Snap Assistant

(Wearable Smart Alzheimer's Assistant)

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ABSTRACT

The project aims at developing a System for people of Alzheimer's patients and their caregivers. Alzheimer's is a type of dementia that causes problems with memory, thinking and behavior. Symptoms usually develop slowly and get worse over time, becoming severe enough to interfere with daily tasks. Due to these conditions they become dependent on their loved ones to assist them in their daily activities.The Snap Assistant will help Alzheimer's patients in their daily routines, so that they can live more independent lives.

The idea is to develop a mobile application for caregivers which will allow them to initially set the schedule of their patients, monitor their location and set a safety zone for their patient. Through this application they will constantly receive notifications about patient's whereabouts and activities. In case of any anomalous behavior of the patient, such as skipping a meal, medicine and exercise, stepping out of his safety zone or removing watch from his wrist at an unusual time, caregiver will receive alerts. Patient's record and schedule will be stored on a web server where on the basis of pattern recognition (behavioral pattern), notifications will be send to both patient and the caregiver. A smartwatch will remain by the side of patient for 24 hours. An application will be installed on their smartwatch to notify and remind him when it is time to eat, take medicine or do exercise. This smart solution will provide a better standard of living to Alzheimer's patients under the careful eye of their caregivers.

CERTIFICATE FOR CORRECTNESS AND APPROVAL

Certified that work contained in the thesis – Snap Assistant – Wearable Smart Alzheimer Assistant carried out by Abeera Saeed, Namra Khurshid and Muhammad Arsalan Karamat in supervision of Asst. Prof Dr. Seemab Latif for partial fulfilment of Degree of Bachelor of Software Engineering is correct and approved.

Approved by

Asst. Prof Dr. Seemab Latif

DATED:

DECLARATION

No portion of the work presented in this dissertation has been submitted in

Support of another award or qualification either at this institution or elsewhere.

DEDICATION

In the name of Allah, the Most Merciful, the Most Beneficent

To our parents, without whose unflinching support and cooperation, a work of this

magnitude would not have been possible.

ACKNOWLEDGEMENTS

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INTRODUCTION

1.1 Overview

Alzheimer's is a type of dementia that causes problems with memory, thinking and behavior. Symptoms usually develop slowly and get worse over time, becoming severe enough to interfere with daily tasks. Due to these conditions they become dependent on their loved ones to assist them in their daily activities. The Snap Assistant will help Alzheimer's patients in their daily routines, so that they can live more independent lives.

The purpose of this project is to develop a smart watch application for Alzheimer's patients and a smart phone application for their caregivers. The goal is to make an application for Alzheimer's patients according to their needs to help them in their daily activities, so that they can live more independent lives. The hand held version of this application will be given to the caregivers and through that they will be able to monitor their routine. This application can also be used by elderly people facing memory loss issues.

1.2 Problem Statement

The purpose is to develop a system which will assist Alzheimer's patients with their routine tasks. We are developing a mobile application for caregivers, a smartwatch application for Alzheimer's patients and a server application for intelligent computation of data. Caregiver will be able to monitor patient's routine and track his location while patient will receive notification of his daily routine on smartwatch.

1.3 Approach

The main focus is to develop an intelligent system for Alzheimer's patients so that they can perform their routine tasks without depending on their caregivers for constant reminders. Snap Assistant will not only notify the patients when it is time for their food,

medicine or exercise but will also keep them safe by alerting their caregivers in case of any anomalous behavior in their schedule and daily travels.

1.4 Scope

The project aims at developing a System for people suffering of Alzheimer disease, a form of dementia. This system provides an intelligent solution to problems of Alzheimer's patients through a notification and alert system which will help patients in carrying out their daily tasks more independently and keep caregivers in the loop.The solution will be quintessential in improving the living standard of Alzheimer's patient by making their lives more independent and lessening the burden of their caregivers.

1.5 Aim &Objectives

The objectives of project include:

1. Using software engineering techniques for gathering requirements during the development process, designing the software, implementing and testing requirements gathered.
2. To learn Object oriented programming and SDLC
3. To learn Android application development
4. To learn web development
5. To learn database design and development
6. To learn data transfer via internet.

1.6 Organization

The first part of thesis is the abstract which describes the main details of Snap Assistant, followed by the introduction section which specifies the problem statement, approach, scope and objectives. The literature review section state the various resources read online before the commencement of the project. They include learning about Alzheimer disease and its stages. The design and development part illustrate the diagrams which describe the detailed design of the Snap Assistant,its components, interfaces and data necessary for the implementation phase. The analysis and evaluation part give details of the black box testing, unit testing and system integration testing; actual results against expected

results. The future work gives states the enhancements that can be applied to the application.

1.7 Deliverables

Table 2-1 : Deliverables

Deliverable Name	Deliverable Summary Description
Software Requirements Specification(SRS) Document	Complete Description of **what** the system will do, who will use it. Detailed description of functional and non-functional requirements and the system features.
Design Document	Complete description of **how** the system will be implemented i.e. the detailed design.
Code	Complete code with the API.
Testing Document	The whole system is tested according to the specification described in the SRS document. Black box, unit and System integration testing is done.
Complete System	Complete working system.

CHAPTER: 02

LITERATURE REVIEW

2 Literature Review

Alzheimer's is the most common form of dementia, a general term for memory loss and other cognitive abilities serious enough to interfere with daily life.

2.1 Stages

2.1.1 Stage 1: No Impairment

During this stage, Alzheimer's disease is not detectable and no memory problems or other symptoms of dementia are evident.

2.1.2 Stage 2: Very Mild Decline

The senior may notice minor memory problems or lose things around the house, although not to the point where the memory loss can easily be distinguished from normal age related memory loss. The person will still do well on memory tests and the disease is unlikely to be detected by physicians or loved ones.

2.1.3 Stage 3: Mild Decline

At this stage, the friends and family members of the senior may begin to notice memory and cognitive problems. Performance on memory and cognitive tests are affected and physicians will be able to detect impaired cognitive function.Patients in stage 3 will have difficulty in many areas including:

1. Finding the right word during conversations
2. Remembering names of new acquaintances
3. Planning and organizing
4. People with stage three Alzheimer's may also frequently lose personal possessions, including valuables.

2.1.4 Stage 4: Moderate Decline

In stage four of Alzheimer's disease clear cut symptoms of Alzheimer's disease are apparent. Patients with stage four Alzheimer's disease:

1. Have difficulty with simple arithmetic
2. May forget details about their life histories
3. Have poor short term memory (may not recall what they ate for breakfast, for example)
4. Inability to manage finance and pay bills

2.1.5 Stage 5: Moderately Severe Decline

During the fifth stage of Alzheimer's, patients begin to need help with many day to day activities. People in stage five of the disease may experience:

1. Significant confusion
2. Inability to recall simple details about themselves such as their own phone number
3. Difficulty dressing appropriately
4. On the other hand, patients in stage five maintain a modicum of functionality. They typically can still bathe and toilet independently. They also usually still know their family members and some detail about their personal histories, especially their childhood and youth.

2.1.6 Stage 6: Severe Decline

Patients with the sixth stage of Alzheimer's disease need constant supervision and frequently require professional care. Symptoms include:

1. Confusion or unawareness of environment and surroundings
2. Major personality changes and potential behavior problems
3. The need for assistance with activities of daily living such as toileting and bathing
4. Inability to recognize faces except closest friends and relatives
5. Inability to remember most details of personal history
6. Loss of bowel and bladder control

7. Wandering

2.1.7 Stages 7: Very Severe Decline

Stage seven is the final stage of Alzheimer's disease. Because Alzheimer's disease is a terminal illness, patients in stage seven are nearing death. In stage seven of the disease, patients lose ability to respond to their environment or communicate. While they may still be able to utter words and phrases, they have no insight into their condition and need assistance with all activities of daily living. In the final stages of the illness, patients may lose their ability to swallow.

2.2 Statistics

It is estimated that 2,000,000 people in Pakistan are suffering from memory loss.

THE NEWS

It is estimated that 2.3 million people are affected by Alzheimer's disease in Pakistan and this may swell to 11.5 million by 2033, experts said at a program on the eve of World Mental Health Day.

DAWN NEWS

"Alzheimer's is a currently incurable, debilitating and emotionally devastating disease of the brain," he said. "If no new medical breakthrough is made, it is projected that almost 135 million people in the world will have it by 2050 and millions of families and friends will feel its overwhelming impact."
Reported by Dr. Shahid Mustafa

THE NEWS

2.3 Related Work

A lot of work has been done for Alzheimer's patients to provide them assistance in their daily routine. Few of the applications currently available in market are mentioned below with their brief description.

Guard2me (A smartwatch for Alzheimer's patient)

It is ideal for keeping your loved one safe in the event of an emergency. Using the Smart Phone App you can locate them on Google Maps and get directions to them from your current location. The website and Smart Phone App will allow you to set a Safe Zone, if they wander outside the Safe Zone you will be alerted by text message.

Clevercare (A smartwatch for Alzheimer's patient)

It gives peace of mind to caregivers, while empowering people to regain their independence and stay safe at all times. Using a standalone, mobile and GPS enabled smart watch, Clevercare connects family members with each other and a 24/7 emergency response call center anywhere, anytime.

Alzheimer's Assistant (Mobile phone app)

The app offers caregivers advice on recognizing symptoms and on feeding, bathing and providing a healthy environment for the patient.

Memory Box (Mobile phone app)

Memory box is a smartphone application that aims to serve as a memory aid and a conversation inspiration to support relatives and caregivers of those suffering from Alzheimer's or other types of dementia. It contains visual, musical and written tips for conversations and memory support. The app contains information pieces about famous events, people, places and topics from the 20th century and you can also save your favorite memories in a scrapbook. Memory Box aims to simplify the daily interaction between caregivers, family members and healthcare professionals and persons living witha cognitive impairment.
Created by Swedish Care International and Forum for Elderly Care with the vision to contribute to a dementia friendly society.

Alzheimer's and Dementia (Mobile phone app)

The Alzheimer's & Dementia app has following features to offer:

Stay ahead with alerts when new issues are available and read Articles in Press throughout the month.

Experience innovative digital content with the newly introduced Article enhancements; featuring Audio Slides, Virtual Microscope, 3D Radiological Viewer, 3D Neuroimaging Viewer and more.

• Get access to the journal content on the app via your institution's IP

• Enjoy Open Access and Open Archive Content without having to login

• Accessibility support to assist the visually impaired

• Interact with figures, tables, and supplementary content

• Stream multimedia for faster viewing or download for later

• Take notes, highlight articles and share via email and social media

• Personalize your experience with My Reading List and save articles for offline reading

CHAPTER:3

OVERALL DESCRIPTION

3 OVERALL DESCRIPTION

This part of the document contains information about the product, its features, perspective, users' characteristics and constraints.

3.1 Introduction

3.1.1 Purpose

The purpose of this chapter is to give the user a clear and precise description of the functionality of the Snap Assistant, a software system for Alzheimer's patients and their caregivers.

This chapter is aimed to eliminate ambiguities and misunderstandings that may exist. For the user, this chapter will explain all functions that the software should perform. For the developer, it will be a reference point during software design, implementation and maintenance.

This chapter encompasses the requirements for version-1 of Snap Assistant. The main purpose of the system is to develop a mobile application for caregivers, a smartwatch application for Alzheimer's patients and a server application for intelligent computation of data. Caregiver will be able to monitor patient's routine and track his location while patient will receive notification of his daily routine on smartwatch.

3.1.2 Intended audience

Intended Audience includes:

Project supervisor:

It will help the supervisor to supervise the project and guide the team in a better way. This document will be used by her to check whether all the requirements have been understood and in the end whether the requirements have been properly implemented or not.

Developers:

Project developers have an advantage of quickly understanding the methodology adopted and personalizing the product.

Testers:

The testers of the system can check user requirements from this SRS and develop the test document accordingly.

UG Project Evaluation team:

It will help the evaluation team to evaluate the progress of FYP project. The document will provide the evaluators with the scope, requirements and details of the project to be built. It will also be used as basis for the evaluation of the implementation and final project.

Reading suggestions

All level 1 and level 2 headings are given in the table of contents, but the lower sub headings are not included. Each main heading is succeeded by a number of sub headings, which are all in bold format. The product overview is given at the start, succeeded by the complete detailed features, including both functional and non-functional requirements. The entire interfaces are also described. The chapter ends with appendices, including a glossary.

3.1.3 Product Scope

Table 3-1 Scope

For	People suffering from Alzheimer's disease and their caregivers. It is also beneficial for old people having memory loss problems.
What	A mobile application for caregivers to monitor their patient's routine and whereabouts. A smartwatch application for patients to assist them in their daily tasks and a server for intelligent computation of data and generating alerts.
The	Snap Assistant (Wearable smartwatch assistant)
Is	An android application
That	Provides assistance to Alzheimer's patients in their routine tasks and keep their caregivers informed.

The document only covers the requirement specifications for Snap Assistant. The Snap Assistant will help Alzheimer's patients in their daily routines, so that they can live more independent lives. A mobile application for caregivers will allow them to initially set the schedule of their patients. Through this application they will constantly receive notifications about patient's whereabouts and activities. Patient's record and schedule will be stored on a web server where on the basis of pattern recognition (behavioral pattern), notifications will be send to both patient and the caregiver. A smartwatch application installed on their smartwatch will be available for the patient which will notify him when it is time to eat, take medicine or do exercise. It will also assist the patient in navigation.

3.2 Overall Description

3.2.1 Product Perspective

Snap Assistant will basically help people suffering from Alzheimer's disease so that they can live more independent lives. It will prove to be a constant companion of the patients and will not only help them perform their day to day tasks but will also help the caregivers to keep track of their patient's whereabouts and activities.

3.2.2 Product Functions

Mobile Application:

- A mobile application for caregiver to initially set the schedule of the patient.

- Allowing caregiver to find patient's location at any time.

Smartwatch Application:

- Constantly tracking patient's location and sending its whereabouts to the caregiver.

- Generating alerts for the caregivers if patient removes the watch from his wrist.

Server Application:

- Using behavioral patterns to prioritize the tasks of the patient.

- Generating constant reminders regarding medication, food and exercise for the patient.

3.2.3 User Classes and Characteristics

The following section describes the types of users of the Snap Assistant. There are explanations of the user followed by the interactions the user(s) shall be able to make with the software.

Alzheimer's Patient

The patient will wear the smartwatch and will use the android wear application. This application will notify him when it is time to take medicine, eat food and do exercise. This application will constantly track patient's location and will send the information to the caregiver.

Caregiver

Caregiver will use the android mobile application and will initially set the schedule of the patient which will be stored on a web server. Caregiver will get notifications regarding patient's activities and location through this app.

Tester (occasional user)

The testers will use the product at the time of the penetration testing to check the flaws of the product.

Administrator (server maintenance)

Administrator will use this product for the overall control of the server and will provide its maintenance.

3.2.4   Operating Environment

3.2.4.1   Hardware

Snap Assistant operates, either directly or indirectly, with the following external hardware:

- **Smartwatch:** Alzheimer's patient will wear a smartwatch and use an android wear application installed on it.

- **Mobile phone:** Caregiver will have mobile phone and handheld application installed on it.

3.2.4.2 Software

- Android Studio.

3.2.5   Design and Implementation Constraints

Smartwatch will remain connected to the mobile phone if it is in its Bluetooth range or has an active Wi-Fi connection.

