IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 1, January 2026

DOI: 10.17148/IJARCCE.2026.151141

A Web-Based Auditorium Utilization and Alert System for Efficient Institutional Resource Management

Lambani Mariya Naik [1], Vishvanath A G [2]

Department of MCA, BIT, K.R. Road, V.V. Pura, Bangalore, India[1]

Assistant Professor, Department of MCA, BIT, K.R. Road, V.V. Pura, Bangalore, India[2]

Abstract: Efficient management of shared institutional resources such as auditoriums is a critical challenge in educational organizations. Manual and semi-digital booking methods often result in scheduling conflicts, underutilization, and lack of transparency. This paper presents a Web-Based Auditorium Utilization and Alert System designed to automate auditorium booking, approval workflows, conflict detection, and user notification. The proposed system adopts a role-based access control mechanism and a centralized database to ensure secure and transparent operations. By automating approvals and providing real-time alerts, the system significantly reduces administrative workload and improves resource utilization efficiency. Experimental deployment in an institutional environment demonstrates improved scheduling accuracy, reduced conflicts, and enhanced user satisfaction.

Keywords: Auditorium Management, Resource Scheduling, Web Application, Alert System, Institutional Automation.

I. INTRODUCTION

Auditoriums are critical shared infrastructure in educational institutions, serving as venues for academic lectures, seminars, workshops, examinations, cultural programs, conferences, and official meetings. As institutions grow in size and the frequency of events increases, efficient management of auditorium resources becomes a significant administrative challenge. Traditional auditorium booking practices in many institutions rely on manual coordination, paper-based registers, or spreadsheet-driven systems, which are often prone to scheduling conflicts, miscommunication, double bookings, and underutilization of resources. These limitations highlight the need for an automated and centralized solution to manage auditorium utilization effectively.

The lack of real-time visibility into auditorium availability further complicates event planning and coordination. Users are frequently required to depend on administrative staff to check schedules and confirm reservations, resulting in delays and increased administrative workload. Moreover, existing systems often fail to provide structured approval workflows and timely notifications, leading to uncertainty regarding booking status. Such inefficiencies not only affect operational productivity but also impact the overall user experience for students, faculty members, and administrators.

1.1 Project Description

The Auditorium Utilization and Alert System is a web-based application developed to automate and optimize the scheduling, monitoring, and management of auditorium resources in educational institutions. Auditoriums are high-value shared facilities used for academic, administrative, and cultural activities, often by multiple departments simultaneously. In many institutions, the absence of an efficient centralized booking system leads to scheduling conflicts, lack of transparency, excessive administrative workload, and underutilization of available infrastructure. This project addresses these challenges by providing a structured, automated, and role-based platform for auditorium management.

The proposed system replaces traditional manual and semi-digital booking approaches with a centralized digital solution that enables users to submit, track, and manage auditorium reservation requests online. The system supports multiple user roles, including students, faculty members, and administrators, each with clearly defined access privileges. Role-based access control ensures that sensitive operations such as booking approval, user management, and system configuration are restricted to authorized personnel, thereby improving security and accountability.

1.2 Motivation

Efficient management of shared institutional resources is a fundamental requirement for the smooth functioning of educational organizations. Among these resources, auditoriums play a crucial role as centralized venues for academic lectures, examinations, seminars, workshops, cultural programs, conferences, and official gatherings. Despite their importance, the management of auditorium usage in many institutions continues to rely on manual coordination, informal

International Journal of Advanced Research in Computer and Communication Engineering
Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 1, January 2026
DOI: 10.17148/IJARCCE.2026.151141

communication, or basic spreadsheet-based systems. These traditional approaches are often inefficient, error-prone, and unable to scale with increasing institutional demands. The motivation for this project arises from the need to address these persistent challenges through an automated, transparent, and reliable digital solution.

One of the primary motivating factors is the frequent occurrence of scheduling conflicts and double bookings caused by the absence of real-time availability information. In manual systems, users are required to depend on administrative staff to verify auditorium availability, leading to delays, miscommunication, and inconsistent records. As event frequency increases, the likelihood of overlapping reservations grows significantly, resulting in last-minute cancellations, rescheduling, and dissatisfaction among users. Such inefficiencies directly affect academic planning and institutional productivity, highlighting the necessity for an automated conflict detection and validation mechanism.

