

**A MINOR-PROJECT REPORT
ON
HOME AUTOMATION AND SECURITY**

**Submitted to
KIIT UNIVERSITY**

In Partial Fulfilment of the Requirement for the Award of

**BACHELOR'S DEGREE IN
COMPUTER ENGINEERING**

BY

Sourabh Sarkar	1515048
Srijita Gayen	1515049
Prerna Singh	1515031

**UNDER THE GUIDANCE OF
PROF. Saurabh Bilgaiyan**



**SCHOOL OF COMPUTER ENGINEERING
KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY
BHUBANESWAR, ODISHA - 751024
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KIIT UNIVERSITY
School of Computer Engineering
Bhubaneswar, ODISHA 751024



CERTIFICATE

This is certify that the project entitled

HOME AUTOMATION AND SECURITY

submitted by

Sourabh Sarkar	1515048
Srijita Gayen	1515049
Prerna Singh	1515031

is a record of bonafide work carried out by them, in the partial fulfilment of the requirement for the award of Degree of Bachelor of Engineering (Computer Science OR Information Technology) at KIIT UNIVERSITY, Bhubaneswar. This work is done during year 2017-2018, under my guidance.

Date: **12/04/2018**

(Prof. Saurabh Bilgaiyan)
Project Guide

Acknowledgements

We are profoundly grateful to **Prof. Saurabh Bilgaiyan** for his expert guidance and continuous encouragement throughout to see that this project rights its target since its commencement to its completion.

Sourabh Sarkar
Srijita Gayen
Prerna Singh

ABSTRACT

The home automation and security becomes important, because it gives the user the comfortable and easily for using the home devices. The implementation and design of wireless home automation control used WIFI technology handheld to control of the selective home devices with integral security and protected system. Any Android device having internet connection is liable to control selective home devices, get security alerts and temperature updates. The IOT device is requires a centralized WIFI Service to get connected to firebase. The devices have been distributed in each room has its own board, these boards are connected to the database of firebase via microcontroller. The system is low cost and flexible with the increasing variety of devices to be controlled. The Android UI can be easily customized according to user needs.

Keywords: Android, home automation and security, JavaScript, embedded C, IOT, Firebase

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Chapter 1

Introduction

1.1 Purpose

This project is based on smart home android application which strives to introduce smart features to a smart home. It helps the user to control electrical equipment and provide an impeccable home security.

Its purpose is to:

- Control the home and stay updated just a tap away.
- Inform the user about the room temperature.
- Maintain security by giving an intrusion alert.
- Inform the user whether main dustbin is full.

1.2 Project Scope

This project can have a high demand in the field of home automation and security. The ease to control your home from any corner is only one tap away. Having advanced features in the application makes it the all-rounder solution for an initiative to develop a smart home.

1.3 Definition, Acronyms and Abbreviations

- PIR- Passive Infra-Red
- PIR Sensor- A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors

- Ultrasonic Sensor- An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves.

1.4 Technology Used

- Android
- Internet of Things
- Firebase

Chapter 2

Overall Description

2.1 Product Perspective:

The product is supposed to be an open source, under the GNU general Public License.

To use the Smart Home, application, the user should have the minimum knowledge of operating an Android smart-phone.

The following are the main features that are included in the IOT Smart Home:

- Controlling Electrical Equipment: It helps a person to control apparatus like lights, fan, etc. from an android device.
- Home Intrusion Alerts: It helps the user whether his or her house is being intruded by anyone by sending notification alerts.
- Dustbin Full Alert: It helps the user to know if the dustbin is full or not so that the user can dump the waste on time.
- Room Temperature Update: It shows current room temperature and humidity so that the user can switch on the air conditioner beforehand thus making rooms cozy to rest after tiring day.

2.2 User Class and Characteristics:

- Working class people who live alone in apartment or their own house.
- For enormous homes, which are big and operating the fans, lights, etc. can be done from any corner of the home.

- Have a secure home when alone at home.
- Intrusion alert, the user will be immediately notified.
- The user will be notified about filled dustbin as well.

2.3 Operating Environment:

- Android
- Firebase

2.4 User Documentation:

- SRS
- Project Report

2.5 Software Interfaces:

- Client on Internet
 1. Android OS (more than API 19)
 2. Smart Home Application User.
- Database Server
 1. Firebase
- Development End
 1. Arduino IDE
 2. Java

2.6 Hardware Interface:

- Client Side:
 1. Smartphone with Android OS, Sensors and processor (Nodemcu, PIR Sensor, DHT11, Ultrasonic Sensor).
- Client Side:

1. Firebase

2.7 External Forces:

2.7.1 Constraints:

- GUI is only in English.
- The app is limited to one user at a time.

2.7.2 Dependencies:

- PIR sensor should be accurate.
- DHT11 should be accurate.
- Servers should be online all the time.

Chapter 3

Software Requirements Specification

3.1 Functional Requirement

3.1.1 Light Controls:

1. PIR Sensor: PIR is a sensor that detects any motion of any heat signature in the surrounding and sends feedback to the Nodemcu. It is used to detect any intruder in our home in our project.
2. Ultra-sonic Sensor: It is the sensor that uses the phenomenon called echo to measure the distance of object from it. It is used to detect the status of main dustbin of our home in our project.
3. Notification in Database: It gets the device id and notification type from Nodemcu and stores in the table.
4. Firebase Functions: It is written in the JavaScript. When there is any new notification id in the database, the functions would create a notification and send to our device using Firebase Messaging Service.

3.1.2 Temperature:

1. DHT11: The DHT11 is a sensor that records the temperature of the surroundings and sends to the firebase.
2. Temperature and Humidity in database: The value is recorded in the firebase through real-time basis.
3. Temperature and Humidity value in application: The application checks the live value from firebase and updates in the UI of the application.

3.1.3 Light Controls:

1. Switch: In this feature the user switches on or off the electrical appliances through his application.
2. Database in Switch: Here the value of switch is stored in the form of Boolean.
3. Hardware Switch on/off: The Boolean value of the switch is taken from the database and implemented by the Nodemcu.

3.2 Non-Functional Requirement

3.2.1 USABILITY

The user can control electrical appliances at one touch and notifies the room temperature and humidity. The project alerts the user if there is any intruder in our house. The municipal corporation can easily locate the dustbin that is full in the locality and clean then on regular basis.

