



Faculty of Computer Science and Information Technology

**An Android-Based UNIMAS Clinic Appointment Mobile  
Application for UNIMAS Students**

**TAY ZHI HAO**

Bachelor of Computer Science with Honours  
(Computational Science)

2019

UNIVERSITI MALAYSIA SARAWAK

THESIS STATUS ENDORSEMENT FORM

TITLE AN ANDROID-BASED UNIMAS CLINIC APPOINTMENT MOBILE APPLICATION FOR UNIMAS STUDENTS

ACADEMIC SESSION: 2018 / 2019

(CAPITAL LETTERS)

hereby agree that this Thesis\* shall be kept at the Centre for Academic Information Services, Universiti Malaysia Sarawak, subject to the following terms and conditions:

- 1. The Thesis is solely owned by Universiti Malaysia Sarawak
2. The Centre for Academic Information Services is given full rights to produce copies for educational purposes only
3. The Centre for Academic Information Services is given full rights to do digitization in order to develop local content database
4. The Centre for Academic Information Services is given full rights to produce copies of this Thesis as part of its exchange item program between Higher Learning Institutions [ or for the purpose of interlibrary loan between HLI ]
5. \*\* Please tick ( / )

- CONFIDENTIAL (Contains classified information bounded by the OFFICIAL SECRETS ACT 1972)
RESTRICTED (Contains restricted information as dictated by the body or organization where the research was conducted)
UNRESTRICTED

Validated by

(AUTHOR'S SIGNATURE)

(SUPERVISOR'S SIGNATURE)

Permanent Address

NO.6, JALAN PULAI 71, TAMAN PULAI UTAMA, 81300 SKUDAI, JOHOR

Date:

Date:

Note \* Thesis refers to PhD, Master, and Bachelor Degree
\*\* For Confidential or Restricted materials, please attach relevant documents from relevant organizations / authorities

**An Android-Based UNIMAS Clinic Appointment Mobile  
Application for UNIMAS Students**

TAY ZHI HAO

This project is submitted in partial fulfilment of the  
requirements for the degree of Bachelor of Computer  
Science with Honours

Faculty of Computer Science and information Technology  
UNIVERSITI MALAYSIA SARAWAK 2019

## DECLARATION

I hereby declare that this project is my original work. I do not copy from other students' work or from any other sources except where due reference or acknowledgement is not made explicitly in the text, nor has any part had been written for me by another person.

.....

(Tay Zhi Hao)

.....

Date

## **ACKNOWLEDGEMENT**

First and foremost, I would like to express my appreciation to my project supervisor, Dr Tiong Wei King for his valuable guidance, advice and encouragement throughout the process of doing this Final Year Project. Next, I sincerely appreciate my project examiner, Dr Wang Hui Hui for her valuable suggestion and assistance towards the progress of this Final Year Project. Besides that, I would like to thank Professor Dr Wang Yin Chai for providing us talks and lectures which guide us while doing this project. I would also like to thank our admin from UNIMAS Health Centre, Nur Nazieha Abdullah for providing valuable opinions for me to develop the mobile application for this project. Last but not least, I would like to take this opportunity to thank all my friends who had shared their knowledge, opinion and valuable recommendation for this project.

## **ABSTRACT**

*Universiti Malaysia Sarawak (UNIMAS) currently has approximate 15000 students studying in the campus. UNIMAS Health Centre is the only clinic available for students. Students need to wait for a long time to visit doctor during the peak hour. The main objective of this project is to develop an Android-based mobile application for UNIMAS students to book their medical appointment for visiting doctor that can provide priority appointment reservation for our UNIMAS students during their registration process. Agile methodology will be used in this project for development purpose. The significance of this proposed project is able to provide a platform that allow UNIMAS students to book their medical appointment without going to UNIMAS Health Centre. It also will detect student information automatically since students need to log in with their UNIMAS Now account.*

