**MINISTRY OF EDUCATION AND TRAINING**

**FPT UNIVERSITY**

Capstone Project Document

**Vietnamese Sign Language Recognition**

|  |  |
| --- | --- |
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# Table of Contents

[Table of Contents 3](#_Toc417282272)

[List of Tables 3](#_Toc417282273)

[List of Figures 3](#_Toc417282274)

[Definitions, Acronyms, and Abbreviations 5](#_Toc417282275)

[A. Report No. 5 System Implementation & Test 7](#_Toc417282276)

[1. Introduction 7](#_Toc417282277)

[1.1 Overview 7](#_Toc417282278)

[1.2 Test Approach 7](#_Toc417282279)

[2. Database Relationship Diagram 7](#_Toc417282280)

[2.1 Physical Diagram 7](#_Toc417282281)

[2.2 Data Dictionary 7](#_Toc417282282)

[3. Performance Measurement 10](#_Toc417282283)

[4. Test Plan 10](#_Toc417282284)

[4.1 Features to be tested: 10](#_Toc417282285)

[4.2 Features not to be tested: 10](#_Toc417282286)

[5. System Testing Test Case 10](#_Toc417282287)

[5.1 Storeowner Core Flow 12](#_Toc417282288)

[5.2 Employee Core Flow 23](#_Toc417282289)

# List of Tables

[Table 1: Definitions 5](#_Toc417282290)

# List of Figures

[Figure 52: Physical Database Diagram 5](#_Toc417282291)

# Definitions, Acronyms, and Abbreviations

|  |  |
| --- | --- |
| **Name** | **Definition** |
| EPS | E-Printer Services |
| App | Application |
| OS | Operating System |
| Playstore | A Market where you can install an app for Android device. |

Table 1: Definitions

# Report No. 5 System Implementation & Test

## Introduction

### Overview

This section contains in detail of all necessary information about system implementation and testing of EPS System includes all test plans, test cases, test results and test environment.

