SMART HOME SECURITY
USING ARDUINO UNO AND MOBILE APPLICATION

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SMART HOME SECURITY

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Thesis submitted in fulfillment of the requirements
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ABSTRAK

Kes pecah rumah semakin banyak berlaku di Malaysia. Setiap tahun mesti kes pecah rumah semakin kedengaran di media sosial dan kaca televisyen. Kebanyakan kes pecah rumah berlaku disebabkan beberapa faktor. Salah satu faktor kelemahan sistem kunci. Kebanyakan pengguna di Malaysia menggunakan kunci mangga untuk kunci. Kunci mangga mempunyai kelebihan iaitu mudah kunci dan kunci unik setiap mangga tetapi ia mempunyai keburukan iaitu mudah dipecahkan dan mudah membuat kunci tambahan. Kunci mangga mudah dipecahkan oleh perompak disebabkan mungkin mereka mempelajari daripada YouTube. Oleh itu, untuk mengatasi masalah ini, projek ini mencadangkan sebuah sistem yang boleh pengguna mengunci pintu rumah dengan mudah dan lebih selamat. Objektif untuk membina sistem ini adalah untuk mengunci pintu rumah dengan menggunakan aplikasi android atau suara dan untuk mengawal pintu rumah dengan menggunakan telefon mudah alih yang membantu pengguna untuk melihat pintu rumah bila-bila masa dan di mana sahaja. Pembangunan Aplikasi Rapid adalah kaedah yang digunakan untuk membangunkan aplikasi ini. Metodologi RAD terdiri daripada empat peringkat utama, pertama adalah peringkat perancangan keperluan, peringkat reka bentuk, peringkat pembinaan, dan terakhir adalah peringkat henti ganti. Selepas aplikasi telah dibangunkan, pelanggan akan diberi ujian penerimaan pengguna (UAT) untuk memastikan bahawa semua fungsi mengikut keperluan tanpa sebarang kesilapan. Ujian UAT akan memastikan aplikasi itu memenuhi semua objektif dan boleh digunakan untuk menyelesaikan masalah semasa mengenai sekuriti rumah. Berdasarkan pengujian sistem, pengguna mengunci pintu rumah dengan mudah dengan menggunakan Sistem kepintaran rumah. Ia berharap sistem yang dicadangkan akan memberi manfaat kepada pihak yang berminat.

ABSTRACT

Home bursts are growing in Malaysia. Every year home-breaking cases are increasingly being heard in social media and television. Most home-based cases occur due to several factors. One of the key system weaknesses. Most users in Malaysia use lock keys for the lock. The mango lock has the advantage of being simple keys and unique keys of each mango but it has its disadvantages that are easy to crack and easy to create extra keys. Mango keys are easily broken by pirates as they may learn from YouTube. Therefore, to address this problem, this project proposes a system that allows users to lock the door easily and safely. The objective of building this system is to lock the door of the house using android or voice app and to control the door of the house using a mobile phone that helps the user to see the door of the house anytime and anywhere. Rapid Application Development is the method used to develop this application. The RAD methodology consists of four main stages, the first is the planning stage of the need, the design stage, the stages of construction, and the last is the stallion level. After the application has been developed, customers will be given a user acceptance test (UAT) to ensure that all functions are in accordance with the requirements without any mistake. The UAT test will ensure that the application meets all objectives and can be used to solve current problems regarding home security. Based on system testing, users lock the door easily by using the Home Intelligence System. It hopes that the proposed system will benefit the interested parties.

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LIST OF ABBREVIATIONS

RAD	Rapid Application Development
SDLC	Software Development Life Cycle
UAT	User Acceptance Testing
SRS	Software Requirement Specification
SDD	Software Design Description
SHSS	Smart Home Security
IDE	Integrated Development Environment

CHAPTER 1

INTRODUCTION

1.1 Background Project

Based on journal, one year after the past edition of the Cluster book 2012 it can be clearly stated that the Internet of Things (IoT) has reached many different players and gained further recognition. There are many areas of things replace with IoT such as Smart Cities, Smart Car, Smart Home and assisted living, Smart Industries, Public safety, Energy & environmental protection, Agriculture and Tourism as part of a future IoT Ecosystem. IoT means a concept and a paradigm that considers pervasive presence in the environment of a variety of things/objects that through wireless and wired connections and unique addressing schemes are able to interact with each other and cooperate with other things/objects to create new applications/services and reach common goals (Gershenfeld, Krikorian, & Cohen, 2004). IoT is a device that can be controlled through wireless and wired connection by other device such as mobile device or computer device.

Smart Home is term commonly used as a residence appliances, lighting, heating, air conditioning, TVs, computers, entertainment audio & video systems, security, and camera systems that can communicate with one another and can be controlled remotely by a time schedule, from any room in the home, as well as remotely from any location in the world by phone or internet(SmartHomeUSA, 2014). Therefore, the security more important in the Smart Home system. This make that home more secure and effective protected the home. When you forget to lock your home, you need come back to lock it. This met waste your time to go work or anywhere.

In Malaysia, statistics of crime case have been increasing to 4.6% until April 2016. Based on Utusan Online, 38,877 cases have been recorded from January to April 2016 say by "Pengarah Jabatan Pencegahan Jenayah dan Keselamatan Komuniti (JPJKK) Bukit Aman, Datuk Acryl Sani Abdullah Sani".(Online, 2017) Based on that, mostly the crime is (58 % from 38,877) robbery home with 6,662 cases. This shows less security home in Malaysia. Maybe they think only key can made their home secure or smart home security costly their salary. This make easy robber to robbery their home because it common key in Malaysia and it can be anyone be robber. The way to destroy key have shown at YouTube. Many responsible have be involved such government, NGO, community and people. Government have doing some talk about home security and same with community but the people don't take this more crucial. So, they need cheap and secure system to enhance their security.

My project is entitled Smart Home Security. It was developed in mobile application, Raspberry pi and Arduino. This system was created to be used in daily life by user. They don't need key in the password at the device to lock their home security. They can lock their home by mobile application and they can doing that at everywhere as long they have internet. The mobile application connects the Raspberry pi to give instruction / signal so Raspberry pi can be doing their job. The Raspberry pi asking user to stand front in camera to detect their face for unlock or lock the home door. They can be changing the password in mobile application. So, by using this system, they don't worry about home security and easier to manage the system to make secure.

1.2 Problem Statement

The first problem that can be addressed are user don't lock their home door. They are human and every human made a mistake so there have possibilities they don't lock their home door (Chitnis, Deshpande, & Shaligram, 2016). For example, they forget to lock their home door because they rushing to go work so many reason why they forget lock their home door such as they have family member in the house.

The second problem that can be addressed are security are low. They have use padlock to lock their home. This is low security because it can be broken by some tools. The crime can learn how brake the padlock in YouTube. For example, The Truth about

to open padlock. It is easy to open with some tools. They need some advanced feature like mobile phone to secure their home.

The third problem is that user don't used the security system because it may have costly (Chitnis et al., 2016). This made user have don't thinks to upgrade their security and waste money if they invest in home security to make their home secure. Mostly, they invest their money buy their life such as house, car, electric, water etc. The advanced security system has differences prices with difference features. There have cheaper with less feature of security and otherwise expensive with more feature of security. Cost of living increase of one reason they given so they be careful to invest anything and people live in rural area don't have big salary or want to be install advanced security system in their home.

1.3 Goal and Objective

The goal of this project is to develop an android application ,Raspberry Pi , Arduino system for smart home security that can manage their information and their user, lock the locker in mobile application and also lock or unlock in device by using face recognition.

The purpose of this project:

i. To improve the door lock security system by using face recognition.

ii. To decrease the burden of the user.

iii. To developing Raspberry pi system with face recognition.

1.4 Scope

The main scopes of this project:

i. The user uses mobile application which require password to lock or open their door.

ii. The system can recognise face user by using face recognition.

iii. The system need internet to connect with user because it need to give notification from mobile application by using internet and get signal to lock the door.

1.5 Significance

i. This project can beneficial to social for more secure their home security system.

ii. To easy the user to buy some high security system of home in low cost.

iii. To easy the user to lock or unlock their home by using voice recognition and mobile application.

1.6 Thesis Organization

This thesis consists of five chapters. Chapter 1 shall discuss on introduction to the project to be develop. It was simple explanation about the project. It included the explanation about objective, the problem statement in the project, the scope of the project and thesis organization to briefing what flow on this report.

In the Chapter 2, it shall discuss on literature view of the project. It is about the study of the project in general and three existing problems which are compared with the solution of the outcome of the project with the advantage and disadvantage of current system.

In the Chapter 3, it discusses the chosen methodology of the project with detailed explanation of each phase, hardware and software requirement, context diagram, use case, modules, dialogue diagram and services used in development. On top of that, the implement of the project and testing methods are explained with algorithms used in project.

In Chapter 4, it discusses the result of the outcome of the project, testing method used, user manual and other attached in appendix. The outcome of the projects is aligning with the objectives of the system.

In the Chapter 5, it discusses conclusion of the project which the outcome is fit to the project and objectives, implementation chosen methodology with required software and hardware along with system constraints and future work

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter contains data about the study of the project in common. It depicts the current problem or solution done

2.2 HOME AUTOMATION SYSTEM

Home Automation System is a system that control feature and basic function of the house automatically and sometimes using a remote. Sometimes it called as home.

Home Automation System is divided into several types such as automated plant watering system, security system food appliances and others. Some of system may enable basic home capacities to be controlled remotely from anyplace utilizing a gadget associated with the Internet. In addition, remote control can be enlarged to telephone, fax machines and another communications equipment. Home automation system is really support human's productivity and the component are well-designed to compatible with computer, appropriate programming, Internet, emergency backup power source, remote control and other home systems.

Smart Home Security (SHSS) is an IoT system that will helps human's home security to prevent crime. SHSS have few of technology such as android application and face recognition. SHSS used face recognition in Raspberry Pi to detect user face to lock or unlock the home door. The system have used some of detection feature in Opencv such as Haarcade and Hog feature. There another feature more powerful such as convolutional neural network (CNN) which neural network but it can't be used

because Raspberry Pi limitation although the latest model Raspberry Pi used. The face recognition detect user face in real time although it can detect in image. That why we need another security which motion detection to make sure there have human not the phone. The system used motion sensor which microware radar to detect human detection. Although, the system have some feature security but it need android application to make easily lock or unlock home door. The android application can control the system in easily such as user didn't require to go the locker to lock or unlock door or go to the system in face to face but it only use android phone with network to lock or unlock the door. The face recognition technology have some pro and cons with other technology such as voice recognition , fingerprint recognition and key password. The Raspberry pi model 3 B+ specification is

Figure 2.1: Arduino Uno

2.3 COMPARISON OF TECHNOLOGY

Table 2.2 shows the comparison between Face recognition, Voice recognition, and Gesture recognition

Name	FACE RECOGNITION	VOICE RECOGNITION	GESTURE RECOGNITION
Definition	Analyse the characteristic of a person's face images that were taken with digital video camera.	Ability of machine or program to receive and reacting or to understand and carry out spoken commands	Recognize the physical movement or gesture of human.
Pros	Security level will be	Enable user / consumers to doing	Speed and sufficient reliable

	significantly increase. The integration process is easy and flawless. High accuracy allows avoiding false identification Time fraud will be excluded.	multitask by specking directly to their system. Quickly turn spoken into written text	for recognition system Recognized in static and dynamic gesture Simple, fast and easy to implement No training
Cons	Difficulties with data processing and storing Troubles with images size and quality. Strong influence of the camera angle.	Background noise can produce false input. Problem with words that sound alike which spelled differently and have different meaning.	Irrelevant object might overlap with hand. Performance recognition algorithm decrease when user far away from the camera. Limitation restrict the application Ambient light affect the colour detection threshold

2.4 REVIEW OF THE EXISTING SYSTEM

There are 3 existing system and the comparison between these 3 different system that will be discussed. The three of existing system are iSmartAlarm Smart Home Security, Sharp Cloud Smarthome Security System and Frontpoint Home Security System.

2.4.1 ISmartAlarm Smart Home Security

Based on ("CubeOne ™," 2018), ISmartAlarm Smart Home Security will notify to your smartphone to inform when important event occurs, wherever you are. It easy-to-use devices to get notify when have emergency and the siren is triggered by phone call, SMS message, push notification. The crucial element is ISmartAlarm CubeOne. It is the brain of your home security system from iSmartAlarm. The free iPhone and Android iSmartAlarm apps allow users to arm and disarm their security system at any time, from anywhere, in real-time. The app communicates with the CubeOne to show user who is at home, when family members left or returned, and the status of each sensor. The system is easily expandable and all iSmartAlarm devices, sensors, and cameras can be added to the CubeOne for flexible and complete home security ("Protect Your Home Intelligently," 2018).

FIGURE 2.2: ISmartAlarm CubeOne

2.4.2 Sharp Cloud Smarthome Security System.

Based on ("Why do you need Sharp Cloud SmartHome System ? As Viewed On :," 2018), Sharp Cloud Smarthome Security System sent notification to user by email with one snapshot per camera attached. Siren will go off for 1 minute if user do not disarm the system. Alarm is triggered by motion, contact sensor or Emergency. If no action is taken by user within 5 minutes of the notification, Emergency Contact will receive one text message per event. It has different function for benefit such as looking after elderly parents, monitoring babes and maids, checking in pets etc. It has interaction 2 ways communication which message and mobile application and it have monitor 24/7 by individuals easily by mobile.("How Does The System Work ? PRIMARY EMERGENCY OWNER / SUBSCRIBED EMERGENCY CHANGE FROM TIME TO TIME . As Viewed On :," 2018)

FIGURE 2.3: Sharp Cloud Smarthome Security System

2.4.3 Frontpoint Home Security System

Based on ("FrontPoint Security," 2018), the control panel is the heart of the system. Touch-Screen Control Panel combines power and simplicity to create a cutting edge device that keeps system connected and home safe. It has simple touch with a 7-inch colour touchscreen, touch arming and disarming, simple settings management, automatic updates and more, the Touch-Screen Control Panel offers advanced technology and control that is easy to use. Any time there's an alert sent out, the Frontpoint Mobile App will let user know right away. User can even check on kids or pets with live video of home, no matter where users are. The minute any of the sensors are triggered, the Control Panel and the monitoring center will all be alerted. So, user can sensoring their home without they not in the house. Not only can sensors be placed on windows and doors, but cabinets and drawers, keeping kids and teenagers away from potential dangers like guns or liquor cabinets by using versatility plus. It has camera feature so user monitor their home on computer, tablet or smartphone. It has another features such as automate lights, thermostat and door locks control utilities and save energy.

FIGURE 2.4: Touch-Screen Control Panel

2.5 COMPARISON THREE EXISTING SYSTEM

Table 2.3: Comparison Three Existing System

FEATURES	Description		
	iSmartAlarm Smart Home Security	Sharp Cloud Smarthome Security System	Frontpoint Home Security System
Controller Used	CubeOne	OverCloud Processing Unit	Touch-Screen Control Panel
Remote Access	Android, iPhone and Smart Watch Apps	Android, remote control and iPhone	Touch-Screen Control Panel, Android iPhone and remote control
Sensor Used	Camera, Motion, Contact	Camera, Door/Window	Light, thermostat, door, Camera, Intrusion
Security Used	Just arm or unarm the security system	Just arm or unarm the security system and use remote control	Need using password to open door.
Special Features	Smart switch, Satellite siren	QR code scanner to activation the security system.	Home automation, automate lights, thermostat, and door locks.
Cost	High	High	High

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

Software Development Life Cycle (SDLC) also called as Application Development Life-Cycle is a process that used in software engineering to outline, develop and to test quality of the software. It contains of detailed plan describing plan of project, structure of project, how to develop, maintain , replace and alter or enhance specific software. Many SDLC example such as Waterfall model which original SDLC, Agile Methodology, Rapid Application Development (RAD) methodology, spiral, Extreme Programming and others. In this project, the software development methodologies used are Rapid Application Development (RAD).

The advantage of RAD being used is the developments are time boxed, delivered and then assembled into working prototype. The RAD way is to reuse the prototype consequently, reduce the length of time of advancement process and testing. Aside from lessen time, very reusability of its parts additionally build up the quality of the project. Besides that, the cost of RAD methodology is low but it is much faster and high quality. The movement on examination and configuration process also upgrade the great quality item on the last stage.

3.2 RAPID APPLICATION DEVELOPMENT (RAD)

RAD is a concept that was born out of frustration with the waterfall software design approach which too often resulted in products that were out of date or inefficient by the time they were actually released. The term was inspired by James Martin. RAD is a software development methodology that uses minimal planning in favor of rapid prototyping. In the RAD model, the functional modules are developed in parallel as

prototypes and are integrated to make the complete product for faster product delivery. RAD is especially well suited for developing software that is driven by user interface requirement. RAD model distributes the analysis, design, build and test phases into a series of short, iterative development cycles which requirement planning, system design, construction phase and cutover.

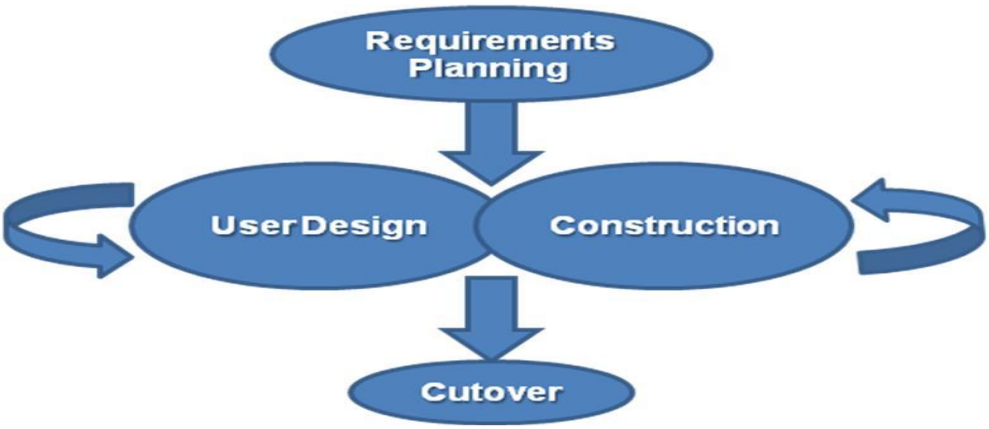


Figure 3.1: RAD model

3.2.1 PHASE1: REQUIREMENT PLANNING

In this phase, the planning and the requirement of Smart Home Security (SHS) gathered and combined together in order to minimize the time of this development. During this phase, Raspberry Pi boards will be reviewed based on its functionality scope and determines the data subjects areas that Raspberry Pi board will support and research the idea of locking system with face recognition. The security system have many innovation and innovate the two project become one project such as Raspberry Pi with mobile and Raspberry Pi with face recognition without using Wi-Fi. The outcome or deliverable from this phase are modeled. It consists of system scope and study the existing systems and document the requirement into Software Requirement Specification (SRS) for system analyst to do the Software Design Description (SDD).

3.2.2 PHASE 2: SYSTEM DESIGN

In this phase, all the requirement and decisions made in requirement planning phase will involving the user of the system will be gathered back on determining the system architecture. This allow initial modeling and prototype the system architecture to be created. In this phase, the requirement will analyzed and specified into system architecture which the design of Unified Model Language (UML), class diagram, MVC diagram and data dictionary. The system architecture will document in the Software Design Description (SDD) for maintenance of the system and programmer to develop the system. In this phase also, the system has be specified into hardware and software used, system configuration and test planning. Client will understand the system flows and it will reduce the probability of making changes to the requirement by modeling the diagram. By prototype of the system, client more understands the system functionality and system flows.

3.2.3 PHASE 3: CONSTRUCTION PHASE

This phase uses the user design and prototype to develop, test and verified the system follows user requirement. The system has develop by Makeroid / Kodular ,Arduino UNO, Raspberry Pi ,and also Firebase and the system will code in Python language, block code and C++ language. Before system is delivered to customer, there are several testing were carried out to test the system and verified there have critical defect and minor defect or there have some error and validate the requirement is meets

with customer's need. If the clients wants add new functionality, then it can add into in the system. This modification process on until the client is completely satisfied with the product. The user manual is provided for client as the guideline of system to use the system.

3.2.4 PHASE 4: CUTOVER

This phase consists of user training activities, which demonstrate how the system operates. User Acceptance Test (UAT) was carried out for client to give feedback on the system. This will be involving the supervisor and client to ensure the system can be executed. This system will deployed in the real environment. Furthermore, the defects and functionality of the system will be improve in the future. As the result, the new system is built, delivered and operate in the real environment.

3.2.5 CONTEXT DIAGRAM AND USE CASE DIAGRAM

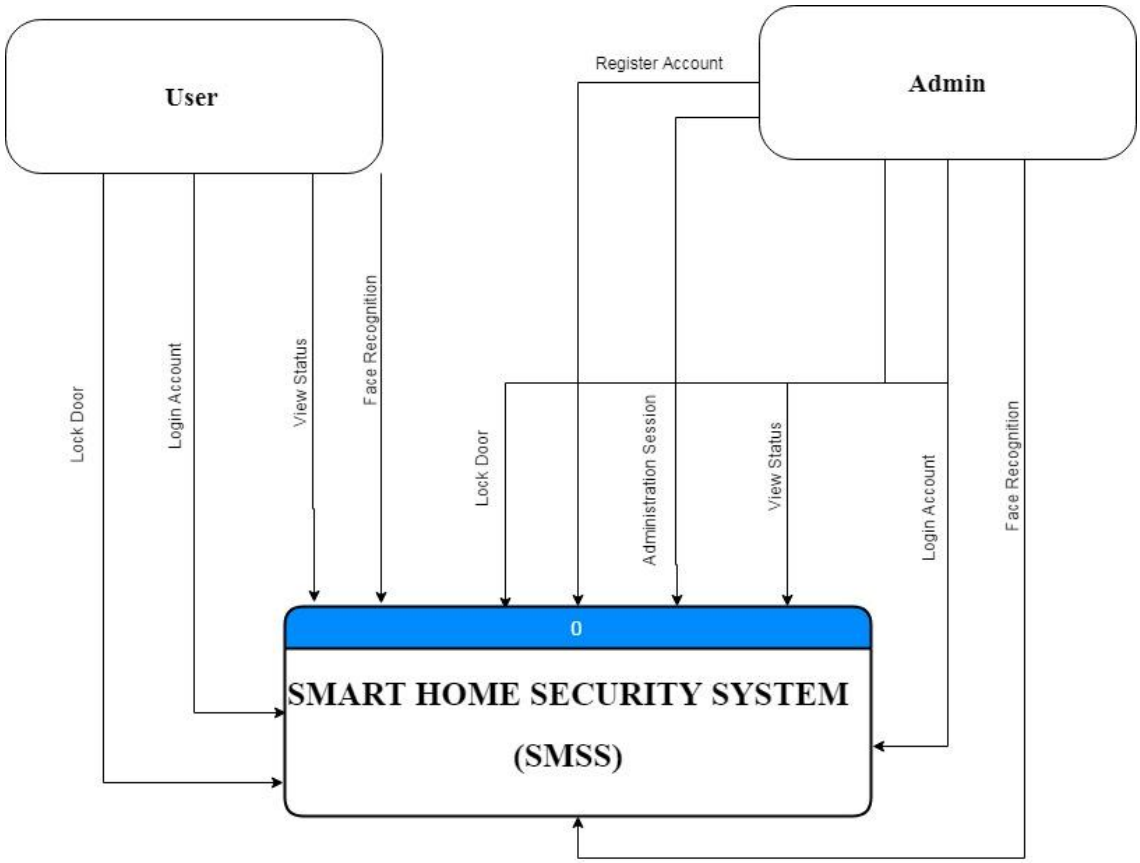


Figure 3.2: Context Diagram of Smart Home Security System

In context diagram, admin need register the account first before login the account. User need insert name , username , IP address , password , number phone and confirmation password. The system will create the account. After that, admin and user need login the account which user insert username and password. The system have few function which administration session , manage user information , view status and manage locker door. When admin chose manage user information function, admin can edit their user information and view their information .When user or admin chose view status, user or admin only view status of locker door. When admin chose administration , user delete another user to login the account, update the another user, add another user and view status all another user . The administration function only used by admin who register the account. When user or admin chose manage locker door, user or admin can setup the password, lock or unlock the locker and changing the password locker. When the system sent alert to the user or admin, user or admin receive alert and user reply the status alert to the system for auto locking. The system detect the someone else by face recognition which unknown detect.

