

Sri Lanka Institute of Information Technology



Assignment 01

SE-S1-WE-33

Case Study – 01

Smart Healthcare System for Urban Hospitals

MediZen Health Application

Case Studies in Software Engineering – SE3070

B.Sc. (Hons) in Information Technology

Group Details

Group Number: SE-S1-WE-33

Project Title: Smart Healthcare System for Urban Hospitals

	Student ID	Student Name	Email
1	IT22003546	Dissanayake D M T V	it22003546@my.sliit.lk
2	IT22350114	Gunawardena T S	it22350114@my.sliit.lk
3	IT22577160	Nimes R H R	it22577160@my.sliit.lk
4	IT22607232	Gamage S S J	it22607232@my.sliit.lk

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1 Introduction

By providing a comprehensive digital platform, the Smart Healthcare System for Urban Hospitals in Sri Lanka seeks to modernize and optimize healthcare services. Through four essential, highly valued business services, the Medi Zen system improves both hospital operations and patient care:

Scheduling Appointments and Payment Management: Patients can simply make, change, or cancel appointments and manage payments using a variety of options. Real-time information on appointments, payments, and resource allocation is convenient to administrators.

Medical and Patient Records Management: The system makes it possible to handle patient records—including demographic information, medical histories, and current treatment in an effective manner. A digital health card that can be accessed by a smartphone app or QR code is given to patients, securely connecting their medical records to the system.

Treatment History Tracking: This feature keeps track of all medical treatments, test findings, and ongoing therapies, such as counselling, chemotherapy sessions. All healthcare facilities will have easy access to treatment records according to the digital health card.

Remote Consulting and Virtual Therapy Tracking: The technology facilitates virtual therapy sessions by supporting remote consultations for physical therapy and mental health. Additionally, it provides wellness tools that are connected with the patient's medical records, such as guided meditations and stress management classes.

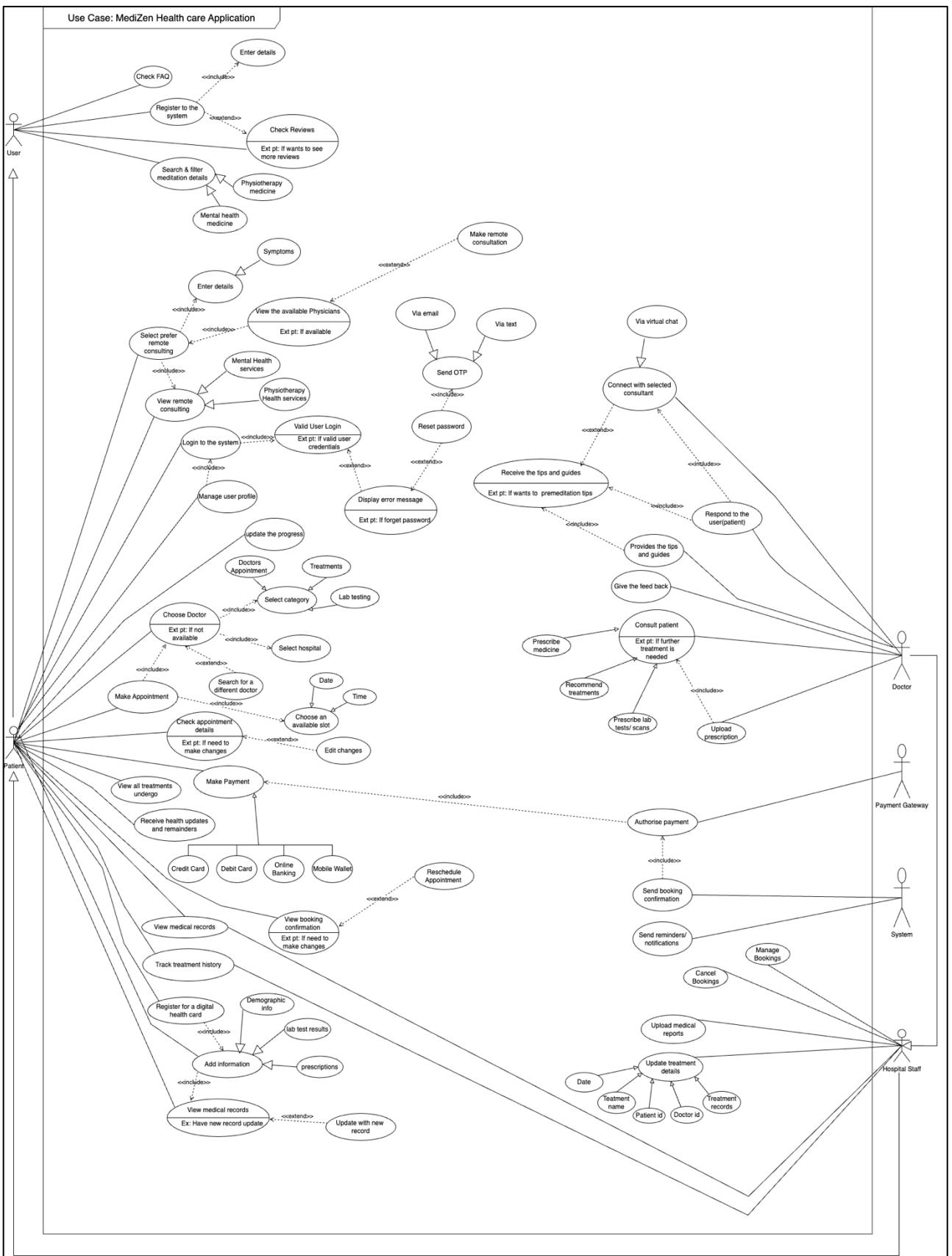
All of these features are connected by the digital health card, guaranteeing standardized and easily accessible medical care from various hospitals and providers. In urban hospitals, this strategy significantly improves both the quality of patient care and operational effectiveness.

2 Assumptions and Justifications

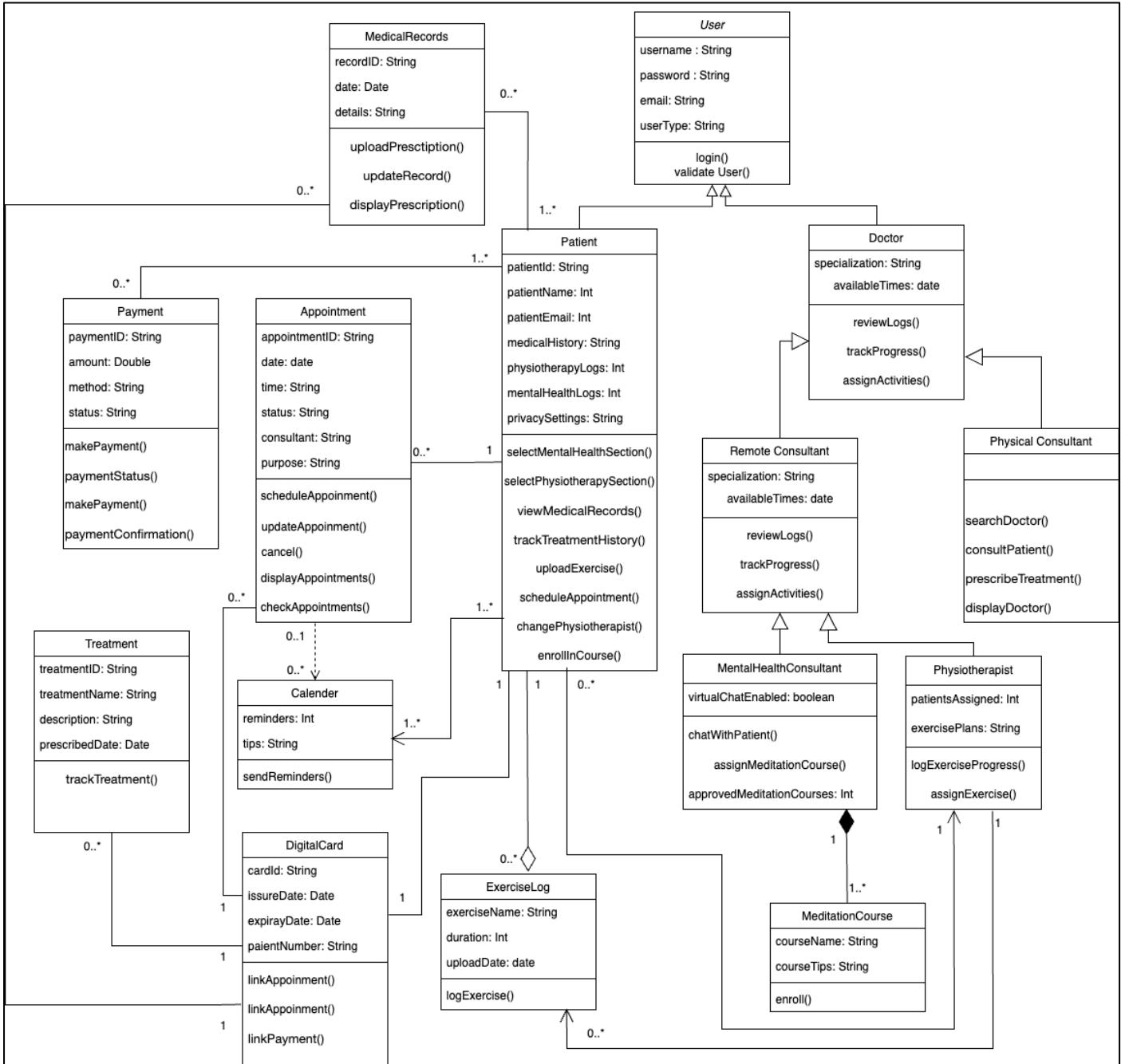
- Tips and Guided Meditations: This will provide patients access to wellness content, including daily tips for healthy living, guided meditations, and stress management techniques.
- Mental Health and Physiotherapy Remote Consultations: The healthcare system will support remote consultations for mental health and physiotherapy. Patients will be able to schedule and attend virtual consultations with healthcare providers through the system's web or mobile application easily.
- Digital Card Integration: The digital card is central to the system, connecting all patient information. Hospital staff can scan the patient's QR code to instantly access medical records, lab reports, scans, and insurance details.
- Initial Patient Registration: Upon registration, patients can upload their previous medical records. After this, all subsequent uploads are managed by hospital staff.
- Prescription Management: Doctors upload prescriptions directly to the system following consultations, ensuring accurate and up-to-date treatment records.
- Lab Report Handling: Lab staff are responsible for uploading all relevant lab reports to the patient's digital profile, making them easily accessible to both patients and doctors.
- Treatment Tracking: Hospital staff update treatment details, allowing patients to view and track their treatment progress through the system.
- The workload for UI was divided among the group members as follows
 - Wireframes for mobile app:
 1. IT22003546 - Dissanayake D M T V
 2. IT22350114 - Gunawardena T S
 - Wireframes for web app:
 1. IT22577160 – Nimes R H R
 2. IT22607232 – Gamage S S J
- User Authentication: All users, including patients, doctors, and hospital staff, must log in with secure credentials to access the system.
- Data Security: All patient data, including medical records, lab reports, and treatment details, is securely stored and encrypted to protect patient privacy.