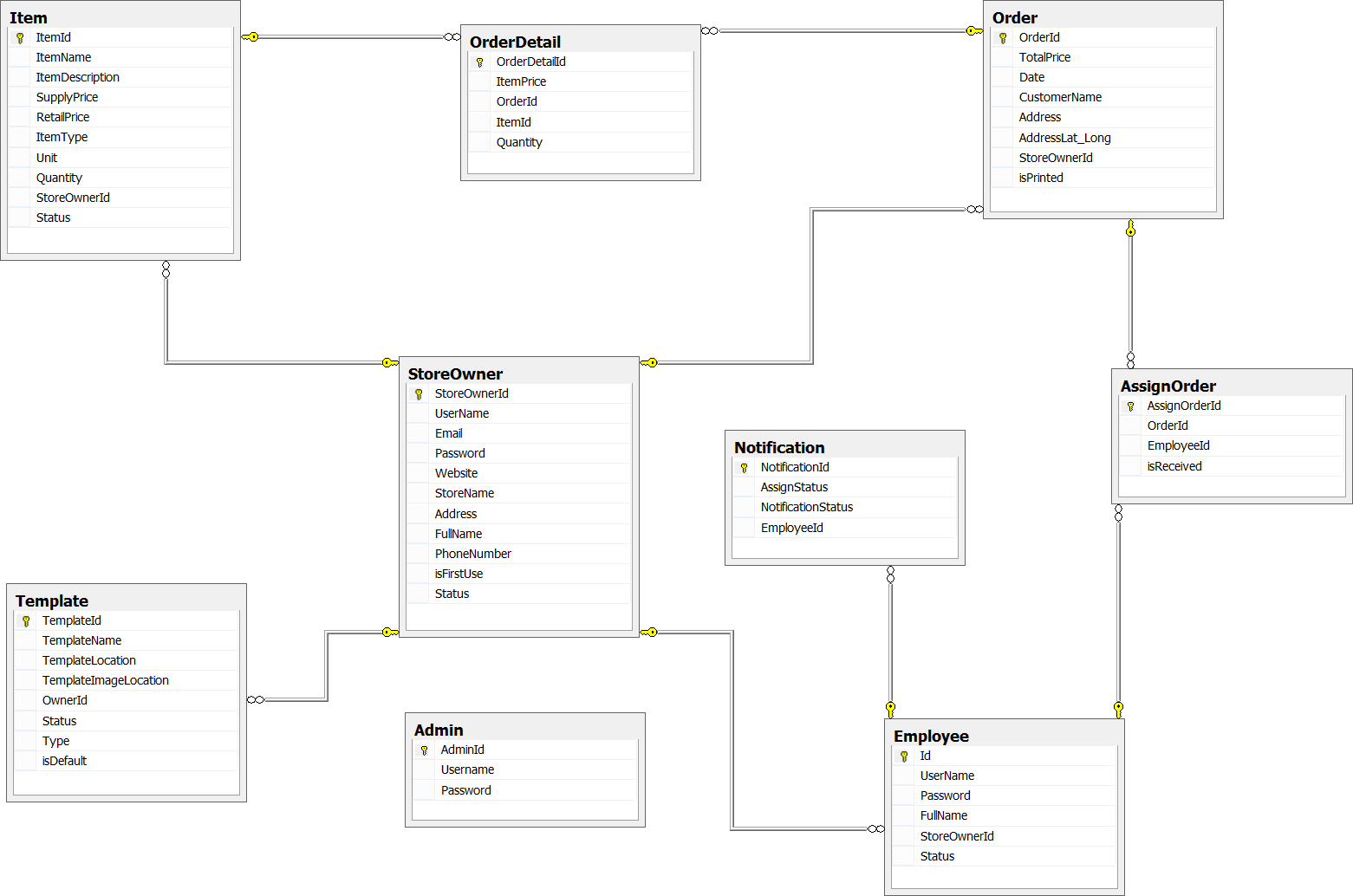
### Test Approach

- Goal: To test the whole system based on the core flow.

- Method: System testing, Black box testing.

## Database Relationship Diagram

### Physical Diagram

Figure 52: Physical Database Diagram

### Data Dictionary

|  |  |
| --- | --- |
| **Entity Data dictionary: describe content of all entities** | |
| Entity Name | Description |
| Store Owner | Describe all storeowner profiles in the system. |
| Employee | Describe all employee profiles in the system. |
| Item | Describe all items stored in the system. |
| Template | Describe all templates available in the system. |
| Order | Describe all order of store in the system. |
| Order Detail | Describe all order detail in the system |
| Notification | Describe all notification of storeowner and employee in the system. |
| AssignOrder | Describe all assignments of orders to employee |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Entity name** | **Attributes** | **Description** | **Domain** | **Null** |
| Store Owner | StoreOwnerId | Unique identifier of storeowner, auto increment. | int | No |
| UserName | Storeowner’s username. | nvarchar(50) | No |
| Email | Storeowner’s email address. | nvarchar(50) | No |
| Password | Storeowner’s password. | nvarchar(50) | No |
| Website | Storeowner’s website address. | nvarchar(50) | Yes |
| StoreName | Name of the store. | nvarchar(50) | No |
| Address | The address of storeowner. | nvarchar(100) | No |
| FullName | Full name of storeowner. | nvarchar(100) | No |
| PhoneNumber | Phone number of storeowner. | int | No |
| isFirstUse | Value to check whether storeowner log in for the first time or not. | bit | No |
| Status | Status of storeowner. | nchar(10) | No |
| Employee | Id | Unique identifier of employee, auto increment. | int | No |
| UserName | Employee’s username. | nchar(20) | No |
| Password | Employee’s password. | nchar(10) | No |
| FullName | Employee’s full name. | nvarchar(50) | Yes |
| StoreOwnerId | Id of storeowner | int | No |
| Status | Status of employee. | nchar(20) | No |
| Item | ItemId | Unique identifier of item, auto increment. | int | No |
| ItemName | Name of an item. | nvarchar(100) | No |
| ItemDescription | Description about an item. | nvarchar(500) | Yes |
| SupplyPrice | Supply price of item. | float | No |
| RetailPrice | Retail price of item. | float | No |
| ItemType | Type of item. | nvarchar(50) | No |
| Unit | Unit of an item. | nvarchar(50) | No |
| Quantity | Quantity of item in store. | int | No |
| StoreOwnerId | Id of storeowner | int | No |
| Status | Status of an item. | nchar(10) | No |
| Template | TemplateId | Unique identifier of template, auto increment. | int | No |
| TemplateName | Name of template. | nvarchar(50) | No |
| TemplateLocation | Location of template on server. | nvarchar(260) | No |
| TemplateImageLocation | Location of image template on server. | nvarchar(260) | No |
| OwnerId | Id of template’s owner | int | No |
| Status | Status of template. | nvarchar(20) | No |
| Type | Type of template. | nchar(10) | No |
| isDefault | Value to check whether template is a default template | bit | No |
| Order | OrderId | Unique identifier of order, auto increment. | int | No |
| TotalPrice | Total price of order. | float | No |
| Date | Date order made. | datetime | No |
| CustomerName | Name of the customer. | nvarchar(30) | No |
| Address | Address of customer. | nvarchar(100) | No |
| AddressLat\_Long | Latitude and longitude of address. | varchar(100) | No |
| StoreOwnerId | Id of storeowner | int | No |
| isPrinted | Value to check whether the order is printed or not. | bit | No |
| OrderDetail | OrderDetailId | Unique identifier of orderdetail, auto increment. | int | No |
| ItemPrice | Price of an item in orderdetail. | float | No |
| OrderId | Id of order | int | No |
| ItemId | Id of item | int | No |
| Quantity | Quantity of items in order. | int | No |
| Notification | NotificationId | Unique identifier of notification, auto increment. | int | No |
| AssignStatus | Status of job assigned to employee | bit | No |
| NotificationStatus | Status of notification | bit | No |
| EmployeeId | Id of employee | int | No |
| AssignOrder | AssignOrderId | Unique identifier of assign order, auto increment. | int | No |
| OrderId | Id of Order | int | No |
| EmployeeId | Id of Employee | int | No |
| isReceived | Value to check whether the order is received or not. | bit | No |
| Admin | AdminId | Unique identifier of admin, auto increment. | int | No |
| Username | Username of admin | nvarchar(20) | No |
| Password | Password of admin | nvarchar(10) | No |