## **ABSTRAK**

Universiti Malaysia Sarawak (UNIMAS) kini mempunyai seramai 15,000 pelajar sedang belajar di kampus. Pusat Kesihatan UNIMAS adalah satu-satunya klinik yang disediakan untuk pelajar. Pelajar perlu menunggu lama untuk melawat doktor semasa waktu puncak. Objektif utama projek ini adalah untuk membangunkan aplikasi mudah alih berasaskan Android untuk pelajar UNIMAS bagi menempah pelantikan perubatan mereka untuk melawat doktor dan mendapat tempahan pelantikan keutamaan untuk pelajar UNIMAS kami semasa proses pendaftaran mereka. Metodologi Agile akan digunakan dalam projek ini untuk tujuan pembangunan aplikasi ini. Kepentingan projek yang dicadangkan ini dapat menyediakan platform yang memudahkan para pelajar UNIMAS menempah pelantikan perubatan mereka tanpa pergi ke Pusat Kesihatan UNIMAS. Aplikasi ini juga akan mengesan maklumat pelajar secara automatik kerana pelajar perlu log masuk dengan akaun UNIMAS Now mereka.

## TABLE OF CONTENTS

<b>ACKNOWLEDGEMENT .....</b>	<b>i</b>
<b>ABSTRACT .....</b>	<b>ii</b>
<b>ABSTRAK.....</b>	<b>iii</b>
<b>TABLE OF CONTENTS.....</b>	<b>iv</b>
<b>LIST OF FIGURES .....</b>	<b>vi</b>
<b>LIST OF TABLES .....</b>	<b>ix</b>
<b>CHAPTER 1 INTRODUCTION .....</b>	<b>1</b>
1.1 Introduction .....	1
1.2 Problem Statement.....	1
1.3 Objectives .....	2
1.4 Methodology.....	2
1.4.1 Planning.....	3
1.4.2 Requirement Analysis .....	3
1.4.3 User Interface Design.....	4
1.4.4 Implementation and Testing.....	4
1.4.5 Evaluation and Quality Analysis.....	4
1.4.6 Final Deployment.....	4
1.5 Scope .....	5
1.6 Significance of Project.....	5
1.7 Project Outline.....	6
<b>CHAPTER 2 LITERATURE REVIEW .....</b>	<b>8</b>
2.1 Introduction .....	8
2.2 Review Existing Mobile Application .....	8
2.2.1 Medanta eCLINIC.....	9
2.2.2 Physio Plus Clinic .....	13
2.2.3 Mayo Clinic.....	17
2.3 Comparison of Features and Functions in Similar Mobile Application.....	21
2.4 Review on Tools and Technologies Used .....	23
2.4.1 Android Studio .....	23
2.4.2 Java Development Kit (JDK).....	23
2.4.3 Android Software Development Kit (SDK).....	24
2.4.4 Firebase .....	24
2.4.5 Android Asset Studio .....	24
2.4.6 Balsamiq.....	25
2.5 Summary.....	25
<b>CHAPTER 3 REQUIREMENT ANALYSIS AND DESIGN .....</b>	<b>26</b>
3.1 Introduction .....	26
3.2 Agile Methodology.....	26
3.3 Planning .....	27
3.4 Requirement Analysis.....	28
3.4.1 Analysis of Current Method.....	28
3.4.2 Analysis of Proposed Mobile Application .....	29



