TELEHEALTH: A MOBILE APPLICATION FOR HEALTH MONITORING

A project submitted in partial fulfillment for the award of the degree of

Bachelor of Technology (B. Tech)

under the guidance of

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Submitted by
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Department of Computer Science and Engineering,
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CERTIFICATE FROM PROJECT GUIDE

This is to certify that the project report entitled "***Telehealth: A Mobile Application for Health Monitoring***", submitted to the Department of Computer Science and Engineering, Tezpur University, in partial fulfillment for the award of the degree of Bachelor of Technology in computer science and engineering, is a record of bona fide work carried out by **Ms. Dhritideepa Sarania**. Roll no. **CSB21070**, under my supervision and guidance.

All help received by him from various sources has been duly acknowledged.

Date: 31st May 2024
Place: Tezpur University

Dr. Nabajyoti Medhi
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CERTIFICATE

This is to certify that the report entitled "***Telehealth: A Mobile Application for Health Monitoring***" is a bona fide record of the project completed by **Dhritideepa Sarania (CSB21070)** and submitted in fulfillment of the requirements and regulations of the mini project for the 3rd year of the 4-year Bachelor of Technology course in Computer Science and Engineering at Tezpur University. He has carried out the project work under the supervision of **Dr. Nabajyoti Medhi**, CSE, Tezpur University.

This certification does not necessarily endorse or accept every statement made, opinion expressed, or conclusion drawn in the report. It only signifies the acceptance of this report for the purpose for which it is submitted.

Date: 31st May 2024
Place: Tezpur University

Dr. Sarat Saharia
Head of Department, CSE

Department of Computer Science and Engineering
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DECLARATION

I hereby declare that the Project Report titled **Telehealth: A Mobile Application for Health Monitoring**, submitted in partial fulfillment for the award of the degree of **Bachelor of Technology in Computer Science and Engineering** during the academic session of Spring 2024, is a result of my independent work. All the information and content presented in this report is based on my original research, analysis, and implementation. Any references and sources of information used, have been duly acknowledged and cited.

I further declare that this project report has not been submitted to any other academic institution or published in any form.

Date: 31st May 2024
Place: Tezpur University

Dhritideepa Sarania
CSB21070

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Finally, I want to thank my family for their unwavering support, patience, and inspiration during this journey. My accomplishments have been propelled by their confidence in me and ongoing encouragement.

Date: 31st May 2024
Place: Tezpur University

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CHAPTER 1: INTRODUCTION

Healthcare is an essential aspect of our society, and its efficacy is crucial for the well-being of individuals. However, the healthcare sector grapples with challenges, particularly in ensuring timely and accessible medical services. Long queues, especially for non-emergency consultations and routine check-ups, contribute to inefficiencies and patient dissatisfaction, highlighting the need for innovative solutions. In response to these challenges, this report introduces a comprehensive Telehealth Mobile Application designed to revolutionize healthcare accessibility and delivery. This telemedicine application serves as a pivotal component within a broader environment that includes the integration of a Telehealth Health Kit and a mobile application for health monitoring.

1.1. Contextualizing Healthcare Challenges

The demand for medical services has been on the rise, leading to congestion in traditional healthcare settings. The prevalence of long queues not only hampers the efficiency of the healthcare system but also results in suboptimal patient experiences. Recognizing these challenges, our project aims to address the limitations of the existing healthcare system, particularly in terms of accessibility and cost-effectiveness.

1.2. TeleHealth Mobile Application: A Solution for Enhanced Accessibility

The Telehealth Mobile Application emerges as a strategic solution to mitigate the challenges faced by the healthcare sector. By eliminating queues, especially for non-emergency consultations and routine check-ups, the application significantly enhances accessibility. Patients can now avail themselves of medical advice promptly, irrespective of geographical constraints, fostering a patient-centric approach to healthcare.

1.3. Integrated Health Monitoring for Comprehensive Care

A key feature of our Telehealth Mobile Application is its integration with the Telehealth Health Kit. This synergy enables comprehensive health monitoring, surpassing the conventional boundaries of virtual consultations. The Telehealth Health Kit serves as a holistic solution, providing healthcare professionals with access to vital patient data, including blood pressure, temperature, ECG readings,

and more. This proactive approach to health monitoring facilitates early intervention and personalized care.

1.4. Contribution to a Larger Healthcare Environment

It is important to recognize that the Telehealth Mobile Application is not an isolated solution but an integral part of a more extensive healthcare ecosystem. The application collaborates seamlessly with the Telehealth Health Kit, creating a synergistic relationship aimed at providing users with a comprehensive and interconnected healthcare experience. Additionally, the incorporation of a mobile app for health monitoring further enriches this environment, contributing to a more holistic approach to healthcare delivery.

As we delve into the subsequent chapters of this report, a detailed exploration of the initial system study, feasibility analysis, system requirements, design, implementation, testing, and conclusion will provide a comprehensive understanding of the Telehealth Mobile Application and its transformative impact on healthcare services.

CHAPTER 2: INITIAL SYSTEM STUDY

2.1. Drawback of the Existing System

The prevailing healthcare system encounters significant drawbacks that impede its ability to provide optimal medical services. The identified drawbacks are:

2.1.1. Inefficiencies Due to Long Queues

The conventional healthcare setup is plagued by long queues, particularly for non-emergency consultations and routine check-ups. These queues create bottlenecks, leading to delays in medical services. This inefficiency results in patient dissatisfaction and compromises the overall effectiveness of the healthcare system.

2.1.2. Limitations of Hospital-Specific Booking Systems

In some instances, high-cost hospitals offer private websites for booking appointments, but these platforms often restrict users to booking only within the confines of that specific hospital. This limitation poses a challenge for patients seeking flexibility and the ability to explore and compare healthcare providers across different hospitals.

2.1.3. Lack of Online Booking in Small-Town Hospitals

Small-town hospitals, due to resource constraints and technological limitations, often lack an online booking system. This absence of digital infrastructure hampers their ability to reach a broader audience and provide seamless services. The cost associated with developing and maintaining an online booking system becomes a barrier for these smaller healthcare facilities.

2.2. Problem Definition

The healthcare sector faces a critical need for innovative solutions to enhance medical services' accessibility and efficiency. In response to this, the project aims to develop a comprehensive Telehealth Web Application. The primary objectives are to facilitate streamlined doctor appointments across various hospitals through a unified platform and integrate the application seamlessly with a portable health monitoring kit. This initiative addresses the existing challenges in healthcare delivery by providing users with a user-friendly interface to book appointments with doctors from any hospital, while concurrently enabling comprehensive

health monitoring through the connected kit. The problem at hand involves devising a sophisticated and user-centric system that combines telemedicine, cross-hospital doctor booking, and health monitoring to revolutionize the healthcare landscape.

2.3. Scope of the Project

Recognizing the limitations of the existing healthcare system, the scope of the Telehealth Mobile Application project is expansive and forward-looking. The project aims to revolutionize the way medical services are accessed and delivered, particularly in the context of non-emergency consultations, routine check-ups, and appointment bookings. The key elements of the project's scope include:

2.3.1. Elimination of Queue-Related Inefficiencies

The Telehealth Mobile Application seeks to alleviate the challenges posed by long queues, thereby enhancing the efficiency of healthcare delivery. By providing a virtual platform for non-emergency consultations, the project aims to minimize waiting times and improve patient satisfaction.