- Role-Based Access: Different user roles (patient, doctor, hospital staff) have access only to the features and information necessary for their functions, ensuring data is managed securely.
- Mobile and Web Accessibility: The system is accessible via both mobile devices and web platforms, providing flexibility for users to manage health information from anywhere.

3 Use Case Diagram – Link



4 Class diagram - [Link](#)



5 Individual Contribution

5.1 Team Member: IT22003546 - Dissanayake D M T V

5.1.1 User Scenario

Number	001
User Case Name	Make an appointment
Actor	Patient
Goal	I want to book an appointment with a doctor.
Overview	The patient uses the system to search for a specialist, select a convenient time slot, provide relevant health information, and confirm the appointment. The system then sends a confirmation and reminder notifications.
Pre-Condition	The patient is registered and logged into the healthcare management system.
Post-Condition	The appointment is successfully booked and recorded in the system.
Basic Path	<ol style="list-style-type: none">1. Login into the system by entering the user credentials.2. Navigate to “Appointment” UI.3. System displays the appointment search form.4. Type the name of the doctor.5. System loads all the results.6. Select the hospital which is convenient.7. System displays all the sessions that doctor conducts in that hospital.8. Select a convenient session.9. System shows the appointment details and payment gateway.10. Enter the card details and submit.11. System shows the Booking confirmation and Payment confirmation.12. System displays a successful message.13. System will remind the appointments when the appointment is getting closer.
Alternative Path	1a : Invalid login credentials, use forgot credentials option. 5a : No availability for appointments for that doctor, visit to Appointment page.
NFRs and TRs	<ol style="list-style-type: none">1. Availability2. Accurate Appointment Managing