- Smartwatch will communicate over Wi-Fi.
- Password of Wi-Fi must have been entered once from mobile.
- Smartwatch will be compatible to mobile phone android version 4.3 and above.

- Watch application will be for round faced smartwatches.

- An active internet connection is required on phone.

- Smartwatches have limited processing memory

3.2.6 User Documentation

A user manual will be provided to the users in which separate instructions will be given according to the particular user i.e., patients, caregivers, developers and testers. It will include the details of the software's working. Help documents will also be a part of the system. The project report will also be available for the users which will highlight the software's features, working and procedures.

3.2.7 Assumptions and Dependencies

- User owns a compatible hardware device and compatible android version on phone and smartwatch.

- User should know how to use android applications and smartwatch wisely in order to avoid runtime errors.

- The customer knows the language (English) used in the user interface to perform actions.

3.3 External Interface Requirements

3.3.1 User Interfaces

- Popup notifications for the patients will be displayed on the middle of the watch screen.

- Popup notifications for the caregiver will be displayed on the top of the mobile screen.

- Patient location will be displayed on Google maps on caregiver's application.

3.3.2 Hardware Interfaces

- Smart watch must be paired with android phone.

- Speakers of watch will be used to get speech output.

- Heart rate and pulse data will be obtained from heart rate sensor.

- Location information will be obtained from GPS sensor.

3.3.3 Software Interfaces

- Smartphone application will be synchronized with mobile phone application.

- Mobile application will run on android version 4.3 and above.

- Smartwatch application will run on android version lollypop and above.

3.3.4 Communications Interfaces

- Data transfer between mobile and smartwatch will take place through Bluetooth or Wi-Fi internet.

- Data communication between the web server and mobile phone will be done through internet.

3.4 System Features

This section describes in detail the system features of the Snap Assistant. System features are interrelated but they are classified into following three modules:

Mobile Application:

1. Schedule input on Mobile application

Smart watch Application:

2. Notification popup and its response.

3. Tracking patient's location.

Server Application:

4. Patient's behavioral analysis and notification generation.

3.4.1 Mobile

3.4.1.1 Schedule Input on mobile application

Description

After logging into the application for the first time, caregiver will initially set the schedule of the patient including his medication, exercise and meal time. Caregiver will save this information and after that, data will automatically transfer to a web server.

Priority

Its priority will be high because if the caregiver will not initially set the schedule of the patient, no notifications and reminders will be generated for the patient.

Stimulus/Response Sequence

1 Open the application.

2 Login.

3 Select set medication.

4 Enter names of medicines with their proper dosage and time.

5 Select set food.

6 Enter names of food items with their quantity and time.

7 Select set exercises.

8 Enter names of exercises with their specifications/duration and time.

Functional requirements

REQ-1: Application shall be accessed only by an authorized user.

REQ-2: Caregiver shall fill the fields with precision and none of the fields should remain empty.

REQ-3: After filling all the fields, caregiver shall save them.

REQ-4: Caregiver shall be connected to Wi-Fi while setting the schedule so that data can be immediately transferred to the server.

REQ-5: Notifications shall be generated for successful or unsuccessful transfer of data.

3.4.2   Smartwatch

3.4.2.1   Notification Popup and its response.

Description

Once the schedule for the patient has been set and a pattern has been developed on the basis of this raw data, patient will start receiving popup notifications on his smartwatch application. These notifications will be received on the time specified in the schedule and will contain the following information:

1 Medication

Name and dosage of the medicine.

2 Food

Name and quantity of the food item

3 Exercise

 Name and duration of the exercise.

Patient will be prompted to respond to these notifications by either accepting or denying them.

Priority

Its priority will be high because without receiving these notification patient will not be able to remember his routine tasks and without the response patient's behavioral analysis will not be possible.

Stimulus/Response Sequence

1 Server generates notifications on the basis of patterns developed from the raw data obtained from mobile application.

2 Patient receives popup notifications on his smartwatch application containing brief description of his routine tasks.

3 Patient responds to these notifications.

Functional Requirements

REQ-1: Patient shall be able to respond to the notifications.

REQ-2. Notifications shall be generated if patient removes watch from his wrist.

3.4.2.2   Tracking Patient's location.

Description

Once the patient has started snap assistant, application will start getting GPS data from the smartwatch and will send it to the server. This way patient's location can be constantly monitored. A pattern will be developed on the server on the basis of this data

and in case patient deviates from his normal pattern, caregiver will be immediately notified. Caregiver can find the location of the patient at any instance.

Priority

This feature will have high priority because tracking patient's location is very important for his safety.

Stimulus/Response Sequence

1 Patient will start the application.

2 Application will start getting data from GPS on smartwatch.

3 Application will send the data collected from the GPS to the server.

4 Location of the patient will be updated on the server.

Functional requirements

REQ-1: Application shall be granted all the required permissions e-g to access smartwatch's location using GPS.

REQ-2: Coordinates of patient's location shall be displayed on Google maps on mobile application.

3.4.3   Server

3.4.3.1   Patient's behavioral analysis and notification generation.

Description

Data obtained from the smartwatch containing patient's location updates and his responses will be received and saved by the server. On the server this stored data will be used for the behavioral analysis of the patient and notification generation.

Priority

This feature will have high priority because notifications will be generated on the basis of behavioral analysis and will later assist patient in his routine tasks.

Stimulus/Response Sequence

1 Receive data containing patient's location and his responses to routine notifications.

2 Develop behavioral patterns on the basis of this data.

Functional requirements

REQ-1: server application shall be intelligent by analyzing behavioral pattern of the patient.

REQ-2: Notifications/alerts shall be generated on the basis of these patterns.

3.5 Other Nonfunctional Requirements

3.5.1 Safety Requirements

The use of the software product has no harms whatsoever; nor does it have any possibility of loss or damage that might be inflicted. If the app crashes during updating of data there will be no change in the database.

3.5.2 Security Requirements

Application running on the mobile/smartwatch should not need any additional information other than the collected data from the user or already present data. There are no connections to other devices or severs so no data will be sent or received or used in any way.

Communication between mobile and smartwatch should be secure so that no one can make any changes in patient's schedule or the other data.

3.5.3 Software Quality Attributes

3.5.3.1 Usability

The graphical user interface of app is to be designed with usability as the first priority. The app will be presented and organized in a manner that is both visually appealing and easy for the user to navigate.

3.5.3.2 Reliability

Application should provide reliability to the user. The product will run stably with all the features mentioned above available and executing perfectly. It should be tested and debugged completely. All exceptions should be well handled.

3.5.3.3 Portability

In API, portability can be defined as "compatibility of application with platform (Android's version) upgraded or downgraded versions. In Android platform when an up gradation is done the application will require some changes for compatibility with the new version. As android's OS is backward compatible so no changes will be required in down gradation. The minimum requirement of operating system is Android 4.3.

3.5.3.4 Flexibility

The design and architecture of the application will be flexible enough for catering any new requirements, if any at some later stage or for the application enhancement.

CHAPTER:4

DESIGN AND DEVELOPMENT

4 DESIGN AND DEVELOPMENT

4.1 Introduction

Alzheimer's is a type of dementia that causes problems with memory, thinking and behavior. Symptoms usually develop slowly and get worse over time, becoming severe enough to interfere with daily tasks. So we are making smart watch assistant for Alzheimer's patients specifically to help them in their daily activities. The purpose of using smart watch is that the patient can keep it with himself all the time and caregivers can keep an eye on the patient all the time.

4.1.1 Purpose:

This chapter describes the architecture and system design of the Snap Assistant (Wearable Smart Alzheimer's assistant).It mostly contains different design diagrams and their explanation. This portion of the document is intended to inform stakeholders of the details of the design and the design process. This document will help the developer(s) in implementation and maintenance of the Application (app).

4.1.2 Scope:

The Snap Assistant will help Alzheimer's patients in their daily routines, so that they can live more independent lives. A mobile application for caregivers will allow them to initially set the schedule of their patients. Through this application they will constantly receive notifications about patient's whereabouts and activities. Patient's record and schedule will be stored on a web server where on the basis of pattern recognition (behavioral pattern), notifications will be send to both patient and the

caregiver. A smartwatch application installed on their smartwatch will be available for the patient which will notify him when it is time to eat, take medicine or do exercise. It will also assist the patient in navigation.

4.1.3 Document Overview:

This document shows the design and working of Snap Assistant. It starts from higher level details for a non-technical reader to understand just by seeing the diagrams to the lower level details that aid the developer to code and understand other technical details of the application. Section 2 the **System Architecture Description** gives a detailed overview of the application. Section 2.1 **Structure and Relationships** shows the higher level details system working by the means of System Block, Activity, State Transition, and Use Case diagrams. Lower level details are described using the Class, Chen's Entity Relationship, Sequence diagrams and Structure Chart. Section 2.2 describes how the application is designed to curb the tendency of **User Interface Issues** and problems during User Interaction.

In Section 3, **Detailed Description of Component** is given to show the working of modules with low level details. It shows the purpose, function, subordinates, dependencies, interfaces, resources, processing and data of the components and their relationships with each other.

Section 4 shows the **Reuse and Relationship to other Products** i.e.; information about work done in the same project before and any reuse of the same work. The section also provides a key to reuse this system for further upgrades.

Section 5 **Design Decisions and Tradeoffs** shows the architecture style and design pattern of the application, while in the Section 6 the **Pseudo Code** of the components is given in for human reading rather than machine reading.

4.2   Work Breakdown Structure:
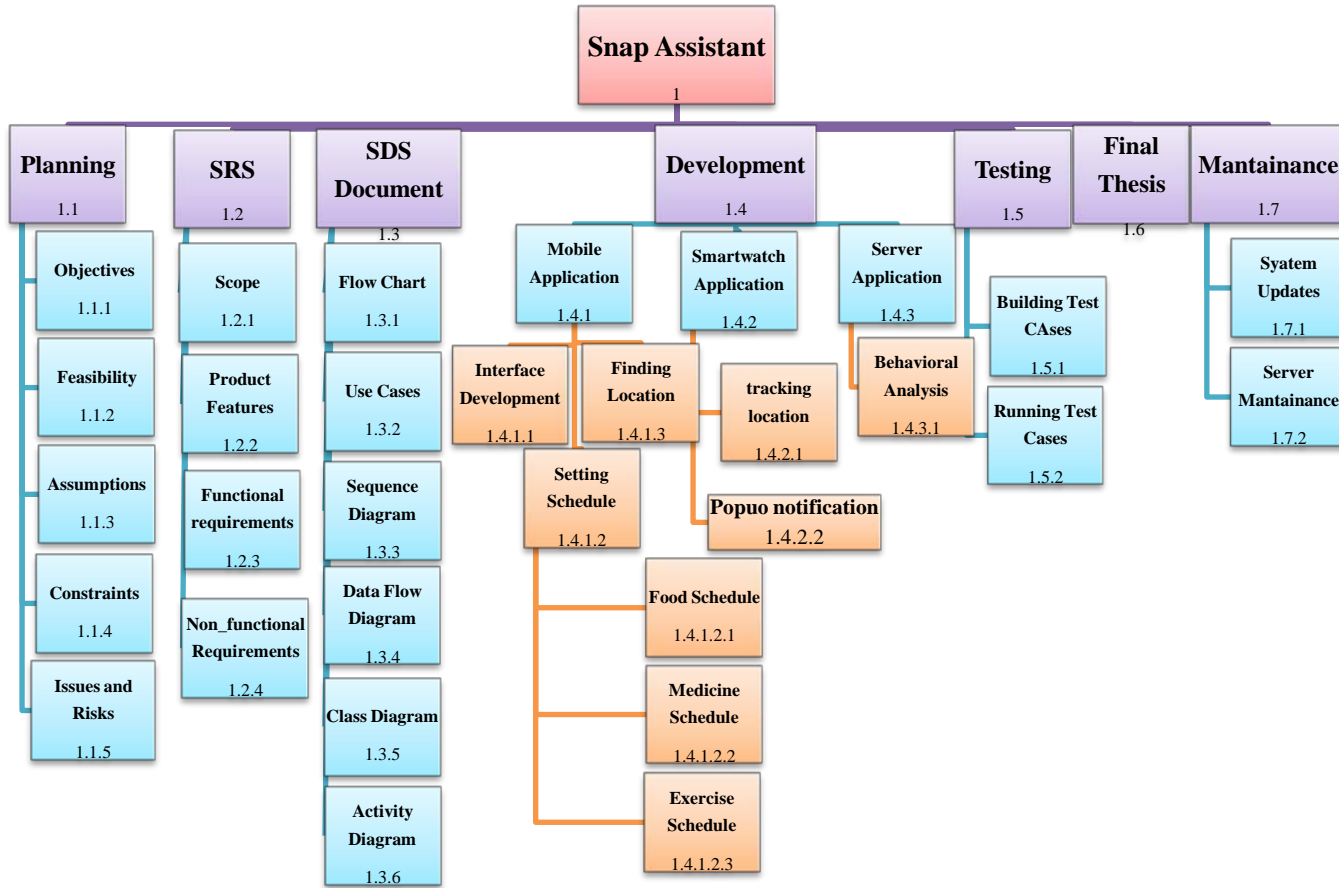
Figure 4-1 Work Breakdown

4.3   System Architecture Description

Detailed description of system architecture and design pattern which this system is going to use is discussed later in the document in section 5 'Design Decisions and Tradeoffs'. This Section gives overview of application, its higher and lower levels details and user interfaces.

4.4   Structure and Relationships:

This section covers the overall technical description of Snap Assistant. It shows the working of application in perspective of different point-of-views and also shows relationships between different components.

4.4.1 System Block Diagram

The diagram(s) show the higher level description of the application(s), generic working of the application(s) and interaction with the user.

