

# **The Future of Ayurveda**

Harnessing the Power of Artificial Intelligence for  
Personalized Treatment and Diagnosis

23-252

## **Project Proposal Report**

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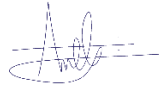
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February 2023

## DECLARATION

I therefore certify that the content of my proposal is entirely original work on my part and that I have not, without due credit, using any materials that have previously been presented for a degree or diploma at another university or higher education institution. To the best of my knowledge and belief, this proposal also doesn't include any content that has already been published or authored by someone else, unless it's explicitly acknowledged in the text.

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Date

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## ABSTRACT

Ayurveda, a traditional medical system, is well-known around the world for its all-encompassing approach to health and wellness. However, despite its many benefits, accessing Ayurvedic treatments and practitioners can be challenging for many. Western medicine can also be expensive and may not always produce the desired results. To meet these challenges, this research project proposes a novel solution that harnesses the power of artificial intelligence to enable treatment and diagnosis using Ayurveda.

The proposed platform will be user-friendly, enabling individuals to find appropriate Ayurvedic treatments based on their specific symptoms and herbalists and qualified practitioners in accordance with those treatments and the user's location. Patients are able to rate and review local Ayurvedic doctors, helping other patients make informed decisions. Additionally, the platform allows patients to book appointments with Ayurvedic doctors and provides a private chat service for doctors and patients to communicate.

The focus of this research project is to create a strong relationship between patients and Ayurvedic practitioners, enabling personalized treatment plans that promote a healthy lifestyle. Through the platform, patients have access to a wealth of information and resources to make informed decisions about their health. The project aims to democratize access to Ayurvedic medicine and contribute to the prevention and management of non-communicable diseases.

The suggested solution will make use of cutting-edge artificial intelligence technologies, including machine learning and natural language processing, to accomplish these objectives. The platform will leverage patient data to enable personalized treatment recommendations, ensuring patients receive the most effective and appropriate treatment for their specific needs.

In conclusion, this research project proposes an innovative solution that leverages the power of artificial intelligence to enable personalized Ayurvedic treatment and diagnosis. The proposed platform will provide a user-friendly interface to find suitable treatments, herbs and qualified practitioners based on patients' locations, symptoms and other patients' evaluations and reviews. The project aims to contribute to the prevention and management of non-communicable diseases by promoting healthy lifestyles and democratizing access to Ayurvedic medicine.

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## LIST OF ABBREVIATIONS

<b>Abbreviation</b>	<b>Description</b>
AI	Artificial intelligence
NLP	Natural-Language-Processing
API	Application-Programming-Interface



# 1. INTRODUCTION

## 1.1 Background & Literature survey

Ayurveda, a traditional system of medicine, originated in India over 5,000 years ago [1]. It believes in the interconnectedness of mind, body, and spirit, and focuses on achieving overall wellness through natural remedies and holistic approaches. In Sri Lanka, Ayurveda has been an integral part of the healthcare system for centuries [2]. However, people seeking Ayurvedic treatments face challenges in identifying the right herbs, remedies, and practitioners to address their specific health concerns. Consulting qualified Ayurvedic practitioners can also be costly and time-consuming.

To address these challenges, we propose a solution that harnesses the power of artificial intelligence (AI) to provide personalized treatment and diagnosis. Our solution is a user-friendly platform that enables people to find suitable Ayurvedic treatments, medicinal herbs, and qualified Ayurvedic doctors based on their specific symptoms. It also offers a way for users to share ideas and experiences with each other.

While there has been some research on the use of Ayurvedic treatments for various diseases and conditions [3], there is still a lack of information and accessibility to Ayurvedic treatments, particularly in non-Indian communities. In Sri Lanka, there has been a growing interest in Ayurvedic medicine, with several studies conducted on its efficacy [4] [5]. However, there is a need for a stronger connection between patients and Ayurvedic doctors. Patients need to be able to find the best and nearest doctors and book appointments and communicate with their doctors conveniently.

Furthermore, Sri Lanka has a rich tradition of using medicinal plants for various health conditions [6]. However, identifying the right plants and preparing them for use can be challenging for individuals. The use of AI can help individuals identify the appropriate medicinal plants based on their specific symptoms and needs.

We conducted a survey to understand the information-seeking behavior of people regarding healthcare on social media platforms. The survey revealed that 80.4% of respondents used Facebook groups to seek healthcare-related information, whereas only 6.4% used Quora spaces, 3.2% used Discord channels, 8.4% used Telegram groups, and 2.1% used Medical Sciences Stack Exchange. Interestingly, 11.2% of respondents reported using no social media platform for healthcare-related information.

### Which social media platforms do you use to seek healthcare-related information?

47 responses

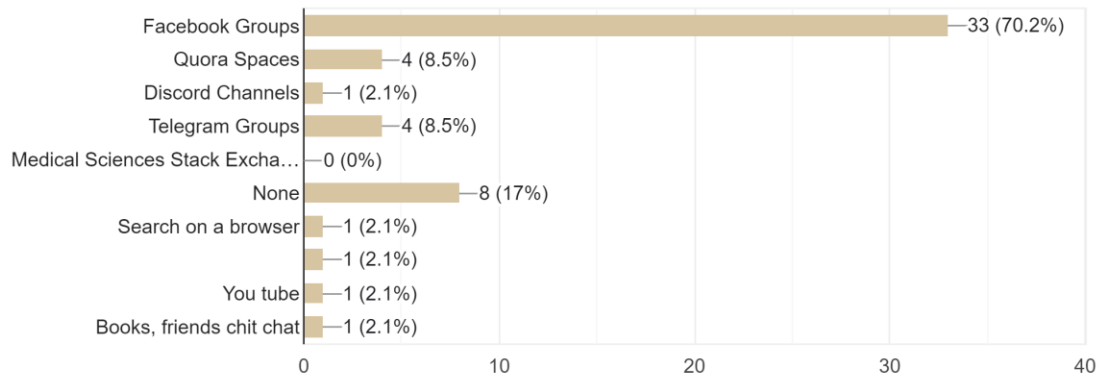


Figure 1: survey question of social media platforms do you use to seek healthcare-related information English medium

