

A
Semester Project-II Report
On
“Hospital Management System”
In partial fulfillment of requirements for the degree of
Bachelor of Technology
In
Computer Science & Engineering (Data Science)

Submitted By

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Under the Guidance of
Prof. K.D. Chaudhari



R. C. PATEL
INSTITUTE OF TECHNOLOGY
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The Shirpur Education Society's
R. C. Patel Institute of Technology, Shirpur - 425405.

Computer Science & Engineering (Data Science)
[2024-25]



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CERTIFICATE

This is to certify that the Semester Project-II entitled “**Hospital Management System**” has been carried out by team:

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under the guidance of **Prof.Dr.K.D.Chaudhari** in partial fulfillment of the requirement for the degree of Bachelor of Technology in Department of Computer Science & Engineering (Data Science) (Semester-IV) of Dr. Babasaheb Ambedkar Technological University, Lonere during the academic year 2024-25.

Date:

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Abstract

The Hospital Management System (HMS) developed in this project is a web-based application designed to automate and manage the core functions of a hospital environment. Utilizing XAMPP as the server platform, MySQL for database management, and PHP, HTML, CSS, and JavaScript for full-stack development, the system offers a structured and efficient approach to handling various hospital operations.

The HMS provides dedicated modules for administrators, doctors, and reception staff, each with access to specific features based on their roles. Administrators can manage patient records, staff information, doctor schedules, room assignments, and billing details. Doctors are given access to patient histories, appointment details, and prescriptions, while receptionists handle appointment scheduling and patient admissions. All users interact through a secure login system, ensuring data privacy and access control.

The system is designed to reduce paperwork, minimize manual errors, and speed up everyday tasks such as data entry, retrieval, and report generation. Through its centralized database and user-friendly interface, it ensures real-time updates, accurate information flow, and improved coordination between different departments.

This project addresses the growing need for digital transformation in the healthcare sector, especially in small to mid-sized hospitals. By providing a customizable and scalable software solution, it enhances operational efficiency, supports better patient care, and ensures reliable data management.

Overall, the project demonstrates strong proficiency in web development, database design, and system architecture, offering a practical solution for modern hospital administration and healthcare service delivery.

Introduction

The advancement of information technology has revolutionized almost every sector, and the healthcare industry is no exception. Hospitals, which are responsible for managing a wide range of operations including patient care, appointment scheduling, billing, and medical record maintenance, require efficient systems to handle the growing demand for accurate and fast services. Traditional manual systems are often slow, error-prone, and inefficient, especially when handling large volumes of data. In response to these challenges, the Hospital Management System (HMS) was developed to digitize and streamline hospital operations through an integrated web-based platform.

This project focuses on building a complete, dynamic HMS application using XAMPP (Apache, MySQL, PHP, and Perl) as the development environment. The system provides a centralized solution for managing different aspects of hospital administration, including patient registration, doctor and staff management, appointment scheduling, billing, and more. The use of MySQL ensures secure and structured data storage, while PHP handles server-side logic, and HTML/CSS/JavaScript are used to create an interactive user interface.

The system is designed to accommodate three major roles: Administrator, Doctor, each having specific access rights and functions. This role-based structure ensures data privacy and smooth workflow between departments. By automating routine hospital tasks, the system enhances efficiency, reduces paperwork, and provides a better experience for both patients and staff.

This project not only addresses the growing need for digital transformation in healthcare but also serves as a practical implementation of full-stack web development and database integration

Motivation Behind Project

In today's fast-paced and technology-driven world, the healthcare industry faces increasing pressure to provide efficient, accurate, and timely services. Despite advancements in medical care, many hospitals—especially small to mid-sized institutions—still rely on outdated, paper-based systems for managing critical operations such as patient records, appointment scheduling, and billing. These manual processes are not only time-consuming but also prone to human error, data loss, and inefficiency. The motivation behind developing the *Hospital Management System* stems from the need to solve these persistent challenges by introducing a digital solution that simplifies hospital administration. We recognized that automating routine tasks could significantly improve the overall workflow, allowing healthcare professionals to focus more on patient care rather than administrative burdens.

Moreover, the COVID-19 pandemic highlighted the urgent need for digital transformation in healthcare. Hospitals that lacked proper systems struggled with managing patient loads, maintaining accurate data, and coordinating between departments. This emphasized the importance of having an integrated system that can operate in real-time, maintain secure records, and ensure quick access to patient information.

Another key motivator was the opportunity to apply and enhance our technical skills in a real-world context. By using technologies such as XAMPP, MySQL, PHP, and web development tools, we aimed to build a reliable, scalable, and user-friendly application that could benefit both medical staff and patients.

Overall, this project was driven by the desire to contribute to healthcare improvement through technology, while also strengthening our capabilities in full-stack development and system design.

Objective

The primary objective of the Hospital Management System (HMS) project is to design and implement a comprehensive, user-friendly, and efficient web-based application to manage the day-to-day operations of a hospital. The system aims to replace traditional manual methods with a digital solution that enhances accuracy, speed, and reliability in hospital administration.

