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AyurSutra: A Smart Panchakarma Patient Management and Therapy Scheduling System

Isha Kakde[1], Gayatri Patil[2], Shreya Ladole[3], Gauri Bakal[4], Khushi Jain[5], Aniket Thakur[6]

[1,2,3,4,5]*Students, Sipna College of Engineering & Technology, Amravati (MS), India*

[6]*Assistant Professor, Sipna College of Engineering & Technology, Amravati (MS), India*

Abstract: *Ayurveda is a traditional healthcare system that focuses on healing through natural means such as Panchakarma therapy. Even though the use of this traditional healthcare system is increasing among the public, many of the Ayurvedic wellness centers still use manual means of handling patient records and therapy schedules. This has created many inefficiencies and issues in the traditional healthcare system. The paper presents a smart Panchakarma patient management and therapy scheduling system called AyurSutra. The system is created to help the operations of Ayurvedic therapy centers. The system includes many advanced features such as automatic therapy scheduling according to the availability of therapists, digital patient records, and automatic notifications through email and SMS. The system is created using web technologies such as HTML, CSS, JavaScript, PHP, and MySQL. The experimental results show that the system can reduce many issues in traditional healthcare systems. The system shows how digital transformation can help traditional healthcare systems. The system can also have many advanced features such as AI-based therapy recommendations and mobile application support.*

Keywords: Ayurveda, Panchakarma, Patient Management System, Therapy Scheduling, Healthcare Automation, Digital Health, Web-Based System, Appointment Management, Smart Healthcare, Data Management.

I. INTRODUCTION

In the recent past, the healthcare industry has experienced remarkable changes due to the incorporation of information technology and other electronic systems. Even the conventional practices of the healthcare industry, such as Ayurveda, are slowly embracing technology to enhance the quality of services. Ayurveda is one of the oldest forms of medicine that emphasizes the practice of holistic healing and preventive medicine. This practice is mainly based on the application of Panchakarma therapies. These therapies include a series of treatments that must be scheduled and coordinated between the therapists and the administrative staff.

However, the conventional practices of the Ayurvedic wellness centers are mainly based on the application of conventional methods such as the use of paper, phone calls, and communication to manage the patient data and schedule the therapies. This conventional method of practice has resulted in a series of problems, which negatively impact the quality of services. Therefore, to address the limitations of the conventional method of practice, there is a need to implement a smart and automated system to manage the Panchakarma therapies. It is in this context that the AyurSutra, a web-based Panchakarma Patient Management and Therapy Scheduling System, is proposed.

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This system seeks to digitalize the entire workflow through the provision of different features such as automated scheduling, patient records, notifications, and progress tracking. The use of advanced web technologies makes it possible to increase efficiency and reduce human errors in the system, thus contributing to the digital transformation of traditional Ayurvedic healthcare systems.

II. LITERATURE REVIEW

A short overview of the research work done in various papers, which have been referred in the implementation process.

A comprehensive review of the research work and systems related to healthcare management and scheduling has been done in order to know the advancements in the field of healthcare management and scheduling in the context of Ayurvedic therapy management systems.

In the research paper presented by Smith J. [1], the importance of digital healthcare management systems in improving hospital operations and the quality of healthcare has been discussed. The research paper demonstrated the impact of implementing electronic health records and scheduling systems in healthcare management, which reduces the workload and increases the accuracy of the data being recorded. However, the research paper mainly focuses on the healthcare management systems implemented in modern healthcare institutions and fails to discuss the traditional healthcare systems being followed in the country.

A research paper on "Impact of Digital Transformation in the Healthcare Sector and Role of Automation in Improving the Quality of Services Being Offered in the Healthcare Sector" was presented by Kumar A. [2]. The research paper highlighted the impact of implementing information technology in healthcare management systems in improving decision-making capabilities. Patel R. [3] proposed a concept for developing an automated clinical scheduling system to minimize appointment conflicts. The proposed system uses algorithm-based scheduling to schedule appointments efficiently. However, the system seems to be more suited for general clinical environments and does not consider the particular requirements of Ayurvedic therapy sessions, which are long and patient-specific.

