

Care Sched: Doctor and Patient Appointment Management

Poornima Nayak¹, Mohammad Ziaullah^{2,*}, Tabasum Guledgudd³

Abstract

The medical appointment system is a web application that uses PHP, JavaScript, and CSS to improve the efficiency of booking medical appointments. It features two interfaces: an admin side where patients and doctors manage their appointments and a user side where they may handle an appointment and to view records, and manage their medicines. The web platform that the system makes available provides a convenient online experience from any internet-enabled device, facilitating appointment scheduling, reducing errors, and lowering administrative workload. The shortcomings of traditional scheduling methods are addressed by this system, which increases accessibility and simplifies operations for healthcare management. The doctor appointment system tackles two main concerns with traditional appointment booking methods: lengthy wait times and human scheduling challenges. Using web technologies to create an intuitive interface for user and administrative interactions, this system seeks to speed up the appointment process. Physician and patient records are managed by the admin side of the system, while medication management, appointment scheduling, and treatment histories are accessible through the user side. This approach enhances both customer satisfaction and operational efficiency.

Keywords: JavaScript, medical appointment, admin

INTRODUCTION

Doctors and patients are the primary focus of the user interface of this application. Patients now have a simple way to plan, monitor, and manage their online appointments thanks to technology [1]. By eliminating the need for phone calls or in-person visits to set up appointments, this reduces frustration and saves time. Patients can also manage their data and trace their treatment history from a single portal. This expedites their workflow and enhances patient communication [2].

*Author for Correspondence

Mohammad Ziaullah

E-mail: mdziaullah_cc@sccab.org

¹Student, Limited Departmental Examination, SECAB Institute of Engineering and Technology, Vijayapura, Karnataka, India

²Assistant Professor, Electronics and Communication Engineering, SECAB Institute of Engineering and Technology, Vijayapura, Karnataka, India

³Head and Assistant Professor, Electronics and Communication Engineering, SECAB Institute of Engineering and Technology, Vijayapura, Karnataka, India

Received Date: November 22, 2024

Accepted Date: January 14, 2025

Published Date: March 10, 2025

Citation: Poornima Nayak, Mohammad Ziaullah, Tabasum Guledgudd. Care Sched: Doctor and Patient Appointment Management. International Journal of Computer Science Languages. 2025; 3(1): 1–12p.

- **Server-side processing:** For server-side activities, PHP is used. It performs necessary functions such as processing form submissions, managing user sessions, and communicating with databases.
- **Client-side interaction:** JavaScript allows for real-time updates and dynamic content changes, which improves the web application's interaction experience.

System Overview

Administrators and end users, or patients and doctors, are the two primary user groups that the Doctor Appointment System is designed to serve. The administrative interface gives medical staff the resources they need to effectively manage patient records, doctor profiles, and appointments.

LITERATURE SURVEY

Overview of Appointment Scheduling Systems

- *Lessening of administrative workload:* According to studies, automated solutions can dramatically reduce the amount of time employees spend scheduling appointments, which improves operational efficiency [3].
- *Error reduction:* According to a study by Johnson [4], automated appointment systems reduced double bookings and scheduling problems, enhancing overall service quality.
- *Convenience and accessibility:* Patients can conveniently schedule appointments online from any location with internet connection thanks to online appointment scheduling tools [4].
- *Reduced wait times:* These solutions assist shorten wait times and increase access to healthcare services by enabling people to make and manage appointments online.

Steps in Development of Appointment Scheduling Systems

Requirement Analysis

- *Needs assessment:* Determining the needs of patients and medical personnel is the first step. This means figuring out which features the system has to offer, such as reminders, appointment scheduling, and record management.
- *Involving stakeholders:* The architecture and functioning of the system are shaped in part by the ideas and comments that healthcare professionals and patients provide regarding their needs and preferences [5].

System Design

- *User interface design:* Ensuring ease of use requires creating an intuitive and user-friendly design. This entails creating layouts that make important features and simple navigation accessible.
- *Database design:* To effectively handle and store appointment, physician, and patient data, a strong database structure is developed. Data integrity and system scalability are supported by well-designed databases.

Implementation

- *Development:* Appropriate technologies including JavaScript for interactive features, CSS for styling and PHP for server-side scripting are used in the construction of the system.
- *Testing:* Extensive testing is done to find and fix defects, guarantee functionality, and confirm that the system satisfies user needs. User acceptability tests, integration tests, and unit tests are all types of testing.

Deployment and Maintenance

- *Deployment:* The users can access the system since it is set up on a web server or cloud platform. Configuring the server environment and making sure the application functions properly are two aspects of deployment.

PROBLEM DEFINITION

Challenges with the Conventional Appointment Scheduling

- *Inefficiencies of manual scheduling:* Manual appointment scheduling usually entails keeping track of appointments via handwritten logs or phone calls. In addition to being labor-intensive, this approach is prone to mistakes like double booking or missing appointments. The task of handling many calls and intricate schedules falls on administrative staff, which might result in errors and inefficiencies [6].
- *Accessibility and convenience limitations:* Patients who have busy schedules or live in various time zones may find it difficult to make appointments using traditional methods, which sometimes require patients to phone during business hours. Patients become less engaged with

healthcare services and are more dissatisfied when they must cope with congested lines or wait on hold. The simplicity of use for patients in managing their appointments is reduced when there is no accessible scheduling option [7].

