

Original Article

## EDUNEXUS: COLLEGE FACILITY BOOKING PLATFORM

Anita Antony <sup>1</sup>, Linta Maria Thomas <sup>1</sup>, Meenu K. Suresh <sup>1</sup>, Milosh Sony <sup>1</sup>, Dr. Rani Saritha R. <sup>2</sup>

<sup>1</sup>Department of Computer Applications, Saintgits College of Engineering, Kottukulam Hills, Pathamuttom P.O., Kottayam, Kerala – 686532, India

<sup>2</sup>HOD, Department of Computer Applications, Saintgits College of Engineering, Kerala, India



### ABSTRACT

The rapid digital transformation of educational institutions necessitates efficient resource management systems that minimize administrative overhead and enhance transparency. Traditional manual methods of booking college facilities such as seminar halls, classrooms, laboratories, sports grounds, and auditoriums often result in double-booking, miscommunication, and inefficient utilization of resources. To address these challenges, this paper presents EDUNEXUS– a College Facility Booking System, a comprehensive web-based platform developed using Node.js, Express.js, MongoDB, and EJS templating. The system provides a centralized solution for scheduling and managing campus facilities, incorporating role-based access control for administrators and staff. Administrators can manage facilities, approve or reject booking requests, and generate analytical reports, while staff can request bookings, specify event details, and receive real-time notifications. A calendar-based visualization reduces scheduling conflicts, and integrated search filters improve accessibility. Security measures such as input validation, session management, and encrypted authentication ensure data integrity and privacy. The system promotes digital transformation by reducing paperwork, eliminating human errors, and fostering transparent communication across departments. Furthermore, analytics-driven insights enable administrators to optimize resource utilization. Designed with scalability and adaptability in mind, EDUNEXUS can be extended with mobile application integration, QR-based check-ins, and AI-driven availability prediction. This work demonstrates how modern web technologies can simplify complex administrative processes, making campus management smarter, faster, and more efficient.

**Keywords:** Facility Booking System, Campus Resource Management, Node.js, Express.js, MongoDB, EJS Templating, Digital Transformation in Education

### INTRODUCTION

In today's digital era, technology is central to improving efficiency and transparency in institutional operations. Colleges and universities manage diverse facilities such as auditoriums, seminar halls, laboratories, classrooms, and sports grounds, where traditional manual booking methods often result in scheduling conflicts, mismanagement, and delays. To address these challenges, the EDUNEXUS– College Facility Booking System has been developed as a modern web-based platform that automates and streamlines facility reservations.

The system provides a centralized interface for faculty and administrators to check availability, submit requests, receive approvals, and manage cancellations in real time. Built with Node.js, Express.js, MongoDB, and EJS templating, the platform ensures

#### \*Corresponding Author:

**Email address:** Anita Antony ([anitaa.mca2426@saintgits.org](mailto:anitaa.mca2426@saintgits.org)), Linta Maria Thomas ([lintamt.mca2426@saintgits.org](mailto:lintamt.mca2426@saintgits.org)), Meenu K. Suresh ([meenuks.mca2426@saintgits.org](mailto:meenuks.mca2426@saintgits.org)), Milosh Sony ([miloshs.mca2426@saintgits.org](mailto:miloshs.mca2426@saintgits.org)), Dr. Rani Saritha R. ([rani.saritha@saintgits.org](mailto:rani.saritha@saintgits.org))

**Received:** 10 December 2025; **Accepted:** 19 January 2026; **Published** 25 February 2026

**DOI:** 10.29121/IJOEST.v10.i1.2026.737

**Page Number:** 36-38

**Journal Title:** International Journal of Engineering Science Technologies

**Journal Abbreviation:** Int. J. Eng. Sci. Tech

**Online ISSN:** 2456-8651

**Publisher:** Granthaalayah Publications and Printers, India

**Conflict of Interests:** The authors declare that they have no competing interests.

**Funding:** This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

**Authors' Contributions:** Each author made an equal contribution to the conception and design of the study. All authors have reviewed and approved the final version of the manuscript for publication.

**Transparency:** The authors affirm that this manuscript presents an honest, accurate, and transparent account of the study. All essential aspects have been included, and any deviations from the original study plan have been clearly explained. The writing process strictly adhered to established ethical standards.

**Copyright:** © 2026 The Author(s). This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

With the license CC-BY, authors retain the copyright, allowing anyone to download, reuse, re-print, modify, distribute, and/or copy their contribution. The work must be properly attributed to its author.

---

scalability, security, and ease of use across multiple devices. By digitizing the booking process, EDUNEXUS reduces paperwork, eliminates human error, and fosters transparent communication, ultimately contributing to smarter and more organized campus resource management.

## **MATERIALS AND METHODS**

### **SOFTWARE AND HARDWARE REQUIREMENTS**

#### **SOFTWARE REQUIREMENTS**

The system requires Windows 10/11 or Linux as the operating system for development and server hosting, while modern browsers such as Chrome or Firefox enable users to access and interact with the web-based interface. The backend is developed using Node.js and Express.js, which provide a scalable runtime and routing framework, and MongoDB serves as the database server for storing and managing booking information. Development is supported by Visual Studio Code as the primary coding and debugging environment, with Git and GitHub used for version control and collaborative development. API testing is carried out using Postman to validate request and response flows, ensuring reliability during integration.