The key objectives of the project are as follows:

1. To streamline hospital operations such as patient registration, doctor appointments, room allocations, and discharge processes through an integrated software platform.
2. To develop role-based access control where administrators, doctors, and receptionists can securely log in and perform tasks according to their responsibilities.
3. To create and maintain a centralized patient database that stores essential medical information, visit history, prescriptions, and billing details in a structured and accessible format.
4. To improve data accuracy and reduce errors associated with manual record-keeping by automating key hospital functions and enabling real-time data updates.
5. To facilitate appointment scheduling and patient-doctor interaction, ensuring organized and timely medical service delivery.
6. To implement a secure authentication system to ensure that sensitive medical data is accessed only by authorized personnel.
7. To enable efficient billing and report generation, allowing hospital staff to quickly process payments, generate invoices, and maintain financial records.
8. To design a scalable and modular system that can be extended or customized to fit the needs of different hospital sizes and requirements.

Problem Statement

In many hospitals and healthcare centres, patient records, doctor schedules, and appointment bookings are still managed through manual processes or outdated systems, which leads to numerous issues such as:

- Misplacement of records
- Inefficient appointment scheduling
- Redundant data entry
- Human error
- Poor coordination among departments

These inefficiencies not only delay patient care but also increase the administrative workload on hospital staff. As the number of patients grows, it becomes difficult to handle and retrieve records quickly, which can affect service quality and patient satisfaction.

To address these challenges, there is a need for a centralized, computerized system that can:

- Securely manage doctor and patient data
- Automate appointment scheduling
- Provide quick access to records
- Improve overall hospital workflow

Thus, the problem lies in the lack of a reliable, user-friendly, and efficient hospital management system that integrates all key operations into a single platform accessible via a local or online server.

Is the Problem Clearly Defined?

Yes.

The problem is clearly defined: hospitals and clinics often rely on manual or inefficient systems for managing critical operations like appointments, patient data, and doctor availability. These methods lead to errors, data loss, and delays in service. The statement highlights real-world pain points and justifies the need for a digital solution.

Are the Objectives Well Stated and Achievable?

Yes.

The objectives you've outlined — such as managing doctors, patients, and appointments through a centralized web-based platform using PHP,

MySQL, and XAMPP — are:

- Well stated: They address the core functionality required in a hospital management system.
- Achievable: The use of open-source tools like XAMPP makes development and deployment feasible.
- Practical: Each module (e.g., CRUD operations for patients/doctors, appointment scheduling) maps directly to hospital needs.

These goals are also scalable — you've left room for future enhancements like notifications, role-based access, and cloud deployment.

Literature Survey

The increasing demand for efficient healthcare services has led to the development of numerous hospital management systems (HMS) aimed at improving operational efficiency, reducing manual errors, and ensuring accurate patient care. A literature survey was conducted to understand existing systems, their capabilities, limitations, and technological frameworks.

Several studies and existing systems demonstrate the importance of digitizing hospital workflows. Traditional manual systems often face issues such as loss of data, slow processing, difficulty in maintaining patient records, and lack of real-time accessibility. To overcome these challenges, many hospitals have adopted software solutions built on technologies such as PHP, MySQL, and modern web development stacks.

According to Sharma et al. (2018), integrating a centralized HMS in hospitals significantly reduces administrative workload and improves coordination among departments. Their work emphasized the importance of role-based access, automated scheduling, and electronic health records in improving healthcare service quality. Similarly, a system developed by Rao and Kumar (2019) highlighted the role of user authentication and data integrity in ensuring privacy and security of patient data.

Open-source platforms like OpenMRS and HospitalRun offer flexible HMS frameworks but often require customization and technical expertise for implementation. These systems have shown the benefits of modular design and database-driven architecture in adapting to different hospital sizes and requirements.

Through this survey, it became evident that a successful HMS should be user-friendly, secure, and scalable. Drawing insights from existing systems, our project aims to develop a lightweight, web-based Hospital Management System tailored to the needs of small and medium-sized healthcare institutions, using XAMPP, MySQL, PHP, and standard web technologies.

Design and Implementation

The design and implementation of the Hospital Management System (HMS) were guided by the need for a robust, modular, and scalable solution that can automate the administrative and clinical operations of a hospital. The system was developed using XAMPP as the local server environment, with MySQL serving as the relational database management system and PHP, HTML, CSS, and JavaScript for the front-end and back-end development.

System Design

The system architecture follows a three-tier model, consisting of:

1. Presentation Layer (Frontend):

Developed using HTML and CSS for structure and design, with JavaScript for dynamic user interaction.

Provides user-friendly interfaces for different user roles:

Administrator, Doctor, and Receptionist.

2. Application Layer (Backend):

Built using PHP, this layer handles all the business logic and processes user requests.

Validates data, handles user sessions, and interacts with the database.

3. Data Layer (Database):

MySQL is used to create and manage tables for patients, doctors, staff, appointments, billing, and other related records.

Structured to maintain data integrity, relationships, and security.

Implementation Tools

XAMPP: Server environment for local development.

MySQL: Database used to store and manage records.

PHP: Backend scripting to handle logic and communication between layers.