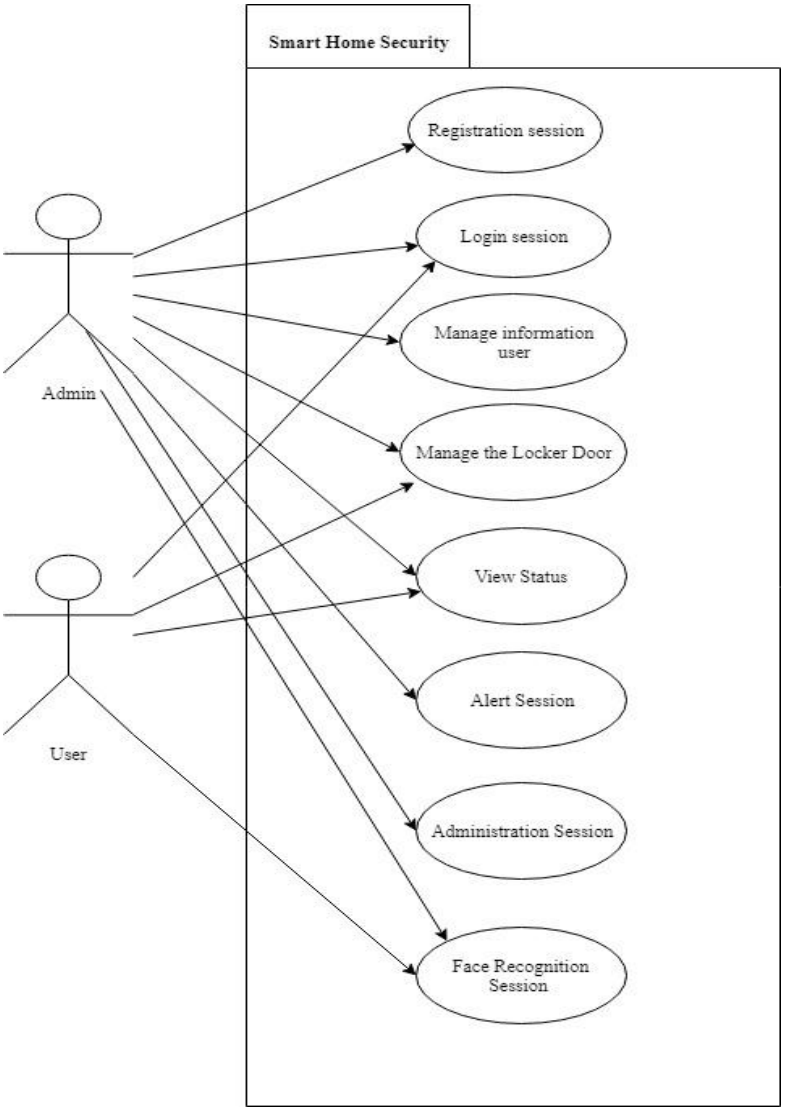


Figure 2.3: Use Case Diagram

3.2.6 GENERAL ARCHITECTUAL AND PACKAGE MODULE

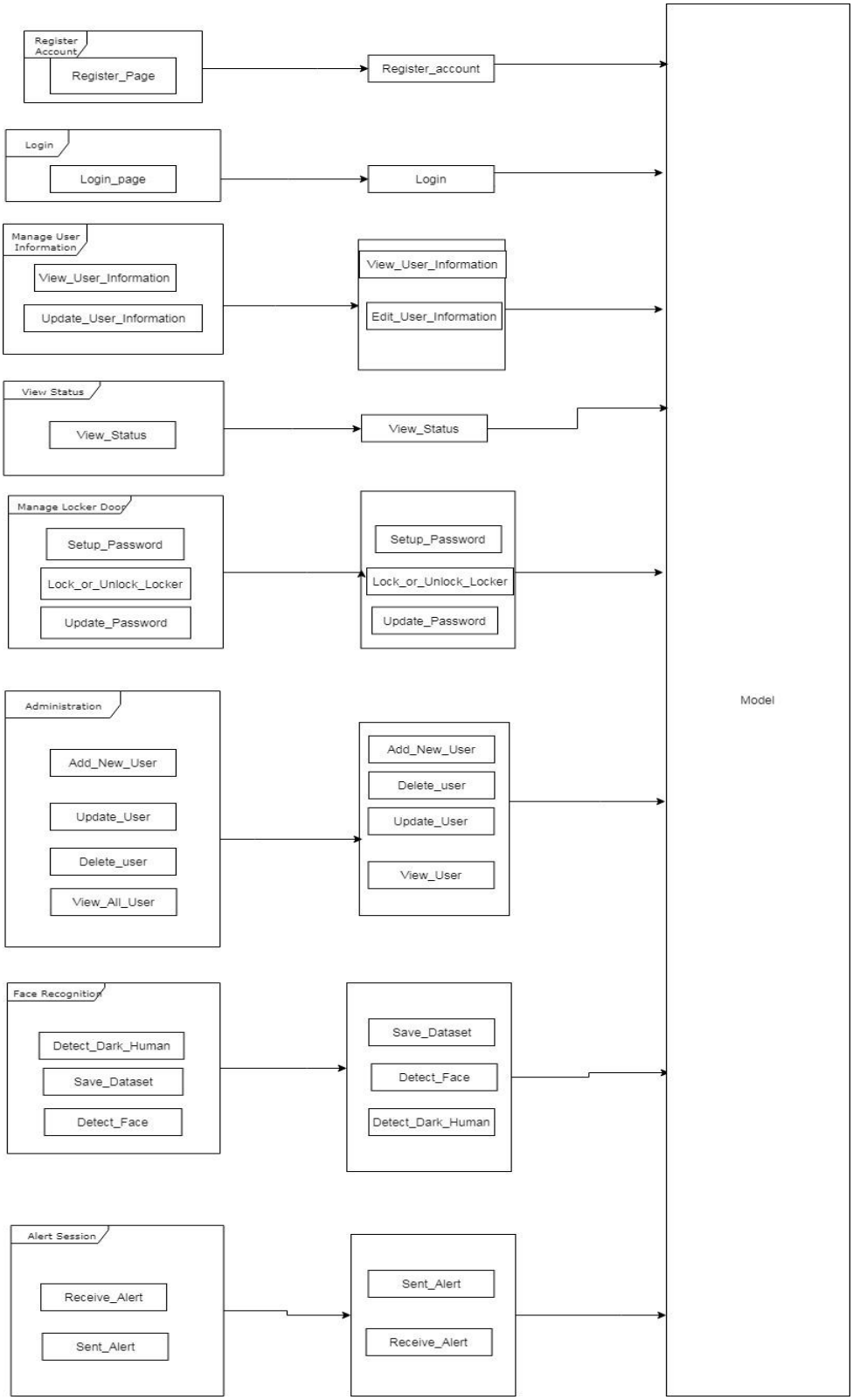


Figure 3.4: General Architecture

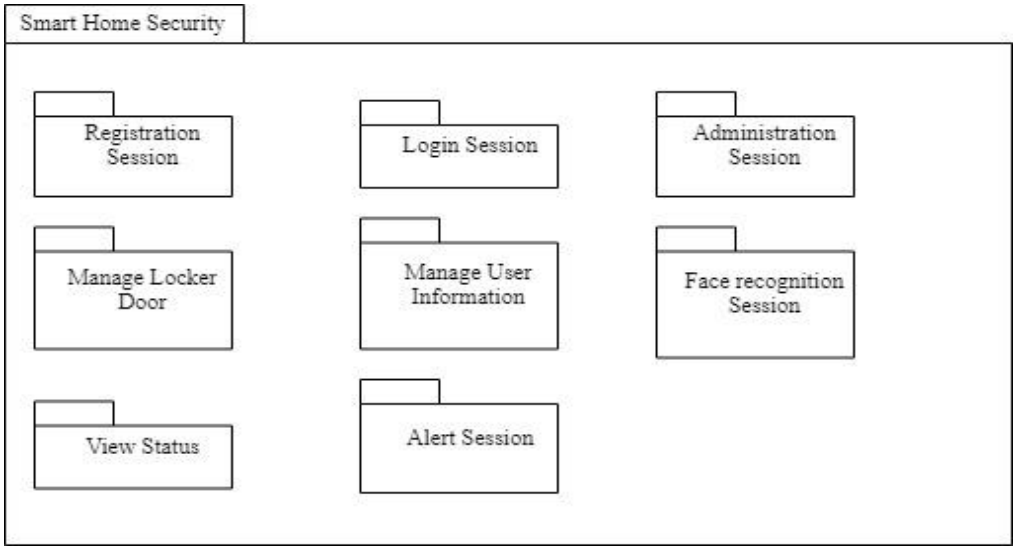


Figure 3.5: Package Module

3.3 HARDWARE AND SOFTWARE

This section will explanation about the hardware and software needed for Smart Home Security.

3.3.1 Hardware Requirement

Table 3.1: Hardware item being used in Smart Home Security System.

HARDWARE	SPECIFICATION	PURPOSE	QUANTITY
Laptop	Asus X554L , x64-based processor, Intel i5, 4GB	To develop the system, prepare the thesis and documentation.	1
Printer	HP Deskjet 2520 series	To print the thesis and documentation	1
Microcontroller	Arduino UNO	As microcontroller for the whole PIC	1
Breadboard	Size: small	A device used as a construction base in developing an electronic	1

Microware radar sensor	Size: small	To sense motion of user and activate the voice recognition when user in range in PIR sensor.	1
Touch Screen	Size: 5 inch	To display of the face recognition.	1
Camera	Resolution: 5 MP	To detect the user face	1
Mobile Phone	Asus Zenfone	To run android apps that control the system.	1
LED	Red, Green	Use as an indicator the voice recognition to the user.	2
Raspberry Pi 3	Model B+	To using the face recognition.	1
Buzzer	Size: small	To give alert to the user.	1
Button	Size: small	To give door bell	1
Tape	Size: Medium	To stick material together	2
Corrugated Cardboard	Size: Medium	To build a house prototype	4
Glue	White	To stick the materials together to decorate the house prototype and combine the device with house prototype.	1 Bottle
Scissor	Any colour	To cut the box	1
Mouse	Wireless	To support the writing report.	1
Keyboard	Size: Small	To type the code in Raspberry Pi	1

Light Dependent Resistor	Size: Small	To detect light or dark	1

3.3.2 Software Requirement

Table 3.2: Software items

SOFTWARE	FUNCTION
Window 10	Main operating system for computer and development.
Google Chrome	Main web browser for searching information
WPS Writer	Software for creating documentations.
Draw.io	Drawing use case, dialogue diagrams, sequence diagram.
Google Drive	Main cloud storage for backup purpose for storing documents, source code of the projects and images.
SmartSheet	Create Gantt Chart
Kodular/Makeroid	Develop the android app
Firebase	Create online database for system.
Java SE Embedded	A tool to write a code for Arduino Uno and compile it in Arduino Uno.
Justinmind Prototype	Tools to build prototype interface of the system.
Python	Tools to run the code of python file in raspberry pi
Opencv	To build face recognition in the raspberry pi

3.4 GANTT CHART

Refer to Appendix A

3.5 IMPLEMENTATION

In this section, implementation of Smart Home Security System is discussed. The system is developed using RAD methodology that ability to both easily and frequently receive feedback from user who are directly interfacing with the application during development and prototyping. The development also used Kodular (Makeroid), Arduino Integration Development Environment (IDE) and Python IDE as text editor and simulator for writing , editing the code and also run the code simulate the system. The data save in the system is saving into cloud Firebase database.

First time user will have to register to the system before using it. A registered user can continue using the system by login and lock or unlock the door. The system should record the user account registration.

User can also add another user to use the system and the system must update change made into database such as update the password of login, update the password locking and update of another user information. The system display the status of locking the door as Door is lock or Door is unlock. The system can also asking admin to delete the another user account. The another feature of system is face recognition feature. User must stand front to the system to active the face recognition feature. The system receive the user face only recognize and another user face can't recognize or unknown. The system record the face of user into database for verification of the face.

3.6 TESTING PLAN

In this case, there have two types of testing techniques which are used in this development of the system. This include both Black Box Testing and White Box Testing techniques for evaluating the performance, security and integration of system.

In Black Box testing, we focus on testing the external structure, design and structure. This testing activity including review of documentations whether it is requirement and development of the prototype. We can do both testing which are User

Acceptance Testing and System Testing for full assessment of the performance of system.

In While Box Testing, we focus on testing activity which the internal structure, design and structure where it are known by tester. We used the diagram which are Use Case Diagram, Context Diagram, Package Diagram and Sequence Diagram as reference for the structure of development, interaction and modules with function for implementation. This testing including unit testing by testing input and output and function of each module. Second, we evaluate and do integration testing to assess the integration of module connecting together as a whole system.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

The purpose of this chapter is to discuss in detail of implementation and testing in developing Smart Home Security System. The process of implementation to developing the system and testing to detect major , minor and critical error and fix it to make the system less of the error or less of major error. The implementation have starting with developing android and after than face recognition. The objective 1 have been achieve by face recognition have developing.

4.2 Testing And Result Discussion

The testing method of developer of developing this system is Black Box Testing which test the external structure of system, design or implementation of the tested is not known the tester . The Black Box Testing is applies highly level testing is System testing and User Acceptance Test (UAT).

Next, the testing method of developer using of developing this system is White Box Testing which test the internal structure of system, design or implementation of tested is known the tester. The White Box Testing is applies lowly level testing is Unit Testing and Integration Testing.

The system developing based on three problem statement. The techniques used in create Smart Home Security System based on follows objective :

i. To improve the security system by face recognition.

ii. To least the burden of the user.

iii. To produce Raspberry pi system with face recognition.

4.3 User Manual

The user guideline of the Smart Home Security is produced for user and admin that want to setup the system of face recognition at the home door and android application and how to use the system in correct way to avoid any error of using and setup.

The system achieved the objectives of the system based on the problem statement and objectives with UAT and Testing Thesis and System Testing Approval

Based appendices have to be attached:

i. User Manual. Refer to Appendix B.

ii. User Acceptance Test. Refer to Appendix C.

iii. Testing Thesis and System Testing Approval. Refer Appendix D.

CHAPTER 5

CONCLUSION

5.1 Introduction

The conclusion of the project is that we have successfully developed Smart Home Security System. Smart Home Security is controlling the locker home door to unlock or lock the home door. The system consists two application which android application and device application. There have two of user which admin and user to use the system. The admin is owner of the system or one who buy the system and user is addition of user to use the system.

The android application have few function such as manage the user information, manage the locker of home door like password, manage administration like add user, update user, delete user and display all user and view the status locker. The device of face recognition have feature face recognition and detect of light and human detection which support face recognition to detect user face in the dark and reduce using electric.

All data have store in Firebase realtime database to use in real time database and secure. The database is nosql language which json tree. There no have specific data type and it can store picture , video or audio and it can analysis the upload or store data and download or retrieve the data.

Methodology of the system is Rapid Application Development (RAD) to develop this project. Based on project development, this methodology suitable to this project because this project required developer create prototype to easy interactive with it and developer manage follow all phases along with time of development of this system.

5.2 Research Constraints

Constrain of this project are:

1. Lack of references

This project need more references such as professional in Raspberry Pi , Opencv tools and documentation format. Due to lack references, the project development time become longer because the developer need time to think solution and find reference relate solution. The development of this system is mostly referred from open source project , and coding forum.

2. Limited Time

This project need more time to do development and testing for better result of software. This project require get feedback from client or stakeholder in resident of Gambang such as survey to get their requirement. This project have been changing of using technology from voice recognition to face recognition and this changing make huge waste of time because it need changing in documentation.

3. Limited Capability of Hardware

Before this project change, this project using voice recognition to improve security the system locker door but it have limited capability of voice recognition such as accuracy of voice user and only few words user can using and word that system receive always using in daily life. This reason the developer have changing from voice recognition to face recognition.

5.3 FUTURE WORK

There have several suggestion and recommendation that can be carried out in the future of the Smart Home Security System:

1. Face recognition should doing live detection and it didn’t detection based on image to detect user face accuracy and more secure.

2. The Smart Home Security mobile application should also build other operation system such as IOS to make multiple operation system can support the system. The Smart Home Security build in Android OS

REFERENCES

Chitnis, S., Deshpande, N., & Shaligram, A. (2016). An investigative study for smart home security: Issues, challenges and countermeasures. *Wireless Sensor Network*, *8*(4), 61–68. https://doi.org/10.4236/wsn.2016.84006

CubeOne TM. (2018). Retrieved from https://www.ismartalarm.com/devices/cubeone/isa00011.html

FrontPoint Security. (2018). Retrieved from http://safe.frontpointsecurity.com/spa-landing-page-quote-wizard?source=%7BD923640C-101A-40AD-99EB-C375BB516926%7D

Gershenfeld, N., Krikorian, R., & Cohen, D. (2004). *The internet of things. Scientific American* (Vol. 291). https://doi.org/10.1038/scientificamerican1004-76

How Does The System Work ? PRIMARY EMERGENCY OWNER / SUBSCRIBED EMERGENCY CHANGE FROM TIME TO TIME . As Viewed On : (2018), 2–3. Retrieved from http://www.sharpsmarthome.com/how-it-works/

Online, U. (2017). Kes jenayah indeks meningkat 4 . 6 % sehingga April tahun ini, 4–7. Retrieved from http://www.utusan.com.my/berita/jenayah/kes?jenayah?indeks?meningkat?4?6?sehingga?april?tahun?ini?1.319570

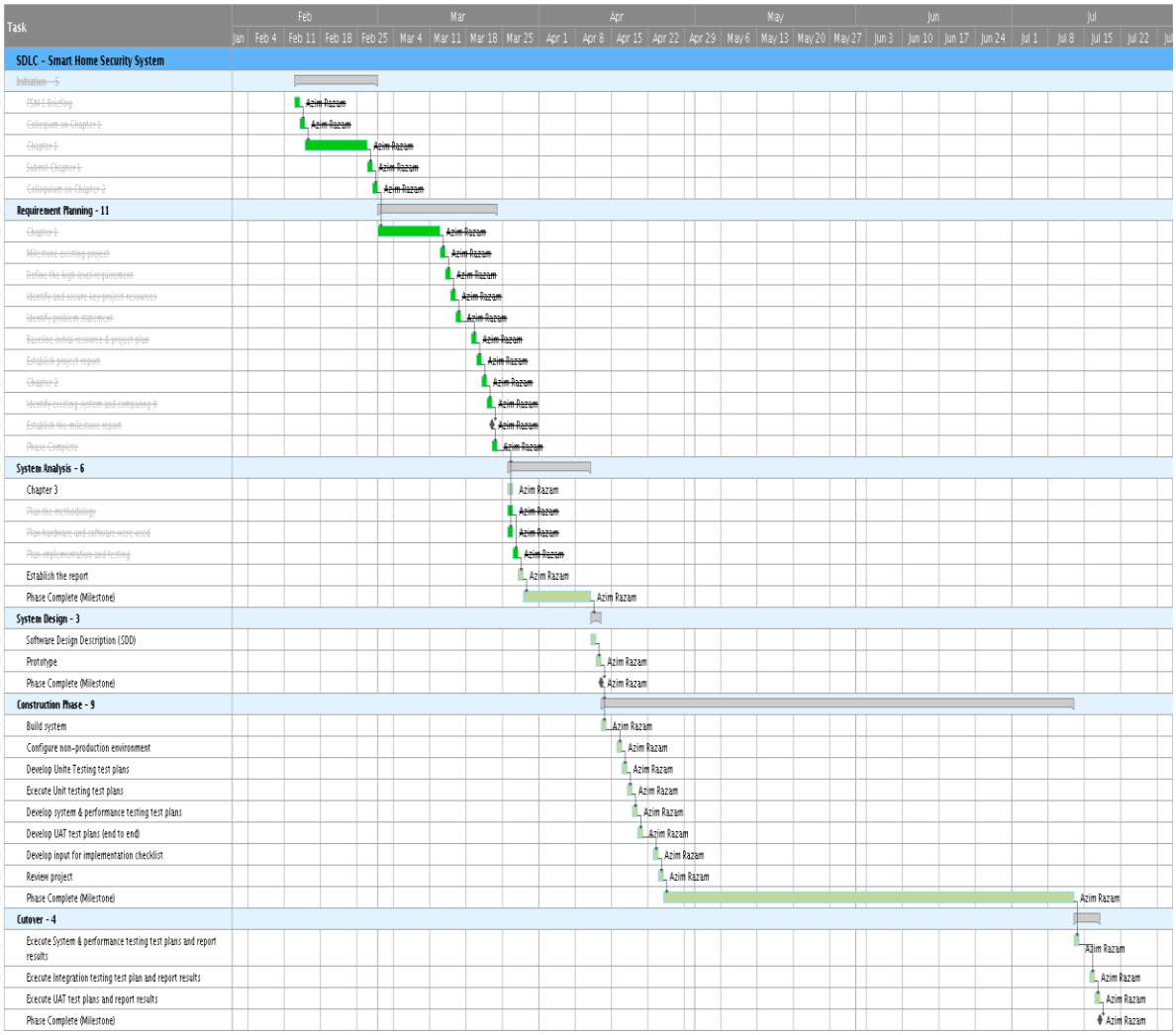
Protect Your Home Intelligently. (2018). Retrieved from https://www.ismartalarm.com/why-ismartalarm#security_cameras

SmartHomeUSA. (2014). What is a Smart Home?, (866), 3–5. Retrieved from

http://www.smarthomeusa.com/smarthome/

Why do you need Sharp Cloud SmartHome System ? As Viewed On : (2018), 1–3. Retrieved from http://www.sharpsmarthome.com/home-security-needs/

APPENDIX A


Task
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36 Develop system & performance testing test plans
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38 Develop input for implementation checklist
39 Review project
40 Phase Complete (Milestone)
41 Cutover - 4
42 Execute System & performance testing test plans and report results
43 Execute Integration testing test plan and report results
44 Execute UAT test plans and report results
45 Phase Complete (Milestone)
Azim Razam

APPENDIX B

User Manual

3. GENERAL INFORMATION

1.1 System Overview

Smart Home Security is mobile application used to managing their locker home door and also managing admin information and user information, Raspberry Pi used to detect face user to lock or unlock the locker of door and Arduino UNO to support the Raspberry Pi such as detect dark, human motion and open LED light. The main purpose of this system is to improve security of home by using face recognition and simplify the user to manage their locker door at anywhere by using mobile application. Other than that, admin can manage their user to increase quantity of user of used.

4. SYSTEM SUMMARY

5.4 System Configuration

SHSS is based an Android operation system, Raspberry Pi and Arduino UNO. The android application required API level 21 or the common name is Android 5.0 lollipop. The application required connection to Internet before used in order to save data, update data, delete data and retrieve data in database and this applies also in Raspberry Pi need connection to Internet to communicate with android app in TCP/IP communication. Data saved in database can be seen using Firebase. After installation on the device, user need register the account which the system asking user key-in IP address. The IP address can be obtaining by setup the Raspberry Pi and connect the Internet then run the Raspberry Pi system which it display the IP address. Key-in IP address in the registration interface.

5.5 User Access Level

User Access for this level is divide into two types of user

1. Android Smartphone admin who have the android application installed in their smartphone.

2. Android Smartphone user who have the android application installed in their smartphone.

5.6 Contingencies and alternate modes of operation

In case there is no Internet connection available data cannot be saved in Firebase so the data saved in the internal memory for temporary database. User can use android application when camera at Raspberry Pi doesn't working. When LED light broken or sensor at Arduino not working very well, user need use another other party to light of the user face in dark.

3. GETTING STARTED

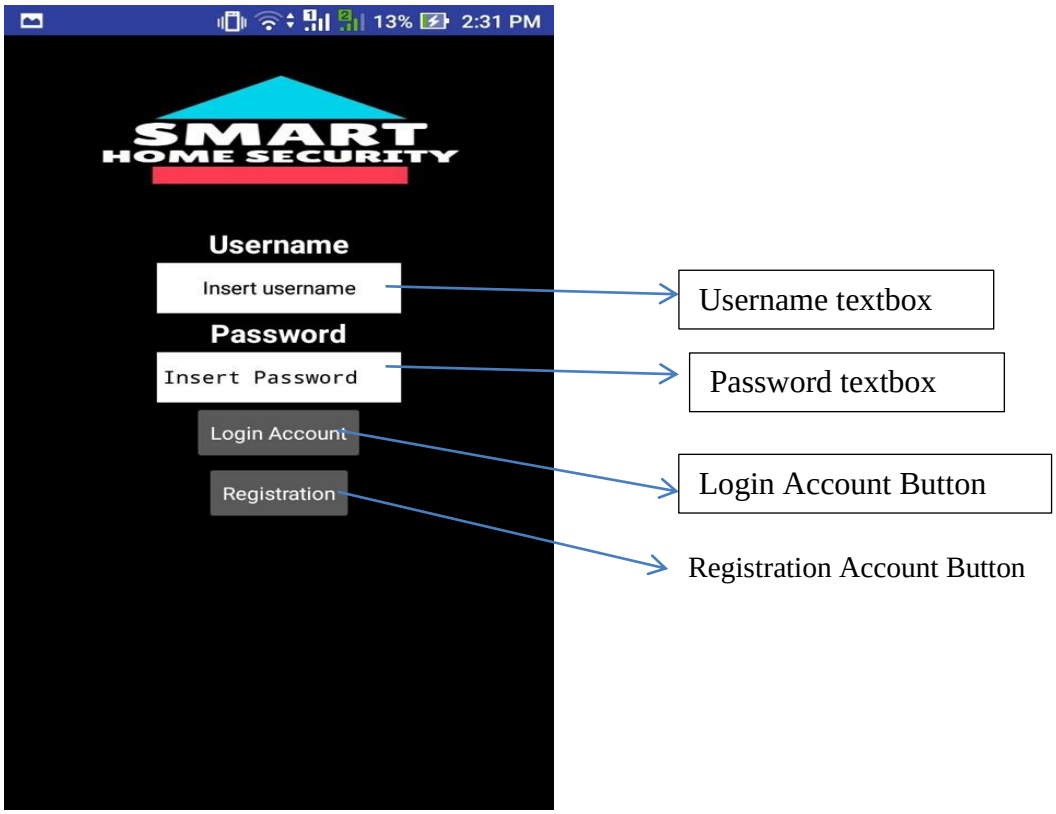

Figure 4.1: Login Page

Username textbox – User must insert username

Password textbox – User must insert Password

Login Account Button – The Home page shown when user insert correct username and password and press this button.

Registration Account Button – The Registration page shown when user press this button.

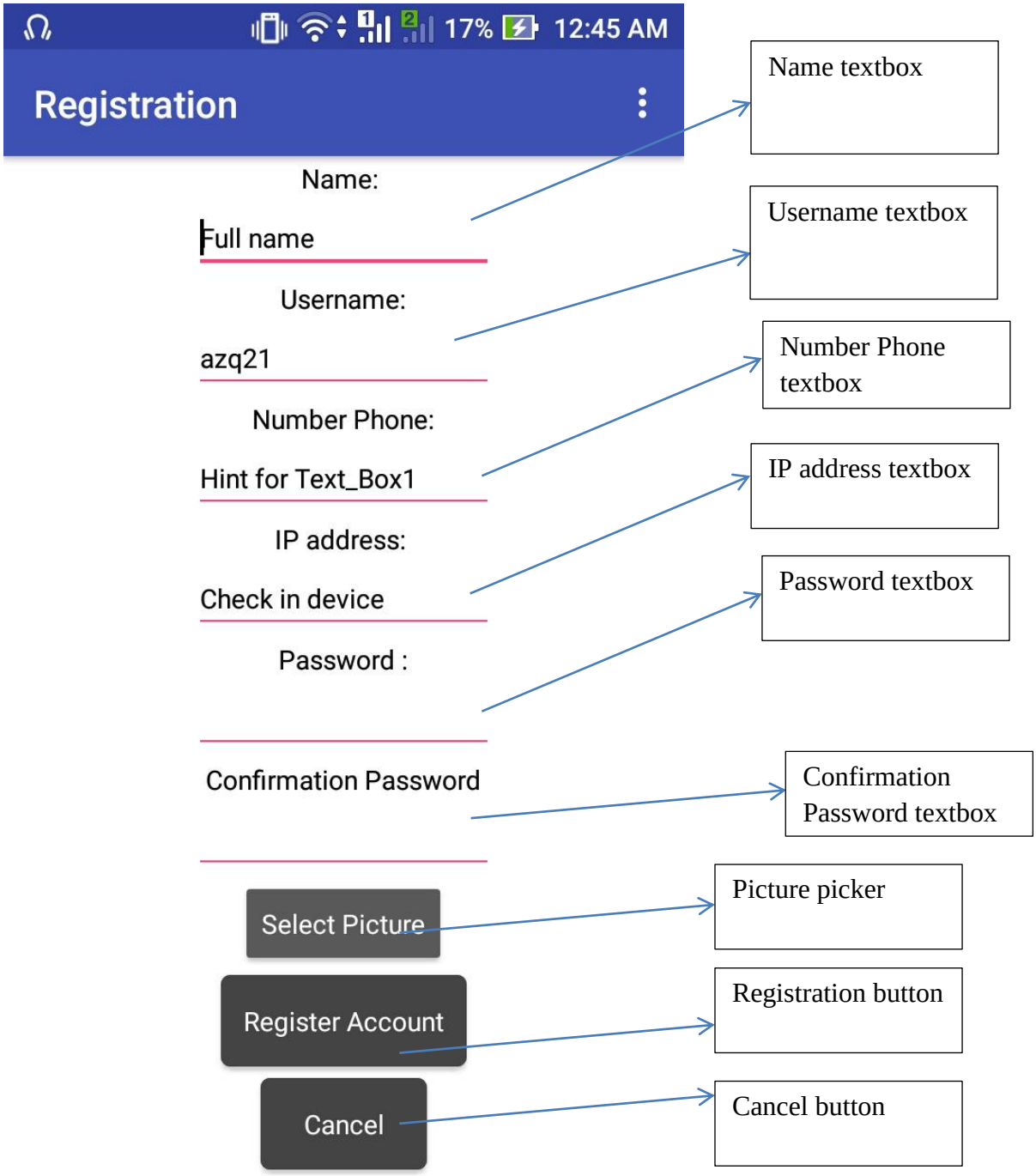

Figure 4.2: Registration Page

Name textbox – User must insert name

Username textbox – User must insert username

IP address textbox – User must insert IP address

Number Phone textbox – User must insert number phone

Password textbox – User must insert password

Confirmation Password textbox– User must insert confirmation password and same with password

Picture picker – User must pick one picture.

Registration button – The Login page shown when user insert corrects all information and press this button.

Cancel button - The Login page shown when user press this button.