3.4.3	Questionnaire .....	29
3.4.4	Interview.....	35
3.4.5	Functional Requirement .....	35
3.4.6	Non-functional Requirement.....	36
3.4.7	Software Requirement.....	36
3.4.8	Hardware Requirement .....	36
3.5	User Interface Design .....	37
3.5.1	Unified Modeling Language .....	37
3.5.2	Use Case Diagram.....	38
3.5.3	Use Case Description .....	39
3.5.4	Activity Diagram.....	46
3.5.5	Sequence Diagram.....	48
3.5.6	Class Diagram .....	50
3.5.7	User Interface .....	51
3.5.8	User Side Interface .....	52
3.5.9	Admin Side Interface .....	57
3.6	Implementation and Testing .....	60
3.7	Evaluation and Quality Analysis .....	60
3.8	Final Deployment .....	61
3.9	Summary.....	61
<b>CHAPTER 4 IMPLEMENTATION AND TESTING.....</b>		<b>62</b>
4.1	Introduction .....	62
4.2	Environment Configuration.....	62
4.2.1	Android Studio .....	62
4.2.2	Firebase Console .....	65
4.2.3	Phone Settings and Emulator Setup .....	67
4.3	Functions and Layouts Implementation .....	68
4.3.1	Android Manifest Setup .....	68
4.3.2	Booking Functions and Layouts.....	69
4.3.3	Other Functions and Layouts .....	74
4.4	Testing .....	79
4.4.1	Functional Testing.....	80
4.4.2	Non-Functional Testing.....	84
4.5	Summary.....	87
<b>CHAPTER 5 CONCLUSION AND FUTURE WORK.....</b>		<b>88</b>
5.1	Introduction .....	88
5.2	Objective Achievement .....	88
5.3	Project Limitation .....	88
5.4	Future Work.....	89
5.5	Conclusion.....	89
<b>REFERENCES.....</b>		<b>90</b>
<b>APPENDIX .....</b>		<b>91</b>
Appendix A: Questionnaire.....		91
Appendix B: Interview Questions and Answers .....		93
Appendix C: User Satisfaction Form .....		96

## LIST OF FIGURES

Figure 1.1: Agile Methodology .....	3
Figure 2.1: Landing Page for Login .....	10
Figure 2.2: Finding Doctor Page .....	10
Figure 2.3: Connecting Family Member Page .....	10
Figure 2.4: Appointment Details Page .....	11
Figure 2.5: Drawer Page.....	11
Figure 2.6: Patient Registration Page .....	14
Figure 2.7: Main Page .....	14
Figure 2.8: Booking Appointment Page.....	14
Figure 2.9: Drawer Page.....	15
Figure 2.10: Editing Appointment Page.....	15
Figure 2.11: Main Page .....	18
Figure 2.12: Search Page.....	18
Figure 2.13: Sign in Page .....	18
Figure 2.14: Request Appointment Page.....	19
Figure 2.15: Customization Page .....	19
Figure 3.1: Agile Methodology .....	27
Figure 3.2: Students been to UNIMAS Health Centre .....	30
Figure 3.3: Number of times per semester Students been to UNIMAS Health Centre.....	30
Figure 3.4: Time usually Students visiting doctor .....	31
Figure 3.5: Time taken for Students waiting for visiting doctor .....	31
Figure 3.6: Ratio of Students concerning about diagnosis report .....	32
Figure 3.7: Ratio of Students concerning about health advices and clinic activities .....	32
Figure 3.8: Ratio of Students wish to have a booking appointment mobile application.....	33
Figure 3.9: Features suggested against number of Students .....	34
Figure 3.10: Use Case Diagram .....	38
Figure 3.11: Activity Diagram for Admin .....	46
Figure 3.12: Activity Diagram for Students .....	47
Figure 3.13: Sequence Diagram for Admin .....	48
Figure 3.14: Sequence Diagram for Students.....	49
Figure 3.15: Class Diagram.....	50
Figure 3.16: Landing Page .....	51
Figure 3.17: Login Page .....	51
Figure 3.18: Latest Information Page.....	52
Figure 3.19: Booking Appointment Page.....	52
Figure 3.20: User Profile Page .....	53
Figure 3.21: Clinic Information Page.....	53
Figure 3.22: New Appointment Page .....	54
Figure 3.23: Blocking Alert Pop-up .....	54
Figure 3.24: Upcoming Appointment Page.....	55
Figure 3.25: Pass Appointment Page .....	55
Figure 3.26: Approved Pop-up.....	56