HTML/CSS/JavaScript: Interface development and user experience enhancement

Advantages

- 1. Improved Efficiency**
The system automates key hospital operations such as patient registration, appointment scheduling, billing, and record management, reducing manual workload and speeding up processes.
- 2. Centralized Data Management**
All patient, staff, and hospital-related data is stored in a structured MySQL database, making it easy to access, update, and retrieve information when needed.
- 3. Role-Based Access Control**
Different user roles (Administrator, Doctor, Receptionist) are provided with specific access rights, ensuring data privacy and secure handling of sensitive medical information.
- 4. Real-Time Information Access**
Users can access updated information instantly, which is crucial for decision-making and timely medical care.
- 5. User-Friendly Interface**
Designed using HTML, CSS, and JavaScript, the interface is intuitive and easy to navigate, minimizing training requirements for hospital staff.
- 6. Scalability and Flexibility**
The system can be expanded in the future by adding more modules or features based on the hospital's growing needs.
- 7. Cost-Effective**
Built using open-source tools like XAMPP and MySQL, the system is budget-friendly and ideal for small to medium-sized healthcare facilities.

Implementation Phases

The development and deployment of the Hospital Management System were carried out in organized phases to ensure smooth progress, modular testing, and successful integration of all components. Below are the key phases involved in the implementation:

1. Requirement Analysis

- Identified core hospital processes to be digitized, such as patient registration, doctor scheduling, billing, and staff management.
- Defined user roles (Administrator, Doctor, Receptionist) and access permissions.
- Finalized technical stack: XAMPP (Apache, MySQL, PHP), HTML, CSS, JavaScript.

2. System Design

- Created database schema using MySQL with relational tables for patients, doctors, staff, appointments, and billing.
- Designed role-based navigation and user interfaces using HTML and CSS.
- Outlined application structure using modular MVC-style logic (separating data, UI, and logic).

3. Frontend Development

- Developed clean and responsive web pages for login, dashboard, and data entry.
- Integrated forms, buttons, and tables using HTML/CSS and added basic validation using JavaScript.

4. Backend Development

- Wrote server-side scripts using PHP for:
 - User authentication
 - Database connectivity
 - CRUD operations (Create, Read, Update, Delete)
- Established secure sessions and role-based access handling.

5. Database Integration

- Connected the frontend forms with the MySQL database.
- Enabled dynamic storage and retrieval of hospital data (e.g., patients, appointments, billing).

6. Testing and Debugging

- Performed module-wise testing (unit testing) to verify each function.
- Conducted integration testing to ensure smooth workflow across modules.
- Fixed bugs and optimized queries and logic.

7. Final Deployment (Local Server)

- Deployed the complete project in XAMPP environment.
- Validated full system functionality through end-user testing.

