

ClinixPro Digital Appointment and Patient System

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Publication Date: 2026/10/16

Abstract: Healthcare appointment management often involves manual scheduling, difficulty in identifying available doctors, long waiting times, and challenges in maintaining patient and prescription information. ClinixPro Digital Appointment and Patient System is a web based healthcare management platform developed to provide a centralized environment for patients, doctors, and administrators. The system enables patients to register, search for verified doctors, view consultation fees and availability, and book appointments online. Doctors can manage their profiles, appointment requests, patient information, prescriptions, consultation fees, and availability. Administrators can verify doctor credentials, manage users, monitor appointments, and handle complaints. The system is developed using the MERN stack, comprising MongoDB, Express.js, React.js, and Node.js. JWT based authentication and password hashing are used to support secure role based access. MongoDB provides document based storage for users, doctors, patients, appointments, prescriptions, and complaints. The system also supports appointment reminders and online consultation through doctor shared Google Meet links. The implemented system was tested through browser based functional testing across patient, doctor, and administrator workflows. The results demonstrate that ClinixPro provides an organized and convenient approach to digital appointment and patient management.

Keywords: Digital Healthcare; Appointment Management; Patient Management; MERN Stack; MongoDB; Doctor Verification; Online Consultation; Healthcare Management System.

How to Cite: K. S. Mohan; Vijaya Durga S.; Kaviyasri V.; Sathyasri T.; Harini Sri S. (2026) ClinixPro Digital Appointment and Patient System. *International Journal of Innovative Science and Research Technology*, 11(10), 655-660.
<https://doi.org/10.38124/ijisrt/26oct474>

I. INTRODUCTION

The rapid growth of digital technology has created new opportunities for improving healthcare accessibility and service management. Traditional healthcare appointment systems commonly depend on telephone calls, direct visits, or manual scheduling by administrative staff. These methods can result in unnecessary waiting time, difficulty in checking doctor availability, scheduling conflicts, and inefficient communication between patients and healthcare professionals. Your project report identifies these challenges, including difficulty tracking doctor availability, lack of centralized medical records, limited transparency in consultation fees, and challenges in verifying doctor authenticity.

Patients also require convenient access to doctor information, appointment schedules, prescriptions, and follow-up information. Doctors need an organized method for managing appointments, patient details, consultation information, and prescriptions. At the same time, administrators need mechanisms to verify doctors and monitor user activities.

To address these requirements, ClinixPro Digital Appointment and Patient System has been developed as a centralized web application connecting patients, doctors, and administrators. The system provides role-based access and supports digital appointment booking, doctor verification, patient management, prescription management, and complaint handling.

ClinixPro is implemented using the MERN technology stack. React.js provides the interactive frontend, Node.js and Express.js manage backend operations and APIs, and MongoDB stores application data. The project report describes the system as a client-server web application in which the frontend communicates with backend services and a centralized database.

The main objective of ClinixPro is to reduce dependence on manual appointment processes and provide a convenient digital environment for healthcare appointment management. The system also introduces administrator based doctor verification so that doctors must be verified before becoming available to patients.

II. RELATED WORK

Web-based appointment scheduling has become an important part of digital healthcare because it allows patients to participate more actively in selecting and managing appointments. A systematic review of web-based medical appointment systems found that online scheduling can provide benefits such as reduced waiting time, reduced staff workload, improved patient access, and improved satisfaction. The review also identified challenges related to safety, flexibility, cost, and user adoption.

Research on outpatient appointment systems has also focused on improving scheduling efficiency and reducing delays. Existing studies examine different approaches for designing and optimizing healthcare appointment systems according to patient demand, service capacity, and scheduling constraints.

A retrospective study of a web-based appointment system reported that online appointment mechanisms can be used to address long registration and waiting times in outpatient healthcare environments.

Although existing research demonstrates the usefulness of digital appointment systems, many systems focus primarily on appointment scheduling. ClinixPro combines appointment management with doctor verification, role-based dashboards, patient information, prescription management, complaint handling, and email reminders in a single web application. This integrated approach is intended to provide a more organized workflow for patients, doctors, and administrators.