Mobile application has two components schedule setting and location tracking. Smartwatch application includes a component which handles the incoming notifications from the server and response to those notifications. Server Application contains database, for storing patient's record and storing patterns for notification generation.
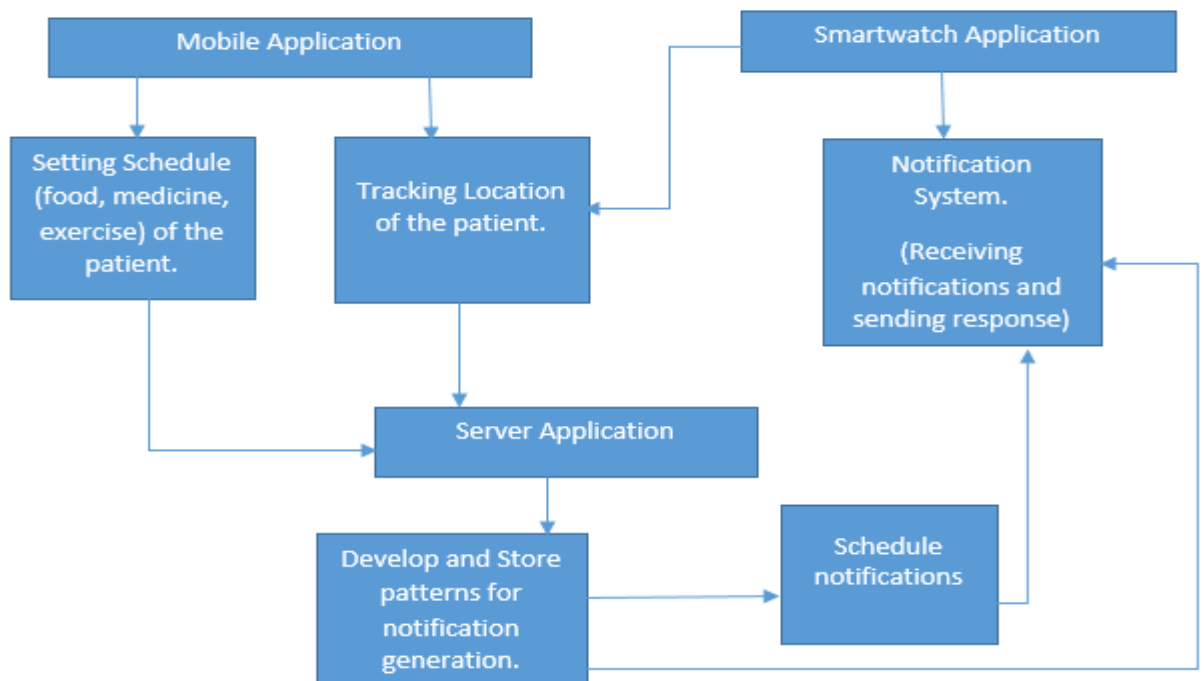
Figure 4-2 Block Diagram

4.5 UML DIAGRAM

4.5.1 User View (Use Case Diagram)
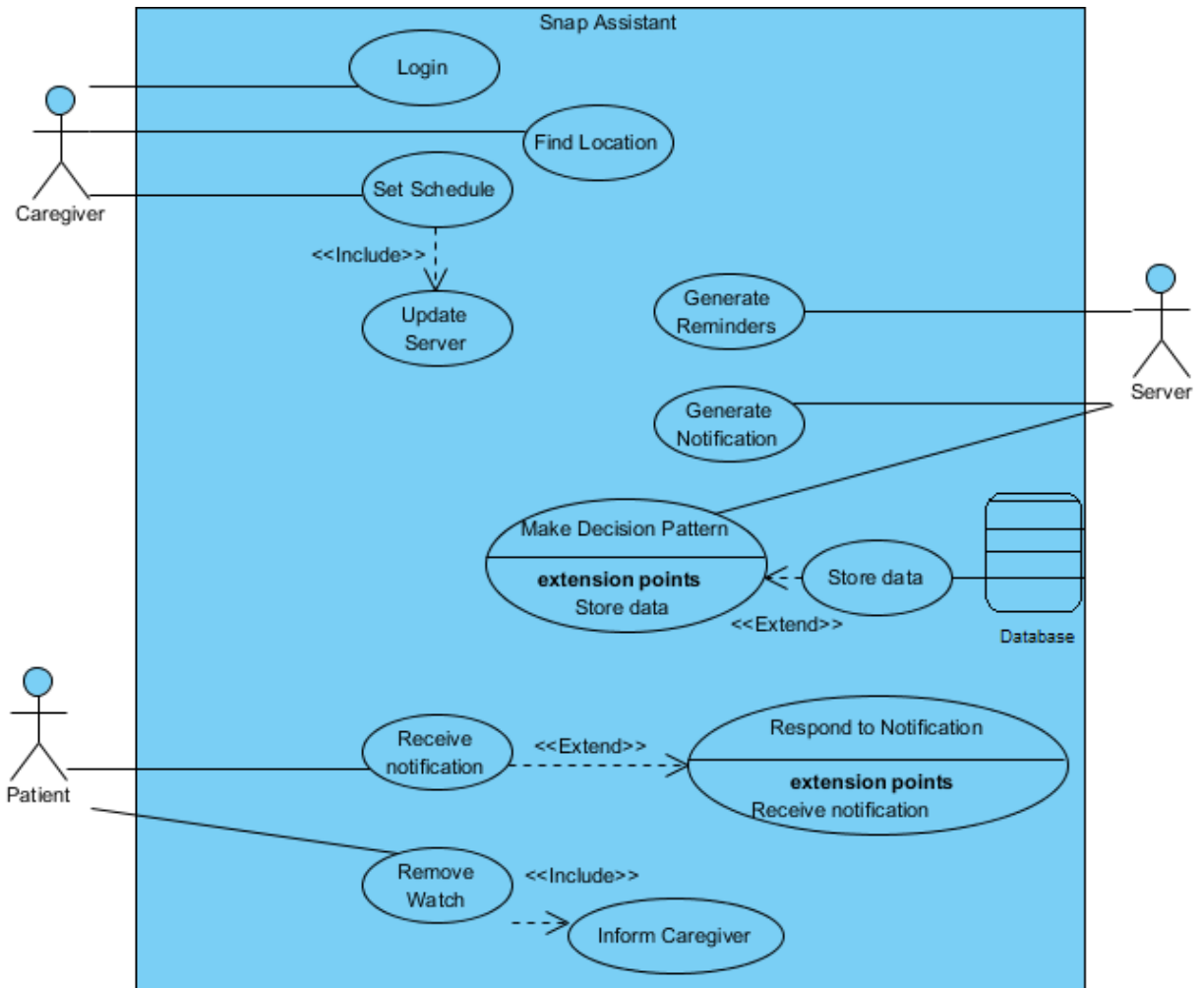

Figure 4-3 Usecase

Actors:

Primary Actors:

- Caregiver
- Patient

Secondary Actors:

- Server
- Database

Use Cases:

- Find Location
- Set Schedule
- Store Data
- Generate Notifications
- Generate Reminders
- Receive Notifications
- Remove Watch

Use Case Description:

Table 4-1 Find Location

Name: Find Location
Actor(s): Caregiver
Use Case Description: Caregiver can find the current location of the patient on the map though coordinates received through GPS of the smartwatch.
Normal Path: • Click on find location button • Location of patient displayed on map.
Alternate Path: • Click on find location button • Patient currently unreachable.
Pre-Condition: GPS in enabled on smartwatch and smartwatch application is sending location coordinates to the mobile application.
Post-Condition: Caregiver will be able to see the location of patient on map.
Extends: N/A
Includes: N/A

Table 4-2 Set Schedule

Name: Set Schedule
Actor(s): Caregiver
Use Case Description: Once the authorized caregiver has logged into the mobile application he can set the medicine, exercise and food schedule of the patient.
Normal Path: • Click on set schedule button • Fill the required fields • Save the schedule • Schedule is updated on server.
Alternate Path 1: • Click on set schedule button • Fill the required fields • Save the schedule. • Schedule is not updated on server.
Alternate Path 2: • Click on set schedule button • Fill the required fields • Save the schedule. • Schedule is not updated on server due to network connection failure.
Pre-Condition: Authorized user login into the system.
Post-Condition:

- **Normal Path:** Schedule is updated on the server and stored in database for forming patterns.
- **Alternate Path:** Schedule is not updated on server and an error message is generated to prompt user to repeat the process.

Extends: N/A

Includes: Update Server

Table 4-3 Store Data

Name: Store Data
Actor(s): Database
Use Case Description: Server receives data (schedule and location) from android application and store it in database for generating patterns.
Normal Path: • Receive data from mobile application   • Update data on server   • Store in database
Alternate Path: • Error in receiving data from mobile application   • Server not updated   • Updated information not stored in database.
Pre-Condition: **Normal Path:** Caregiver set schedule in mobile application and it is updated on server.   **Alternate Path:** Location coordinates received from smartwatch application.
Post-Condition: Patterns are generated on the basis of stored data.
Extends: Make decision patterns
Includes: N/A

Table 4-4 Generate Notifications

Name: Generate Notifications
Actor(s): Server
Use Case Description: Server generates notifications on the basis of patterns stored in database and send them to smartwatch application.

Normal Path:
 	
   • Patterns generated on the basis of data stored.
 	
   • Notifications are generated on the basis of patterns.

Alternate Path: N/A
Pre-Condition: Patterns are generated on the basis of stored data.
Post-Condition: Patient will receive notifications.
Extends: N/A
Includes: N/A

Table 4-5 Generate Reminders

Name: Generate Reminders
Actor(s): Server
Use case Description: If patient for some reason do not respond to the notifications, server will generate reminders.

Normal Path:
   • Patient do not respond to notifications.
 	
   • Reminder generated for patient.

Alternate Path: N/A
Pre-Condition: Patient do not respond to notifications.
Post-Condition: Patient receives reminders.

Extends: N/A
Includes: N/A

Table 4-6 Receive Notifications

Name: Receive Notifications
Actor(s): Patient receive notifications
Use Case Description: Patient receive notifications from the server related to his daily routine.
Normal Path: • Receive notifications from server • Respond to those notifications
Alternate Path 1: • Receive notifications from server • Do not respond to those notifications
Alternate Path 2: • Do not receive notifications due to network failure.
Pre-Condition: Server generates notifications.
Post-Condition: Response to notifications update data on server.
Extends: Respond to notifications.
Includes: N/A

Table 4-7 Remove Watch

Name: Remove Watch
Actor(s): Patient
Use Case Description: If patient removes watch an alert will be send to the caregiver so that he can check up on him.
Normal Path:

• Patient remove watch from the wrist   • Caregiver receives an alert.
Alternate Path: N/A
Pre-Condition: N/A
Post-Condition: Caregiver receives an alert that patient has removed his watch.
Extends: N/A
Includes: Inform caregiver

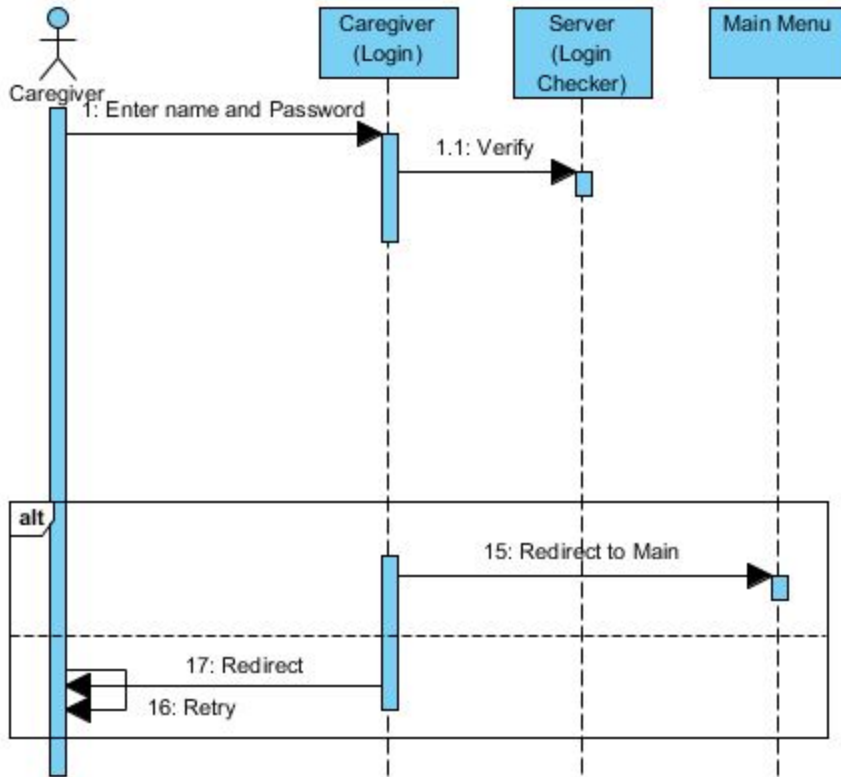### 4.5.2   Sequence Diagram

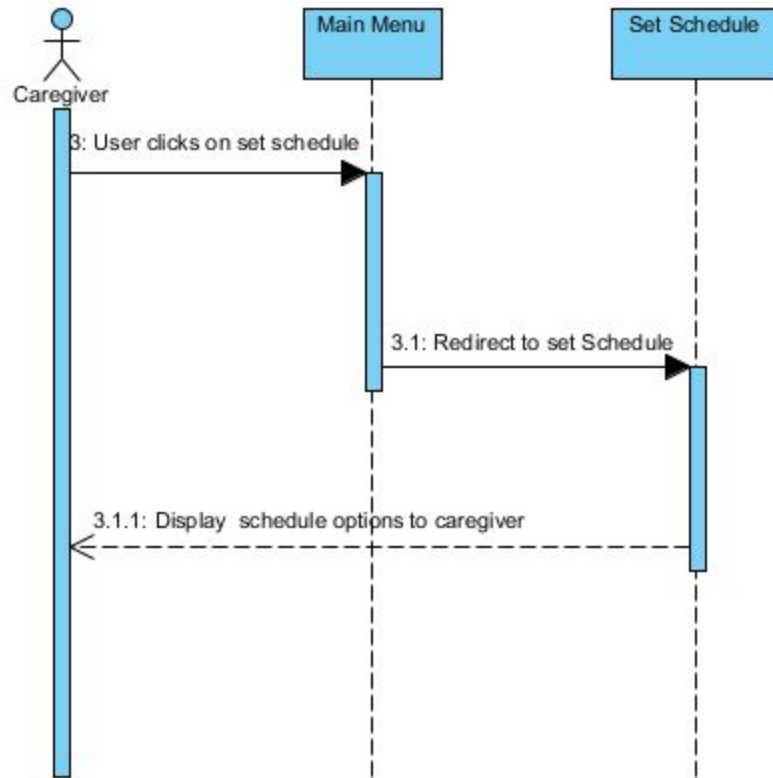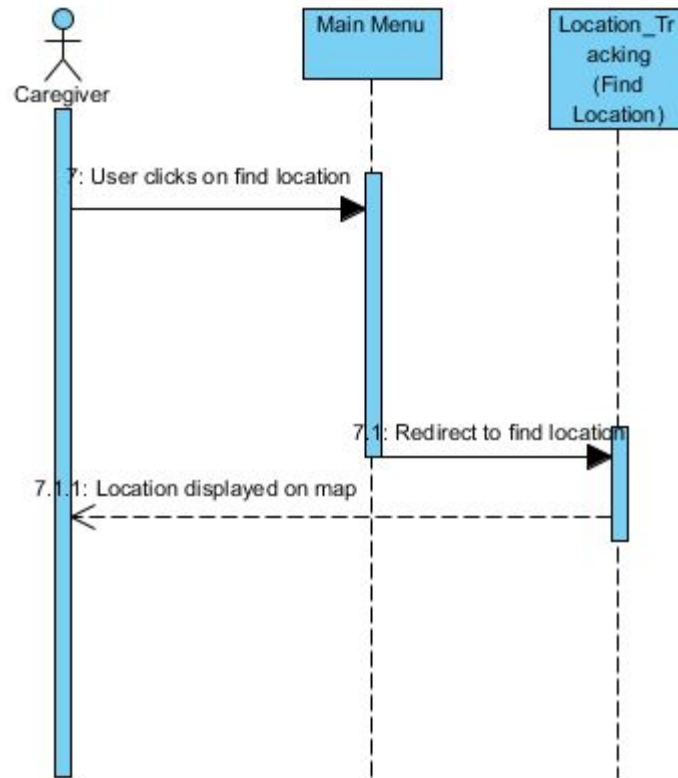The sequence diagram(s) of the Snap Assistant is given below:

Figure 4-4 Login

Figure 4-5 Set Schedule

Figure 4-6 Location Tracking
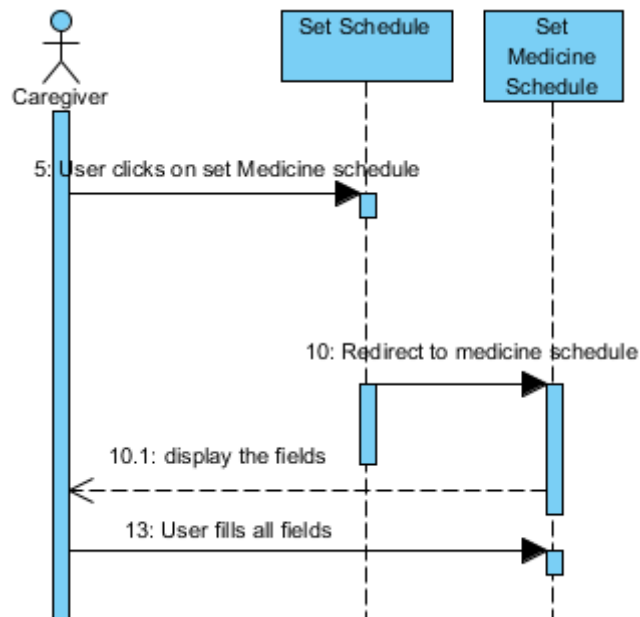
Figure 4-7 Set Medicine Schedule
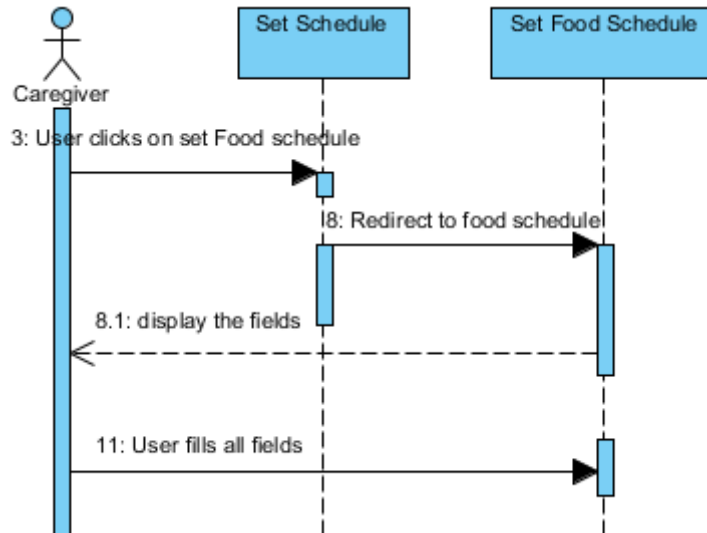
Figure 4-8 Set Food Schedule
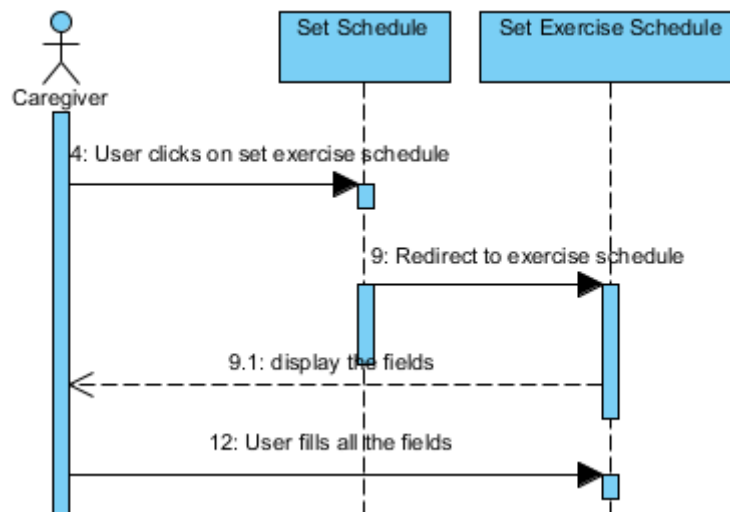
Figure 4-9 Set Exercise Schedule
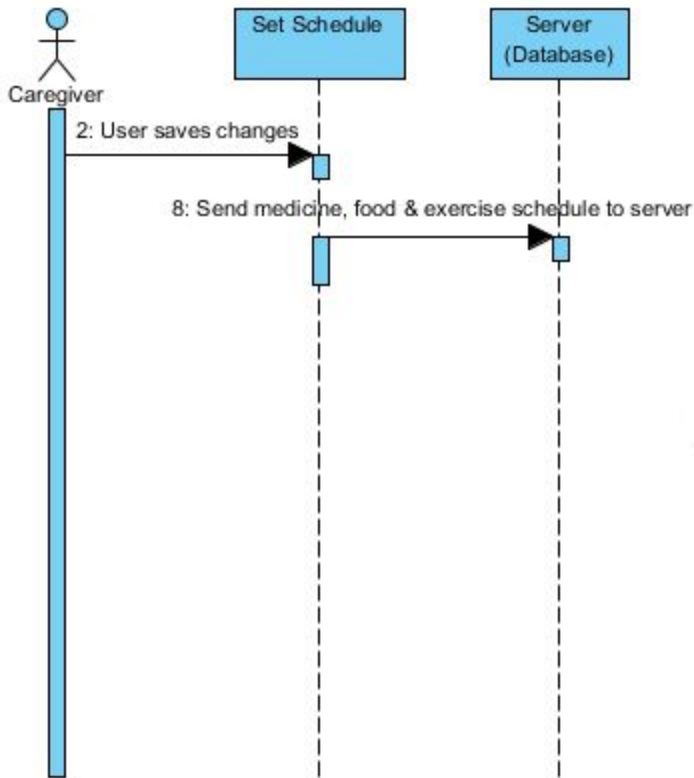
Figure 4-10 Send data to Server
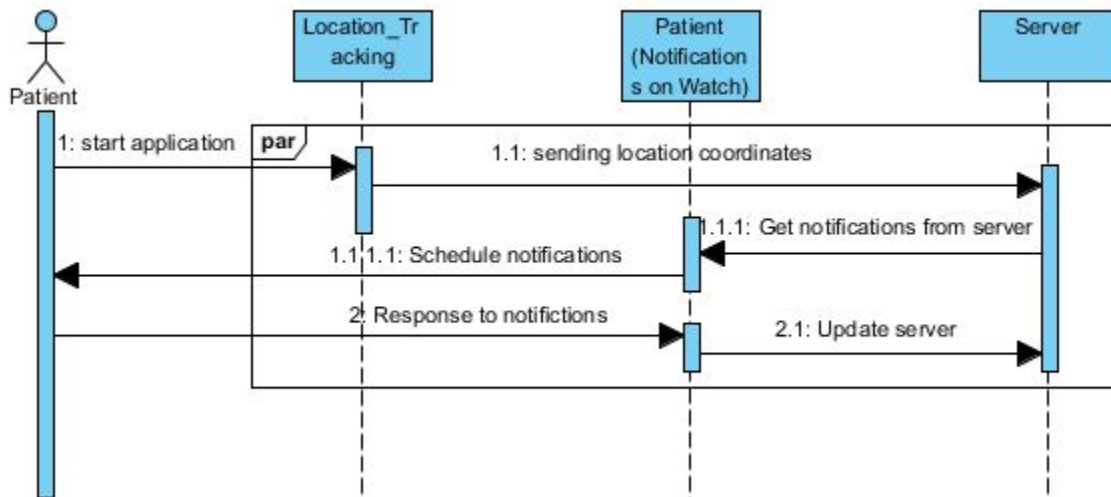
Figure 4-11Location Tracking and Notifications

4.5.3 Logical View (State Transition Diagram)

The State Transition diagram is shown in the figure below:
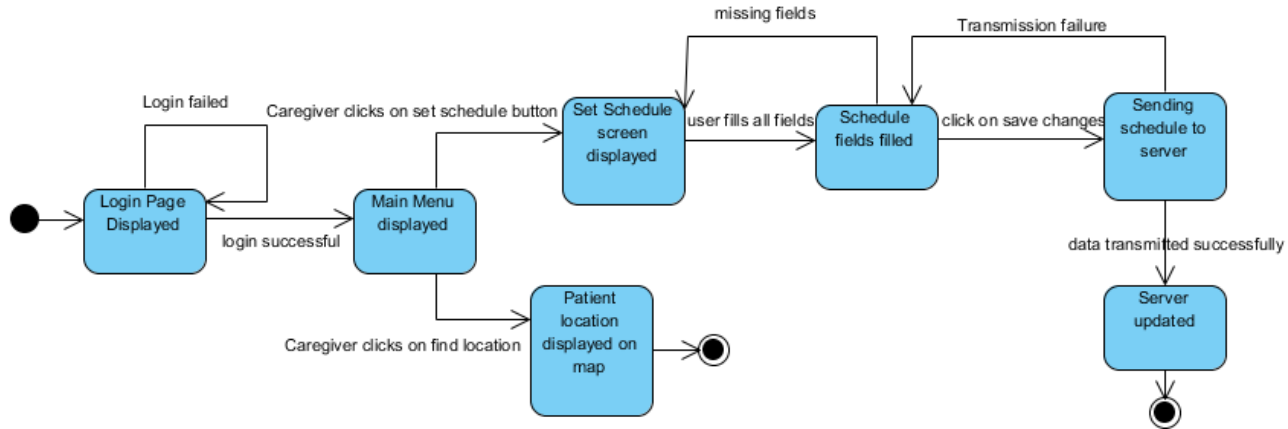
Figure 4-12 Mobile Application
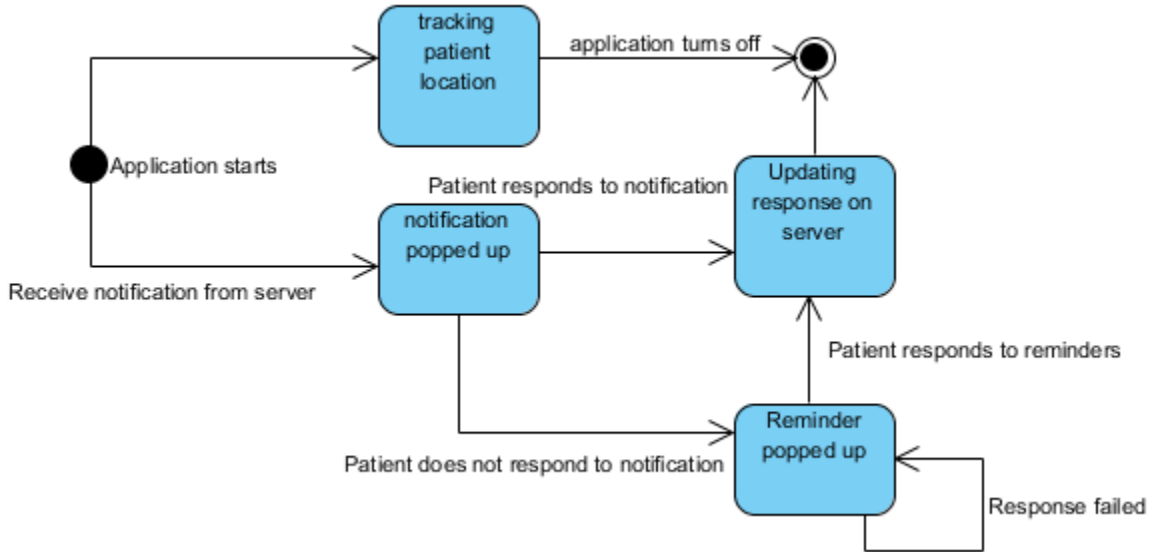
Figure 4-13 Smartwatch Application

4.5.4 Dynamic View (Activity Diagram)

In activity diagram, the dynamic view of the system is shown. All the activities are shown concurrently with their respective start and end states.
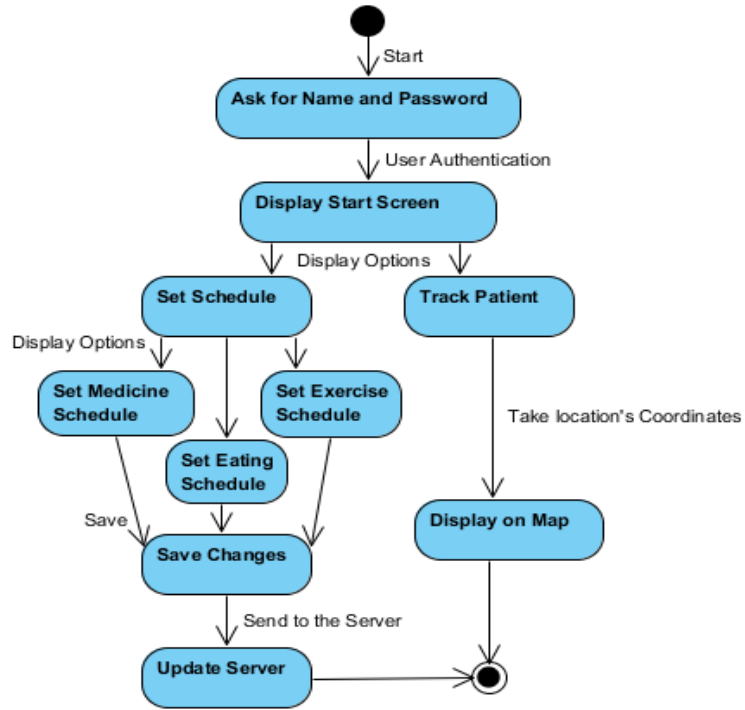
Figure 4-14 Mobile Application
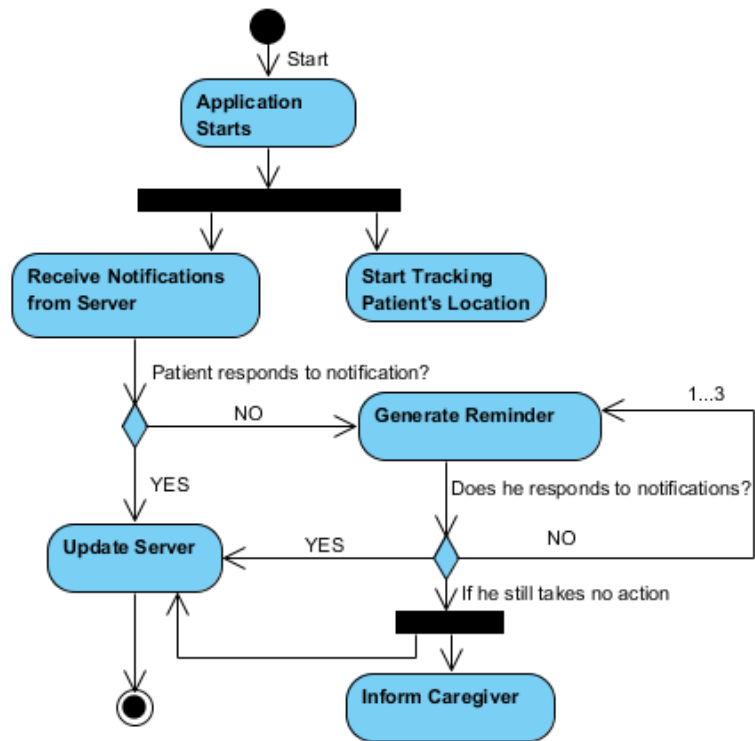
Figure 4-15 Smartwatch Application
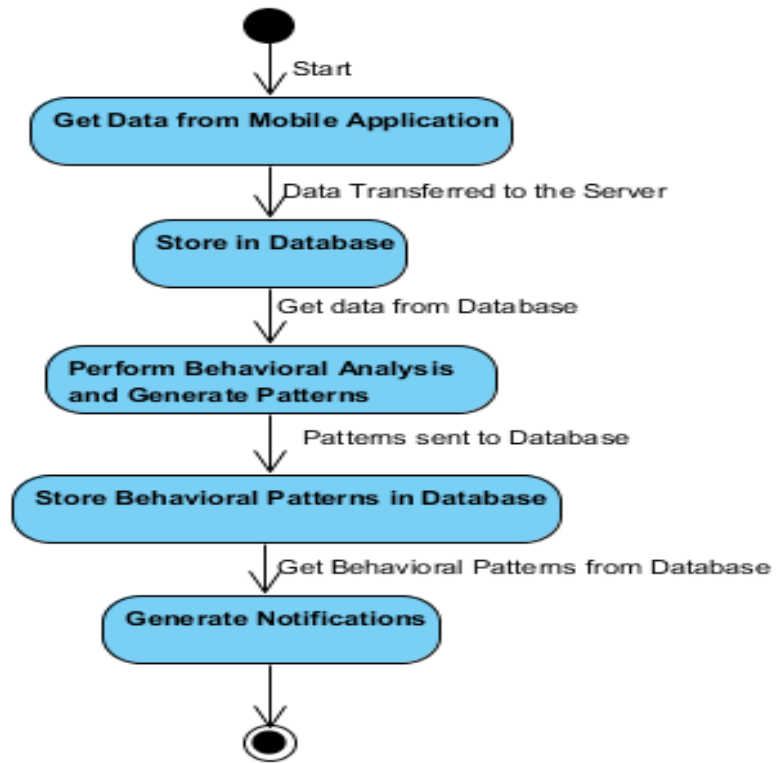
Figure 4-16 Server