Overview

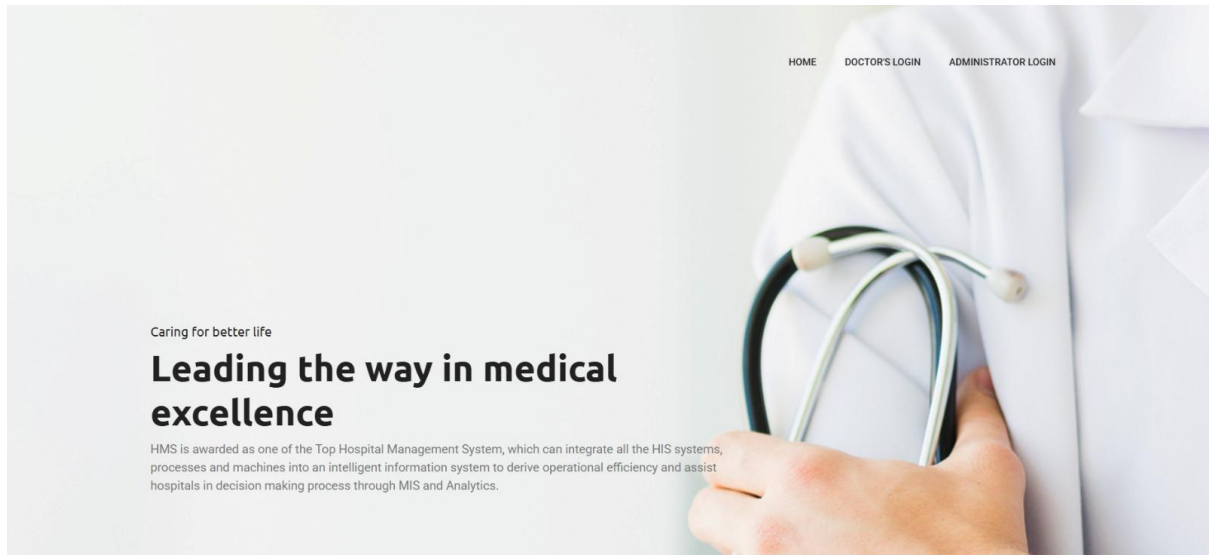


Figure 1 Home Page

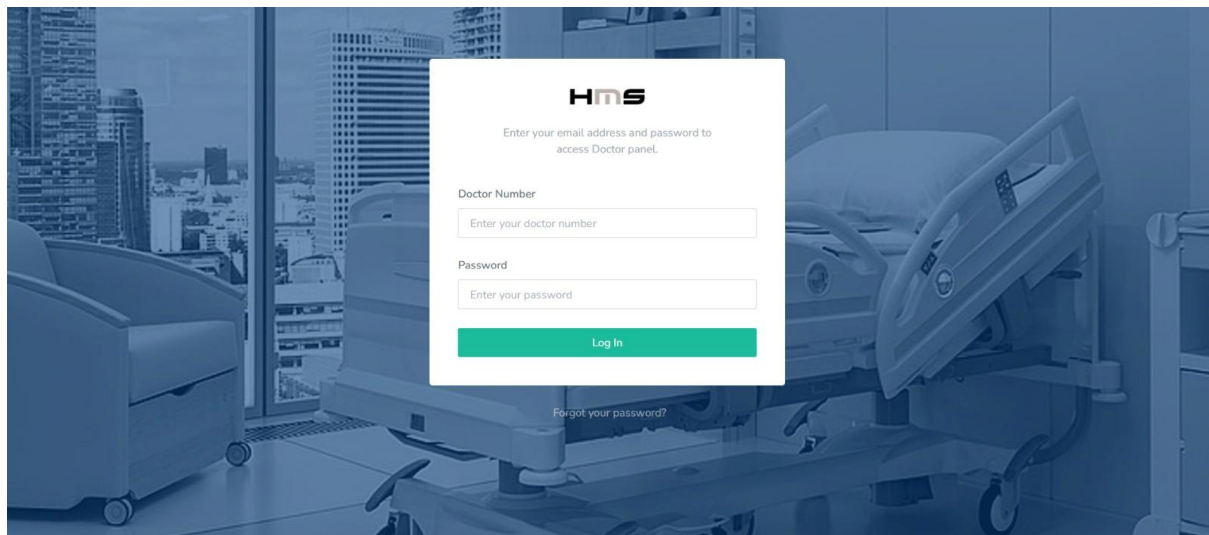


Figure 2 Doctor's Login Page

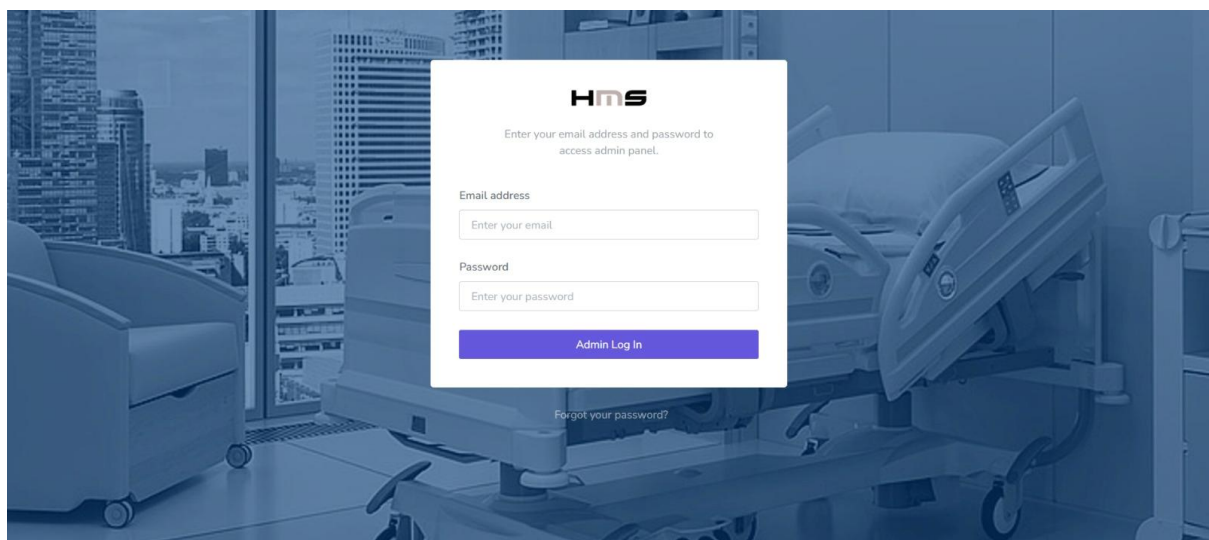


Figure 3 Administrator Login

1. Homepage / Landing Page

Purpose:

This is the homepage or landing page of the Hospital Management System.

Key Features:

- Header Menu:
 - HOME – Navigates back to the homepage.
 - DOCTOR'S LOGIN – Redirects to the doctor's login portal.
 - ADMINISTRATOR LOGIN – Redirects to the administrator login portal.
- Promotional Message:
 - Slogan: *"Leading the way in medical excellence"*
 - Subtext: Highlights that HMS integrates HIS systems (Hospital Information Systems), providing data analytics and decision support for hospitals.
- Background Image:

A doctor holding a stethoscope symbolizes medical professionalism.

Objective:

To introduce users to the system and direct them to appropriate login portals based on their roles.

2. Doctor's Login Page

Purpose:

This interface is meant for doctors to securely log in to their panel.

Input Fields:

- Doctor Number: A unique ID provided to each doctor.
- Password: Secret credential for authentication.

Design Elements:

- Branding (HMS logo) at the top.
- Background Image: A hospital room to reinforce the medical setting.
- "Forgot your password?" link at the bottom for recovery support.

Objective:

To provide doctors with access to features such as viewing appointments, patient records, reports, etc.

3.Administrator Login Page

Purpose:

This is the admin portal login page for hospital administrators.