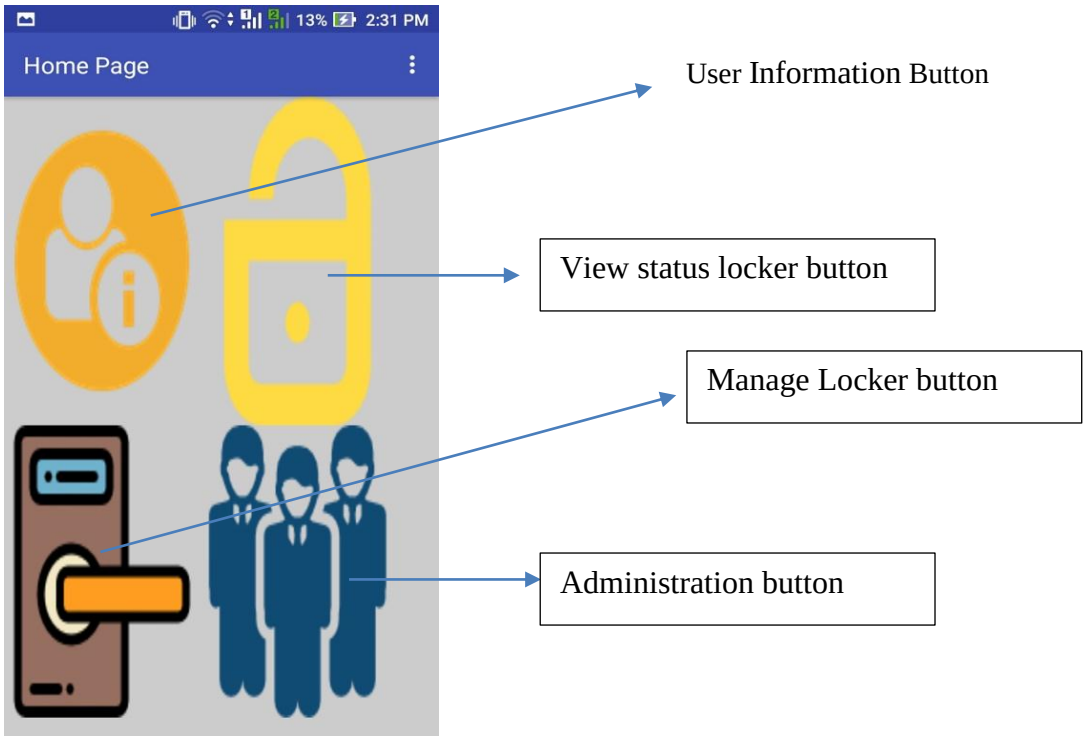

Figure 4.3: Home Page

User Information button - The User Information page shown when user press this button.

View status locker button - The View status locker page shown when user press this button.

Manage Locker button - The Manage Locker page shown when user press this button.

Administration button - The Administration page shown when user press this button.

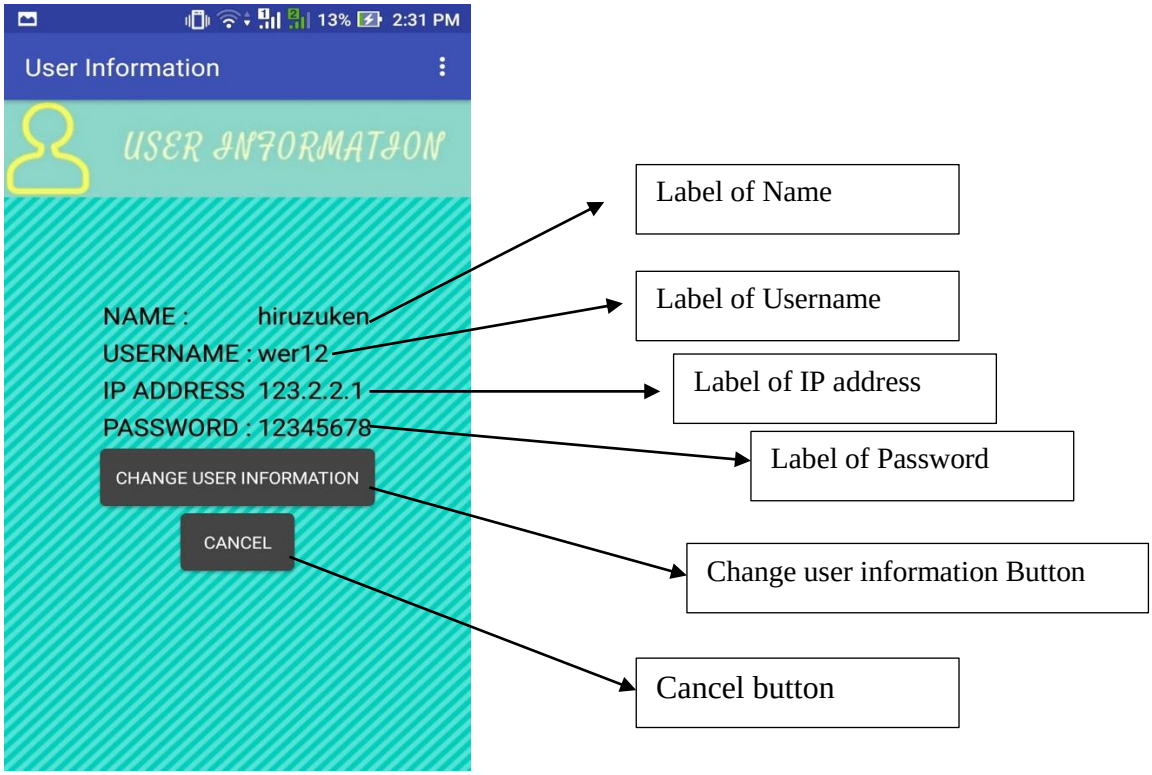

Figure 4.4: User Information page

Cancel button - The Home page shown when user press this button.

Change user information Button - The Change user information page shown when user press this button

Label of Name – Show name of user

Label of Username - Show username of user

Label of IP address – Show IP address

Label of Password – Show password

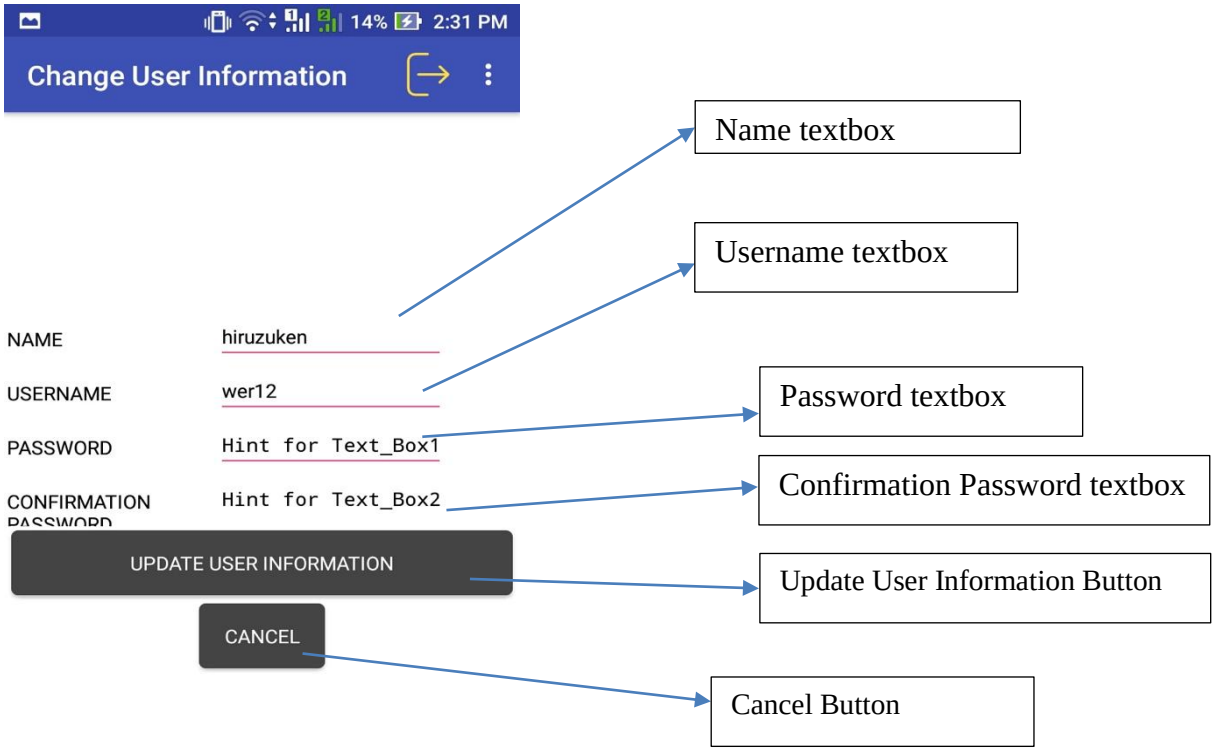

Figure 4.5: Change User Information Page

Name textbox – User must insert name

Username textbox – User must insert username

Password textbox – User must insert password

Confirmation Password textbox– User must insert confirmation password and it same with password

Cancel button - User Information page shown when user press this button.

Update User Information Button - User Information page shown when user press this button

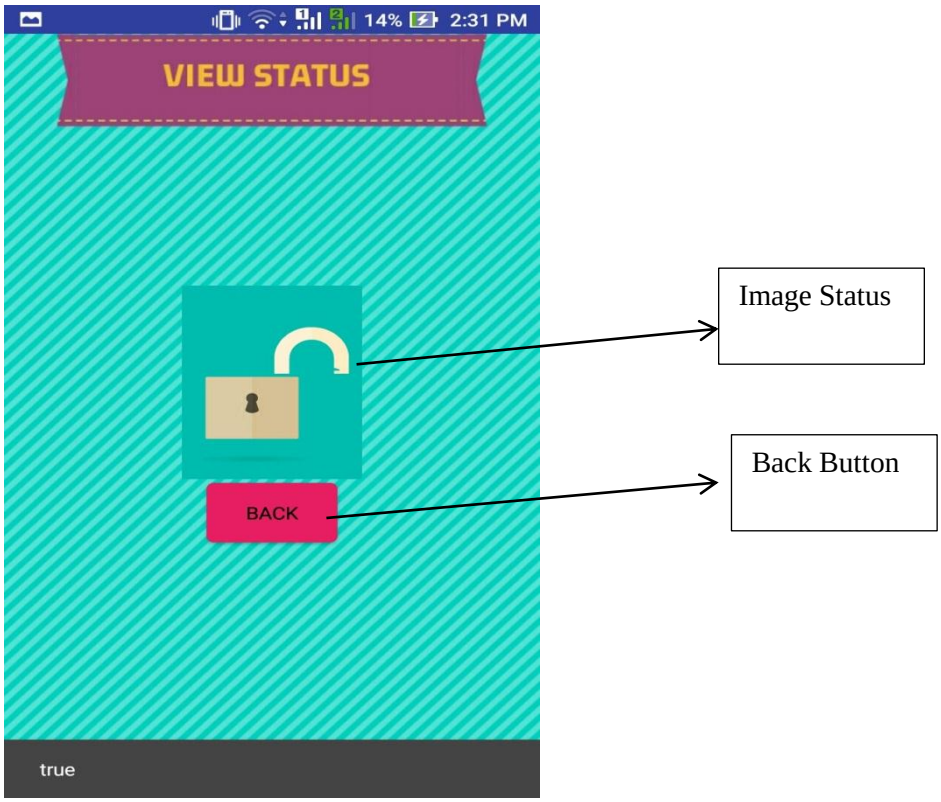

Figure 4.6: View Status Page

Back button - Home page shown when user press this button.

Image status – Display image status of locker

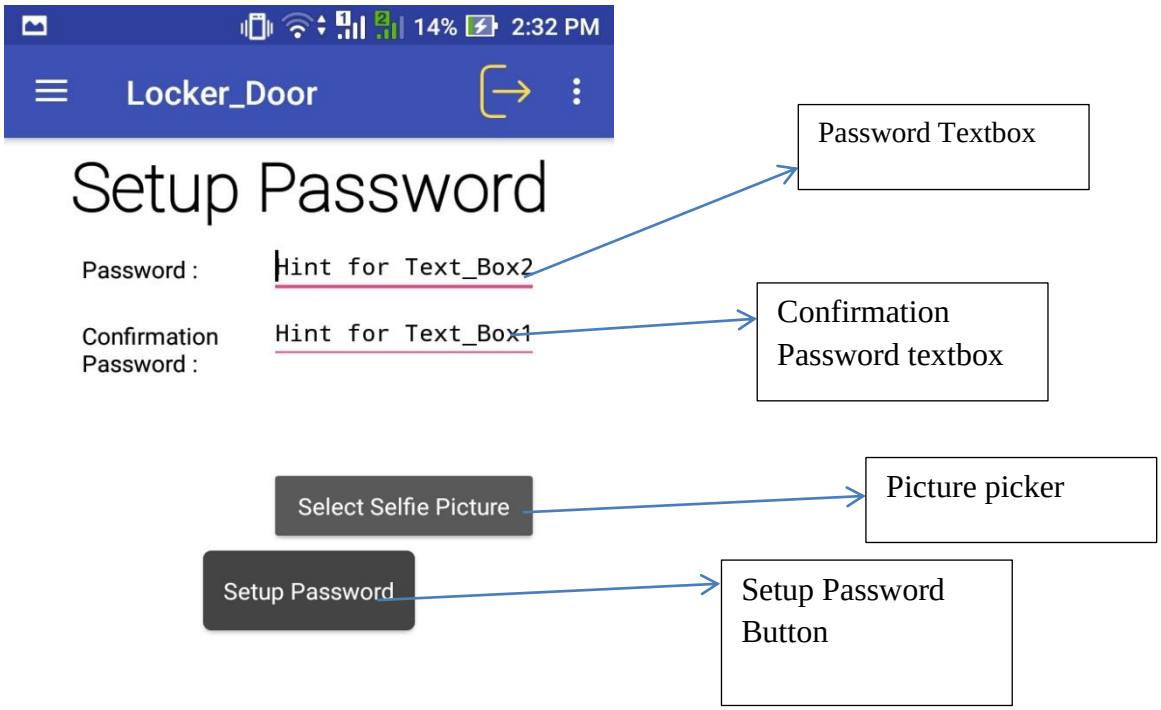

Figure 4.7: Setup Password interface

Password textbox – User must insert password

Confirmation Password textbox– User must insert confirmation password and it same with password.

Picture picker – User must pick one picture.

Setup Password Button – Locker door page shown when user press this button and password locker save in database.

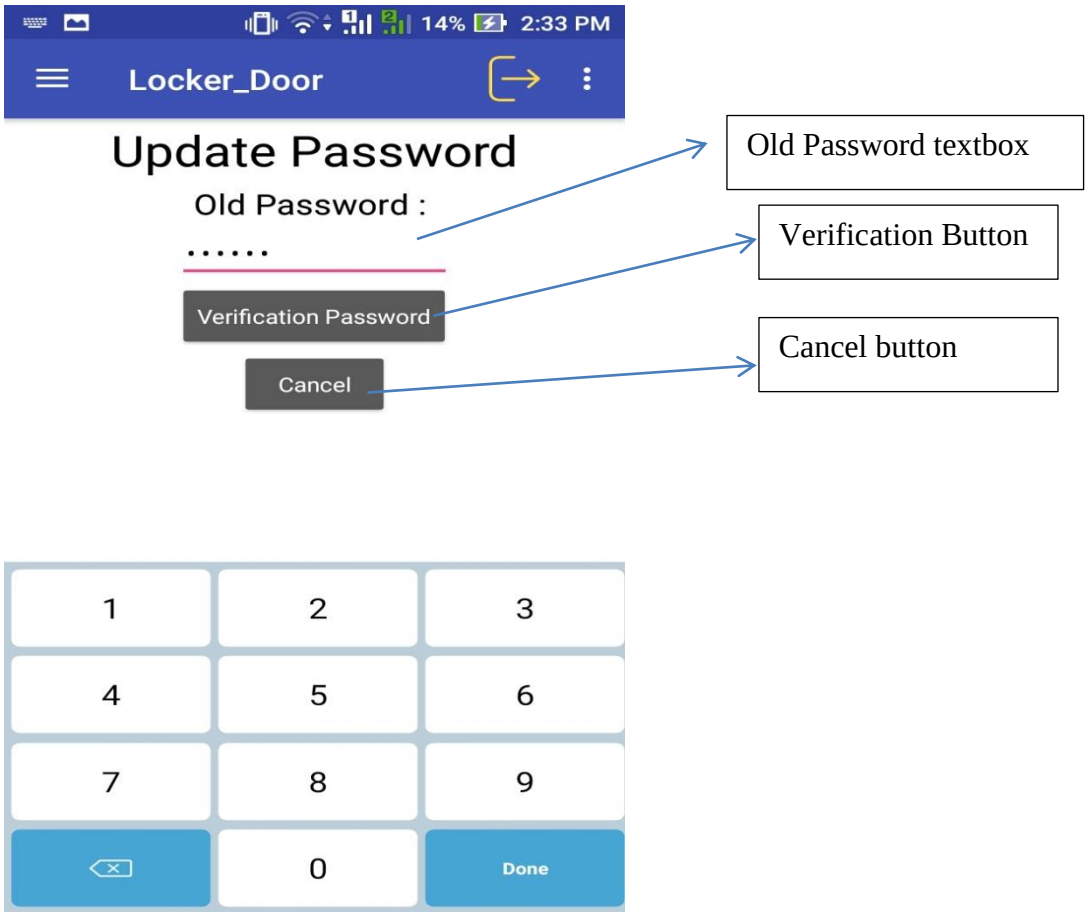

Figure 4.8:Update Password Interface

Old Password textbox – User must insert correct old password

Cancel button - Locker Door page shown when user press this button.

Verification Button – Change password interface shown when user press this button and it verify the old password

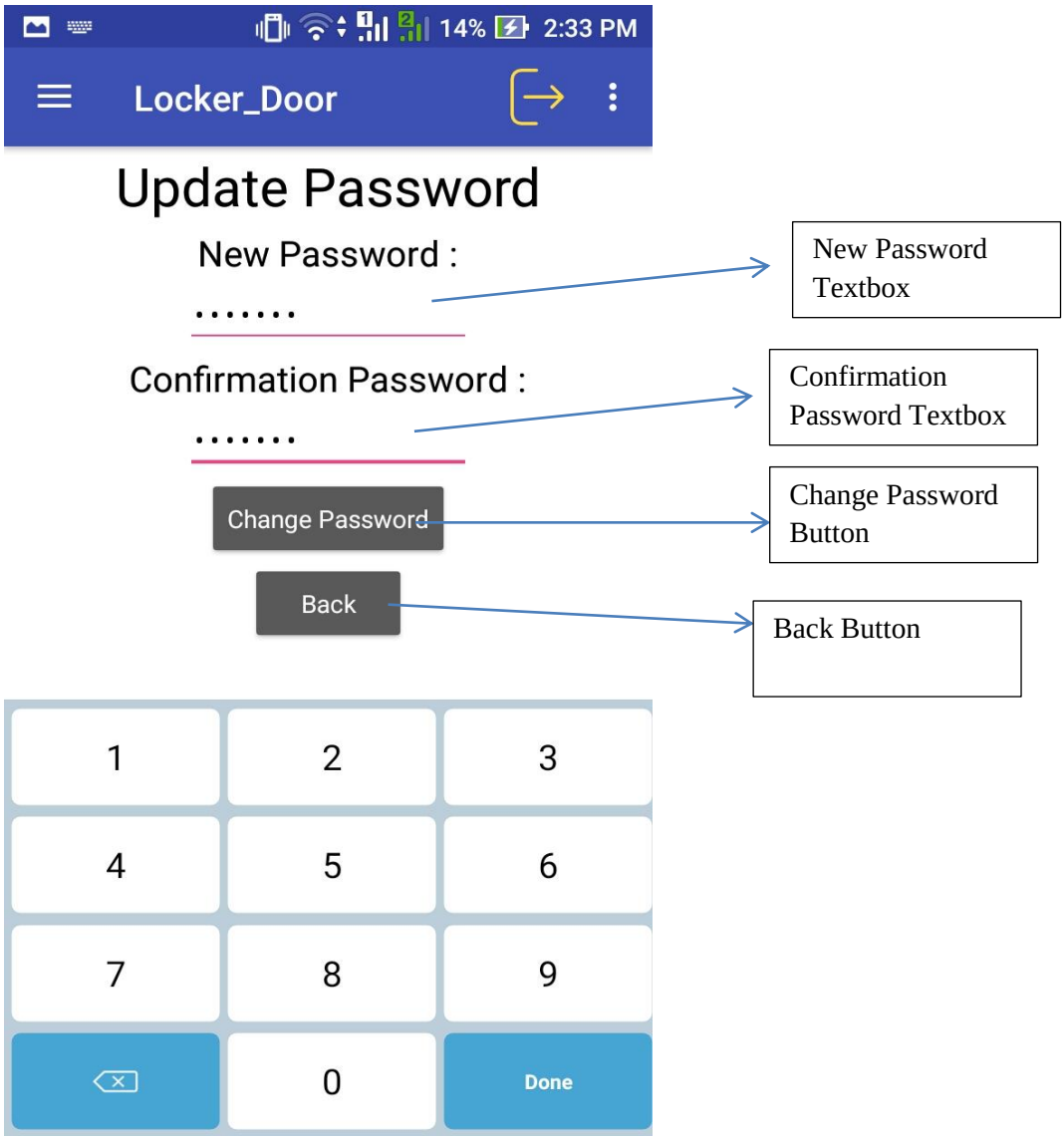

Figure 4.9: Update Password

New Password Textbox – User must insert new password

Confirmation Password textbox– User must insert confirmation password and same with new password

Change Password Button – Locker Door interface show when user press this button.

Back button - Verify password page shown when user press this button.

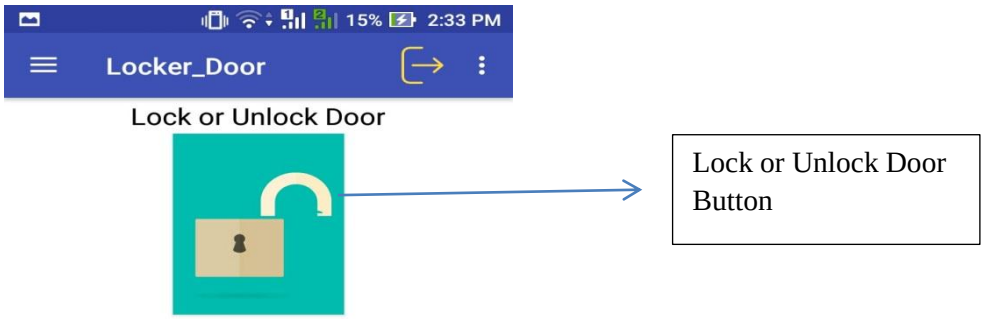

Figure 4.10: Lock or Unlock interface

Lock or Unlock Door Button – Enter the password interface will shown when user press this button.

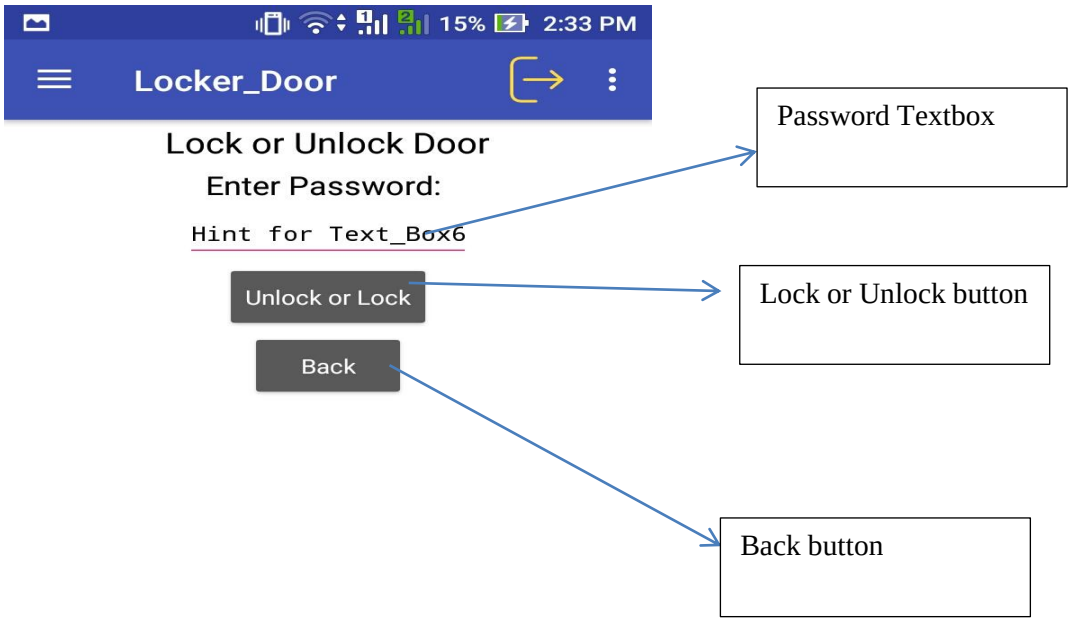

Figure 4.11: Enter Password Interface

Password Textbox – User must insert correct password

Lock or Unlock button – Lock or Unlock interface will show when user press this button

Back button - Lock or Unlock interface will show when user press this button

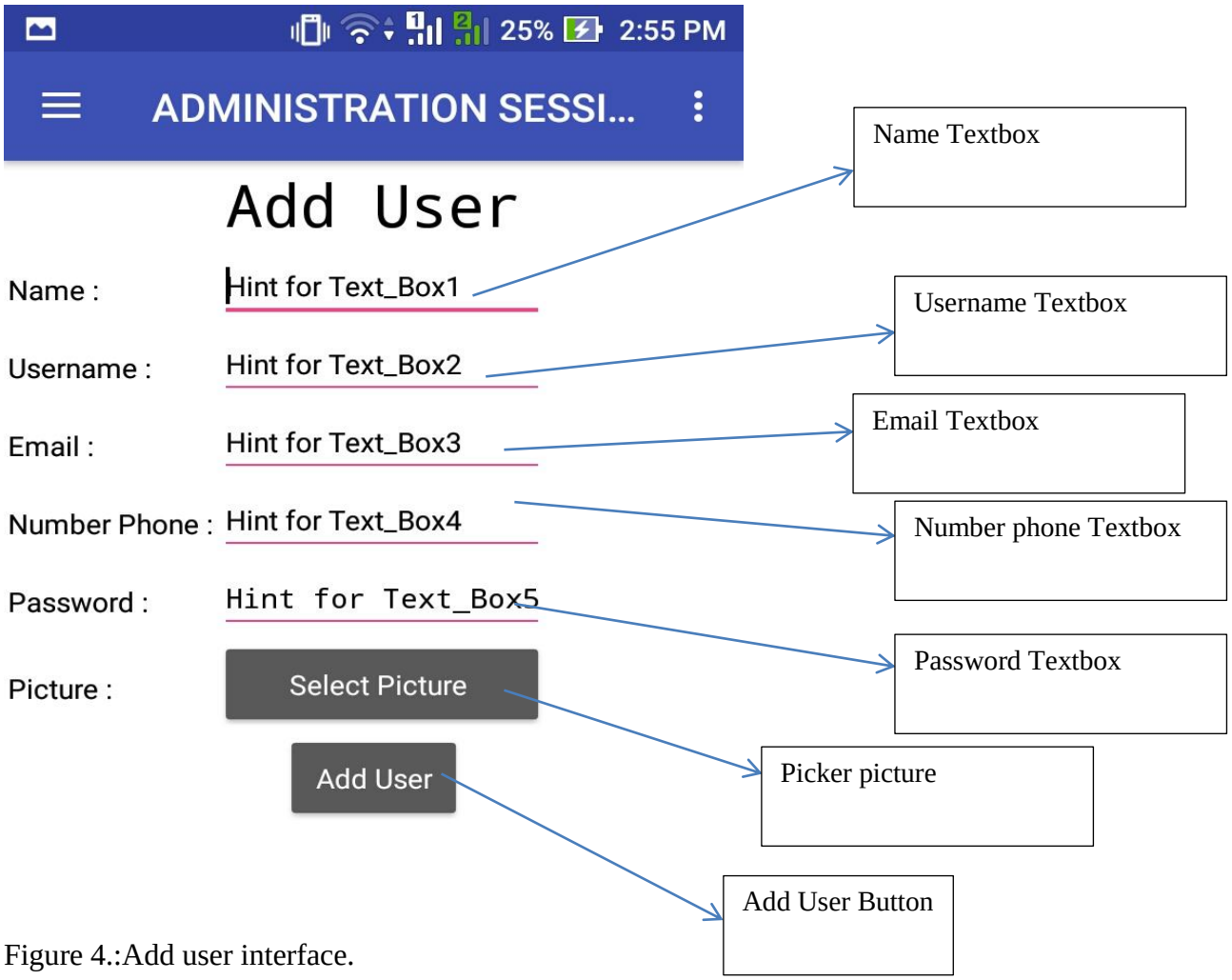

Figure 4.:Add user interface.

Name textbox –Admin must insert name of user

Username textbox – Admin must insert username

Password textbox – Admin must insert password

Number Phone textbox – Admin must insert number phone user

Email Textbox – Admin must inset email user

Picture picker –Admin must pick one picture user.