- *Administrative overhead:* The manual scheduling process is very taxing on administrative employees. Operational costs are raised by the time and effort required to input, update, and maintain appointment details. The administrative burden can have a detrimental impact on the standard of patient care and the effectiveness of clinic operations.
- *Challenges in data management:* Conventional systems frequently rely on laborious and error-prone hardcopy recordkeeping or basic digital spreadsheets. Physical records carry a greater risk of loss or misplacing crucial appointment information, whilst spreadsheets might not have the sophisticated capabilities required for effective data management. This may lead to erroneous or incomplete records, which would be detrimental to both operational effectiveness and patient care [8].

The Necessity for a Digital Solution

- *Digital increased productivity:* By automating scheduling processes, digital technologies cut down on mistakes and administrative work. They manage many appointments well, giving staff members more time to focus on other crucial duties.
- *Patients increased accessibility:* Patients can benefit from online appointment management and scheduling whenever and wherever they choose. Patients are happier and use healthcare services more frequently as a result of this flexibility.
- *An optimized data administration:* A unified digital platform provides strong data administration features. The likelihood of data loss or improper management is decreased by maintaining precise, current, and readily available appointment records.
- *Efficient communication:* The patients can receive automated notifications and reminders, which would cut down on no-shows and guarantee prompt follow-ups [9].

SYSTEM SPECIFIC REQUIREMENTS

Functional Requirements

Authorization and Authentication of Users

- *Role management:* Different user roles, including as administrators, physicians, and patients, should be supported by the system, each with certain permissions.
- *Authentication:* To guarantee strong security, secure login and registration procedures, including multi-factor authentication (MFA) choices, must be put in place.
- *Authorization:* Users' access to relevant functionalities should be restricted depending on their role through the implementation of role-based access restrictions.

Appointment Scheduling

- *Booking functionality:* Online appointment scheduling and time slot viewing should be provided to patients. To avoid conflicts, the system has to update slot availability in real time.
- *Appointment management:* Users should be able to schedule, cancel, or reschedule appointments, and both patients and doctors should receive notifications.
- *Doctor availability:* In order to appropriately reflect their current schedule, doctors must be able to set and amend their availability.

Patient and Doctor Management

- *Profile management:* Users must have the ability to see and edit their profiles, which should contain personal and health-related data.
- *Record management:* Having the ability to add, amend, and remove records as necessary, administrators should be able to handle patient and physician information [10].

Notifications and Reminders

- *Automated reminders:* To lower the number of no-shows, the system ought to automatically remind users via email or SMS of forthcoming appointments.
- *Modify notifications:* Users who are relevant should automatically receive notifications for appointment confirmations, cancellations, and rescheduling.

Reporting and Analytics

- *Appointment reports:* To assist with administrative responsibilities, the system should provide reports on a variety of parameters, including appointment counts.
- *User activity reports:* To track and enhance operational effectiveness, administrators ought to be able to generate reports on user activity and system performance.

Privacy and Security of Data

- *Compliance:* To protect sensitive patient data, the system needs to abide by data protection laws (such as General Data Protection Regulation [GDPR] and Health Insurance Portability and Accountability Act [HIPAA]).
- *Encryption:* To guarantee data confidentiality and prevent unwanted access, all data, whether in transit or at rest, should be encrypted.

Nonfunctional Requirements

The quality characteristics and limitations that impact the system's functionality and user experience are described in nonfunctional requirements.

Performance

- *Reaction time:* When a user interacts with the system, like to schedule or see appointments, it should react quickly, ideally in a matter of seconds.
- *Scalability:* It must be able to accommodate expanding loads, user counts, and appointment schedules without experiencing performance problems.

Usability

- *User interface:* The interface of the system must be easy to use and straightforward for users to browse and accomplish activities.
- *Accessibility:* To guarantee that people with disabilities can use the system, it must be built in accordance with accessibility standards (such as Web Content Accessibility Guidelines [WCAG]).

Reliability

- *Availability and reliability:* The system should have high availability, meaning it should run constantly with little downtime.
- *Backup and recovery:* In order to safeguard data, regular backups must be made, and in the event of a system failure, recovery protocols should be established to restore data.

Compatibility

- *Browser support:* To guarantee a consistent user experience, the system should work with many web browsers, including Chrome, Firefox, Safari, and Edge.
- *Device support:* It should have a responsive design that adapts to multiple screen sizes and be viewable on a range of platforms, such as computers, tablets, and smartphones.

Technical Requirements

The technologies and infrastructure required for system development and operation are described in detail in the technical requirements.

Technology Stack

- *Code quality:* To make future changes and debugging easier, the system's code needs to be clear, well-documented, and maintainable.
- *Technical support:* Sufficient documentation and support should be provided to help with system upkeep and user concerns.

Backend Technologies

- *PHP:* This programming language is used to manage application logic, process data, and communicate with databases via server-side scripting. PHP is the preferred option due to its broad support base and simplicity of integration with different web servers.
- *MySQL:* Data about appointments, patients, and doctors is stored and managed using the relational database management system MySQL. MySQL uses SQL for querying and manipulation, and it offers strong data management features.

Frontend Technologies

- *JavaScript:* JavaScript is used to develop dynamic and interactive user interfaces through client-side scripting. Real-time updates and enhanced user engagement are made possible via JavaScript.
- *CSS:* Cascading style sheet (CSS) is used to style the visual components of the application, such as the layout, fonts, and color with varying screen resolutions and devices. CSS guarantees a unified and visually appealing design.

Infrastructure

- *Web server:* A dependable web server with enough power to manage anticipated traffic and application demand, like Apache or Nginx, should host the system.
- *Hosting environment:* Scalable and adaptable hosting solutions can be achieved with cloud platforms like as AWS or Azure, which offer advantages including automated scalability.