4.5.5 Implementation View (Class Diagram)
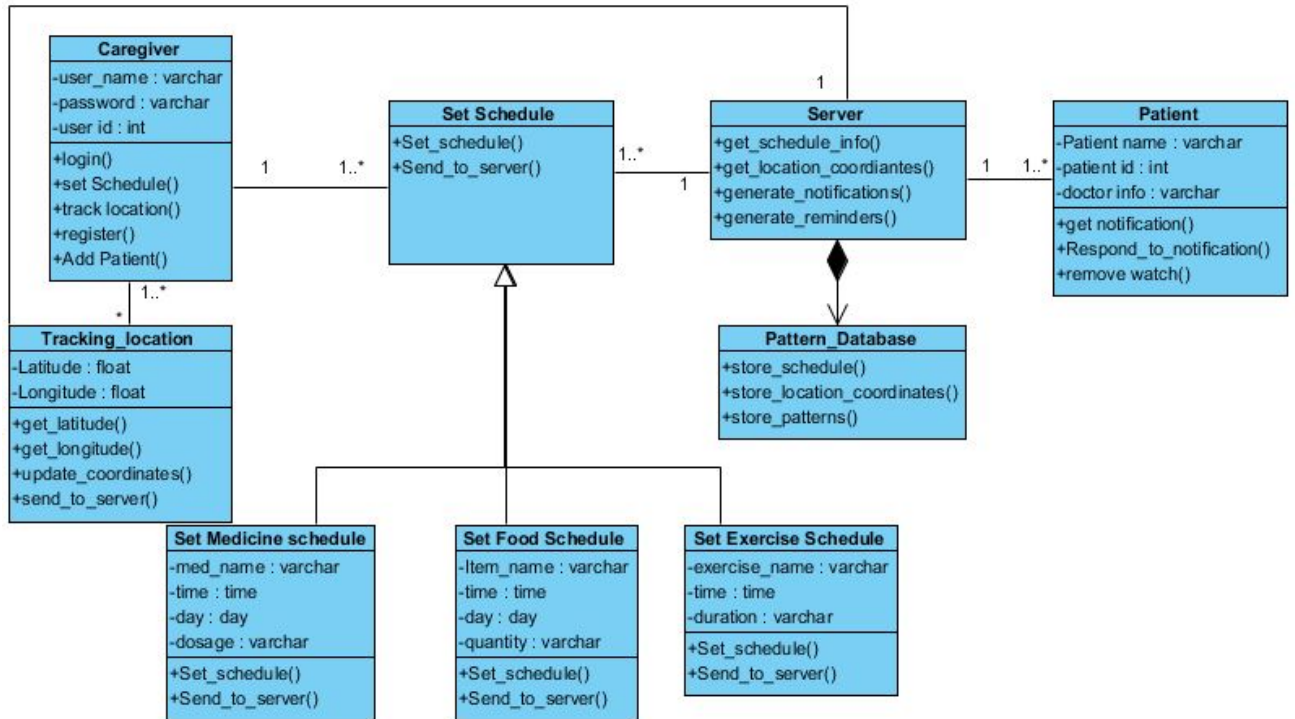
Figure 4-17 Class Diagram

Table 4-8 Classes

Classes	Description
Caregiver	The main class of mobile application, which'll be executed first in when the application is run. It will prompt user to sign up into the application. Once the user is logged in it will allow the user to either set schedule of the patient or track his location.
Patient	This is the main class of smartwatch application which will allow patient to receive notification and respond to them.
Set Schedule	This class will allow caregiver to set the schedule of patient. It has further three subclasses according the schedule being set, 1. Set Medicine Schedule 2. Set Food Schedule. 3. Set Exercise Schedule.
Tracking Location	This class will get location coordinates of patient from GPS and

	send them to server.
Server	Server class will receive schedule and location coordinates from mobile and smartwatch application and will further send them to a database for storage.
Pattern database	This class will get patterns generated by server and store them. Server will access these stored patterns for notification generation.

4.5.6 Entity Relationship Diagram
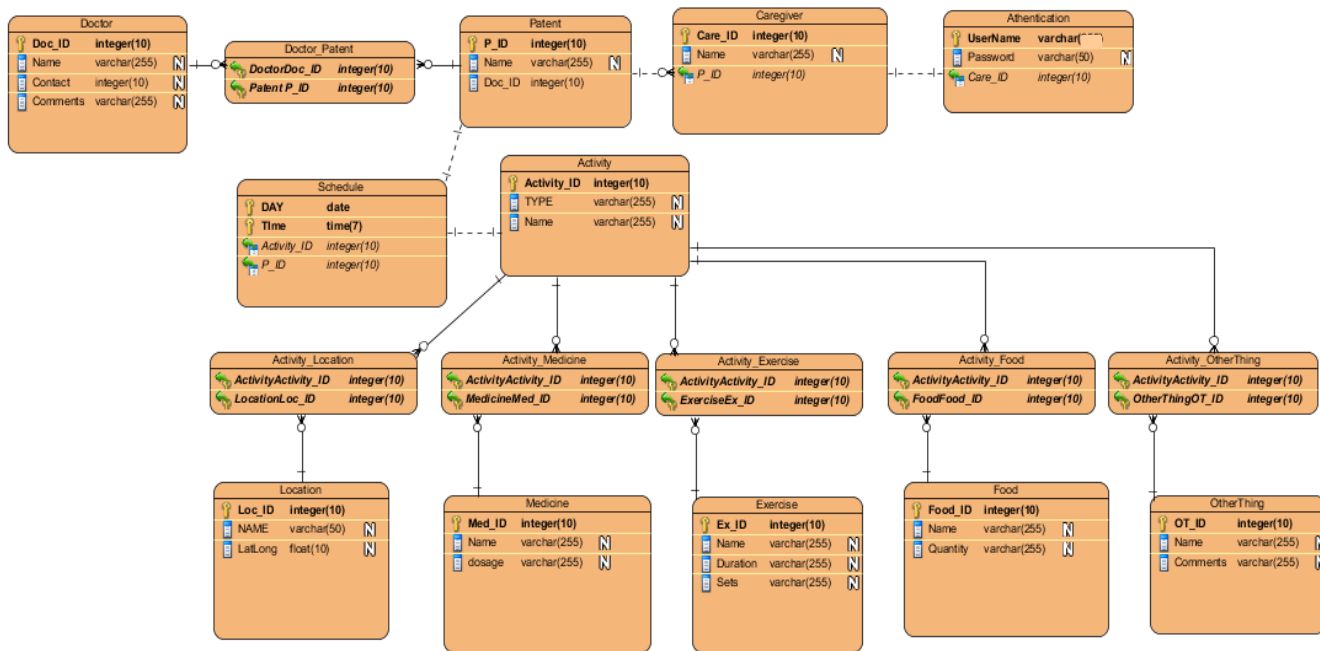
Figure 4-18 ERD

4.5.7 Structure Chart

This chart shows the breakdown of the application to its lowest manageable levels. It shows the modules and their corresponding functions which this application will implement. This chart basically shows the structure breakdown of the application starting from main modules to specific functions.

41
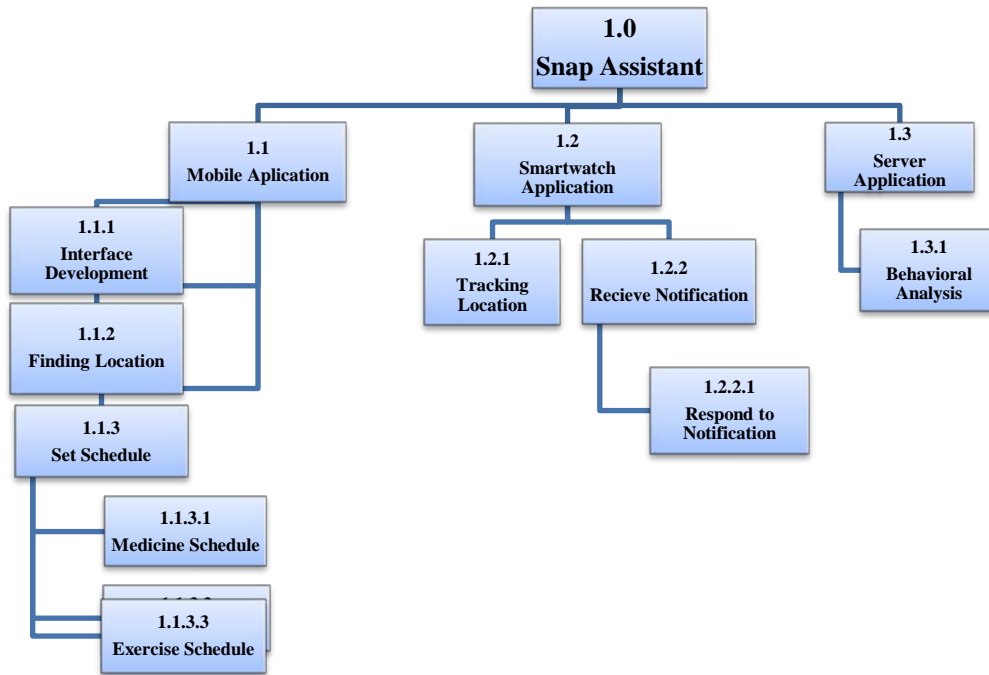
Figure 4-19 Structure Chart

4.6 User Interface

The user Interface of the Snap Assistant is as follows:
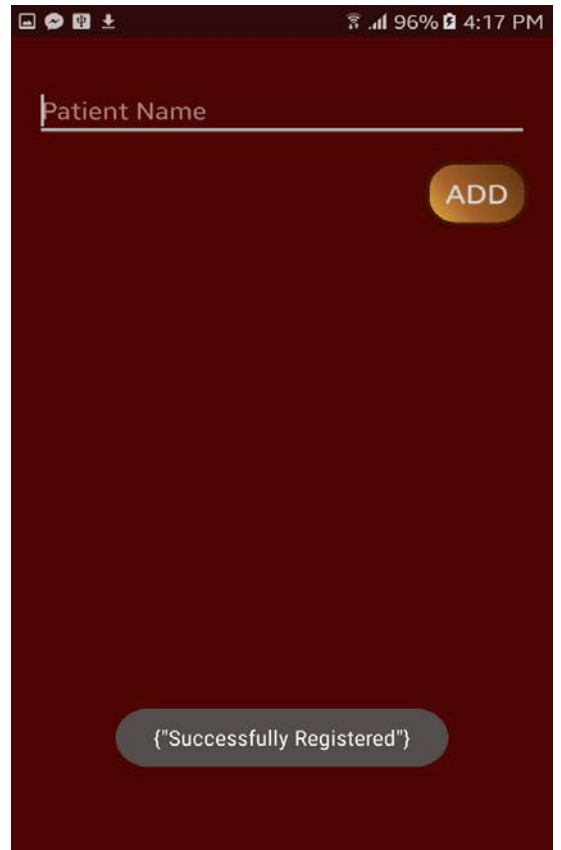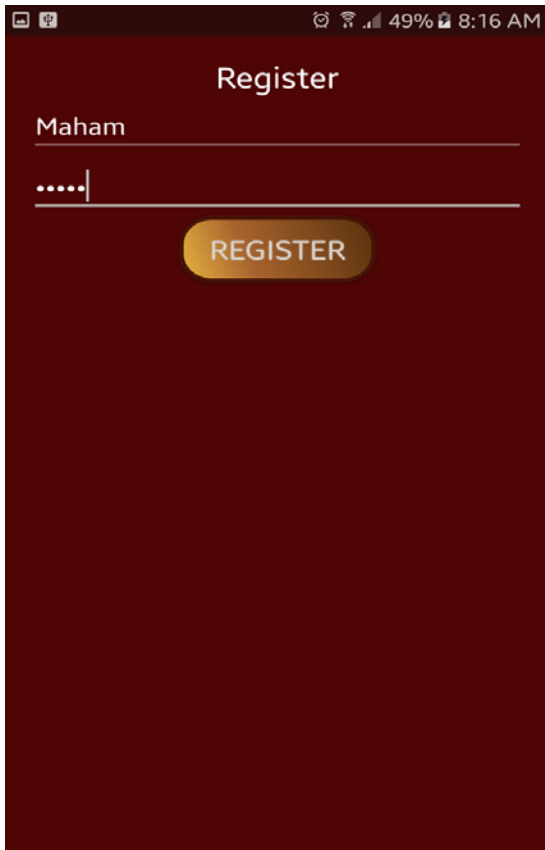
Figure 4-20 Registration
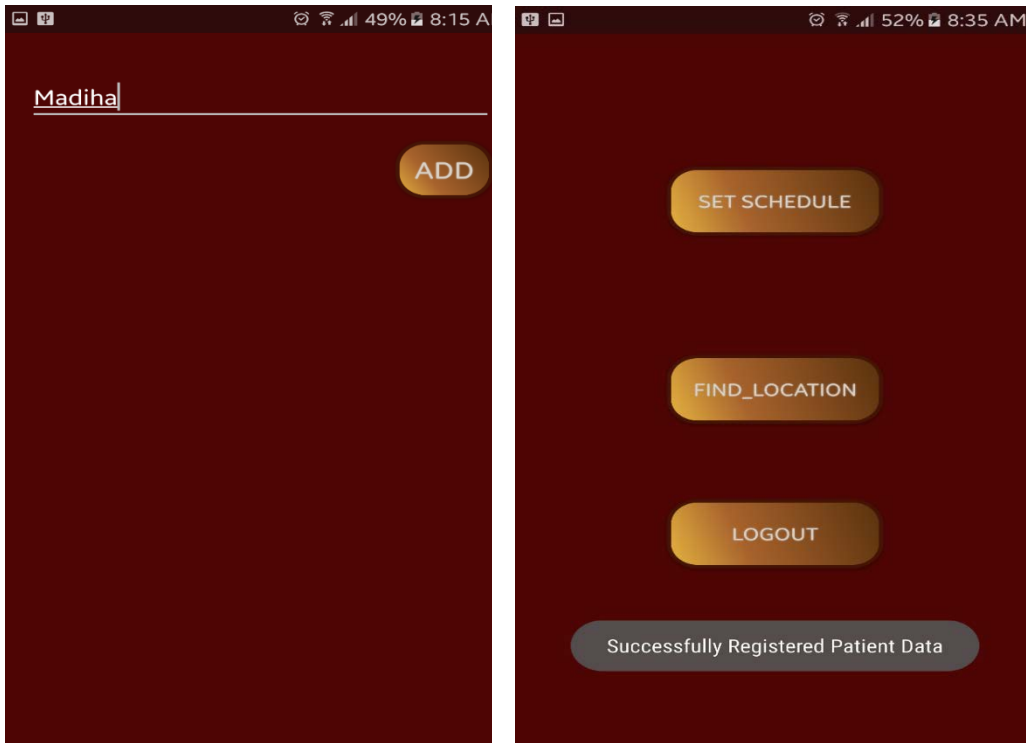
Figure 4-21 Add Patient
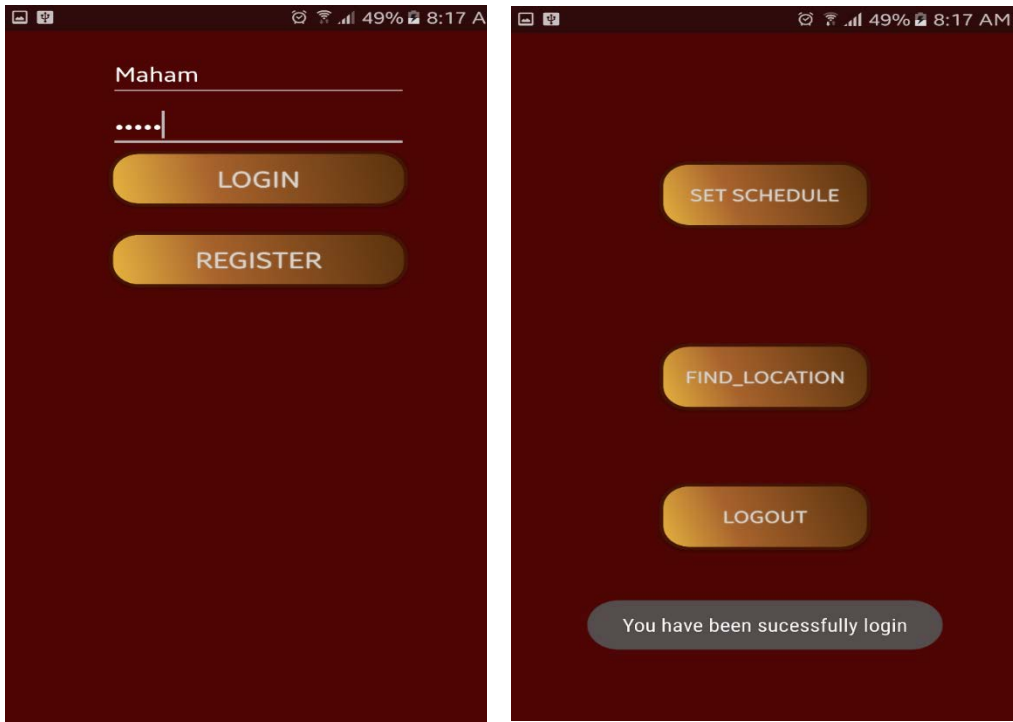
Figure 4-22 Login