5.1.2 Sequence Diagram - [Link](#)

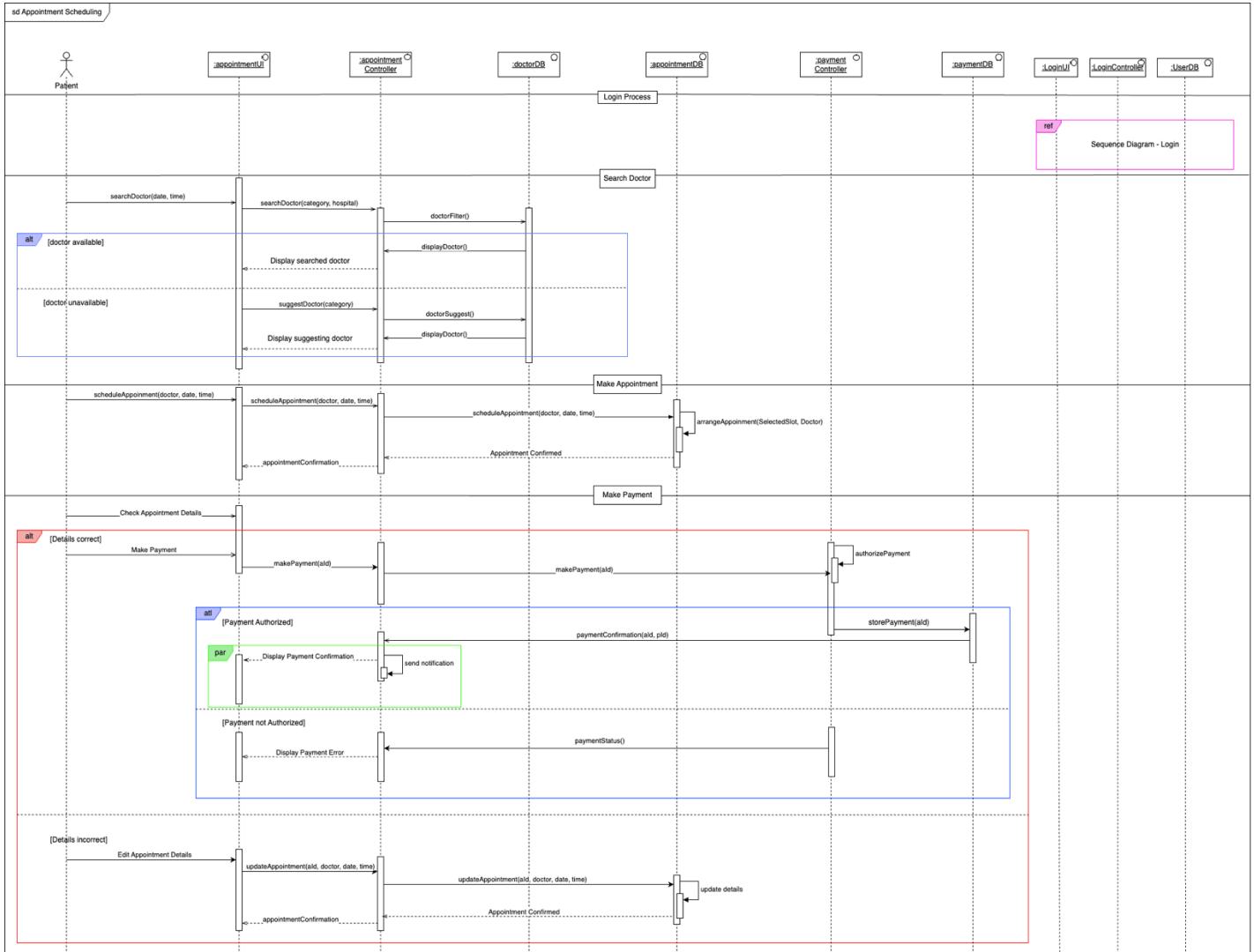


Figure 5.1 - Sequence Diagram for Appointment Scheduling

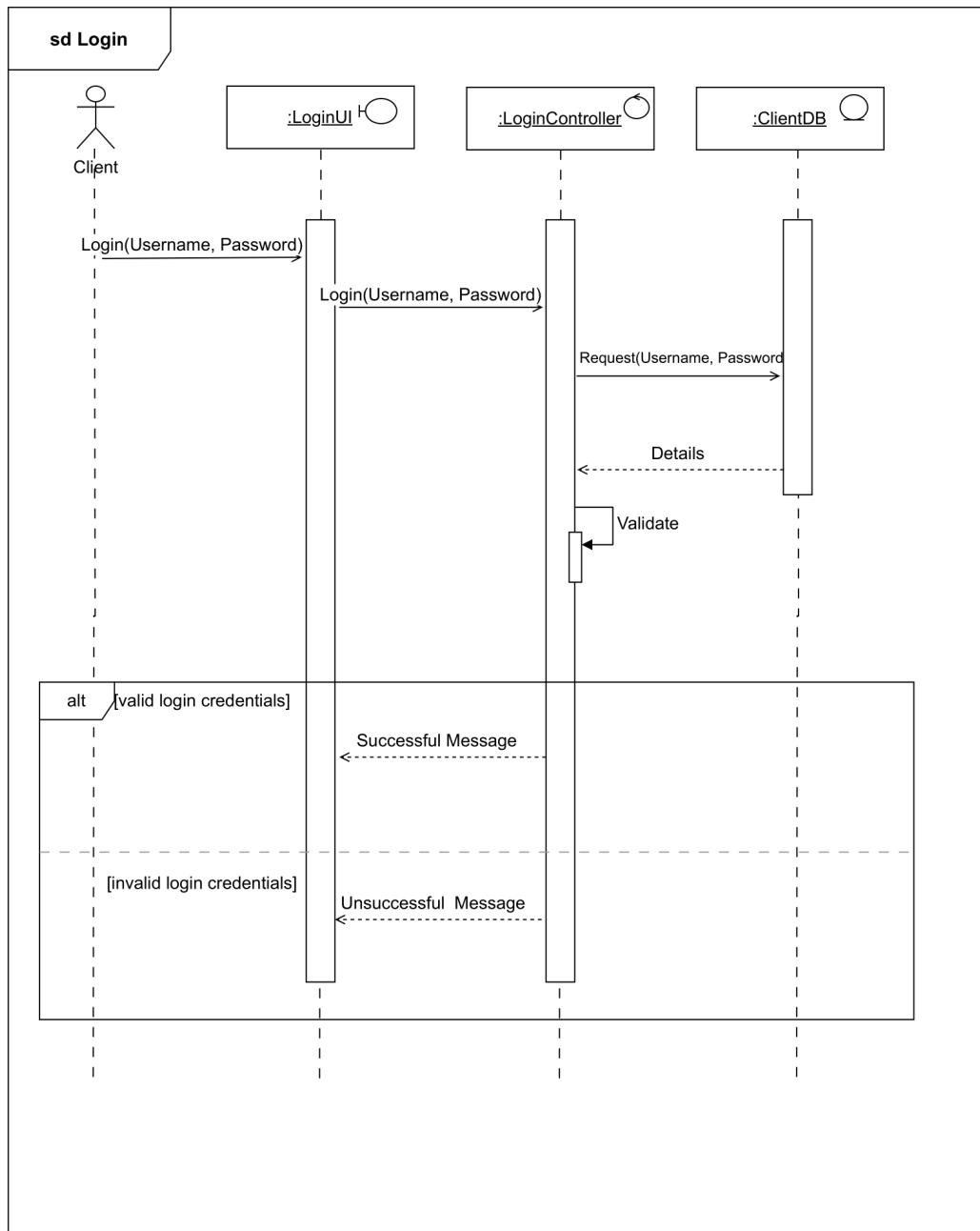


Figure 5.2 - Sequence Diagram for Login

5.1.3 Storyboard

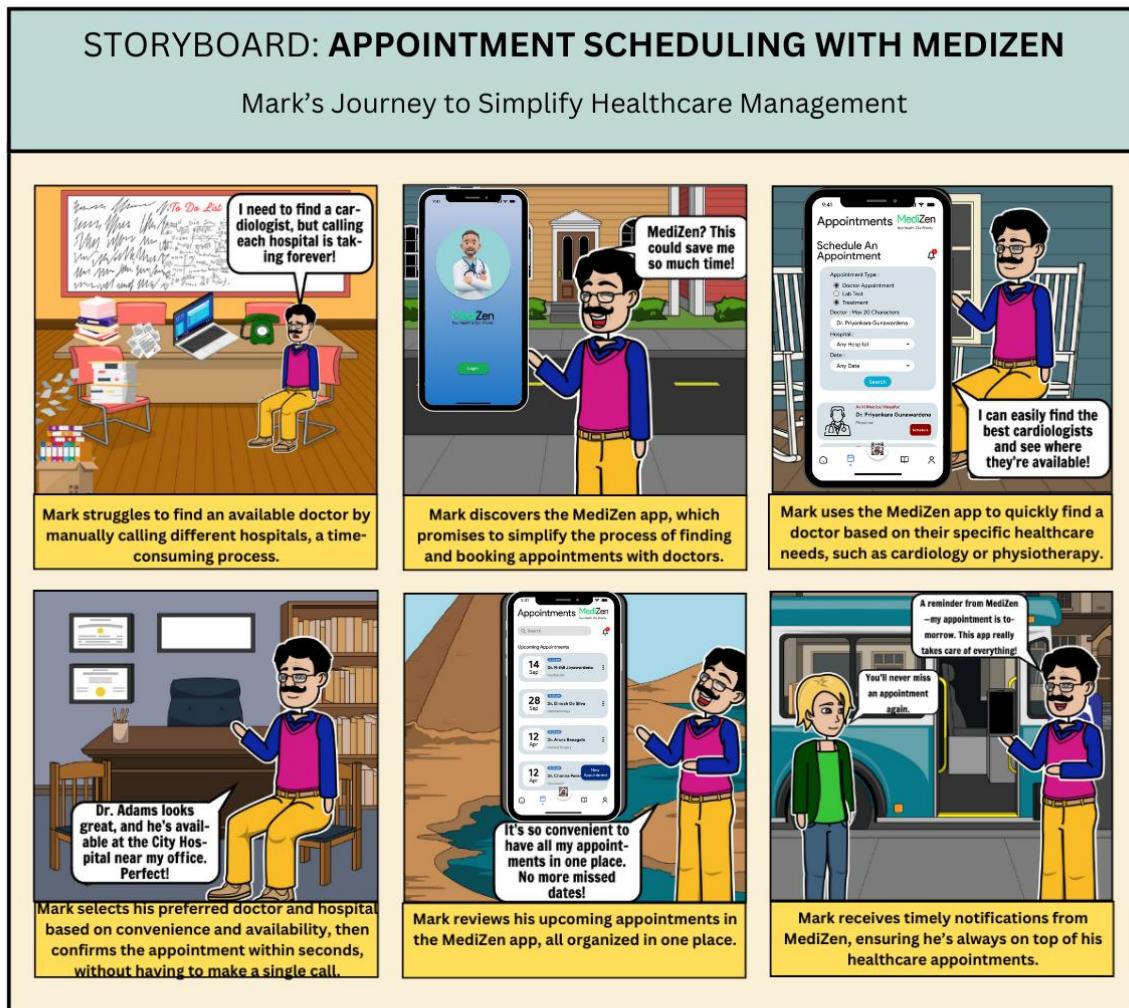
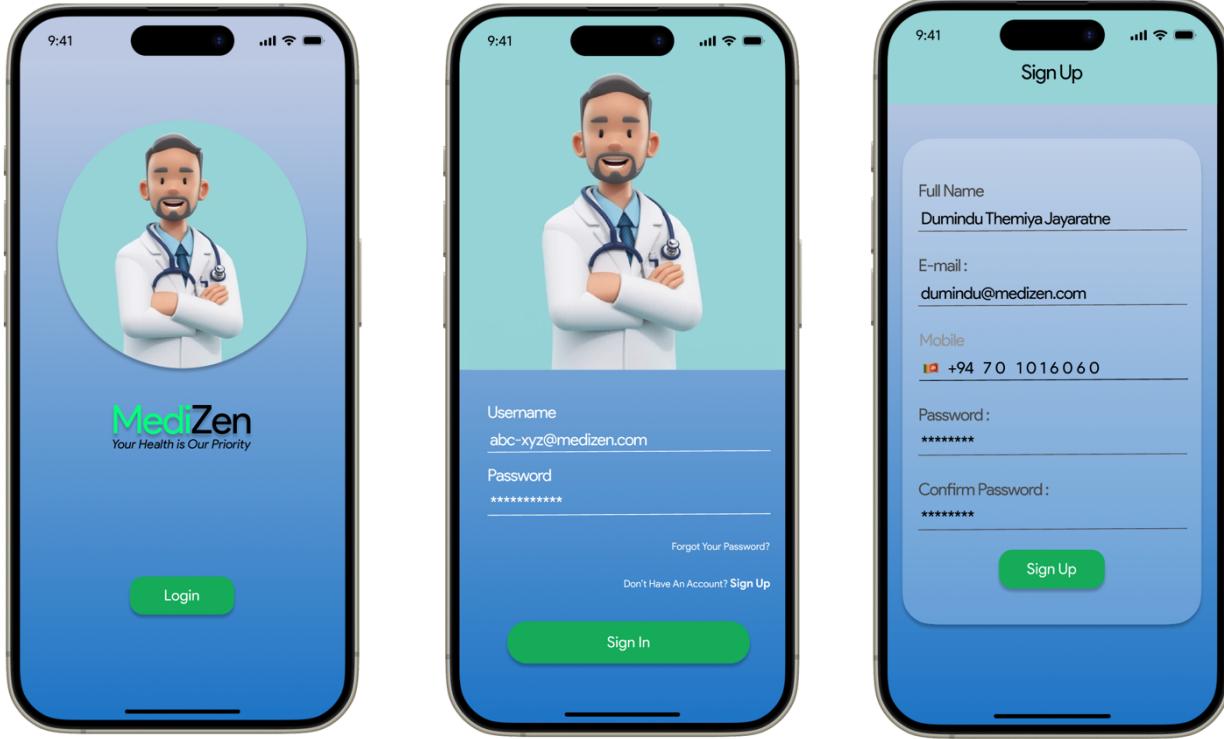