Integration

- *Third-party services:* It is essential to integrate with third-party services in order to use features like email and SMS notifications. Notification and communication features are improved by these integrations.
- *Application programming interfaces (APIs):* To enable data interchange and interoperability, the system may need APIs for integration with other healthcare applications or systems, such as electronic health record (EHR) systems.

Security

- *Access restrictions:* Put in place strong access restrictions to guarantee that sensitive data and particular system functionalities are only accessible by authorized users.
- *Data encryption:* Data must be protected using encryption methods when it is at rest (using the appropriate encryption algorithms) and during transmission (using HTTPS).

METHODOLOGY

The hospital's web platform for managing physicians and patients is called Hospital Management System. In this project, MySQL and PHP are used. The entire project mainly consists of 3 modules, which are:

1. Admin module
2. User module
3. Doctor module

Admin Module

1. *Dashboard:* The administrator can view patients, doctors, appointments, and new queries in this section.

2. *Doctors*: The administrator can add a doctor's area of expertise and manage doctors in this part (add/update).
3. *Users*: The administrator can view user details (including those who accept online appointments) and delete any unnecessary users from this section.
4. *Patients*: The administrator can view the patient's details in this section.
5. *Appointment History*: The admin can view the appointment history in this section.
6. *"Get in Touch with Us" Questions*: The administrator can see user-submitted queries in this section.
7. *Doctor Session Logs*: The administrator can view the login and logout times in this section.
8. *User Session Logs*: The administrator can view the login and logout times of users in this section.
9. *Reports*: The administrator can check patient reports for certain time periods in this section.
10. *Patient Search*: Using the patient's name and mobile number, the admin can search for the patient in this part.
11. The admins can modify their own password.

The flow model of the Admin Module is shown in Figure 1.

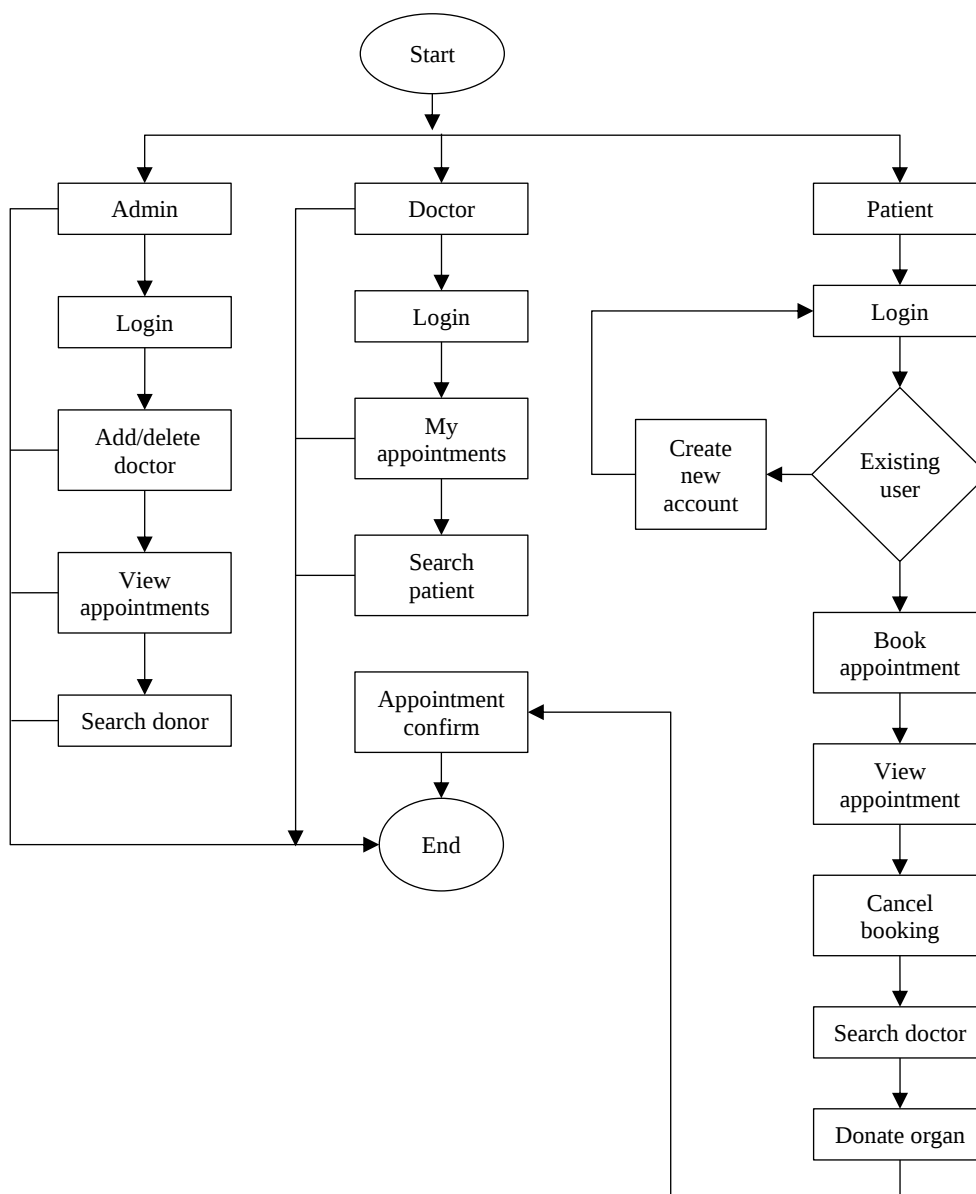


Figure 1. Flow model of the Admin Module.

