represents input/output





**Figure 7: System Diagram which represent different types of actions or steps in a process.**

* 1. **Database design and Normalization**
     1. **Data Dictionary**
        1. **Table name: User\_registration**

**Description: To store all the user’s username, password and id.**

**Primary Key: User\_id**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr. No.** | **Name** | **Datatype** | **Constraint** | **Description** |
| 1 | user\_id | VarChar2(10) | Primary Key | To store user id |
| 2 | username | VarChar2(15) | Not null | To store the username  of user |
| 3 | user\_pwd | VarChar2(12) | Not null ,  6>length >12 | To store the password  of user |

**Table 2: User\_registration table**

* + - 1. **Table name: devices**

**Description: To store all the device details**

**Primary Key: device\_id**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr. No.** | **Name** | **Datatype** | **Constraint** | **Description** |
| 1 | device\_id | VarChar2(15) | Primary Key | To store id of device |
| 2 | user\_id | VarChar2(12) | Foreign Key | To store the id  of user |
| 3 | device\_name | VarChar2(10) | VarChar2(10) | To store name of device |
| 4 | device\_status | VarChar2(10) | Boolean | To store status of device |
| 5 | device\_type | VarChar2(10) | VarChar2(10) | To store type of device |

**Table 3: Devices table**

* + - 1. **Table name: room**

**Description: To store all the room details**

**Primary Key: room\_id**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr. No.** | **Name** | **Datatype** | **Constraint** | **Description** |
| 1 | room\_id | VarChar2(15) | Primary Key | To store id of room |
| 2 | device\_id | VarChar2(10) | Foreign Key | To store device id |
| 3 | room\_name | VarChar2(12) | Not null | To store name of room |

**Table 4: Room table**

* + - 1. **Table name: digital\_assistant**

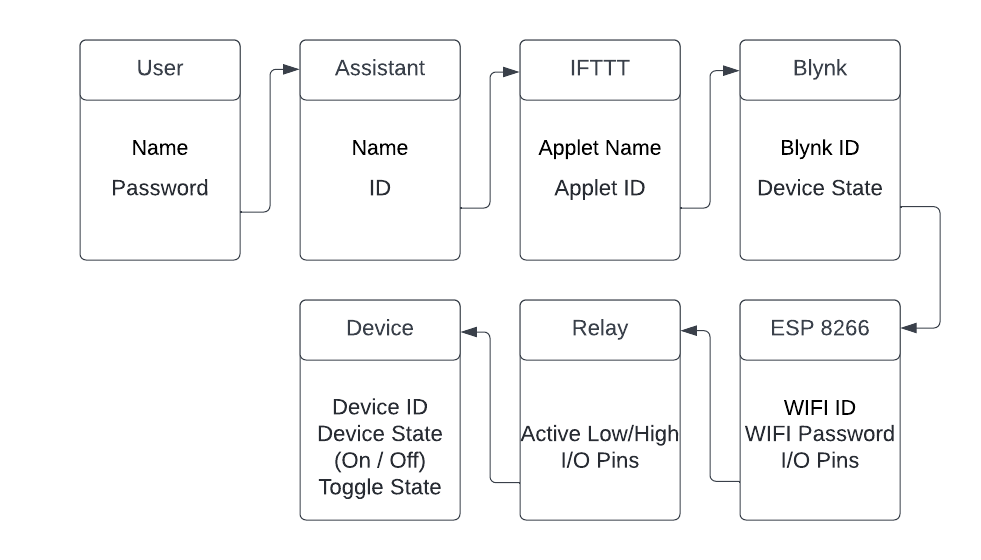
**Description: To store all the digital assistant’s details**

**Primary Key: dig\_id, room\_id**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr. No.** | **Name** | **Datatype** | **Constraint** | **Description** |
| 1 | assistant\_id | VarChar2(15) | Primary Key | To store id of digital assistant’s id |
| 2 | room\_id | VarChar2(12) | Primary Key | To store id of room’s id |
| 3 | assistant\_name | VarChar2(10) | Not null | To store digital assistant’s name |