## Performance Measurement

**3.1 Clustering Performance**

Clustering is performed by running K Mean Algorithm which has complexity of : O(n \* k \* I \* d)

* n : number of points
* k : number of cluster
* I : number of iteration
* d : number of attributes (3)

Clustering take almost the time of process that we can ignore the time needed to load data from database, digitalize data.

The speed of clustering will vary and increase dramatically when n increase. The purpose of this project is not about optimizing K-Mean Algorithm so it is accepted to let the process run till it completes. Moreover, the clustering is designed to run by staff, wait time is acceptable.

## Test Plan

We have two main test phases: Function test (Integration test) and System test.

For Integration test, we use the functional test. This kind of test shows us the working of each function right or wrong. We focus on the result of the function in different cases.

The System test check all the activities the Smart lock after setup such as: what the system do when it is turned on and if user do somethings, what will response. We create test case to check each function’s activity. Then, we observe and record the result.

### Features to be tested:

* Functional Testing:

+ Integration testing: Test all function on Raspberry Application and each external module

+ System testing: Test all function for Raspberry Application – external modules

- UI Testing: Test UI on Raspberry Application

### Features not to be tested:

* Hardware module: Raspberry Pi B2.

### Testing tools and environment

- Testing tools:

+ A raspberry board with connect to PC/Laptop running Linux OS

+ QT Creattor

+ Minicom on Raspberry

- Environment:

+ Some where with good light condition

## System Testing Test Case

5.1. Test on real device

5.1.1. Component testing

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ID** | **TEST CASE DESCRIPTION** | **PRE-CONDITION** | **TEST CASE PROCEDURE** | **EXPECTED OUTPUT** | **Result** | **Note** |
| CPN01 | Send message to GSM SIM900 | \_ GSM SIM900 have sim card \_ GSM SIM 900 is turned on \_ Raspberry is turn on GSM SIM900 connect to Raspberry through UART port | \_Turn on terminal on Raspberry \_Using command "minicom -b 115200 -o -D /dev/ttyAMA0" \_type in "AT+CPIN?" then press ENTER | \_Recognize devce \_GSM SIM900 respone  "READY" in terminal | Pass |  |
| CPN02 | Send sms message using GSM SIM900 | \_ GSM SIM900 have sim card \_ Simcard is available to send sms \_ GSM SIM 900 is turned on \_ Raspberry is turn on GSM SIM900 connect to Raspberry through UART port | \_Turn on terminal on Raspberry \_Use command "minicom -b 115200 -o -D /dev/ttyAMA0" to open minicom \_type in "AT+CMGS="+84945246345"" then press ENTER \_type in "test sms" then press Ctrl+Z | \_GSM SIM900 respone  "OK" in terminal \_Recieved SMS "test sms" on mobile | Pass |  |
| CPN03 | Change Solenoid Lock's status to unlock | \_Solenoid lock connect to 12V power \_Solenoid lock connect to Raspberry using GPIO port \_In raspberry have test.c file which have testing unlock code - Raspberry have bcm2835 library | \_Turn on terminal on Raspberry \_type in"sudo gcc test test.c -lbcm2835" then ENTER \_ type in "sudo ./test.c" then ENTER | Solenoid lock changes status to unlock, after 5s, Its status changes back to lock | Pass |  |
| CPN04 | Receive picture from camera | \_Camera connect to Raspberry using Camera port. - Raspberry is alrealy installed camera driver - Connect to LCD | \_ Open terminal on raspberry \_ Type command "raspistill -o image.jpg" then press enter | \_ LCD show a camera windows and image which is recorded by camera | Pass |  |
| CPN05 | Receive signal from keypad | \_Keypad connect to Raspberry using GPIO port - Raspberry have bcm2835 library | \_Turn on terminal on Raspberry \_type in"sudo gcc test test.c -lbcm2835" then ENTER \_ type in "sudo ./testkepad.c" then ENTER - Press any button on keypad | Raspberry receive signal and show pressed key on terminal | Pass |  |
| CPN06 | Show screen on LCD | \_LCD connect to Raspberry using HDMI port | \_Turn on LCD  \_ Do something on Raspberry | See your activities on LCD screen. | Pass |  |