Figure 5.3 - Storyboard for Appointment Scheduling

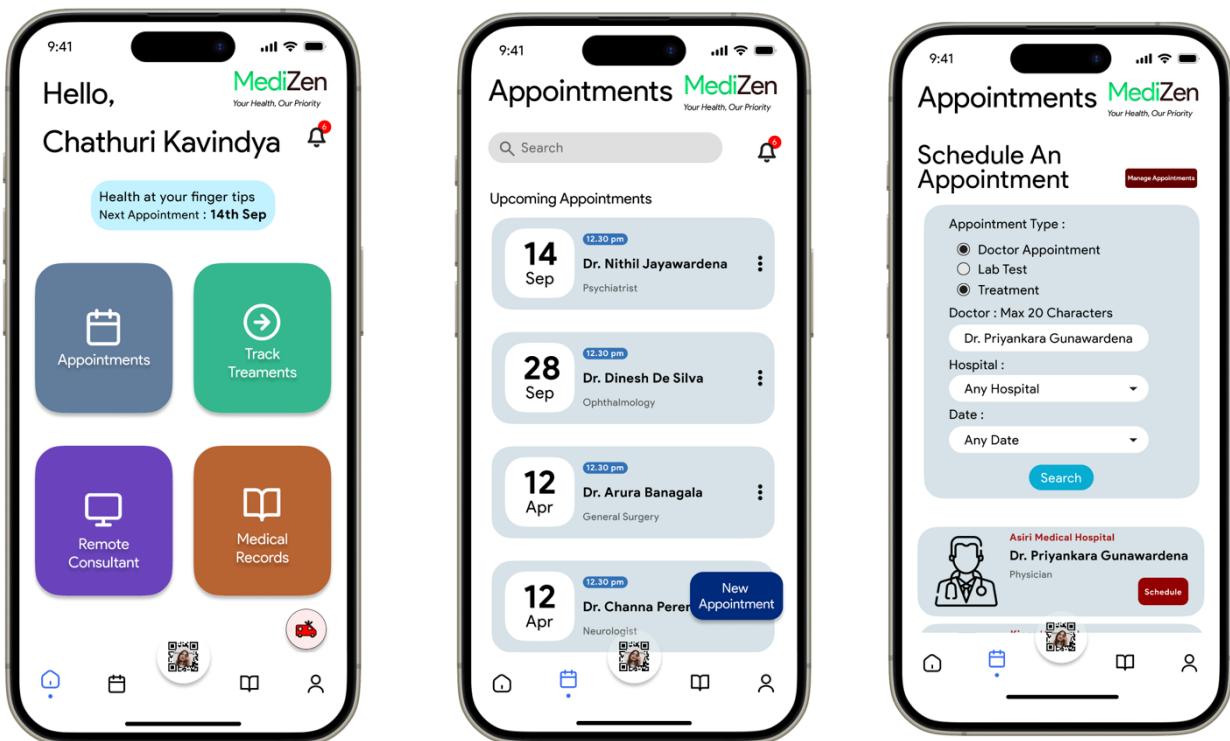
5.1.4 Wireframes

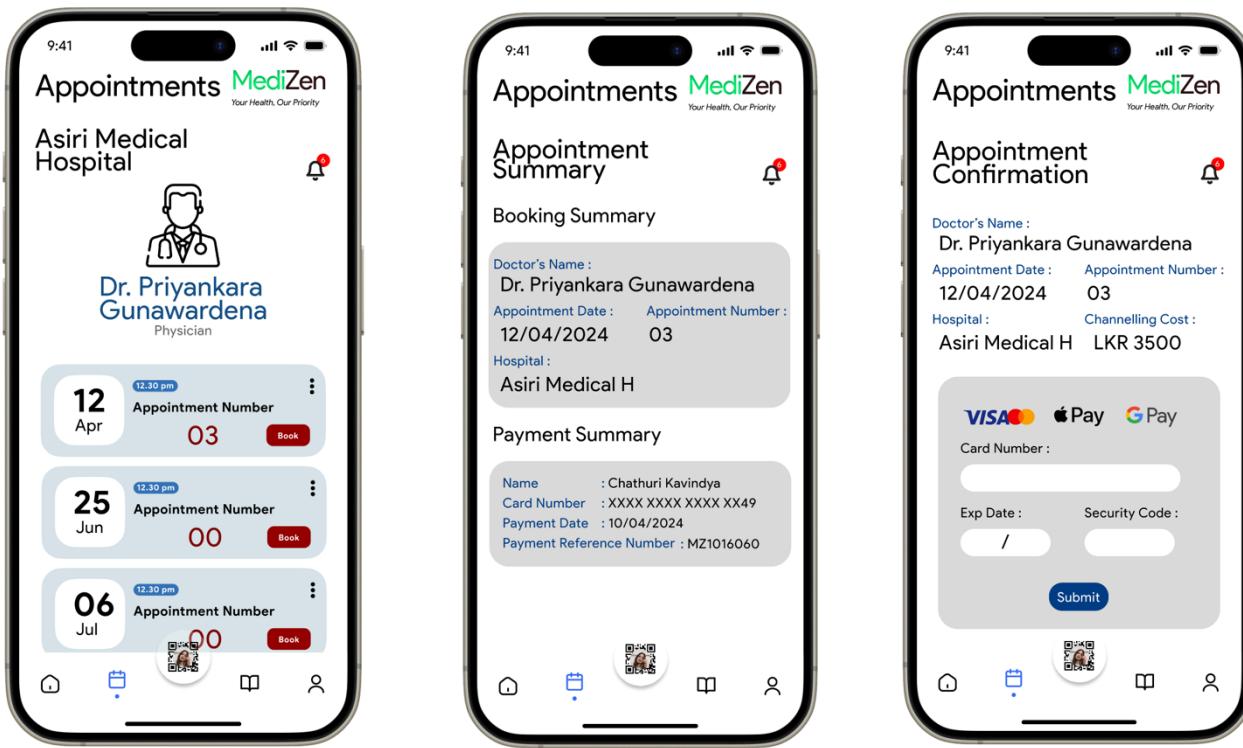
High fidelity

Onboarding, Sign in, Sign Up

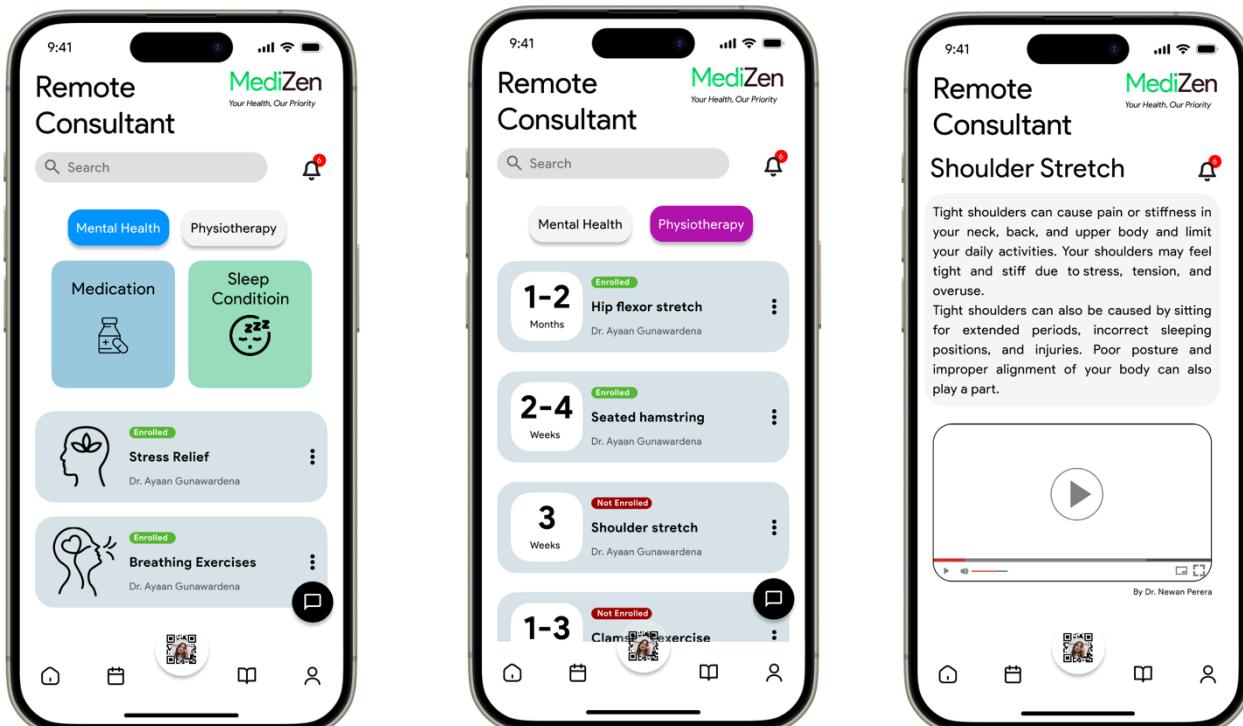


Appointment Management





Remote Consultant



Low fidelity



5.2 Team Member: IT22350114 - Gunawardena T S

5.2.1 User Scenario

Number	002
User Case Name	Medical Records and Treatment Management
Actor	Patient
Goal	As a patient, I want to manage my medical records and track my ongoing treatments, so that I can easily access and monitor my health information.
Overview	The patient accesses the system to upload, view, and track medical records and treatments, including prescriptions, lab results, and chemotherapy sessions.
Pre-Condition	User is registered under the system.
Post-Condition	The system updates the medical records and treatment logs, providing the patient with a consolidated view of their health information.
Basic Path	<ol style="list-style-type: none"> 1. Log in to the system by entering user credentials. 2. The system displays the patient's dashboard. 3. Navigate to the "Medical Records" page. 4. View the existing medical records (lab reports, prescriptions, scans). 5. Navigate to the "Treatment Tracking" page. 6. View ongoing treatments. 7. Can easily track the treatment details, view progress, 8. The system displays a summary of all medical records and treatments. 9. Navigate to the 'Appointments' section to review upcoming consultations related to ongoing treatments. 10. The system notifies the patient of any recent updates or changes to their treatment plan. 11. The patient reviews the updated treatment plan 12. The patient logs out of the system.
Alternative Path	<p>1a: Invalid login credentials, use the "Forgot Password" option.</p> <p>4a: No existing medical records found, as a new patient, upload the existing records.</p> <p>9a: No upcoming appointments found, suggest scheduling a follow-up.</p> <p>11a: Issue with reviewing the updated treatment plan, request clarification from the healthcare provider.</p>
NFRs and TRs	<ol style="list-style-type: none"> 3. Secure storage of medical records. 4. Timely updates and accurate tracking of treatments.