2.3.2. Comparison and Booking Across Hospitals

A significant aspect of the project's scope involves enabling customers to compare doctors from different hospitals and make informed decisions. This functionality transcends the limitations of hospital-specific online booking systems, offering users a more comprehensive and transparent experience.

2.3.3. Inclusion of Small-Town Hospitals

The Telehealth Mobile Application extends its reach to small-town hospitals that may not have existing online booking systems. By providing these hospitals with a cost-effective online presence, the project contributes to bridging the digital divide in healthcare accessibility.

CHAPTER 3: FEASIBILITY ANALYSIS

Feasibility analysis serves as a crucial step in determining the practicality and viability of the proposed Telehealth Mobile Application project. The analysis encompasses various dimensions, ensuring a comprehensive understanding of the project's feasibility.

3.1. Technical Feasibility

3.1.1. Existing Technological Landscape

The project leverages existing technologies commonly found in Mobile Application development. The use of microservices aligns with modern architectural practices, ensuring scalability and maintainability. The reliance on OTP and microservices for authentication and admin approval indicates a robust technical foundation.

3.1.2. Technology Acquisition Plan

The technologies required for the Telemedicine Mobile Application are well-established and readily available in the market. The plan includes integrating microservices like Appointment Management, User Management, Admin Approval, Authentication, and Data Storage, ensuring a comprehensive and technically feasible solution.

3.2. Economic Feasibility

3.2.1. Cost-Benefit Analysis

The project's economic feasibility is evident through a well-defined cost-benefit analysis. Development costs, including labour and technology acquisition, are justifiable against the anticipated benefits, such as improved healthcare accessibility and potential revenue generation through subscription models and transaction fees.

3.2.2. Risk Assessment

A comprehensive risk assessment considers potential economic risks, providing a foundation for risk mitigation and contingency planning. This demonstrates a proactive approach to economic feasibility, ensuring the project's sustainability.

3.3. Behavioural Feasibility

3.3.1. User Acceptance

The consideration of three distinct user roles (Admin, Doctor, and Patient) reflects a user-centric design. The intuitive design and features like OTP-based authentication and admin approval microservices enhance user acceptance. Preliminary feedback or surveys with potential users can further validate this aspect.

3.3.2. Organizational Impact

Acknowledging the impact on organizational structures and workflows indicates a thorough understanding of behavioural feasibility. Strategies for change management and employee training align to minimize disruption during the transition to the new system.

The Telehealth Mobile Application demonstrates strong technical, economic, and behavioural feasibility. Leveraging modern technologies, incorporating user-centric design principles, and outlining potential monetization avenues contribute to a well-rounded feasibility analysis. The project is positioned for success, addressing critical healthcare challenges while ensuring a sustainable and impactful solution.

CHAPTER 4: SOFTWARE REQUIREMENT SPECIFICATION (SRS) DOCUMENT

The Telehealth Mobile Application aims to provide a seamless platform for patients, doctors, and administrators to facilitate remote healthcare services. This SRS document outlines the functional and non-functional requirements of the system, ensuring conceptual integrity and a black-box view.

4.1. Purpose

The purpose of this document is to define the features, constraints, and goals of the Telehealth Mobile Application. It serves as a reference for development, testing, and maintenance. The Telehealth Mobile Application will allow users to create accounts, schedule appointments, and monitor health vitals. It will match patients with suitable doctors based on symptoms and availability.

4.2. Definitions and Abbreviations

- OTP: One-Time Password
- ECG: Electrocardiogram
- GSR: Galvanic Skin Response
- ESP: Electronic Stability Program

4.3. Functional Requirements

4.3.1. User Authentication

1. Login and Register using Email or Socials: Users can authenticate using their email.

2. OTP Microservice for Security: Secure one-time passwords (OTPs) are sent for user verification.

4.3.2. User Roles

1. Doctor: Submits credentials for admin verification

2. Patient:

- Creates an account
- Provides symptoms for appointment scheduling

4.3.3. Appointment Management

1. Matching Algorithm: Matches patients with the best-suited doctor based on symptoms and availability.

2. Doctor Acceptance:

- Notifies matched doctors
- Patients choose from available options

4.3.4. Health Monitoring

1. Vitals Dashboard:

Displays patient historical data:

- Blood Pressure
- Temperature
- ECG
- GSR
- Heart rate
- Room Temperature
- Body Temperature
- Humidity

4.3.5. Patient Features

1. Appointment History: Patients can check their appointment history.

2. Old Prescriptions: Access previous prescriptions.

4.4. Non-Functional Requirements

1. Security: Log on ID and Password for all users

2. Usability: Intuitive user interface design for web app pages

3. Performance:

- Responsive and fast interface
- Quick loading and prompt response to user actions

4.5. Goals of Implementation

1. Develop a robust and user-friendly telemedicine platform.
2. Ensure data security and privacy.
3. Optimize performance for seamless user experience.
4. Implement using the Agile methodology.

This concise SRS document provides an overview of the Telehealth Mobile Application's requirements, emphasizing both functionality and quality attributes. The system's conceptual integrity is maintained, allowing for effective development and future enhancements.

CHAPTER 5: SYSTEM DESIGN

5.1. System Architecture

The system architecture of the Telehealth Mobile Application is meticulously crafted to ensure a robust, scalable, and efficient framework. This chapter delves into the intricacies of architectural design, outlining key components and their interactions.

5.1.1 Three-tier Architecture:

The application follows a classic three-tier architecture comprising the presentation layer, application layer, and database layer. The presentation layer, implemented using React Native and Tailwind, provides an intuitive and user-friendly interface for seamless interaction. The application layer, powered by Laravel and NodeJS, handles the business logic, ensuring smooth communication between the presentation layer and the database. MySQL is employed in the database layer to manage and store data securely.

5.2. Database Tables

1. Patient Table

FIELD	TYPE	DESCRIPTION
email	VARCHAR	Primary key of Patient Table
name	TEXT	Patient's full name
dob	TEXT	Patient's Date of Birth
gender	TEXT	Patient's Gender
password	VARCHAR	Hashed Patient's Account password
social	INT	
timestamp	DATETIME	Time and Date of patient's account creation
otp	INT	OTP sent at the time of registration
city	TEXT	Patient's City Name
state	TEXT	Patient's State Name
verified	INT	Identifier for Patient verification

2. Doctor's Table

FIELD	TYPE	DESCRIPTION
doctor_id	VARCHAR	Primary of the doctor table
doctor_name	VARCHAR	Email of the Doctor
doctor_email	VARCHAR	Name of the Doctor
doctor_mobileno	VARCHAR	Mobile number of the doctor
doctor_regno	VARCHAR	Registration number of the doctor
doctor_degree	LONGTEXT	Degrees of Doctor
doctor_certificate	LONGTEXT	Identifier for Doctor's Certificate
doctor_gender	TEXT	Gender of the Doctor
doctor_specilization	VARCHAR	Medical Specialization of the Doctor
doctor_bloodgrp	VARCHAR	Blood Group of the Doctor
doctor_address	VARCHAR	Work Address of Doctor
doctor_pwd	VARCHAR	Hashed Password of the Doctor
doctor_dob	VARCHAR	Date of Birth of the Doctor
doctor_rating	FLOAT	Doctor's Rating by Patients
otp	INT	OTP sent at the time of registration
otp_verified	INT	Identifier for Doctor's Account Verification
a_verified	INT	Admin Verification of Doctor