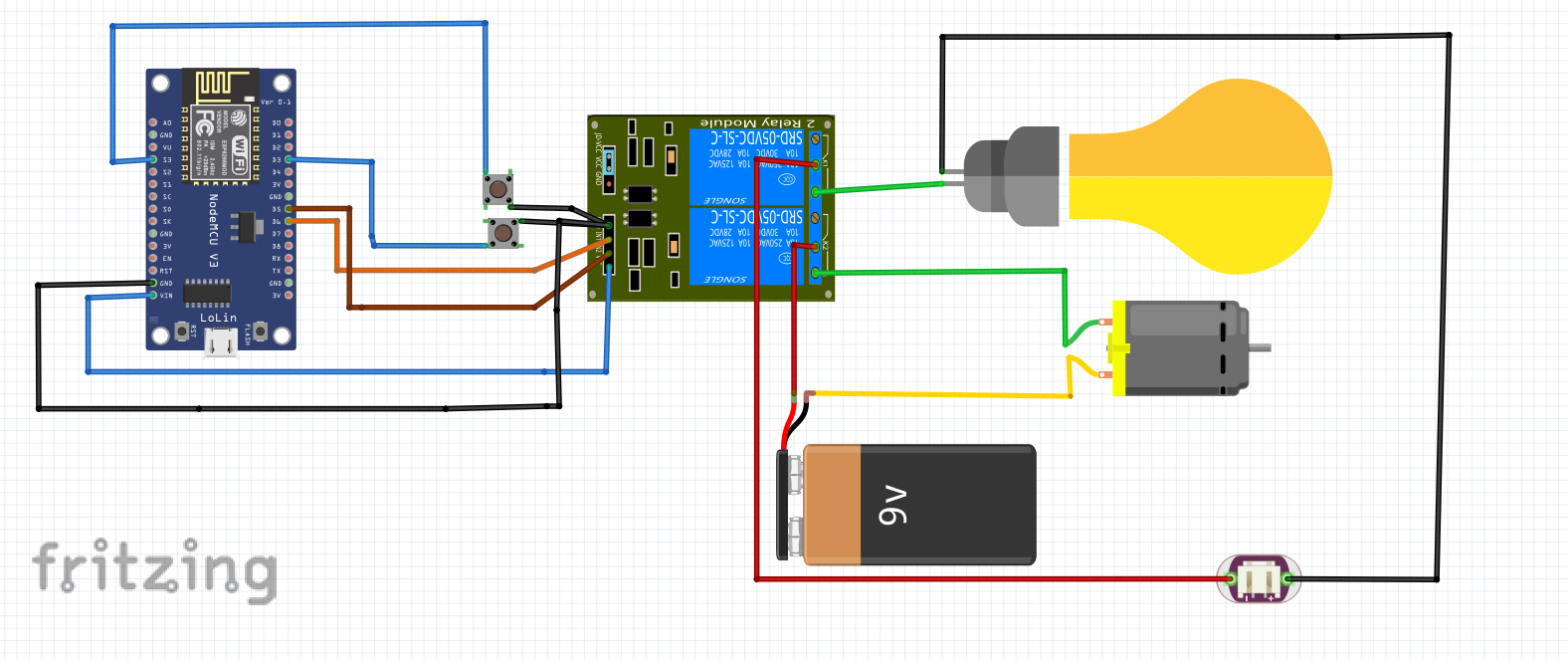
**Table 5: Digital\_assistant table**

* 1. **Database Relation Diagram**

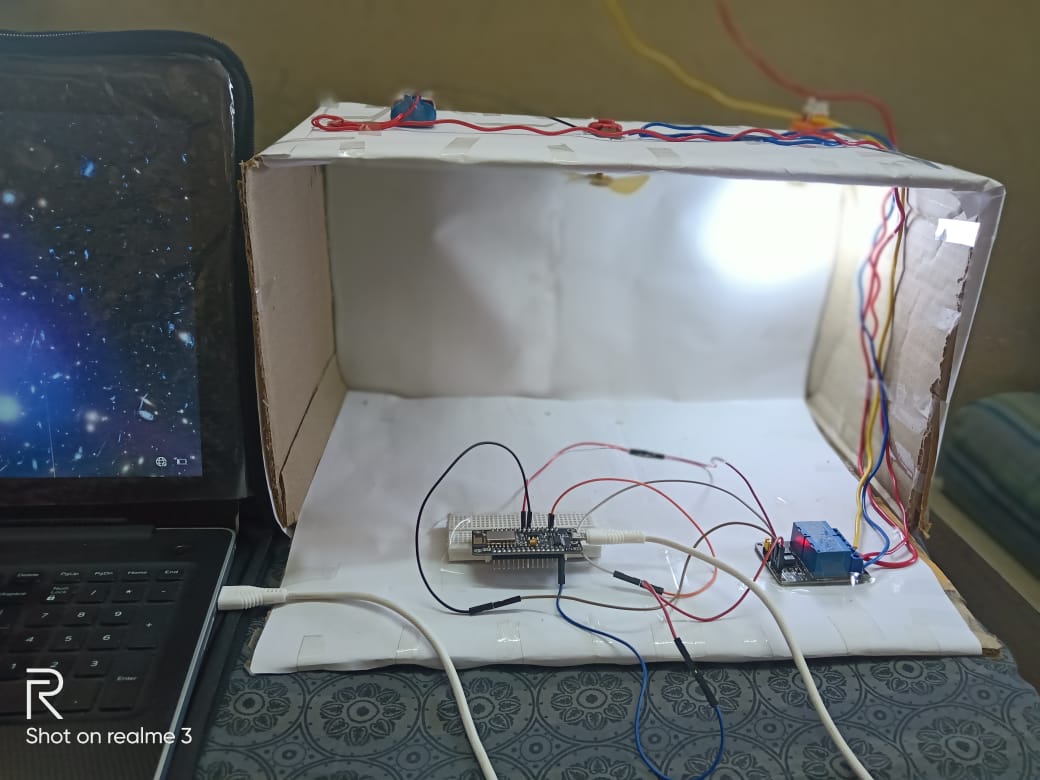


**Figure 8: Database Relation Diagram shows flow of data from starting from user to end point.**

* 1. **Template Design**
     1. **Circuit Design of Project**

**Figure 9: Circuit Diagram of Home Automation Project which have capability to control and handle AC source device as well as DC source device.**

* + 1. **Physical Design and Model of Project**

** Figure 10: Model of project based on real time house which contains of appliances like fan (running on DC source) and bulb fan (running on AC source) connected with Microprocessor board.**

**Chapter 3: Implementation and Testing**

* 1. **Software and Tools**
     1. **IOT Platform (Blynk Web Application)**

The website <https://blynk.cloud/dashboard/> is used as main service to control the devices remotely through internet.

This website provides us the service to create rooms(templates) and can contain more than one device simultaneously. Also, the controlling of device, UI of web application is provided by the above-mentioned website.

* + 1. **IOT Platform (Blynk Mobile Application)**

The app for Blynk Mobile application can be download from <https://play.google.com/store/apps/details?id=cloud.blynk&hl=en_IN&gl=US> is used one of the options to control the devices remotely through internet.

This app is similar to the web application of Blynk but the app works on Android/IOS device as a native app. This app provides same behaviour and UI to user as most of users will carry a smartphone.

* + 1. **IFTTT (If this than that) Web Service**

The website https://ifttt.com/ is used as service for voice command provided by user through Google Assistant. Here various applets are created for triggering of different voice commands provided by user.

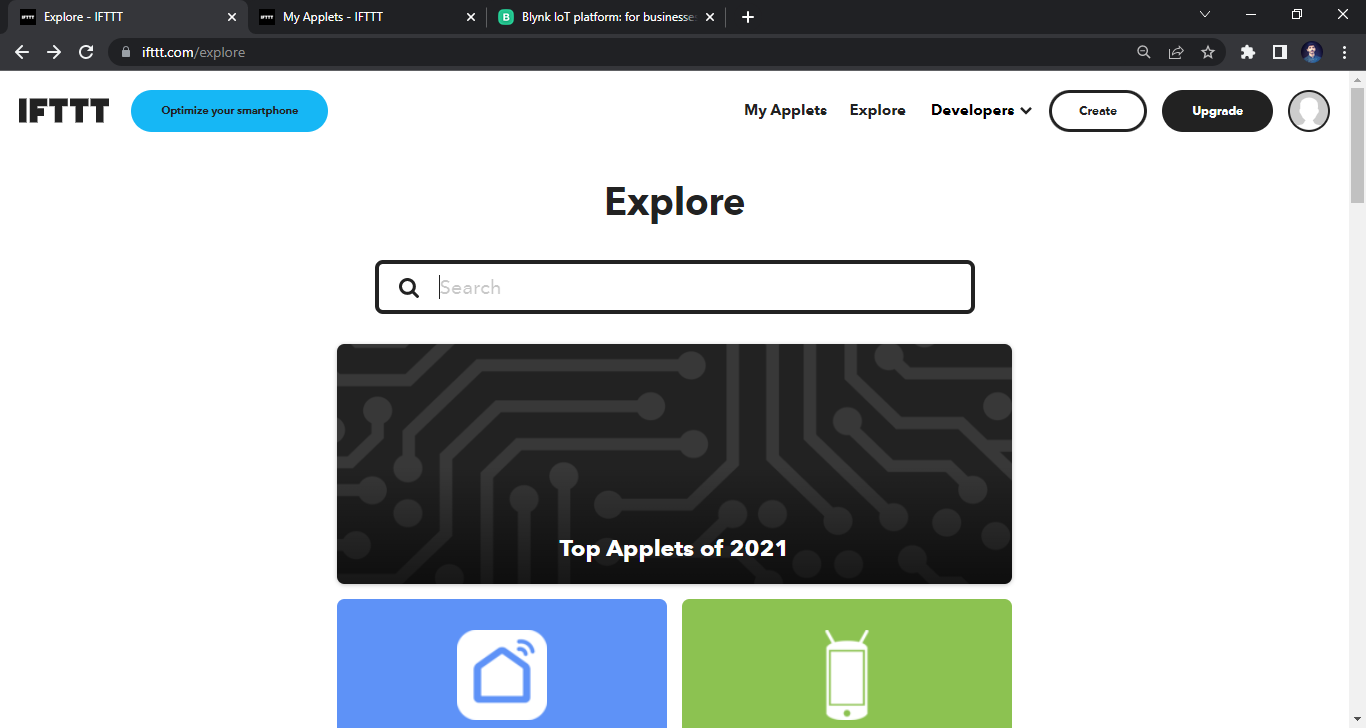
* + 1. **IOT Application Development Platform (Arduino IDE)**