Add user Button – All textbox empty when Admin press this button.

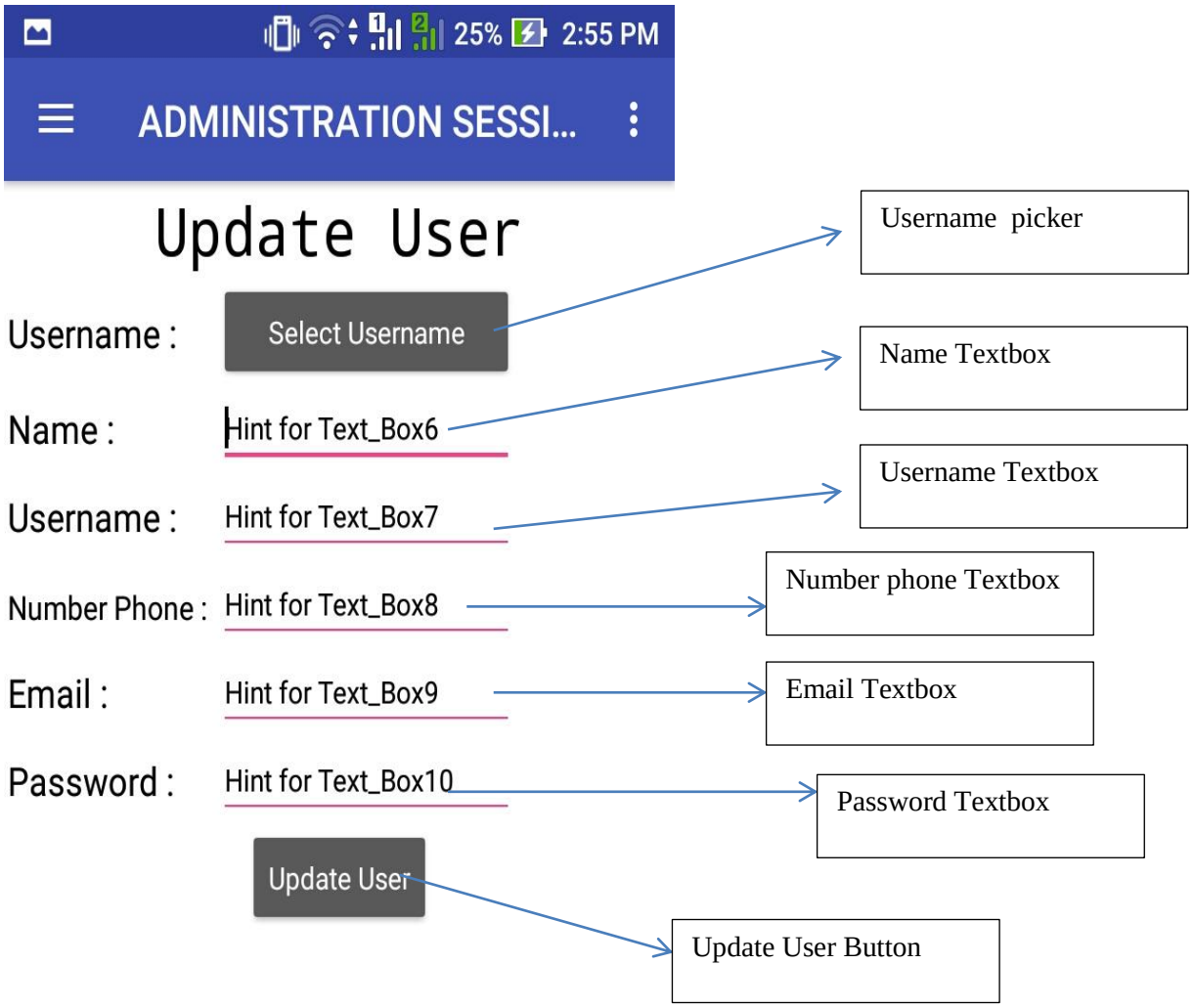

Figure 4.: Update User Interface

Username picker – Admin select username who it need update information and username textbox fill with the username selected .

Name textbox –Admin must insert name of user

Username textbox – Admin must insert username

Password textbox – Admin must insert password

Number Phone textbox – Admin must insert number phone user

Email Textbox – Admin must inset email user

Update User Button – All textbox empty when admin press this button

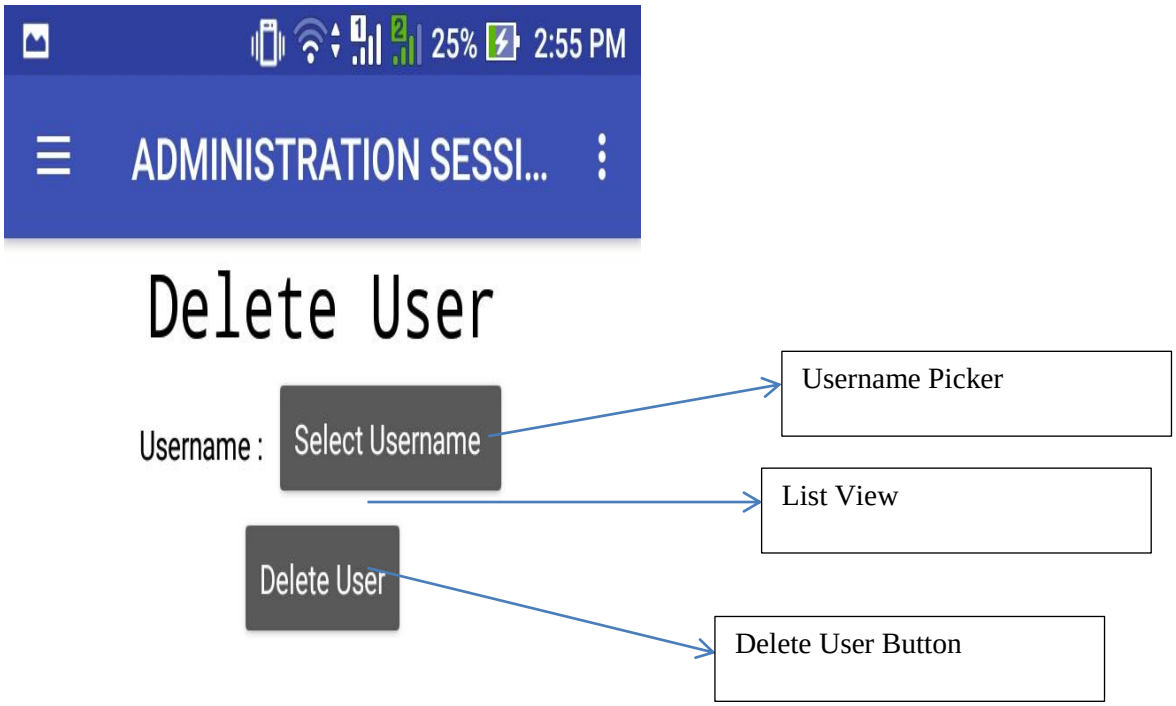

Figure 4.13: Delete User Interface

Username Picker - Admin select username to delete.

List View – Show list of selected user information

Delete User Button – Selected user information delete when admin press this button

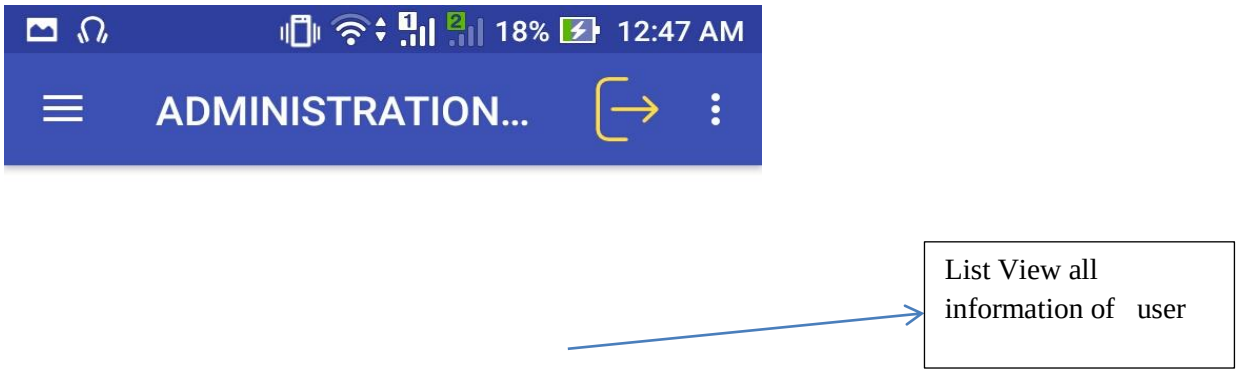

Figure 4.14: Display All information of user

List View all information of user – Display all user information

APPENDIX C

USER ACCEPTANCE TEST (UAT)

TABLE OF CONTENTS

1.0 TESTING REPORT

The purpose of this section to show the User Acceptance Test for Smart Home Security System. Approval of this testing implies that reviewers are confident that following the execution of test plan, the result system will be considered fully-tested and eligible for implementation.

The chosen user will go each instruction in user manual. Any errors or problems found by user must be noted on this form. This form also needs to be signed by users after the test is finished.

1.1 User Case Number 1: The admin register to make an account

Event	Test Data	Expected Result	Actual Result	Pa
TC-01-001: Admin didn't enter anything in text field	Name = “” Username=”” Password=”” Number Phone =”” Confirmation Password=”” Picture=”” IP address = “”	Popup message “ Please fill all information”	Popup message “Please fill all information”	
TC-01-002: User didn't insert name only	Name=”” Username=jim Password=12345678 Confirmation Password=12345678 Picture=selfie.jpg Number Phone=012332443 IP address = 10.21.90.1	Popup message “ Please insert name “	Popup message “ Please insert name “	
TC-01-003: User didn't insert username only	Name=syafi azim Username=”” Password=12345678 Confirmation Password=12345678 Picture=selfie.jpg Number Phone=012332443 IP address = 10.21.90.1	Popup message “ Please insert username “	Popup message “ Please insert username “	
TC-01-004: User didn't insert ip address only	Name=syafi azim Username= jim Password=12345678 Confirmation	Popup message “ Please insert ip address “	Popup message “ Please insert ip address “	

	Password=12345678 Picture=selfie.jpg Number Phone=012332443 IP address = “”			
TC-01-005: User didn’t insert number phone only	Name=syafi azim Username= jim Password=12345678 Confirmation Password=12345678 Number Phone=”” IP address = 10.21.90.1 Picture=selfie.jpg	Popup message “ Please insert number phone “	Popup message “ Please insert number phone “	
TC-01-006: User didn’t insert password only	Name=syafi azim Username= jim Password=”” Confirmation Password=12345678 Number Phone=012332443 IP address = 10.21.90.1 Picture=selfie.jpg	Popup message “ Please insert password “	Popup message “ Please insert password “	
TC-01-007: User didn’t insert password confirmation only	Name=syafi azim Username= jim Password=12345678 Confirmation Password=”” Number Phone=012332443 IP address = 10.21.90.1 Picture=selfie.jpg	Popup message “ Please insert confirmation password “	Popup message “ Please insert confirmation password “	
TC-01-008: User didn’t pick picture	Name=syafi azim Username= jim Password=12345678 Confirmation Password=”” Number Phone=012332443 IP address = 10.21.90.1 Picture=selfie.jpg	Popup message “ Please pick a picture “	Popup message “ Please pick a picture “	
TC-01-009: User did insert all information required	Name=syafi azim Username= jim Password=12345678 Confirmation Password=12345678 Number Phone=012332443 IP address = 10.21.90.1 Picture=selfie.jpg	Redirect to Login page	Redirect to Login page	

1.2 User Case Number 2: The admin login the account

Event	Test Data	Expected Result	Actual Result	Pa
TC-02-001: Admin didn't enter anything in text field	Username="" Password=""	Popup message " Please insert username and password"	Popup message "Please username and password"	
TC-02-002: Admin didn't insert username only	Username="" Password=12345678	Popup message " Please insert username "	Popup message " Please insert username "	
TC-02-003: Admin didn't insert password only	Username= jim Password=""	Popup message " Please insert password "	Popup message " Please insert password "	
TC-02-004: Admin did insert username and password	Username= jim Password=12345678	Redirect to Login page	Redirect to Login page	
TC-02-005: Admin did insert incorrect username and password	Username= ajim Password=1234513	Alert "Please insert correct username and password"	Alert "Please insert correct username and password"	
TC-02-006: Admin did insert username and password	Username= jim Password=12345678	Redirect to Home page	Redirect to Home page	

1.3 User Case Number 3: Admin manage user information

Event	Test Data	Expected Result	Actual Result	Pa
TC-03-001: The system display user information	Username = jim	The user information been display	The user information been display	
TC-03-002: Admin touch change user information button	Username = jim	System redirect update of user information interface	System redirect update of user information interface	
TC-03-003: Admin didn't insert anything in text field	Name= Username= Password= Confirmation Password= Number Phone=	Popup message " Please insert all information"	Popup message " Please insert all information"	

TC-03-004: Admin didn't insert username only	Name=syaifq Username= Password=1234454 Confirmation Password=1234454 Number Phone=0124354532	Popup message "Please insert username"	Popup message " Please insert password "	
TC-03-005: Admin didn't insert name only	Name=syaifq Username=ajim Password=1234454 Confirmation Password=1234454 Number Phone=0124354532	Popup message "Please insert name"	Popup message "Please insert name"	
TC-03-006: Admin didn't insert password only	Name=syaifq Username=ajim Password=1234454 Confirmation Password=1234454 Number Phone=0124354532	Popup message "Please insert password"	Popup message "Please insert password"	
TC-03-006: Admin didn't insert confirmation password only	Name=syaifq Username=ajim Password=1234454 Confirmation Password=1234454 Number Phone=0124354532	Popup message "Please insert confirmation password"	Popup message "Please insert confirmation password"	
TC-03-007: Admin did insert not same confirmation password with password	Name=syaifq Username=ajim Password=1234454 Confirmation Password=1234454 Number Phone=0124354532	Popup message "Please insert correct password or confirmation"	Popup message "Please insert correct password or confirmation"	
TC-03-008: Admin didn't insert number phone only	Name=syaifq Username=ajim Password=1234454 Confirmation Password=1234454 Number Phone=0124354532	Popup message "Please insert number phone"	Popup message "Please insert number phone"	
TC-03-009: Admin insert all information	Name=syaifq Username=ajim Password=1234454 Confirmation Password=1234454 Number Phone=0124354532	Redirect to the display user information	Redirect to the display user information	

1.4 User Case Number 4: Admin manage locker door

Event	Test Data	Expected Result	Actual Result	Pa
TC-04-001:	Username = jim	The system redirect	The system redirect	

Admin touch setup password button		setup password interface	setup password interface	
TC-04-002: Admin didn't insert anything in text field in setup password interface	Password Lock= Confirmation Password Lock = Picture 1=	Popup message " Please insert all information"	Popup message " Please insert all information	
TC-04-003: Admin didn't insert password lock only in setup password interface	Password Lock= Confirmation Password Lock =1234454 Picture 1=selfie.jpg	Popup message "Please insert password locker"	Popup message "Please insert password locker"	
TC-04-004: Admin didn't insert confirmation password lock only in setup password interface	Password Lock =1234454 Confirmation Password Lock = Picture 1=selfie.jpg	Popup message "Please insert confirmation password locker "	Popup message "Please insert confirmation password locker "	
TC-04-005: Admin did insert not same confirmation password with password in setup password interface	Password Lock =1234454 Confirmation Password Lock =1234453 Picture 1=selfie.jpg	Popup message "Please insert correct password or confirmation"	Popup message "Please insert correct password or confirmation"	
TC-04-006: Admin didn't pick a picture only in setup password interface	Password=1234454 Confirmation Password=1234453 Picture 1=	Popup message " Please pick a picture "	Popup message " Please pick a picture "	
TC-04-007: Admin insert all information	Password Lock =1234454 Confirmation Password Lock =1234454 Picture 1=selfie.jpg	Redirect to the manage locker door interface	Redirect to the manage locker door interface	
TC-04-008: Admin touch update password locker in manage locker door interface	Username = jim	The system redirect update password locker interface	The system redirect update password locker interface	
TC-04-009: Admin didn't insert anything in text	Password Old Lock=	Popup message " Please insert old password"	Popup message " Please insert old password"	

field in update password locker interface for verify old password				
TC-04-010: Admin insert old password locker in update password locker interface for verify old password	Password Old Lock=1234454	The system redirect new password locker interface	The system redirect new password locker interface	
TC-04-011: Admin didn't insert anything in text field in update password locker interface	New Password Lock= Confirmation New Password Lock =	Popup message " Please insert all information"	Popup message " Please insert all information	
TC-04-012: Admin didn't insert password lock only in update password locker interface	New Password Lock= Confirmation New Password Lock =1234454	Popup message "Please insert password locker"	Popup message "Please insert password locker"	
TC-04-013: Admin didn't insert confirmation password lock only in update password locker interface	New Password Lock =1234454 Confirmation New Password Lock =	Popup message "Please insert confirmation password locker "	Popup message "Please insert confirmation password locker "	
TC-04-014: Admin did insert not same confirmation password with password in update password locker interface	New Password Lock =1234454 Confirmation New Password Lock =1234453	Popup message "Please insert correct password or confirmation"	Popup message "Please insert correct password or confirmation"	
TC-04-0015: Admin insert new password and confirmation password	New Password Lock =1234454 Confirmation New Password Lock =1234454	Redirect to the manage locker door interface	Redirect to the manage locker door interface	
TC-04-0016: Admin didn't insert Password Lock in	Password Lock=	Popup message " Please insert password locker"	Popup message " Please insert password locker"	

lock or unlock interface				
TC-04-0016: Admin didn't insert Password Lock in lock or unlock interface	Password Lock=1234454	Redirect to the manage locker door interface	Redirect to the manage locker door interface	

1.5 User Case Number 5: Admin view the status of locker

Event	Test Data	Expected Result	Actual Result	Pa
TC-05-001: The system display status of locker	Username = jim	The status of locker	The status of locker	
TC-05-002: Admin touch back button		Redirect to Home page	Redirect to Home page	
TC-05-003: Admin touch logout button	Username= jim	Redirect to Login page	Redirect to Login page	

1.6 User Case Number 6: Alert Session

Event	Test Data	Expected Result	Actual Result	Pa
TC-06-001: The android sent alert to device via internet or network	Status = false	The device will lock the door.	The device will lock the door.	
TC-06-002: The device sent alert to phone via message	Alert = someone try break the system.	User receive alert via message	User receive alert via message	
TC-06-003: Internet or network disconnect		Alert message = "Internet disconnect. Please connect the internet"	Alert message = "Internet disconnect. Please connect the internet"	

1.7 User Case Number 7: Administration Session

Event	Test Data	Expected Result	Actual Result	Pa

TC-07-001: Admin touch add user button	Username = jim	Redirect to the add user interface	Redirect to the add user interface	
TC-07-002: Admin didn’t insert anything in text field in add user interface	Name= Username= Password= Number Phone= Email= Picture=	Popup message “ Please insert all information”	Popup message “ Please insert all information”	
TC-07-003: Admin didn’t insert username only	Name=azim Username= Password=1212434 Number Phone=012132343 Email=azim@g.com Picture=selfiw01.jpg	Popup message “Please insert username“	Popup message “ Please insert password “	
TC-07-004: Admin didn’t insert username only	Name= Username=azim12 Password=1212434 Number Phone=012132343 Email=azim@g.com Picture=selfiw01.jpg	Popup message “Please insert name“	Popup message “Please insert name“	
TC-07-005: Admin didn’t insert password only	Name=azim Username=azim12 Password= Number Phone=012132343 Email=azim@g.com Picture=selfiw01.jpg	Popup message “Please insert password“	Popup message “Please insert password“	
TC-07-006: Admin didn’t insert number phone only	Name=azim Username=azim12 Password=1212434 Number Phone= Email=azim@g.com Picture=selfiw01.jpg	Popup message “Please insert number phone“	Popup message “Please insert number phone“	
TC-07-007: Admin didn’t insert email only	Name=azim Username=azim12 Password=1212434 Number Phone=012132343 Email= Picture=selfiw01.jpg	Popup message “Please insert email “	Popup message “Please insert email“	
TC-07-008: Admin didn’t select picture only	Name=azim Username=azim12 Password=1212434	Popup message “ Please pick a picture “	Popup message “ Please pick a picture “	

	Number Phone=012132343 Email=azim@g.com Picture=			
TC-07-009: Admin did inset all information	Name=azim Username=azim12 Password=1212434 Number Phone=012132343 Email=azim@g.com Picture=selfiw01.jpg	Redirect to administration interface	Redirect to administration interface	
TC-07-010: Admin touch update user button		Redirect to the update user interface	Redirect to the update user interface	
TC-07-011: Admin select username at username picker	Username=azim12	Username of picker show in username text field	Username of picker show in username text field	
TC-07-012: Admin didn't insert anything in text field in add user interface.	Name= Username= Password= Number Phone= Email= Picture=	Popup message " Please insert all information"	Popup message " Please insert all information"	
TC-07-013: Admin didn't insert username only	Name=azim Username= Password=1212434 Number Phone=012132343 Email=azim@g.com Picture=selfiw01.jpg	Popup message "Please insert username"	Popup message " Please insert password "	
TC-07-014: Admin didn't insert username only	Name= Username=azim12 Password=1212434 Number Phone=012132343 Email=azim@g.com Picture=selfiw01.jpg	Popup message "Please insert name"	Popup message "Please insert name"	
TC-07-015: Admin didn't insert password only	Name=azim Username=azim12 Password= Number Phone=012132343 Email=azim@g.com Picture=selfiw01.jpg	Popup message "Please insert password"	Popup message "Please insert password"	
TC-07-016: Admin didn't insert	Name=azim Username=azim11	Popup message "Please insert number	Popup message "Please insert number	

number phone only	Password=1212434 Number Phone= Email=azim@g.com Picture=selfiw01.jpg	phone“	phone“	
TC-07-017: Admin didn’t insert email only	Name=azim12 Username=azim12 Password=1212434 Number Phone=012132343 Email= Picture=selfiw01.jpg	Popup message “Please insert email “	Popup message “Please insert email“	
TC-07-018: Admin touch update button	Name=azim Username=azim12 Password=1212434 Number Phone=012132343 Email=azim@g.com Picture=selfiw01.jpg	Redirect to administration interface	Redirect to administration interface	
TC-07-019: Admin touch delete user button at administration interface		Redirect to the delete user interface	Redirect to the delete user interface	
TC-07-020: Admin select username at username picker	Username = azim12	The system show user information based on admin pick in list view	The system show user information based on admin pick in list view	
TC-07-21: Admin touch delete button at delete user interface		System delete the user information	System delete the user information	
TC-07-22: Admin touch display all user information in administration interface		Redirect to the display all user information interface and system display all user information	Redirect to the display all user information interface but it didn’t show any user information.	
TC-07-23: Admin touch back button at administration interface		Redirect to the Home page	Redirect to the Home page	

1.8 User Case Number 8: Face Recognition Session

Event	Test Data	Expected Result	Actual Result	Pa
TC-08-001: User touch save face button in home interface		Redirect to the create dataset interface	Redirect to the create dataset interface	
TC-08-002: User touch save dataset button	Dataset = jim/jim01	Save the dataset in database	Save the dataset in database	
TC-08-003: User touch finish button at save dataset interface		Redirect to the home interface	Redirect to the home interface	
TC-08-004: User touch face detection in home interface		Redirect to the face detection	Redirect to the face detection	
TC-08-005: Known User stand to camera to detect face	Known User Face	Home door lock or unlock and status change	Home door lock or unlock and status change	
TC-08-006: Unknown User stand to camera to detect face	Unknown User Face	Unknown detection	Unknown detection	
TC-08-007: System detect dark and human motion at camera	Dark Human motion	Light open	Light open	

2018

SOFTWARE REQUIREMENT SPECIFICATION (SRS)

SMART HOME SECURITY SYSTEM

MOHAMMAD SYAFI AZIM BIN MOHD RAZAM (CB15058)
To be submitted to the Project Saujana Muda
Bachelor of Computer Science (Software Engineering)

CHAPTER 6DOCUMENT APPROVAL

	Name	Date
Authenticated by: _____ Developer	MOHAMMAD SYAFI AZIM BIN MOHD RAZAM	4/5/2018
Approved by: _____ Client		

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1. INTRODUCTION

The purpose of this documentation is develop an Smart Home Security System for Malaysian people.

1.1 PURPOSE

The purpose of the Software Requirement Specification (SRS) for Smart Home Security System is to gain all possible requirement that have come up to define the SHSS and meet the requirement line.

In short, the purpose of this SRS document is to provide an overview of the SHSS project scope and the context of the system. This document describes the system's aim, users, interfaces, hardware and software that will be used in development. For establish SHSS, me use the RAD Methodology. By using this method, the development systems can be continue with the prototype and meet requirements needs.

1.2 SYSTEM OVERVIEW

Smart Home Security is a system that developed to lock or open the house door by using mobile application or face recognition for Malaysian people. The main purpose of this system is lock the door at anywhere. This system involves 2 user which admin to manage their house locking door security, manage their user and manage their information and user to manage their locking door and view their information. SRS will be medium platform to gain better understanding of SHSS, requirements that may be developed later, and document the idea to make it in proper way.

1.3 DOCUMENT OVERVIEW

This Software Requirement Specification document has four differences parts, which is purpose, product description, specific requirement, acronyms, and abbreviation. This chapter provided the basic overview of Smart Home Security System (SHSS).

The purpose of this chapter to provide the basic understanding of SHSS for stakeholder and list all the requirements needed. This chapter also listed out the entire module and sourced referenced that will be implemented in this system with details.

In product description, it provided the system functionality, interaction among the Smart Home Security System with the targeted users. The lists of actors are list out to make sure the requirement meets the stakeholder goals. This chapter also mentioned about the system constraints, assumptions and system dependencies. This to make sure the stakeholder will better be understanding how this system work and basic requirements of user in order to let this system function properly. The assumption and dependencies are stated to make as references if the system failure. It will easier to we overhaul the system.

The specific requirement will have provided the detailed about this system and able to let the stakeholder know more details about the product features, interface requirements and requirement traceability. These documents will help the stakeholder well known of the system flow and feature. Besides, it will represent the detailed about the system and software that will develop using the requirements that has been gathered. This system will provide full security and privacy according to the stakeholder. It will protect users and all the documents.

Lastly, this chapter will have listed out all the acronyms and abbreviation that will help and useful for stakeholder well understand this system.

CHAPTER 102. PRODUCT DESCRIPTION

2.1 Product Perspective

For enhance the security system in Malaysia, Smart Home Security System is developed. SHSS gave user to access the system and do all the security process in the system. This system will user to increase their security of their home and all data will be save in database safely.

This system's main functions are enable user to locking or unlocking the house door by mobile application or face recognition. Admin have many function such as manage their password locker, manage their user , manage their user information and view status locker door. User can only their password locker and view status the locker door.