[4] The importance of Ayurvedic therapy along with healthcare technology was highlighted in a report published by the World Health Organization.[5] The report highlighted the importance of the role that digital technology can play in enhancing traditional healthcare practices. However, there is a lack of technology for Ayurvedic therapy.

[6] The significance of Ayurvedic therapy in conjunction with healthcare technologies was emphasized in a report published by the World Health Organization. [7] The report highlighted that digital technologies can play a vital role in enhancing traditional healthcare practices. However, there is a lack of specific technologies to support Ayurvedic therapy.

[8] [Moreover, various research studies have been conducted to explore patient management systems and hospital information systems that have been developed to support various features such as record management and reporting. [9] Even though these systems have been developed to support various important features, they have been complex and have not been suitable for small-scale environments. [10] the review of existing literature, it is evident that although significant progress has been made in healthcare automation, there is a research gap in systems that have been developed to support

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Panchakarma therapy management. [11] Most of the systems have been developed to support general hospital environments and have not been able to address the needs of Ayurvedic treatment processes.

Thus, the proposed system, namely AyurSutra, aims to bridge this research gap and develop a dedicated and efficient system to support Panchakarma therapy management to enhance the overall performance of Ayurvedic wellness centers. [12]

III. IMPLEMENTATION

Implementation of the proposed system, namely "AyurSutra," is mainly concerned with the development of a web-based system that can facilitate the automation of Panchakarma therapy. The system is developed to ensure that it can provide an efficient and interactive interface for the users of the system. The implementation of the system is mainly concerned with the development of a web-based system that can facilitate the automation of Panchakarma therapy.

For the development of the system, the latest technology used is the latest web technology. The frontend of the system is developed using HTML, CSS, and JavaScript. The backend of the system is developed using PHP. MySQL is used as the database management system. The functionality of the system is based on the automated scheduling module. The automated scheduling module is responsible for allocating the therapy sessions based on the availability of the therapist and the preferences of the patients. The system will allocate the time slot based on the availability of the therapist if the patients request a therapy session.. The scheduling process can be represented as:

S = min(Ta, Pr)

Where, S is the scheduled slot,
Ta is therapist availability, and
Pr is the request of the patient.

The system also incorporates a secure authentication system, which only allows authorized users to access the system. The system allows the administrator to monitor patients, therapies, and activities via a centralized dashboard. The therapist can view his/her schedule and patients' progress, and the patient receives notifications about his/her therapy sessions.

IV. SYSTEM ARCHITECTURE

The architecture of the proposed system, which is named AyurSutra, follows a three-tier system architecture model, which ensures the development of a scalable system as well as effective data management. The system has three layers: the Presentation Layer, Application Layer, and the Database Layer.

1. **Presentation Layer:** The presentation layer of the system is the interface of the system. The presentation layer of the system ensures the interaction between the user and the system. The presentation layer of the system has been implemented using HTML, CSS, and JavaScript.The

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users of this system include administrators, receptionists, and therapists. The users can use this system to carry out their activities such as registering patients and checking their progress. The presentation layer is simple and intuitive and thus makes the system easier to use.