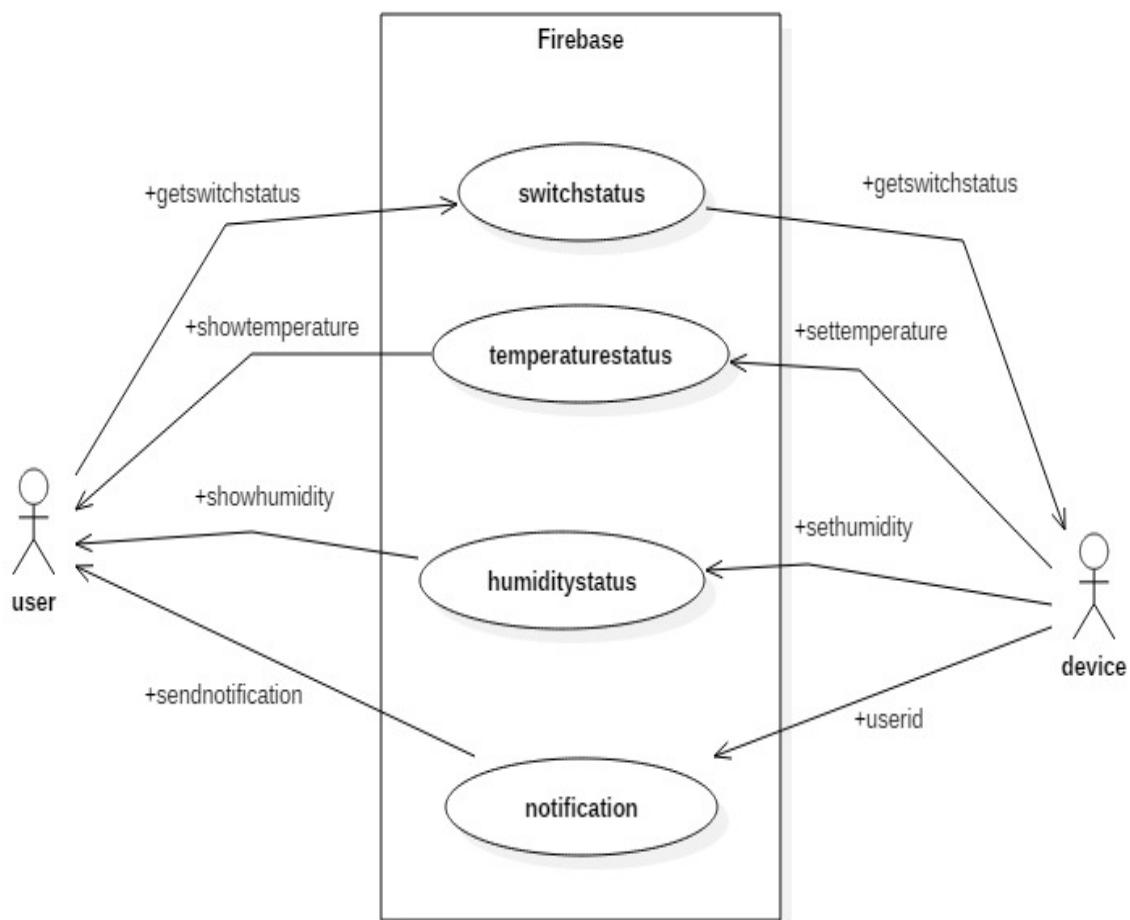
3.2.2 RELIABILITY

Easy to use. It is reliable and cost effective. But the only weakness is slow networks.