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60 responses

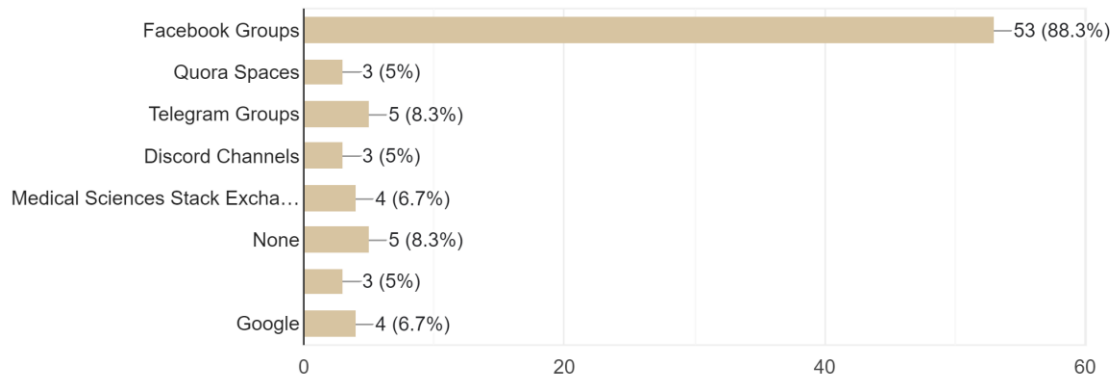


Figure 2: survey question of social media platforms do you use to seek healthcare-related information Sinhala medium

Another survey conducted to understand the search behavior of people seeking an Ayurvedic specialist doctor revealed that 75.2% of respondents would search on the internet to find one, whereas only 48.6% would ask friends or some people to find one, and 7.9% would read newspapers.

If you want to find an Ayurvedic specialist doctor, what will you do to find one?

47 responses

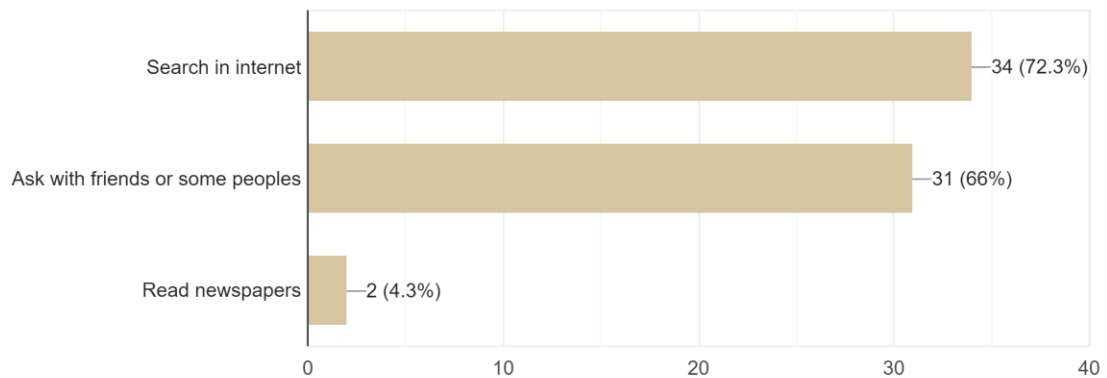


Figure 3: survey question of common ways to find an Ayurvedic specialist doctor in English medium

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60 responses

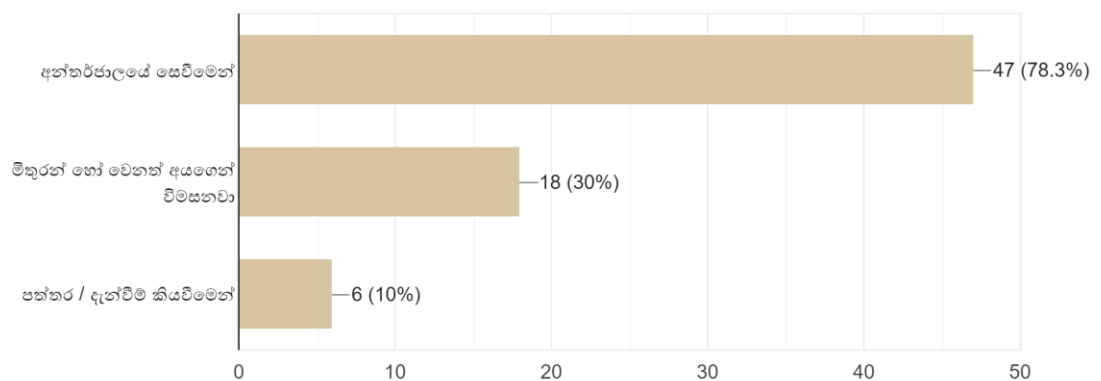


Figure 4: survey question of common ways to find an Ayurvedic specialist doctor in Sinhala medium

In conclusion, Ayurveda offers an alternative approach to conventional Western medicine. However, people face challenges in accessing the right information and identifying the appropriate Ayurvedic treatments and practitioners. Our proposed solution aims to leverage AI to improve accessibility and personalize treatments. The survey results highlight the importance of considering social media platforms for disseminating healthcare-related information and the internet as a primary source for finding Ayurvedic specialist doctors.