3. Doctor Booking Table

FIELD	TYPE	DESCRIPTION
s_no	INT	Primary Key for Doctor Appointments
doctor_id	VARCHAR	Foreign Key linking to Doctor's Table
patient_email	VARCHAR	Foreign Key linking to Patient's Table
book_date	DATE	Date of the Appointment
book_timeslot	TIME	Time Slot for the Appointment
slot_no	INT	Slot Number of the Appointment

4. DoctorTimeSlot Table

FIELD	TYPE	DESCRIPTION
slot_id	INT	Primary Key of Appointment Slots
Doctor_id	VARCHAR	Foreign Key linking to Doctor's Table
TimeSlotMon	TIME	Time of Slot defined for Monday
TimeSlotTue	TIME	Time of Slot defined for Tuesday
TimeSlotWed	TIME	Time of Slot defined for Wednesday
TimeSlotThu	TIME	Time of Slot defined for Thursday
TimeSlotFri	TIME	Time of Slot defined for Friday
TimeSlotSat	TIME	Time of Slot defined for Saturday
TimeSlotSun	TIME	Time of Slot defined for Sunday
Slots_possible	INT	Number of possible slots within the time slot
Start_date	DATE	Start date of when the time slot is valid
Start_end	DATE	End Date of when the time slot is valid

5. ESP_Info Table

FIELD	TYPE	DESCRIPTION
timestamp	DATETIME	Time and Date of ESP Information taken at
espmacid	VARCHAR	MAC ID of ESP Device
broker_ip	TEXT	IP Address of Broker
versioncode	VARCHAR	Version Code
espmodel	VARCHAR	Model number of ESP Device

6. GSR_Trends Table

FIELD	TYPE	DESCRIPTION
email	TEXT	Primary Key of the GSR Trends Table
lowest	DECIMAL	Lowest value picked up by GSR sensor
average	DECIMAL	Average value picked up by GSR sensor
highest	DECIMAL	Highest value picked up by GSR sensor
timestamp	TIMESTAMP	Time and Date of GSR Information taken at

7. LiveUser Table

FIELD	TYPE	DESCRIPTION
Sno	INT	Primary Key of LiveUser Table
Email	VARCHAR	Email of the Patient
espMacID	VARCHAR	ESP device's MAC ID
timestamp	DATETIME	Time and Date of ESP Information taken at

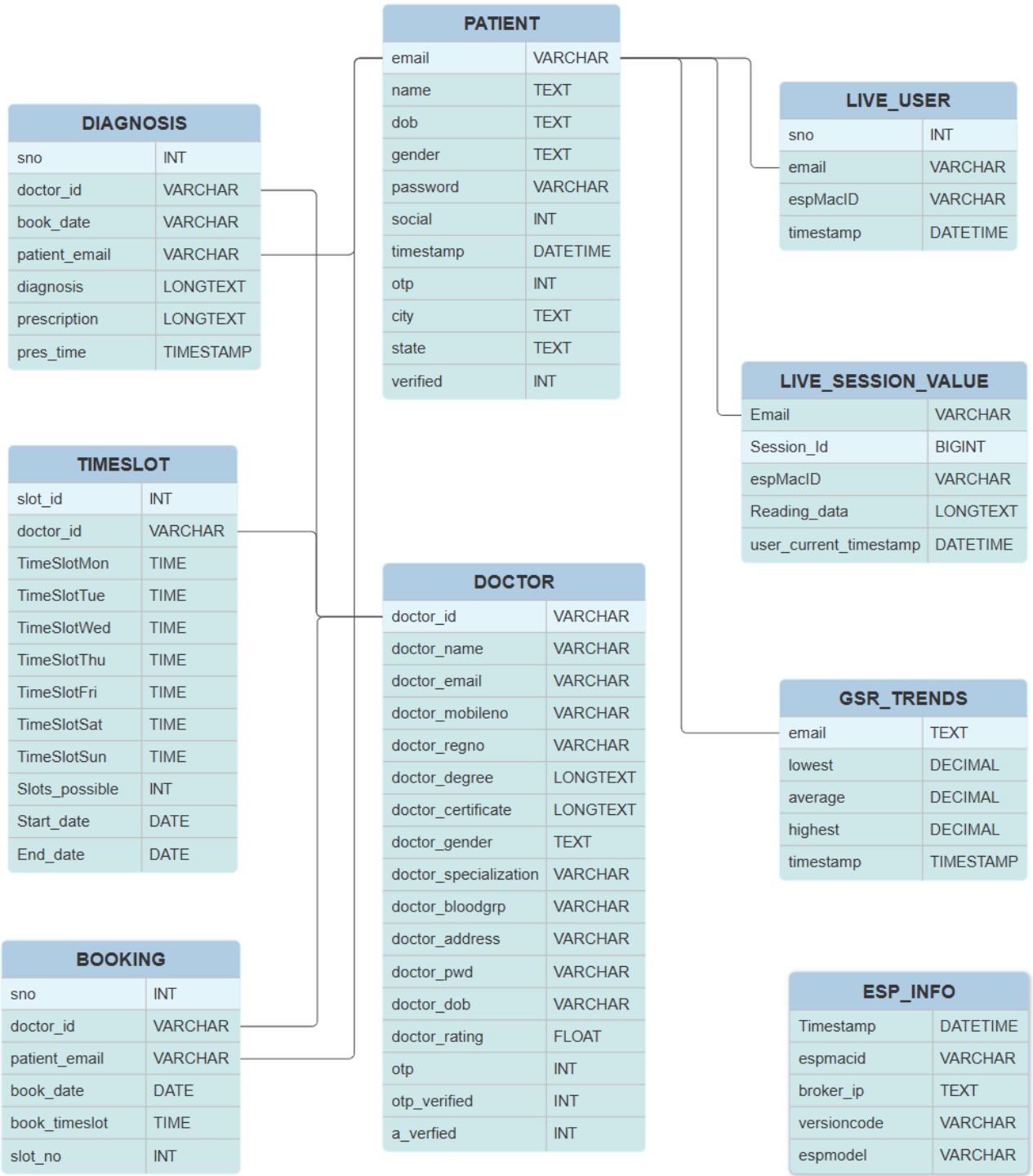
8. Live_Session_Value Table

FIELD	TYPE	DESCRIPTION
Email	VARCHAR	Email of the Patient
Session_id	BIGINT	Primary key of the Live_Session_Value Table
espMacID	VARCHAR	ESP device's MAC ID
Reading_data	LONGTEXT	Date read by ESP Device
User_current_timestamp	DATETIME	Date and Time of when data was taken

9. Patient_Diagnosis Table

FIELD	TYPE	DESCRIPTION
Sno	INT	Primary Key of Patient_Diagnosis Table
Doctor_id	VARCHAR	Foreign Key linking to Doctor's Table
Book_date	VARCHAR	Date of the Appointment
Patient_email	DATE	Email of the Patient
Diagnosis	LONGTEXT	Diagnosis for Patient written by Doctor
Prescription	LONGTEXT	Prescription for Patient written by Doctor
Pres_Time	TIMESTAMP	Date and Time of Prescription submitted