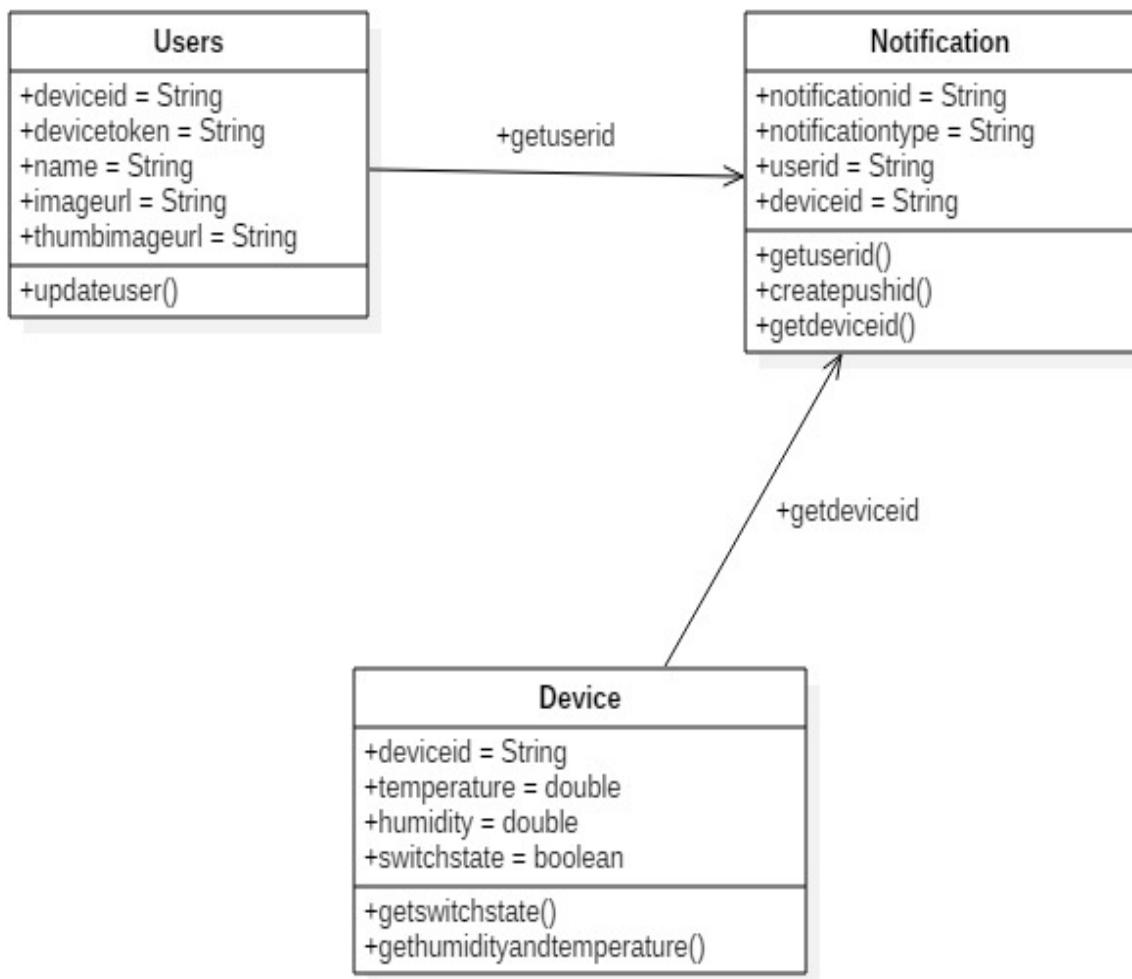
Chapter 4

System Design

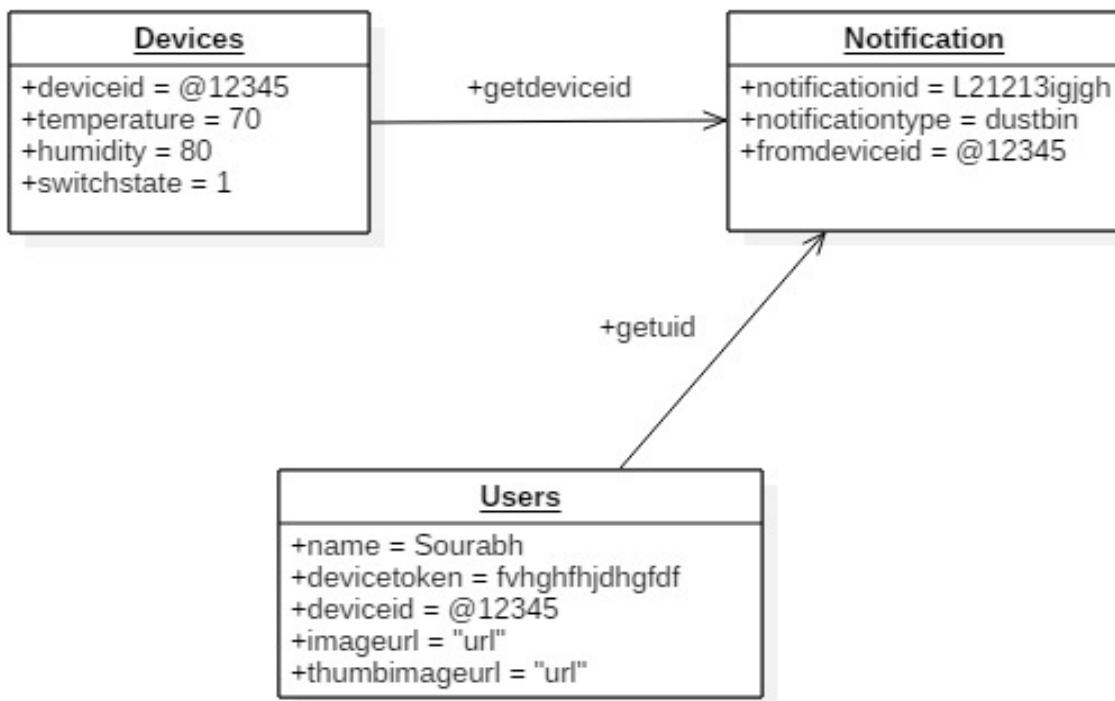
4.1 Use Case Diagram



4.2 Class Diagram