## 1.2 Research Gap

After conducting further research on the topic of AI applications in Ayurvedic medicine, it appears that there is still a gap in the development of mobile applications that can assist patients in selecting the best Ayurvedic doctor for their specific symptoms and needs. While there are studies that explore the use of machine learning algorithms in Ayurvedic medicine for diagnosis

and treatment recommendations [7] [8] [9], there is limited research on utilizing AI for doctor selection in this field.

Additionally, there is a lack of research on the integration of patient feedback and ratings into the selection process of an Ayurvedic doctor, which is an important factor in helping patients make informed decisions about their healthcare provider [10] [11]. The existing mobile applications in this domain do not adequately take into account user feedback or ratings to suggest a suitable Ayurvedic doctor [12].

Overall, the current research suggests that there is a need for the development of AI-powered mobile applications that can assist patients in selecting the best Ayurvedic doctor based on their symptoms and needs, while also taking into account patient feedback and ratings.

*Table 1: comparison of existing and proposed system*

Feature	Existing Mobile Applications	Proposed System
AI-powered doctor selection based on symptoms	No	Yes
AI-powered doctor selection based on proximity	No	Yes
AI-powered doctor selection based on ratings/feedback	No	Yes
Integration of patient feedback and ratings	Limited	Yes
Ability to book appointments online	Yes	Yes
Information on doctor qualifications and experience	Yes	Yes
Information on doctor availability and fees	Yes	Yes
Specific focus on Ayurvedic medicine	Limited	Yes

### 1.3 Research Problem

The lack of accessibility and personalization in Ayurvedic medicine has been a major concern for patients seeking alternative forms of healthcare. Despite the growing popularity of Ayurveda, there is still a significant gap in the market for a mobile application that utilizes AI to assist patients in finding the most suitable Ayurvedic doctors based on their individual symptoms, location, and user feedback. This study aims to bridge this gap by addressing the research problem of the lack of a mobile application that can provide personalized recommendations for Ayurvedic doctors based on patient symptoms and feedback.

To address this research problem, a survey was conducted, and the results revealed that 94.5% of respondents agreed that a platform to find the best and nearest Ayurvedic doctors related to their symptoms would be helpful. This highlights the need for a mobile application that can provide personalized recommendations for Ayurvedic doctors based on the patient's individual symptoms, location, and user feedback.

If a platform has a feature to find the best and nearest Ayurvedic doctors related to your symptoms, will it be helpful?

47 responses

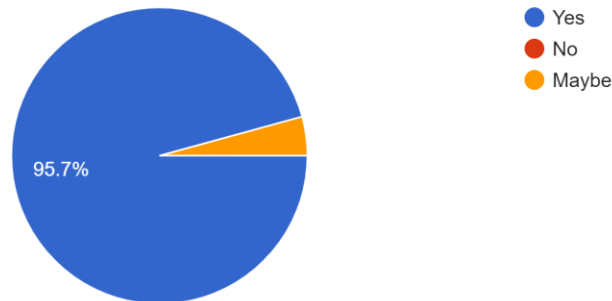


Figure 5: The question highlights the need for a mobile app that can provide personalized recommendations for Ayurvedic doctors based on the patient's individual symptoms, location and user feedback. English Medium

ඔබේ රෝග ලක්ෂණ වලට අදාළ හොඳම සහ ළඟම ආයුර්වේද වෛද්‍යවරුන් සොයා ගැනීමට වේදිකාවක් තිබේ නම්, එය ප්‍රයෝජනවත්ද?

60 responses

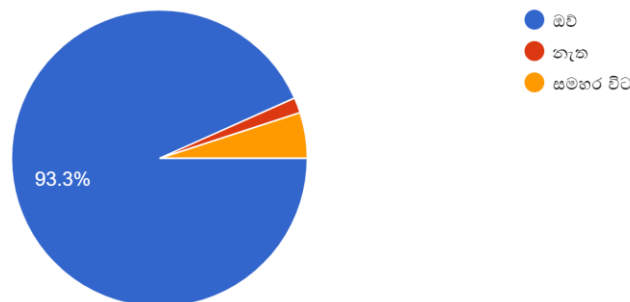


Figure 6: The question highlights the need for a mobile app that can provide personalized recommendations for Ayurvedic doctors based on the patient's individual symptoms, location and user feedback. Sinhala Medium

The proposed mobile application aims to improve access to Ayurvedic medicine and help individuals make informed decisions about their healthcare. It will not only aid in the identification of the right Ayurvedic doctor but also provide a platform for users to provide feedback and ratings for the selected doctors. The application will utilize machine learning algorithms to assist patients in selecting the most suitable Ayurvedic doctor based on their individual symptoms, location, and user feedback.

In conclusion, this study aims to develop a mobile application that utilizes AI to provide personalized recommendations for Ayurvedic doctors based on patient symptoms and feedback. The proposed application will help bridge the gap in the market for a personalized and accessible Ayurvedic healthcare platform. The results of the survey indicate a significant demand for such a platform, emphasizing the importance of addressing the research problem of the lack of a mobile application that can provide personalized recommendations for Ayurvedic doctors based on patient symptoms and feedback.

## 2. OBJECTIVES

### 2.1 Main Objectives

The main objective of this study is to develop a mobile application to identify the best and most suitable Ayurvedic doctor for treatment according to a patient's symptoms. The patient's symptoms will be input. The user's ratings and feedback to select the best Ayurvedic doctor and Nearest shows the user the list of nearest Ayurvedic doctors based on the user's location.