➤ Proposed System

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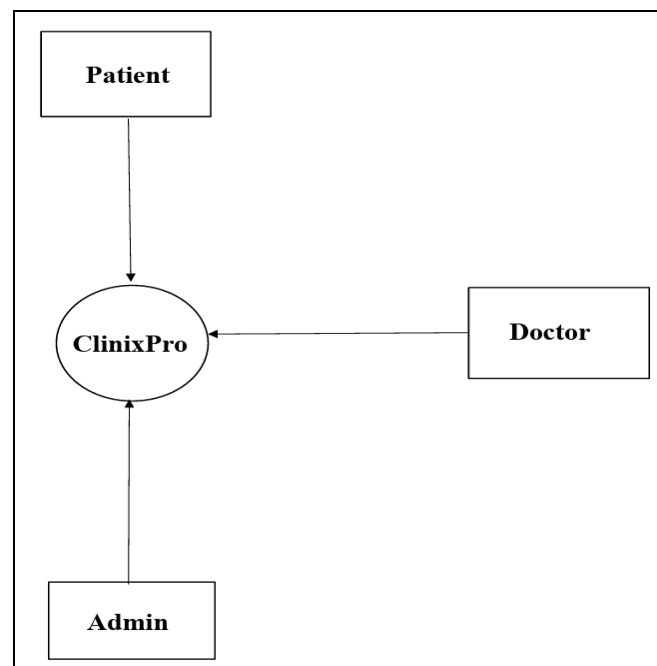


Fig 1 Context Level Diagram of ClinixPro

➤ Patient and Doctor Interaction

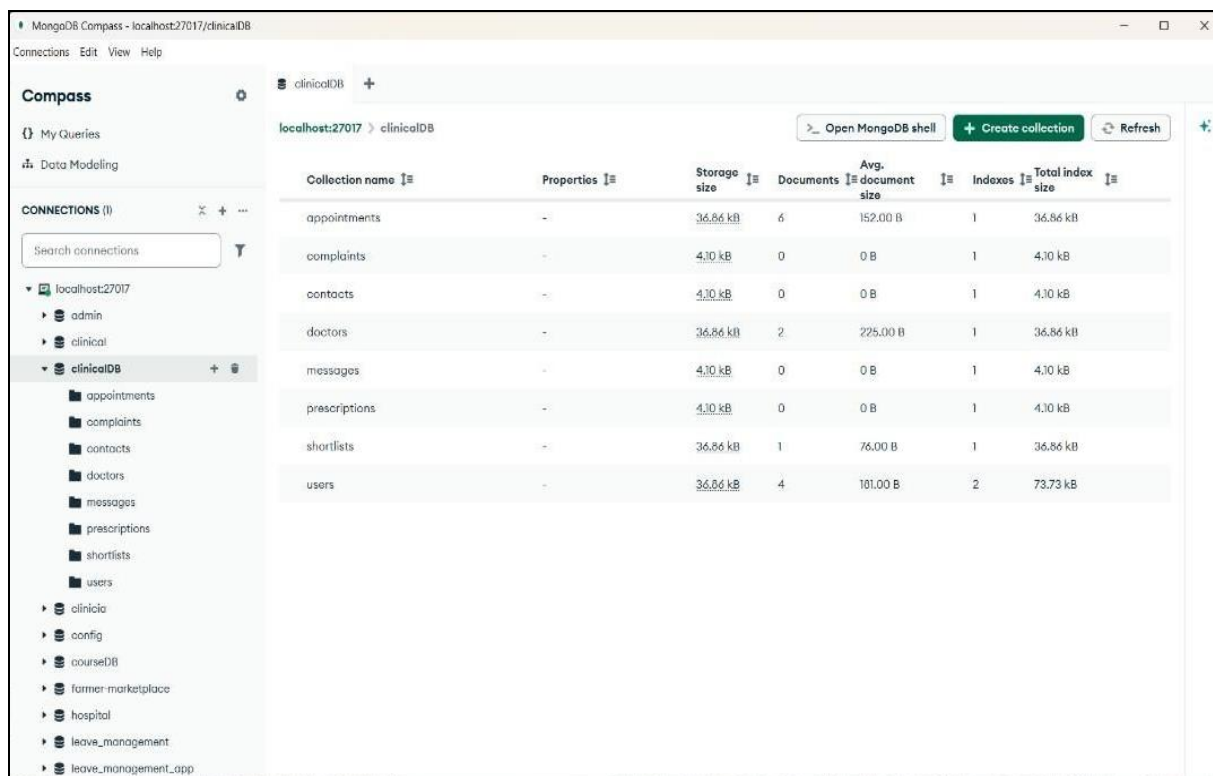
The patient module provides registration and login facilities, doctor search and filtering, consultation information, availability details, appointment booking, prescription viewing, and appointment tracking. Patients can select a suitable doctor and submit appointment information digitally.