5.3. Entity Relationship Diagram



5.4. DATA FLOW DIAGRAM

5.4.1. Level 0 Data Flow Diagram

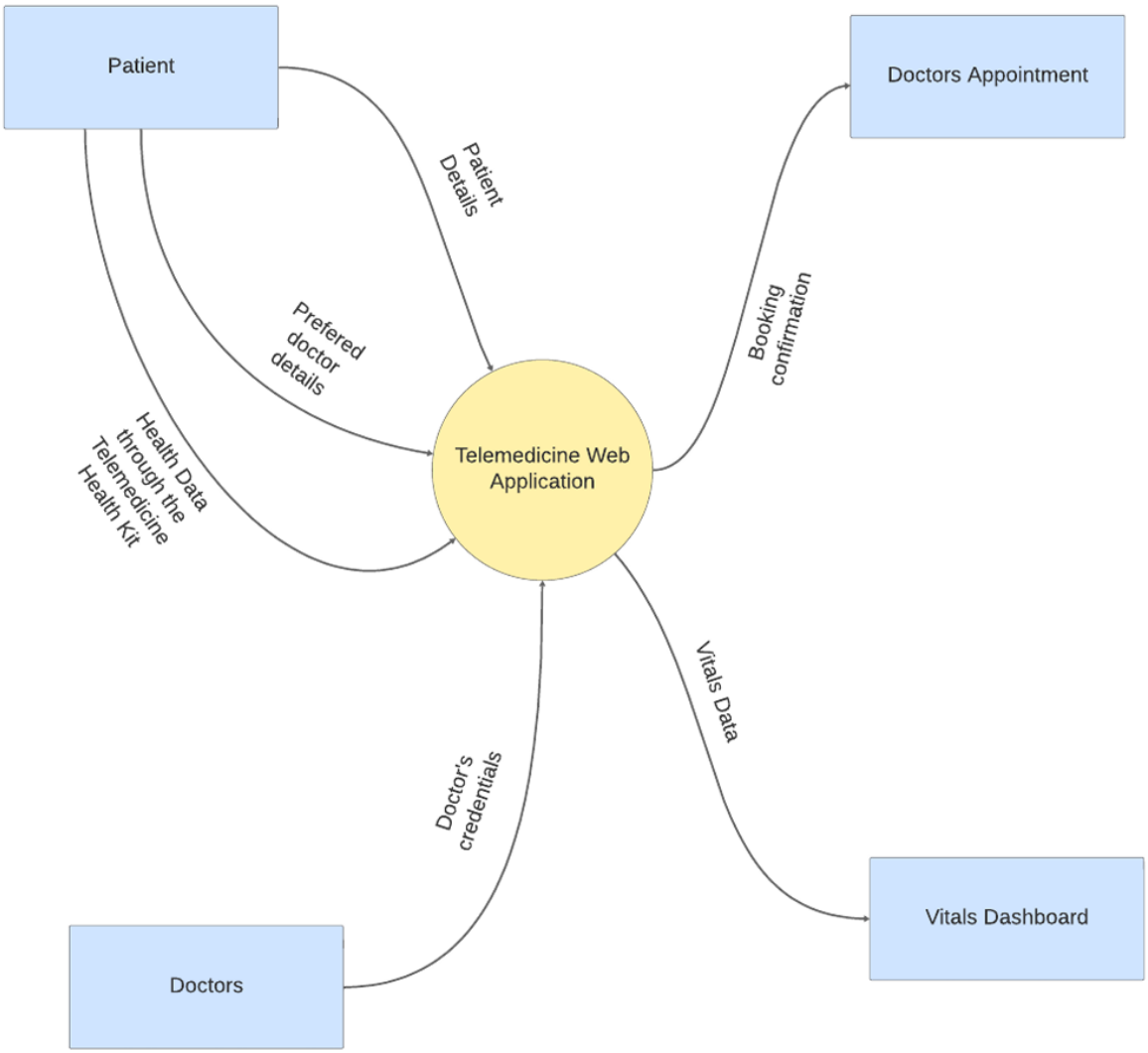


Figure 5.2: Level 0 DFD

5.4.2. Level 1 Data Flow Diagram

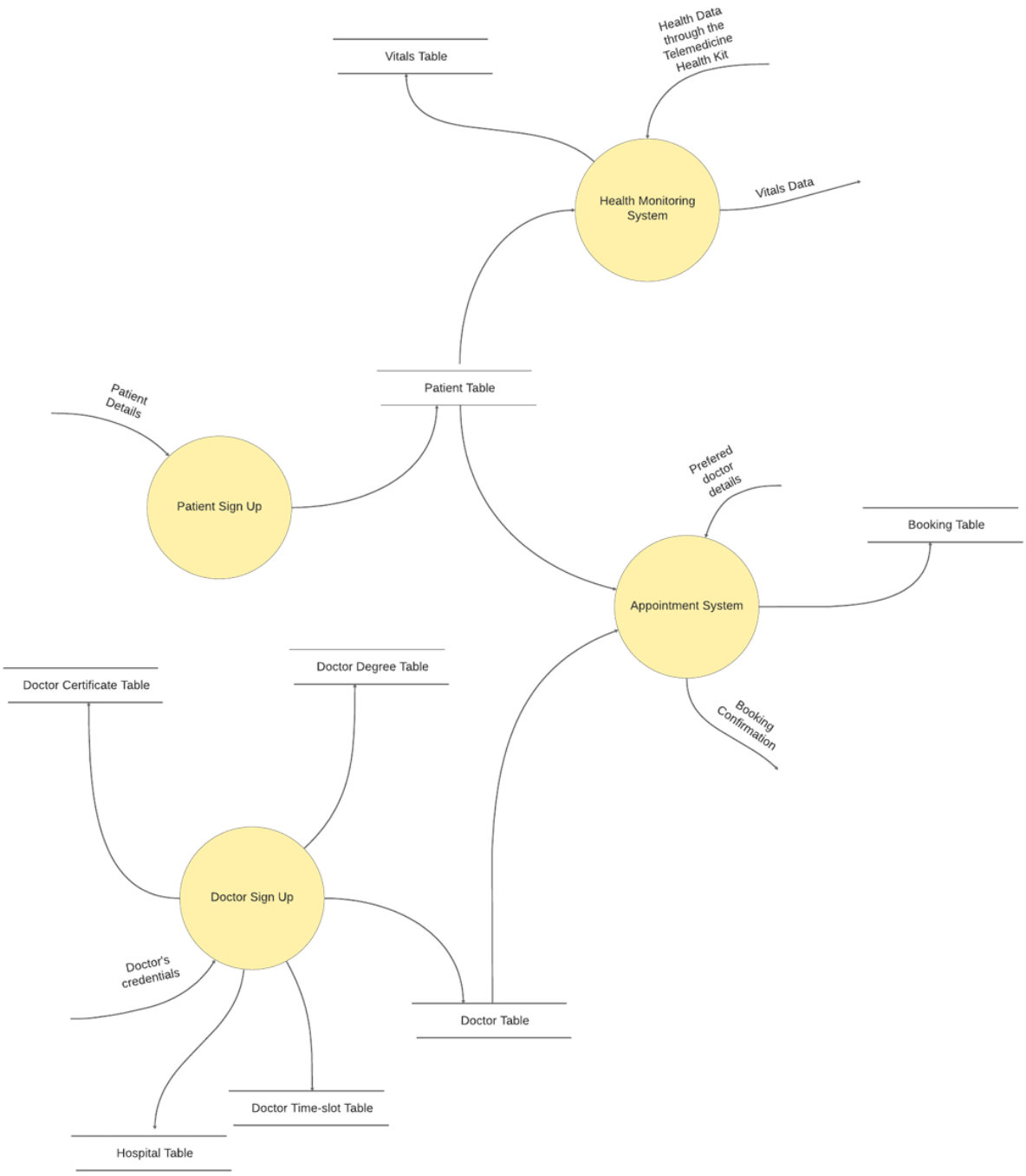


Figure 5.3: Level 1 DFD

CHAPTER 6: SYSTEM IMPLEMENTATION

6.1. Tech Stack

The Telehealth Mobile Application leverages a robust and versatile tech stack, carefully selected to ensure optimal performance, scalability, and reliability.

- Frontend: React Native

React Native is a Javascript-based Mobile App Framework that allows the building of natively rendered mobile apps for iOS and Android.

- Backend

  - Laravel: Laravel, a PHP web application framework, serves as the backbone of the backend infrastructure. Known for its elegant syntax and developer-friendly features, Laravel facilitates rapid development and ensures the scalability of the application.

  - NodeJS: NodeJS is utilized for specific backend microservices, offering a non-blocking, event-driven architecture that aligns with the application's requirement for agile and scalable service-oriented components.

- Database: MySQL

MySQL is chosen as the relational database management system (RDBMS) to store and manage data efficiently. Its ACID compliance and reliability make it an ideal choice for handling the complex data structures associated with healthcare information.

6.2. Hosting Service

The backend infrastructure is hosted on Amazon Web Services (AWS), a leading cloud computing platform. AWS provides a secure, scalable, and flexible application hosting environment, ensuring high availability and reliability. The decision to host on AWS aligns with industry best practices for cloud-based deployment, allowing for seamless integration of additional services as the application evolves.

6.3. User Interface Design

The user interface design follows a user-centric approach, catering to the diverse needs of administrators, doctors, and patients. This design philosophy is aimed at enhancing the overall user experience and ensuring that the application is accessible and easy to navigate for all types of users. To bring the envisioned user interface to life, the UI/UX design was meticulously planned using the Figma tool. Figma allows for collaborative design processes, enabling the development team to work seamlessly with designers. The tool facilitates the creation of interactive prototypes, ensuring that the user interface aligns with the intended user experience.

Some of the User Interface snapshot is attached below:

Figure 6.1: Splash Screen

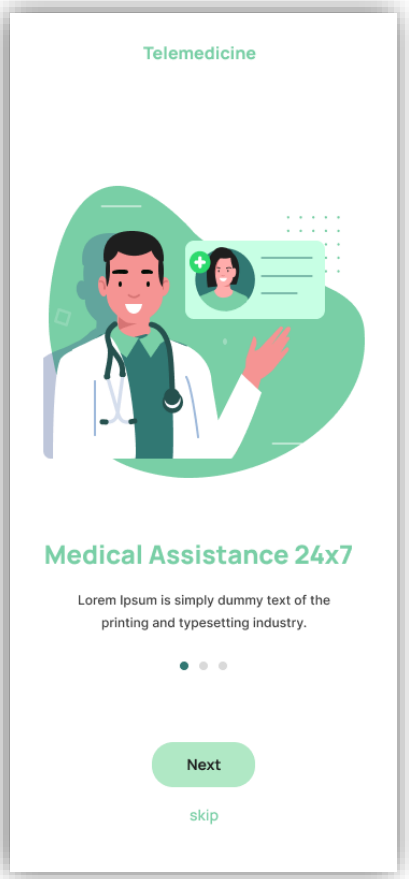


Figure 6.2: Onboarding Page 1

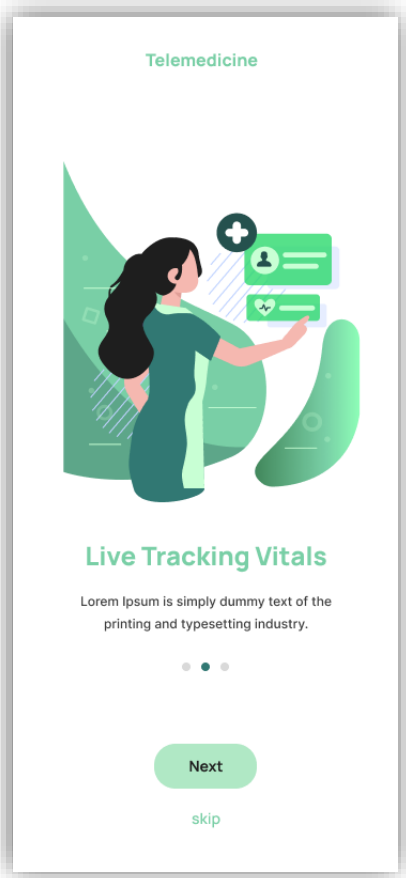


Figure 6.3: Onboarding Page 2

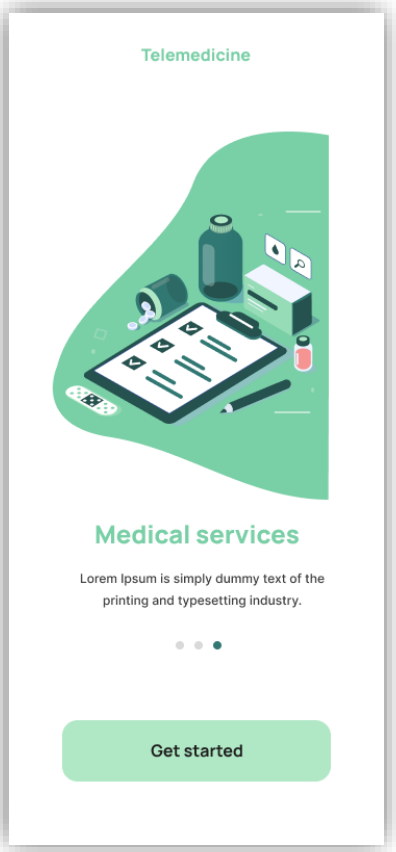


Figure 6.4: Onboarding Page 3

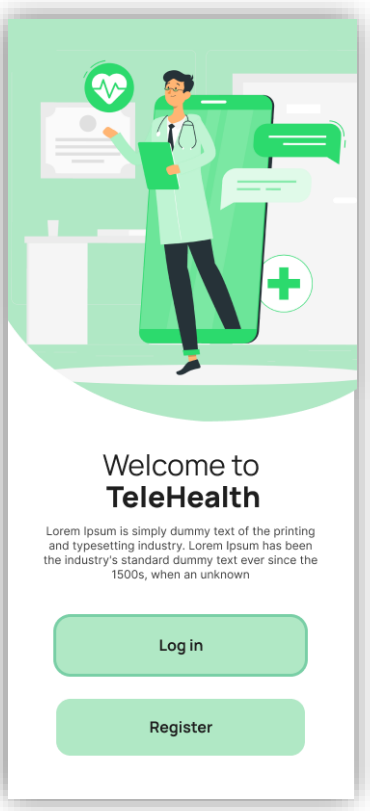


Figure 6.5: Welcome Screen