5.2.2 Sequence Diagram - [Link](#)

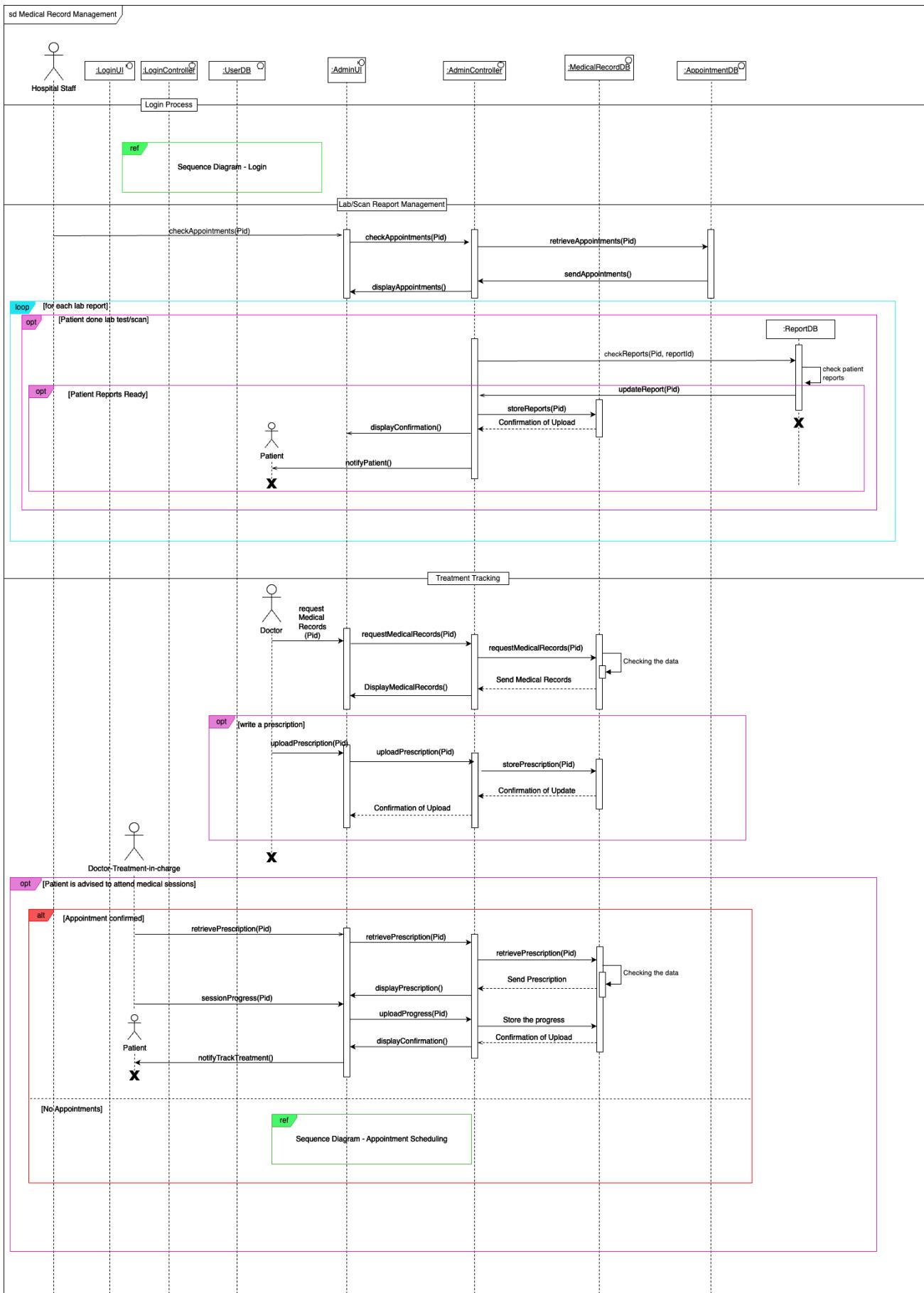


Figure 5.4 - Sequence Diagram for Medical Record Management

5.2.3 Storyboard

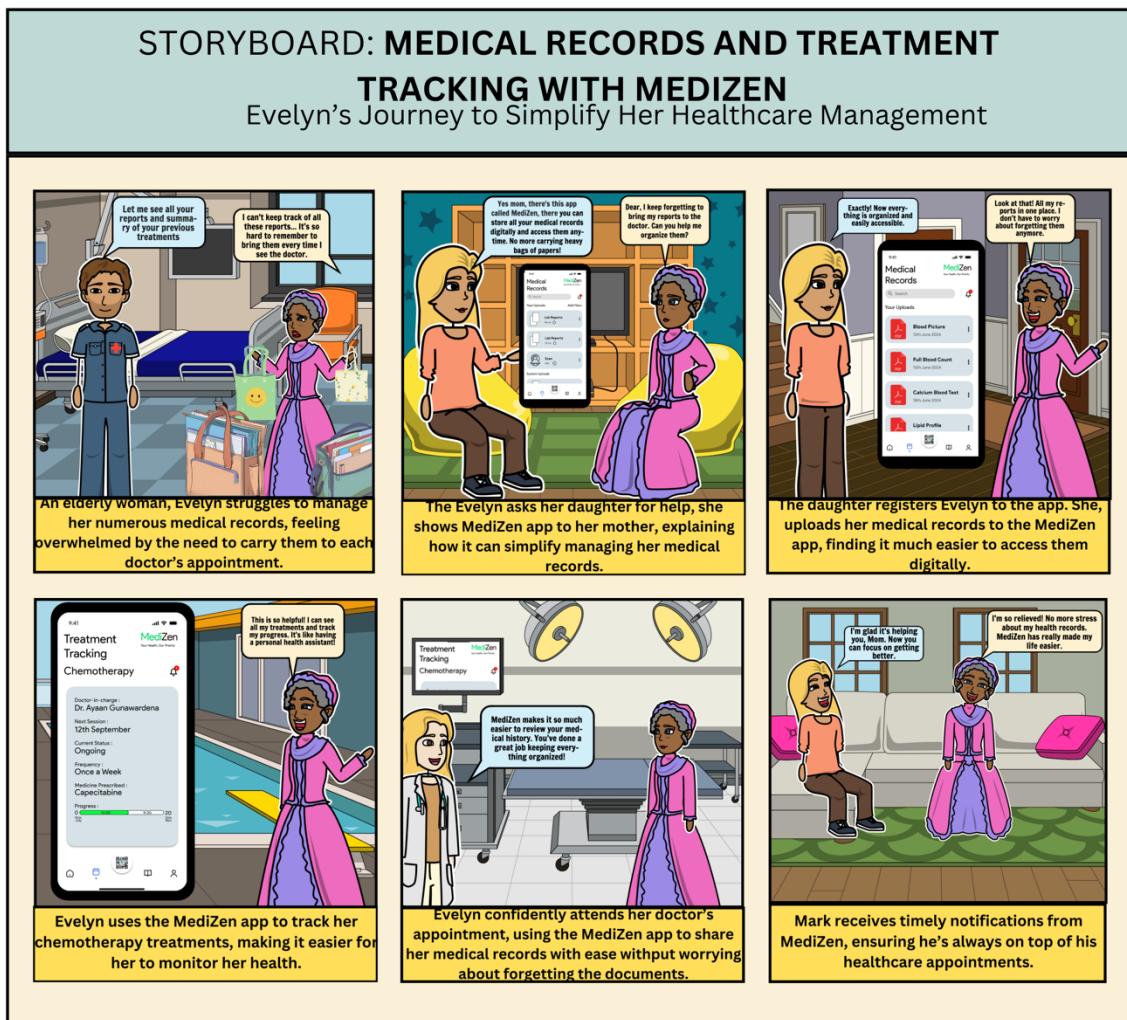
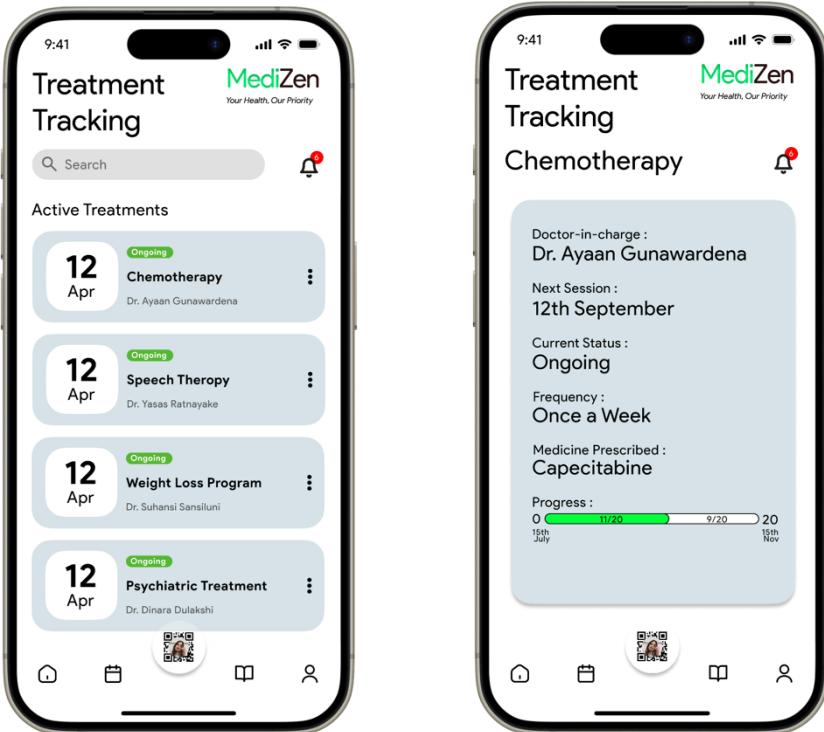