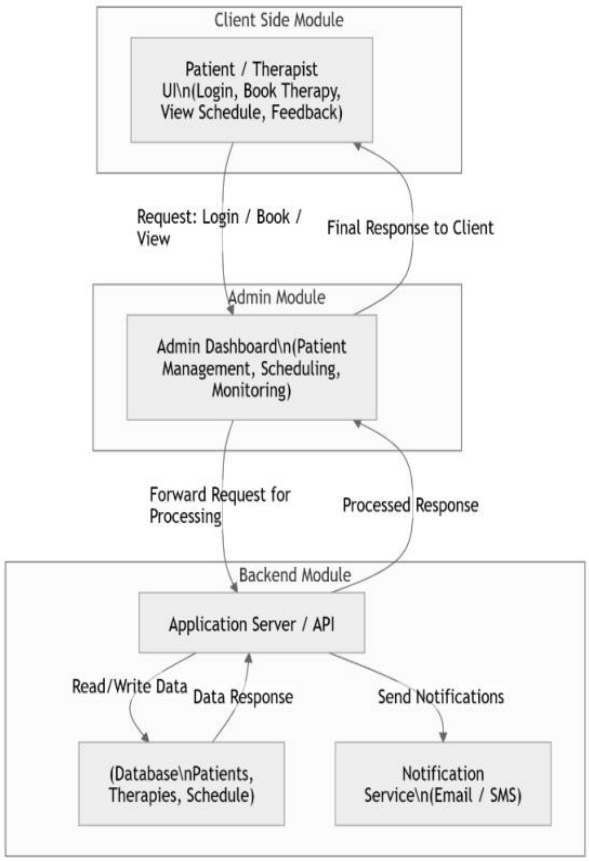

Fig. 1. System Architecture of AyurSutra

2. **Application Layer:** The application layer is the main processing part of the system. The application layer is implemented using PHP. The application layer is responsible for processing all the requests made to the system. The application layer is responsible for providing the system's functionality. The system comprises a scheduling module, which is responsible for checking the availability of the therapist and allocating the therapy sessions to the patients.

3. **Database Layer:** The database layer is responsible for managing all the data in the system. MySQL is used as a database management system to store the data in a structured manner, i.e., data about patients, therapists, therapy schedules, feedback, and notifications. The interaction between these layers helps in the smooth functioning of the system. When a user interacts with the system, a process is initiated in the application layer, and data is stored or retrieved from the database layer. The structured approach makes the system's performance better.

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V. METHODOLOGY

Component	Technology Used
Frontend	React.js (Responsive UI for Patients/Doctors)
Backend	Node.js & Express.js (High-performance API)
Database	MongoDB (Flexible schema for complex therapy data)
Communication	Twilio API (SMS) & Nodemailer (Email Alerts)
Payment Gateway Integration	RazorPay API

The methodology for the proposed system, named AyurSutra, is based on creating an efficient and scalable web-based system for handling Panchakarma therapy scheduling and patient management. The development process for this system will be based on a structured approach, from requirement analysis to system development and testing.scalable web-based system for handling Panchakarma therapy scheduling and patient management. The development process for this system will be based on a structured approach, from requirement analysis to system development and testing.The first step in creating this system is to analyze the requirements based on the problems faced by Ayurvedic wellness centers, which can be addressed by creating an efficient system for handling Panchakarma therapy scheduling and patient management through effective communication and data management. Based on this, a new system will be developed as a full-stack web application.

The system is developed using MERN technology stack. The front-end of the application is developed using React.js, which provides a dynamic user interface for administrators, doctors, and patients. The back-end of the application is developed using Node.js and Express.js, which are efficient tools for handling API requests and execution. The database used for storing patient data, therapy schedules, and feedback is MongoDB, which is highly efficient for unstructured data.

The main feature of this system is the automation scheduling feature. When a patient requires a therapy session, the system will select the available time slot for the therapist. If the time slot chosen by the patient is not available, then alternative time slots will be given to the patient.

The system will be integrated with communication services using Twillio API for sending SMS and Nodemailer for sending emails, ensuring timely reminders for therapy sessions. The system will be integrated with Razorpay API for secure online payment processing.

The system will be integrated with Razorpay API for secure online payment processing.Finally, the system will be tested in different scenarios to check the performance, usability, and reliability of the system. The results obtained from the system will prove the effectiveness of the proposed methodology.