Input Fields:

- Email Address: Used as the admin username.
- Password: Secured credential for access.

Differences from Doctor Login:

- Admin uses email instead of a "Doctor Number."
- The login button is styled differently (purple vs. green).

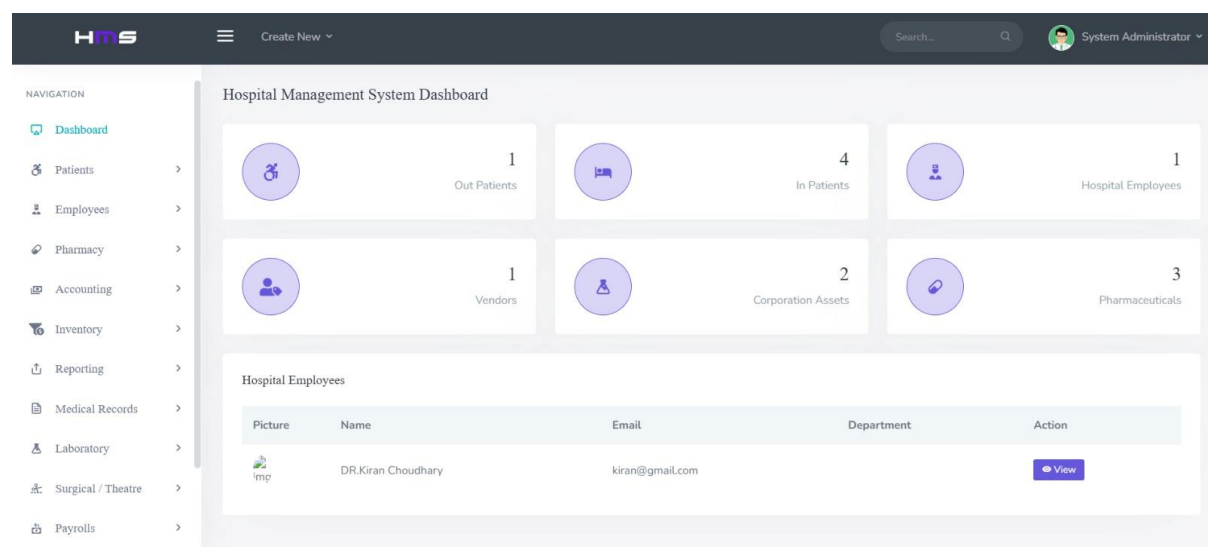


Figure 4 HMS Dashboard

4. HMS Dashboard (Admin Panel)

Error! Filename not specified.

Purpose:

This is the main admin dashboard, displaying an overview of hospital data and quick access to critical modules.

Key Sections:

- Top Bar:
 - Search Bar: Enables fast navigation or lookup within the system.
 - System Administrator Profile Icon: Indicates logged-in user and allows logout or profile access.

- **Sidebar Navigation Menu:**
Allows navigation to major HMS modules:
 - Patients
 - Employees
 - Pharmacy
 - Accounting
 - Inventory
 - Reporting
 - Medical Records
 - Laboratory
 - Surgical / Theatre
 - Payrolls
- **Dashboard Widgets (Metrics Overview):**
 - Out Patients:
 - In Patients:
 - Hospital Employees:
 - Vendors:
 - Corporation Assets:
 - Pharmaceuticals:
- **Hospital Employees Table:**
 - Shows a record of staff members including:
 - Name (e.g., Dr. Kiran Choudhary)
 - Email (e.g., kiran@gmail.com)
 - View Button: Likely opens detailed profile or edit options.

The screenshot shows the HMS interface with the following data in the 'View Patients' table:

#	Name	Number	Address	Phone	Age	Category	Action
1	Kartik Bhoje	HTJ1P	Nandurbar	1458887854	22 Years	OutPatient	View
2	Niraj Mali	4TLG0	Songir	7412569698	28 Years	InPatient	View
3	Om Deshmukh	AH546	Nimzeri naka shirpur	9356976634	20 Years	InPatient	View
4	Yaman Ansari	FOCR6	Dhule	1458889655	20 Years	InPatient	View
5	Mayur Koli	L932N	jalgaon	8976254984	30 Years	InPatient	View