#### **HARDWARE REQUIREMENTS**

The hardware setup requires a multi-core processor to ensure smooth performance during development and testing tasks, along with at least 8 GB of RAM to support multitasking and efficient handling of databases. A minimum of 256 GB of storage is recommended to accommodate codebases, dependencies, and data records. Stable network connectivity is essential for accessing cloud services, repositories, and deployment platforms, while standard peripherals such as a keyboard, mouse, and display provide the basic development environment.

#### **FUNCTIONAL SPECIFICATIONS**

The EDUNEXUS platform is designed to streamline the booking and management of college facilities through well-defined functional modules. The system provides secure user registration and authentication, allowing faculty and administrators to log in with verified credentials. Facility booking enables users to request reservations for auditoriums, classrooms, laboratories, seminar halls, and sports areas by specifying date, time, and purpose. An integrated conflict management feature checks for overlapping requests and prevents double booking, ensuring fair allocation of resources.

The administrator dashboard offers complete control over booking requests, allowing approvals, rejections, and updates to schedules, while maintaining a digital record of all transactions. Notifications are automatically generated to inform users about booking status, cancellations, or updates, and a booking history module provides easy access to past reservations for accountability and planning. Together, these specifications ensure transparency, efficiency, and reliability in campus facility management.

#### **SYSTEM ARCHITECTURE**

The system architecture combines Node.js for backend operations including routing, session management, and API handling, while Express.js provides middleware support and request processing. MongoDB serves as the database for storing facility details, booking records, user information, complaints, and notifications, with Mongoose used for schema modeling and validation. EJS templating is employed to dynamically render content, and Bootstrap ensures responsive design across multiple devices.

The frontend technologies, including HTML, CSS, and JavaScript, create interactive dashboards for both administrators and faculty users. Role-based access control enforces privileges, allowing administrators to manage facilities and bookings while faculty members submit requests and track approvals. Security mechanisms such as input validation, password encryption, and session handling are integrated to protect user data and prevent unauthorized access.

#### **DATABASE DESIGN**

The database schema is designed using MongoDB collections to manage users, facilities, bookings, complaints, and notifications. The Users collection stores login credentials, roles, and contact details, ensuring secure authentication. The Facilities collection maintains records of classrooms, laboratories, seminar halls, auditoriums, and sports grounds, including type, capacity, and availability status. The Bookings collection links users to facilities with date, time, and approval status, enabling conflict detection and history tracking. The Complaints collection records issues raised by users and their resolution status, while the Notifications collection stores automated alerts and system messages.

## IMPLEMENTATION PROCEDURES

Implementation followed a modular approach beginning with environment setup, including Node.js installation, Express.js configuration, and MongoDB integration. The backend was developed to handle authentication, booking workflows, and conflict resolution, while the frontend was designed using EJS templates and Bootstrap for responsive layouts. The booking interface was implemented with calendar visualization, request forms, and notification alerts, ensuring ease of use for faculty members. The administrator dashboard was developed to provide booking approvals, facility management, complaint handling, and analytics reporting.

## RESULTS AND DISCUSSIONS

The EDUNEXUS platform demonstrated excellent performance through comprehensive testing. Unit testing verified core components like authentication, booking submission, and conflict management, while integration testing ensured seamless interaction between frontend, backend, and MongoDB database. System testing with multiple concurrent users confirmed stability, with booking operations processing quickly and conflict detection preventing all overlapping reservations.

Performance metrics showed low response times for data retrieval, smooth dashboard loading even with large booking histories, and reliable notification delivery. The system's advantages include centralized facility management, automated conflict prevention, role-based security, real-time notifications, and responsive design across devices. Limitations include internet dependency, lack of native mobile app, and basic analytics capabilities.

## CONCLUSIONS AND RECOMMENDATIONS

The EDUNEXUS platform provides an efficient, transparent solution for college facility management, eliminating scheduling conflicts and reducing manual coordination through automation. The system's scalable Node.js/MongoDB architecture, role-based access control, and real-time notifications enhance operational efficiency across educational institutions. Performance testing confirms reliability under diverse conditions.

Future recommendations include mobile app development for push notifications, QR-based check-ins for usage verification, AI-driven analytics for predictive scheduling, multi-language support, and ERP system integration. These enhancements would further optimize resource utilization and user experience.

## ACKNOWLEDGMENTS

None.

## REFERENCES

- Ajith, R., Sathvika, A., Srija, N., and Archana, P. (2025). Campus Venue Booking System. *Journal on Innovations in Teaching and Learning*, 4(1), 115–124. <https://doi.org/10.46632/jdaai/4/1/13>
- Harshith, S., Rao, P. D., and Roopashree, C. S. (2022). Sports Facility Booking. *International Journal of Advanced Research in Science, Communication and Technology*, 2(1).
- Navin, R. S. K. (2021). Online Reservation System. *International Journal of Advance Research, Ideas and Innovations in Technology (IJARIIT)*, 7(4).
- Pandey, I. R. (2024). Innovations in School Room Reservation Management: Towards Smart and Sustainable Solutions. *Gurukul International Multidisciplinary Research Journal*, 12(VIII). <https://doi.org/10.69758/GIMRJ240618V12P008>
- Pawar, T., Sonawane, V., Saudagar, A., and Patil, S. (2025). An Intelligent Booking Platform for Sports and Conference Halls Using IoT Integration. *International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)*, 5(10). <https://doi.org/10.48175/IJARSCT-25694>