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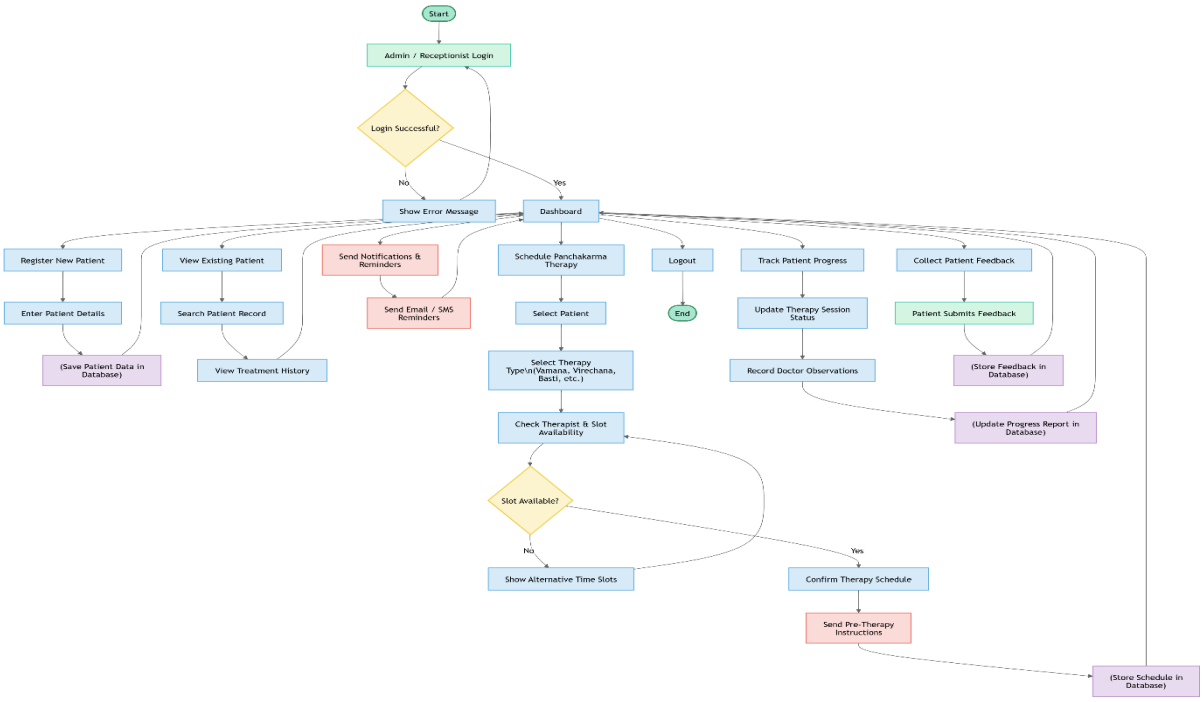
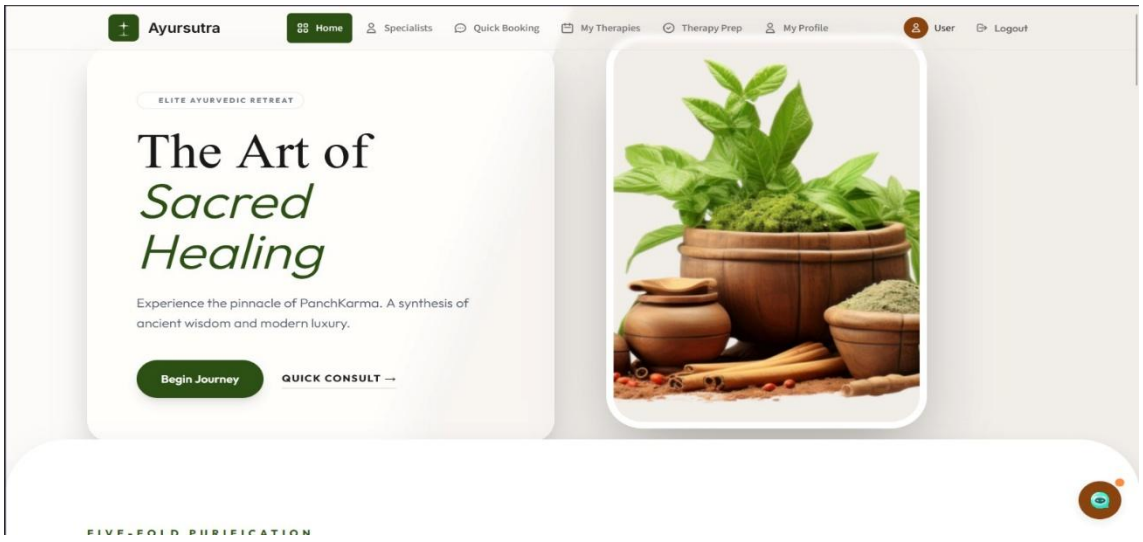
VI. SYSTEM WORKFLOW