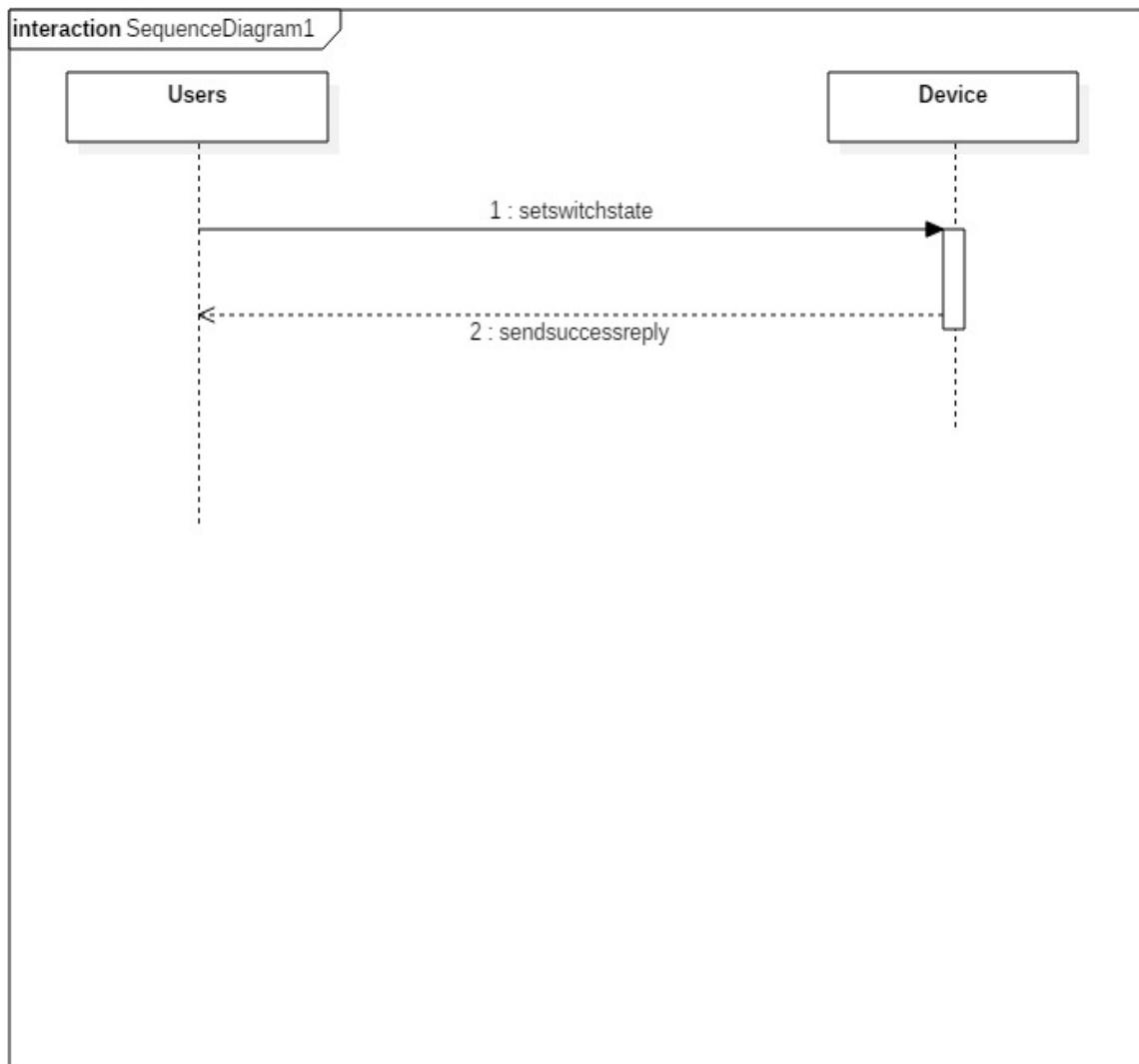


4.3 Object Diagram

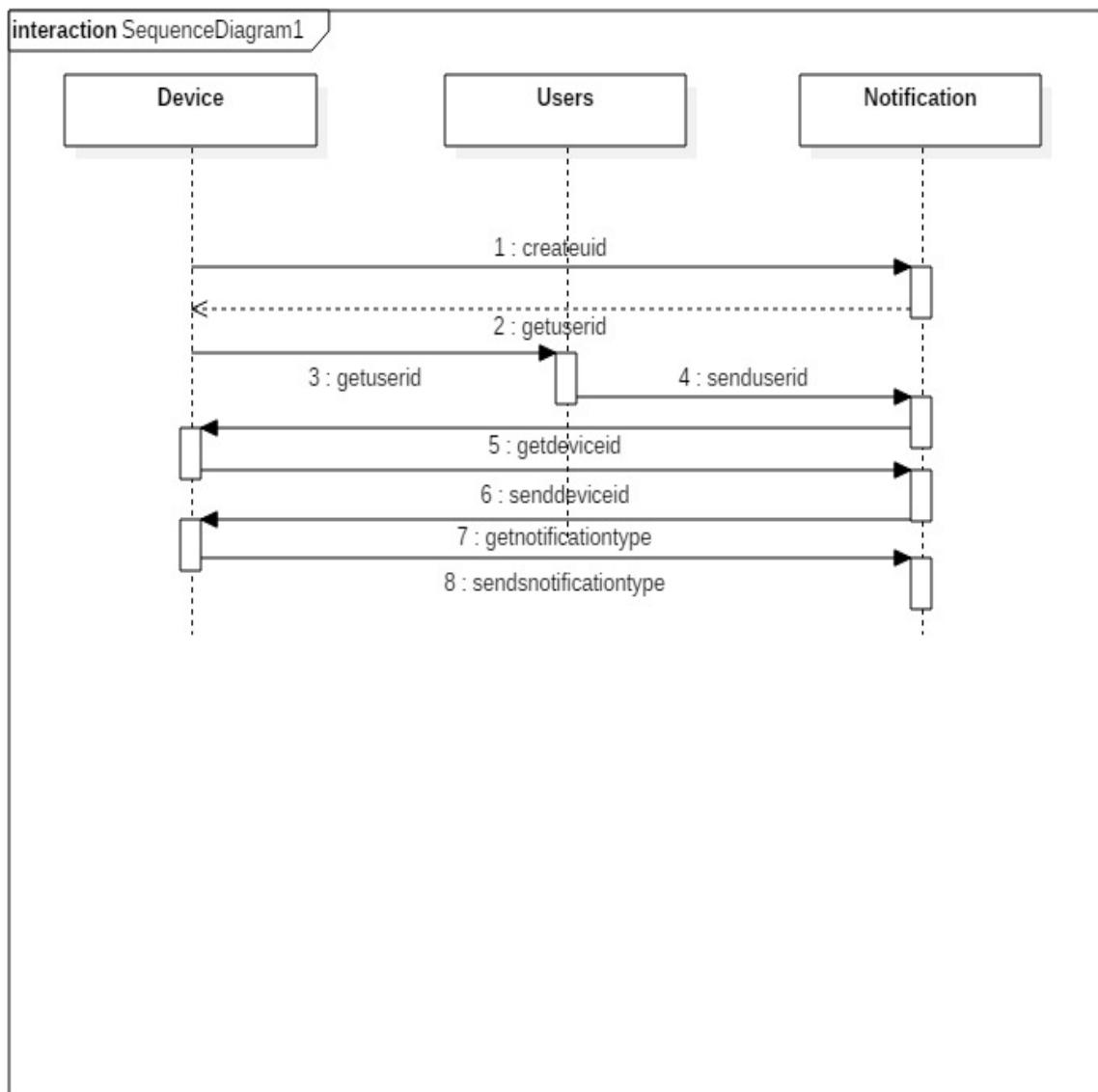


4.4 Sequence Diagram

- For Switching Electrical Equipment.