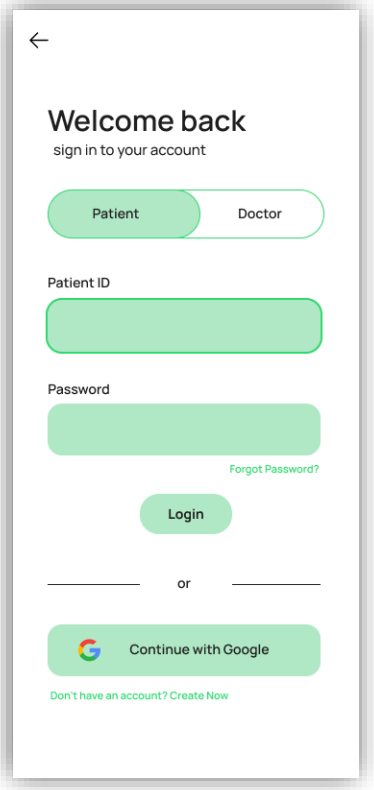


Figure 6.6: Sign In Page (Patient)

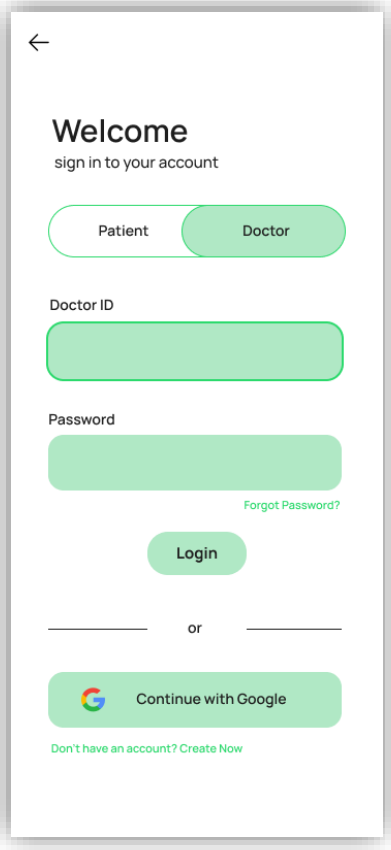


Figure 6.7:

Sign In Page (Doctor)

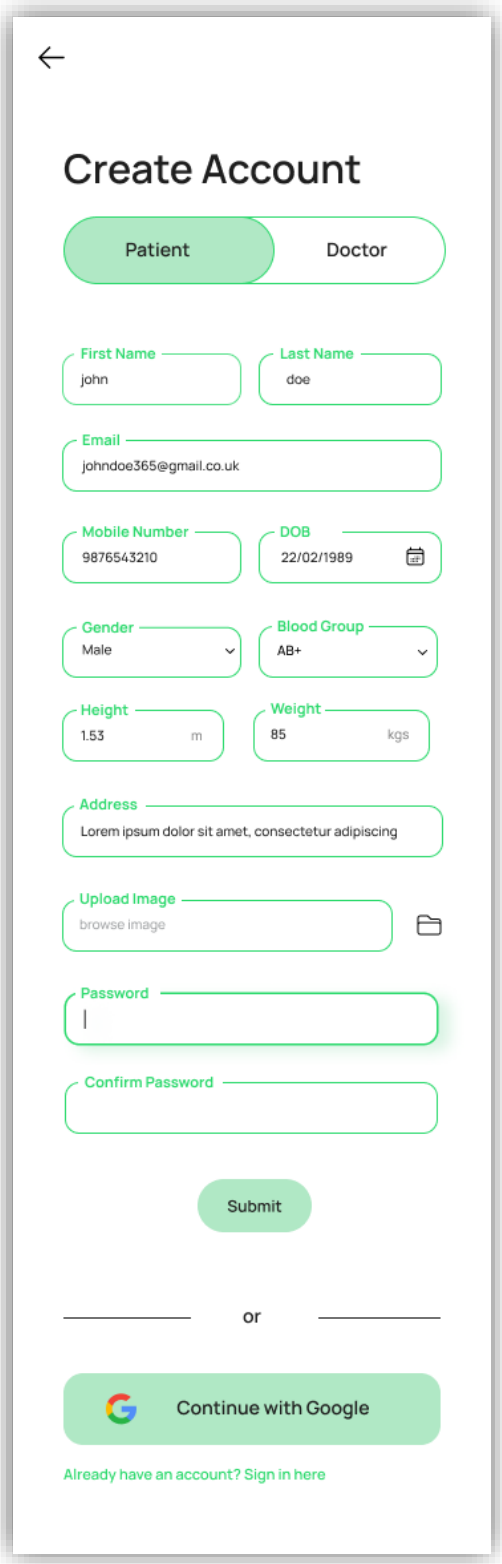


Figure 6.8: Registration Page (Patient)

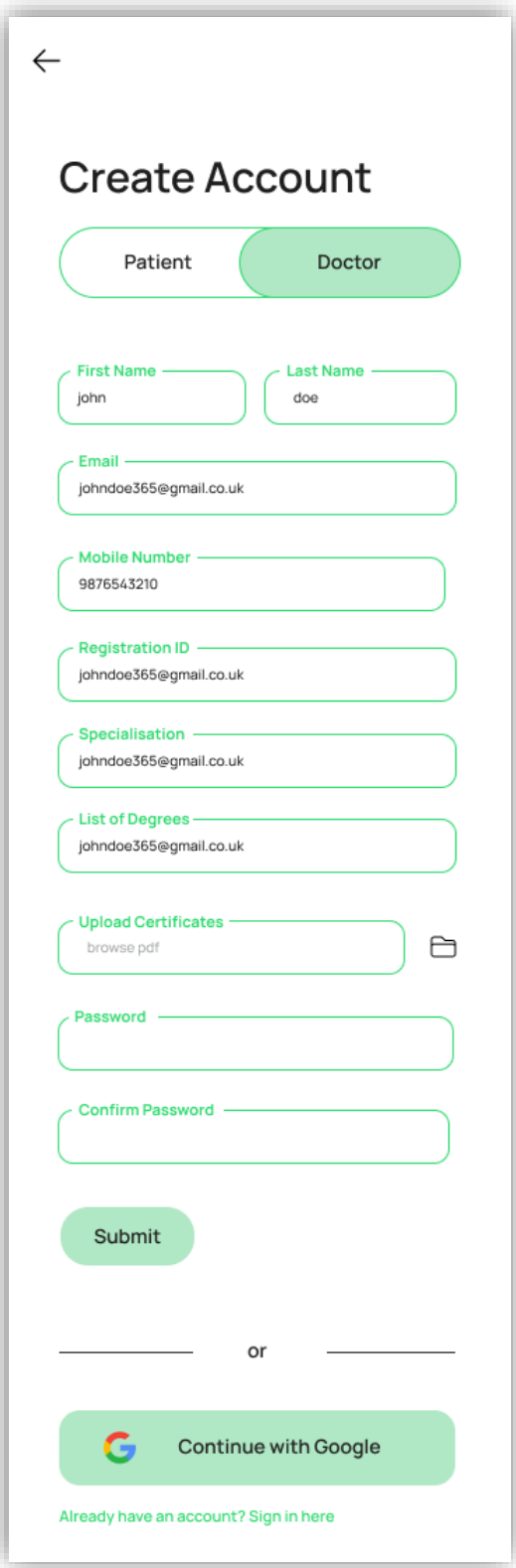


Figure 6.9: Registration Page (Doctor)