The best IoT platform to write and deploy code into microcontroller board is Arduino IDE. The Arduino IDE can be downloaded from <https://www.arduino.cc/> website and will work as a code editor. The user can compile, run and test our code in Arduino IDE. After testing the code and finding for bugs, user can then finally upload our code to our device ESP8266. So once our code is uploaded on device, it will sense automatically and gets connected with Hotspot ID and Hotspot Password provided in code and receive the requests and perform accordingly.

* + 1. **Google Assistant**

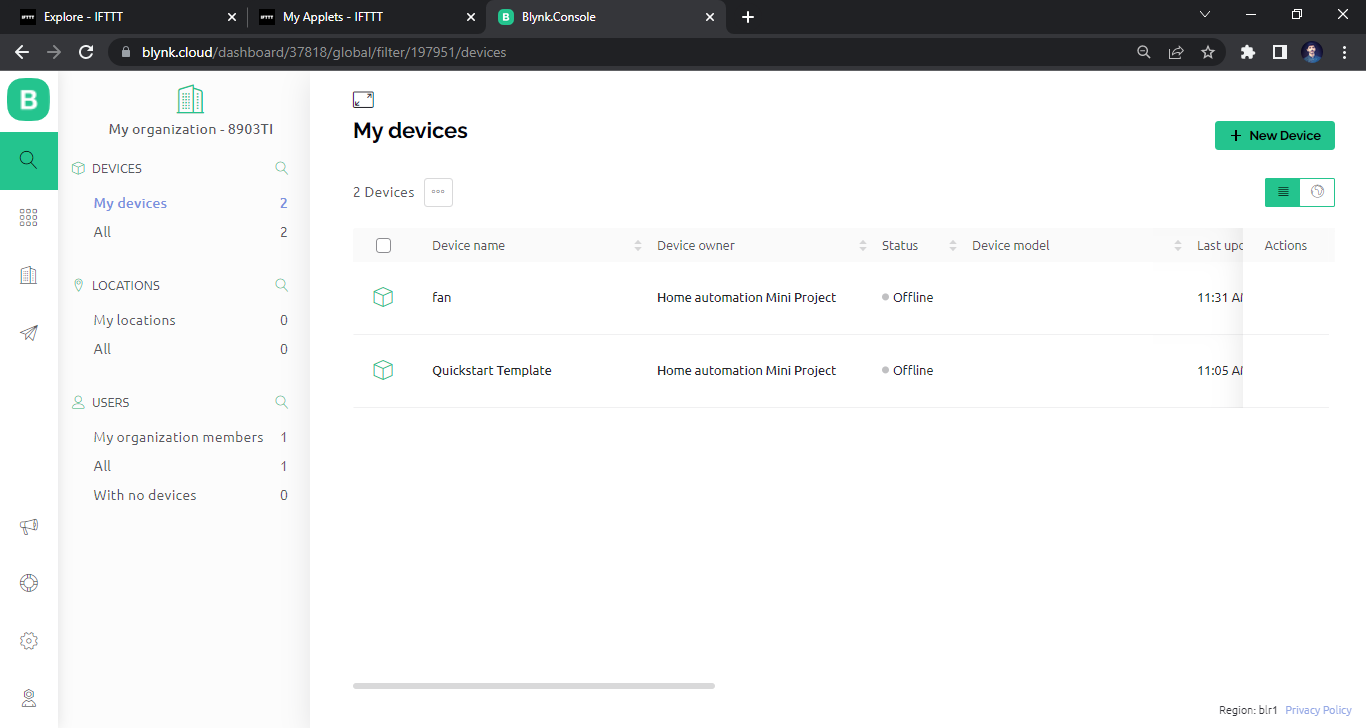
Google Assistant is now pre-installed app in every Android Device. So, there is no need to externally download the application. So, user can open the assistant and give the voice commands like “Turn on the Light” OR “Turn Off the light” so it will send appropriate signals to IFTTT server which will send the request to Blynk Server.