A user can give ratings and feedback to a selected Ayurvedic doctor and can chat privately with an Ayurvedic doctor and book an appointment.

And for these functions to take place, it is essential that both the patient and the Ayurvedic practitioner who are the users of the application are registered in the application.

### 2.2 Specific Objectives

There are ten specific objectives that must be reached in order to achieve the overall objective described above.

1. Developing an intuitive and user-friendly mobile application interface that enables users to input their symptoms easily and navigate through the app seamlessly.
2. Implementing a machine learning model that analyzes a patient's symptoms and suggests the most suitable Ayurvedic doctors based on their specialization, ratings, and proximity to the patient's location.
3. Integrating a feedback and rating system into the application to enable patients to rate their experience with a particular Ayurvedic doctor and provide feedback that can be used to improve the recommendation system.
4. Developing a private chat feature that allows patients to communicate with Ayurvedic doctors, ask questions, and book appointments.
5. Building a registration system that allows patients and Ayurvedic doctors to create accounts and manage their profiles within the application.
6. Implementing a secure payment system that enables patients to pay for appointments and consultations within the app.
7. Developing a feature that enables patients to view the availability of Ayurvedic doctors and book appointments based on their schedule.
8. Creating a database that stores the patient's medical history and provides Ayurvedic doctors with access to this information during consultations.
9. Ensuring the application meets regulatory requirements and is compliant with data privacy laws.
10. Conducting user testing and gathering feedback to continuously improve the application's functionality and user experience.

### 3. METHODOLOGY

The methodology for this research project will involve the development of a mobile application to help individuals seeking Ayurvedic medicine to identify the most suitable Ayurvedic doctor for their specific symptoms. The development of the application will involve the use of machine learning techniques to recommend the best Ayurvedic doctors based on ratings and feedback provided by other users. The application will also include a feature for users to rate and give feedback to the selected Ayurvedic doctors and book appointments with them. Additionally, the application will enable users to have private chats with doctors.

### 3.1 System Architecture

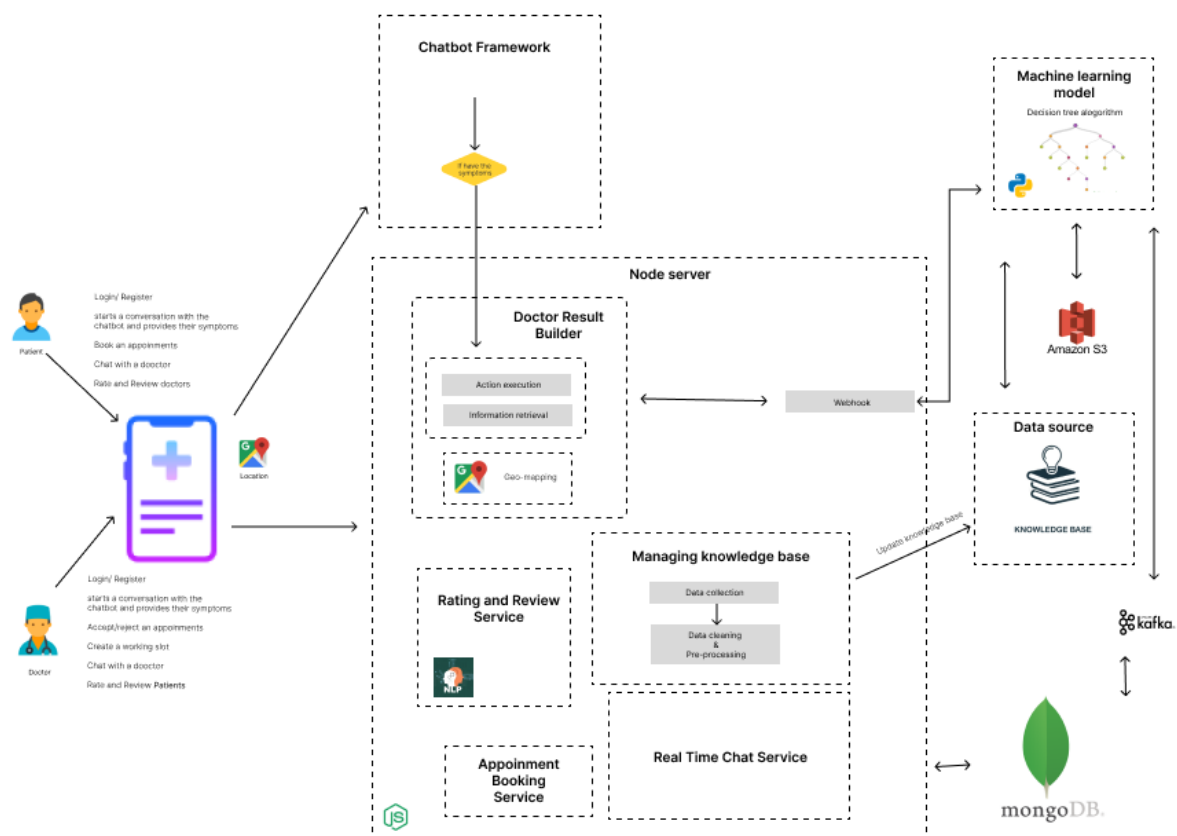


Figure 7: System Architecture

The system will consist of a mobile application that will be developed using Python and JavaScript programming languages. The Node server will be the main server for the application. The application will allow users to input their symptoms, and machine learning algorithms will recommend the most suitable Ayurvedic doctors based on ratings and feedback from other users.