Figure 3.27: Notification Page .....	56
Figure 3.28: Add Information Page.....	57
Figure 3.29: Approving or Rejecting Page.....	57
Figure 3.30: Admin Appointment Page .....	58
Figure 3.31: Appointment List Page .....	58
Figure 3.32: Doctor List Page .....	59
Figure 3.33: Admin Panel Page.....	59
Figure 4.1: Android Studio Version 2.3.3 .....	63
Figure 4.2: Minimum SDK API 21 Android 5.0 (Lollipop) .....	63
Figure 4.3: Gradle Build for Project.....	64
Figure 4.4: Firebase Console.....	65
Figure 4.5: Root Level of Android App .....	65
Figure 4.6: App Level Gradle File of Android App.....	65
Figure 4.7: Gradle Dependency Line .....	66
Figure 4.8: Firebase Database Structure .....	66
Figure 4.9: Deployment Target Selection .....	67
Figure 4.10: Developer Options in Phone System Setting.....	67
Figure 4.11: User Permission .....	68
Figure 4.12: Landing Activity .....	68
Figure 4.13: Firebase Messaging Service .....	69
Figure 4.14: Booking Activity .....	69
Figure 4.15: New Booking Activity .....	69
Figure 4.16: Choose Appointment Date.....	70
Figure 4.17: Choose Appointment Time.....	70
Figure 4.18: Date Picker Codes.....	70
Figure 4.19: Time Picker Code .....	71
Figure 4.20: Full Details.....	71
Figure 4.21: Slot Full .....	71
Figure 4.22: Confirm and Save Appointment Details.....	72
Figure 4.23: Checking Availability .....	73
Figure 4.24: Login Activity.....	74
Figure 4.25: User Details Drawer .....	74
Figure 4.26: No Internet Connection.....	75
Figure 4.27: No Matched Information .....	75
Figure 4.28: Network Connection Alert Dialog.....	75
Figure 4.29: Checking Network Status .....	76
Figure 4.30: Search Function .....	76
Figure 4.31: Appointment Activity .....	77
Figure 4.32: Notification Received .....	77
Figure 4.33: Approve Appointment .....	78
Figure 4.34: Reject Appointment.....	78
Figure 4.35: Send Notification .....	79
Figure 4.36: Question 1 of User Satisfaction Form .....	84
Figure 4.37: Question 2 of User Satisfaction Form .....	85
Figure 4.38: Question 3 of User Satisfaction Form .....	85

Figure 4.39: Question 4 of User Satisfaction Form .....	86
Figure 4.40: Question 5 of User Satisfaction Form .....	86
Figure 4.41: Question 6 of User Satisfaction Form .....	87

## LIST OF TABLES

Table 2.1: Comparison of Proposed Mobile Application and Existing Mobile Applications .	21
Table 3.1: Software Requirements .....	36
Table 3.2: Hardware Requirements.....	36
Table 3.3: Book New Appointment .....	39
Table 3.4: Receive Patient Sequence .....	39
Table 3.5: View Information and Clinic Activities.....	40
Table 3.6: View Upcoming Appointment and Historical Records .....	40
Table 3.7: View Clinic Information .....	41
Table 3.8: Receive Notification .....	41
Table 3.9: View User Profile.....	42
Table 3.10: Add or Edit Information and Clinic Activities.....	42
Table 3.11: Add or Edit Doctor Details .....	43
Table 3.12: View Admin Panel.....	43
Table 3.13: View Appointment List.....	44
Table 3.14: Approve or Reject Appointment .....	44
Table 3.15: View Appointment Details.....	45
Table 4.1: Sign in and Sign out by User .....	80
Table 4.2: Book Appointment with Selected Date and Time .....	80
Table 4.3: Receive Notification about Appointment Status.....	81
Table 4.4: View List of Information and Activities .....	81
Table 4.5: Receive Patient Sequence .....	81
Table 4.6: View Upcoming Appointments and Historical Records.....	82
Table 4.7: View Clinic Information, Doctor Details and User Profile .....	82
Table 4.8: Sign in and Sign out by Admin .....	82
Table 4.9: Approve or Reject Appointment Made by Users.....	83
Table 4.10: Add, Edit and Remove Information and Activities.....	83
Table 4.11: Add, Edit and Remove Doctor's Detail .....	83