* 1. **User Interface and Snapshot**
     1. **IFTTT Website**

****

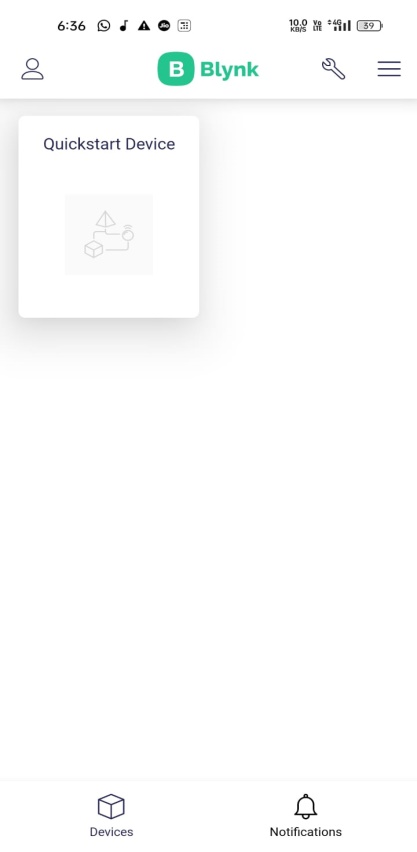
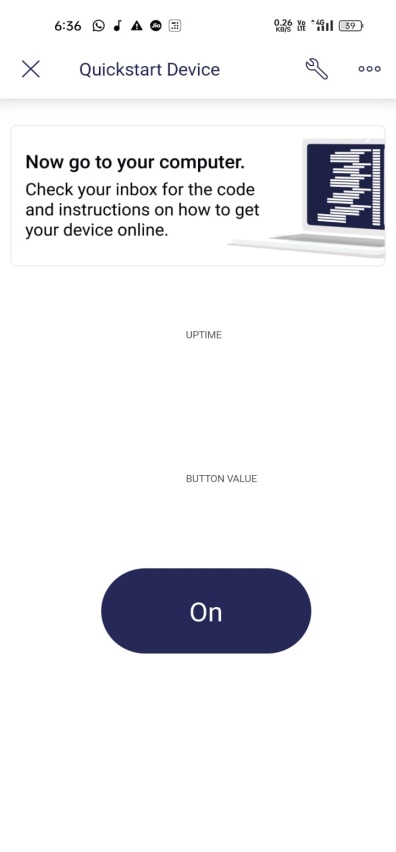
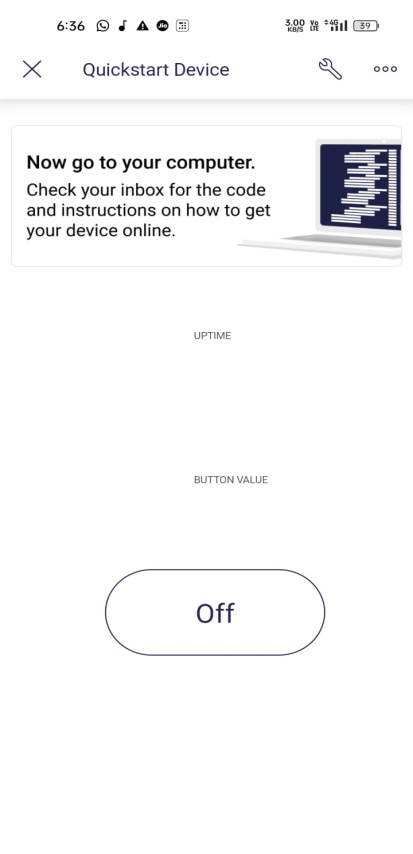
**Figure 11: IFTTT Website’s UI which provides facility to Automate from anywhere, anytime.**

* + 1. **Blynk Web Application**

****

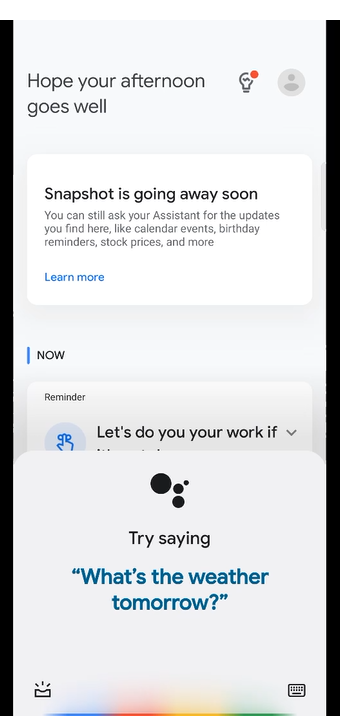
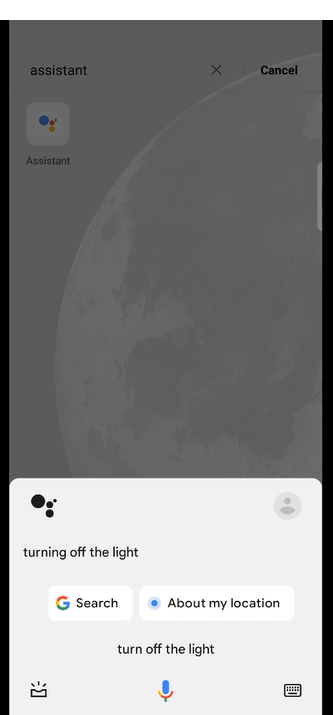
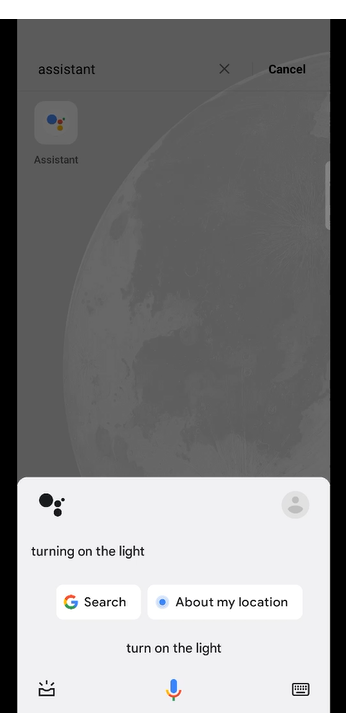
**Figure 12: Blynk Website’s UI which helps to deploy, and remotely manage connected electronic devices at any scale.**

* + 1. **Blynk Mobile Application**

****

**Figure 13, Figure 14 & Figure 15: Blynk App’s UI which opens up with a dashboard. It helps you to select specific device and control it seamlessly.**

* + 1. **Google Assistant**

****

**Figure 16, Figure 17 & Figure 18: Google Assistant’s UI which opens up the mic of smartphone and waits for users’ command and assist the user for specific command provided.**

* 1. **Testing using Use Cases**
     1. **User Registration with IFTTT**

**Test Scenario:** To register the user with IFTTT

**Steps:** 1) Visit the website <https://ifttt.com/>

2) Click on Login

3) Enter the registration details

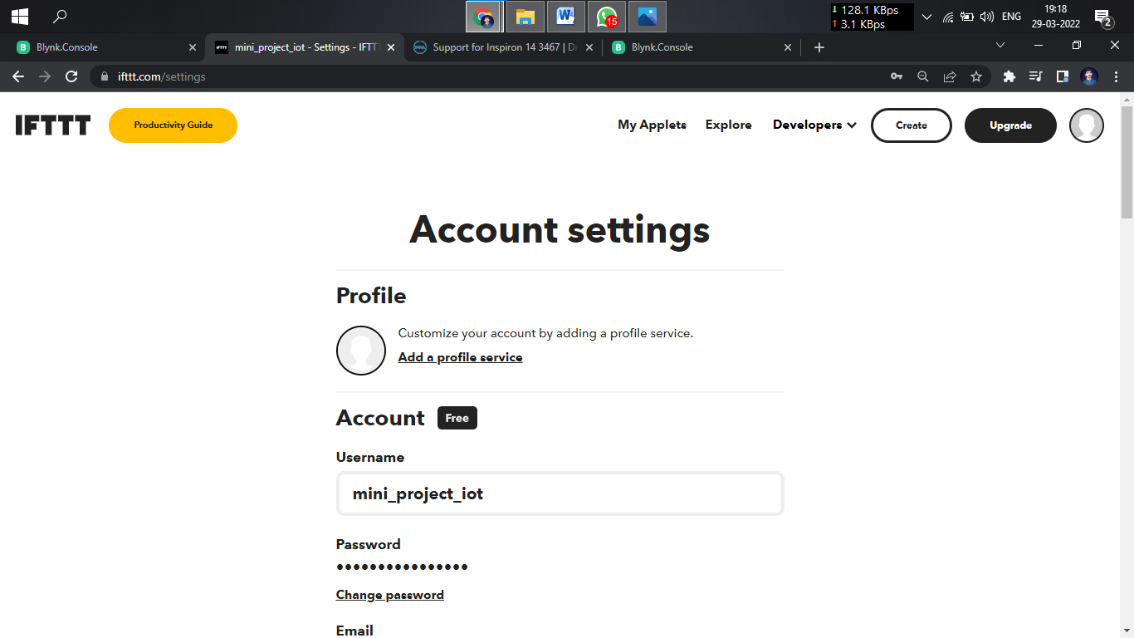
4) Sample Test Data are:

User Email: [harshmajithiya9@gmail.com](mailto:harshmajithiya9@gmail.com)

User Password: 12345678

**Expected Result:** The user will get logged in with the IFTTT successfully.

**Actual Result:** As Expected



**Figure 19: After Logging in successfully with IFTTT webservice from the website.**

* + 1. **User Registration with Blynk**

**Test Scenario:** To register the user with Blynk

**Steps:** 1) Visit the website <https://blynk.cloud/dashboard/>

2) Click on Login

3) Enter the registration details

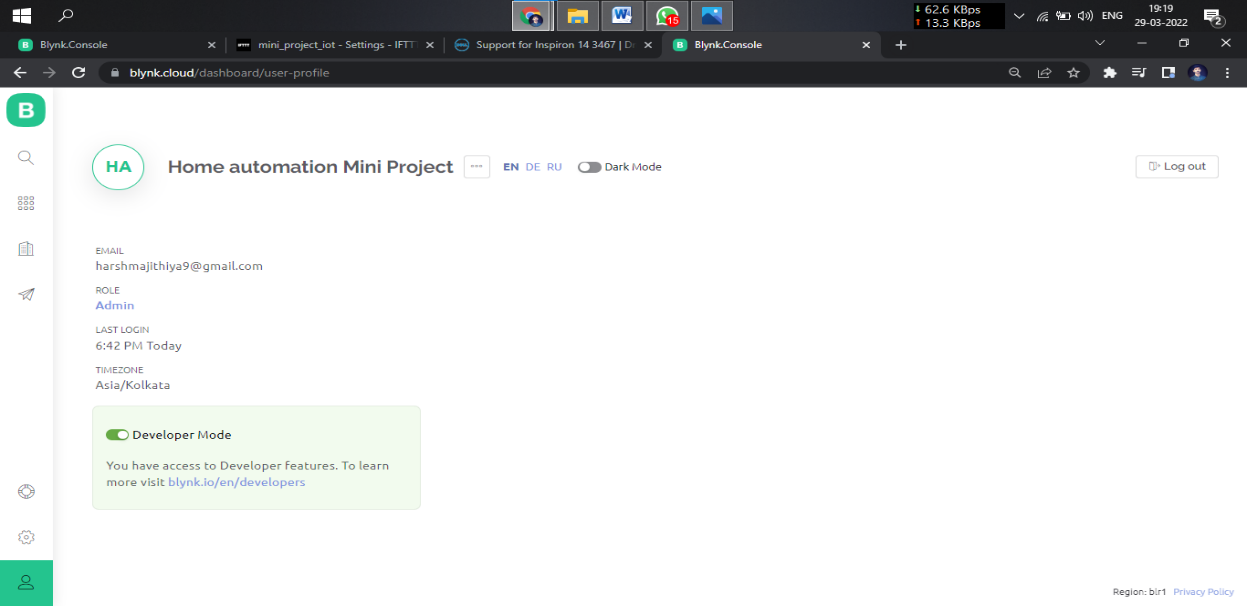
4) Sample Test Data are:

User Email: [harshmajithiya9@gmail.com](mailto:harshmajithiya9@gmail.com)

User Password: 12345678

**Expected Result:** The user will get logged in with the Blynk Console successfully.

**Actual Result:** As Expected

****

**Figure 20: After Logging in successfully with Blynk Console from the website.**

* + 1. **Setting up mobile device with Google Assistant**

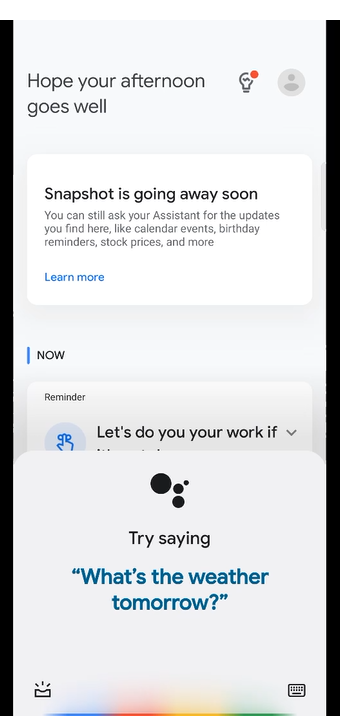
**Test Scenario:** To register the android device with Google Home assistant.

**Steps:** 1) Download Google Home Assistant App from PlayStore from the link <https://play.google.com/store/apps/details?id=com.google.android.apps.googleassistant&hl=en_IN&gl=US>

2) Register Gmail Account with application

**Expected Result:** The user will start using the Google Assistant Services

**Actual Result:** As Expected

****

**Figure 21: After Connecting Google Assistant with provided Gmail Account**

* + 1. **Controlling device with Google Assistant**

**Test Scenario:** To switch device on or off with Google Home assistant.

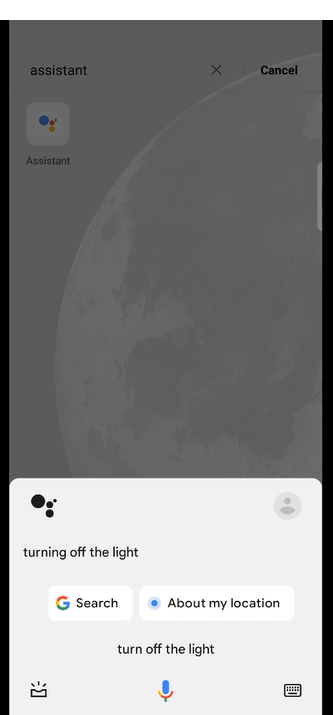
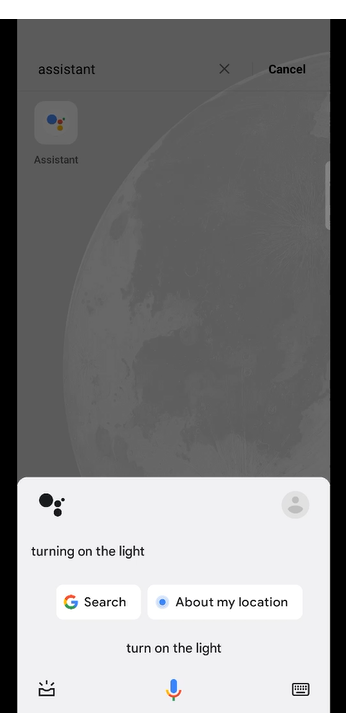
**Steps:** 1) Say “Ok Google” to open up Google Assistant.