The doctor module allows doctors to register and upload their professional license. Doctor accounts require administrator verification before they are made available to patients. Verified doctors can manage their profile, availability, consultation fee, appointment requests, patient information, and prescriptions.

The administrator module provides centralized control over the platform. The administrator can verify doctor licenses, manage registered users, monitor appointments, and handle complaints. This verification process improves trust by ensuring that doctors are reviewed before being listed for patients. The three-module organization is described in the project report.

➤ Database Design

MongoDB is used as the database because it provides document-based storage suitable for storing application information. The main collections are Users, Doctors, Patients, Appointments, Prescriptions, and Complaints. User information includes authentication and role details, while doctor information contains professional and verification details. Appointment records maintain patient, doctor, date, time, reason, and status information. Prescription records maintain diagnosis, medicines, notes, and date information.



The screenshot shows the MongoDB Compass interface for a database named 'clinicalDB' on 'localhost:27017'. The left sidebar lists various databases, with 'clinicalDB' selected. The main panel displays a table of collections within 'clinicalDB'.

Collection name	Properties	Storage size	Documents	Avg. document size	Indexes	Total index size
appointments	-	36.86 kB	6	152.00 B	1	36.86 kB
complaints	-	4.10 kB	0	0 B	1	4.10 kB
contacts	-	4.10 kB	0	0 B	1	4.10 kB
doctors	-	36.86 kB	2	225.00 B	1	36.86 kB
messages	-	4.10 kB	0	0 B	1	4.10 kB
prescriptions	-	4.10 kB	0	0 B	1	4.10 kB
shortlists	-	36.86 kB	1	76.00 B	1	36.86 kB
users	-	36.86 kB	4	101.00 B	2	73.73 kB

Fig 2 MongoDB Database Collections Used in ClinixPro

III. IMPLEMENTATION AND RESULTS

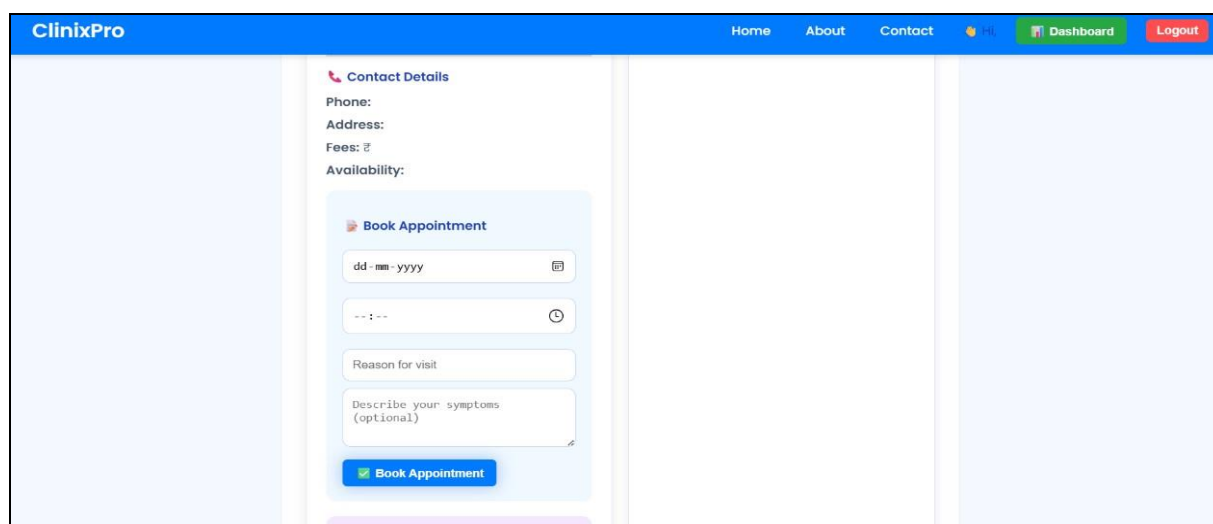
ClinixPro was implemented using React.js, Node.js, Express.js, and MongoDB. React.js is responsible for the user interface and role-specific dashboards. Express.js handles API routing and server-side operations, while Node.js provides the runtime environment. MongoDB stores user, doctor, appointment, prescription, and complaint information.