5.1.2. Integration test

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ID** | **TEST CASE DESCRIPTION** | **PRE-CONDITION** | **TEST CASE PROCEDURE** | **EXPECTED OUTPUT** | **Result** | **Note** |
| SLFROR01 | Open lock by keypad - correct phone - correct password - correct passcode  - enter passcode <= 1h | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port | \_ Press “2” button on keypad | \_ Menu keypad unlock screen appeared on LCD | Pass |  |
| \_ Press “1” button on keypad | \_ Change to unlock using keypad screen | Pass |  |
| \_ Press “2” button on keypad | \_ Change to enter phone number screen | Pass |  |
| \_ Press “1” button on keypad | \_ Select input phone line | Pass |  |
| \_ Enter “0903060593” using keypad | \_ Phone number = "0903060593" | Pass |  |
| \_ Press “\*” button on keypad | \_ Back to none select line | Pass |  |
| \_ Press “2” button on keypad | \_ Select input password line | Pass |  |
| \_ Enter “123456” from keypad then press A | \_ Password = "123456" the System change to input passcode line | Pass |  |
| \_ Wait a moment until when received Passcode SMS from system | \_System sent passcode SMS to "0903060593" and change into enter passcode screen | Pass |  |
| \_ Enter correct passcode using keypad | \_Sysem compare entered passcode successfully | Pass |  |
| \_ Press "A" button on keypad | \_Lock is opened | Pass |  |
| SLFROR02 | Open lock by keypad - incorrect phone - correct password - correct passcode | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port | \_ Press “2” button on keypad | \_ Menu keypad unlock screen appeared on LCD | Pass |  |
| \_ Press “1” button on keypad | \_ Change to unlock using keypad screen | Pass |  |
| \_ Press “2” button on keypad | \_ Change to enter phone number screen | Pass |  |
| \_ Press “1” button on keypad | \_ Select input phone line | Pass |  |
| \_ Enter " 0945246345" using keypad | \_ Phone number = "0945246345" | Pass |  |
| \_ Press “\*” button on keypad | \_ Back to none select line | Pass |  |
| \_ Press “2” button on keypad | \_ Select input password line | Pass |  |
| \_ Enter “123456” from keypad then press A | \_ Password = "123456" then system show error message “Số điện thoại chưa đăng kí” | Pass |  |
| SLFROR03 | Open lock by keypad - correct phone - incorrect password - correct passcode | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port | \_ Press “2” button on keypad | \_ Menu keypad unlock screen appeared on LCD | Pass |  |
| \_ Press “1” button on keypad | \_ Change to unlock using keypad screen | Pass |  |
| \_ Press “2” button on keypad | \_ Change to enter phone number screen | Pass |  |
| \_ Press “1” button on keypad | \_ Select input phone line | Pass |  |
| \_ Enter “0903060593” using keypad | \_ Phone number = 0903060593 | Pass |  |
| \_ Press “\*” button on keypad | \_ Back to none select line | Pass |  |
| \_ Press “2” button on keypad | \_ Select input password line | Pass |  |
| \_ Enter “111111” from keypad then press A | \_ System show error message “Password sai | Pass |  |
| SLFROR04 | Open lock by keypad - correct phone - correct password - incorrect passcode | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port | \_ Press “2” button on keypad | \_ Menu keypad unlock screen appeared on LCD | Pass |  |
| \_ Press “1” button on keypad | \_ Change to unlock using keypad screen | Pass |  |
| \_ Press “2” button on keypad | \_ Change to enter phone number screen | Pass |  |
| \_ Press “1” button on keypad | \_ Select input phone line | Pass |  |
| \_ Enter “0903060593” using keypad | \_ Phone number = "0903060593" | Pass |  |
| \_ Press “\*” button on keypad | \_ Back to none select line | Pass |  |
| \_ Press “2” button on keypad | \_ Select input password line | Pass |  |
| \_ Enter “123456” from keypad then press A | \_ Password = "123456" the System change to input passcode line | Pass |  |
| \_ Wait a moment until when received Passcode SMS from system | \_System sent passcode SMS to "0903060593" and change into enter passcode screen | Pass |  |
| \_ Enter incorrect passcode | \_Sysem compare entered passcode unsuccessfully and show error message “Passcode Sai | Pass |  |
| \_ Press "A" button on keypad | \_Lock is not opened | Pass |  |
| SLFROR06 | Open lock by keypad - correct phone - correct password - correct passcode - enter passcode > 1h | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port | \_ Press “2” button on keypad | \_ Menu keypad unlock screen appeared on LCD | Pass |  |
| \_ Press “1” button on keypad | \_ Change to unlock using keypad screen | Pass |  |
| \_ Press “2” button on keypad | \_ Change to enter phone number screen | Pass |  |
| \_ Press “1” button on keypad | \_ Select input phone line | Pass |  |
| \_ Enter “0903060593” using keypad | \_ Phone number = "0903060593" | Pass |  |
| \_ Press “\*” button on keypad | \_ Back to none select line | Pass |  |
| \_ Press “2” button on keypad | \_ Select input password line | Pass |  |
| \_ Enter “123456” from keypad then press A | \_ Password = "123456" the System change to input passcode line | Pass |  |