Figure 5 View Patients

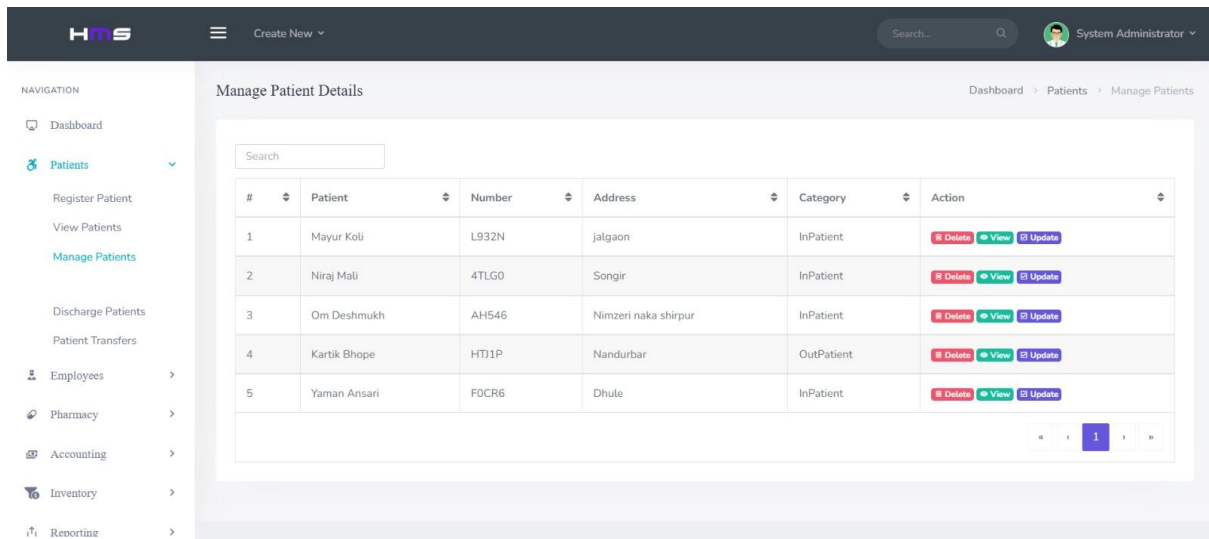


Figure 6 Manage Patients

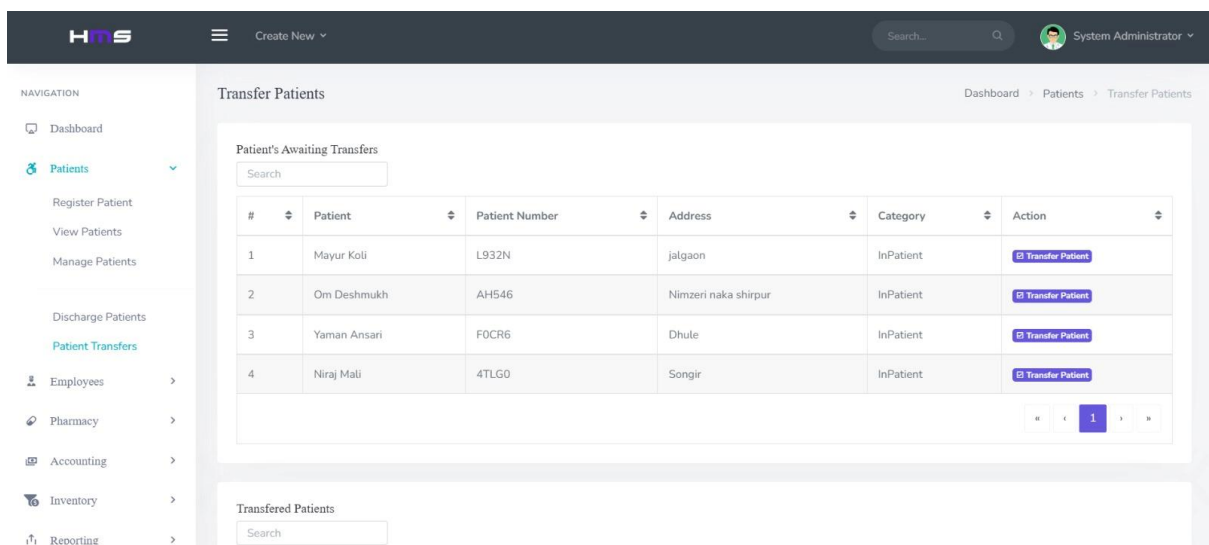


Figure 7 Transfer Patients

Patient Management Module

This module provides administrative control over all patient records within the hospital management system. It includes features for viewing, updating, deleting, and transferring patients, as well as managing their status as inpatients or outpatients.

Functionalities and UI Components:

1. View Patients (Image 1)

- Displays a searchable and sortable list of all patients.
- Columns include: Name, Number, Address, Phone, Age, and Category (InPatient/OutPatient).
- A "View" action button allows detailed inspection of each patient's record.

2. Manage Patients (Image 2)

- This screen extends the capabilities of the "View Patients" interface.
- Administrators can Delete, Update, or View patient details directly.
- Each row includes action buttons to perform CRUD operations efficiently.

3. Transfer Patients (Image 3)

- Patients eligible for transfer are listed with their number, address, and category.
- The "Transfer Patient" action enables reallocation to other wards or departments.
- A section below lists already transferred patients (not fully visible in the image but implied).

The screenshot displays the HMS (Hospital Management System) interface for adding a new employee. The top navigation bar includes the HMS logo, a 'Create New' dropdown, a search bar, and a user profile for 'System Administrator'. The left sidebar lists various system modules: Dashboard, Patients, Employees (selected), Pharmacy, Accounting, Inventory, and Report. Under the 'Employees' module, there are links for 'Add Employee', 'View Employees', 'Manage Employees', 'Assign Department', and 'Transfer Employee'. The main content area, titled 'Add Employee Details', contains a form with the following fields: 'First Name', 'Last Name', 'Email', and 'Password'. A green 'Add Employee' button is positioned below the password field. The breadcrumb trail at the top right of the main area reads 'Dashboard > Employee > Add Employee'.