Figure 4-23 Find Location
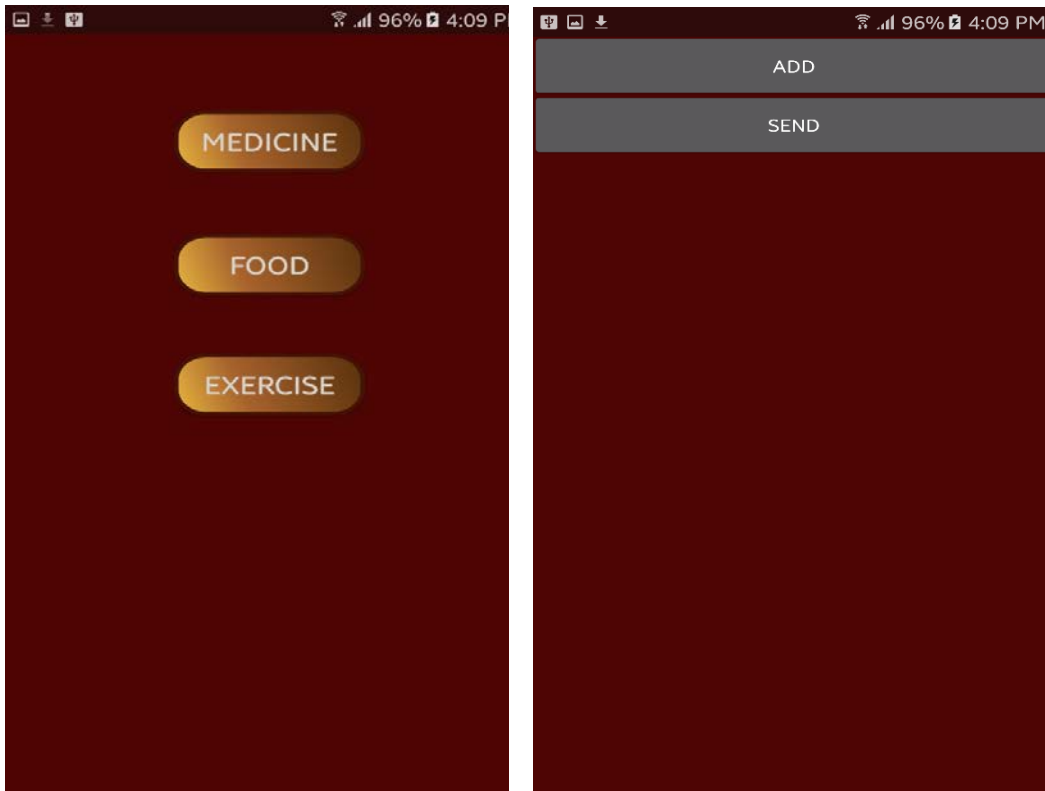
Figure 4-24 Set Schedule
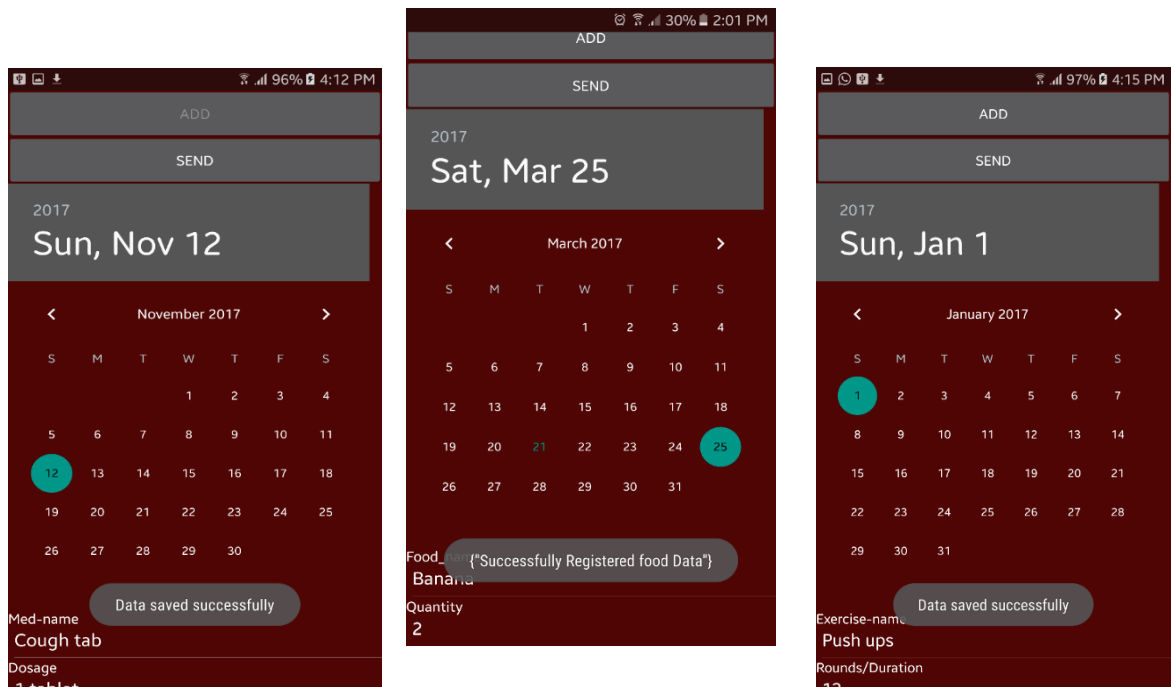
Figure 4-25 Food, Medicine, Exercise
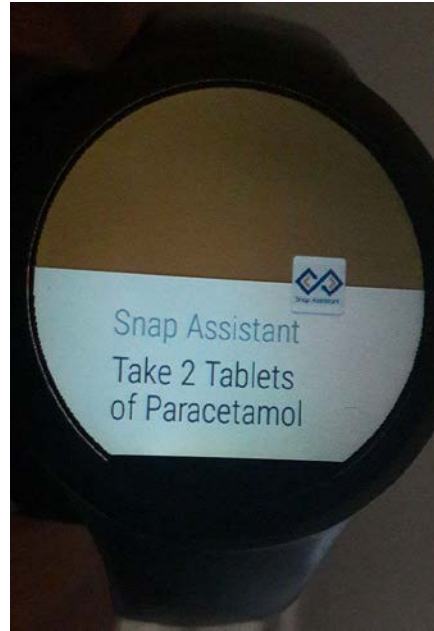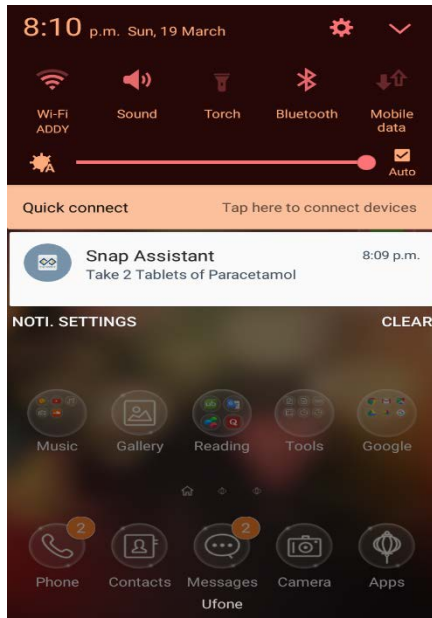
Figure 4-26 Notifications

4.7 Detailed Description of Components:

Table 4-9 Set Schedule

Identification	*Name:* Set Schedule *Location:* Presentation layer of the system architecture
Type	UI component
Purpose	This component fulfills following functional requirements (as specified in SRS Document) related to user interface in the application: **REQ-1:** Application shall be accessed only by an authorized user. **REQ-2:** Caregiver shall fill the fields with precision and none of the fields should remain empty. **REQ-3:** After filling all the fields, caregiver shall save them. **REQ-4:** Caregiver shall be connected to Wi-Fi while setting the schedule so that data can be immediately transferred to the server. **REQ-5:** Notifications shall be generated for successful or

	unsuccessful transfer of data.
Function	This component performs the basic functionality of mobile application. Caregiver can set and update the schedule (medicine, food, exercise) of patient. This schedule will be further updated on the server.
Subordinates	N/A
Dependencies	N/A
Interfaces	The user interface will display the fields in which user will enter the details of medicine, food and exercise schedule of patient.
Resources	**Software:** Android Studio, Java code with XML.
Processing	Take input i-e schedule of patient from caregiver through user interface of mobile application.
Data	Medicine, food and exercise schedule of patient.

Table 4-10 Notification Popup

Identification	*Name:* Notification Popup
	Location: Presentation layer of the system architecture
Type	UI component
Purpose	Following functional requirements mentioned in SRS are fulfilled by this component:
	REQ-1: Pop up notifications shall be enabled on the smartwatch by the user.
	REQ-2: Patient shall be able to respond to the notifications.
Function	This component displays notifications of schedule on smartwatch application and patient respond to those notifications.
Subordinates	N/A

Dependencies	This component depends on pattern generation and schedule notification components of server application.
Interfaces	Notifications will be displayed on UI of smartwatch application.
Resources	**Software:** Android Studio, Java code with XML
Processing	Notifications of schedules will pop up on smartwatch application. Patient will respond to those notifications.
Data	Response to notifications.

Table 4-11 Pattern Generation

Identification	*Name:* Pattern Generation *Location:* Application Logic layer of the system architecture
Type	Component
Purpose	Following functional requirements mentioned in SRS are fulfilled by this sub-component: **REQ-1:** Server shall perform the behavioral analysis of patient's routine. **REQ-2:** Server application shall be intelligent by analyzing behavioral pattern of the patient.
Function	The function of this component is to generate and store patterns based on schedule input of caregiver and response of patient.
Subordinates	N/A
Dependencies	This is depended on set schedule component of mobile application and notification popup component of smartwatch application.
Interfaces	N/A
Resources	Software: Server and Database.
Processing	Patterns are formed on the basis of data received from mobile and smartwatch application. These patterns are further stored

	in a database.
Data	Schedule of patient and his location coordinates.

Table 4-12 Location Tracking

Identification	*Name:* Location Tracking *Location:* Application Logic layer of the system architecture
Type	Component
Purpose	Following functional requirements mentioned in SRS are fulfilled by this component: • **REQ-1:** Application shall be granted all the required permissions. • **REQ-2:** Application shall be able to track patient location and monitor his daily travel routine. • **REQ-3:** Coordinates of patient's location shall be displayed on Google maps on mobile application.
Function	This component gets the coordinates of patient from the smartwatch and displays them on the map on mobile phone.
Subordinates	The subordinate of this component is • GPS sensor data: Requirement 4.2.2.1 in SRS
Dependencies	This component is dependent on smartwatch application which is responsible for getting coordinates and sending them to mobile application.
Interfaces	**Hardware Interface:** GPS to calculate patient's location coordinates. **Software Interface:** Google map to display patient's location.
Resources	**Hardware:** GPS **Software:** Android Studio and Java code
Processing	Location of the patient will be displayed on the mobile screen on the map.

Data	Location coordinates, longitude, latitude

Table 4-13 Notification Generation

Identification	*Name:* Notification Generation
	Location: Application Logic layer of the system architecture
Type	Component
Purpose	Following functional requirements mentioned in SRS are fulfilled by this component:
	REQ-2: Notifications/alerts shall be generated on the basis of these patterns.
Function	The function of this component is to generate notifications and reminders on the basis of schedule set by caregiver and behavioral patterns of patient's routine.
Subordinates	N/A
Dependencies	This is dependent on the set schedule and patterns generation module.
Interfaces	N/A
Resources	Server and database
Processing	Notification generation on the basis of behavioral patterns.
Data	Behavioral patterns

4.8 Reuse and Relationships to Other Components

The snap assistant is for Alzheimer's patients. Some work has been done in this area. Guard2me (A smartwatch for Alzheimer's patient) Clevercare (A smartwatch for Alzheimer's patient) etc. have previously made for Alzheimer's patients. We are using their idea of making patient independent in performing their daily routine tasks. But we are going to enhance its efficiency by making an intelligent system. Patient behavior will be analyzed and server will be responsible for intelligent computation of data.

We are making a mobile application for caregiver and a smartwatch application for Alzheimer's patients, but it can be further enhanced by making a web app so that caregiver can login from anywhere. Also we are just working on the patient daily schedule and daily travel routine but it can be further developed by including mind games, soothing music and chat bots to make it more functional and increase its efficiency and usability.