| \_ Wait a moment until when received Passcode SMS from system | \_System sent passcode SMS to "0903060593" and change into enter passcode screen | Pass |  |
| \_ Wait for over 1h then enter correct passcode using keypad | \_Sysem compare entered passcode unsuccessfully and show error message “Passcode hết hạn” | Pass |  |
| \_ Press "A" button on keypad | \_Lock is not opened | Pass |  |
| SLFROR07 | Open lock by keypad - correct phone - correct password - passcode not input | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port | \_ Press “2” button on keypad | \_ Menu keypad unlock screen appeared on LCD | Pass |  |
| \_ Press “1” button on keypad | \_ Change to unlock using keypad screen | Pass |  |
| \_ Press “2” button on keypad | \_ Change to enter phone number screen | Pass |  |
| \_ Press “1” button on keypad | \_ Select input phone line | Pass |  |
| \_ Enter “0903060593” using keypad | \_ Phone number = "0903060593" | Pass |  |
| \_ Press “\*” button on keypad | \_ Back to none select line | Pass |  |
| \_ Press “2” button on keypad | \_ Select input password line | Pass |  |
| \_ Enter “123456” from keypad then press A | \_ Password = "123456" the System change to input passcode line | Pass |  |
| \_ Press "A" button on keypad | \_Lock is not opened | Pass |  |
| SLFROR08 | Open lock by keypad - nothing input | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port | \_ Press “2” button on keypad | \_ Menu keypad unlock screen appeared on LCD | Pass |  |
| \_ Press “A” button on keypad | \_ System show error message “Vui lòng điền thông tin” | Pass |  |
| SLFROR09 | Open lock by keypad - phone not input \_ corect password | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port | \_ Press “\*” button on keypad | \_ Menu screen appeared on LCD | Pass |  |
| \_ Press “1” button on keypad | \_ Change to unlock using keypad screen | Pass |  |
| \_ Press “2” button on keypad | \_ Change to enter phone number screen | Pass |  |
| \_ Press “2” button on keypad | \_ Select input password line | Pass |  |
| \_ Enter “123456” from keypad | \_ Password = "123456" the System change to input passcode line | Pass |  |
| \_ Press “A” button on keypad | \_ System show error message “Vui lòng điền thông tin” | Pass |  |
| SLFROR10 | Open lock by keypad - correct phone - password not input | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port | \_ Press “2” button on keypad | \_ Menu keypad unlock screen appeared on LCD | Pass |  |
| \_ Press “1” button on keypad | \_ Change to unlock using keypad screen | Pass |  |
| \_ Press “2” button on keypad | \_ Change to enter phone number screen | Pass |  |
| \_ Press “1” button on keypad | \_ Select input phone line | Pass |  |
| \_ Enter “0903060593” using keypad | \_ Phone number = "0903060593" | Pass |  |
| \_ Press “A” button on keypad | \_ System show error message “Vui lòng điền thông tin” | Pass |  |
| SLFROR11 | Open lock by facial - home member face | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port | \_ Press “1” button on keypad | \_ Menu Facial unlock screen appeared on LCD | Pass |  |
| \_ User stand in front of the camera | \_ System compare user face with database successfully | Pass |  |
|  | \_ System show error message “Vui lòng điền thông tin” | Pass |  |
| SLFROR12 | Open lock by facial - Guess face | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port | \_ Press “1” button on keypad | \_ Menu Facial unlock screen appeared on LCD | Pass |  |
| \_ Guess stand in front of the camera | \_ System compare user face with database unsuccessfully - system show error message “Not regconize” | Pass |  |
|  | \_ Lock is not opened | Pass |  |
| SLFROR13 | Open lock by facial - Using facial photo of home member | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port | \_ Press “1” button on keypad | \_ Menu Facial unlock screen appeared on LCD | Pass |  |
| \_Hold the home-member's facial photo in front of the camera | \_ System compare user face with database unsuccessfully - system show error message “Đây không phải là một khuôn mặt thật” | Fail |  |
|  | \_ Lock is not opened | Fail |  |
| SLFROR14 | User management | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port \_Login as home-owner | \_ Press “3” button on keypad | \_Change to System menu | Pass |  |
| \_ Press “2” button on keypad | \_ Change to management menu | Pass |  |
| \_ Press “1” button on keypad | \_ Change to user management screen with user table in right side | Pass |  |
| SLFROR15 | User management - add phone | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port \_Login as home-owner | \_ Press “3” button on keypad | \_Change to System menu | Pass |  |
| \_ Press “2” button on keypad | \_ Change to management menu | Pass |  |
| \_ Press “1” button on keypad | \_ Change to user management screen | Pass |  |
| \_ Press “1” button on keypad | \_ Change to add user screen | Pass |  |
| \_ Press “1” button on keypad | \_ Select phone line | Pass |  |
| \_ Enter phone = “0945246345” using keypad | \_ Phone = 0945246345 | Pass |  |