User Module (Patient)

1. *Dashboard*: Patients can browse their profile, appointments, and book an appointment on this section.
2. *Schedule Appointment*: The patient can schedule an appointment in this area.
3. *Appointment History*: The patient's individual appointment history is displayed in this area.
4. *Medical History*: The patient's individual appointment history is displayed in this section.
5. The users can reset, modify, and update their password.

Doctor Module

1. *Dashboard*: Patients can browse their profile, appointments, and book an appointment on this section.
2. *Schedule Appointment*: The patient can schedule an appointment in this area.
3. *Patients*: A doctor can add or update patients in this section.
4. *Search*: Using the patient's name and mobile number, the doctor can look up the patient in this part. The doctors can reset, modify, and update their passwords.

Data Flow and Interaction

User Login and Registration:

- *Process*: Individuals can choose to register if they are new or use existing login credentials to log in. Using the database, the system verifies credentials and grants access based on the user role (doctor or patient).

Appointment Scheduling:

- *Process*: Patients can schedule appointments using the user interface. The system confirms the availability and puts the appointment information into the database.

Record Management

- *Process*: Admins can add, remove, or modify patient and physician records via the admin interface. Patients' personal information can be read and managed by physicians as needed.

System Deployment

Local Server Setup

- *Requirements*: XAMPP installed on a Windows PC. The steps are:
- *Extract Files*: First, unzip the project files to extract them.
- *Folder of copy*: Place the extracted folder in xampp/htdocs/.

Database Configuration

- Access <http://localhost/phpmyadmin/>.
- Create a database named "registration".
- Import the registration: SQL file to establish the database schema and starting contents.

Run Application

"<http://DoctorPatient/applicationlayer/Doctorpatient.php>" on local host You can access the program in a web browser by using the URL above.

RESULTS

Figure 2 explains the initial page of the user interface (UI). It has three buttons called "Doctor," "Admin," and "User," all of which are arranged horizontally in a single line.

Admin

- In the screen, click on 'Upload Android Malware Dataset' button and upload dataset as shown in Figure 3.

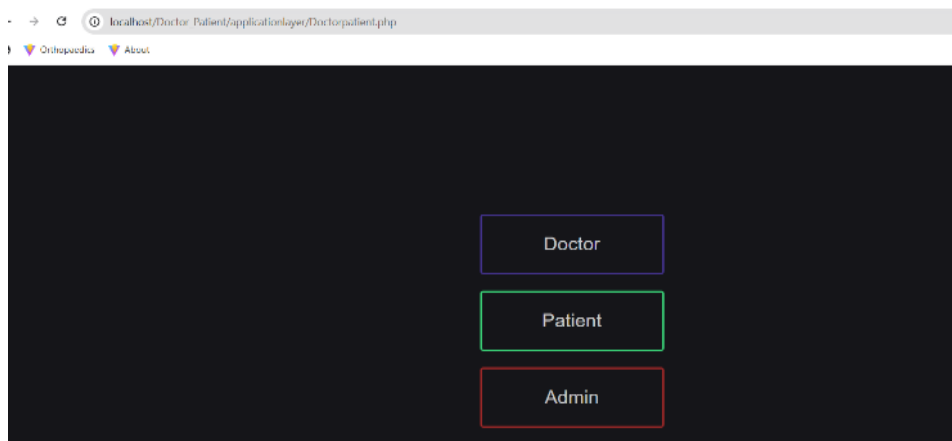


Figure 2. App user interface front page.

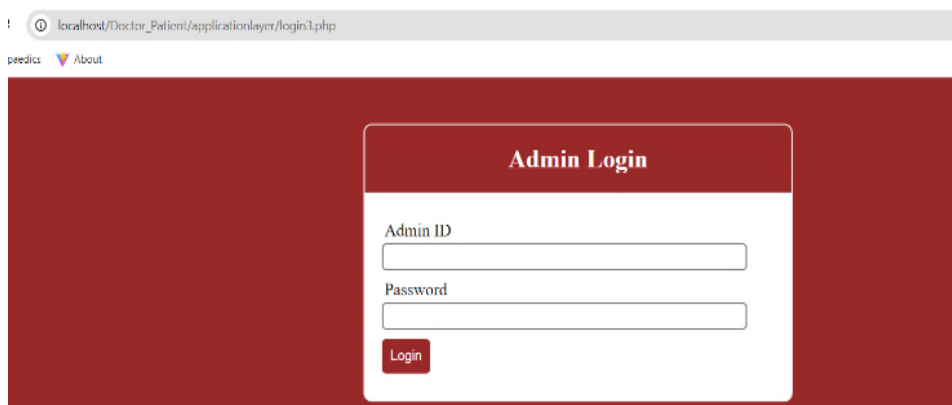


Figure 3. Upload Android malware dataset.