Figure 5.5 - Storyboard for Medical Record

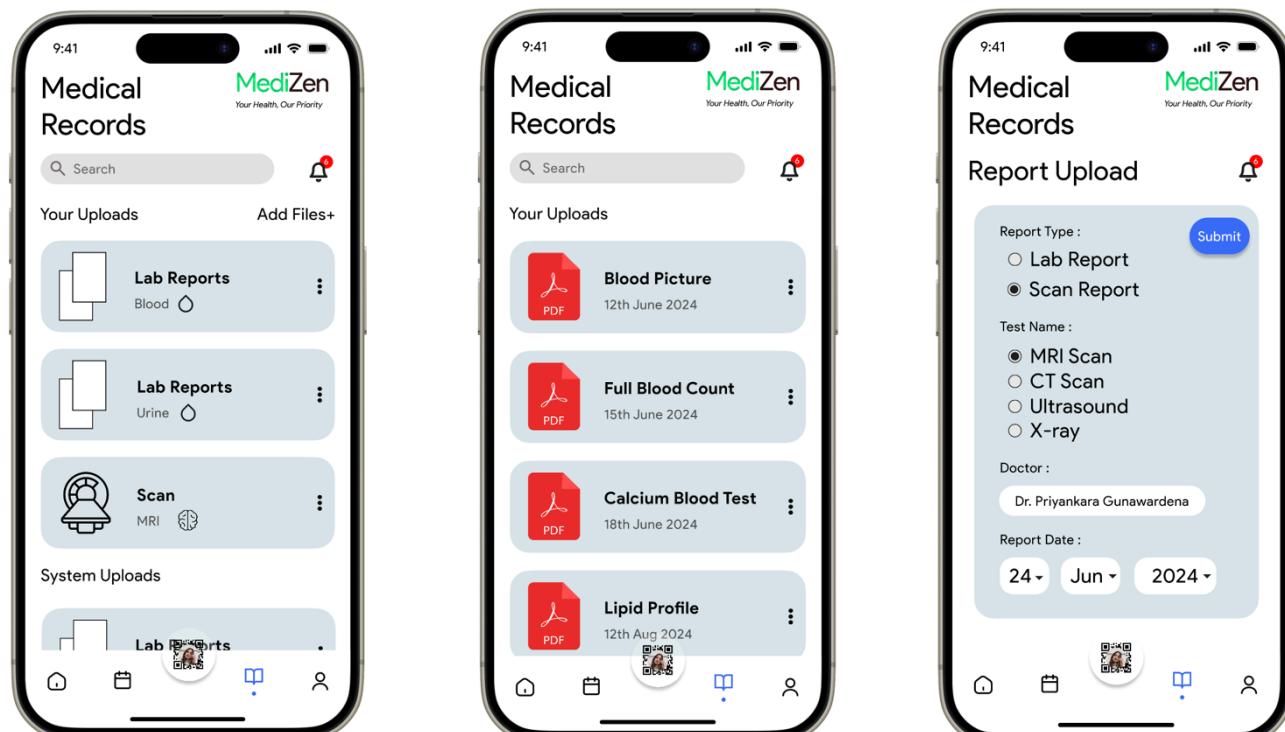
5.2.4 Wireframes

High fidelity

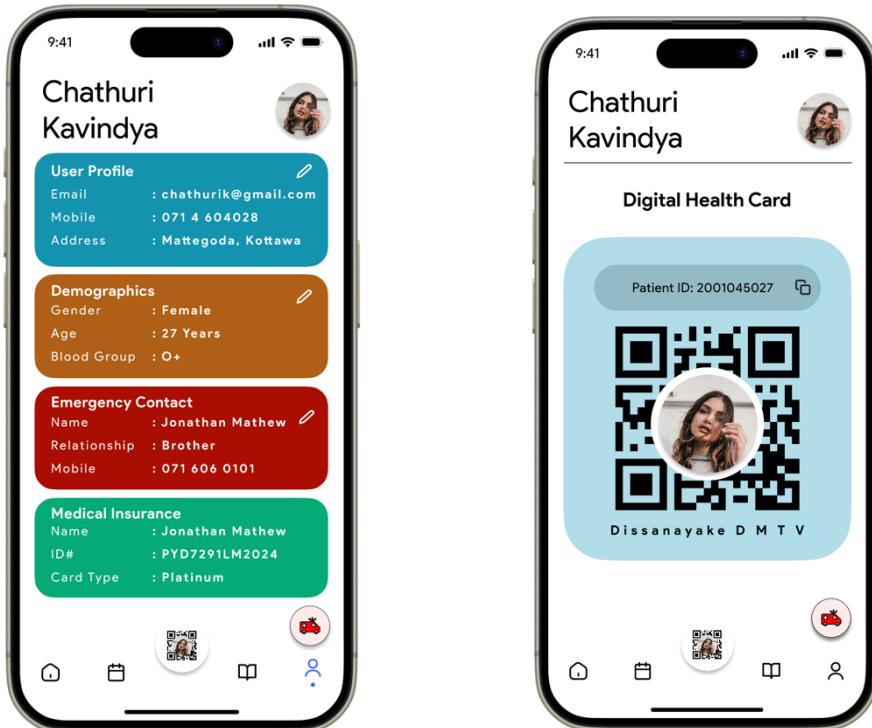
Treatment Tracking



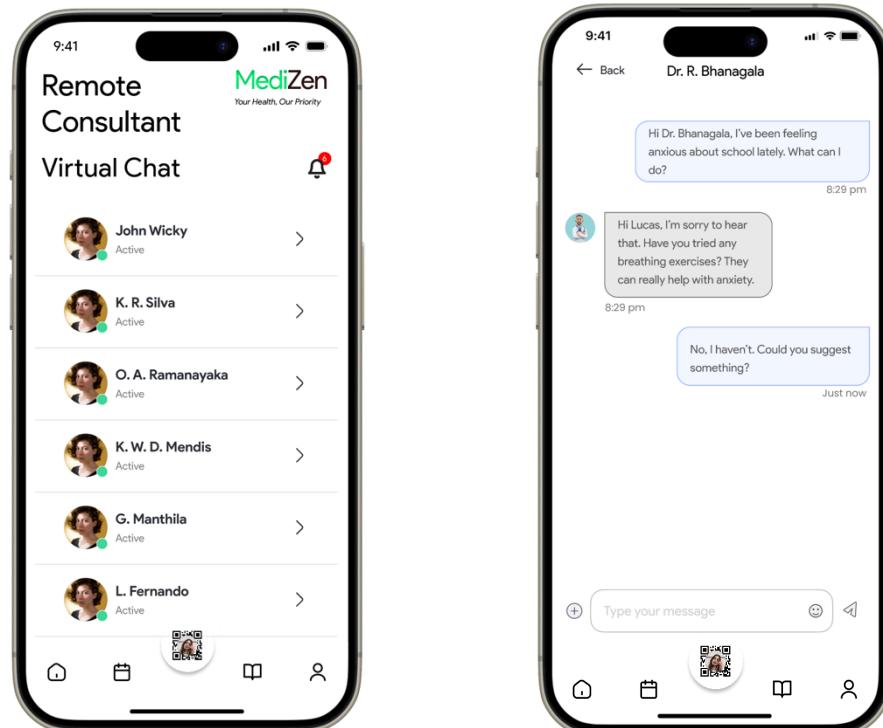
Medical Record Management



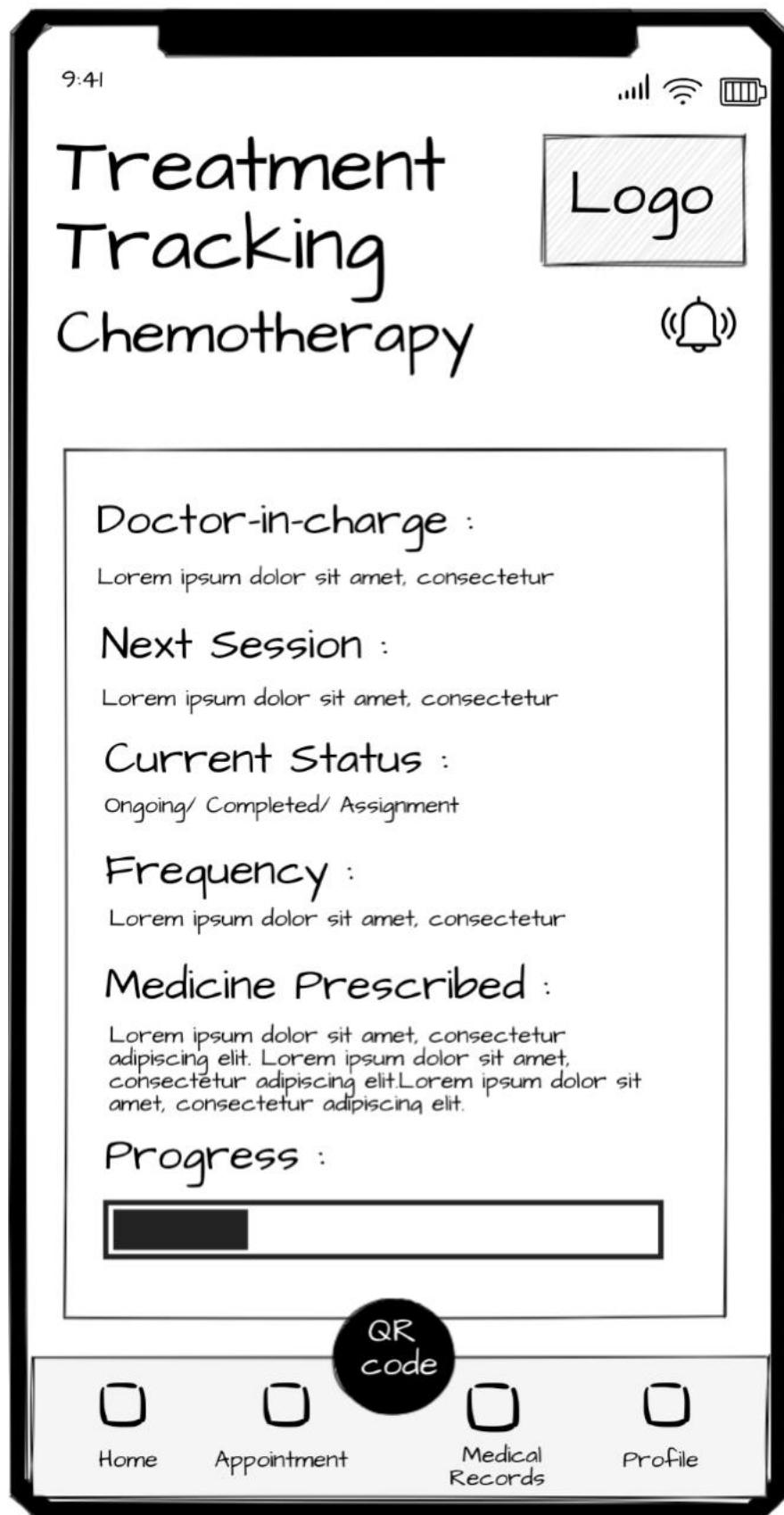
User Profile, Digital Health Card



Remote Consultant – Virtual Chat



Low fidelity



5.3 Team Member: IT22577160 – Nimes R H R

5.3.1 User Scenario

Number	003	
Name	Manage Mental Health and Physiotherapy Sections	
Summary	A patient logs into the app, navigates to the Mental Health section to search for conditions, engage in virtual chat with a consultant, enroll in meditation courses, and schedule appointments. Additionally, the patient can switch to the Physiotherapy section to log exercises, upload data, and track progress with their physiotherapist, as well as schedule appointments.	
Priority	High	
Pre-Conditions	The patient has an active account and is logged into the app. Both the Mental Health and Physiotherapy sections are available. The patient has assigned consultants or physiotherapists.	
Post-Conditions	The patient's mental health logs and/or physiotherapy logs are updated based on their interactions. Any scheduled appointments are confirmed and added to the patient's calendar. Notifications, reminders, and tips are sent according to the patient's calendar and activity.	
Primary Actor	Patient	
Trigger	The patient needs to manage their mental health or physiotherapy activities, including scheduling appointments.	
Main Scenario	Steps	
	01	The patient logs into the app using their credentials.
	02	The patient navigates to the Mental Health section.
	03	The patient searches for their condition by entering keywords or symptoms.
	04	The system retrieves and displays relevant information and suggestions.
	05	The patient initiates a virtual chat with a mental health consultant if more help is needed.
	06	The patient schedules an appointment with a consultant.
	07	The patient enrolls in an approved meditation course recommended by the consultant.
	08	The system updates the patient's mental health log, confirms the appointment, and schedules reminders and tips based on the selected activities.
Extensions	1a	(If the patient forgets their password) The system provides a "Forgot Password" option, allowing the patient to reset their password via email or SMS.
	2a	(If the patient selects the Physiotherapy section instead of the Mental Health section) The patient can log prescribed exercises and upload their exercise data.
	2b	The physiotherapist reviews the patient's exercise logs and tracks progress over time.
	2c	The patient can change their physiotherapist and schedule new sessions if needed.
	2d	(If the exercise data fails to upload) The patient receives an error message and is prompted to try again or contact support.
	6a	(If the selected time slot is unavailable) The system suggests alternative time slots or consultants.