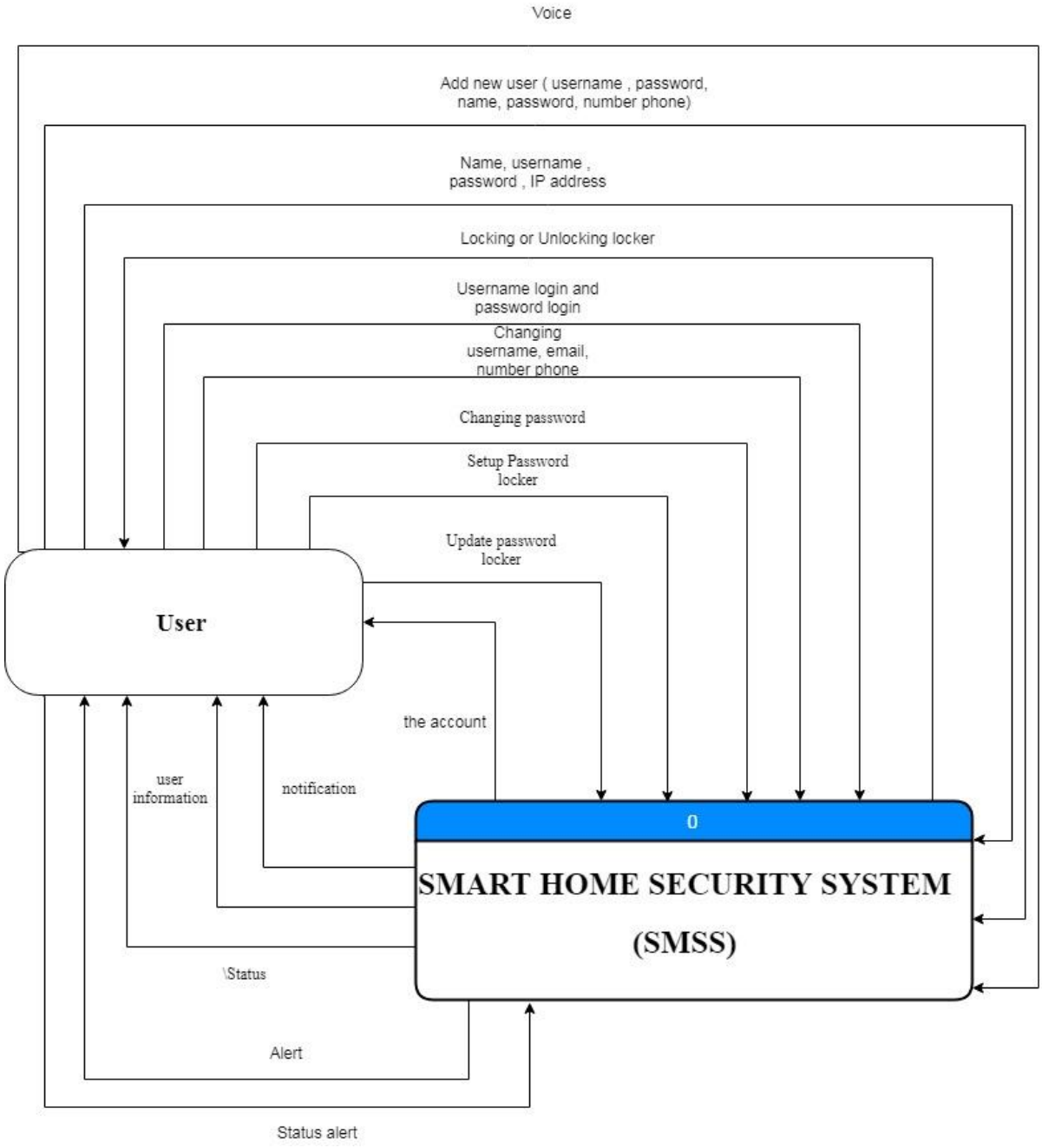


Figure 2.1: Context Diagram

2.2 Product Functions

Use Case	Function
Registration Session	This use case allows admin to register the account of the application.
Login Session	This use case allows use or admin to login the account after they register.
Manage information user	This use case allows admin to managing their user information such as changing password, username and name.
Manage the Locker Door	This use case allows user to manage locking or unlock of their home door
View Status	This use case allows user to view their status of locking door.
Alert Session	This use case allows user to receive and sent alert to the system.
Administration Session	This use case allows admin to manage their another user by add the another user , delete another user account , view the status the active user.
Face Recognition Session	This use case allows user to lock or unlock the door by using face recognition.

2.3 User Characteristics

User	Characteristics
User	• They must know to use an online system and reach at least the beginner level. • They must have knowledge about English language and reached

	at least the beginner level.
Admin	• They must know to use an online system and reach at least the beginner level. • They must have knowledge about English language and reached at least the beginner level.

2.4 Constraints

- The system should have connection with internet connection for connect the database, and mobile application.
- The system should provide authorization for different parties to login in order to secure access.
- The system shall be operation for 24 hours period.
- The database of storage must keep update when user changing the password of login or password of locker door.
- The systems should be efficiently in a response time between different users to respond a request for input and output.
- The system should have connection with mobile application through Wireless Internet (WIFI).

2.5 Assumptions and Dependencies

- The platform of Smart Home Security System should be in mobile app platform , raspberry pi platform and arduino platform.
- This SHSS shall works only with the presence of internet connection.
- The user of this system must be user.
- The user must have a valid account to use this SHSS.
- The user must register the account to have a valid account.

CHAPTER 113. SPECIFIC REQUIREMENTS

3.1 Software Product Features

3.1.1 Use Case Registration session

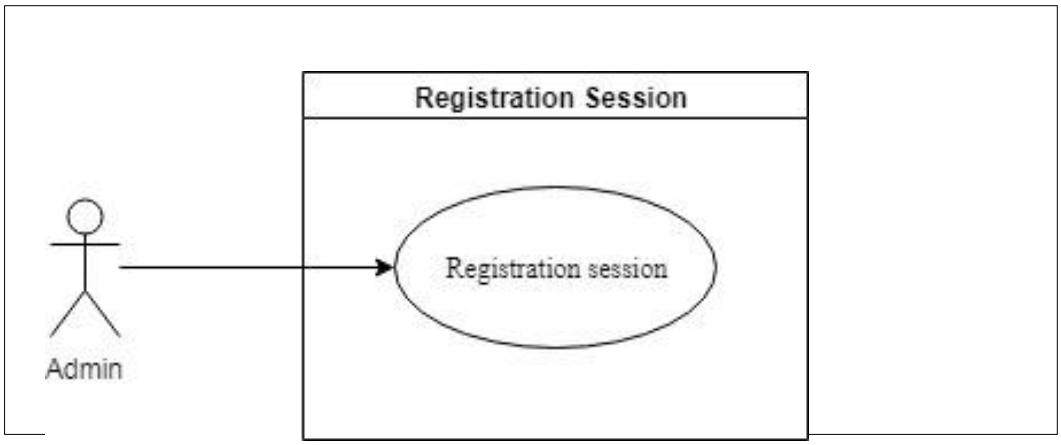


Figure 3.1 Use Case Registration session Diagram

Table 3.1 Use Case Registration session

Use Case ID	UC01
Use Case Name	Registration session
Brief Description	This use case allows user to register the valid account to login the account.
Actor	Admin
Pre-Conditions	Admin must click registered the account at login page.
Basic Flow	<<Registration>> 1. The use case begins with admin fills of the information such as name, username, IP address, password, confirm password and pick one picture.

	2. Admin must fills all information and different criteria to full fill. 3. The password must contain 8 digit to secure the password. 4. The IP address can contain at the box of device. 5. Admin click the submit button to register the account 6. This use case ends
Alternative Flow	None
Exception Flow	None
Post-Conditions	Back to the login page
Rules	The password must have 8 character
Constraints	User can register one time only
Activity Diagram	Refer Appendix B-1.1 : Basic Flow – Registration Session

3.1.2 Use Case Login Session

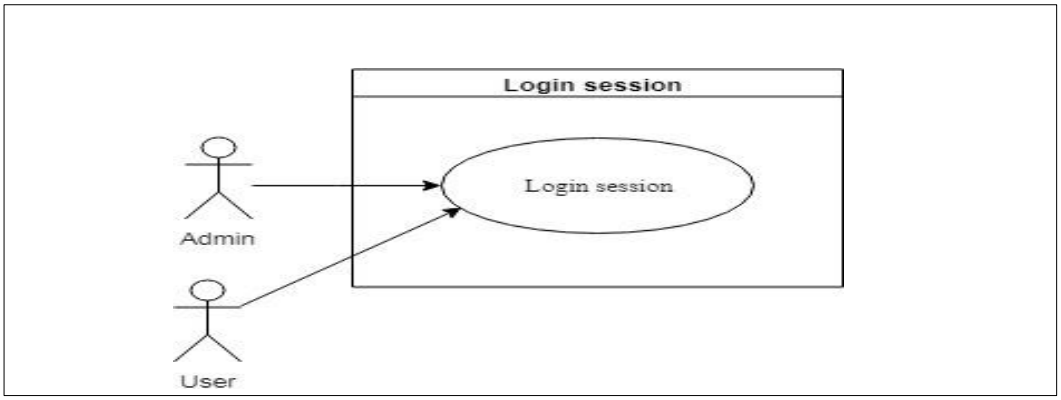


Figure 3.2 Use Case Login session Diagram

Table 3.2 Use Case Login session

Use Case ID	UC02
Use Case Name	Login session

Brief Description	This use case allows user to login the account with valid username and password
Actor	User, Admin
Pre-Conditions	User must register the account
Basic Flow	<<Login>> 1. User must fills the valid username and password 2. User touch the login button to login the account. 3. This use case ends.
Alternative Flow	None
Exception Flow	None
Post-Conditions	Home page appear
Rules	None
Constraints	None
Activity Diagram	Refer Appendix B-1.2 :Basic Flow - Login Session

11.1

3.1.3 Use Case Manage user information

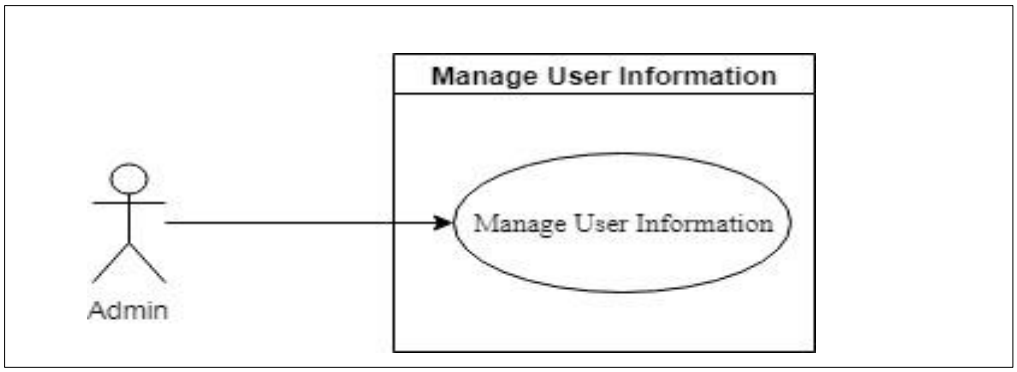


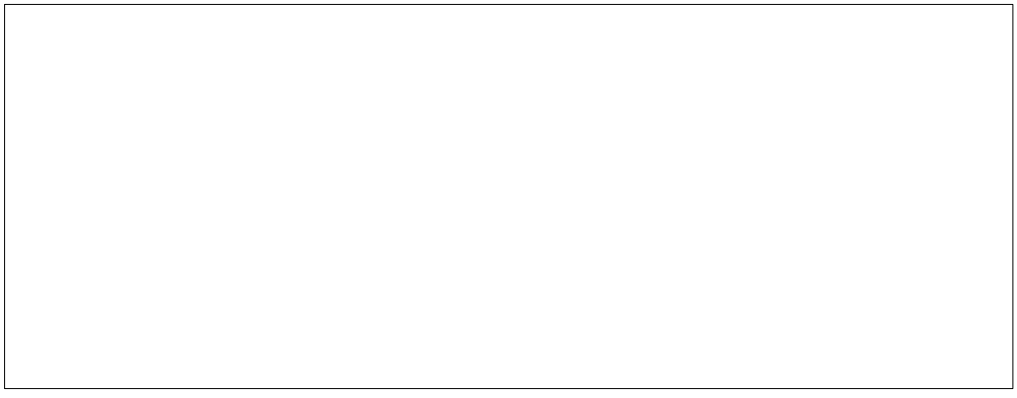
Figure 3.3 Use Case Manage user information Diagram

Table 3.3 Use Case Manage user information

Use Case ID	UC03
Use Case Name	Manage user information

Brief Description	This use case allows admin to managing their user information such as changing password of login, add the another user information, changing setting etc.
Actor	Admin
Pre-Conditions	Admin must click setting in home page
Basic Flow	<<Display User information>> 1. The system display user information which name, username, password and IP address <<Update the user information>> 1. Admin can change their user information 2. Admin can insert username, password or name. 3. Admin need insert password and confirmation password to ensure user want changing it.
Alternative Flow	None
Exception Flow	None
Post-Conditions	Back to the home page.
Rules	Password must contain 8 digit.
Constraints	None
Activity Diagram	Refer Appendix B-1.3:Basic Flow - Manage User Information

3.1.4 Use Case Manage Locker Door



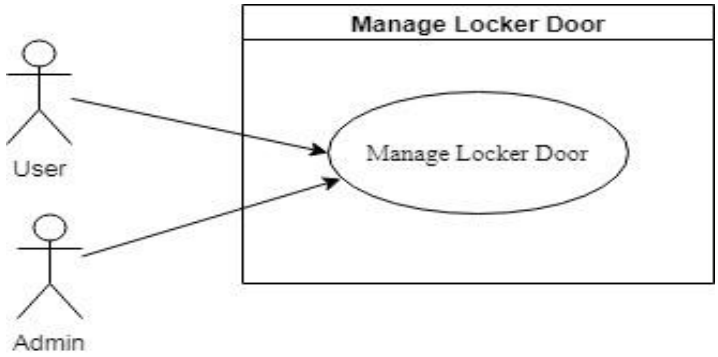


Figure 3.4 Use Case Manage Locker Door Diagram

Table 3.4 Use Case Manage Locker Door

Use Case ID	UC04
Use Case Name	Manage Locker Door
Brief Description	This use case allows user to manage locking or unlocking the locker door.
Actor	User, Admin
Pre-Conditions	User must click locking in home page
Basic Flow	<<Setup the password>> 1. This use case begins when user first time using this function. 2. User must touch setup the password for locker door interface. 3. User must enter any digit until 8 digits for password of the locker door, re-enter the password for confirmation of password and pick a picture. 4. User touch submit button for verification of password. <<Lock or Unlock the locker>> 1. User can lock or unlock the door by touch the

	lock or unlock button. 2. User enter password and the door will be locking or unlocking. <<Update the password>> 1. User can update the password to change the password. 2. User key-in the old password first for verification. 3. User key-in new password and confirmation new password. 4. User touch update button. 5. The password has be changing,
Alternative Flow	<<Face Recognition >> 1. User must front with camera to active it. 2. User can use face recognition to lock or unlock the door. 3. User stay in front the camera to open or unlock the door. 4. The door will lock or unlock.
Exception Flow	None
Post-Conditions	Back to the locker door page.
Rules	None
Constraints	1. User must connect the internet while used this function. 2. User must front with camera device to active it.
Activity Diagram	Refer Appendix

	B-1.4:Basic Flow and Alternative Flow – Manage Locker Door

3.1.5 Use Case View Status

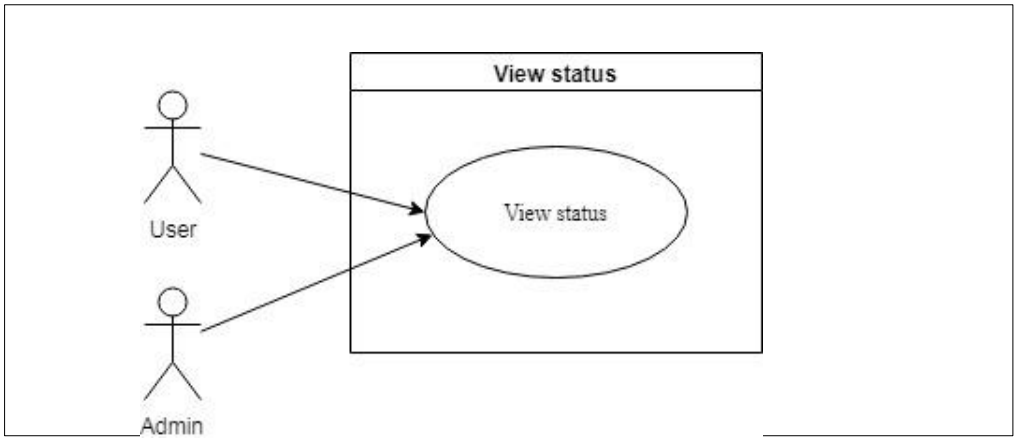


Figure 3.5 Use Case View Status Diagram

Table 3.5 Use Case View Status

Use Case ID	UC05
Use Case Name	View Status.
Brief Description	This use case allows user or admin to view their status of locking door.
Actor	User, Admin
Pre-Conditions	User must login the account
Basic Flow	<<View Status>> 1. This use case begins when user click display status at home page. 2. The status will be display at the view status page.
Alternative Flow	None
Exception Flow	None
Post-Conditions	Display the status at home page

Rules	None
Constraints	User must connect the internet while used this function.
Activity Diagram	Refer Appendix B-1.5: Basic Flow – View Status

3.1.6 Use Case Alert Session

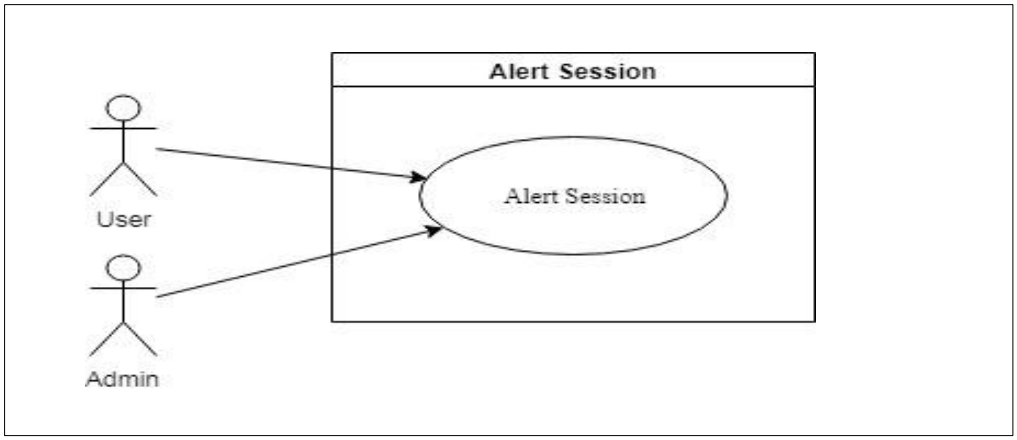


Figure 3.6 Use Case Alert Session Diagram

Table 3.6 Use Case Alert Session

Use Case ID	UC06
Use Case Name	Alert Session
Brief Description	This use case allows user to receive alert and sent alert to the system.
Actor	User, Admin
Pre-Conditions	User must login the account
Basic Flow	<<Receive alert>> 1. The system will alert to user to give alert of their security in the Locker door system. 2. The system sent alert to user by message or the application. <<Sent Alert Locking door>>

	1. This function begin when system sent alert to user, the user need sent alert to the system. 2. User click lock button in the alert popup. 3. The system will lock the locker immediately.
Alternative Flow	<<Sent Alert Locking door>> 1. This function begin when system sent alert to user, the user need sent alert to the system. 2. User click cancel in the alert popup. 3. The system don't lock the locker door.
Exception Flow	None
Post-Conditions	Back to the home page.
Rules	None
Constraints	User must connect the internet while used this function.
Activity Diagram	Refer Appendix B-1.5: Basic Flow – View Status

3.1.7 Use Case Administration Session

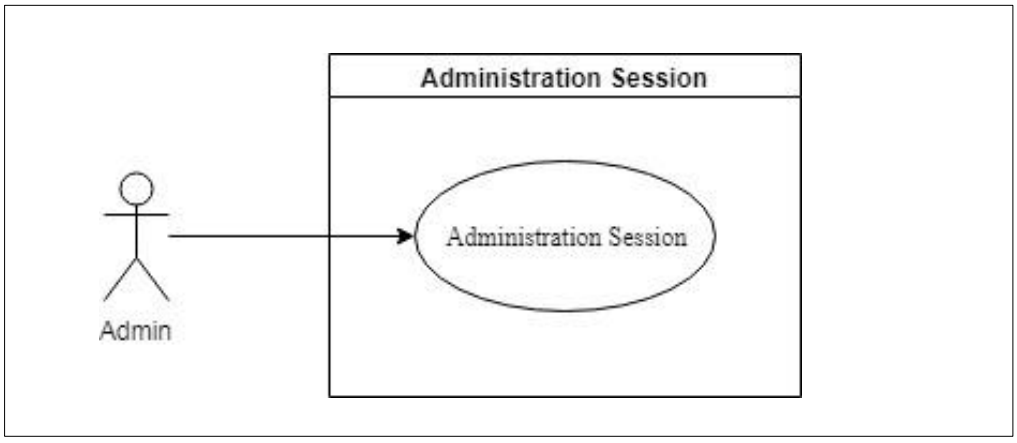


Figure 3.7 Use Case Administration Session Diagram

Table 3.7 Use Case Administration Session

Use Case ID	UC07
Use Case Name	Administration Session
Brief Description	This use case allows admin to manage the user account where add another user, delete user, active the security of user and view active status.
Actor	Admin
Pre-Conditions	Admin must login the account
Basic Flow	<<Add another user>> 1. Admin can add another user to login the account. 2. Admin key-in name, password, number phone, email and username. <<Delete user>> 1. Select the user to delete their account. 2. Admin click delete button to delete the user account. 3. Admin need confirm deleting the user account for confirmation. 4. The system display deleting successful. <<Update another user account>> 1. Admin select what username need to update or change. 2. Admin update the user information account which name, username, password, number phone, email, or password. 3. Admin click update button. 4. User get notification of changing by application. 5. The user information account changing.

	<<View status the user account>> 1. This function begins when admin clicks view user status button. 2. The status will display in view active status page.
Alternative Flow	None
Exception Flow	None
Post-Conditions	Back to the home page
Rules	None
Constraints	User must connect the internet while used this function.
Activity Diagram	Refer Appendix B-1.5: Basic Flow – View Status

3.1.8 Use Case Face Recognition Session

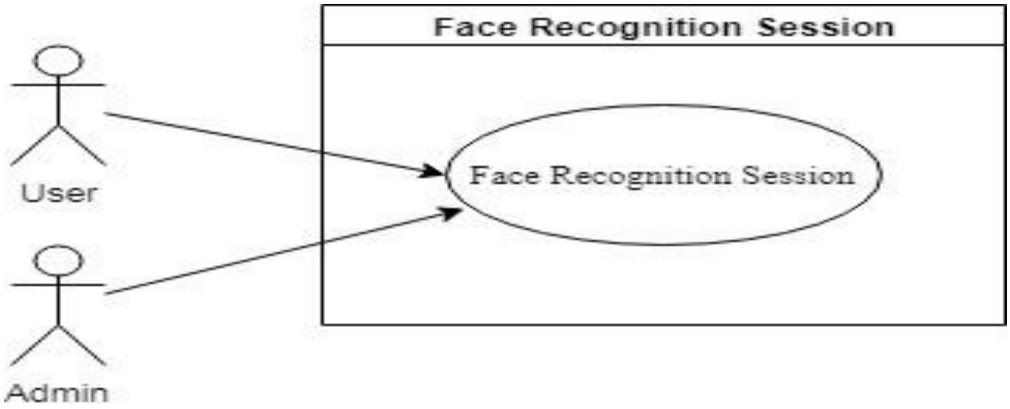


Figure 3.8 Use Case Face Recognition Session Diagram

Table 3.8. Use Case Face Recognition Session

Use Case ID	UC08
Use Case Name	Face Recognition Session
Brief Description	This use case allows admin to manage the user account where add another user, delete user, active the security of user and view active status.
Actor	Admin, User
Pre-Conditions	Touch the Lock or unlock button in the screen
Basic Flow	<<Save dataset of user face>> 1. User stand front at camera 2. The camera detect user face 3. User touch many time save button 4. The picture save in database 5. Dataset of user save pickle to detect user face in face recognition. <<Open LED light>>

	1. The system detect user motion and dark. 2. The system open LED light. <<Face recognition>> 1. User front of the camera to activate face recognition. 2. The system detect user face 3. The locker door locking or unlocking.
Alternative Flow	None
Exception Flow	None
Post-Conditions	Back to the home interface
Rules	None
Constraints	User must connect the internet while used this function.
Activity Diagram	Refer Appendix B-1.5: Basic Flow – View Status

3.2 External Interface Requirements

3.2.1 User Interfaces (edit)

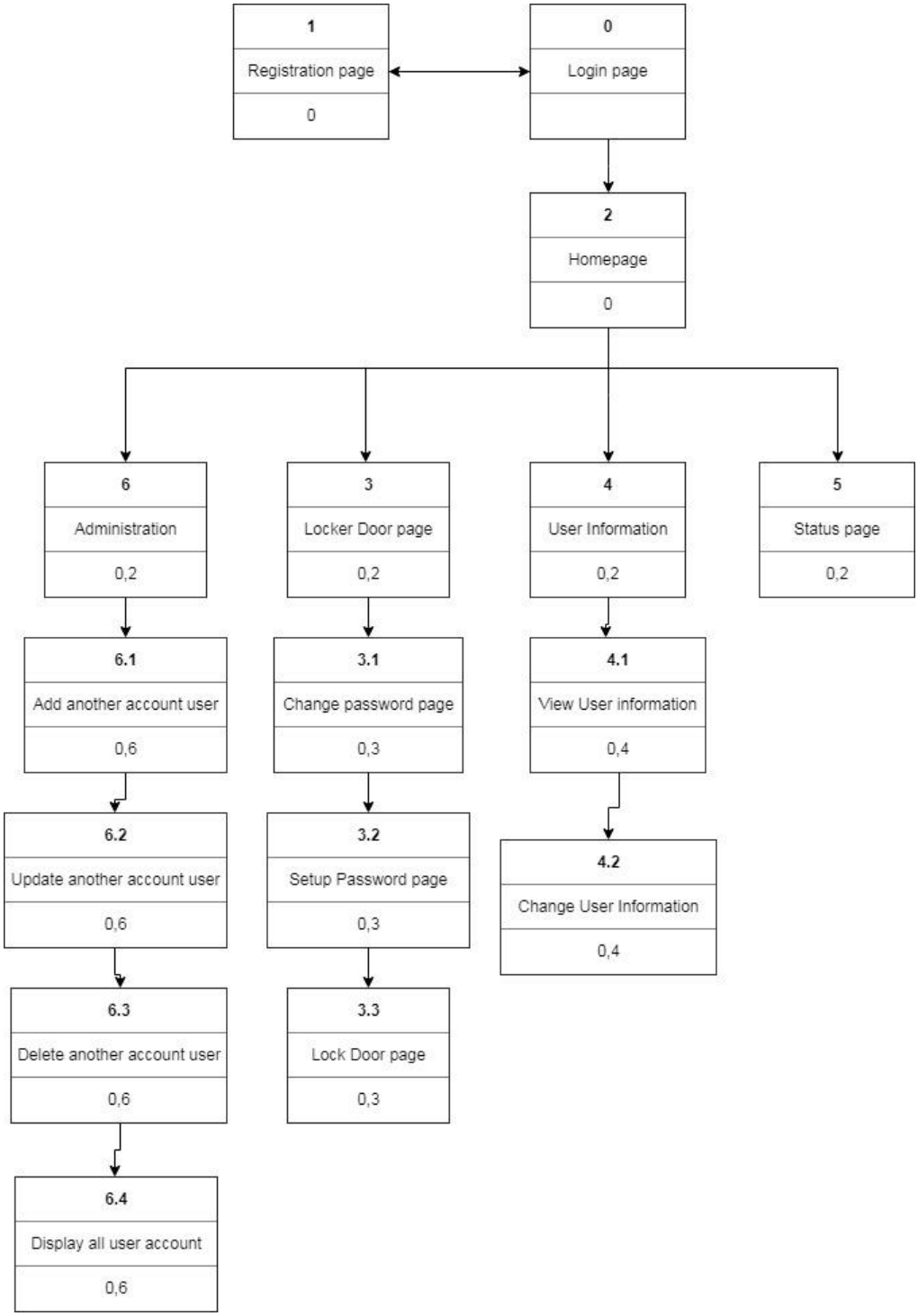


Figure 3.3 Dialogue Diagram

Table 3.3 User Interfaces Description

User Interface Name or Number	Description	User Interface Layout
Login interface	User shall key-in their username and password	Refer Appendix B-2
Registration interface	User shall key-in their information such as name, username, IP Address, password, confirmation password and picture	Refer Appendix B-2
Home interface	User select menu of the function which locker door, settings, view status, user information and administration session.	Refer Appendix B-2
Locking Door interface	User select menu of the function which lock door, setup password and update the password	Refer Appendix B-2
Lock or unlock door interface	User touch lock and key-in password then the door automatically lock or	Refer Appendix B-2

	unlock.	
Update the password interface	User key-in old password firstly and key-in new password and confirmation of new password.	Refer Appendix B-2
Setup the password locker Interface	User key-in the password and confirmation password to setup password.	Refer Appendix B-2
Update User information interface	User can update user information which username, password and name.	Refer Appendix B-2
View Status	System display status of door.	Refer Appendix B-2
User information interface	User can select menu of the function which user information or change the password of login	Refer Appendix B-2
Administration page	Admin can select menu of the function which add another user account , update another user account, delete another user account and view all status user	Refer Appendix B-2

	account.	
Add another user account interface	Admin key-in another user name, no phone, email, username and password.	Refer Appendix B-2
Update another user account interface	Admin pick username who want to update and admin update their information such their username, name, password , email, and number phone.	Refer Appendix B-2
Delete another user account interface	Admin pick username who want delete user and system display the user information and admin delete the user account.	Refer Appendix B-2
View all status another user account interface	Admin click display button and system display all status and information of user.	Refer Appendix B-2
Home interface at system	User click want to save dataset or unlock or lock the home door.	Refer Appendix B-2
Save dataset interface	User insert their username and touch upload button. The system detect user face and user touch	Refer Appendix B-2

	save button to save picture of user.	
Face recognition interface	The system detect user face and unlock or lock the locker home door	Refer Appendix B-2

3.2.2 Hardware Interface

The Smart Home Security is required Raspberry pi and Arduino device with all sensor, camera and screen to connection between mobile application with Raspberry pi. The communication protocol will used IP address in Raspberry pi so the mobile application have IP address of Raspberry pi and will be connected by it. We need camera to detect user face in face recognition and also all sensor which buzzer , led microware radar to support the system.

