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Design and Implementation of a Web-Based Campus Facility Reservation System

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Abstract - A new online tool helps user book college halls or rooms without paperwork. Instead of filling out paperwork, people now enter requests directly into the system. approval steps happen faster is quick. Confusion over double booked rooms conflict drops when it we show the status of halls. user access their dashboards to check request status any time they want. Behind the scenes the application is developed using the MERN stack architecture consisting of MongoDB, Express.js, React.js, and Node.js this four core technologies work together. Each step acts so actions flow from frontend to backend and back again. Booking stays digital, so duplicate slots cannot happen in anyway. With this setup, managing campus spaces becomes clearer & faster.

Keywords - Facility Booking System, Web Application, MERN Stack, Online Reservation System, Campus Facility Management

1. INTRODUCTION

Colleges often conduct events like training sessions, gatherings, or department related functions where rooms must be booked ahead of time. Usually, people sign up by filling out sheets or talking straight to office workers in order to book the hall. Doing it this way takes time while also increasing chances of mistakes such that double-booked spaces, slow permission steps, missing paperwork happen more than they should be. It's hard to keeping logs on paper which leads to problems when trying to find status of rooms/ halls.

To solve this issues we using online booking system where user reserve room, it brings all bookings into one place, everyone who are involved can access the status of the room. Instead of guessing who has access, users see open slots right away. Requests go in through digital, no paper needed. when user give request, each of it shows its progress which reduce confusion. admin staff handle approvals requests from a dashboard built for them alone. its efficient and quick because its all digital and reliable. With everything linked digitally, sharing resources gets simpler across departments

2. PROBLEM STATEMENT

Despite digital advances, plenty of educational institution stick to old-school ways when it comes to reserving spaces. Paper slips or casual chats with office workers usually kick off the request. These steps tend to slow down approvals, make recordkeeping messy, plus open doors to confusion. When event numbers climb, juggling bookings by hand turns shaky - mistakes creep in without warning.

Mistakes pop up easily when people book the same room at the same time - no shared system means no one sees what others have booked. Looking back at who used which space last month? Tough luck if everything's on paper or scattered across notebooks. Without one clear digital spot, checking availability turns into guesswork. A single online hub fixes that, keeping dates straight without confusion. It tracks every change, shows real-time openings, leaves nothing to memory.

3. PROPOSED SYSTEM OVERVIEW

The proposed College Facility Booking System is designed to automate and simplify the reservation of institutional facilities such as seminar halls, laboratories, and event spaces. The system provides a centralized web platform where users can check facility availability and submit booking requests. Administrators can review and approve requests through a dedicated dashboard.

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The system is developed using the MERN stack architecture consisting of MongoDB, Express.js, React.js, and Node.js. This architecture enables efficient communication between the client interface and the server while maintaining booking records in a centralized database.

4. LITERATURE SURVEY

Recent research studies conducted by educational institutions have worked on web based reservation systems to improve facility management.

• Pravalika et al. (2023) developed an event booking system that allows users to reserve venues through a web interface and enables administrators to manage booking requests through management dashboard. The system enables users to track their bookings through interface while it prevents scheduling conflicts from happening.

• Lalitha et al. created an online booking management system for college event halls which uses the booking process through digital solution that replaces traditional manual booking methods. Their system maintains a comprehensive database of booking records which enables them to detect and stop users from applying duplicate reservation requests.

Modern reservation systems use complete web development technologies which include Node.js and React.js and MongoDB to build booking systems that can handle user traffic.
The research results show that web-based booking systems provide many important benefits which include better operational efficiency and greater operational clarity and to handle institutional facilities.es

5. SYSTEM GOALS

The proposed system goals is to achieve the following :

• Provide a digital platform and reliable for booking campus facilities.

• Prevent duplicate reservations through database validation.

• Enable admin to approve or reject booking requests.

• Maintain record details of all facility reservations.

• Improve transparency and efficiency in facility management.

5.1 High-Level Architecture

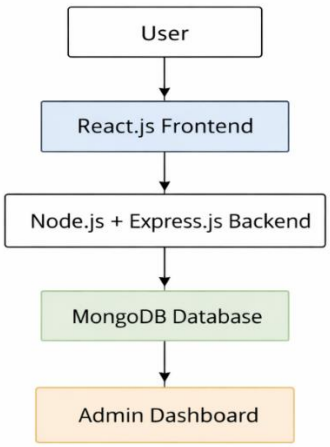

Fig 1. High-Level Architecture of the College Facliacity Booking System

Fig 4.2.1. High-Level Architecture of the College Facility Booking System

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The system is composed of the following components:

• **Frontend:** user interface is built with React.js and allows users to submit booking requests and check their booking status.