2) Say “Turn on the device (For Example: light)” to turn up the device.

3) Say “Turn off device (For Example: light)” to switch off the device.

**Expected Result:** The user will able to control the device using voice commands.

**Actual Result:** As Expected

** **

**Figure 22 and Figure 23: User controlling his devices by Google Assistant.**

* + 1. **Controlling device with Web application and Mobile Application of Blynk**

**Test Scenario:** To switch device on or off with Blynk Website and Blynk Mobile Application.

**For Mobile Application:**

**Steps:** 1) Download Blynk IoT App from PlayStore from the link <https://play.google.com/store/apps/details?id=cloud.blynk&hl=en_IN&gl=US>

2) Register Gmail Account with application.

3) Click on your device

4) Press on toggle button to switch on or off the device

**For Web Application:**

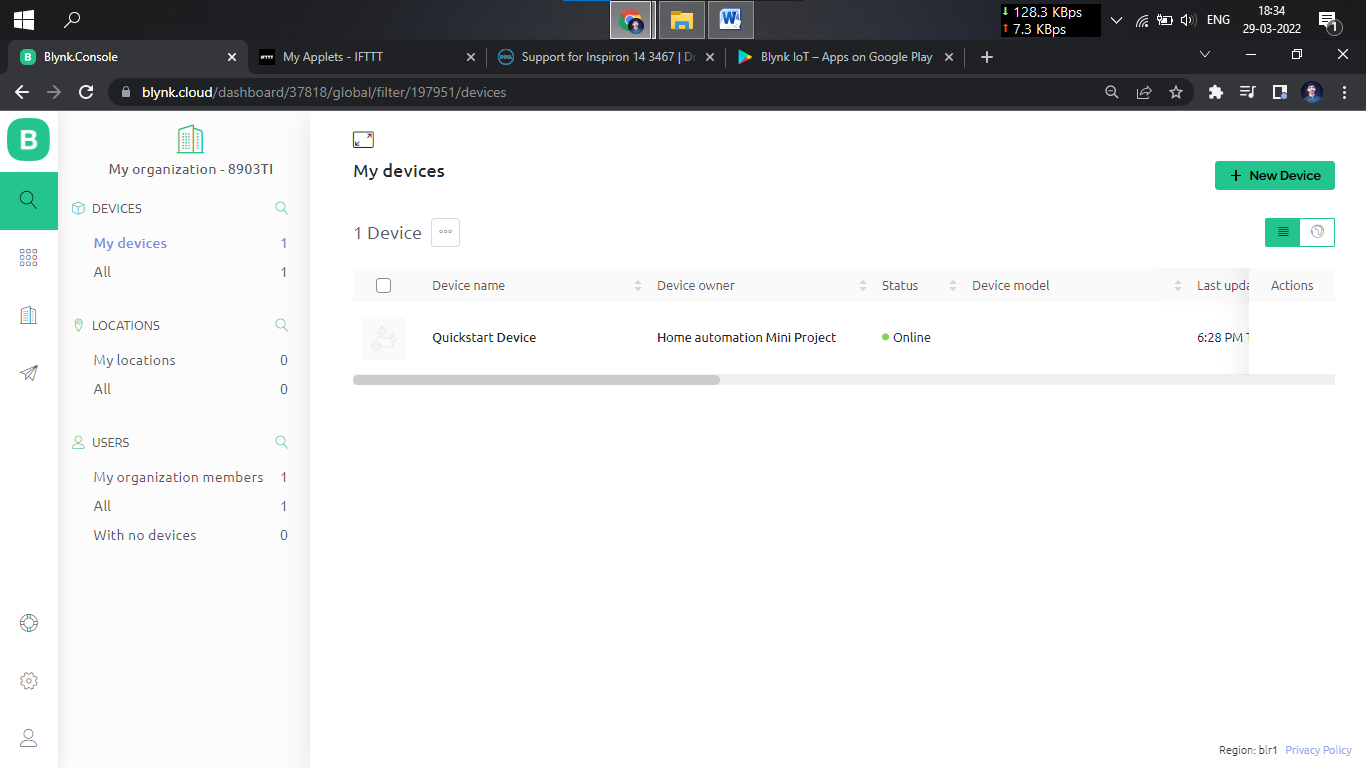
**Steps:** 1) Visit the website <https://blynk.cloud/dashboard/>

2) Click on your device

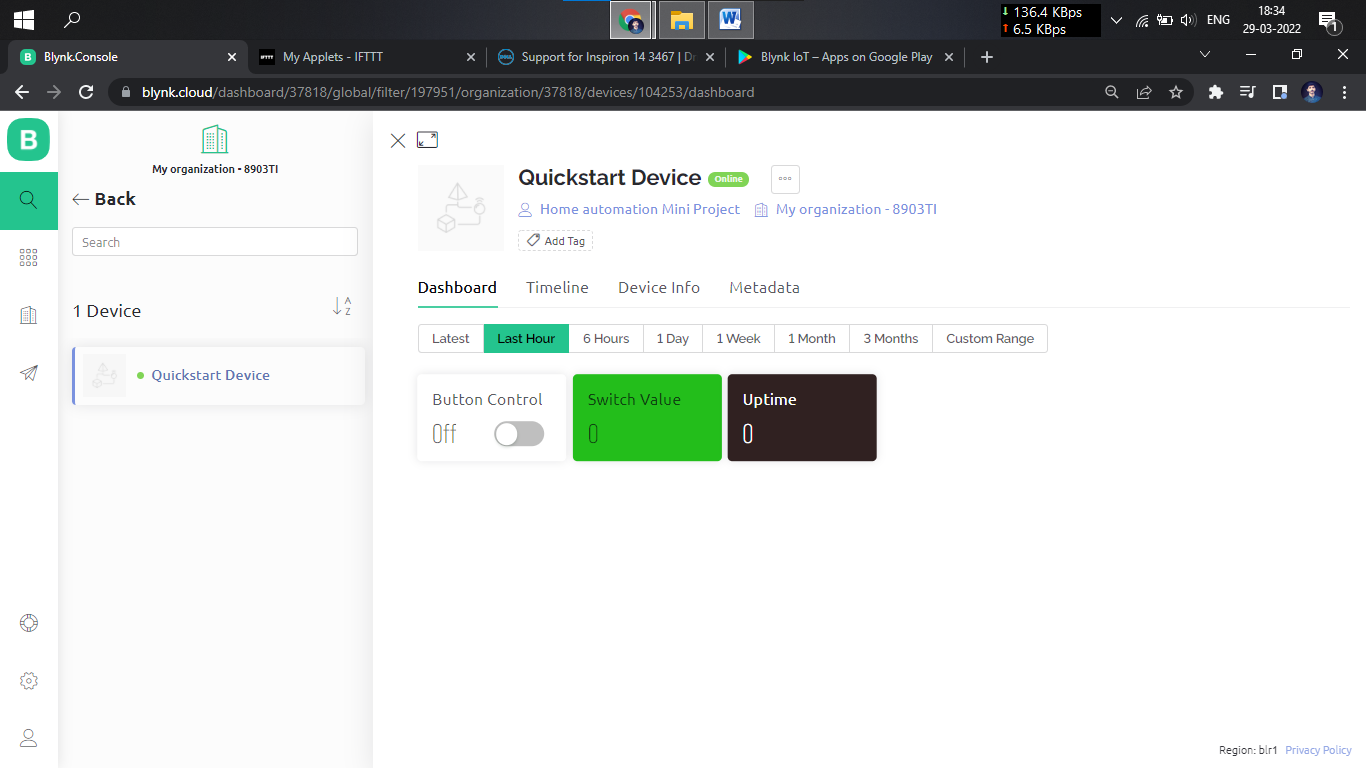
3) Press on toggle button to switch on or off the device