3.2.3 Software Interface

The Smart Home Security System will connected with online database which Firebase. It can update in real time and automatically. The hacker cannot doing sql injection because it not sql database but it is cloud database.

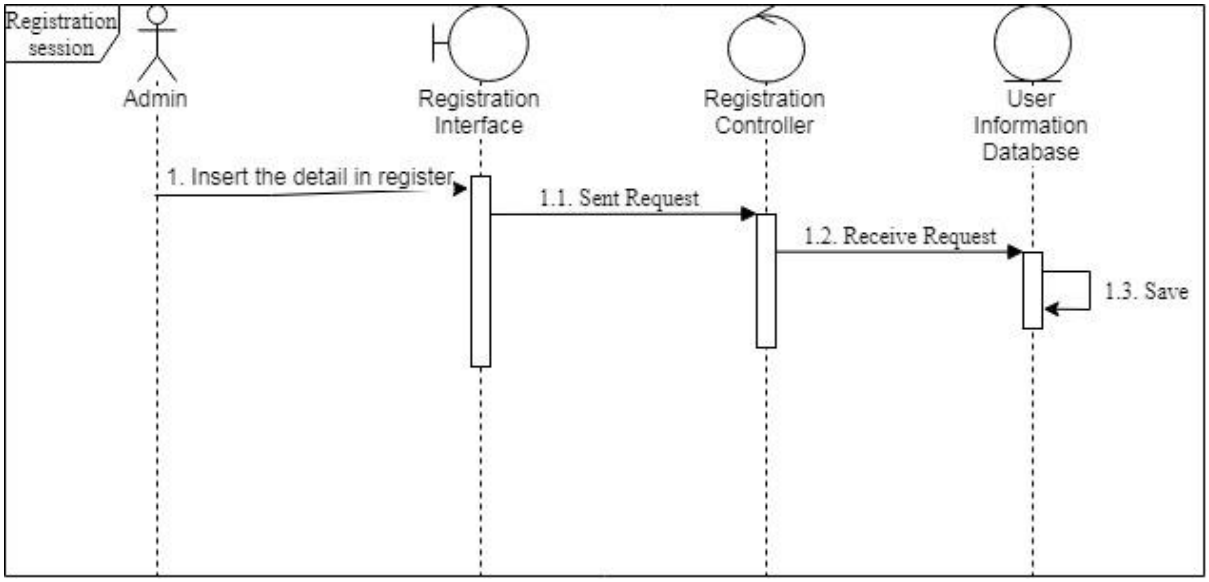
3.3 Requirements Traceability

REQUIREMENT ID	REQUIREMENT DETAIL STATEMENT	REQUIREMENT SOURCE
R01	User can lock or unlock in anywhere.	Documentation
R02	User can adding another user for their family used.	Documentation

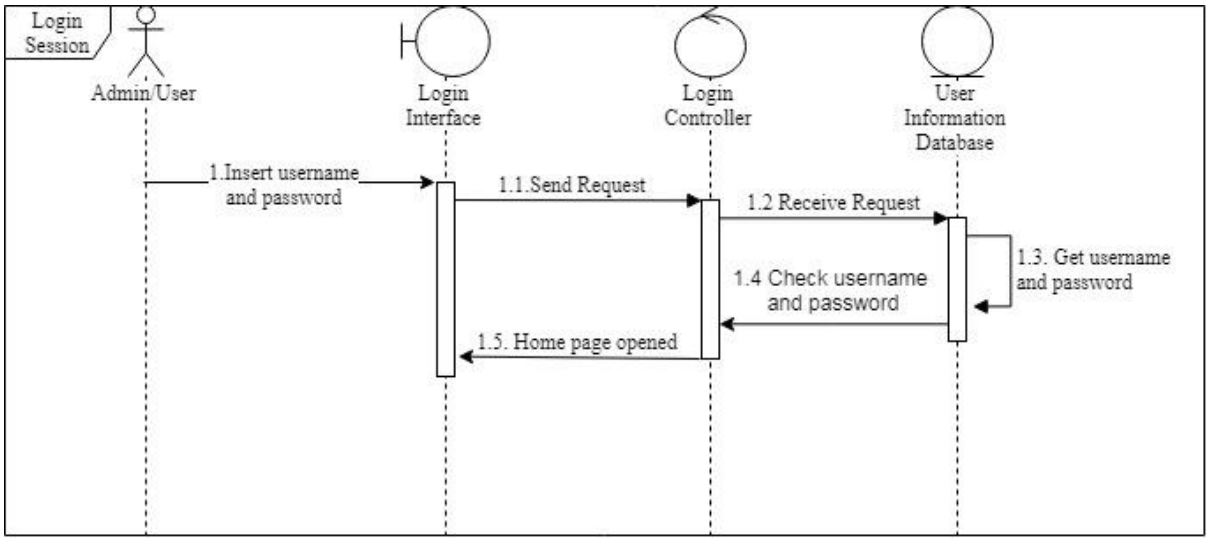
R03	User easily lock or unlock by using face recognition	Documentation
R04	The system can detect user face on the camera	Documentation
R05	The system can also changing the password of locking and login.	Documentation
R06	The system should have alert to user for security have breached.	Documentation
R07	The system should register first before user want to use it	Documentation
R08	The system should asking 8 digits of password of locking	Documentation

APPENDIX B-1

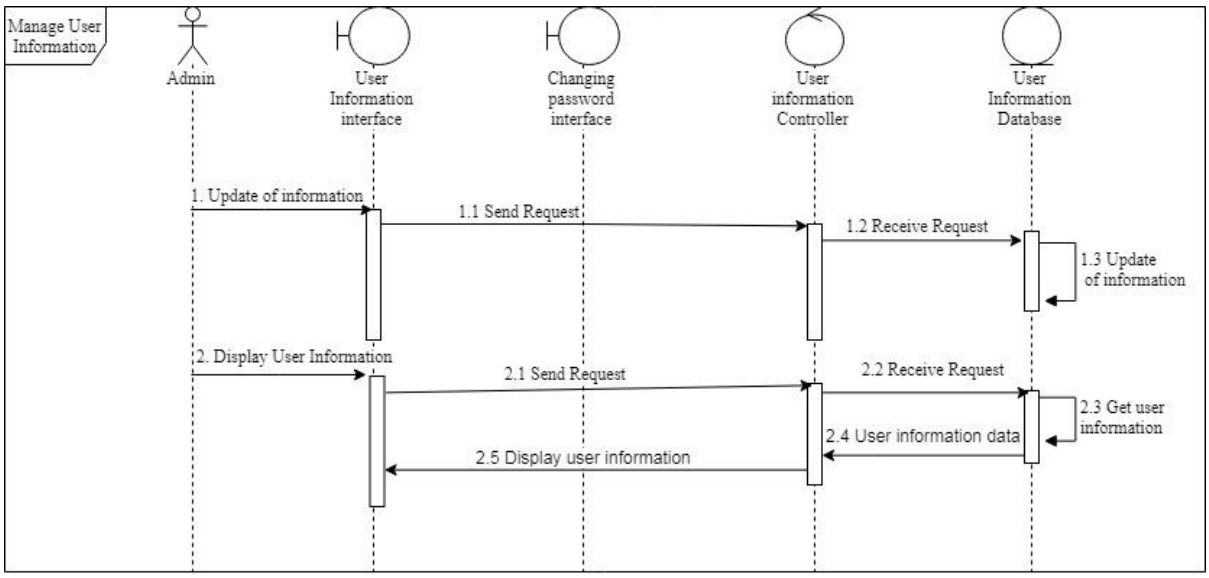
Sequence Diagram



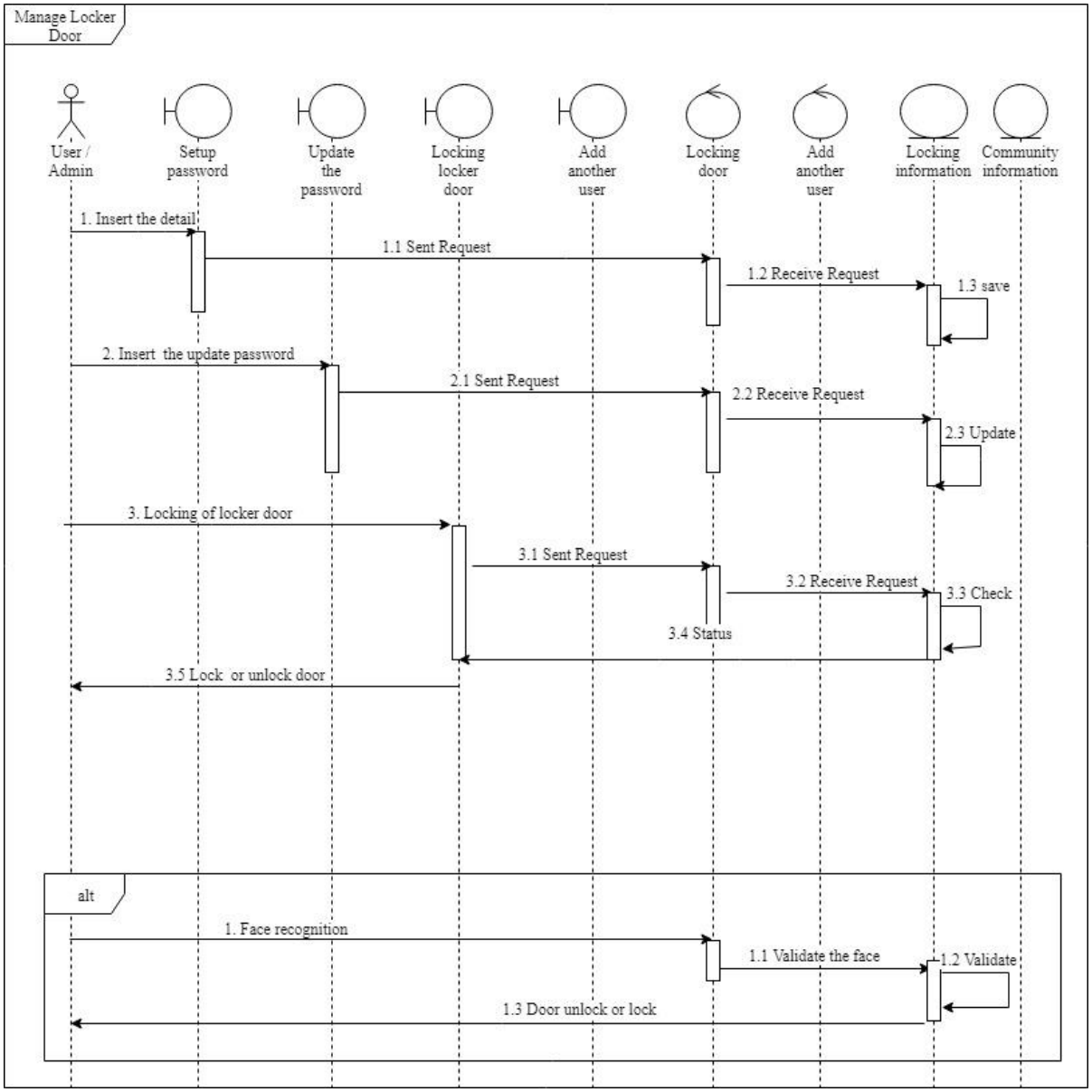
B-1.1:Basic flow - Registration Session



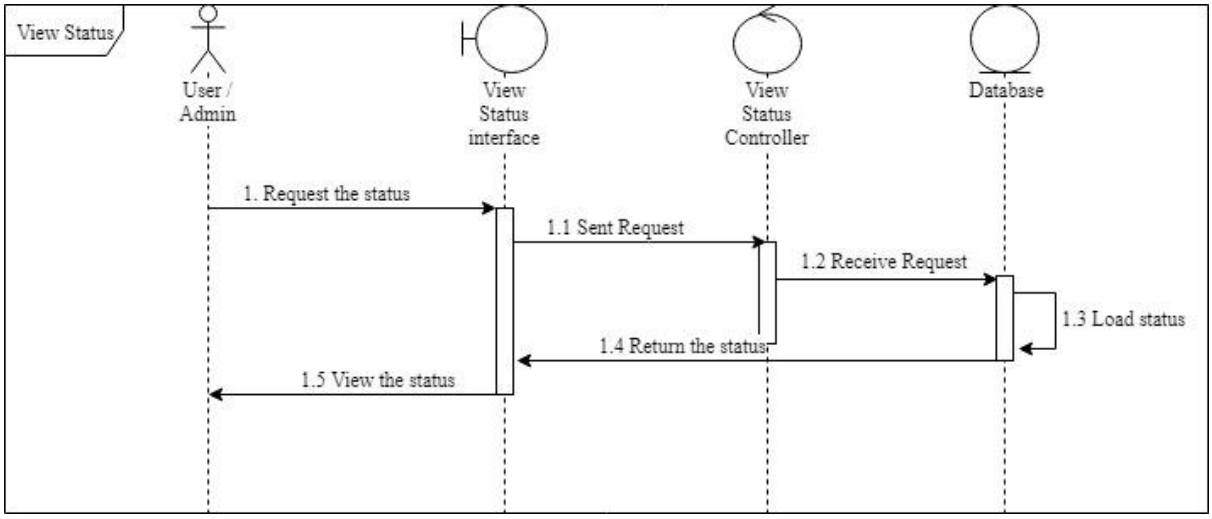
B-1.2: Basic Flow - Login Session



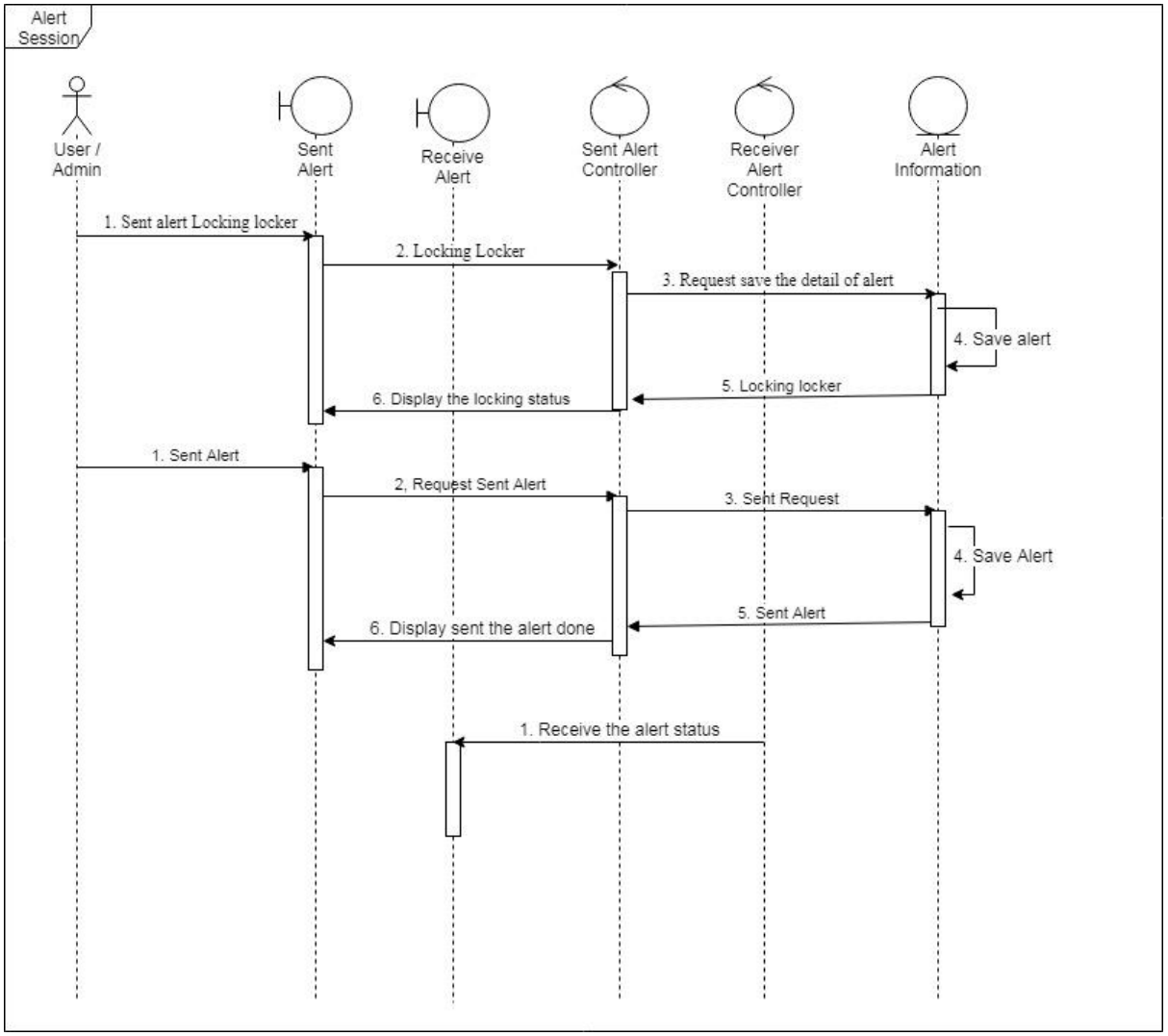
B-1.3:Basic Flow - Manage User Information



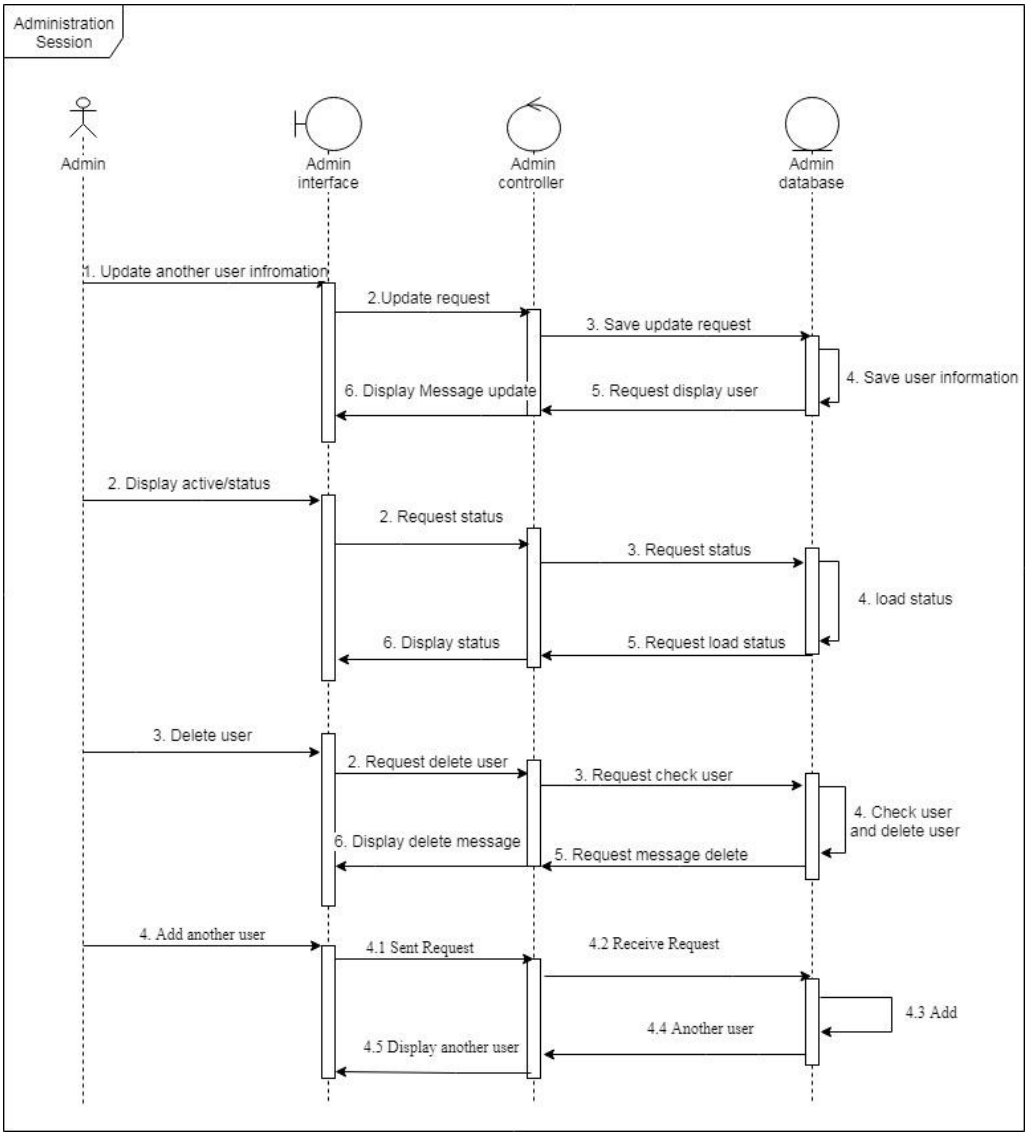
B-1.4:Basic Flow and Alternative Flow – Manage Locker Door



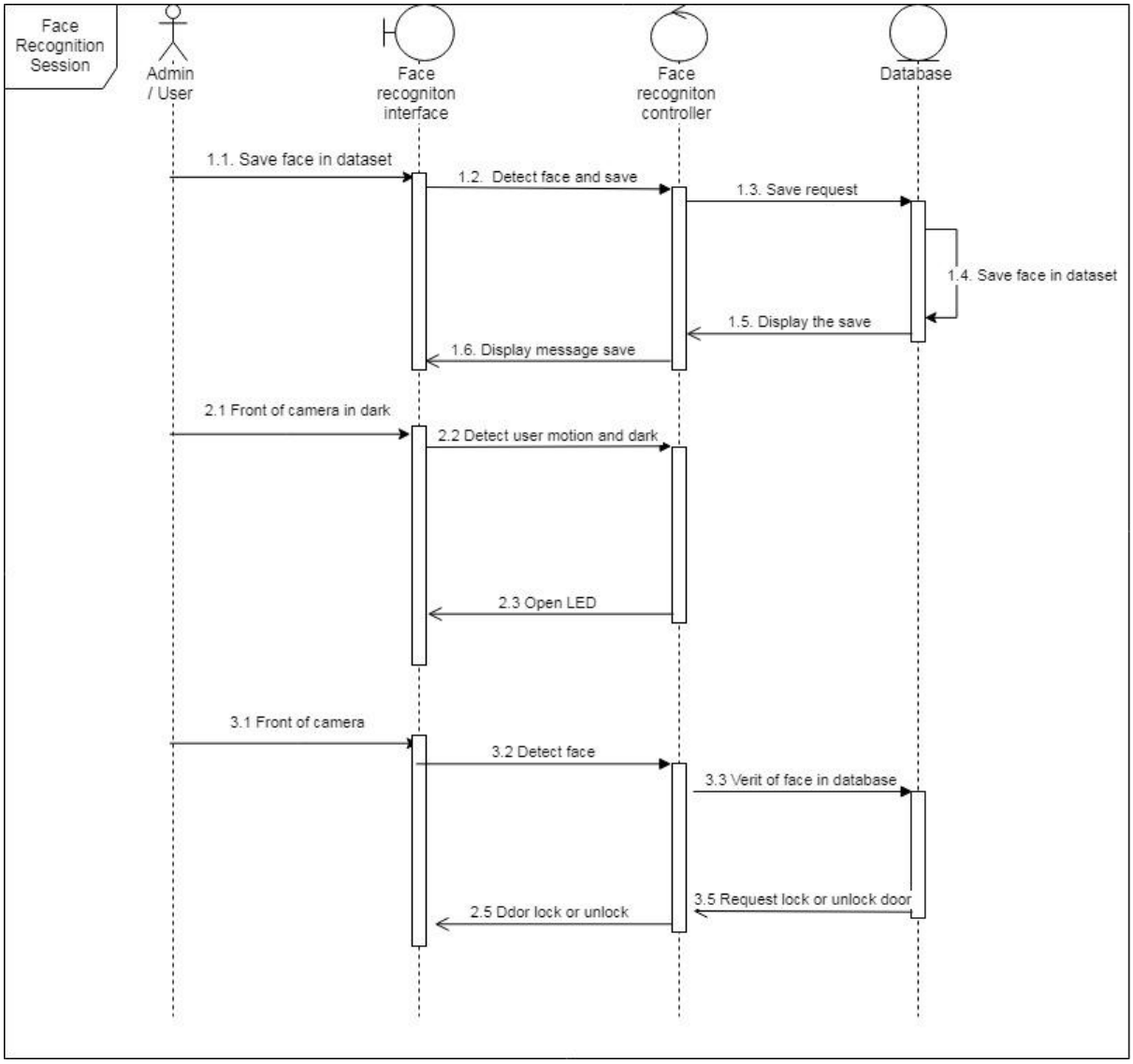
B-1.5: Basic Flow – View Status



B-1.6:Basic Flow – Alert Session



B-1.7: Basic Flow – Administration Session



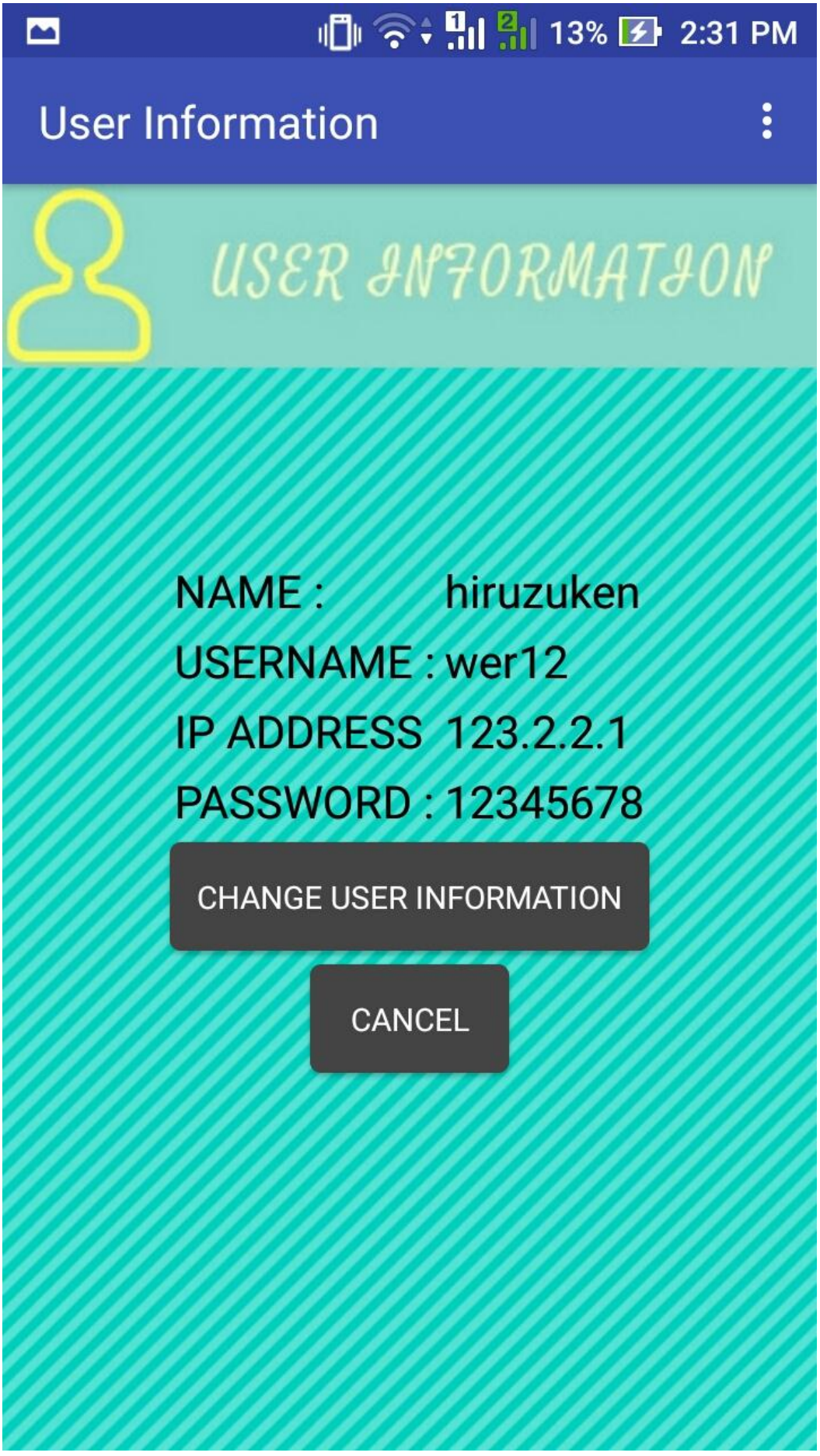
B-1.8: Basic Flow – Face Recognition Session