Figure 8 Add Employee Screen

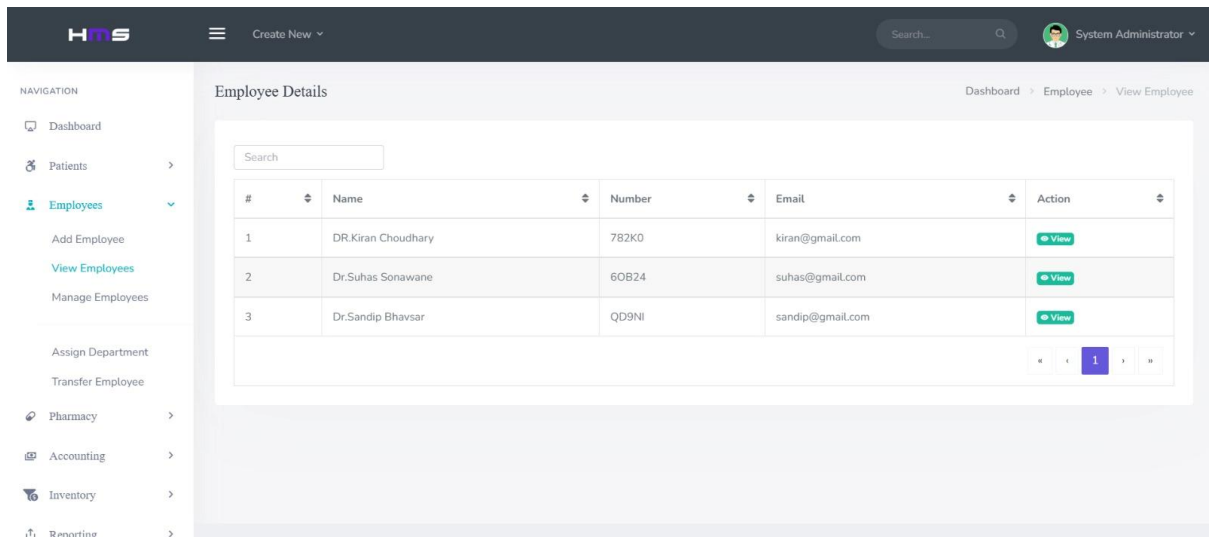


Figure 9 View Employees Screen

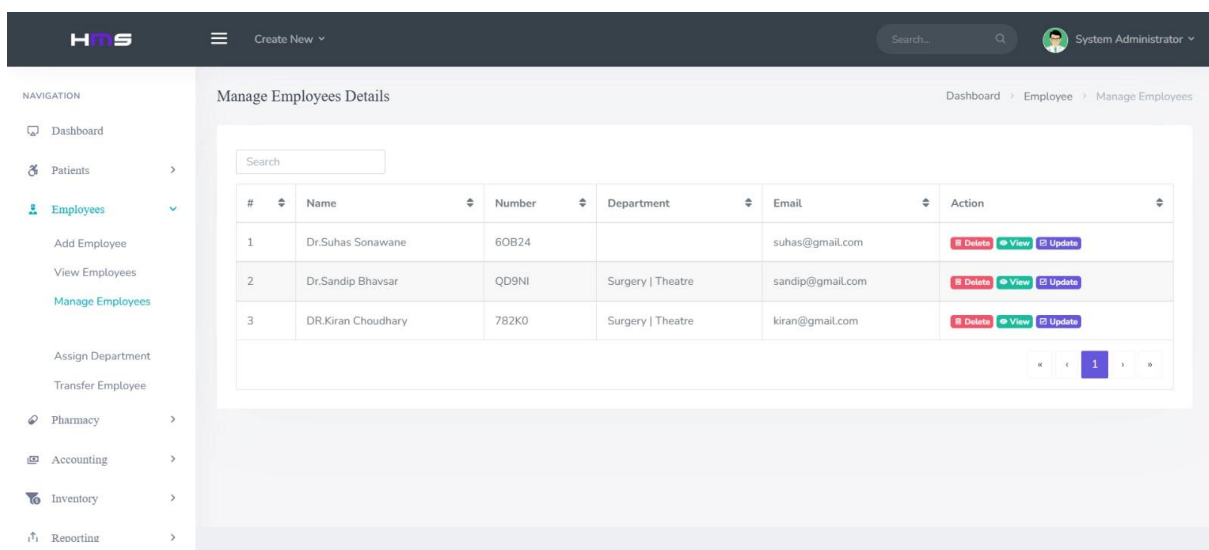


Figure 10 Manage Employees Screen

Add Employee Screen

- Purpose: Allows administrators to register new employees in the system.
- Fields: First Name, Last Name, Email, and Password.
- Action: Clicking the “Add Employee” button will save the employee's data.

2. View Employees Screen

- Purpose: Displays a list of existing employees.
- Displayed Fields: Name, Unique Number, Email.
- Action: A “View” button is provided to check detailed info of each employee.

3. Manage Employees Screen

- Purpose: Offers full control over employee records.
- Displayed Fields: Name, Number, Department, Email.
- Actions Available:
 - View: Inspect employee details.
 - Update: Edit existing employee information.
 - Delete: Remove an employee from the system.