5.3.2 Sequence Diagram - [Link](#)

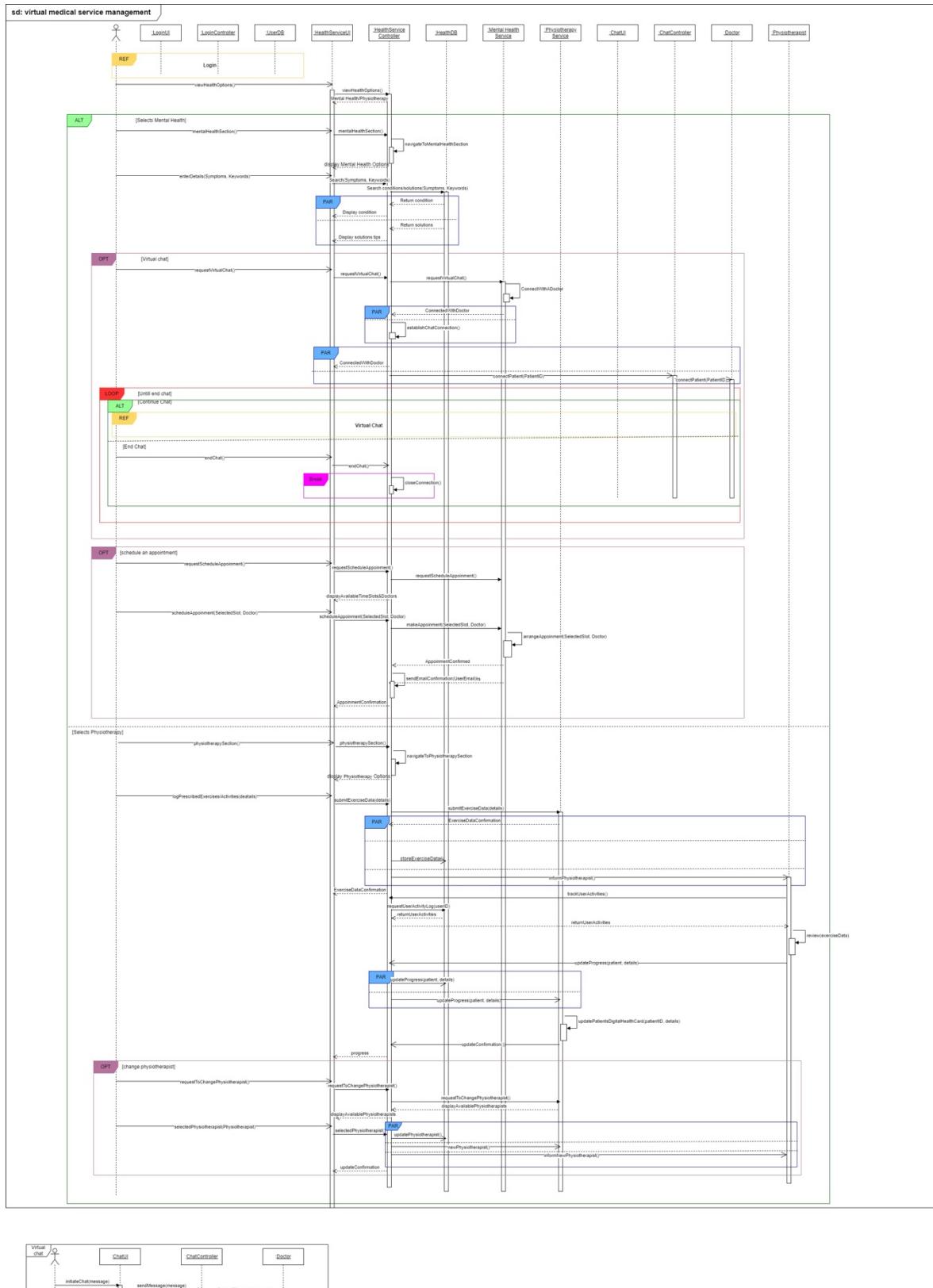


Figure 5.6 - Sequence Diagram for Remote Consulting

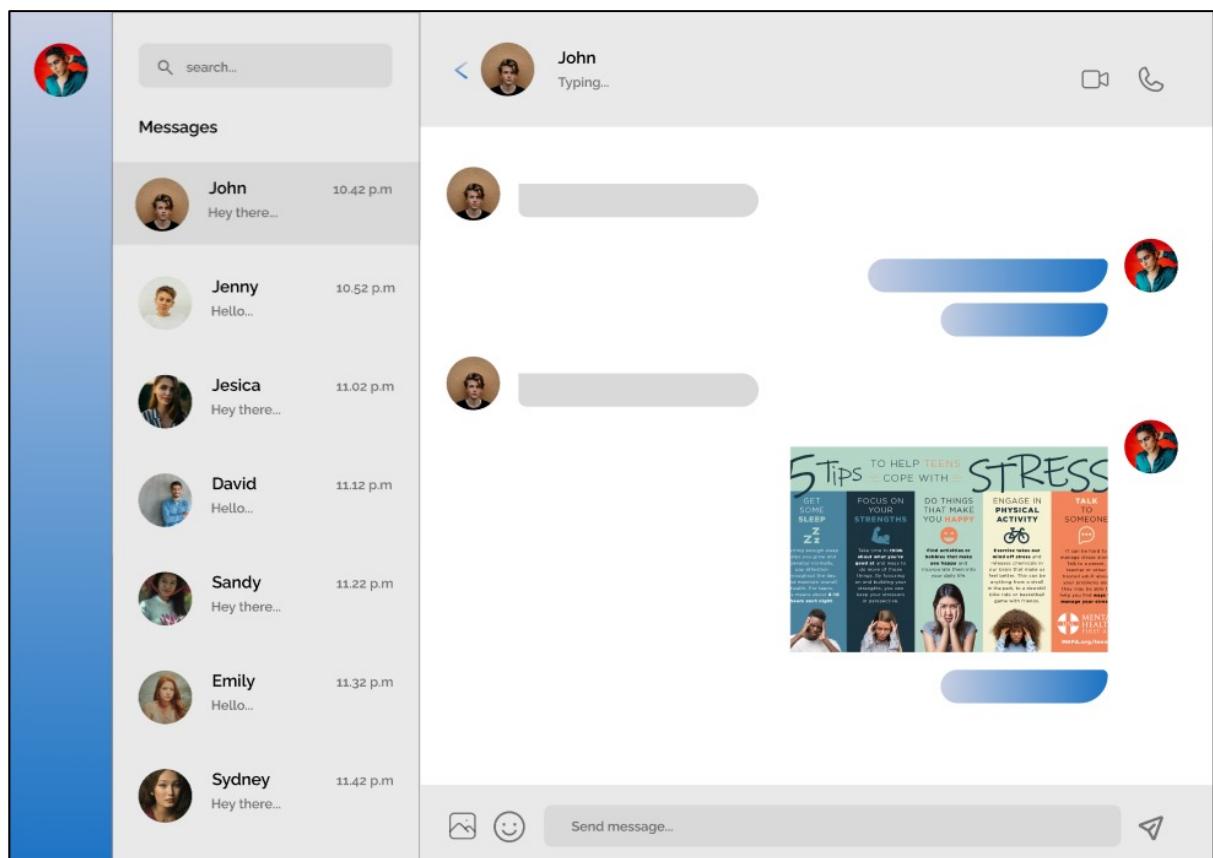
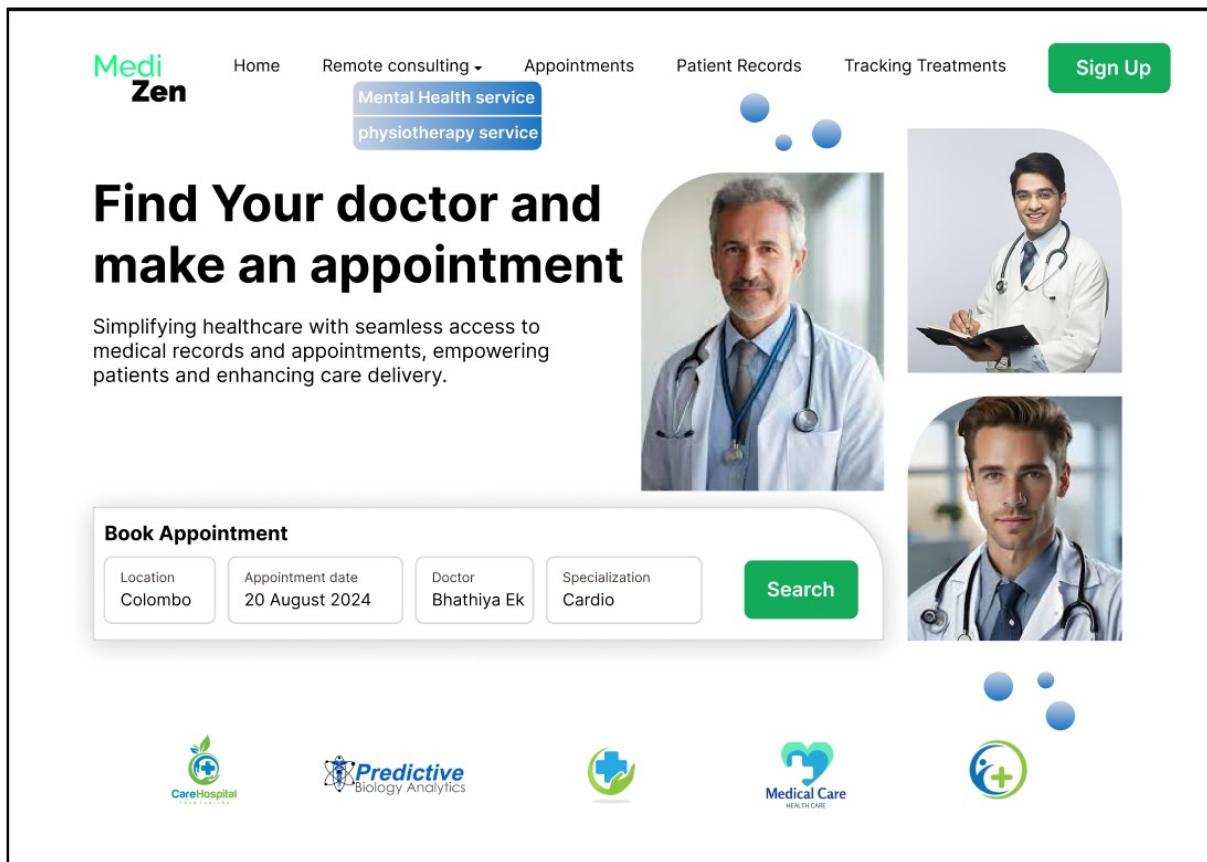
5.3.3 Storyboard



Figure 5.7 - Storyboard for Remote Consulting

5.3.4 Wireframes.

High fidelity



Medi Zen

- Home
- Remote consulting
- Appointments
- Patient Records
- Tracking Treatments
-
- < Back

Mental Wellness Dashboard

You got Your mental health Guidelines, Treatment and courses.

[View History](#)

5 hrs

Sleep Condition
Take break from work and take rest

Overall Health
5% grater than last week

John

Weight 55kg
 Height 160cm
 Sign Out

September

Mo	Tu	We	Th	Fr	Sa	Su
35	26	27	28	29	30	31
36	2	3	4	5	6	7
37	9	10	11	12	13	14
38	16	17	18	19	20	21
39	23	24	25	26	27	28
40	30	1	2	3	4	5

[Add Event](#)

Medi Zen

- Home
- Remote consulting
- Appointments
- Patient Records
- Tracking Treatments
-
- < Back

Physiotherapy Dashboard

It look like you have not completed your exercise today.

[View History](#)

Gait Training Exercises In Physical Therapy

105 bpm

Heart Rate
Your Heart Rate is normal

2,500 steps

Steps
Need 7500 more steps to complete 10,000 steps

5 hrs

Sleep Condition
Take break from work and take rest

98 mmHg

Blood Pressure
Your Blood Pressure is normal

John

Weight 55kg
 Height 160cm
 Sign Out

September

Mo	Tu	We	Th	Fr	Sa	Su
35	26	27	28	29	30	31
36	2	3	4	5	6	7
37	9	10	11	12	13	14
38	16	17	18	19	20	21
39	23	24	25	26	27	28
40	30	1	2	3	4	5

[Add Event](#)

Low fidelity

The wireframe shows a mobile application interface for MediCare. The top navigation bar includes three dots on the left and the MediCare logo on the right. A vertical sidebar on the left contains icons for navigation, a grid view, messaging, a chart, a profile, and settings.

The main content area features a header "MediZen" and a greeting "Hello, John". Below this, there are three large placeholder boxes, each marked with a large 'X' in the center. To the right of these boxes is a user profile section showing a circular icon with a person, the name "John", and statistics: "55kg", "160cm", and "Sign Out".

Below the profile is a date indicator "18 April 2024" followed by a calendar for April 2024. The calendar grid is as follows:

SU	MO	TU	WE	TH	FR	SA
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

On the left side of the main content area, there are two cards: "Sleep Condition" showing "5 hrs" and "Take break from work and take rest", and "Overall Health" showing a pie chart with the note "5% greater than last week".

5.4 Team Member: IT22607232 – Gamage S S J

5.4.1 User Scenario

Number	003	
Name	Manage Patient Profile and log medical records.	
Summary	A patient logs into the app, navigates to the patient profile section. Patient fills the demographic information in the details page. And uploads the past prescriptions and medical records that is required. According to the ongoing and the status of the profile patient is received the notifications and reminders.	
Priority	High	
Pre-Conditions	The patient has an active account and is logged into the app.	
Post-Conditions	The patient's entire medical history can be accessed in a one digital health card Notifications, reminders, and tips are sent according to the patient's ongoing activities and treatments.	
Primary Actor	Patient	
Trigger	The patients need to manage their profiles in an active way.	
Main Scenario	Steps	
	01	The patient logs into the app using their credentials.
	02	The patient navigates patient profile section.
	03	The patient fills out his demographic information.
	04	The system retrieves and displays relevant information about the personal details of the patient.
	05	The patient logs his past medical records and prescriptions including lab test results.
	07	The system updates the patient's profile according to the undergone treatments.
	08	The patient receives notifications and reminders as per their events and the treatments which are undergone.
Extensions	1a	The system provides a "Forgot Password" option, allowing the patient to reset their password via email or SMS.
	3a	app provides the patient with potential health risk indicators, such as risks associated with age, gender, or lifestyle.
	5a	The app enables the patient to track their progress for ongoing treatments, showing milestones and improvements over time.
	5b	The app provides alerts if new medications prescribed have potential interactions with existing medications the patient is taking.
	6a	can customize the types of notifications they and their preferred notification channels (SMS, email)
	7a	The app sends notifications when a prescription refill is needed and allows patients to request refills through integrated pharmacies.