II. RELATED WORK

Paper [1] studies traditional manual auditorium booking systems used in educational institutions. The authors describe the use of paper registers and verbal coordination for scheduling events such as seminars and examinations. While simple to implement, the study highlights frequent issues such as double bookings, delayed confirmations, and lack of historical records. However, the system completely lacks automation, real-time availability checking, and structured approval mechanisms, making it inefficient for large institutions.

Paper [2] investigates spreadsheet-based auditorium and hall management solutions using tools such as Microsoft Excel and Google Sheets. The authors demonstrate that digital spreadsheets improve record organization compared to manual registers. Despite this improvement, the system does not support real-time multi-user access, automated conflict detection, or role-based authorization. Additionally, the absence of alert mechanisms results in poor communication between users and administrators, limiting practical usability.

Paper [3] explores a web-based room and facility booking system with basic user authentication and online request submission. The study shows that centralized databases help reduce manual workload and improve data consistency. However, the proposed system provides limited administrative control and does not include automated approval workflows or real-time user notifications, which reduces transparency and efficiency.

Paper [4] presents an institutional resource scheduling framework that integrates timetable data and room availability to optimize space utilization. The research emphasizes efficient allocation of shared resources through data-driven planning. Despite its analytical strength, the framework lacks a user-friendly interface and does not provide interactive dashboards or alert-based communication, restricting adoption by non-technical users.

Paper [5] examines challenges in adopting digital administrative systems within educational institutions. The authors identify complex interfaces, lack of role-based access control, and insufficient feedback mechanisms as major barriers to effective usage. The study recommends simple web-based interfaces and automated notifications to enhance usability and administrative efficiency.

Paper [6] reviews existing auditorium and facility management systems and concludes that most solutions address scheduling, approval, or communication as isolated components. The authors highlight the need for an integrated platform that combines booking management, conflict detection, administrative approval, and alert notification within a single system. This observation directly motivates the proposed Auditorium Utilization and Alert System, which integrates automated booking, role-based approval workflows, conflict detection, and real-time alerts through a centralized, web-based application.

III. METHODOLOGY

A. Data Collection and System Input Handling

The system utilizes institutional data related to auditorium management, including user details, auditorium information, and booking requests. Data collected includes auditorium name, seating capacity, date and time of events, duration, purpose of booking, and user role information (student, faculty, or administrator). Input data is validated to eliminate inconsistencies such as overlapping time slots, invalid dates, or incomplete booking details. Preprocessing ensures standardized time formats and accurate availability checks before storing records in the centralized database.

B. User Authentication and Role-Based Access Control

A secure authentication mechanism is implemented to verify user identity before granting access to the system. Users log in using valid credentials, and role-based access control determines the functionalities available to them. Students and faculty members are permitted to submit and view booking requests, while administrators are authorized to approve or