JWT based authentication is used to control access to protected resources, while bcrypt is used for password security. The project report describes role-based authentication, doctor license verification, appointment booking, prescription management, and complaint handling as key system functions.

The implemented system was tested manually through the browser using the Patient, Doctor, and Administrator workflows. The major functions were checked from registration and login through appointment booking, doctor verification, appointment management, and prescription operations.

➤ Appointment Booking

Patients can enter the required appointment information and submit a booking request for a selected doctor. The appointment information is stored in MongoDB and becomes available to the doctor through the dashboard.



The screenshot shows the 'ClinixPro' web application interface. The top navigation bar includes 'Home', 'About', 'Contact', 'Dashboard', and 'Logout'. The main content area is titled 'Contact Details' and includes fields for 'Phone:', 'Address:', 'Fees: ₹', and 'Availability:'. Below these is a 'Book Appointment' section with a date picker (dd-mm-yyyy), a time picker (--:--), a 'Reason for visit' text area, and a 'Describe your symptoms (optional)' text area. A 'Book Appointment' button is at the bottom of this section.

Fig 3 Patient Appointment Booking Interface

➤ Patient Dashboard

The Patient Dashboard provides access to doctor search and filtering and allows patients to interact with appointment-

related functions. The dashboard provides a centralized interface through which patients can find suitable doctors and manage their healthcare appointments.

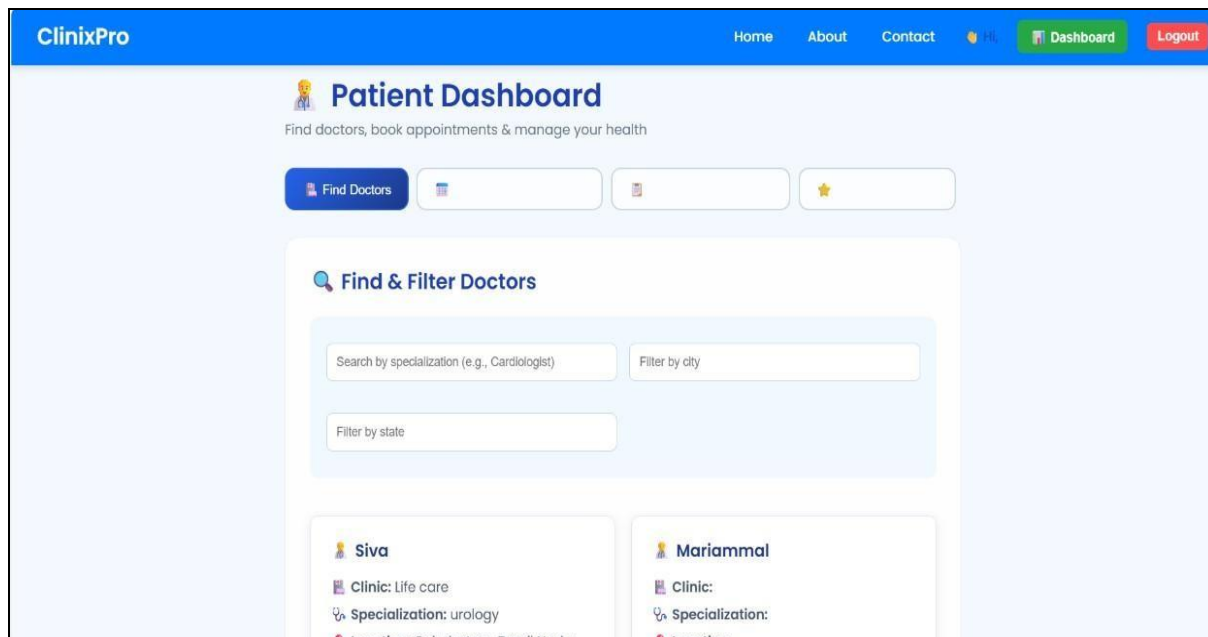


Fig 4 Patient Dashboard for Doctor Search and Appointment Management.