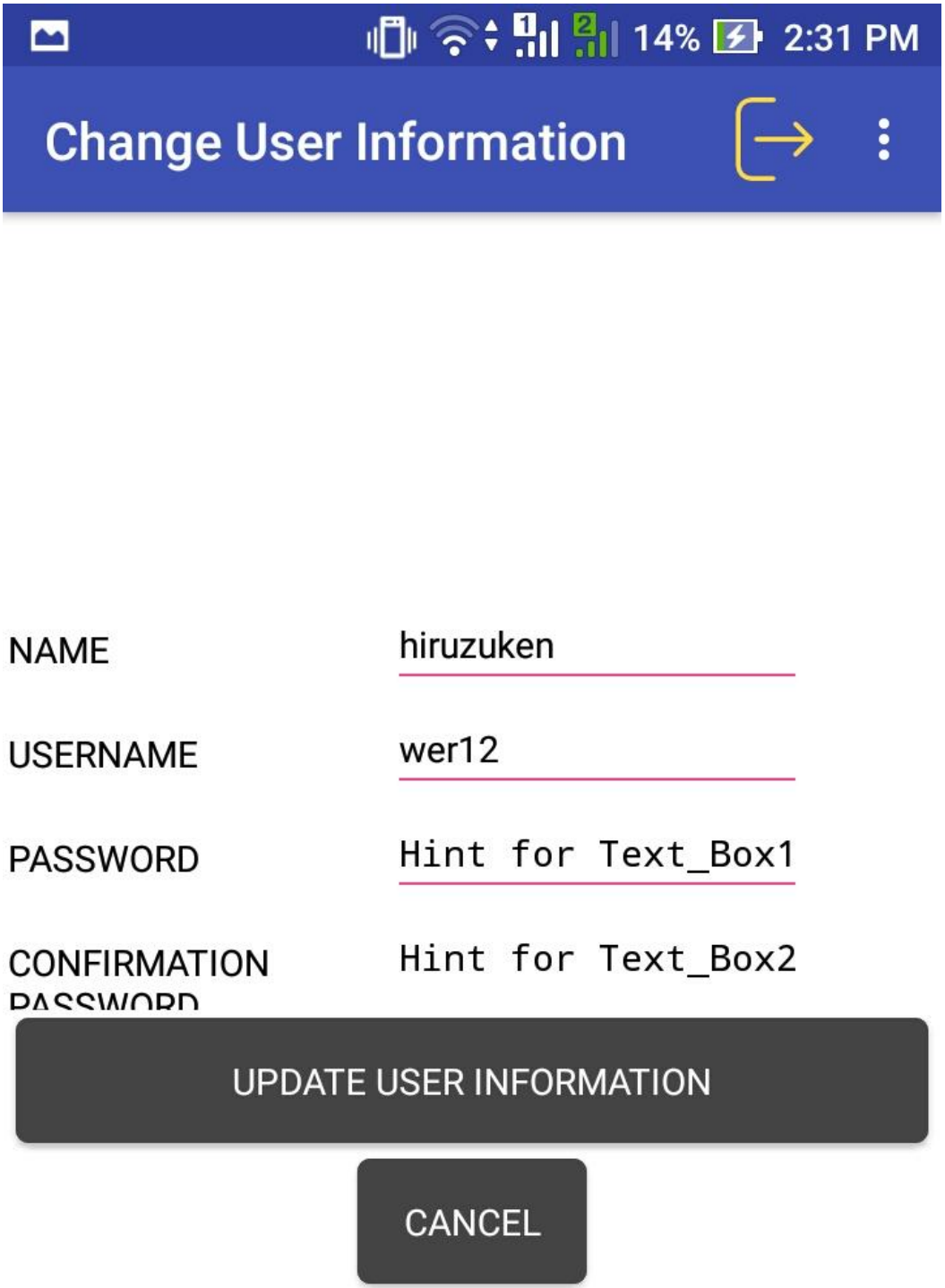
APPENDIX B - 2

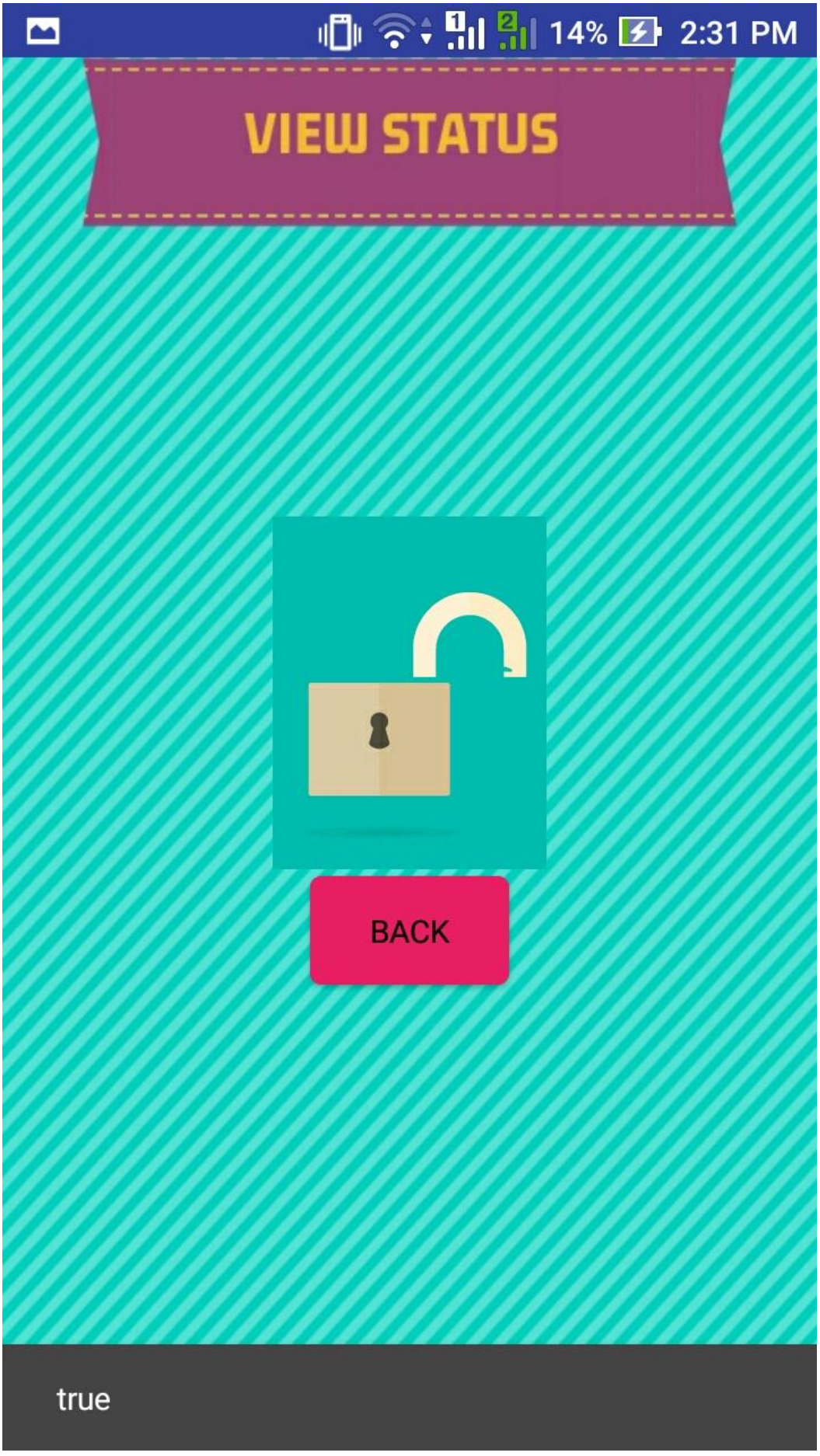
User Interfaces

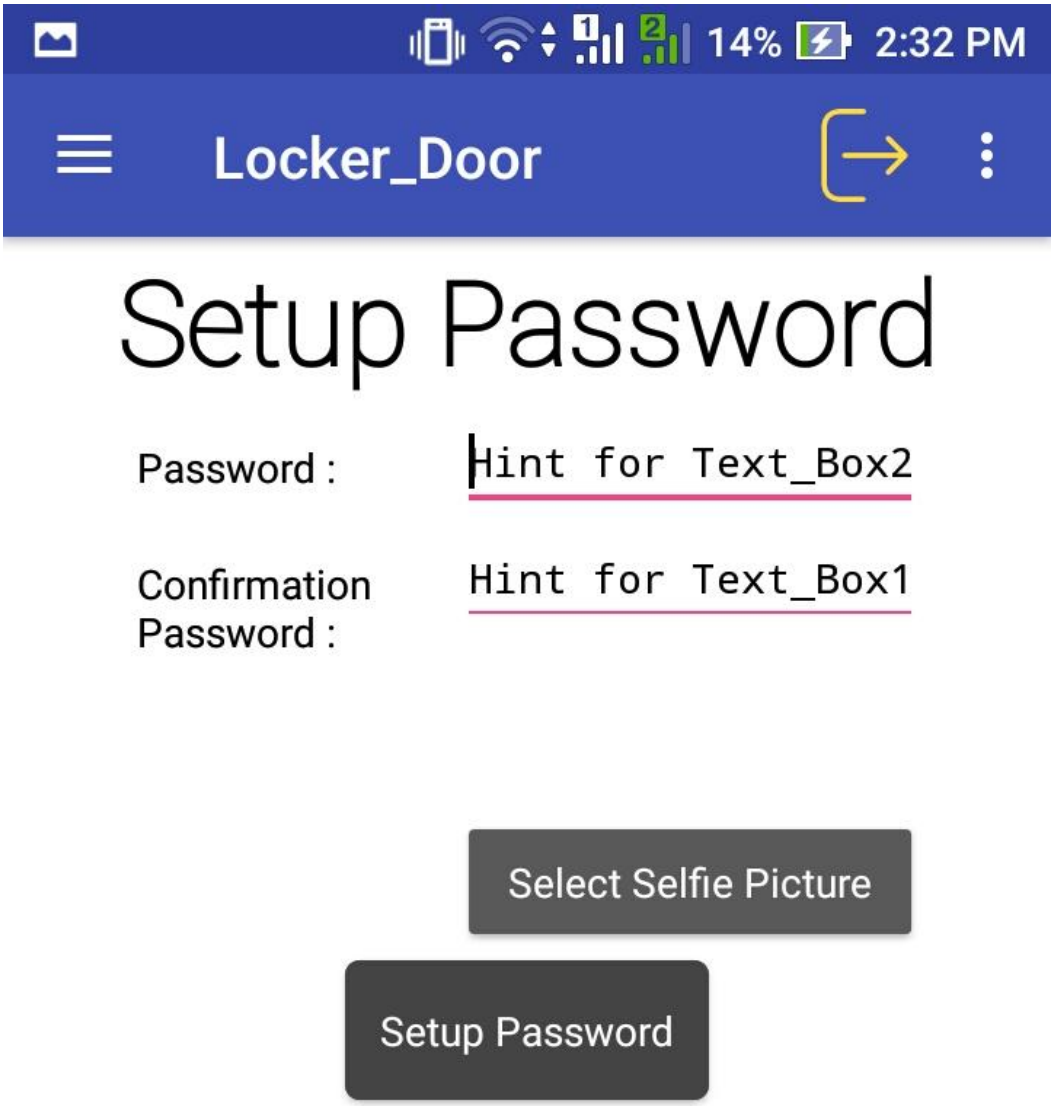

13% 2:31 PM
SMART
HOME SECURITY
Username
Insert username
Password
Insert Password
Login Account
Registration

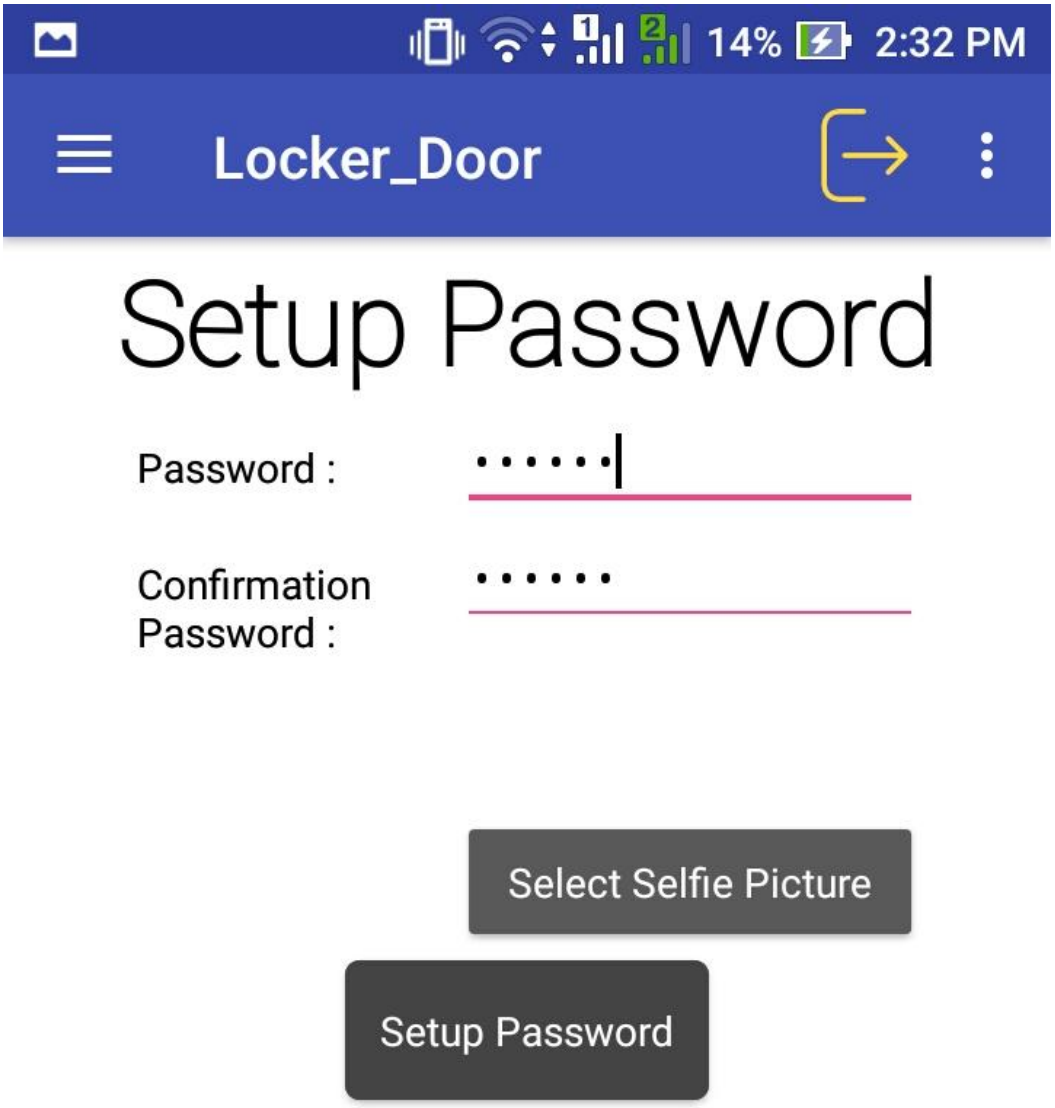

13%
2:31 PM
Home Page

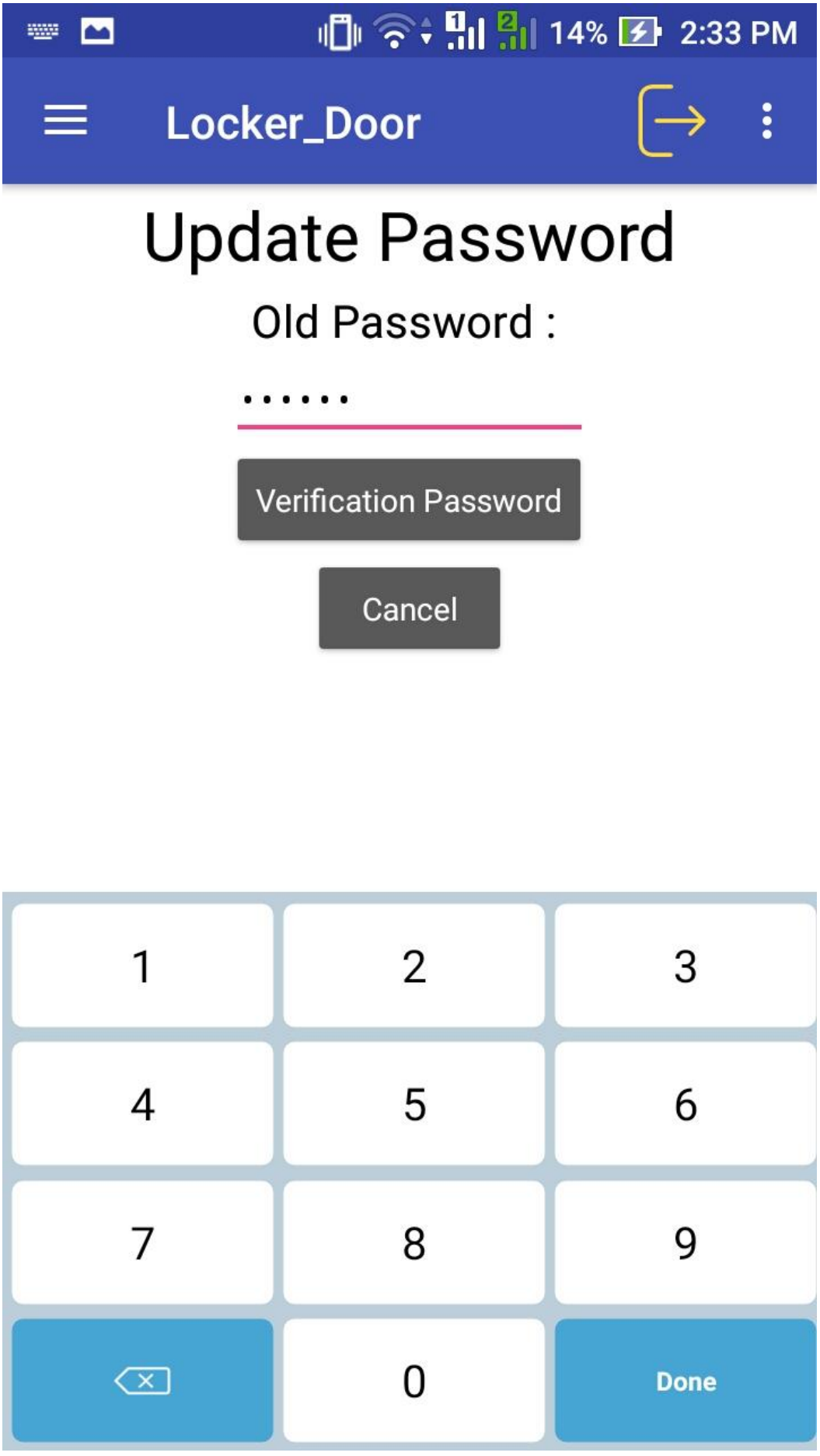

13% 2:31 PM
User Information
USER INFORMATION
NAME : hiruzuken
USERNAME : wer12
IP ADDRESS 123.2.2.1
PASSWORD : 12345678
CHANGE USER INFORMATION
CANCEL

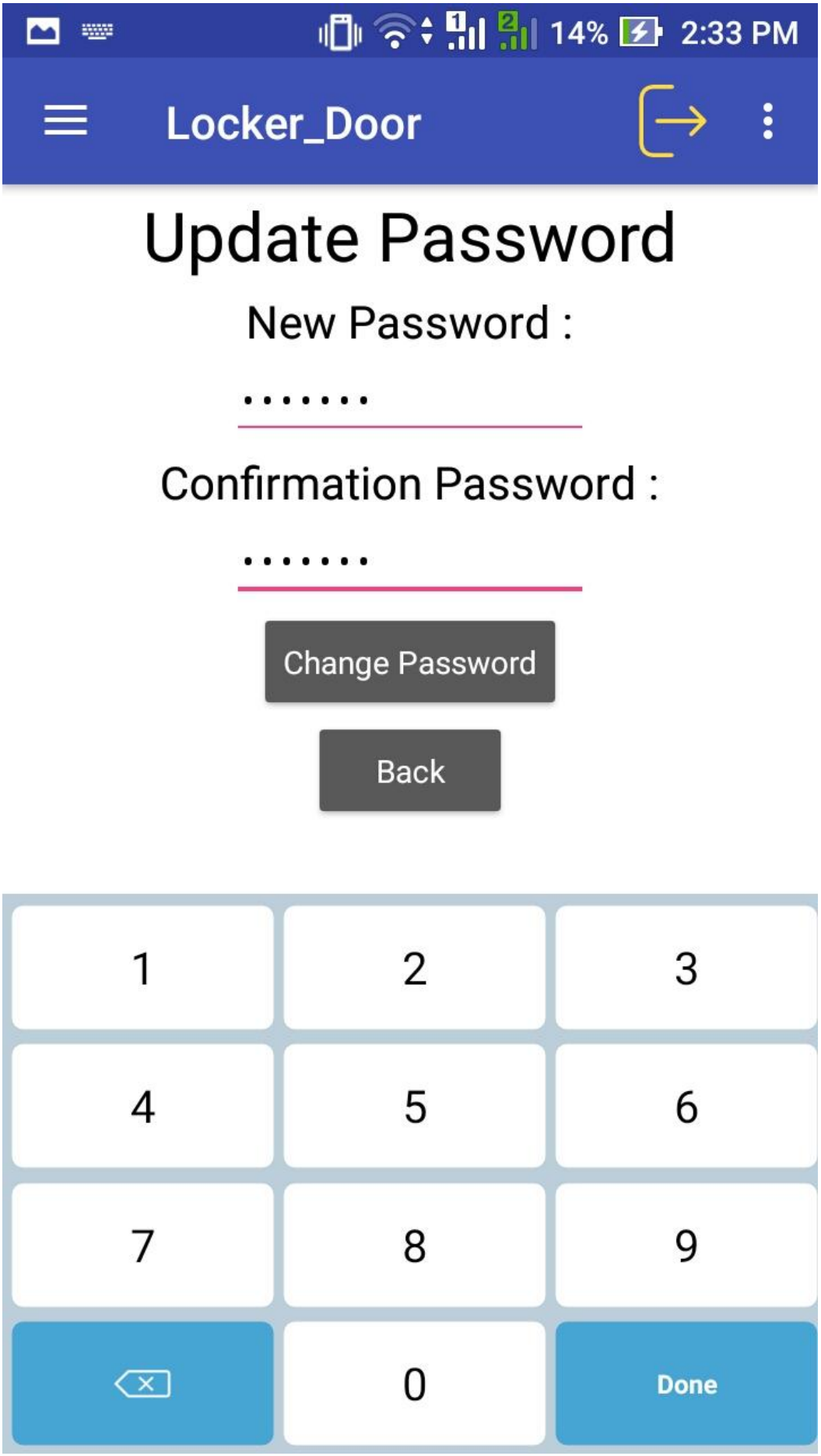

14% 2:31 PM
Change User Information
NAME
hiruzuken
USERNAME
wer12
PASSWORD
Hint for Text_Box1
CONFIRMATION PASSWORD
Hint for Text_Box2
UPDATE USER INFORMATION
CANCEL


14% 2:31 PM
VIEW STATUS
BACK
true

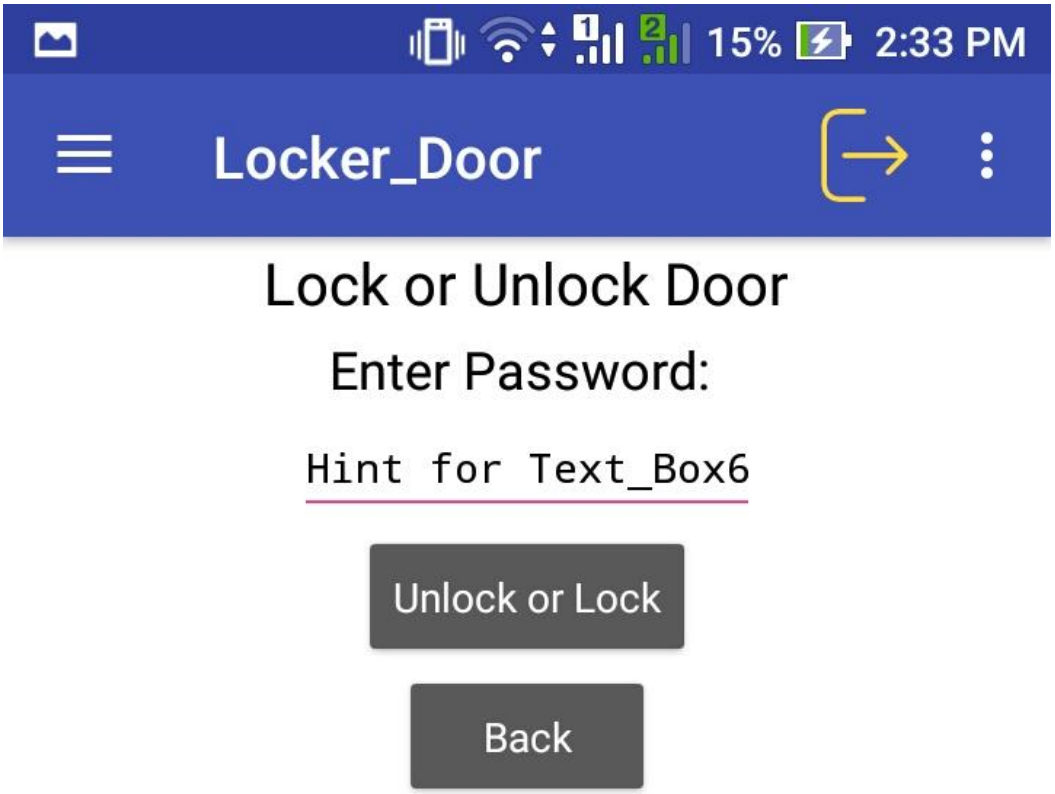

14% 2:32 PM
Locker_Door
Setup Password
Password :
Hint for Text_Box2
Confirmation Password :
Hint for Text_Box1
Select Selfie Picture
Setup Password