## **CHAPTER 1 INTRODUCTION**

### **1.1 Introduction**

UNIMAS Clinic Appointment Apps is an Android-based mobile application that is developed for the convenience of our UNIMAS students to book their medical appointment with the doctor at UNIMAS Health Centre. From the previous experience, students always need to come early to the clinic and register themselves manually for a medical appointment and wait until their name to be called. A lot of time will be wasted during the waiting time. By using this apps, students can provide their reason and personal details, followed by choosing a suitable slot of time which is available to them. Students manage to choose their suitable time instead of spending their time to keep waiting at the clinic. Besides that, students can make a medical appointment anywhere at any time. The admin of UNIMAS Health Centre does not need to arrange the appointment manually but only responsible for calling the patient's name according to the patient list generated by the database after students had registered themselves at the reception counter of UNIMAS Health Centre.

### **1.2 Problem Statement**

UNIMAS students are normally very busy with their college activities, projects and assignments. They are facing lack of time to go to UNIMAS Health Centre making an appointment manually to have a medical treatment. UNIMAS Health Centre uses the first come first serve basis to arrange the order of patients. Therefore, UNIMAS students need to go to UNIMAS Health Centre in early morning to register for an appointment. They must wait until their name to be called and this causes a lot of time has been wasted during the waiting process.

### **1.3 Objectives**

The objectives of this project are:

- i. To develop an Android-based mobile application for UNIMAS students to book their medical appointment for visiting doctor that can provide priority appointment reservation for our UNIMAS students during their registration process.
- ii. To evaluate the usability of the proposed mobile application.

### **1.4 Methodology**

Figure 1.1 below shows the phases of agile methodology. Agile Methodology is the best methodology that is suitable to use for developing Android apps. It is a quick and iterative method because the tasks can be divided into short phases of work, frequent assessment and adaptation to plans. Android apps normally have shorter development life cycles, frequent changing demands or scopes, frequent updates, and ability to quickly download. It is more flexible and adaptive to create an apps that is seamless, quick, small and easy to work upon (Kaur, A., 2016). The testing process of Android apps will happen simultaneously as its developing process. Changes can be made easily since this approach is being used.