Decision trees are the machine learning algorithm chosen for this challenge. A supervised learning technique known as a decision tree can handle several features and produce rules to categorize data points. The doctor list dataset, which includes doctor ID, name, location, specialization, rating, and sentiment scores from reviews, will be used to train the decision tree.

To ensure that the doctor list dataset is up-to-date, a data pipeline will be set up to retrieve new ratings and reviews periodically. The sentiment scores of the reviews will be calculated using Google NLP, and the dataset will be updated accordingly. The data pipeline will be automated using tools like Apache Airflow, which will schedule and manage the periodic data retrieval and processing.

To ingest and process streaming data in real-time, Apache Kafka will be used to set up a data ingestion pipeline that adds new data to the doctor list dataset and triggers the retraining of the machine learning model. This will ensure that the machine learning algorithm stays up-to-date with new data and continues to provide accurate recommendations.

For private chats between users and doctors, Matrix will be used. Matrix is an open-source protocol for secure and decentralized communication that enables end-to-end encryption and cross-platform communication. Google Maps Distance Matrix API will be utilized for location-based services, which will enable the application to show the user the nearest available Ayurvedic doctors based on their location.

Finally, the system will use TensorFlow for machine learning and AWS S3 for storage. It is possible to create and train machine learning models using the well-liked open-source framework TensorFlow. The cloud-based storage solution AWS S3 offers scalable and dependable data and file storage.

Overall, the proposed system architecture is designed to provide a seamless and efficient user experience and to improve the accuracy of doctor recommendations for Ayurvedic medicine users.

### 3.1.1 Software solution

The Software Development Life Cycle (SDLC) is a structured and systematic approach to software development that aims to maintain code accuracy and consistency. However, traditional software development methods often make it difficult for developers to return to earlier stages when requirements change. In such cases, they are forced to complete all the remaining steps in the proper order. Agile methodology, on the other hand, offers greater adaptability to changes in requirements.

Agile methodology emphasizes the acceptance of change and greater flexibility in the development process. Scrum is considered the most effective agile framework, providing a portable method for agile project management to address and resolve complex adaptive issues. Collaboration, openness, and continuous improvement are emphasized in Scrum.





Figure 8: Software Development Cycle

Product backlog, sprint planning, sprint backlog, daily scrum, sprint review, and sprint retrospective are the six fundamental Scrum procedures. A prioritized list of features that need to be produced is called a product backlog. Selecting items from the product backlog and outlining the work to be done during the sprint are both part of the sprint planning process. Before moving on to the next item, the team pledges to finish everything on the sprint backlog. The team discusses progress and makes plans for the following day during the daily scrum. The team presents the work produced during the sprint during the sprint review, which takes place at the end of the sprint. In order to analyze the sprint and pinpoint areas for improvement, the team comes together for a sprint retrospective meeting.

In summary, incorporating agile methodology in SDLC provides developers with greater flexibility and adaptability to changing needs. Scrum, the most effective agile framework, is a systematic approach to project management that prioritizes collaboration, openness, and continuous improvement. The six core processes of Scrum offer a framework for managing and resolving complex adaptive issues in software development.

- **Requirement gathering**

- **Collecting information from Gampaha Wickramarachchi Ayurvedic University**

We conducted various online meetings with the participation of our team to gather knowledge about Ayurveda and disorders with **Dr. Janaki Wickramarachchi**, Dean of Faculty of Medicine, Gampaha Wickramarachchi Ayurveda University. She agreed to give us the information we needed. She gave us the legal permission to continue the project and gave us guidance on what we need to focus on moving forward.

- **Data gathering**

To begin, we read a number of published studies to gain a basic understanding. We will read a number of articles next to get additional information. The external supervisor put us in touch with several Ayurvedic experts and showed us the data we needed to proceed. Our supervisors held several meetings with us to discuss basic approaches to data collection. Gampaha University will provide the remaining necessary information in the future.

- **Conducting a survey**

We distributed a survey with closed and open questions to get information about people's knowledge of Ayurvedic remedies and diseases as well as their understanding of AI/ML and its relationship.

- **Feasibility study (Planning)**

- **Economic feasibility**

An economic feasibility report is critical for determining whether the project is financially viable, as it analyzes the project's development costs and benefits. The proposed system must be cost-effective and efficient to ensure its success.

- **Schedule feasibility**

A schedule feasibility assessment examines the timelines for the project, and any delays or missed deadlines can have a significant impact on its success. The proposed system must complete each task within the allotted time period to ensure that the project stays on schedule.

- **Technical feasibility**

Technical feasibility planning is essential in the development of any system. It involves evaluating the required skills and expertise necessary for mobile and web application development, as well as the ability to understand software architectures and communicate effectively with stakeholders to obtain the necessary information. The development team must have the necessary technical skills and communication abilities to move forward with the system's development.

- **Design (system and software design documents)**

After the planning phase, system and software design documents are created which contributes to the overall system diagram.