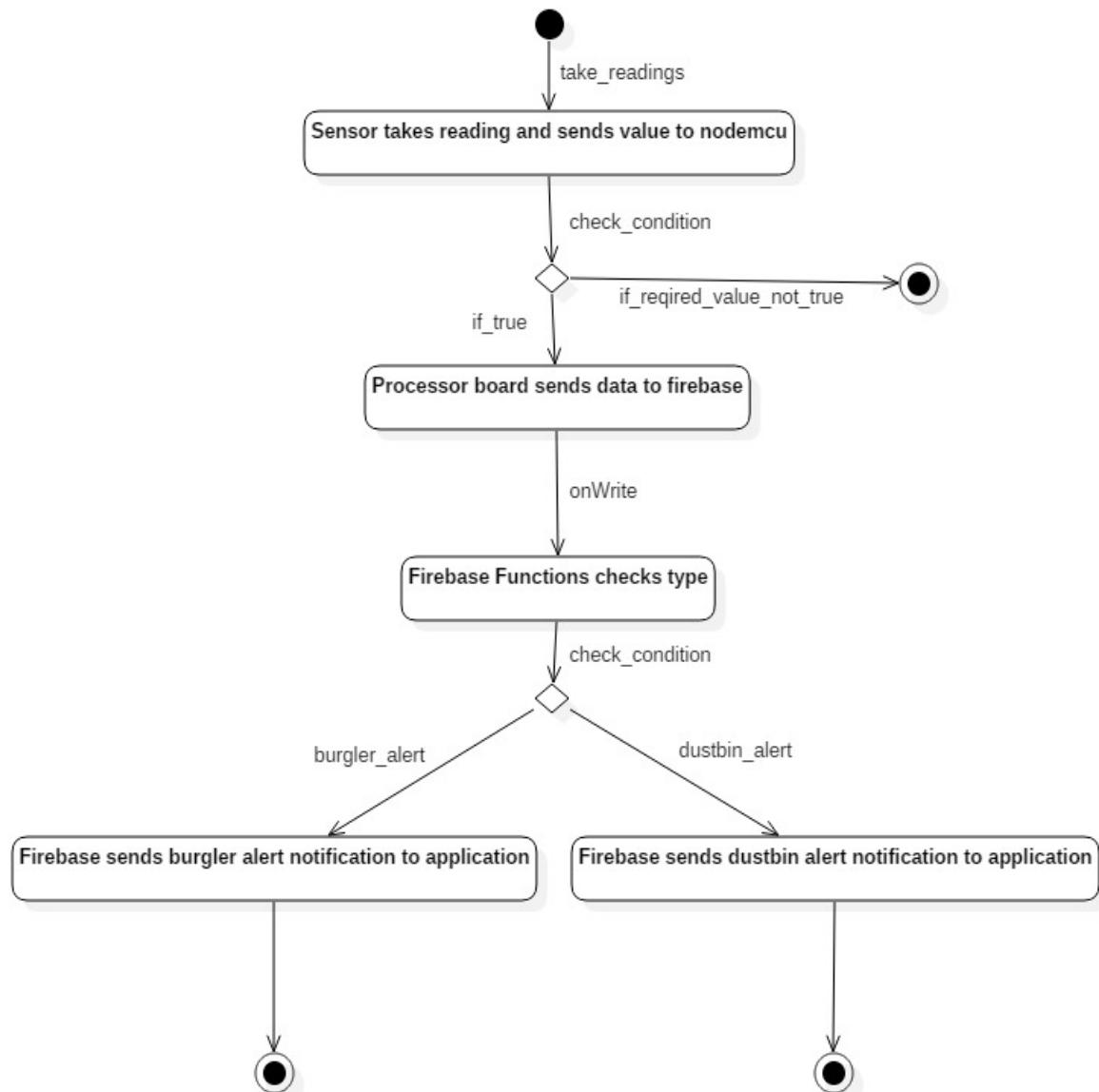


- For Notification Feature

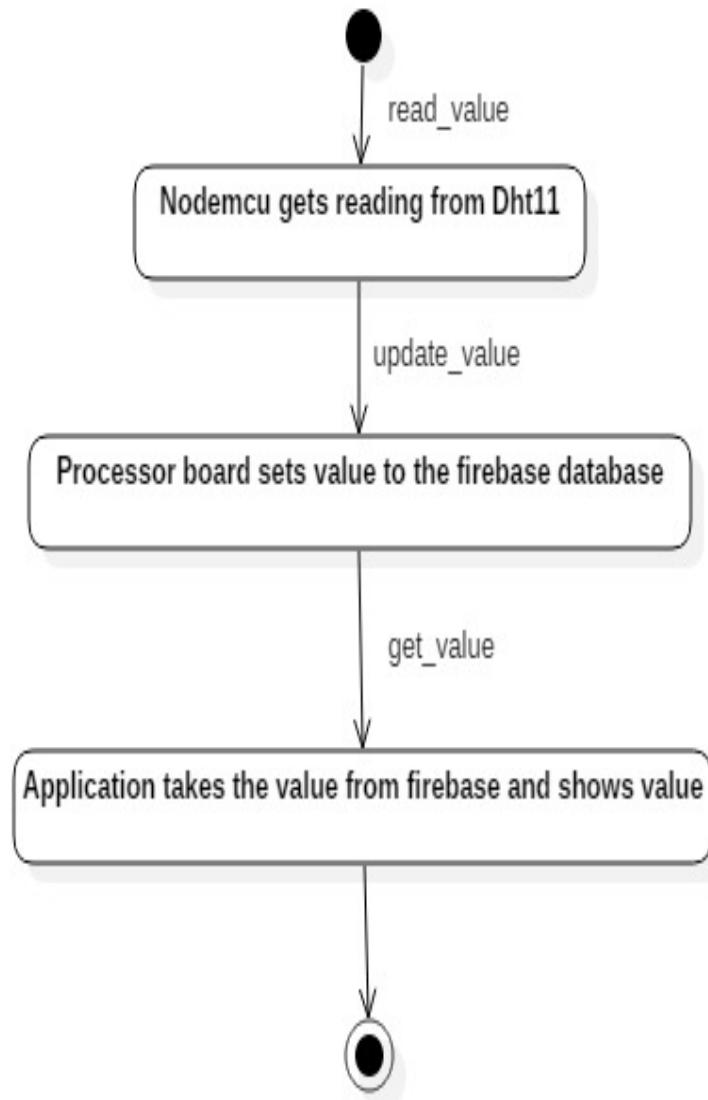


4.5 Activity Diagram

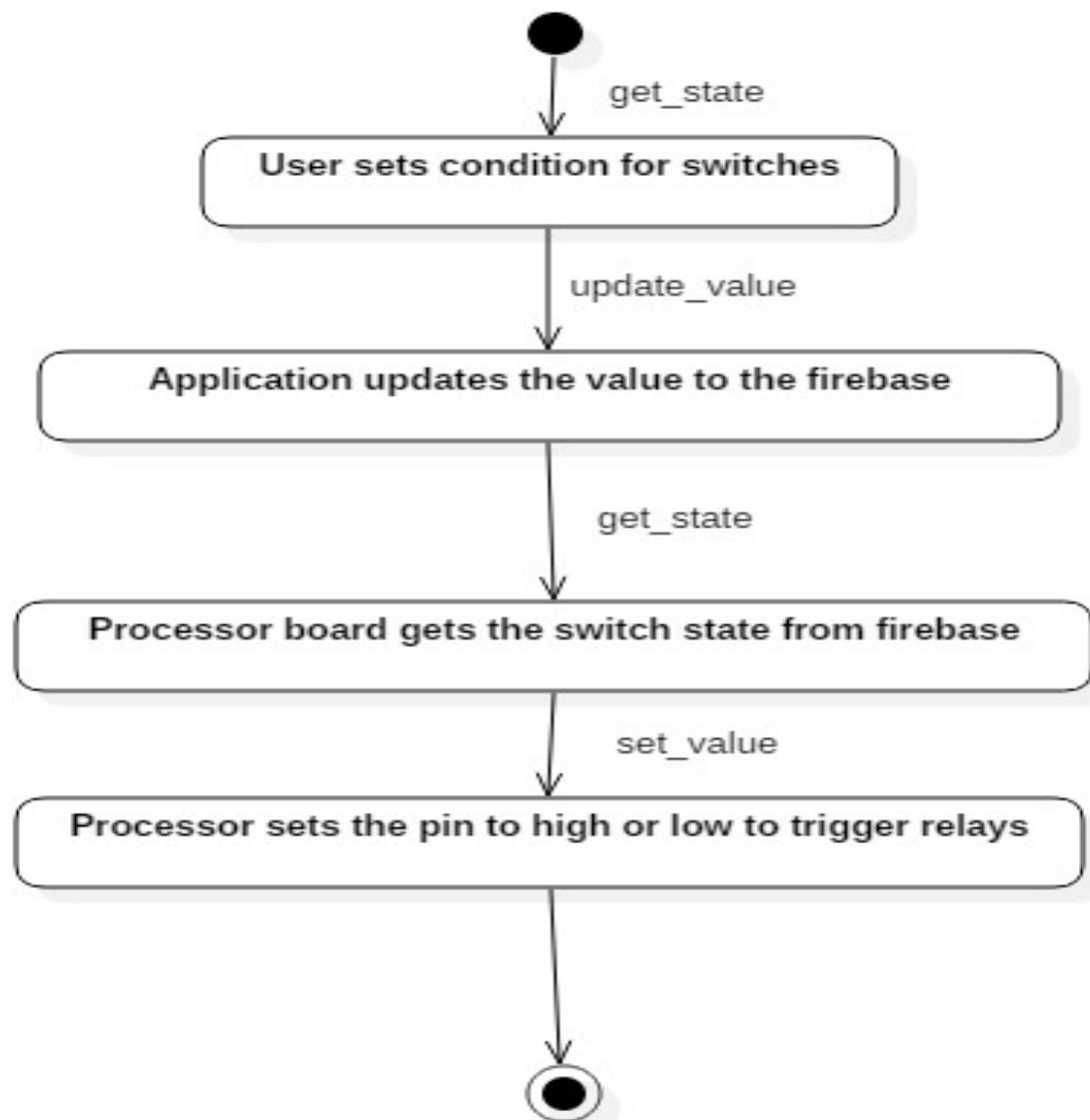
- For Notification Feature



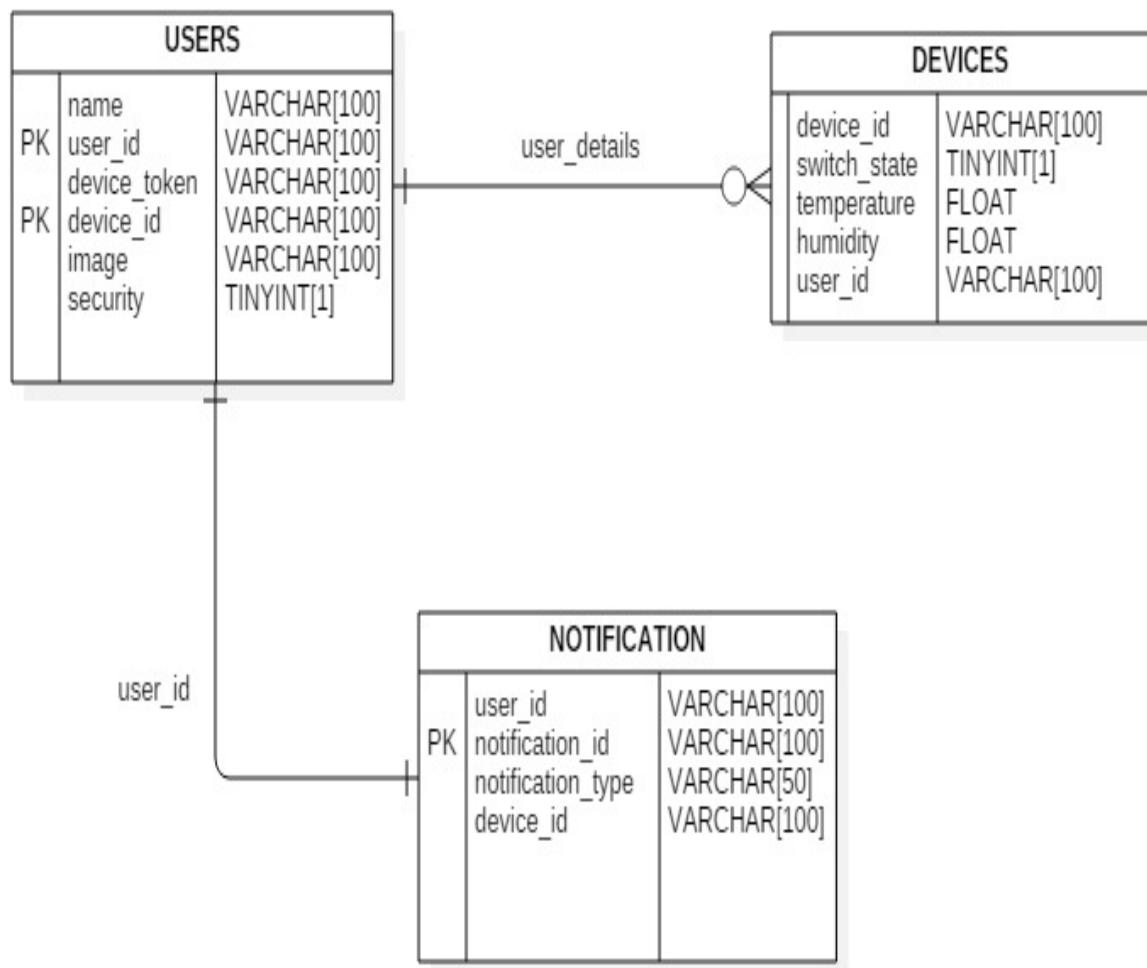
- Temperature and Humidity



- Switch States



4.6 E-R Diagram



Chapter 5

System Testing

These results we have got during testing the device manually and came as we expected. The following table shows the test cases with the results.

5.1 Test Cases and Test Results

Test ID	Test Case Title	Test Condition	System Behavior	Expected Result
T01	Switch State Test	Normal	Switching on or off	Switching on or off
T02	Temperature and humidity test	In air condition	Showing temperature as expected	Showing temperature as expected
T03	Intruder Alert Test	Normal (switched) on	Sending Notification	Notification Sent

Note: Testing should be performed manually

Chapter 6

Project Planning