VII. RESULTS AND ANALYSIS



The proposed system, namely AyurSutra, was implemented and tested to assess its effectiveness in managing Panchakarma therapy. Various scenarios were created to test the system for patient registration, therapy scheduling, notification delivery, progress tracking, and feedback collection. rSutra helps in efficient and error-free management in Ayurvedic therapy.

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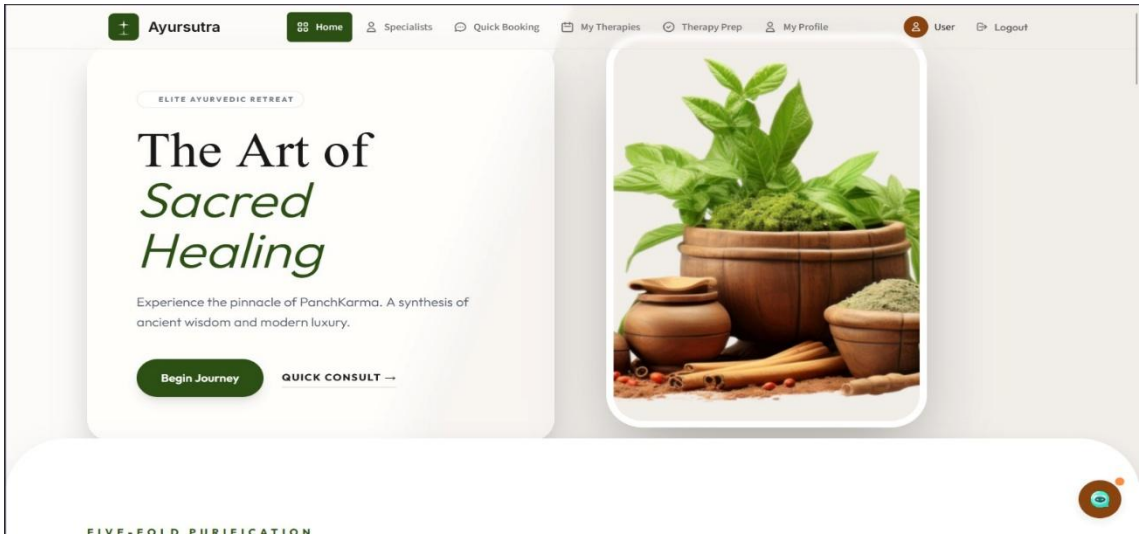
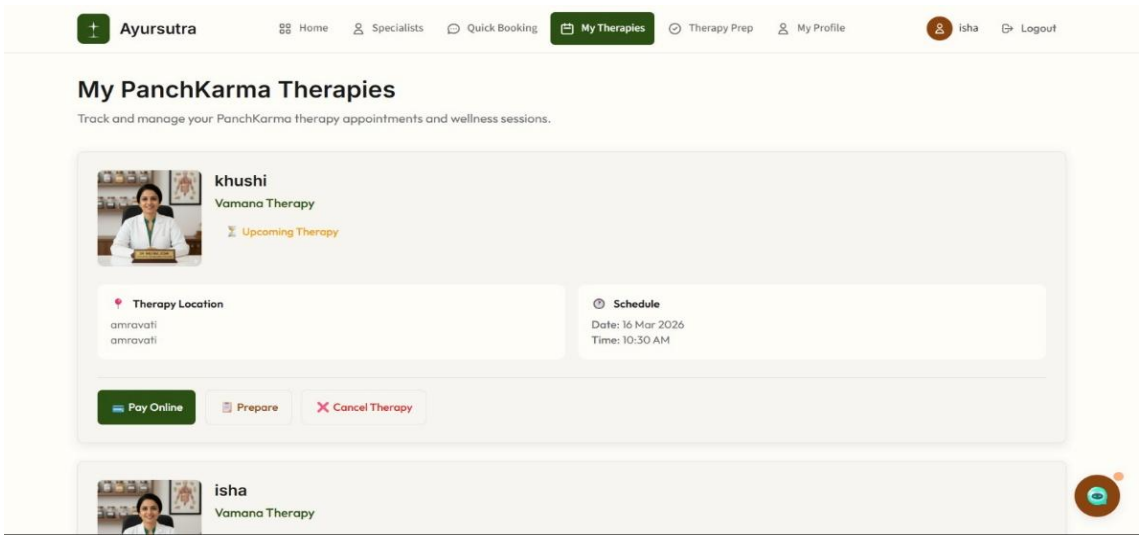