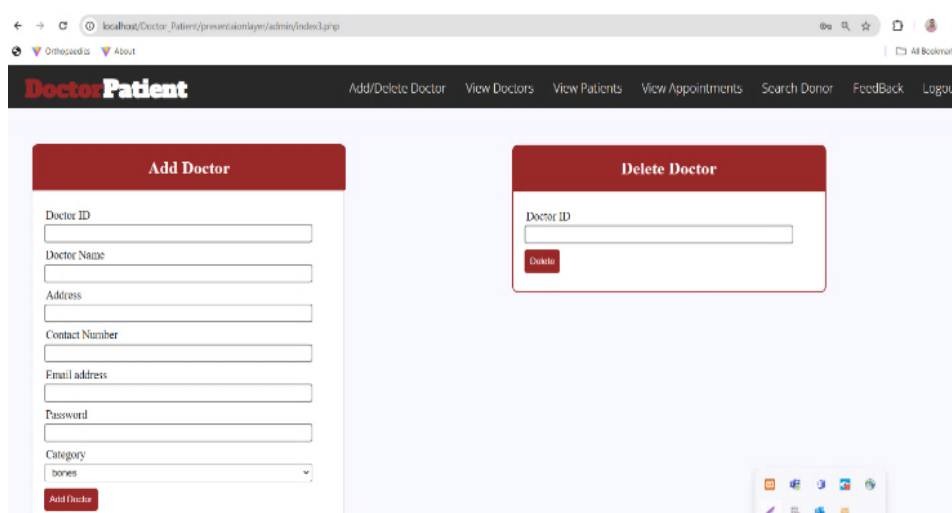
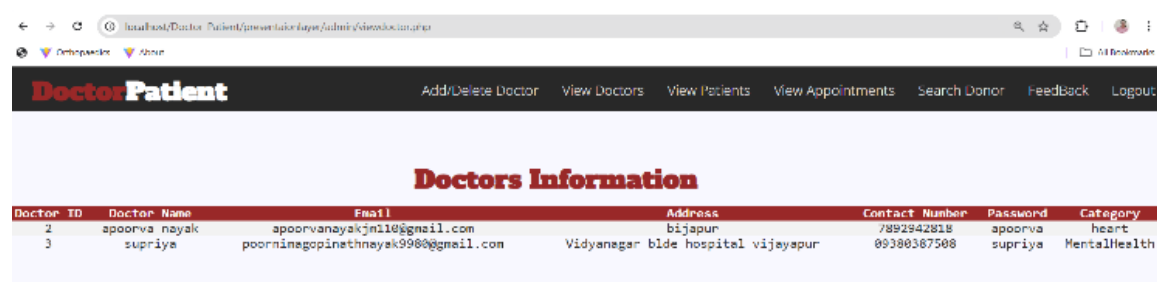


Figure 4. Admin home page.

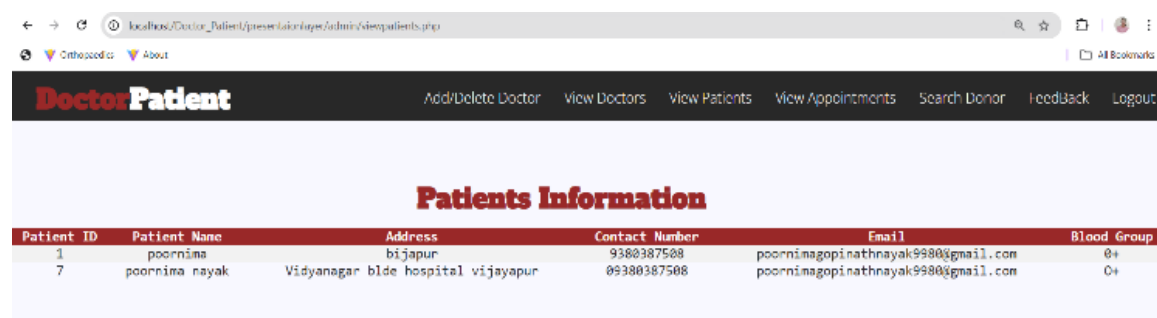
- Figure 4 explains how the Admin UI home page appears after the admin logs in, where they can add new physicians or remove current doctors from the system.
- Figure 5 explains that in the doctor home page, when the “View Doctors” option is clicked, a list of doctors along with their specialties will be displayed.
- Figure 6 explains that a list of doctors and their specializations will appear when the “View Doctors” option on the doctor home page is selected.



The screenshot shows the 'Doctors Information' table in the admin interface. The table has columns for Doctor ID, Doctor Name, Email, Address, Contact Number, Password, and Category. There are two rows of data.

Doctor ID	Doctor Name	Email	Address	Contact Number	Password	Category
2	apoorva nayak	apoorvanayakjnl10@gmail.com	bijapur	7892942818	apoorva	heart
3	supriya	poorninagopinathnayak9980@gmail.com	Vidyanagar blde hospital vijayapur	09380387508	supriya	MentalHealth

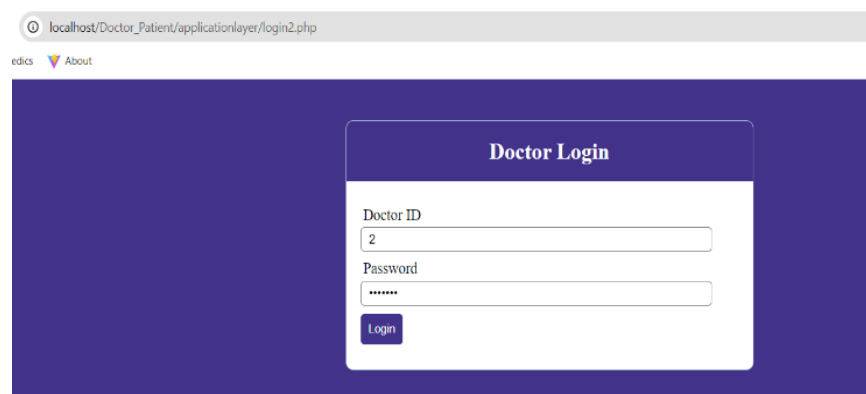
Figure 5. Admin view: doctors.



The screenshot shows the 'Patients Information' table in the admin interface. The table has columns for Patient ID, Patient Name, Address, Contact Number, Email, and Blood Group. There are two rows of data.