- We thought of a problem statement which is basically for offering all the electronic appliance control within user's fingertips.
- We gathered the requirement after analysis the problem.
- We build use case diagram according to the above requirement and analyzed. Two actors: Registered Users and Devices
- We analyzed all the almost all possible negative aspects and dealt with them.
- We are planning to upgrade our prototype according to user feedback.

Chapter 7

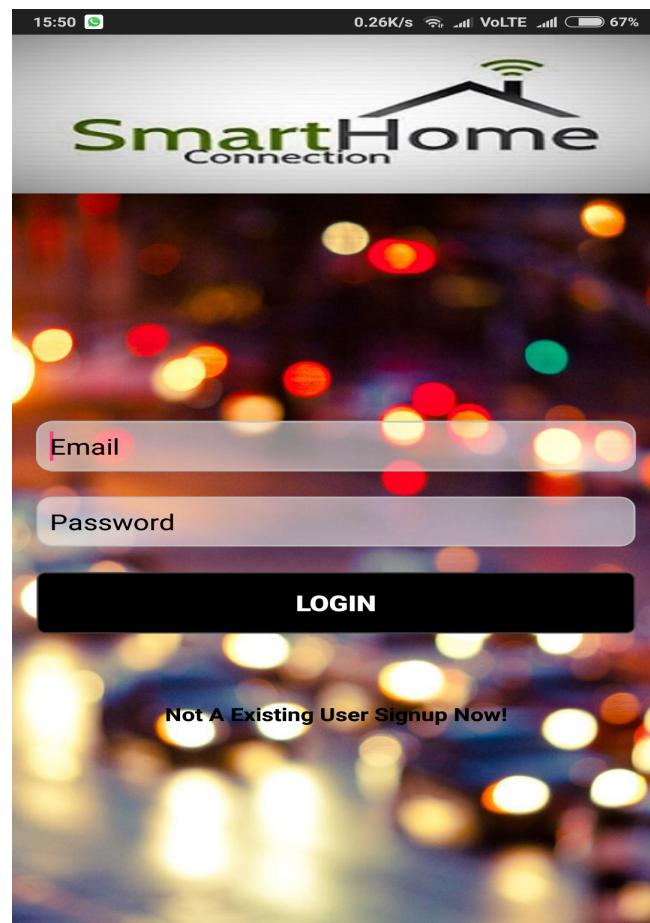
Implementation

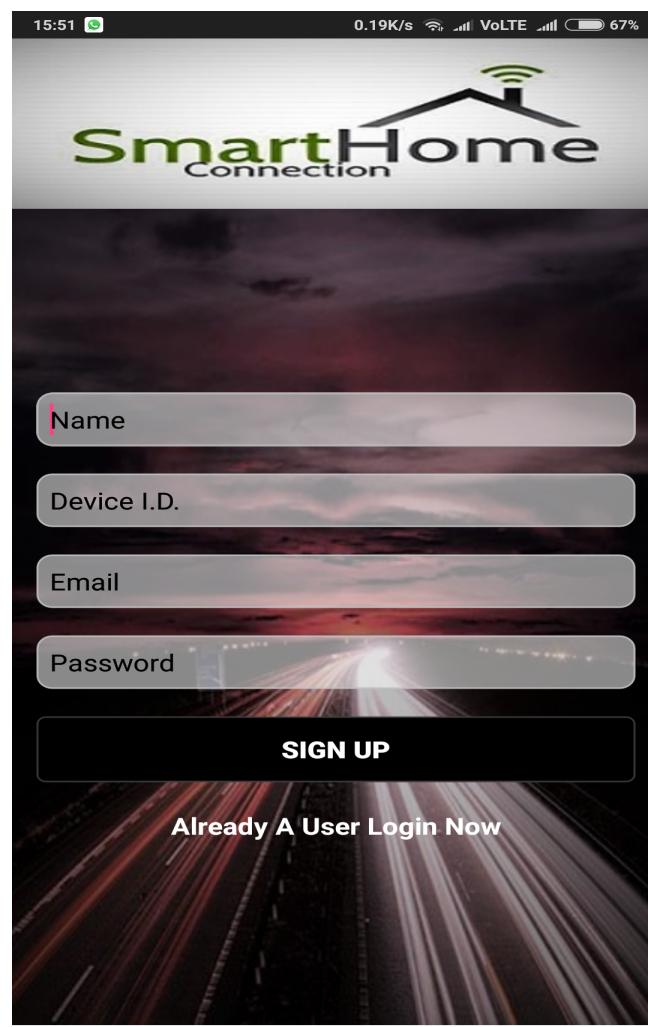
- The NodeMCU is configured to connect to assigned hotspot to send or receive data.
- The Android application is completed and is working as expected.
- Firebase Function is sending correct notification to our Application.
- The light controls and temperature sensors are working as we expected.
- We are taking feedback about our application UI and our prototype for improvements to our service.