Home Page

This page is an implementation of the Frontend Design Philosophy, which includes the Responsive UI/UX. The simple design is achieved through the latest CSS frameworks, which might be Tailwind CSS or Styled Components. The focus is on the messaging and providing a smooth transition to the booking and specialist search.



Appointment Page

The figure above depicts the 'My PanchKarma Therapies' dashboard for the AyurSutra web application. This section enables users to view and manage their therapy session schedules. The user is able to view critical therapy information, including the patient's name, type of therapy, location of therapy, appointment date, and time. Users are also given various options to perform actions such as making payments, therapy preparation, and therapy cancellation.

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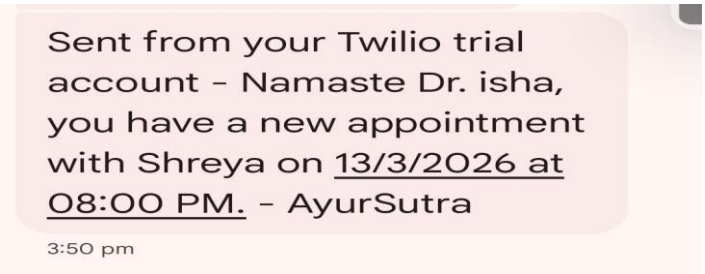
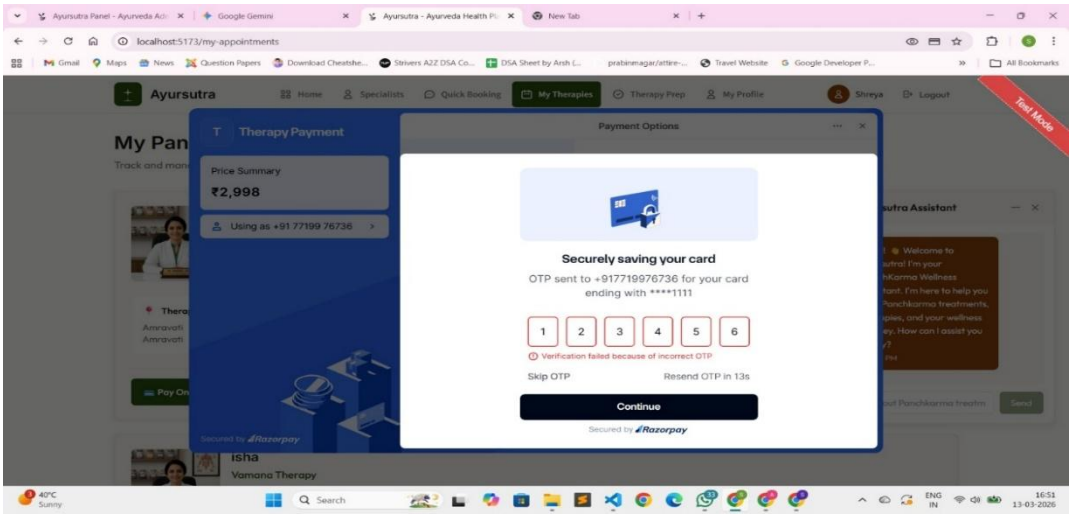
The application also includes a virtual assistant for users who require therapy-related information and assistance in getting therapy-related information and Panchakarma therapy-related information. This section will show the depiction of the Frontend Design Philosophy and how it applies to Responsive UI/UX. The design is simple and neat, using current CSS frameworks like Tailwind CSS or Styled Components, ensuring the messaging is at the center, yet allowing for a smooth transition to other features, such as booking and searching for specialists.