Snap Assistant is not based on any previous systems neither it's an extension of any other applications at any level. But it can be evolved into a bigger and more complex system with more features and functionality. Beginner developers can also reuse some of the modules of the system.

The application can also be enhanced to further include chatbots, music for patients' peace of mind and a web application identical to mobile application.

4.9 Design and tradeoffs

The top most level of the system is the user interface. Presentation layer contain a GUI which prompts patient to input schedule for the patient, displays popup notification and display patient's location on map. Logic layer contains business logic, it will make all the application decisions, patient location tracking and notification generation. It will also read data from the data tier. Data layer contain methods which help the Business layer to connect data and it will store patient data and behavioral patterns.

We have followed the three tier architectural design for our application in this as shown below:
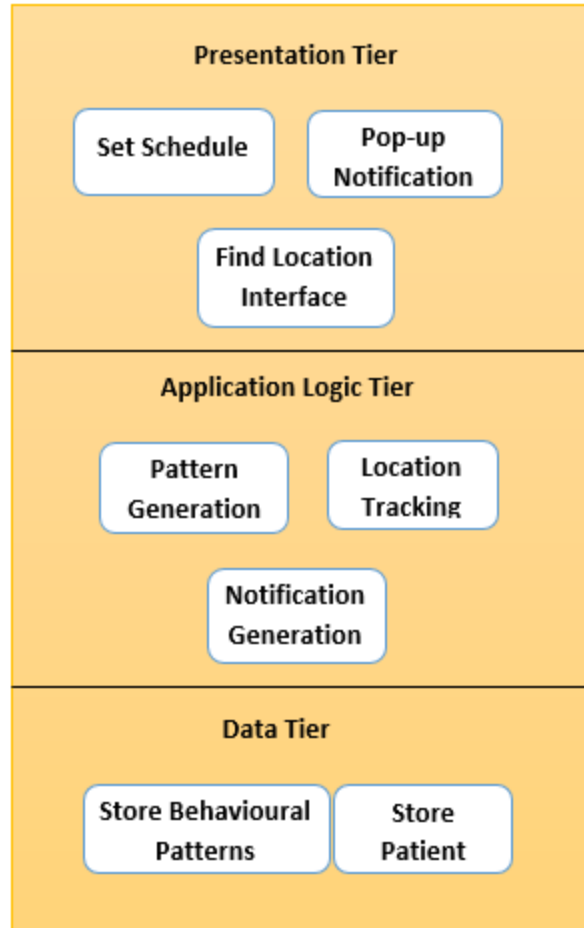
Figure 4-27 Three Tier Architecture

CHAPTER:5

SYSTEM IMPLEMENTATION

5   SYSTEM IMPLEMENTATION

We are developing a mobile application for caregivers, a smartwatch application for Alzheimer's patients and a server application for intelligent computation of data. Patient will receive notification of his daily routine on smartwatch and caregiver will be able to monitor his location and will receive alerts in case of any anomalous behavior of the patient.

5.1   Pseudo code for components

5.1.1   Set Schedule

```
Begin

Set_Medicine_Schedule (); //method to get medicine schedule input from caregiver

Set_Food_Schedule(); // method to get medicine schedule input from caregiver

Set_Exercise_Schedule(); //  method to get medicine schedule input from caregiver

Save(); //method to send schedule to the server

End
```

5.1.2   Location Tracking

Begin

Get_Location_Coordinates(); //method to get location coordinates from gps

Send(); //method to send coordinates to mobile application and server

Display_on_Map(); //method to display coordinates on map

Update_Server(); //method to update server about location of patient

End

5.1.3   Pattern Generation

Begin

Get_data(); //method to get data from database

Process(); //method to perform analysis on data

Generate_Patterns(); //method to generate decision patterns

Store(); method to store patterns on the database

End

5.1.4   Notification Generation

Begin

Get_pattern(); //method to obtain behavioral patterns from database

Generate_Alerts(); //method to generate notifications on the basis of these behavioral paterns

End

5.1.5 Notification Pop-ups

Begin

Receive_Notification(); //method to receive notifications from server

display(); //method to display popup notifications

Get_Response();// method to obtain response from the patient

Send();// send response to the server

End

CHAPTER:6

ANALYSIS AND EVALUATION

6   Analysis and Evaluation

6.1   Introduction

This test plan document describes the appropriate strategies, process and methodologies used to plan, execute and manage testing of the "Snap Assistant". The test plan will ensure that Snap Assistant meets the customer requirements at an accredited level.

Manual Testing will be followed which includes testing a software manually, i.e., without using any automated tool or any script. In this type, the tester takes over the role of an end-user and tests the software to identify any unexpected behavior or bug. Each Unit will be tested separately and then will be integrated with other units; therefore, Unit Testing and Integration testing will be followed. For each unit, Black box Testing is done and for combined units Acceptance Testing is done.

The test scope includes the Testing of all functional, application performance and use cases requirements listed in the requirement document.

Software testing, depending on the testing method employed, can be implemented at any time in the development process. However, most of the test effort occurs after the requirements have been defined and the coding process has been completed.

This document includes the plan, scope, approach and procedure the testing of Snap Assistant. The pass/fail criteria of the test items are also defined. The document tracks the necessary information required to effectively define the approach to be used in the testing of the product.

6.2 Approach

Acceptance test will be executed based on this acceptance test plan. And after all test cases are executed, a test report will be summarized to show the quality of Snap Assistant. Following test approaches will be used in test execution:

- **Unit test**. Developers are responsible for unit testing. The implementation of each module and individual component will be verified separately.

- **Integration test**. After the unit test is passed above the defined quality threshold, testers will execute the integration test cases. After all the modules are integrated, it is crucial to test the product as a black-box.

- **Positive and negative testing design technique**. This approach will be combined with unit test and integration test. Test cases are designed in obvious scenarios, which ensure that all functional requirements are satisfied. What's more, different test cases will also be covered to show how the system reacts with invalid operations.

6.3 Features to be tested

Following Features are tested:

- Caregiver will be able to register himself as caregiver of the patient from mobile application.
- Caregiver will be able to add patient, find is location and set his schedule for medicine, food and exercise and send this information to the server.
- Caregiver will be able to login himself anytime to view patient's location or set his schedule.
- Caregiver and patient will be notified with the respective alerts.
- Caregiver will be notified if patient's steps out of his specified vicinity.

6.4 Item Pass/Fail Criteria

Details of the test cases are specified in section Test Deliverables. Following the principles outlined below, a test item would be judged as pass or fail.

- Preconditions are met

- Inputs are carried out as specified

- The result works as what specified in output => Pass

6.5 Testing tasks

- Develop test cases.

- Execute tests based on the developed test cases for the software.

- Report defects from the executed test cases if any.

- Provide complete test report.

- Incorporate or manage changes later in the stage of the project development.

6.6 Test Deliverables

Test cases

Output from tools

6.7 Responsibilities:

All developers of the project are responsible for the completion of all components testing and integration testing tasks.

6.8 Staffing and Training Needs:

Basics knowledge of testing strategies and techniques is needed for the testing of the project.

Techniques such as Black Box testing, integration testing should be known to developers. All the developers will be testing each other's work and will be actively participating in the development and testing of the project simultaneously.

6.8.1 Schedule

6.8.1.1 Important Dates

- Unit Testing and integration testing will be finished by the start of 22 March, 2017 as will Development process

- Acceptance Testing will be performed right after the Development process completes that is in the start of April.

6.9 Risks and contingencies

6.9.1 Schedule Risk:

The project might get behind schedule so in order to complete the project in time we will be needing to increase the hours/day that the project is being worked on.

6.9.2 Operational Risks:

Operational risks will be eliminated by Scheduling daily meetings and regular deadlines to meet the goals of the project as well as provide proper communication within the group.

6.9.3 Technical risks:

Technical risks will be eliminated by keeping the once defined requirements constant.

6.9.4 Programmatic Risks:

In case of a programmatic risk the scope of the project will be limited in order to stay inside the constraints of the project.

6.10 Test Cases

6.10.1 Unit and Component level Testing

Table 6-1 Registration

Test Case Number	01
Test Case Name	Registration
Description	Testing Caregiver Registration. Caregiver will register himself by giving his details.
Testing Technique	Component testing, Black Box Testing
Preconditions	Application should be open
Input Values	Enter username, password and email in text fields and click on "Register" Button
Steps	• Open the application • Main Screen is open. • Select the 'Register' button.

	· Enter details
	· Click on 'Register' button.
Expected output	Caregiver should be registered.
Actual output	Caregiver is registered successfully.
Status	Test case passed successfully.

Table 6-2 Add Patient

Test Case Number	02
Test Case Name	Add Patient
Description	Caregiver will add his patient after registration.
Testing Technique	Component testing, Black Box Testing
Preconditions	Application should be open and caregiver should be successfully registered.
Input Values	Enter patient's name and click on "Add" Button
Steps	· Open the application
	· Main Screen is open.
	· Register caregiver.
	· Enter patient name.
	· Click on the 'Add' button.
Expected output	Patient should be added to the database.
Actual output	Patient is successfully registered.
Status	Test case passed successfully.

Table 6-3 Login

Test Case Number	03
Test Case Name	Login
Description	Caregiver will login himself for further procedures.
Testing Technique	Component testing, Black Box Testing

Preconditions	Application should be open and caregiver should already be registered.
Input Values	Enter username and password. Click on "Login" Button
Steps	• Open the application • Main Screen is open. • Enter username and password • Select the 'Login' button.
Expected output	Login is successful.
Actual output	Caregiver is successfully login.
Status	Test case passed successfully.

Table 6-4 Find Location

Test Case Number	04
Test Case Name	Find Location
Description	Caregiver finds patient's location.
Testing Technique	Component testing, Black Box Testing
Preconditions	Caregiver should be logged in and menu screen is open.
Input Values	Click on "Find Location" Button
Steps	• Select the 'Find Location' button.
Expected output	Patient location should be displayed on map.
Actual output	Patient location is displayed on map.
Status	Test case passed successfully.

Table 6-5 Set Schedule

Test Case Number	05
Test Case Name	Set Schedule
Description	Testing the set schedule button on the menu screen.
Testing Technique	Unit testing, Black Box Testing

Preconditions	Caregiver should be logged in and menu screen is open.
Input Values	Click on "Set Schedule" Button
Steps	• Select the 'Set Schedule' button.
Expected output	Schedule screen should be opened.
Actual output	Schedule screen is opened.
Status	Test case passed successfully.

Table 6-6 Medicine Schedule

Test Case Number	06
Test Case Name	Medicine Schedule
Description	Testing the Medicine button
Testing Technique	Unit testing, Black Box Testing
Preconditions	Schedule screen should be opened.
Input Values	Click on "Medicine" Button
Steps	• Select the 'Medicine' button.
Expected output	Medicine schedule should appear.
Actual output	Medicine schedule is appeared.
Status	Test case passed successfully.

Table 6-7 Food Schedule

Test Case Number	07
Test Case Name	Food Schedule
Description	Testing the Food button
Testing Technique	Unit testing, Black Box Testing
Preconditions	Schedule screen should be opened.
Input Values	Click on "Food" Button
Steps	• Select the 'Food' button.
Expected output	Food schedule should appear.

Actual output	Food schedule is appeared.
Status	Test case passed successfully.

Table 6-8 Exercise Schedule

Test Case Number	08
Test Case Name	Exercise Schedule
Description	Testing the Exercise button
Testing Technique	Unit testing, Black Box Testing
Preconditions	Schedule screen should be opened.
Input Values	Click on "Exercise" Button
Steps	• Select the 'Exercise' button.
Expected output	Exercise schedule should appear.
Actual output	Exercise schedule is appeared.
Status	Test case passed successfully.

Table 6-9 Set Medicine Schedule

Test Case Number	09
Test Case Name	Set Medicine Schedule
Description	Caregiver sets medicine schedule and saves changes on the server.
Testing Technique	Component testing, Black Box Testing
Preconditions	Medicine Button is selected. Medicine schedule Screen should be opened.
Input Values	Click on 'Add' Button. Enter medicine name, dosage and time in the given text fields click on 'Save' Button and then click on 'Send' Button
Steps	• Select 'Add' Button. • Enter medicine name, dosage and time.

	• Select 'Save' Button.
	• Select 'Send' Button.
Expected output	Data should be saved in database.
Actual output	Data is saved successfully.
Status	Test case passed successfully.

Table 6-10 Set Food Schedule

Test Case Number	10
Test Case Name	Set Food Schedule
Description	Caregiver sets food schedule and saves changes on the server.
Testing Technique	Component testing, Black Box Testing
Preconditions	Food Button is selected. Food schedule Screen should be opened.
Input Values	Click on 'Add' Button. Enter food name, quantity and time in the given text fields click on 'Save' Button and then click on 'Send' Button
Steps	• Select 'Add' Button.
	• Enter food name, quantity and time.
	• Select 'Save' Button.
	• Select 'Send' Button.
Expected output	Data should be saved in database.
Actual output	Data is saved successfully.
Status	Test case passed successfully.

Table 6-11 Set Exercise Schedule

Test Case Number	11
Test Case Name	Set Exercise Schedule
Description	Caregiver sets exercise schedule and saves changes on the

	server.
Testing Technique	Component testing, Black Box Testing
Preconditions	Exercise Button is selected. Exercise schedule Screen should be opened.
Input Values	Click on 'Add' Button. Enter Exercise name, quantity and time in the given text fields click on 'Save' Button and then click on 'Send' Button
Steps	• Select 'Add' Button. • Enter Exercise name, quantity and time. • Select 'Save' Button. • Select 'Send' Button.
Expected output	Data should be saved in database.
Actual output	Data is saved successfully.
Status	Test case passed successfully.

Table 6-12 Notification Popup

Test Case Number	12
Test Case Name	Notification Popups/Alerts generation
Description	Testing Notification popups on mobile and smartwatch application.
Testing Technique	Component testing, Black Box Testing
Preconditions	Schedule must have been set and patient location is constantly monitored
Input Values	N/A
Steps	• Choose a mounted drive which is to be dismounted. • Click on mounted button.
Expected output	Notification should appear on the mobile and smartwatch screen
Actual output	Notifications displayed on screen

Status	Test case passed successfully.

6.10.2 Integration Testing:

Table 6-13 Caregiver Registration

Test Case Number	13
Test Case Name	Caregiver Registration
Description	Testing the integration of 'Register' user interface with its functionality.
Testing Technique	Component testing, White Box Testing
Preconditions	Caregiver enters his details and clicks register button.
Input Values	Click on 'Register' button.
Steps	• Application starts • Main screen appears • Caregiver enters his details • Clicks on Register button
Expected output	Caregiver details should be saved in database
Actual output	Caregiver details are saved in database
Status	Test case passed successfully.

Table 6-14 Add Patient

Test Case Number	14
Test Case Name	Add Patient.
Description	Testing the integration of 'Add Patient' user interface with its functionality.
Testing Technique	Component testing, White Box Testing
Preconditions	Caregiver should be logged in
Input Values	Click on 'Add' button.
Steps	• Enter patient name.

	• Click on Add button
Expected output	Patient data should be saved in database
Actual output	Patient data is saved in database
Status	Test case passed successfully.