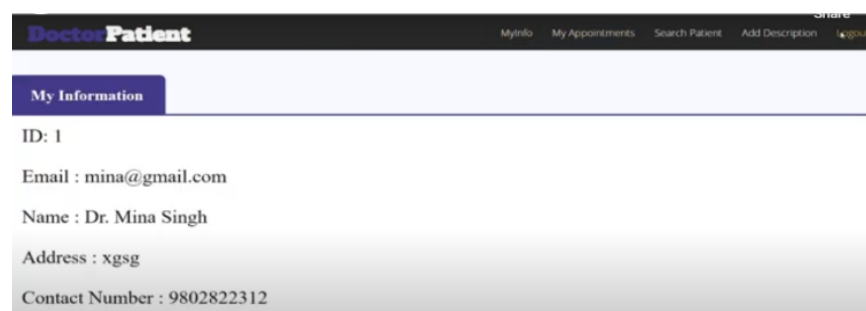
Patient ID	Patient Name	Address	Contact Number	Email	Blood Group
1	poornima	bijapur	9380387508	poorninagopinathnayak9980@gmail.com	0+
7	poornima nayak	Vidyanagar blde hospital vijayapur	09380387508	poorninagopinathnayak9980@gmail.com	0+

Figure 6. Admin view: patients.



The screenshot shows the 'Doctor Login' form. It has a title 'Doctor Login' and two input fields: 'Doctor ID' with the value '2' and 'Password' with masked characters '*****'. There is a 'Login' button below the password field.

Figure 7. Doctor login page.



The screenshot shows the 'My Information' page for a doctor. It displays the following details: ID: 1, Email: mina@gmail.com, Name: Dr. Mina Singh, Address: xgsg, and Contact Number: 9802822312.

Figure 8. Doctor personal information in home page.

Doctor

- Figure 7 explains that the UI has three buttons on the initial page that are labeled “Doctor,” “Admin,” and “User.”
- Figure 8 explains that the UI has three buttons on the initial page that are labeled “Doctor,” “Admin,” and “User.” Clicking “Doctor” takes you to the doctor's personal information page on his or her home website.

Patient

- Figure 9 explains that the UI has three buttons on the initial page that are labeled “Doctor,” “Admin,” and “User.” You may enter your login information on the patient login screen by clicking on the “Patient” option.
- Figure 10 explains that in the first page of the UI, there are three buttons labeled “Doctor,” “Admin,” and “User.” Clicking on “Patient” directs you to the patient's home page, where the patient's personal information was displayed.

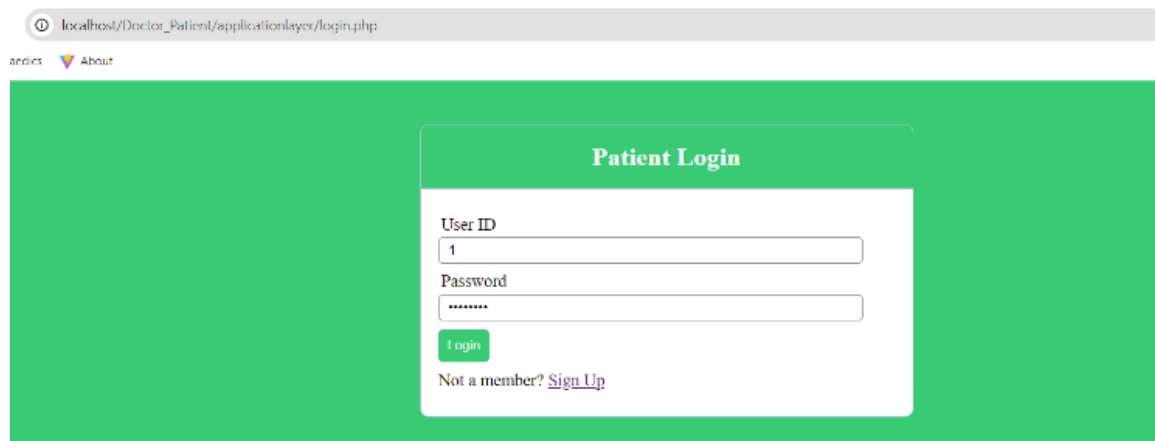


Figure 9. Patient login page.

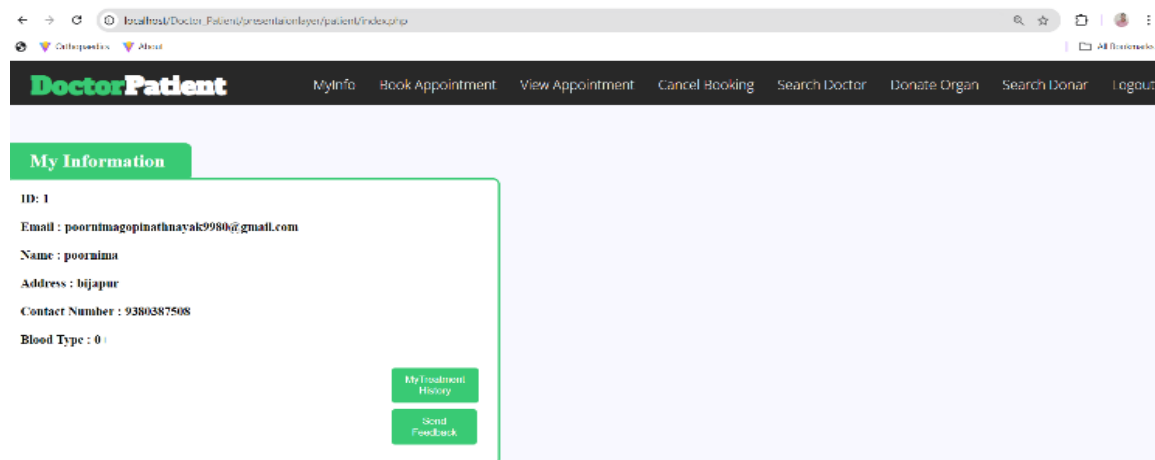


Figure 10. Patient personal information in home page.