**Expected Result:** The user will able to control the device using web application as well as mobile application of Blynk Iot Platform.

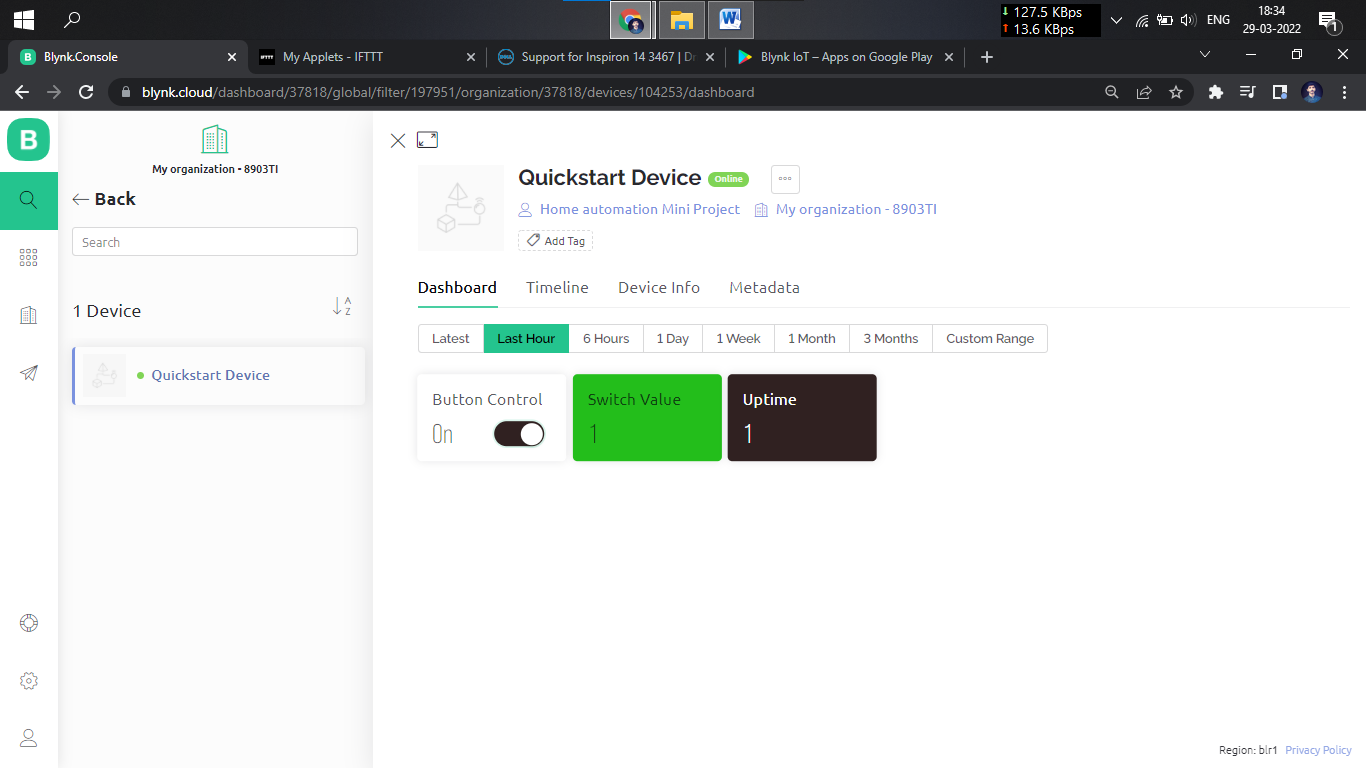
**Actual Result:** As Expected

****

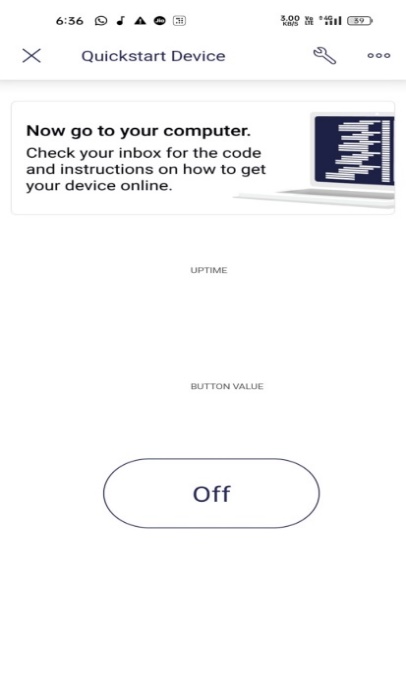
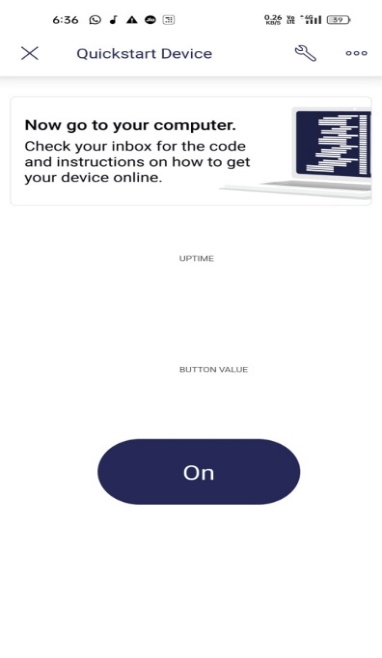
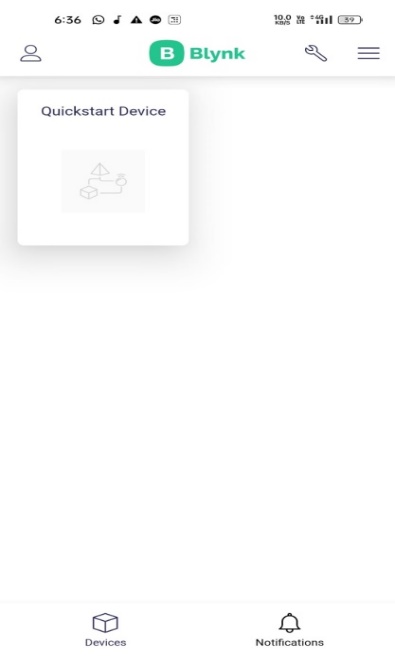
**Figure 24: Opening Blynk Web Application Dashboard and selecting any device.**