- **Sequence Diagram**

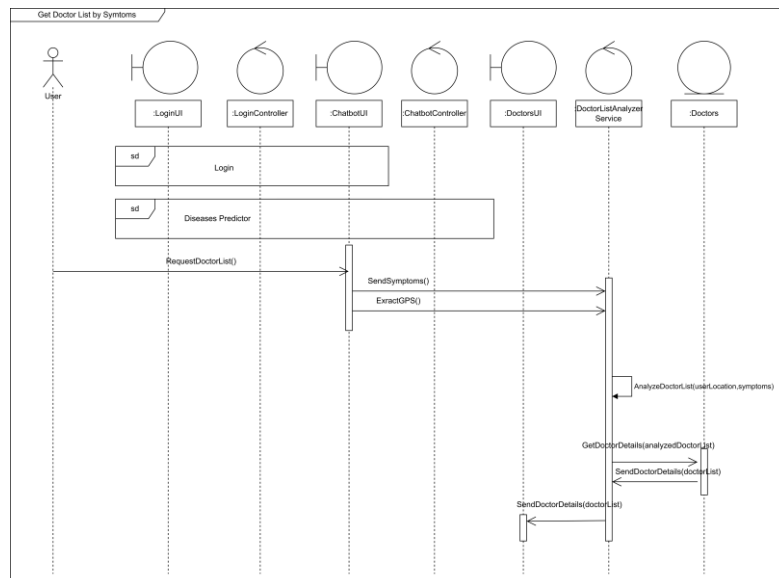


Figure 9: Sequence Diagram

- **Use Case Diagram**

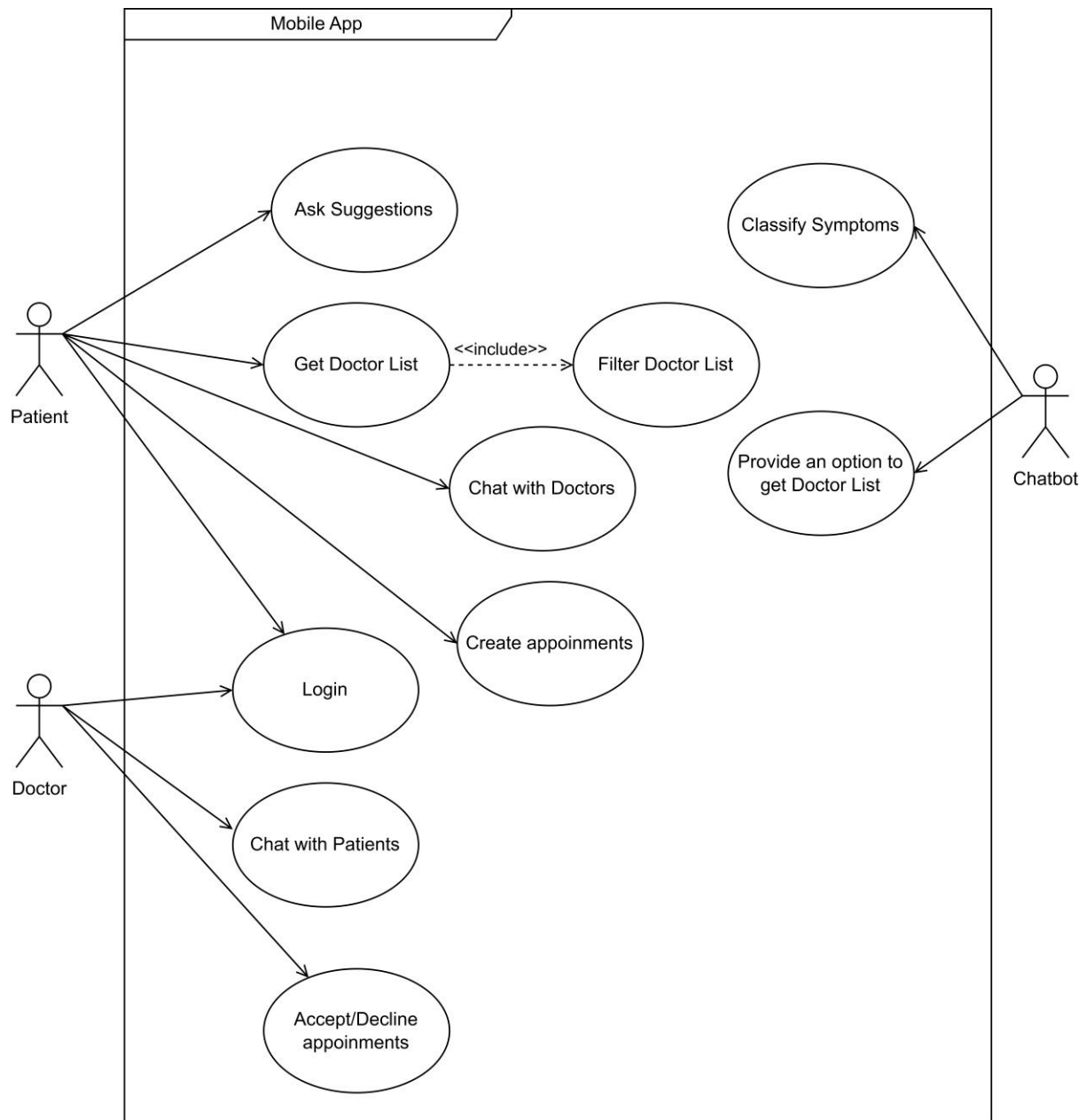


Figure 10: Use Case Diagram

- Implementation (Development)**

According to the methodology, the implementation process entails the creation of the following functionalities to meet user needs and deliver the best possible solution with high accuracy and reliability.

- Implementation of a cross platform mobile-based system using React Native and expo.
  - Training an AI model to detect the specialization of a doctor to be consulted based on patient symptoms.
  - Analyze doctor ratings and reviews using natural language processing (NLP),
  - Doctor appointment booking system.

- Development of the real time chat system
- **Testing (Track and Monitor)**

System flaws, unmet requirements, and defects are all examined during this stage of software testing in order to ensure the software's quality. To accomplish the goal, a number of testing procedures, including unit, component, integration, system, and user acceptance testing, are used.