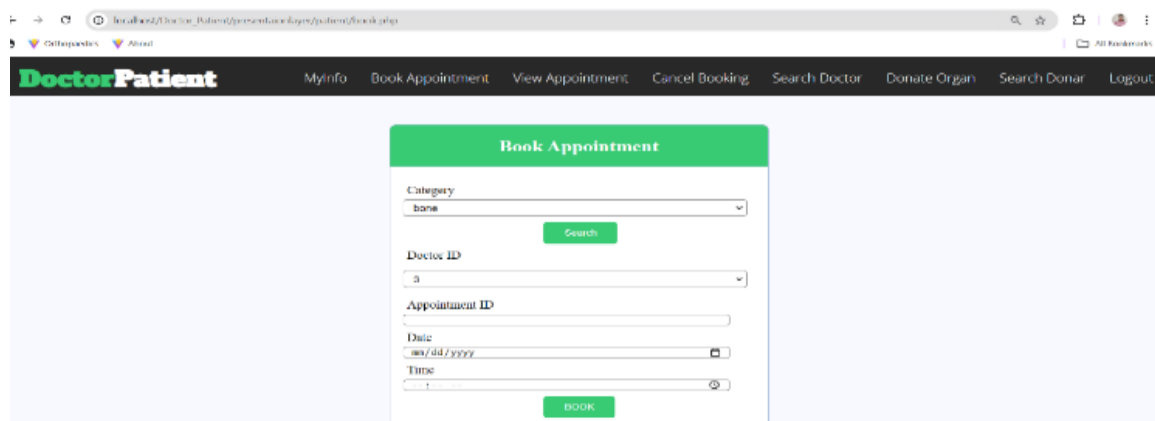
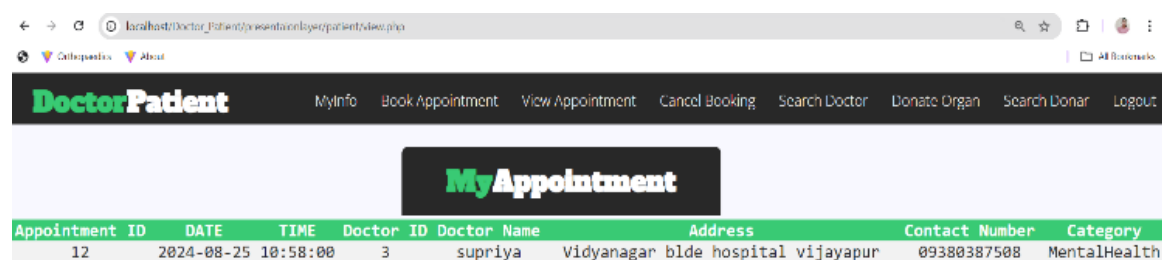
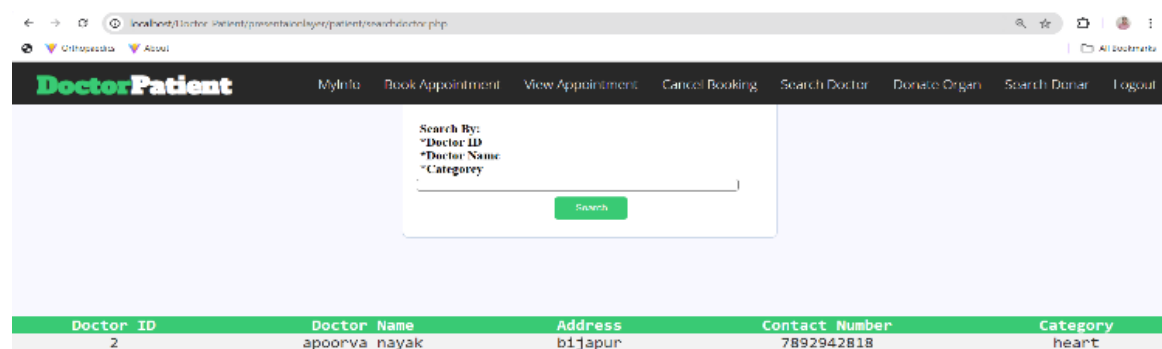


Figure 11. Doctor appointment book tab in patient portal.



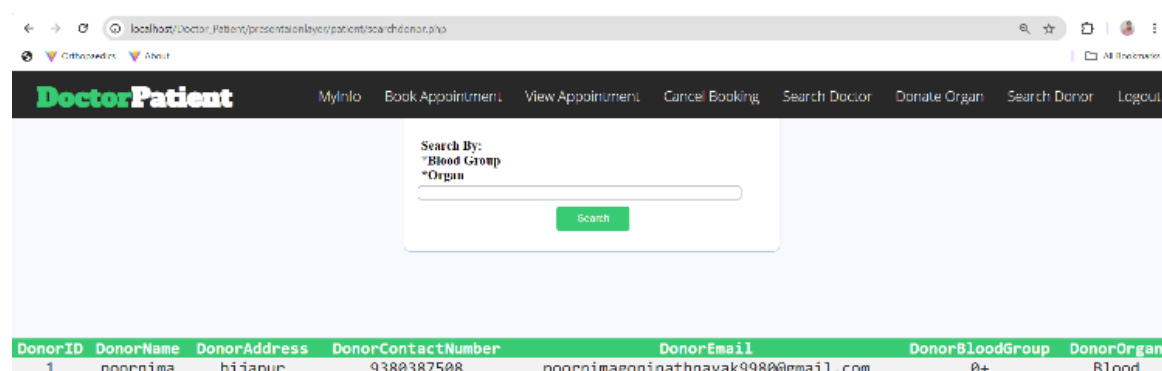
Appointment ID	DATE	TIME	Doctor ID	Doctor Name	Address	Contact Number	Category
12	2024-08-25	10:58:00	3	supriya	Vidyanagar blde hospital vijayapur	09380387508	MentalHealth