Table 6-15 Set Schedule

Test Case Number	15
Test Case Name	Set Schedule
Description	Testing the integration of Schedule component, user interface with its functionality.
Testing Technique	Component testing, White Box Testing
Preconditions	Caregiver should be logged in
Input Values	Medicine name, food name, exercise name, dosage, quantity, time text fields and Add, Save, Send buttons
Steps	• Select Add Button • Enter all text fields • Select Save Button • Select Send Button
Expected output	Data should be saved in database.
Actual output	Data is saved in database.
Status	Test case passed successfully.

CHAPTER:7

FUTURE WORK

7 FUTURE WORK

A system of this magnitude always needs more and more work to evolve. There are a lot of possible changes and additions that can be done to the system to improve its performance and functionalities. The system has been made in a modular fashion which enables integrating new features very easy.

7.1 Extended Scope

Chat Bots: Snap Assistant will have its own personalized chat bot. When the patient is in distress this chat bot will help him remember his friends and family members and will also assist him in finding the location of his home, nearby hospital or the place of his friends and family members in case he has lost his way.

Mind Games: In order to keep the patient busy and active snap assistant will include some mind games. This will sharpen his memory to some extent.

Music: Music has a soothing effect on the patients. Caregiver will be asked to set a playlist for the patient that will include all his favorite songs, which reminds him of good times. This way whenever patient will lose control, music will calm him down.

Web Application: Snap assistant (Web application) will also be available for caregivers. Caregivers will be able to set the schedule of their patients and as well as monitor their routine by logging into it.

CHAPTER:8

CONCLUSION

8 CONCLUSION

8.1 Overview

The purpose of this project is to develop a smart watch application for Alzheimer's patients and a smart phone application for their caregivers. The goal is to make an application for Alzheimer's patients according to their needs to help them in their daily activities, so that they can live more independent lives. The hand held version of this application will be given to the caregivers and through that they will be able to monitor their routine. This application can also be used by elderly people facing memory loss issues.

8.2 Objectives Achieved

The Project helped to achieve the objectives of learning software development process/cycle, Android Development, handling network issues and integration of databases. It also helped us understand what problems we have to face when developing a project in the industry.

CHAPTER:9

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BIBLIOGRAPHY

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APPENDIX A

USER MANUAL

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General Information

9   GENERAL INFORMATION

This section explains in general terms the system **Snap Assistant**and the purpose for which it is intended.

9.1   System Overview:

Snap Assistant consist of a smart watch application for Alzheimer's patients and a smart phone application for their caregivers. The system is developed according to the needs of Alzheimer's patients to help them in their daily activities, so that they can live more independent lives. The hand held version of this application will be given to the caregivers and through that they will be able to monitor their daily routine. This product can also be used by elderly people facing memory loss issues.

9.2   Organization of the manual:

The user's manual consists of five sections: General Information, System Summary, Getting Started, Using the System.

1. **General Information** section explains in general terms the system and the purpose for which it is intended.
2. **System Summary** section provides a general overview of the system. The summary outlines the uses of the system's hardware and software requirements, system's configuration, user access levels and system's behavior in case of any contingencies.
3. **Getting Started** section explains how to setup the system and configure it for the first time. The section presents briefly system's settings.
4. **Using the System** section provides a detailed description of system functions.

System Summary

10 SYSTEM SUMMARY

System Summary section provides a general overview of the system. The summary outlines the uses of the system's hardware and software requirements, system's configuration, user access levels and system's behavior in case of any contingencies.

10.1 System Configuration:

Snap Assistant requires an android smartwatch with an android wear application installed on it of the Alzheimer's patients. It also requires an android mobile phone with a handheld application installed on it for the caregivers. Both applications should be synchronized.

10.2 User Access Levels:

The smartwatch will be available to the patients and mobile phone application will be available to the authenticated caregivers.

10.3 Contingencies:

In case of any errors or system crashes, the database will not be affected and Patient records will remain safe. If any of the application crashes, the changes made to the application will not be saved on the server database.

Getting Started

11 GETTING STARTED

Getting Started section explains how to configure the system and install it for the first time use. The section also presents briefly the system's menu.

11.1 Installation:

The application can be installed by the exe file provided.

1. After installation, System has to be checked for network availability from Settings.
2. It should be connected to the network
3. The location on the smartwatch should be turned on.
4. Both applications (Smartwatch and Handheld) should be synchronized.

11.2 SystemInterface:

The first screen of the mobile phone application Login or Register option.

1. It will allow the caregiver to *Login* himself by entering his username and password.
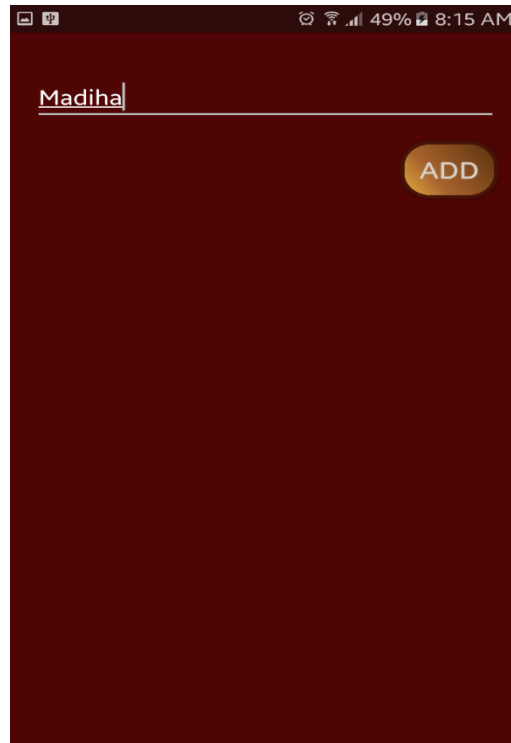2. The other option allows caregiver to *Register* himself by providing his username and password.
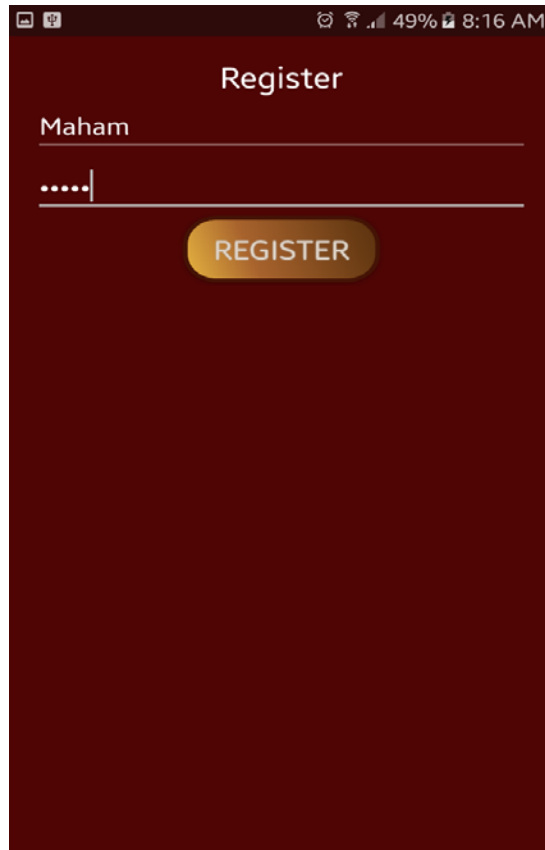
Figure 11-1 Register Screen
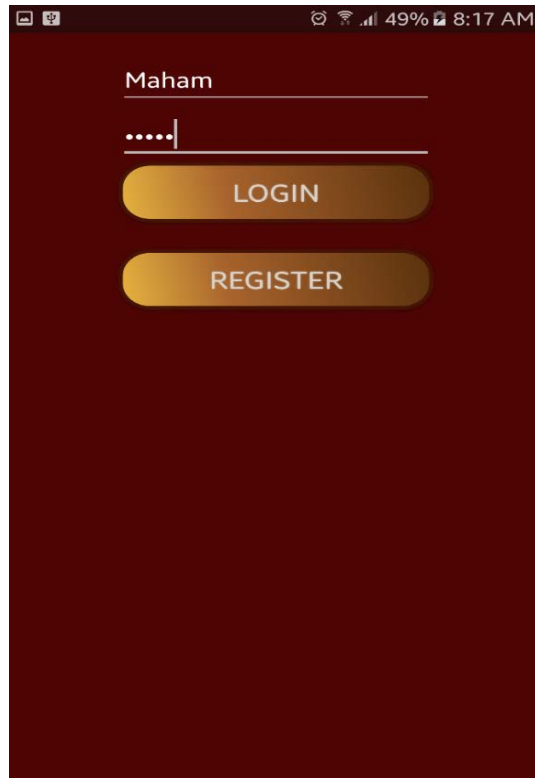
Figure 11-2 Login Screen

11.2.1 Add patient

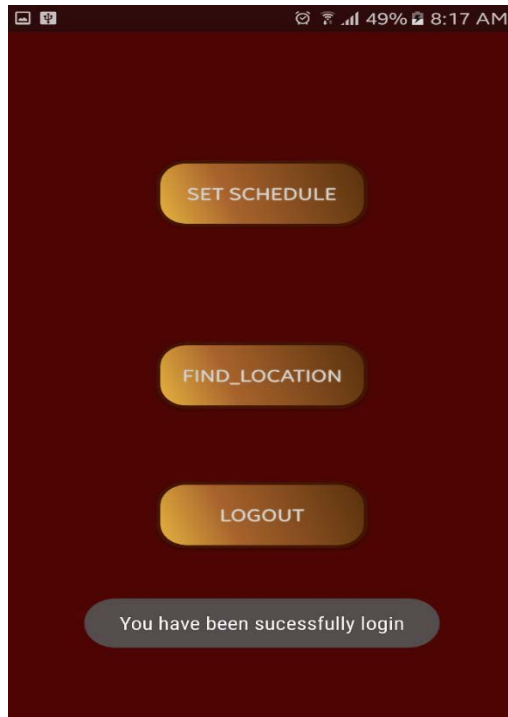After the registration caregiver will be prompted to enter his patient name.

Figure 11-3 Add Patient

11.2.2 Menu:

After the patient is added or caregiver login,menu screen will be displayed to the caregiver.
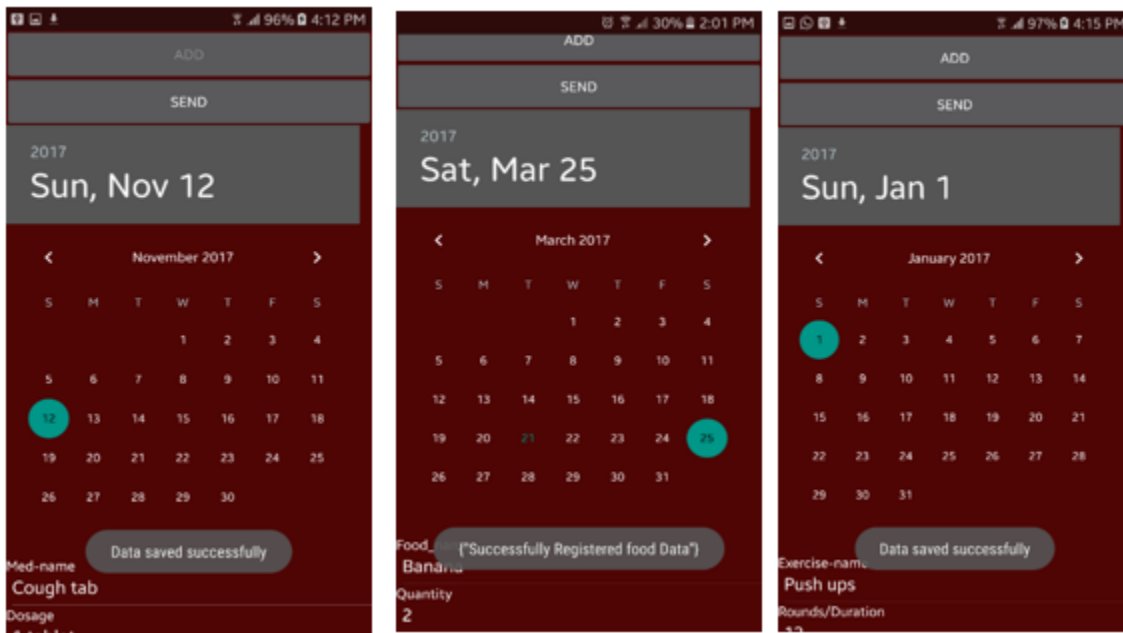
1. It will allow caregiver to set patient schedule.
2. It will allow caregiver to view patient's location.
3. User can log out from application from here.

Figure 11-4 Menu

11.2.3 Set Schedule

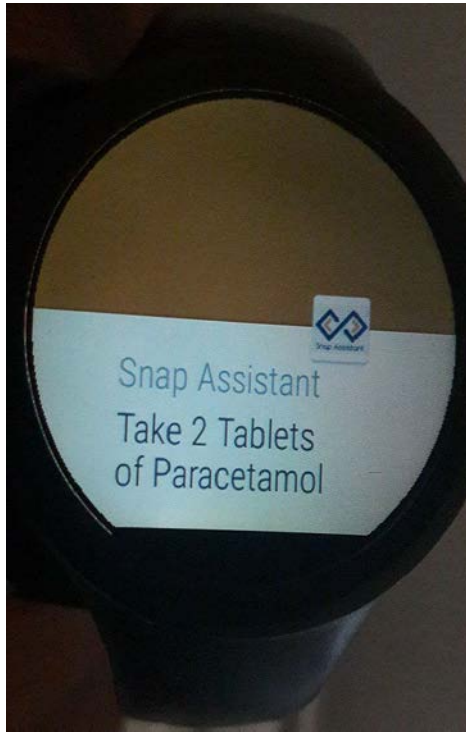It will allow caregiver to set patient's medicine, food and exercise schedule.

Figure 11-5 Medicine, Food and Exercise Schedule

11.2.4 Notification Popup

This feature will allow patient to receive notifications and reminders about his medicine, food and exercise schedule. Also, it will allow caregiver to receive alerts on any anomalous behavior of the patient.

Figure 11-6 Notification

Using the System

12 USING THE SYSTEM

This section provides a description of system functions and features.

12.1 Register:

1. This option enables caregiver to register himself as the caregiver of his patient.
2. It asks for:
   2.1. Caregiver username
   2.2. Caregiver password
3. The caregiver will click on the registerbutton and his details will be saved on the server database.

12.2 Login:

4. This option enables caregiver to login himself if he is already registered as the caregiver of his patient.
5. It asks for:
   5.1. Username
   5.2. Password
6. The caregiver will click on the Login button and his details will be authenticated through the server database.

12.3 Add Patient:

1. Caregiver after being registered will add his patient name.
2. A patient id will be assigned to his patient.

12.4 Menu:

On this screen, three options will be displayed to the caregiver.

1. First option will allow him to Set Schedule of his patient.

    1.1. Set Medicine Schedule

    It will allow caregiver to set medicine name, dosage and time to take that medicine.

    1.2. Set Food Schedule

    It will allow caregiver to set food name, quantity and time for having that meal.

    1.3. Set Exercise Schedule

    It will allow caregiver to set exercise name, quantity and time for exercise.

2. Second option will allow him to view his patient location.

    On clicking this button, patient location will be displayed on map.

3. Third option will allow patient to log out from that application.

12.5 Notification Popups:

Notifications will appear on smartwatch and mobile phone application.

1. On Smartwatch patient will receive notification regarding his medicine, food and exercise schedule.

2. On mobile phone caregiver will receive alerts on any anomalous behavior of the patient.