### 3.1.2 Commercialization

This research is proposed as a good solution to one of the research gaps identified in the research program. After developing the app, the program will be introduced to the public and Ayurvedic practitioners as well as Ayurvedic related industries.

The system consists of two versions; First is to identify doctors and appointment booking. The second one, the premium version, allows you to chat with doctors.

#### 3.1.2.1 Future scope

The application has been expanded to include monitoring the patient's condition for the doctor in the future.

## 4. PROJECT REQUIREMENTS

The project requirements aim to provide users with a convenient and reliable platform to access personalized Ayurvedic treatment and connect with the most suitable Ayurvedic doctor for their specific symptoms.

### 4.1 Functional requirements

1. Symptom input: The application should allow users to input their symptoms to receive personalized treatment recommendations.
2. Doctor recommendation: The application should utilize machine learning algorithms to recommend the most suitable Ayurvedic doctor based on the user's symptoms and feedback from other users.
3. Doctor rating and feedback: The application should allow users to rate and provide feedback on the selected Ayurvedic doctor.
4. Private chat and appointment booking: The application should allow users to privately chat with the selected Ayurvedic doctor and book appointments.

### 4.2 Non-functional requirements

1. User interface: The application should have an easy-to-use and intuitive interface.
2. Security: The application should ensure the security of user data and communication between the user and the Ayurvedic doctor.
3. Performance: The application should provide fast and reliable performance, with quick response times.
4. Scalability: The system should possess the capability to handle a vast number of users and doctors, ensuring scalability.
5. Compatibility: With various devices and operating systems is an essential requirement for the system.

### 4.3 System requirements

Software requirements are created to specify the software resources that must be imposed on a system in order for the suggested system to operate as intended. The following are the requirements for this proposed component's software definition.

- React Native and Expo to create a cross platform mobile application.
- Node Server to connect web and mobile applications
- Software development platform
- Natural language processing (NLP) tools
- Google API

## 4.4 User requirements

This mobile application will be developed for Two types of users.