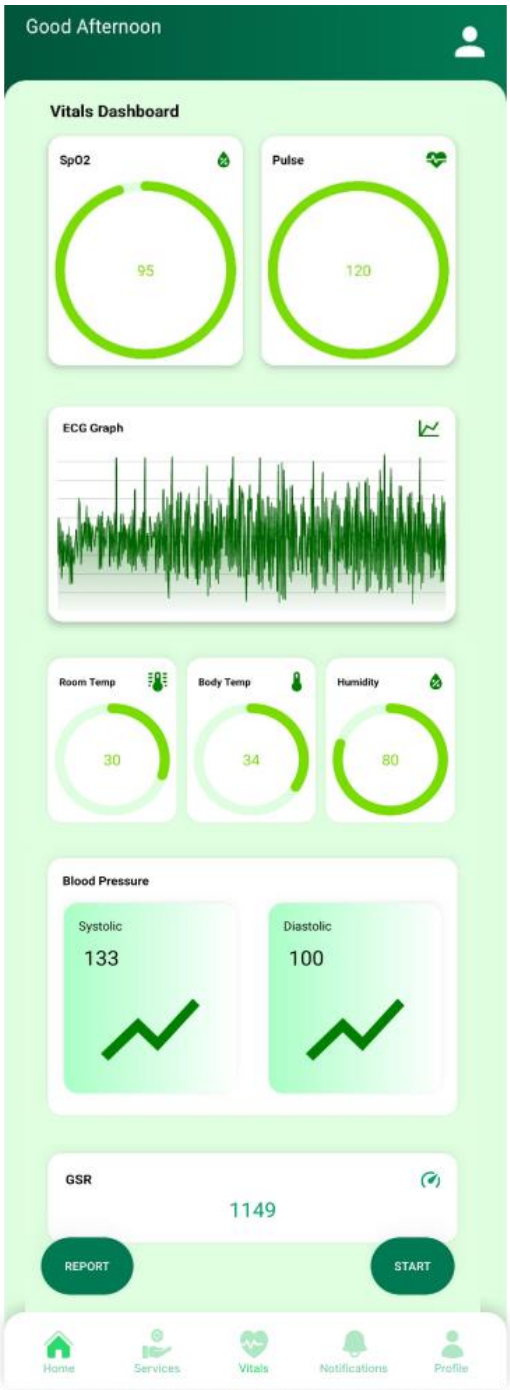


Figure 6.10: Vitals Dashboard

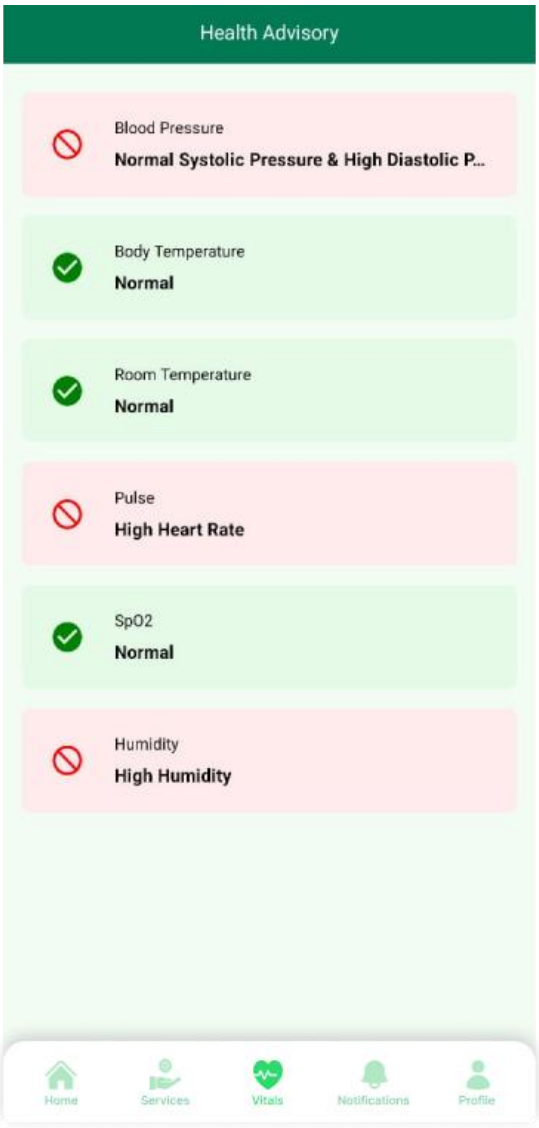


Figure 6.11: Health Advisory Page

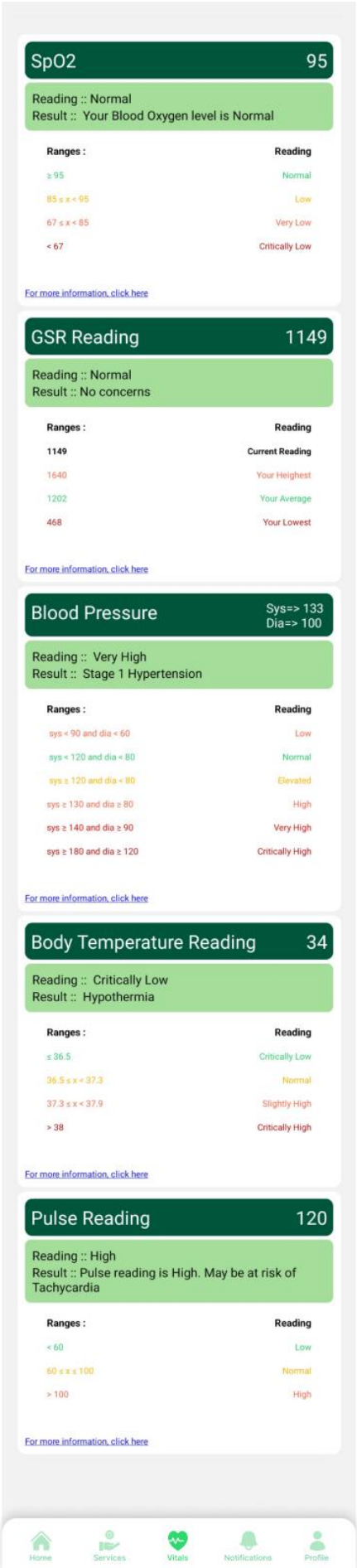


Figure 6.12:
Vitals Report

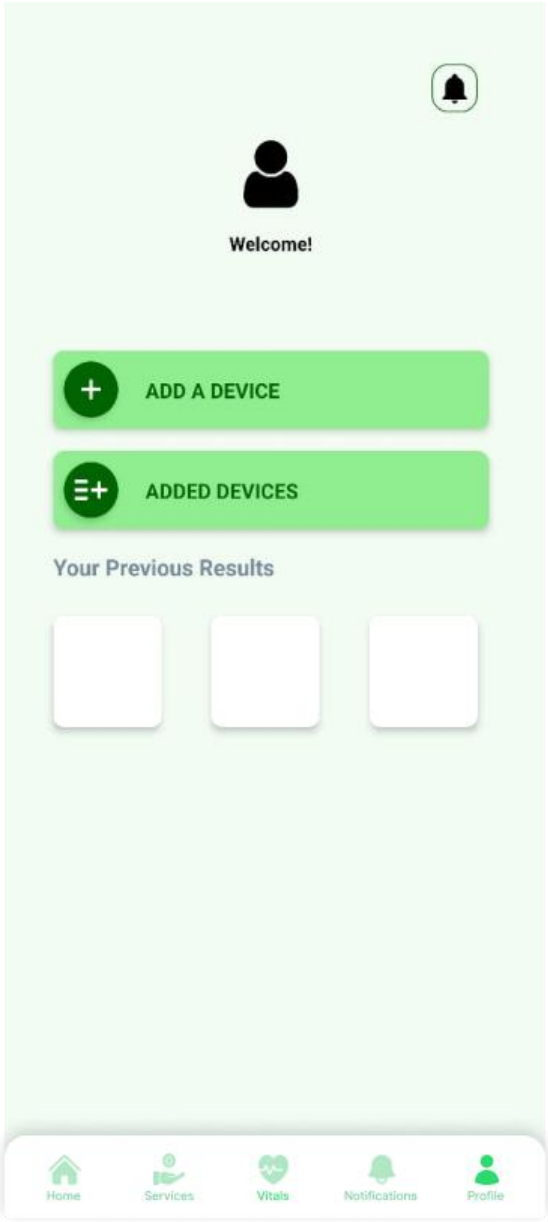


Figure 6.13: Profile

CHAPTER 7: SYSTEM TESTING

In the testing phase of the Telemedicine Mobile Application’s development, we prioritize reliability, functionality, and performance. The chapter outlines systematic testing, covering unit testing, validation testing, functional testing, database testing, and load testing. Each facet strengthens the application's robustness by scrutinizing various dimensions. Rigorous evaluations ensure the integrity of components, functional coherence, database resilience, and optimal performance under diverse loads. This chapter reveals the testing procedures fortifying the Telemedicine Mobile Application’s effectiveness.

7.1. Unit Testing

Unit testing, a fundamental aspect of the testing strategy, involves a meticulous examination of individual program units to ensure their proper functioning. Each unit is tested based on predefined input and expected output scenarios, confirming that every component of the system operates as intended, promoting a robust and error-free codebase.

7.2. Validation Testing

Validation testing is a critical phase in the software development lifecycle, aimed at evaluating the system's compliance with specified business requirements. Throughout the development process and upon its completion, the application is rigorously assessed to ensure alignment with the client's needs. This includes validating that the Telemedicine Mobile Application meets its intended use in the designated environment. The testing indicates that the application significantly fulfills the expected requirements.

7.3. Functional Testing

Functional testing plays a pivotal role in verifying that the software system adheres to its functional requirements and specifications. This testing type involves scrutinizing each function of the application by supplying relevant inputs and validating the outputs against predefined functional requirements. Extensive functional testing procedures confirm that every aspect of the application functions as expected, meeting the intended objectives seamlessly.

7.4. Database Testing

Database testing involves a comprehensive evaluation of the application's interaction with the database. Various operations, including read, write, and delete operations on data, were conducted to thoroughly examine the database's responsiveness. The introduction of dummy data allowed the simulation of real-world scenarios, and subsequent updates and deletions were rigorously tested for consistency. Database testing procedures ensure the reliability and integrity of data operations within the Telemedicine Mobile Application.

7.5. Load Testing

Load testing is a crucial aspect of ensuring the application's performance under various user loads. Simulating scenarios with a significant number of concurrent users assessed the application's response time, resource utilization, and overall stability. Load testing helps identify potential bottlenecks and ensures that the system remains responsive even during peak usage. The Telemedicine Mobile Application demonstrates robust performance and responsiveness, even under challenging load conditions.

CHAPTER 8: CONCLUSION

8.1. Results