➤ Doctor Dashboard and Appointment Management

The Doctor Dashboard provides doctors with access to appointment requests and patient-related information.

Verified doctors can review scheduled appointments and manage their consultation workflow.

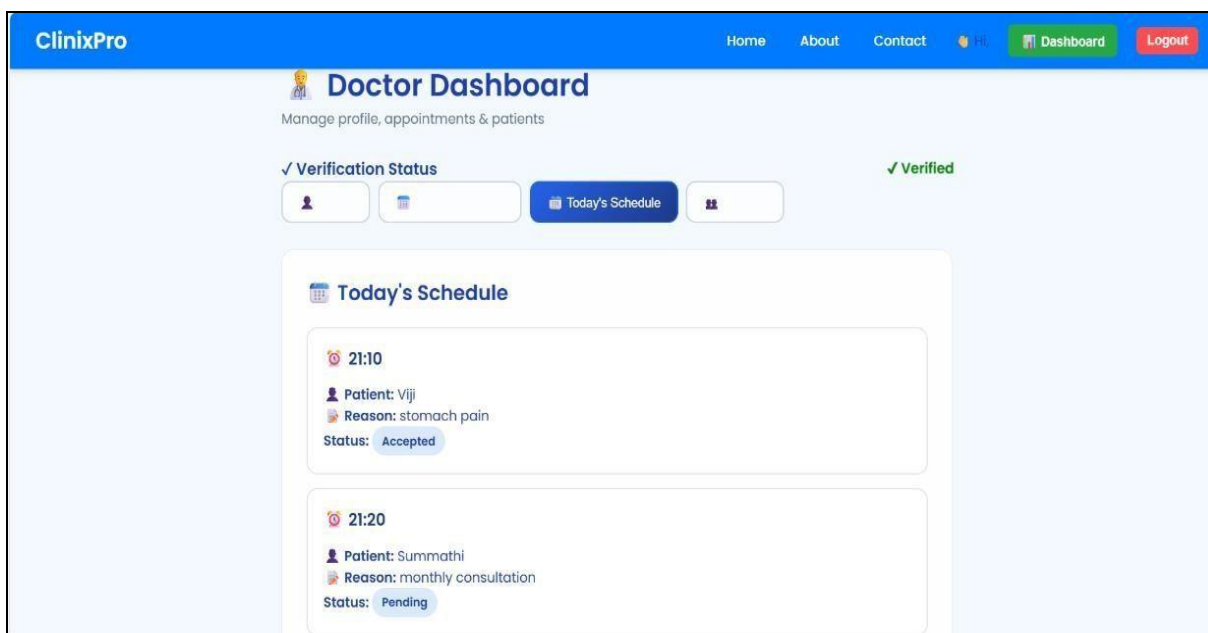


Fig 5 Doctor Dashboard Showing Appointment Management

➤ Administrator Verification

The administrator plays an important role in maintaining the reliability of the platform. Doctor accounts are reviewed through license verification before they become

available to patients. The administrator dashboard also provides access to appointment and user management functions.