14% 2:32 PM
Locker_Door
Setup Password
Password :
Confirmation Password :
Select Selfie Picture
Setup Password

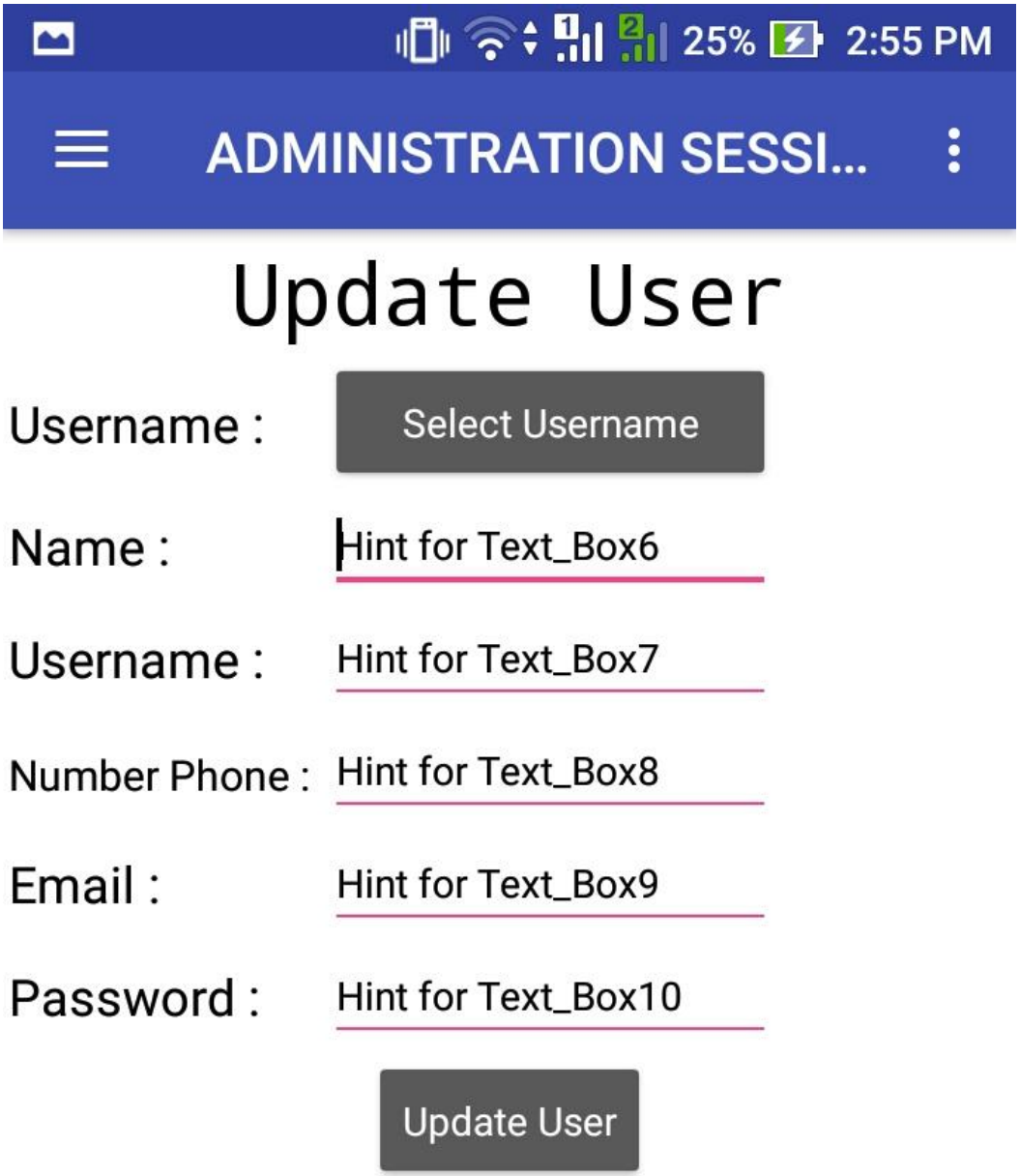

14% 2:33 PM
Locker_Door
Update Password
Old Password :
Verification Password
Cancel
1
2
3
4
5
6
7
8
9
0
Done

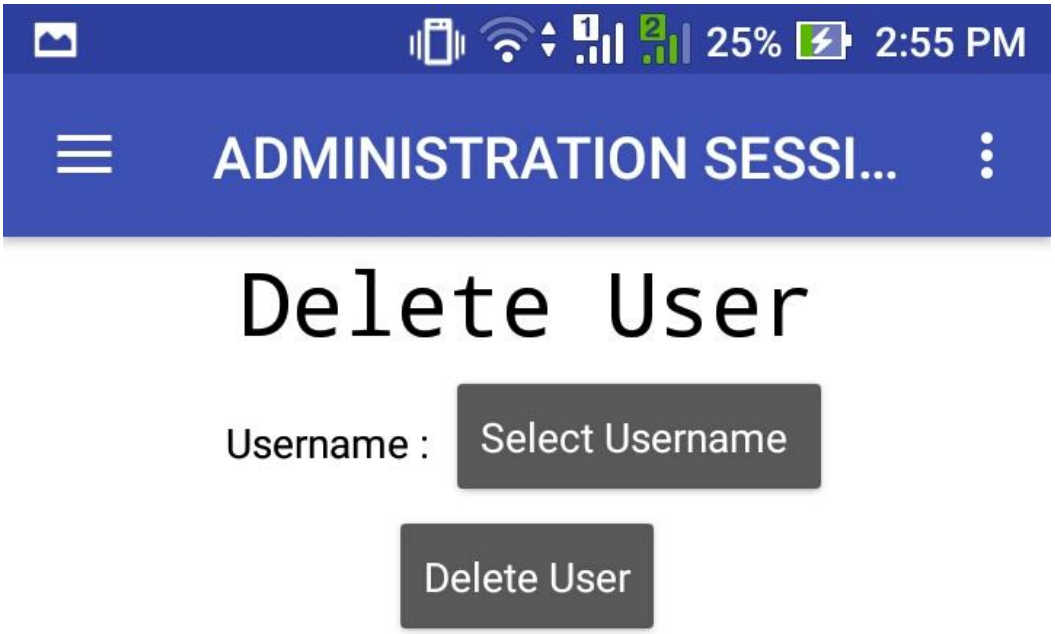

14% 2:33 PM
Locker_Door
Update Password
New Password :
.....
Confirmation Password :
.....
Change Password
Back
1
2
3
4
5
6
7
8
9
0
Done

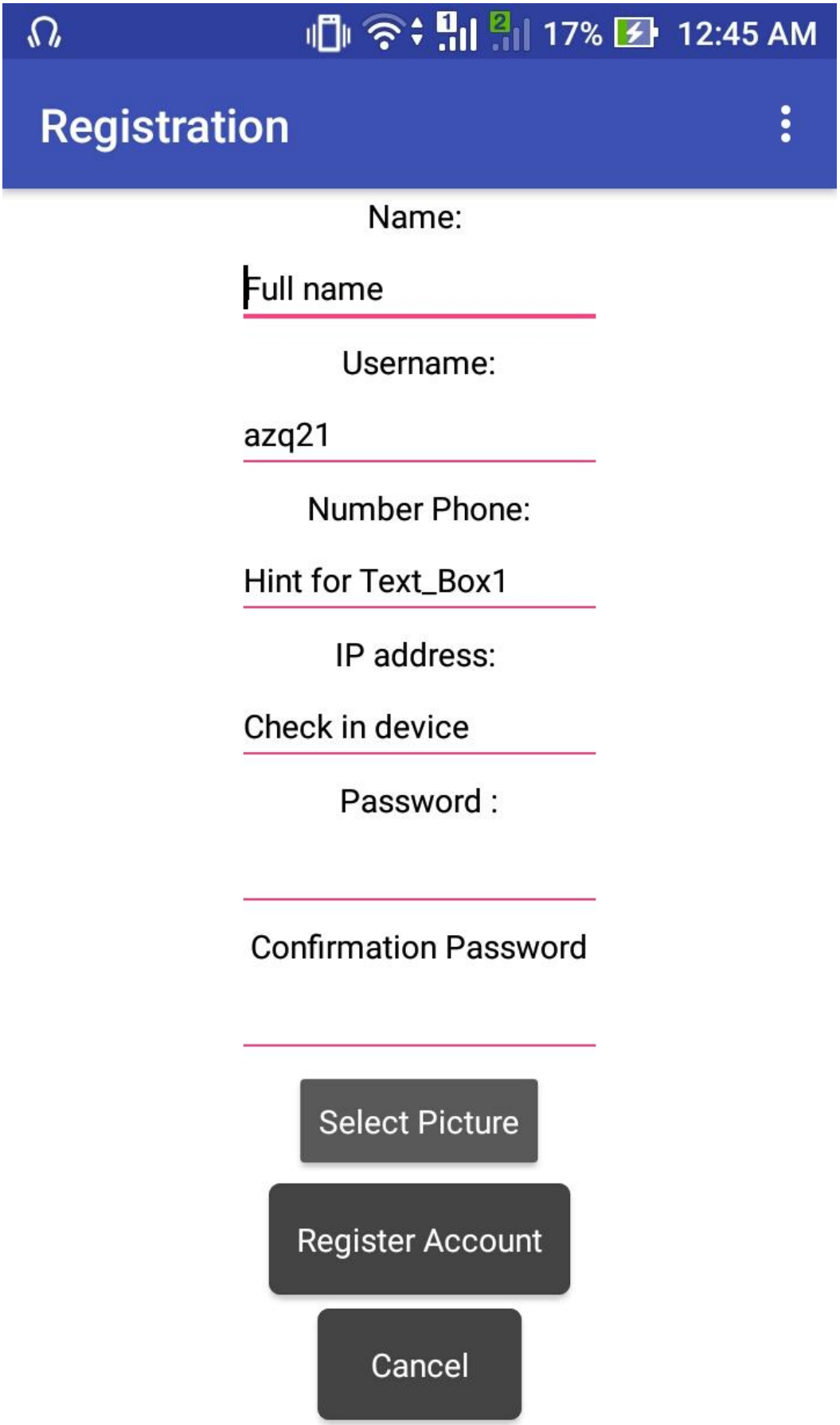

15%
2:33 PM
Locker_Door
Lock or Unlock Door


15%
2:33 PM
Locker_Door
Lock or Unlock Door
Enter Password:
Hint for Text_Box6
Unlock or Lock
Back


25% 2:55 PM
ADMINISTRATION SESSI...
Add User
Name :
Hint for Text_Box1
Username :
Hint for Text_Box2
Email :
Hint for Text_Box3
Number Phone :
Hint for Text_Box4
Password :
Hint for Text_Box5
Picture :
Select Picture
Add User


25% 2:55 PM
ADMINISTRATION SESSI...
Update User
Username :
Select Username
Name :
Hint for Text_Box6
Username :
Hint for Text_Box7
Number Phone :
Hint for Text_Box8
Email :
Hint for Text_Box9
Password :
Hint for Text_Box10
Update User


25%
2:55 PM
ADMINISTRATION SESSI...
Delete User
Username :
Select Username
Delete User


17%
12:45 AM
Registration
Name:
Full name
Username:
azq21
Number Phone:
Hint for Text_Box1
IP address:
Check in device
Password :
Confirmation Password
Select Picture
Register Account
Cancel


18%
12:47 AM
ADMINISTRATION...

SOFTWARE DESIGN DOCUMENT

(SDD)

SMART HOME SECURITY SYSTEM

Generated By:

MOHAMMAD SYAFI AZIM BIN MOHD RAZAM

Revision History	
Revision	**Description**
01	SRS

1. INTRODUCTION

1.1. Identification

System name: SMART HOME SECURITY

1.2. Overview of the System

Figure 1.1 is a use case diagram which describe the overview of Smart Home Security System.

The following are the list of use case description:

Table 1.1: List of use case description

Use Case	Function
Registration Session	This use case allows admin to register the account of the application.
Login Session	This use case allows use or admin to login the account after they register.
Manage information user	This use case allows admin to managing their user information such as changing password, username and name.
Manage the Locker Door	This use case allows user to manage locking or unlock of their home door
View Status	This use case allows user to view their status of locking door.
Alert Session	This use case allows user to receive and sent alert to the system.
Administration Session	This use case allows admin to manage their another user by active the another user security, delete another user account and view the status the active user.

Face Recognition Session	This use case allows user to lock or unlock the door by using face recognition.

1.3. Overview of the Document

This paragraph summarizes the purpose and contents of this Software Design Document (SDD). It specifies the requirement aspects related to the Smart Home Security System

In general, this SDD is divided into 5 sections as the following:

Chapter 1 Describes the scope identification, system overview and the document overview.

Chapter 2 List of all the data dictionary

Chapter 3 Describes the preliminary design for the CSCI. The preliminary design will identify System Architecture, Static Organization,and Dynamic Organization, the description of each CSC design, the characteristics of each CSC and the traceability of requirements set forth in SRS and IRS.

Chapter 4 Describes the detail design.

Chapter 5 System Design Approvel.

2. DATA DICTIONARY

Table 2.1: Data Dictionary for table User

Field Name	Description	Data Type	Constraint
Name	Full of name of User	-	-
Username	Username	-	Primary Key
Password	Password of login	-	-
Email	Email	-	-
NumberPhone	Number Phone user	-	-
IpAddress	IP Address of arduino	-	-
PasswordLock	Password of Lock	-	-
Status	Status of lock door	Boolean	-

UserID	UserID		
Owner	Username of admin of the user		

Table 2.2: Data Dictionary for table Administration

Field Name	Description	Data Type	Constraint
Name	Full of name of Admin	-	-
Username	Username	-	Primary Key
Password	Password of login	-	-
NumberPhone	Number Phone user	-	-
IpAddress	IP Address of arduino	-	-
PasswordLock	Password of Lock	-	-
Status	Status of lock door	Boolean	-
UserID	UserID		

Table 2.3: Data Dictionary for Face recognition

Field Name	Description	Data Type	Constraint
Username folder	Consist user picture	-	-

3. PRELIMINARY DESIGN

3.1 System Architecture

This paragraph identifies the internal organizational structure of the Smart Home SecuritySystem. The relationship among system subsystem will be described.

3.1.1 Static Organization

Figure 3.1 shows the static organization for Smart Home Security System. It consists of:

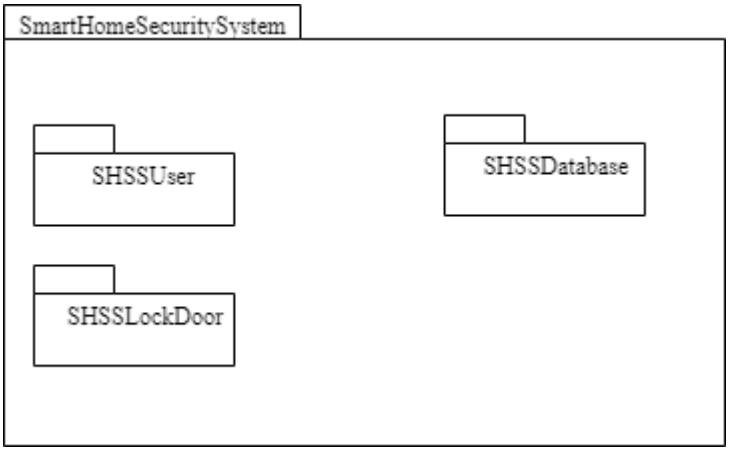


Figure 3.1: Static Organization of Smart Home Security System

This section describes the detail for each subsystem/packages.

1. SHSSAdministration

This package is responsible to control all information their user and admin about information of user such as name, username, password of login and etc when interaction with Smart Home Security. This package consists of the following classes or unit

a) Registration Class
b) Login Class
c) Userinformation Class
d) Administration Class

2. SHSSLockDoor

   This package is responsible to control the information about lock door when interactiong with the Smart Home Security System. This package consists of the following classes or unit:

   e) LockDoor Class
   f) PasswordLockDoor Class
   g) StatusView Class
   h) FaceRecognition Class

3. SHSSDatabase

   This package does not consist any classes. This package just act as reuse database that consist many table.

4. SHSSUser

   This package is responsible to control the information about user when interactiong with the Smart Home Security System. This package consists of the following classes or unit:

   i) Login Class

3.2 Dynamic Organization

Figure 3.2 shows component and their relationships between each other in the Smart Home Security System.

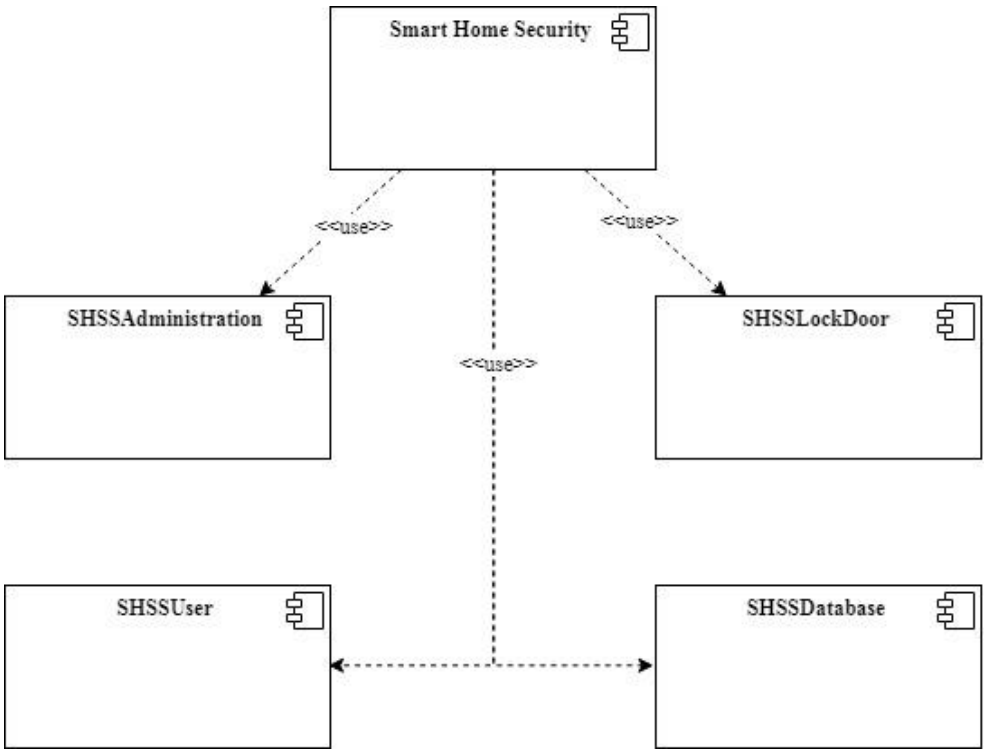


Figure 3.2: Component Diagram of Smart Home Security

4. DETAILED DESIGN

4.1 SHSSAdministration

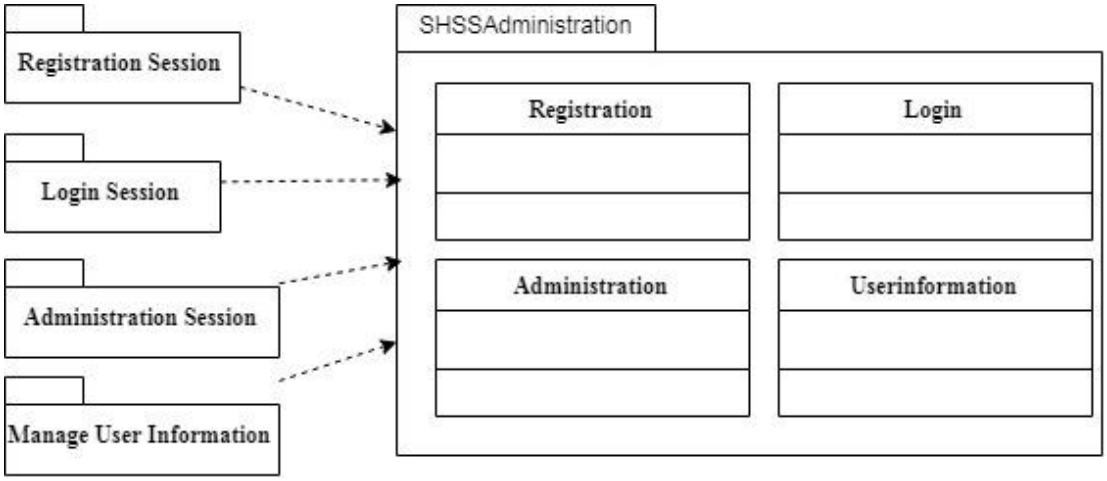


Figure 4.1: SHSSAdministration Package

4.1.1 Userinformation.class

Class Type : Entity Class

Responsibility: This classs is responsible to manage some operation related to UserInformation table in database.

Attributes :

Table 4.1: Table of attributes of Userinformation.class

Attributes	Data type
Name	String
Username	String
PasswordLogin	String
NumberPhone	String

Methods:

Table 4.2: Table of methods of Userinformation.class

Methods	Description
Void UpdateUserInformation (Connection con, String Username)	To update user information record

4.1.2 Registration.class

Class Type : Entity Class

Responsibility: This classs is responsible to manage some operation related to UserInformation table in database.

Attributes :

Table 4.3: Table of attributes of Registration.class

Attributes	Data type
Name	String
Username	String
PasswordLogin	String
IpAddress	String
ConfirmationPassword	String
PhoneNumber	Double

Methods:

Table 4.4: Table of methods of Registration.class

Methods	Description
Void AddRegistration (Connection con)	To add new user registration record

4.1.3 Login.class

Class Type : Entity Class

Responsibility: This classs is responsible to login the system

Attributes :

Table 4.5: Table of attributes of Login.class

Attributes	Data type

Username	String
PasswordLogin	String

Methods:

Table 4.6: Table of methods of Login.class

Methods	Description
Void ValidateLogin (Connection con, String Username, String PasswordLogin)	To valid the username and password to login the system.

4.2 SHSSLockDoor

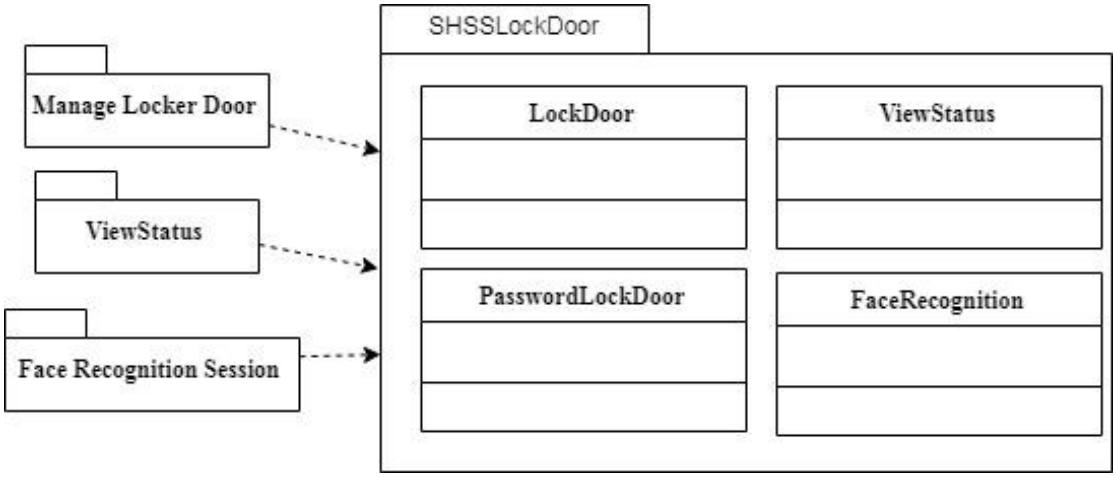


Figure 4.2: SHSSLockDoor Package

4.2.1 LockDoor.class

Class Type : Class

Responsibility: This classs is responsible to lock or unlock the door and interaction mobile application with Raspberry pi and arduino to control the motor of locker.

Attributes :

Table 4.7: Table of attributes of LockDoor.class

Attributes	Data type
PasswordLock	String
Username	String
IpAddress	String
Status	Boolean

Methods:

Table 4.8: Table of methods of LockDoor.class

Methods	Description
Void LockDoor (Connection con, String PasswordLock,String Username)	To lock or unlock the door by using mobile application
Boolean Interaction (Connection con, String IpAddress)	To connect the mobile application with Raspberry Pi

4.2.2 PasswordLockDoor.class

Class Type : Entity Class

Responsibility: This classs is responsible to manage all operation related to the LockDoorr table in the database

Attributes :

Table 4.9: Table of attributes of PasswordLockDoor.class

Attributes	Data type
PasswordLock	String
Username	String
IpAddress	String

Methods:

Table 4.10: Table of methods of PasswordLockDoor.class

Methods	Description
Void SetupPassword (Connection con, String PasswordLock, String Username)	To setup new password in LockDoor record.
Void UpdatePassword (Connection con, String PasswordLock, String Username)	To update the password in LockDoor record.

4.2.3 ViewStatus.class

Class Type : Class

Responsibility: This classs is responsible to view the status of lock door

Attributes :

Table 4.11: Table of attributes of PasswordLockDoor.class

Attributes	Data type
Username	String
Status	Boolean

Methods:

Table 4.12: Table of methods of PasswordLockDoor.class

Methods	Description
Void ViewStatus (Connection con, String Username)	To display the status in LockDoor record.

4.2.4 FaceRecogmition.class

Class Type : Class

Responsibility: This classs is responsible to detect and save face of user.

Attributes :

Table 4.11: Table of attributes of PasswordLockDoor.class

Attributes	Data type
UserID	String
Haarcascade_frontalface_default..xml	cascade
Encoding.pickle	encoding

dataset	dataset
hog	Detection-method

Methods:

Table 4.12: Table of methods of PasswordLockDoor.class

Methods	Description
Void FaceRecognition (Connection con, haarcascade_frontalface_default.xml, encodings.pickle)	To detect the face of user.
Void encode_faces (dataset, encodings.pickle, hog)	To save dataset of user into encodings.pickle to detect face.
Void UnlockOrLock (UserID)	To unlock or lock the door by activate the motor of locker.
Void SaveDataset (encodings.pickle,UserID)	To save image of user into dataset.

4.3 SHSSUser

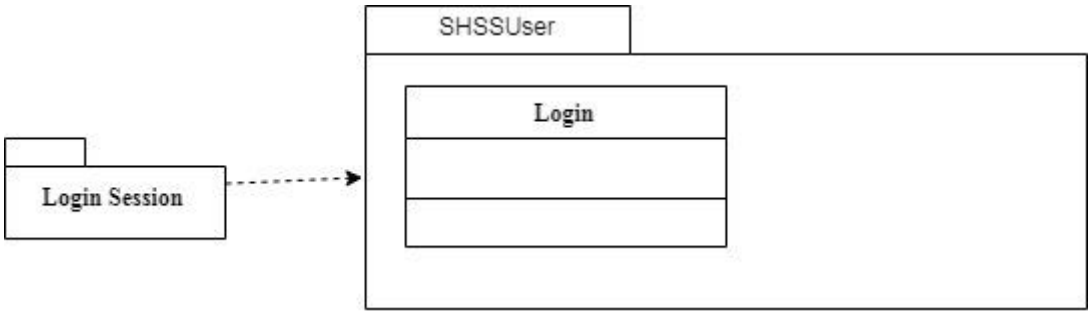


Figure 4.2: SHSSLockDoor Package

1.1

4.3.1 Login.class

Class Type : Entity Class

Responsibility: This classs is responsible to login the system

Attributes :

Table 4.13: Table of attributes of Login.class

Attributes	Data type
Username	String
PasswordLogin	String

Methods:

Table 4.14: Table of methods of Login.class

Methods	Description
Void ValidateLogin (Connection con, String Username, String PasswordLogin)	To valid the username and password to login the system.

5. SYSTEM DESIGN APPROVEL

	Name	Date
Authenticated by: _____ Developer	MOHAMMAD SYAFI AZIM BIN MOHD RAZAM	
Approved by: _____ Client		