Figure 12. Doctor Appointment view Tab in Patient portal.



Doctor ID	Doctor Name	Address	Contact Number	Category
2	apoorva nayak	bijapur	7892942818	heart

Figure 13. Search doctor in the patient's portal.



DonorID	DonorName	DonorAddress	DonorContactNumber	DonorEmail	DonorBloodGroup	DonorOrgan
1	poornima	bijapur	9380387508	poornimagopinathnayak9988@gmail.com	0+	Blood

Figure 14. Search donor in the patient's portal.

- Figure 11 explains that Patients can make appointments with the doctor of their choice through the patient portal's "Doctor Appointment Book" feature. Patients can choose a physician, confirm their appointment, and select a time and day.
- Figure 12 explains that the Patients can view detailed information about their past and upcoming appointments using the "Doctor Appointment View" tab in the patient portal.
- Figure 13 explains that patients can search for doctors by name, ID, and category using the Patient Portal's "Search Doctor" tool. Patients can locate their blood type and organ by using the "Search Donor" function in the patient portal.
- Figure 14 explains that the "Search Donor" feature in the patient portal allows patients to find blood group and organ.

Advantages and Applications

Advantages

- *Enhanced convenience*: Essentially, patients do not need to make phone calls or in-person visits because they can book appointments online from anywhere.
- *Effective appointment management*: Basically, it automates the scheduling process to reduce the likelihood of manual errors and double booking.

- *Better record-keeping*: To facilitate access and management, digital records of patient consultations, diagnoses, and medications are maintained.
- *Decreased administrative workload*: Adding or removing records is just one example of an administrative operation that is automated to relieve staff members of their manual labor.
- *Enhanced accessibility*: To put it briefly, this increases the accessibility of healthcare services for people who live in remote places or have mobility challenges.
- *Real-time updates*: This feature improves communication between doctors and patients by giving real-time updates on the status of appointments.
- *Scalability*: Economical resolution: In general, a web-based solution is less expensive than conventional techniques that need manual scheduling and paper records.
- *Reporting and analytics*: To make well-informed decisions, this role generates reports and analyses important indicators such as patient demographics and appointment trends.
- *Fewer no-shows*: Essentially, automated scheduling and reminders assist cut down on patient cancellations and no-shows.

Applications

- *Healthcare clinics: Utilization*: Coordinates appointments, optimizes clinic workflow, and raises patient contentment.
- *Hospitals: Application*: Easily manages a high number of patient appointments in several departments.
- *Private medical practices: Use*: Helps solo practitioners or small groups of doctors handle their patients and schedules automatically.
- *Telemedicine services: Utilization*: Enables virtual appointment scheduling and online consultations for out-of-town medical services.
- *Specialty clinics: Use*: Coordinates appointments for particular medical specialties, like dermatology or cardiology.
- *Dental offices: Application*: Arranges patient appointments and keeps track of dental treatment
- *Pharmacies: Application*: Oversees services that require appointments, like immunization clinics and consultations.
- *Wellness centers: Application*: Makes appointments for services such as exercise programs, dietary counselling, and physical therapy.

CONCLUSION

For patients, physicians, and administrators, the Doctor Appointment System is a comprehensive system that simplifies the management of healthcare records. Within a user-friendly interface, this project successfully integrates a number of functionalities, such as doctor management, appointment scheduling, user authentication, and patient-doctor interaction. While doctors can effectively manage their calendars and patient information, patients can conveniently search for doctors, schedule appointments, and view their medical history. With the ability to add or remove doctors and manage the database, administrators have powerful tools at their disposal to manage the entire system.

REFERENCES

1. Khan MA. Healthcare management system. *J Health Informatics*. 2021; 12 (2): 55–65.
2. Reddy RG. Review of healthcare management systems. *Int J Med Informatics*. 2022; 89: 1–11.
3. Smith J. Appointment scheduling systems in healthcare. *Health IT Journal*. 2020; 15 (4): 85–95.
4. Johnson AC. Optimizing appointment scheduling in healthcare. *Healthcare Technol Rev*. 2023; 17: 32–45.
5. Patel PK. Telemedicine: current trends and future directions. *J Telemed Telecare*. 2023; 26 (1): 1–10.
6. Morris SR. Advances in telemedicine. *Telehealth J*. 2022; 19 (2): 115–123.
7. Smith DB. AI applications in healthcare. *Artif Intell Rev*. 2022; 31: 225–245.
8. Zhang KL. Artificial intelligence in medical diagnosis. *J AI Res*. 2021; 45 (3): 189–199.
9. Lee HT. Mobile health applications: a review. *J Mobile Technol Med*. 2023; 10 (1): 12–20.
10. Davis EO. Impact of mobile apps on healthcare. *Healthcare Innov*. 2022; 22: 67–80.