| \_ Press “\*” button on keypad | \_ Back to none select line | Pass |  |
| \_ Press “2” button on keypad | \_ Select role line | Pass |  |
| \_ Choosing “Home owner” role using “1” or “2” button | \_ “Home owner” selected | Pass |  |
| \_ Press “\*” button on keypad | \_ Back to none select line | Pass |  |
| \_ Press “3” button on keypad | \_ Select Password line | Pass |  |
| \_ Enter user's password = “123456” using number on keypad | \_ Password = “123456” | Pass |  |
| \_ Press “\*” button on keypad | \_ Back to none select line | Pass |  |
| \_ Press “A” button on keypad | \_ User “0945246345” added,back to user management screen and new phone will be added with column isNew = 1 | Pass |  |
| SLFROR15 | User management - modify user | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port \_Login as home-owner | \_ Press “3” button on keypad | \_Change to System menu | Pass |  |
| \_ Press “2” button on keypad | \_ Change to management menu | Pass |  |
| \_ Press “1” button on keypad | \_ Change to user management screen with user table in right side | Pass |  |
| \_ Select “dthk” user to modify using “D” and “C” button | \_ "dthk" in selected | Pass |  |
| \_ Press “2” button on keypad | \_ Change to “dthk” 's user modify screen | Pass |  |
| \_ Press “1” button on keypad | \_ Select phone line | Pass |  |
| \_ Enter phone = “0908070600” using keypad | \_ Phone = 0908070600 | Pass |  |
| \_ Press “\*” button on keypad | \_ Back to none select line | Pass |  |
| \_ Press “2” button on keypad | \_ Select role line | Pass |  |
| \_ Choosing "Memer” role using “1” or “2” button | \_ “Member” selected | Pass |  |
| \_ Press “\*” button on keypad | \_ Back to none select line | Pass |  |
| \_ Press “3” button on keypad | \_ Select Password line | Pass |  |
| \_ Enter user's password = “111111” using number on keypad | \_ Password = “111111” | Pass |  |
| \_ Press “\*” button on keypad | \_ Back to none select line | Pass |  |
| \_ Press “4” button on keypad | \_ Select block line | Pass |  |
| \_ Choosing “block” role using “1” or “2” button | \_ “Block” selected | Pass |  |
| \_ Press “A” button on keypad | \_ User modified successfully, system will back to user management screen and user's info will be changed | Pass |  |
| SLFROR16 | User management - remove user | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port \_Login as home-owner | \_ Press “3” button on keypad | \_Change to System menu | Pass |  |
| \_ Press “2” button on keypad | \_ Change to management menu | Pass |  |
| \_ Press “1” button on keypad | \_ Change to user management screen with user table in right side | Pass |  |
| \_ Select "0908070600" line using “D” and “C” button | \_ "0908070600" in selected | Pass |  |
| \_ Press “3” button on keypad | \_ Confirm dialog will be shown | Pass |  |
| \_ Press “A” button on keypad | \_ User removed sucessfully, system will back to user management screen and user “0908070600” will be removed | Pass |  |
| SLFROR17 | Face management | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port \_Login as home-owner | \_ Press “3” button on keypad | \_Change to System menu | Pass |  |
| \_ Press “2” button on keypad | \_ Change to management menu | Pass |  |
| \_ Press “2” button on keypad | \_ Change to facial management screen with user table in right side | Pass |  |
| SLFROR18 | Face management - add face | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port \_Login as home-owner | \_ Press “\*” button on keypad | \_ Menu screen appeared on LCD | Pass |  |
| \_ Press “2” button on keypad | \_ Change to management menu | Pass |  |
| \_ Press “2” button on keypad | \_ Change to facial management screen with user table in right side | Pass |  |
| \_ Press “2” button on keypad | \_ Change to add face screen | Pass |  |
| \_ Select user name = "0945246345" using “C” and “D” button and press “A” button to confirm selection | \_ User = "0945246345" | Pass |  |
| \_ Press “1” button on keypad | \_ User's face is captured successfully | Pass |  |
| SLFROR19 | Face management - remove face | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port \_Login as home-owner | \_ Press “3” button on keypad | \_Change to System menu | Pass |  |
| \_ Press “2” button on keypad | \_ Change to management menu | Pass |  |
| \_ Select user name = "0945246345" using “C” and “D” button and press “A” button to confirm selection | \_ User = "0945246345" is selected | Pass |  |
| \_ Press “2” button on keypad | \_ Confirm dialog will be shown | Pass |  |
| Press “A” button to confirm selection | \_ User = "0945246345" facial data is deleted | Pass |  |
| SLFROR20 | Lock system management | Raspberry is connected to: - GSM SIM900 using UART PORT - Solenoid lock using GPIO PORT - KEYPAD using GPIO PORT - CAMERA using GPIO PORT \_ LCD using HDMI port \_Login as home-owner \_ User is on System management mode | \_ Press “B” button on keypad | \_ Back to main menu | Pass |  |
| \_ Press “B” button on keypad | \_ Turn of the system management | Pass |  |