• **Backend**: Node.js and Express.js manage operations of server and booking requests process.

• **Database**: MongoDB is used to store user data, information of the facility, and records of the booking.

• **Admin Dashboard:** it provides admins with the capability to check and approve booking requests.

6. SYSTEM IMPLEMENTATION

This Booking System is developed as a web based application using the MERN stack architecture. It provides an interface for users to request facility reservations and allows admins to manage and approve/reject booking requests. The application consists of several modules including user authentication, facility booking, and administrative management.

6.1 User Login Interface

The system provides a login interface that allows users to securely use the booking platform. Users must enter their identity to authenticate them accessing the booking features. An authentication mechanism ensures that only authorized users can access the booking system to requests and with booking id anyone can view booking information.

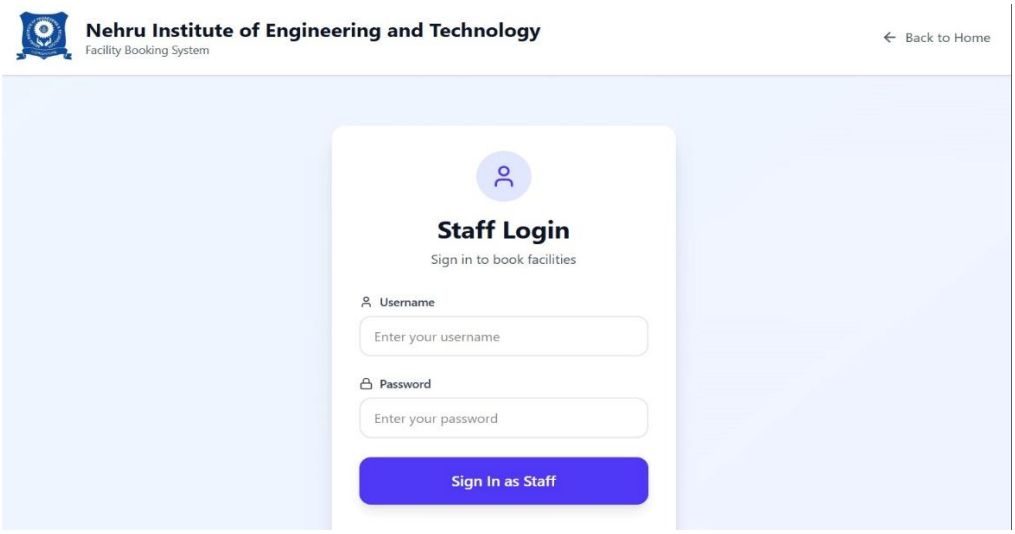

Figure 5.1.1: User Login Interface of the Facility Booking System

6.2 Facility selection

When you sign in, you can search and select venues such as conference rooms, laboratories, or meeting spaces. The system provides you with essential information about each venue, including its name and availability. The system enables you to choose the ideal event location because it shows you all available times for your selected locations.

The facility selection module interacts with the database to retrieve real-time information about available facilities. The system shows current booking schedules which assist users in finding available facilities that they can use on their selected date and time. The booking process becomes more efficient because this system helps to prevent scheduling conflicts.

6.3 Booking Request Interface

The booking request system enables users to create facility reservation requests by entering their facility name and selected date and chosen time slot information. The system checks facility availability before request processing to stop any potential scheduling conflicts. The request enters the approval process after submission when it goes to the administrator.

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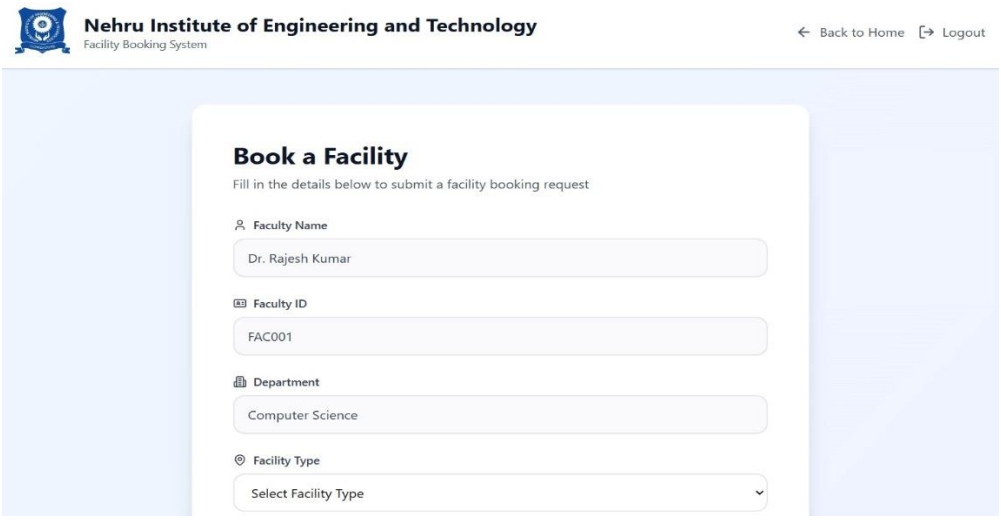