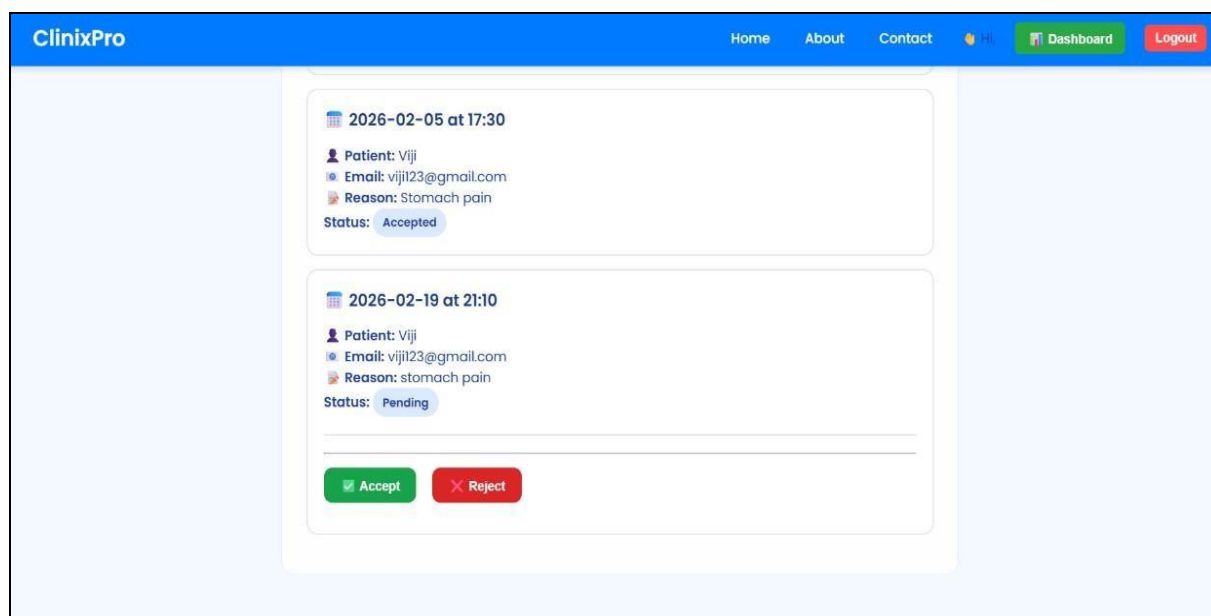


Fig 6 Administrator Dashboard for System Management

➤ Testing

Manual browser-based testing was performed using the three main user roles. The testing covered registration, login, doctor verification, appointment booking, appointment management, prescription operations, and dashboard access.

The project report contains sample functional tests including patient registration, doctor registration with license upload, administrator doctor approval, appointment booking, and prescription updates. All these sample tests are reported as passed.

- A Concise Table can be Included in the Journal:

Table 1 Testing

Test Function	Expected Result	Status
Patient registration	Patient account created	Passed
Doctor registration	Doctor account created for verification	Passed
Doctor verification	Verified doctor becomes available	Passed
Appointment booking	Appointment stored and displayed	Passed
Prescription update	Prescription available to patient	Passed

IV. CONCLUSION AND FUTURE SCOPE

ClinixPro Digital Appointment and Patient System provides a centralized web-based platform for managing healthcare appointments and patient-related information. The system connects patients, doctors, and administrators through role-based interfaces and provides functionality for doctor discovery, appointment booking, doctor verification, appointment management, prescription management, and complaint handling.

The MERN stack provides an integrated environment for developing the application, with React.js supporting the frontend, Node.js and Express.js managing backend services, and MongoDB providing document-based data storage. The implemented system was manually tested through the browser, and the major workflows were verified successfully.

The administrator-based doctor verification mechanism adds an important layer of trust, while digital appointment and prescription management reduces dependence on manual processes. ClinixPro therefore demonstrates the feasibility of using a full-stack web application to organize healthcare

appointment management and improve accessibility for patients and doctors.

The current system can be extended with additional healthcare services in future versions. Direct video consultation within the ClinixPro application can be integrated instead of relying on externally shared Google Meet links. Online payment functionality can also be incorporated to support digital consultation fee transactions.

Future versions can additionally provide mobile application support, advanced healthcare analytics, improved notification mechanisms, and further integration with digital health services. These enhancements can improve scalability and provide a more comprehensive digital healthcare platform.

ACKNOWLEDGMENT

We sincerely thank the Department of Information Technology, SNS College of Technology, Coimbatore, for providing the necessary facilities, resources, and academic support for the successful development of the ClinixPro

system. We also express our gratitude to the faculty members and institution for their valuable guidance, encouragement, and support throughout the project. Finally, we thank everyone who contributed directly or indirectly to the successful completion of this work.

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