****

**Figure 25: Switching off previously selected device.**

****

**Figure 26: Switching on our previously selected device.**

****

**Figure 27, Figure 28 and Figure 29: Opening Blynk Mobile Application Dashboard and selecting our device and toggling the states of the device previously selected from dashboard.**

**Chapter 4: Conclusion and Future work**

**4.1 Conclusion**

Consumers are looking to secure their home environment in today’s unpredictable world, and the new home automation service gives them the peace of mind that they need to protect their family’s well-being. This project is about wireless home automation using Android mobile helps us to implement such a fantastic system in our home at a very reasonable price using cost-effective devices.

Thus, it overcomes many problems like costs, inflexibility, security etc. In addition, will provide greater advantages like it decrease our energy costs, it improves home security. In addition, it is very convenient to use and will improve the comfort of our home. The project has proposed the idea of smart homes that can support a lot of home automation systems.

Also, in home and building automation systems, the use of wireless technologies gives several advantages which cannot be achieved by using a wired network.

Some other benefits of this system are:

1) Reduced installation costs.

2) Easy deployment, installation, and coverage.

3) System scalability and easy extension.

4) Aesthetical benefits.

5) Integration of mobile devices.

For all these reasons, wireless technology is not only an attractive choice in renovation and

refurbishment, but also for new installations.

**4.2 Future work**

Well, no system is ever perfect. It always has a scope for improvement. One just needs to put on a thinking cap and try and make the system better. The future scope for this project can be huge. There are many factors to improve on to make this project more powerful, intelligent, scalable, and to become better overall for home automation.

* Future scope for the home automation systems involves making homes even smarter.
* Homes can be interfaced with sensors including motion sensors, light sensors and temperature sensors and provide automated toggling of devices based on conditions.
* More energy can be conserved by ensuring occupation of the house before turning on devices and checking brightness and turning off lights if not necessary.
* The system can be integrated closely with home security solutions to allow greater control and safety for home owners.
* Changing the way of the automated notifications by using the GSM module to make this system more professional.
* The next step would be to extend this system to automate a large-scale environment, such as offices and factories.

Home Automation offers a global standard for interoperable products. Standardization enables smart homes that can control appliances, lighting, environment, energy management and security as well as the expandability to connect with other networks.

**References**

* **Websites**
  + **IFTTT**
    - https://ifttt.com/discover
    - https://www.pocketlint.com/SmartHome/SmarHomenews
  + **Blynk**
    - https://www.blynk.cc/
    - https://docs.blynk.cc/
  + **NodeMCU**
    - https://nodemcu.readthedocs.io/en/master
    - https://iotbytes.wordpress.com/nodemcupinout/
  + **Google Assistant**
    - https://assistant.google.com/intl/en\_in/
    - https://www.pocketlint.com/Apps/Appsnews/Googleappnews
  + **IoT**
    - https://internetofthingsagenda.techtarget.com/definition /IoT-device
  + **Arduino IDE**
    - https://www.arduino.cc/en/Guide/Environment
  + **Wikipedia**
    - <https://www.wikipedia.org/>
* **Research Papers**

1. *“Smart Energy Efficient Home Automation System using IOT”, by* Satyendra K. Vishwakarma, Prashant Upadhyaya, Babita Kumari, Arun Kumar Mishra.
2. *“IOT Based Smart Security and Home Automation”, by* Shardha Somani, Parikshit Solunke, Shaunak Oke, Parth Medhi, Prof. P. P. Laturkar.
3. “*A Dynamic Distributed Energy Management Algorithm of Home Sensor Network for Home Automation System”, by* Tui-Yi Yang, Chu-Sing Yang, Tien-Wen Sung; in 2016 Third International Conference on Computing Measurement Control and Sensor Network.
4. *“Enhance Smart Home Automation System based on Internet of Things”, by* Tushar Churasia and Prashant Kumar Jain; in Proceedings of the Third International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC 2019) IEEE Xplore Part Number:CFP19OSVART; ISBN:978-1-7281-4365-1.
5. *“Visual Machine Intelligence for Home Automation”, by* Suraj, Ish Kool, Dharmendra Kumar, Shovan Barman.
6. *“A Low Cost Home Automation System Using Wi-Fi based Wireless Sensor Network Incorporating internet of Things”, by* Vikram.N, Harish.K.S, Nihaal.M.S, Raksha Umesh, Shetty Aashik Ashok Kumar; in 2017 IEEE 7th International Advance Computing Conference.
7. *“Voice Controlled Home Automation System using Natural Language Processing and Internet of Things”, by* Mrs. Paul Jasmin Rani, Jason Bakthakumar, Praveen Kumaar.B, Praveen Kumaar.U, Santhosh Kumar; in 2017 Third International Conference on Science Technology Engineering & Management (ICONSTEM).
8. [*“GOOGLE ASSISTANT CONTROLLED HOME AUTOMATION”*](https://ieee-vecsb.org/wp-content/uploads/sites/45/Google-assistant-controlled-home-automation.pdf) *,By* Mr. Kalyan Chenumalla, Mr. Srikanth Gottam, Mr. Prashanth Kusuma, Ms. P. Bhavya Shri - IEEE VEC SB Department of Electronics and Communication Engineering.

* **Blogs and Useful Links**
  + <https://www.electronicshub.org/voice-activated-home-automation/>
  + <https://circuitdigest.com/microcontroller-projects/voice-controlled-home-automation-using-google-assistant>
  + <https://www.electronicsforu.com/electronics-projects/voice-activated-home-automation-system>
  + <https://robu.in/voice-controlled-home-automation-using-google-assistant/>
  + <https://www.hackster.io/1NextPCB/voice-controlled-home-automation-using-google-assistant-2453f2>
  + <https://www.electricaltechnology.org/2018/02/voice-recognition-based-home-automation-system.html>