5.4.2 Sequence Diagram - [Link](#)

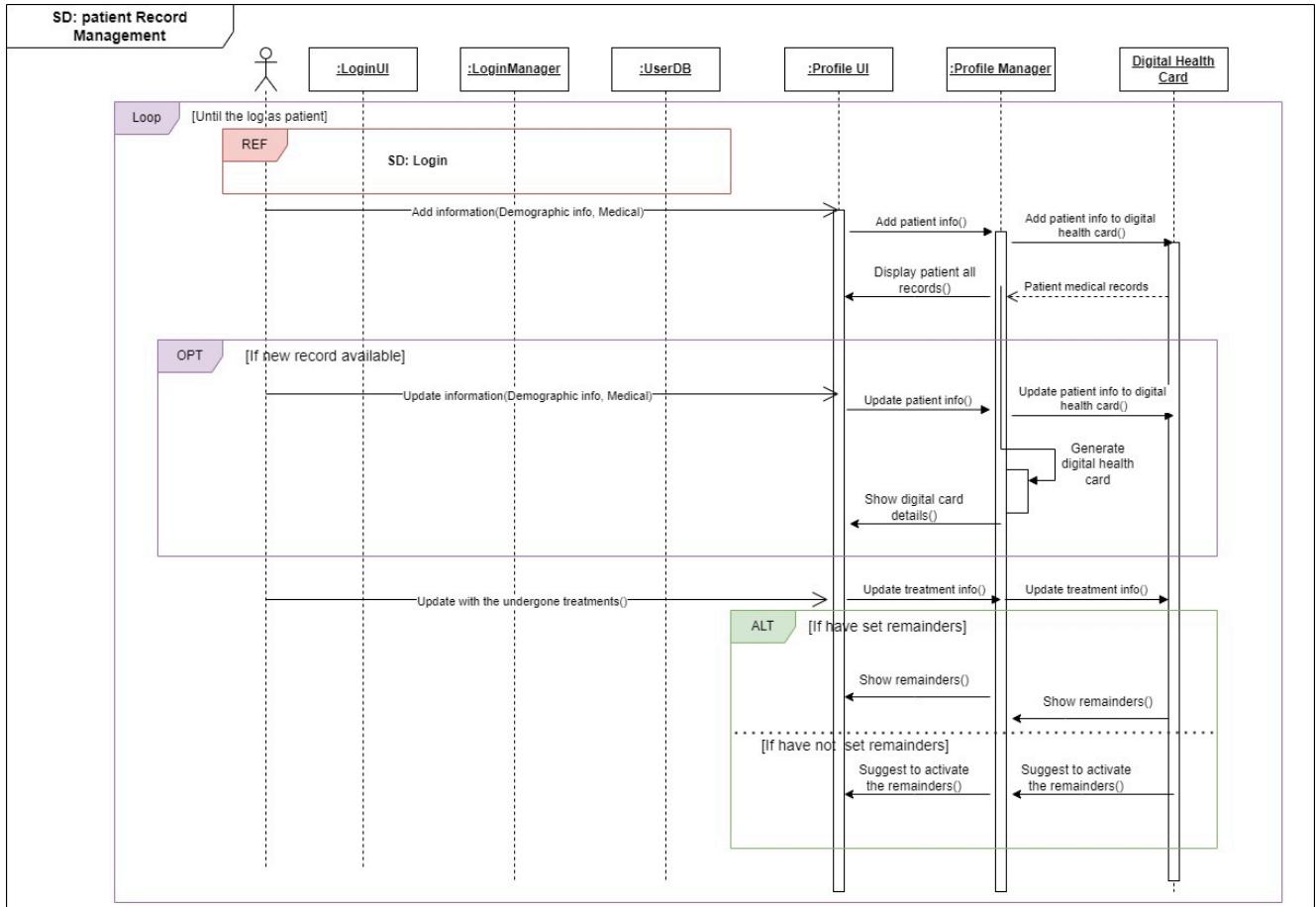


Figure 5.8 - Sequence Diagram for Patient Record Management

5.4.3 Storyboard

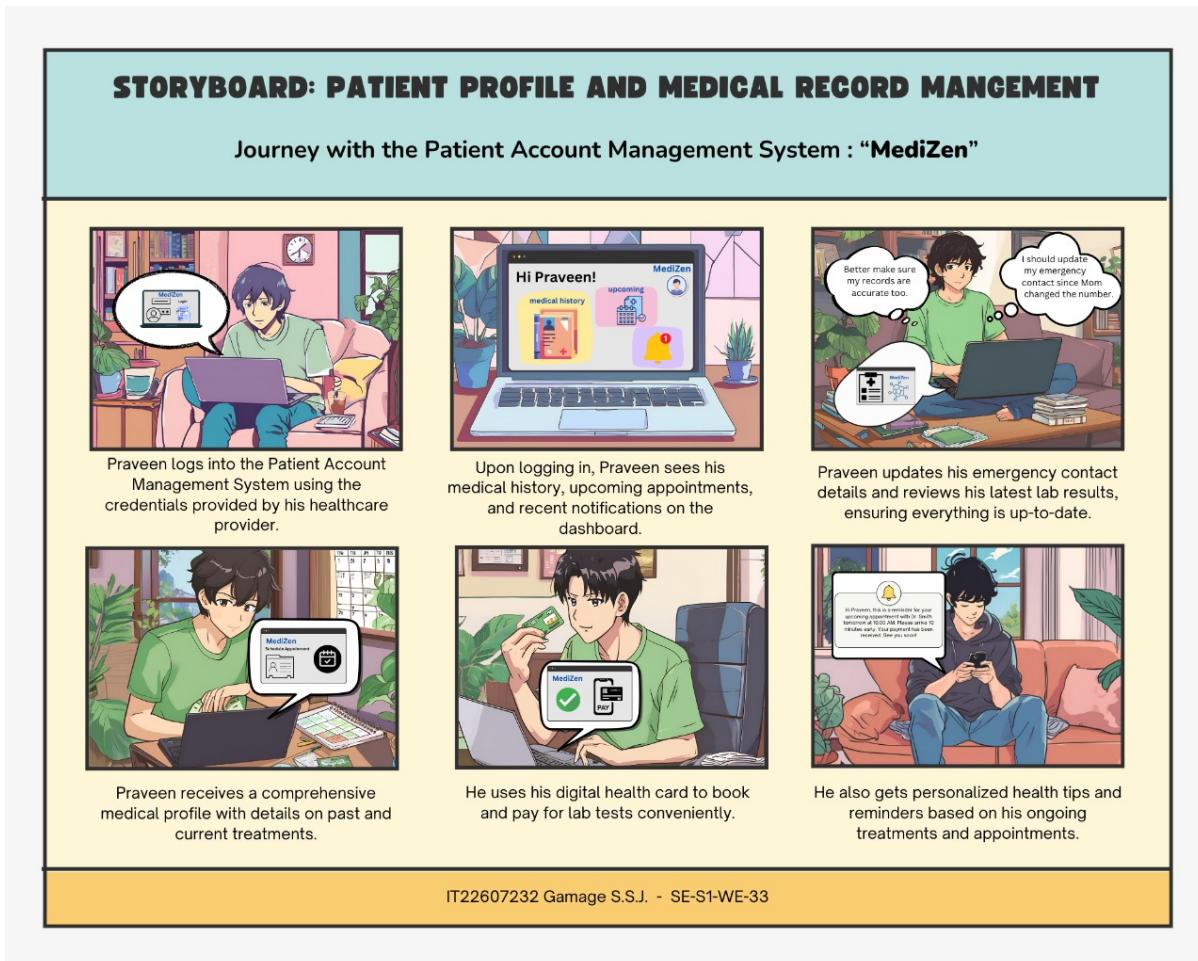


Figure 5.9 - Storyboard for Patient Record Management

5.4.4 Wireframes

High Fidelity

The wireframe shows the Medi Zen interface for patient John. The top navigation bar includes Home, Remote Consulting (dropdown), Appointments, Patient Records, Tracking Treatments, a bell icon, and a profile picture of John with the greeting "Hi!! John". The left sidebar has icons for Home, Doctors, Lab Tests, Billing, and Settings. The main content area starts with a "Hello, John" message and a welcome note. It features a "View History" button and a "Past Lab Results Upload" section with a "Upload files:" button. Below this is a "Medical History" section listing conditions like migraine, Diabetes, pressure, stress, and leg pain. A "Your Activities" section lists a To Do list, Meditation Course, and Physiotherapy session. A "Download Pdf" button is at the bottom. On the right, there's a "Vital Signs" button, a "Consent Forums" button, and a graphic of two people with a heart and a plus sign.

The wireframe shows the Medi Zen interface for patient Ravindu. The top navigation bar includes Home, Remote Consulting (dropdown), Appointments, Patient Records, Tracking Treatments, a bell icon, and a profile picture of Ravindu with the greeting "Hi!! Ravindu". The left sidebar has icons for Home, Lab Tests, Billing, and Settings. The main content area displays three patient profiles for tracking: Ms. Seetha Perera (Cardio Unit), Mr. Nuwan Karunaratna (Physical Unit), and Mr. Raveen Ekanayake (Neuro unit). Each profile includes a patient photo, name, category, and a "Track" button.

Medi Zen

Find me

Simplify medical patients

Hemas Hospital
Prof.Jayamini Senewiratna Demerologist **Channel**

Kings Hospital
Prof.Jayamini Senewiratna Demerologist **Channel**

Ninewells Hospital
Prof.Jayamini Senewiratna Demerologist **Channel**

Patient Records Tracking Treatments **Sign Up**

Book Appointment

Location Colombo Appointment date 30 August 2024 Doctor Jayamini Se Specialization Dermatologist **Search**

Patient Records **Tracking Treatments**

Sign Up

Book Appointment

CareHospital **Predictive Biology Analytics** **Medical Care**

Medi Zen

Home Remote Consulting Appointments Patient Records Tracking Treatments

Hi!! Ravindu

< Upload Patient Progress

Hello, Ravindu

Welcome to Medi Zen, where your health meets care.

Download Report summary

Patient Record 1
Patient prescription , blood report ABC **Upload**

Patient Record 2
Patient prescription , Urine culture test **Upload**

Patient Record 3
Patient prescription , cardio- echo test **Upload**

Lab Tests

Billing

Medi Zen

Home Remote Consulting Appointments Patient Records Tracking Treatments

Hi!! John

< Reminders & Notifications

Hello, John

Welcome to Medi Zen, where your health meets care.

Don't Miss out Anything.....

Search by date/key word:

Title	Description	Date
Title	Description	9:41 AM

Turn On Notifications >

View History >

The screenshot displays the Medi Zen mobile application's user interface. At the top, there is a navigation bar with links for Home, Remote Consulting, Appointments, Patient Records, and Tracking Treatments. A circular profile picture of a man named John is shown with the greeting "Hi!! John". To the left of the main content area, there is a vertical sidebar with icons for Home, Lab Tests, Billing, and Settings. The main content area features a large banner with a red cross icon and a circular arrow icon. Below this, a section titled "Don't Miss out Anything....." contains a search bar and a list of four notifications, each with a title, description, and timestamp (9:41 AM). To the right, there is a blue-themed section with buttons for "Turn On Notifications >" and "View History >".

Low fidelity