This picture illustrates the Functional Reliability of this system. The application, by utilizing this automated system of notifications, reduces the rate of "no show" and ensures that specialists are notified of their schedules, even if they're not actively logged in and using the web dashboard. It shows the developer's capability to incorporate complex cloud communications into a full-stack application.



The following figure depicts the online therapy payment interface for the AyurSutra system integrated with Razorpay payment gateway. This interface helps the patient to securely make payments for their booked therapy sessions of Panchakarma therapy. The system displays the price summary for therapy and user information before proceeding with the payment gateway. Once the patient selects the payment method, the payment gateway prompts users to provide OTP for verification purposes in order to ensure secure transactions. The integration of Razorpay into this system allows users to make digital payments using debit cards, credit cards, and other online payment options. This feature helps

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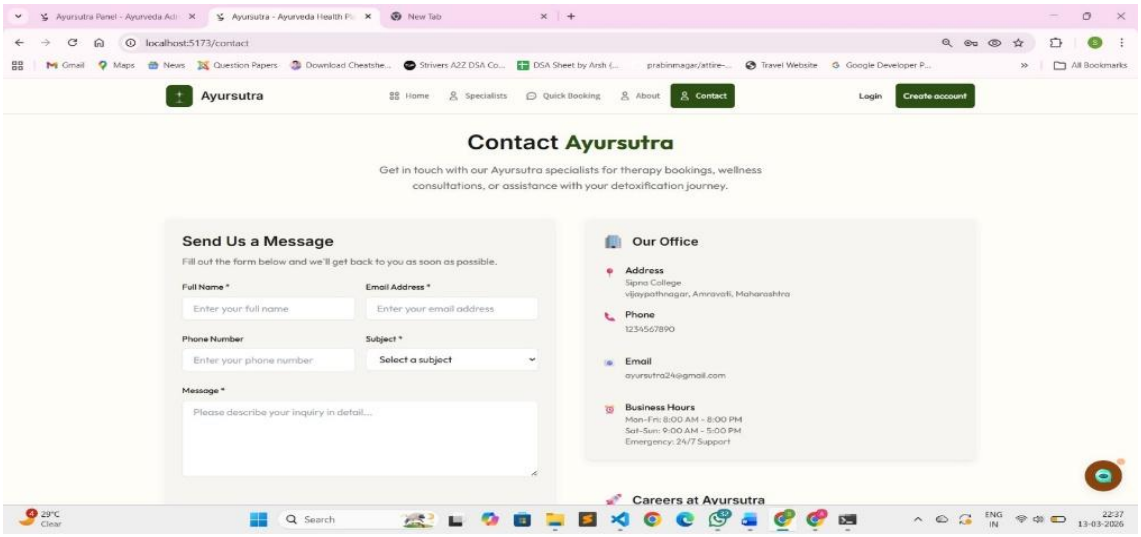
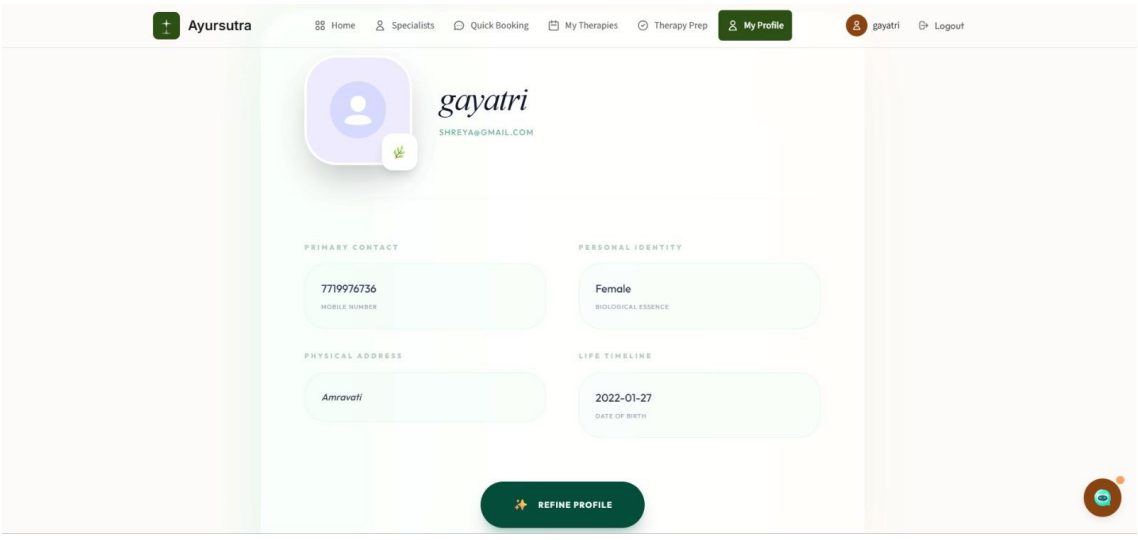
in providing more convenience for users because they can directly make payments for therapy through this web interface while keeping their financial transactions secure and encrypted.