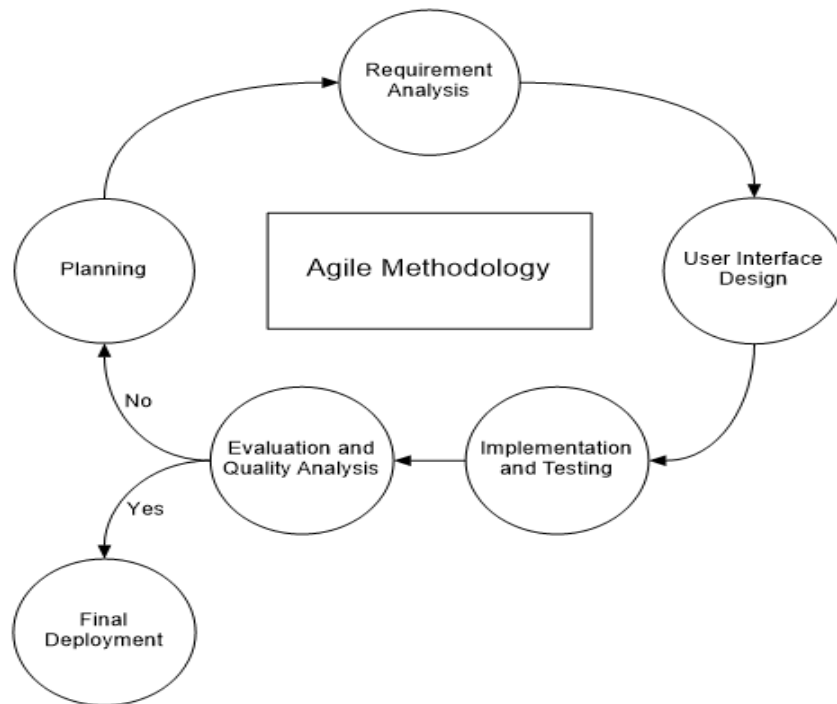


Figure 1.1: Agile Methodology

### 1.4.1 Planning

This phase is used to plan the project title and prepare some draft ideas for the project. An idea must be confirmed. Some literature reviews should be done on some similar mobile applications that are available on today's market to collect information.

### 1.4.2 Requirement Analysis

Doing requirement analysis to identify which techniques should be used in the project and what should be done in the project. Further explain about the methodology used for developing the proposed mobile application.



### **1.4.3 User Interface Design**

Drawing a series of diagram to represent the flow of proposed mobile application. Design a rough user interface as a layout guideline to be followed when development is in the process.

### **1.4.4 Implementation and Testing**

Using the techniques and tools that is suitable such as Android Studio and Firebase to implement the coding of the mobile application. Design the layout of the mobile application. Do some testing and prepare the testing result.

### **1.4.5 Evaluation and Quality Analysis**

Release the beta version of the mobile application to users and testers to collect their feedbacks for further improvement. Find bugs that exist in the proposed mobile application and then solve them. Improve the efficiency of the mobile application by simplifying unnecessary codes.

### **1.4.6 Final Deployment**

The final version of mobile application is released in this stage. Deploy the mobile application and present to supervisor, examiner and others.

## **1.5 Scope**

The target user of this apps will be UNIMAS students and the admin of UNIMAS Health Centre. This apps aims to create a platform for UNIMAS students to book a medical appointment wherever they are. Students can base on their time slot selected to go to UNIMAS Health Centre without waiting there all the time.

## **1.6 Significance of Project**

These are the significance of the project:

- i. This apps provides a platform that allow UNIMAS students to book their medical appointment without going to UNIMAS Health Centre.
- ii. This apps provides convenience to students who had booked their medical appointment by using the proposed mobile application to have priority to visit doctor when they register themselves at the clinic reception counter.
- iii. This apps can detect student information automatically since students need to log in with their UNIMAS Now account.
- iv. This apps can allow students to view the list of doctors and their information.
- v. The apps can generate patient sequence for students after their appointment made has been approved by doctor.
- vi. This apps only allows students to book their medical appointment at least one day before their appointment date.
- vii. This apps can inform students about the status of their appointment made via notification.
- viii. This apps will block students from continue booking new medical appointment if the appointment slot on that day has reached its limit.

## **1.7 Project Outline**

This project consists of these following chapters:

### Chapter 2: Literature Review

This chapter is about reviewing existing mobile application that is available on today market. Three similar clinic appointment mobile applications will be downloaded from the Google Play store for reviewing purpose. Background of the selected mobile application, its features and its advantages and disadvantages will be recorded and compared to find out their similarity and differences. Besides that, review on tools and technology used will also be included in this chapter.

### Chapter 3: Requirement Analysis and Design

This chapter will explain further about the requirement analysis of agile methodology for this project. Both analyses for current method and proposed method which is the mobile application should be done. Both data of questionnaire and interview should be collected and prepare a graph to simplify those data. Both functional and non-functional requirement for the proposed mobile application should be stated clearly. Use case diagram and activity diagram should be prepared. A basic interface should be designed for the proposed mobile application in this chapter.