- Patients
- Doctors

## 4.5 Wireframes

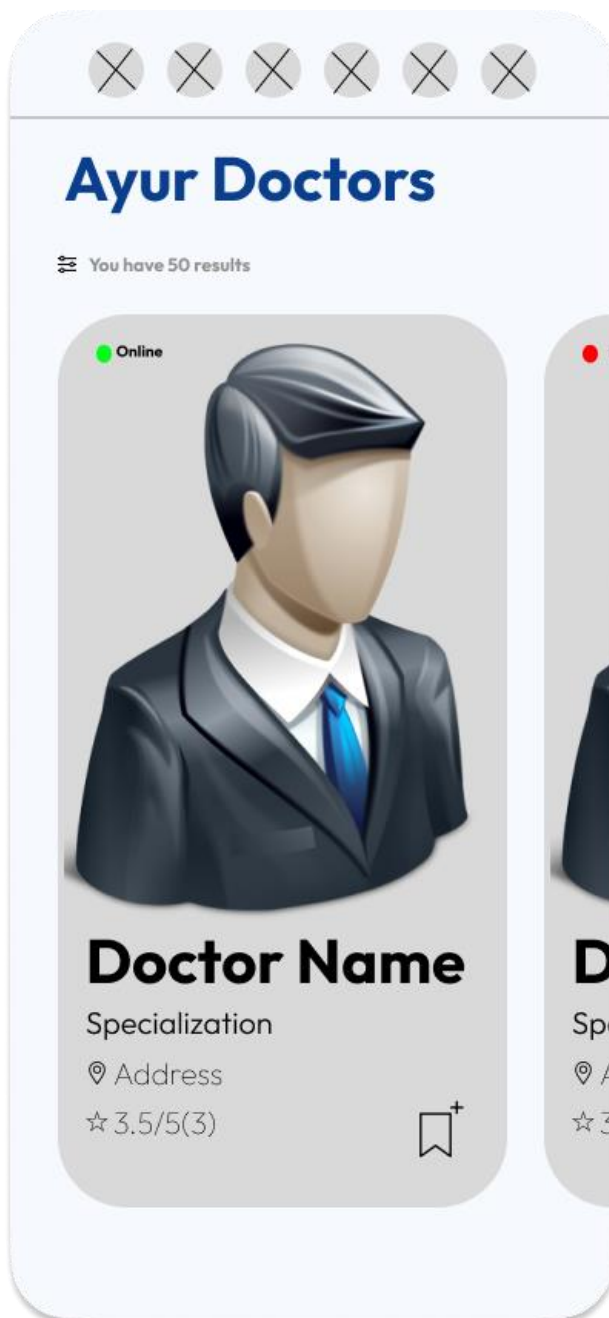


Figure 12: Doctor List Wireframe

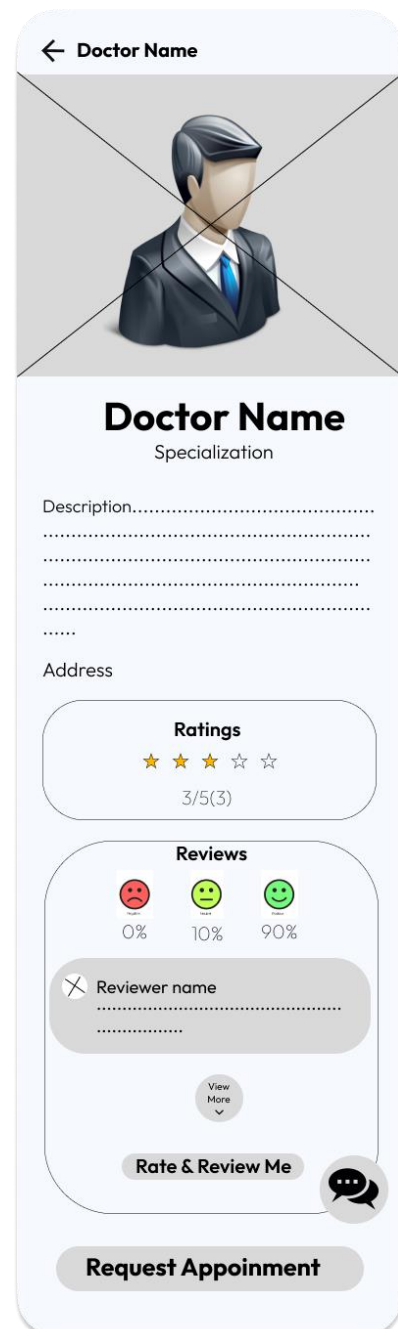
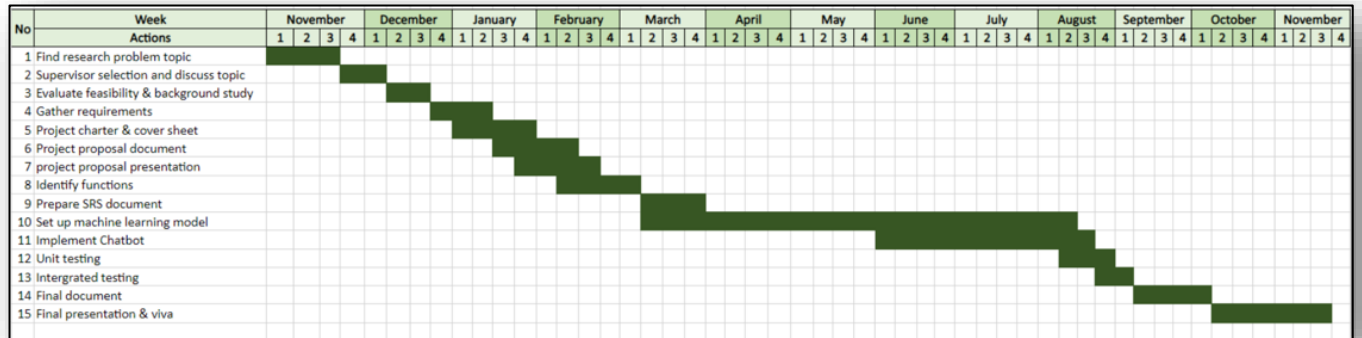


Figure 11: Doctor Details Wireframe

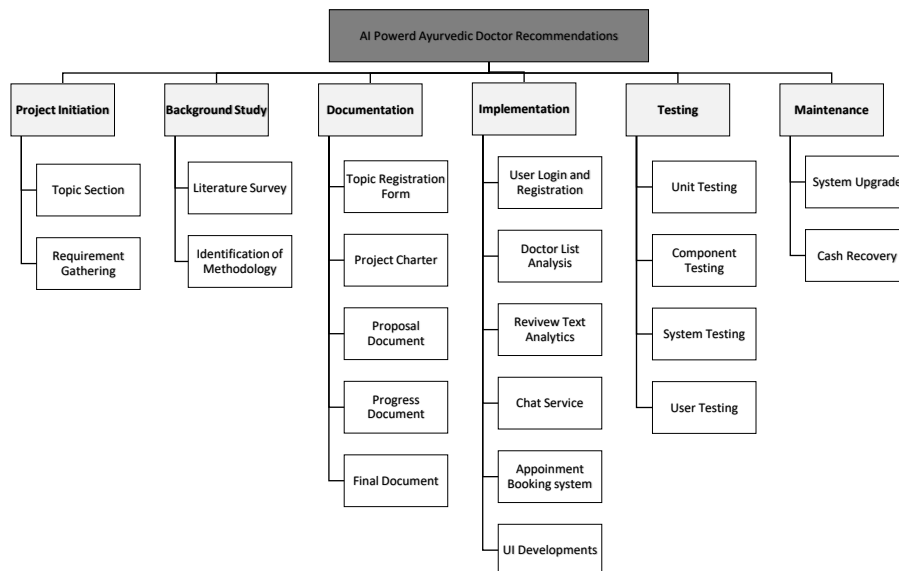
## 5. GANTT CHART

Table 2: Gantt Chart



### 5.1 Work Breakdown Structure (WBS)

Table 3: Work Breakdown Structure



## 6. BUDGET AND BUGET JUSTIFICATION

*Table 4: Budget Justification*

<b>Expenses</b>	
<b>Requirement</b>	<b>Cost (\$)</b>
Travelling cost for data collection (per day)	1.56
Cost of Deployment (per month)	20
Cost of hosting in Play Store (one-time registration fee)	25
Cost of hosting in App Store (annual developer account fee)	99
Google NLP (per 1,000 units of sentiment analysis)	1
Google Maps Distance Matrix API charges (per request for up to 100,000 elements)	0.005
Storages	0.11






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# APPENDICES

## Appendix A: Plagiarism Report

Assignment Inbox: RP-2023-Regular						
Assignment Title	Info	Dates			Similarity	Actions
Project Proposal Report		Start	02-Mar-2023	6:22PM	9% 	<a href="#">Resubmit</a> <a href="#">View</a> 
		Due	31-May-2023	11:59PM		
		Post	10-Mar-2023	12:00AM		

## Appendix B: Sample Questionnaire

<https://forms.gle/JQcxdPGPtDa6SiBY9>