The above figure is a representation of the Contact Page of the AyurSutra Panchakarma Management System. The purpose of this page is to enable the user to communicate with the support team of AyurSutra in relation to their needs, whether it is in relation to booking a therapy session or a general inquiry. The page is designed in a manner that includes a contact form wherein the user is able to input their name, email, phone number, subject, and a message in relation to the purpose of the inquiry. The page is further designed in a manner that includes the office address, phone number, email, and office hours of the organization

The descriptions are intended to highlight the feature and aesthetic of your project, which is Ayursutra, in a formal college report.



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This screenshot displays how the interface for the "My Profile" page is organized into sections, such as Primary Contact (mobile number), Personal Identity (gender), Physical Address, and Life Timeline (date of birth), for a registered user (e.g., "Gayatri"). The prominent "Refine Profile" button at the bottom of the interface, which features a gradient effect, makes it easier for users to edit their information.

The above figure shows the MongoDB Atlas Data Explorer interface displaying the appointments collection used in the AyurSutra system. Each document in this collection contains information regarding a therapy session appointment booked by a patient. The data set contains several significant fields, such as userId, doctorId, slotDate, slotTime, userData, doctorData, amount, payment status, and appointment completion status, which enable the system to manage therapy sessions effectively. The appointment data set ensures that therapy schedules are properly recorded, preventing scheduling conflicts for patients and therapists. The system stores this appointment data in MongoDB, allowing for easy access and updates whenever a patient schedules, cancels, or completes a therapy session.

The above screenshot shows the "My Profile" page, where a registered user, for example, "Gayatri," can manage their details. The interface has been divided into sections, such as Primary Contact (mobile number), Personal Identity (gender), Physical Address, Life Timeline (DOB), etc. The prominent "Refine Profile" button with a gradient effect is available at the bottom for easy editing of user details.

The figure above depicts the consultation and appointment management interface for the AyurSutra web application. The interface is created using React.js and displays the appointment data fetched from the MongoDB database using backend APIs. The interface displays various attributes of the appointment data set, including patient name, payment method, patient age, appointment date and time, consultation fees, and action status. The interface allows users, such as administrators or therapists, to manage appointments directly and perform operations such as approval, cancellation, and completion of consultations. The interface also illustrates how the stored data set is fetched and displayed in real time using the backend and frontend for efficient therapy management.

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