#### Chapter 4: Implementation and Testing

This chapter will start the implementation of the proposed mobile application which is the coding part. Using the techniques and tools that is suitable such as Android Studio and Firebase to implement the coding of the proposed mobile application and set up a proper database for it. Design an attractive user interface of the proposed mobile application. Testing should be done and the testing result should be recorded in this chapter. Bugs found in the proposed mobile application should be fixed before the presentation.

#### Chapter 5: Conclusion and Future Work

This chapter will include the conclusion of the project and the lesson learned from doing this project. The parts that can have further improvement in the future work are recorded down to improve the quality of the proposed mobile application.

## **CHAPTER 2 LITERATURE REVIEW**

### **2.1 Introduction**

Most of the clinic and hospital in Malaysia or oversea countries had developed their own mobile application platform. Since almost everyone of us in this modern era has our electronic gadget such as smartphone or tablet. Having a mobile application will ease the patient in arranging their time and scheduling their medical appointment with the doctor. The features and functions developed in these mobile applications are mostly based on the needs of the local user and fulfilling their requirements. Since these mobile applications developed are more advanced and require more resources, the development fee will be very expensive and this is not suitable to be used in this project. The mobile application that will be developed is to meet UNIMAS students' requirement and basic needs of UNIMAS Health Centre. In this chapter, the features and functions of the existing mobile applications will be identified and having a fully comparison with the proposed mobile application.

### **2.2 Review Existing Mobile Application**

There are three existing mobile applications that had been downloaded from Google Play Store. These mobile applications will be used to compare with the proposed mobile application based on their features and functions. The following are the name of these three mobile applications.

- Medanta eCLINIC
- Physio Plus Clinic
- Mayo Clinic

## **2.2.1 Medanta eCLINIC**

### **Background of the mobile application**

Medanta eCLINIC was developed in 2018 that allows users to virtually consult their doctor via the mobile application, book a hospital appointment and access his or her own medical records. Users can search for Medanta doctors by specialty, treatment or disease, or let the mobile application recommends a relevant doctor to the users based on their requirement. Besides that, users can view their previous health records. Users manage to link their family members with their own account to book an appointment for them or even access their health records via this mobile application. This mobile application registers users and creates their Unique Hospital Identification Digit (UHID) for the first visit which allow them to skip the registration queue for consultation.

### **Features and Functions of the mobile application**

There are a lot of features and functions found in this mobile application. Figure 2.1 shows that users can activate this apps by using their patient identity (ID) if they are the existing Medanta patient. This apps includes login function for users to use the mobile application but it separates first time users and repeat users at the login page. Figure 2.2 shows that this apps can assist users to help them finding a suitable doctor to book a medical appointment. User can choose doctors according to their illness, treatment needed and speciality. This apps also arranges doctors by specialty, treatment and disease.