Figure 5.3.1: Facility Booking Request Interface

6.4 Admin Dashboard for Booking Management

The system provides an administrative dashboard which administrators use to manage all incoming facility booking requests. Administrators review submitted requests to make approval or rejection decisions according to availability and scheduling requirements.

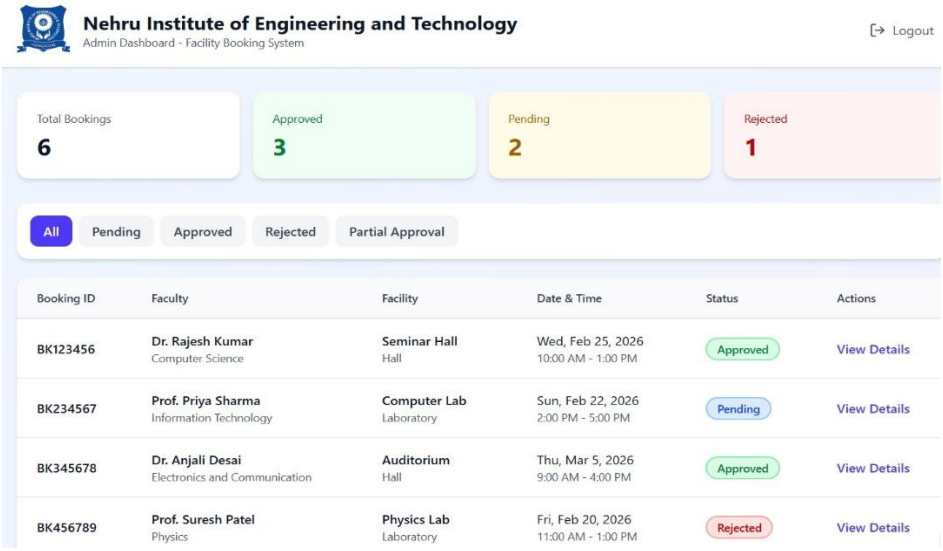

Figure 5.4.1: Admin Dashboard for Booking Approval

6.5 Booking Status Tracking

Users can track the progress of their booking request after they submit their request through the booking system with the booking status system. The system shows all booking request statuses which include pending status and approved status and rejected status. The system enables users to monitor their booking request outcomes.

The system automatically updates booking status information when an administrator processes a request through the admin dashboard. The system provides users with a transparent booking process which enables them to monitor reservation status without having to contact administrative staff.

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7. FUTURE WORK

This Booking System needs multiple new features which will improve both its user experience and system performance according to the current proposal. The system can be enhanced through the implementation of automated email and SMS notification services which will enable instant communication with users. The system sends users notifications about their booking request status which includes approval or rejection or update information to enhance communication flow between users and administrators.

The next system version will operate through cloud based deployment which allows more users to access the system while supporting multiple institutional functions. The system needs to have advanced analytics and reporting features which will help administrators monitor facility usage and booking trends.

8. CONCLUSION

This Booking System which has been proposed creates an effective online system that handles facility bookings for educational institutions. The manual booking system which has been used by most organizations requires too much time and causes customers to experience scheduling problems while their reservation details go missing and they cannot see what has been booked. The system which has been developed provides a solution to these problems by creating a digital platform which allows users to submit booking requests while administrators control the approval process through their specialized dashboard. The system uses MERN stack architecture which enables efficient communication among its frontend backend and database systems. The system uses digital booking records and facility availability checks which prevent duplicate bookings and enhance overall building management. The proposed system enables better business operations because it decreases work demands on staff members while creating an easy-to-use booking system which all users can understand. The implementation demonstrates how modern web technologies can be applied to streamline facility management processes in educational institutions.

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