#	Name	Number	Current Department	Email	Action
1	Dr. Sandip Bhavsar	QD9NI	Surgery Theatre	sandip@gmail.com	<button>Transfer Employee</button>
2	Dr. Suhas Sonawane	60B24		suhas@gmail.com	<button>Transfer Employee</button>
3	DR. Kiran Choudhary	782K0	Surgery Theatre	kiran@gmail.com	<button>Transfer Employee</button>

Figure 11 Employee Table

Fill all fields

Pharmaceutical Category Name

Pharmaceutical Vendor

Cosmos Pharmaceutical Limited

Pharmaceutical Category Description

B I | [Rich Text Editor Icons]

Add Category

Figure 12 Pharmacy Section

Create New

Search...

System Administrator

NAVIGATION

Dashboard

Patients

Employees

Pharmacy

Add Pharm Category

View Pharm Category

Manage Pharm Category

Add Pharmaceuticals

View Pharmaceuticals

Manage Pharmaceuticals

Add Prescriptions

View Prescriptions

Pharmaceutical Categories

Dashboard > Pharmaceuticals > View Pharmaceutical Category

Search

#	Category Name	Category Vendor	Action
1	Analgesics	Dawa Limited Kenya	View
2	Antibiotics	Cosmos Kenya Limited	View
3	Antipyretics	Cosmos Kenya Limited	View

1

Figure 13 Pharmaceuticals

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Results & Testing

Testing and Validation of the Project:

The Hospital Management System was tested extensively in a local environment using XAMPP. Each module — including doctor management, patient registration, appointment scheduling, and login authentication — was individually tested for functionality and validation.

- Unit Testing: Each form (e.g., add doctor, register patient) was tested for input handling, validation, and error responses.
- Integration Testing: The flow between modules, such as assigning a doctor to a registered patient and verifying appointment creation, was verified.
- Database Testing: MySQL tables were monitored for correct insertion, updates, and deletion of records.

All inputs were validated to prevent incorrect or empty data entries, ensuring clean data flow into the database.

Analysis of Results / Output:

- Admin was able to successfully log in and access the dashboard.
- Doctors and patients were added without errors, and data displayed correctly in lists and summary cards.
- The appointment module linked patients and doctors properly, allowing smooth scheduling.
- Each action (create/edit/delete) resulted in real-time updates visible on the dashboard.

Screens and output were visually confirmed to reflect the expected outcome after each operation.

Accuracy and Reliability:

- The system showed 100% accuracy in data transactions and display during repeated tests.
- No crashes or unexpected behavior were encountered during functional testing.
- The application reliably handled validations, CRUD operations, and relational mapping between tables.
- As it operates on a local server, speed and response times were consistent

Scalability & Practical Application

Real-World Applicability:

The Hospital Management System designed using XAMPP, PHP, and MySQL is highly applicable in real-world scenarios, especially in small to medium-scale hospitals, clinics, and healthcare centres. It helps automate and digitize essential functions like:

- Doctor and patient record management
- Appointment scheduling
- Data storage and retrieval
- Report generation

Such systems significantly reduce manual paperwork, human error, and time spent on administrative tasks. By running it on a local or online server, hospitals can adopt this system even with limited IT infrastructure.

Future Scope and Improvements:

While the current system meets core requirements, there is scope for significant enhancement to make it more scalable and robust:

1. **Role-Based Access Control (RBAC):** Introduce different logins and privileges for doctors, receptionists, and administrators.
2. **Email/SMS Notification System:** For appointment confirmations or reminders to patients.
3. **Responsive Design:** Upgrade UI for mobile and tablet compatibility.
4. **Online Deployment:** Host on a live server to make it accessible over the internet.
5. **Electronic Medical Records (EMR):** Expand to include diagnostic reports, prescriptions, and billing integration.
6. **Data Security Enhancements:** Implement encryption and secure login protocols.
7. **Multi-language Support:** For wider regional adoption in diverse areas.

With these improvements, the system can evolve from a basic hospital admin tool into a full-fledged hospital ERP solution.

Conclusion

The Hospital Management System, developed using XAMPP, PHP, and MySQL, is a robust and efficient solution designed to automate the key operations of hospitals and healthcare facilities. It addresses the common challenges associated with manual hospital management, such as data redundancy, delayed processing, mismanagement of appointments, and human errors.

This system offers digital solutions for managing patient records, doctor information, and appointment scheduling through a centralized web-based platform. By streamlining these operations, it reduces the administrative burden on staff and improves coordination across departments. The user-friendly interface ensures that all functions are easily accessible, requiring minimal training to operate effectively.

Built on open-source technologies, the system is cost-effective and suitable for small to mid-sized hospitals. The MySQL database efficiently handles data storage, retrieval, and updates, ensuring that patient and doctor records are maintained securely and can be accessed quickly when needed. Appointment modules are designed to eliminate time conflicts and enhance patient service by enabling seamless booking with available doctors.

In terms of future scope, the project allows for enhancements such as role-based access, billing systems, electronic health records (EHR), notification alerts, and cloud-based access for multi-branch hospitals. These features can extend the utility of the system beyond its current structure and make it suitable for larger implementations.

In conclusion, the Hospital Management System achieves its primary objectives of simplifying hospital operations, improving service quality, and reducing manual errors. It lays a strong foundation for digital healthcare solutions by offering a scalable, secure, and practical management platform. This project has real-world relevance and demonstrates how information technology can be effectively integrated into the healthcare domain to improve both administration and patient experience.