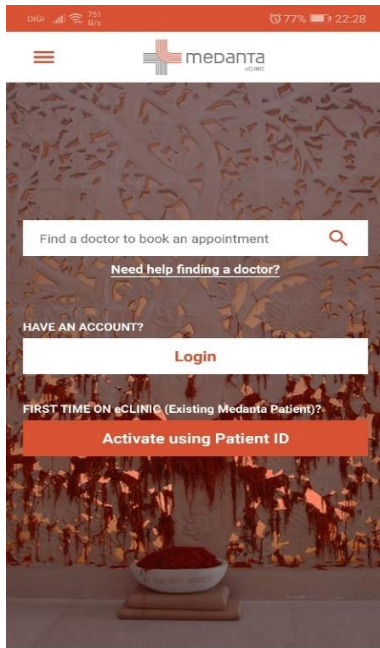


Figure 2.1: Landing Page for Login

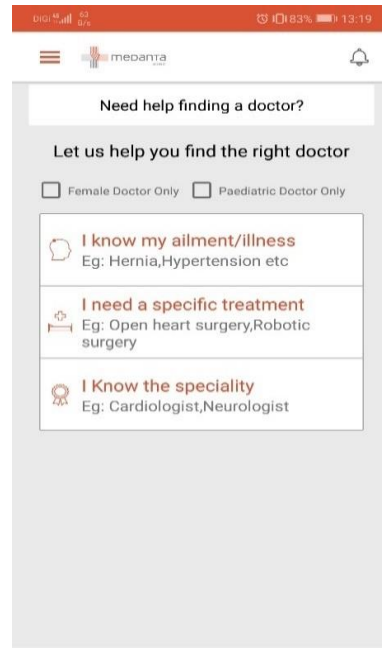


Figure 2.2: Finding Doctor Page

Users enable to book medical appointment for themselves or others because they can switch to family member's profile after connecting each other as shown in Figure 2.3.

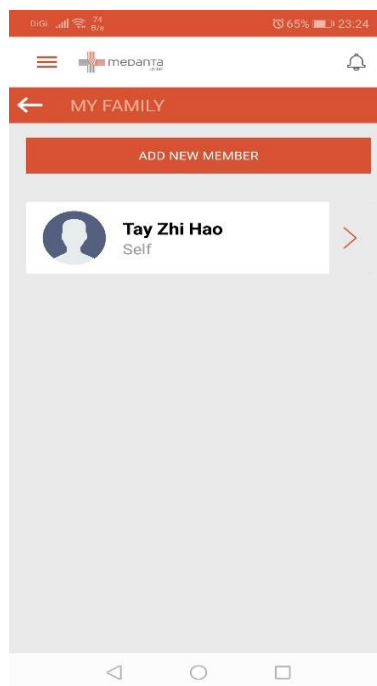


Figure 2.3: Connecting Family Member Page

Users enable to contact doctor via phone call, video call or in person as shown in Figure 2.4. A verification code will be sent to users' phone number after they had successfully booked an appointment. Users still can modify or cancel their appointment made before it is approved by the doctors. Besides that, this apps also contains click to call function for emergency. Figure 2.5 shows that users can view their appointment made and their medical reports. Users can view the latest notification at the home page. Users can view their payment and receipt via this apps. These functions also available inside the drawer of the apps.

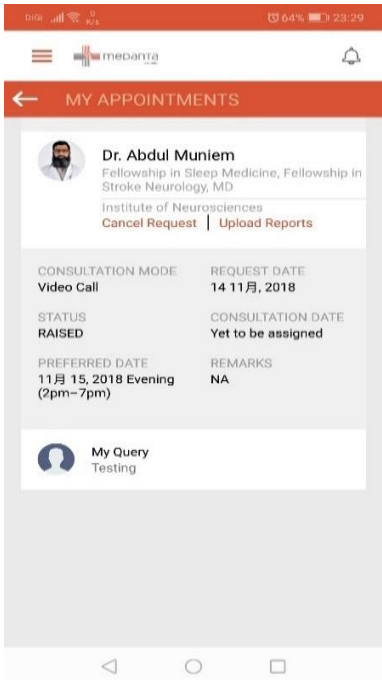


Figure 2.4: Appointment Details Page

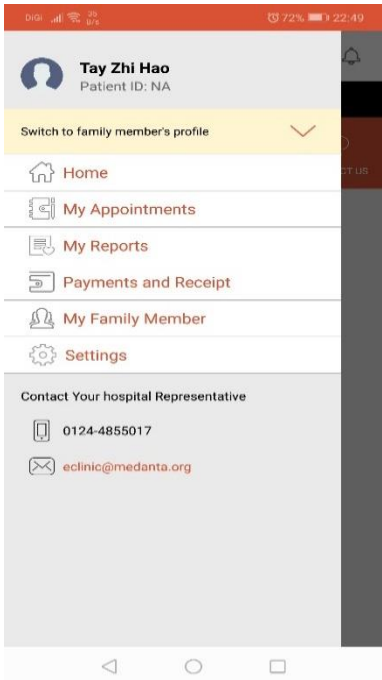


Figure 2.5: Drawer Page