The Telemedicine Mobile Application stands as a transformative solution, addressing the intricate challenges prevalent in the healthcare sector with a dedicated focus on enhancing accessibility and operational efficiency. The journey of its development has been marked by meticulous planning, innovative design strategies, and exhaustive testing protocols, all orchestrated to deliver a flawless and user-centric experience.

8.2. Future Works

8.2.1. Online Payment Gateway

The integration of an online payment gateway is envisioned to streamline financial transactions within the application. This addition promises enhanced convenience for users, paving the way for a more seamless and user-friendly interaction.

8.2.2. Subscription Models

The introduction of subscription models emerges as a progressive step, offering a range of plans tailored for both doctors and patients. These subscription tiers are meticulously designed to provide varied levels of access to features and services, catering to the diverse needs of the user base.

8.2.3. Data Analysis Services

The future roadmap includes the extension of data analysis services to healthcare organizations and researchers. Leveraging the wealth of anonymized data collected through the application, this service aims to offer invaluable insights for research and development purposes, fostering advancements in the healthcare domain.

8.2.4. Multi-language Support

Enhancing inclusivity and accessibility, the implementation of multi-language support is on the horizon. This feature will enable users to interact with the application in their preferred language, breaking down language barriers.

8.2.5. Testing Result Dashboard

To enhance transparency and decision-making, a testing result dashboard is envisioned. This dashboard will provide comprehensive insights into the system's performance, highlighting areas of improvement, and facilitating ongoing quality enhancement efforts.

8.3. Learning Experience

The development of the Telemedicine Mobile Application has been an immersive and enlightening journey, providing deep insights into the intricate process of constructing a comprehensive web application. The challenges encountered, particularly in the development of the authentication system, have not only presented practical learning opportunities but have also underscored the application of theoretical concepts in real-world scenarios. Despite the inherent challenges, this semester's odyssey has been characterized by excitement and reward, contributing significantly to personal and professional growth. The learnings acquired throughout this endeavour are poised to leave an enduring impact, shaping a foundation for continued exploration and advancement in the field of mobile application development.

REFERENCES

1. React. (n.d.). https://react.dev/

2. Laravel- The PHP Framework For Web Artisans. (n.d.). https://laravel.com/

3. PHP: Hypertext Preprocessor. (2023, November 23). https://www.php.net/

4. What is Software Testing. (2023, December 6) GeeksforGeeks.
https://www.geeksforgeeks.org/software-testing-basics/

5. What is DFD Data Flow Diagram. (2023, September 20). GeeksforGeeks.
https://www.geeksforgeeks.org/what-is-dfddata-flow-diagram/

6. Lane, G. K. C. (2023, January 17). How to Write a Software Requirements Specification (SRS Document). Perforce Software.
https://www.perforce.com/blog/alm/how-write-software-requirements-specification-srs-document.

7. Introduction of ER Model. (2023, September 20). GeeksforGeeks.
https://www.geeksforgeeks.org/introduction-of-er-model/