Chapter 8

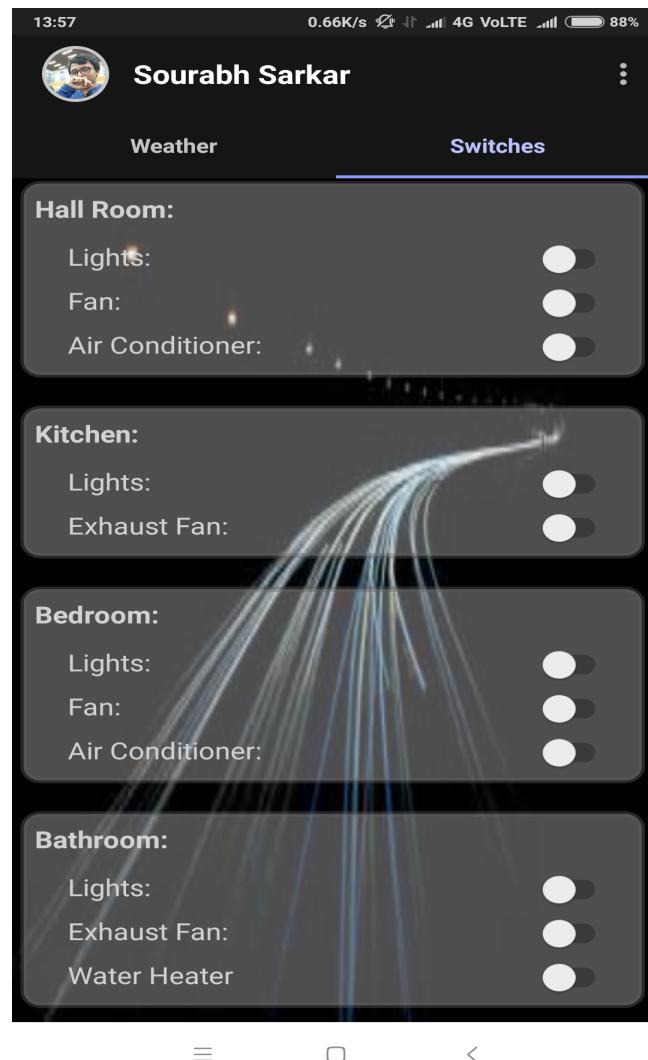
Screenshots of Project

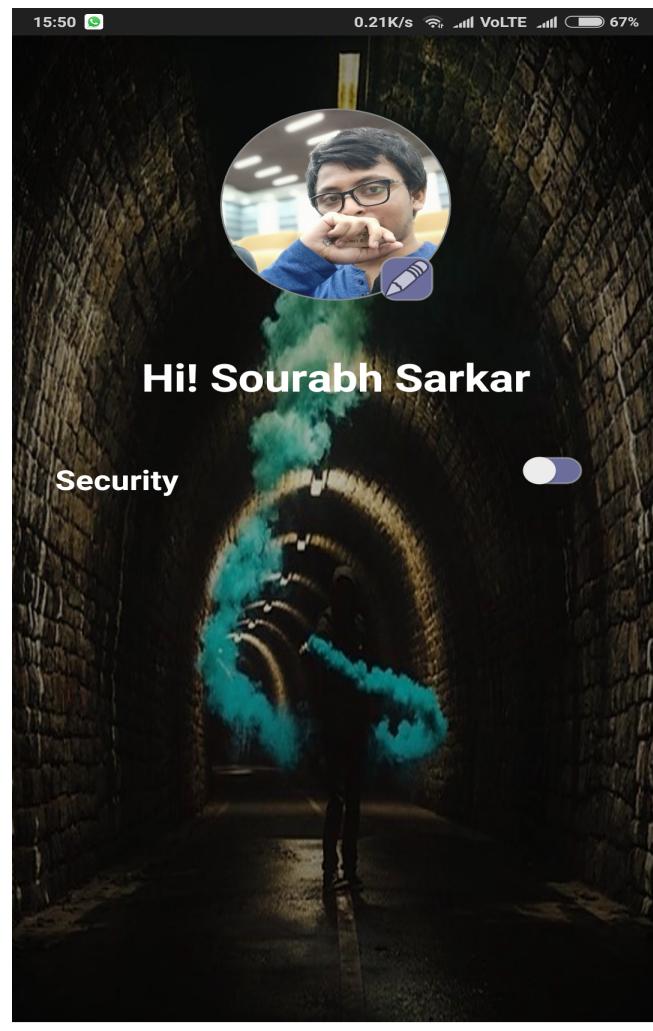
8.1 Application Screenshots

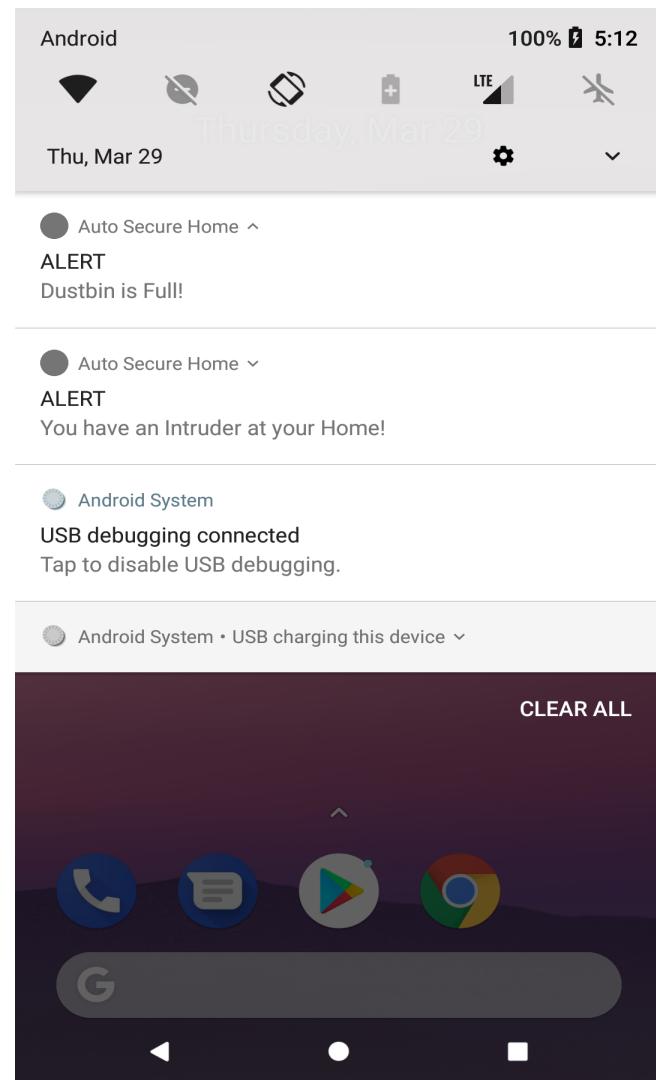














Our app is the front end of our IOT project Auto Secure Home. Gives updates of room temperature and humidity. Gives u advantage to switch on or off the electronic appliances. Detects intruders and Alerts if dustbin is full.

Team::

Sourabh Sarkar(1515048)

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Version 1.1

Connect with us

Contact us

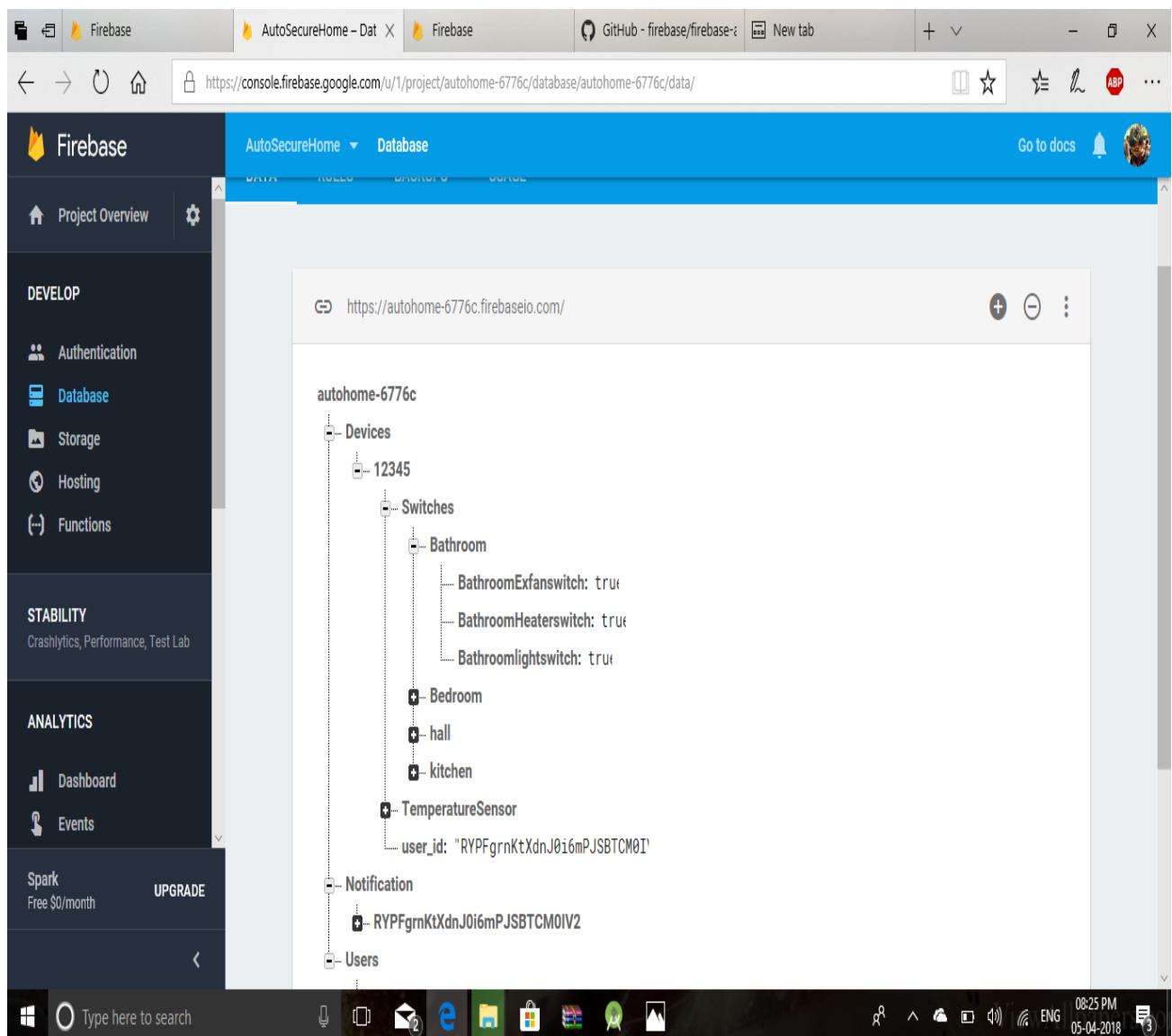
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8.2 Database Screenshots



The screenshot shows the Firebase Database console for a project named "AutoSecureHome". The left sidebar contains navigation links for Project Overview, Authentication, Database, Storage, Hosting, Functions, Crashlytics, Performance, Test Lab, Analytics, Dashboard, Events, and Spark (Free \$0/month). The main area displays the database structure:

```
database structure:
  - Switches
    - Bathroom
      - BathroomExfanswitch: true
      - BathroomHeaterswitch: true
      - Bathroomlightswitch: true
    - Bedroom
    - hall
    - kitchen
  - TemperatureSensor
  - user_id: "RYPFgrnKtXdnJ0i6mPJSBPCM0I"

  - Notification
    - RYPFgrmKtXdnJ0i6mPJSBPCM0IV2

  - Users
    - RYPFgrmKtXdnJ0i6mPJSBPCM0IV2
      - device_token: "dETbCa1rSog:APA91bFFt4MaYLgzQUL-EUcU_fy0PVvCcc"
      - deviceid: "12345"
      - image: "https://firebasestorage.googleapis.com/v0/b/aut... "
      - name: "Sourabh Sarkar"
      - security: true
      - thumb_image: "https://firebasestorage.googleapis.com/v0/b/aut... "


  - 
```

Chapter 9

Conclusion and Future Scope

9.1 Conclusion

This set up will not only help the user to live in their house with ease. It will also keep their home safe and clean and better place to live. This can be the first initiate towards a smart home. With the app Smart Home a new dimension can be added to every aspect of having a secure home.

9.2 Future Scope

Our project is originally designed to control electrical apparatus using smart phone devices, note current temperature, and give alert about burglar intrusion and dustbin fill alert.

More work can be done in this field, like automatic controlling of temperature, automatically calling police in case of burglar alert, informing respective authority if main dustbin becomes full, and a lot more. The need of safe and automated system is preferred by many people but till now cost is very high. This installation charge can be reduced by more work in this field.

References

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- [2] <https://www.tutorialspoint.com/android/index.htm>
- [3] <http://www.instructables.com/howto/home+automation/>
- [4] https://github.com/ioxhop/IOXhop_FirebaseESP32