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

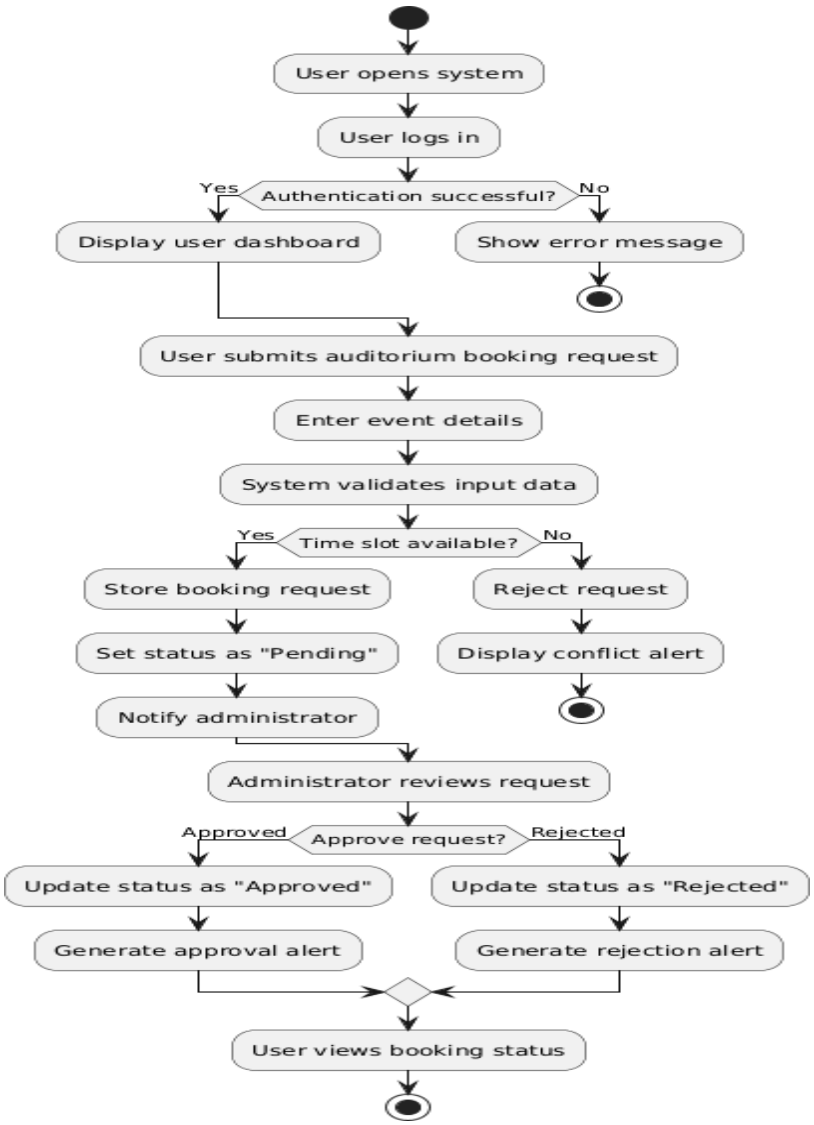
Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 1, January 2026

DOI: 10.17148/IJARCCE.2026.151141

reject requests and manage user accounts. This approach ensures system security, accountability, and controlled access to sensitive administrative operations.

C. Auditorium Booking and Conflict Detection Module

The auditorium booking module allows authorized users to submit reservation requests through an online form. The system analyses the requested date, time, and auditorium against existing approved bookings to detect scheduling conflicts. If overlapping time slots are identified, the system restricts the booking or flags it for administrative review. This automated conflict detection mechanism prevents double bookings and ensures fair and optimal utilization of auditorium resources.



D. Approval and Alert Notification Module

Once a booking request is submitted, it is marked as pending and forwarded to the administrator for review. Administrators access a dedicated dashboard displaying all pending requests along with availability details. Based on institutional policies and priorities, the request is approved or rejected. Upon decision, the system updates the booking status and generates an alert notification for the user. Alerts are displayed on the user dashboard upon login, ensuring timely and transparent communication without manual follow-ups.

E. System Integration and Deployment

All modules are integrated into a web-based application developed using Java Server Pages (JSP) for the presentation layer and Java Servlets for backend processing. A MySQL relational database is used for secure data storage and retrieval.

International Journal of Advanced Research in Computer and Communication Engineering
Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 1, January 2026
DOI: 10.17148/IJARCCE.2026.151141

The system follows a three-tier architecture comprising presentation, application, and data layers, ensuring modularity and scalability. Deployment is carried out on an Apache Tomcat server, and the user interface is designed to be intuitive and responsive, enabling easy adoption by users with varying technical backgrounds

G. Hardware and Software Requirements

Hardware Requirements

- Processor: A standard dual-core or quad-core processor such as Intel i3/i5 or AMD Ryzen series is sufficient to run the web-based auditorium management application efficiently.
- RAM: A minimum of 4 GB RAM is required for basic operation, while 8 GB RAM is recommended for smoother performance during multi-user access and database operations.
- Storage: At least 256 GB of hard disk or SSD storage is required to store the application files, database records, and system logs.
- Internet Connectivity: A stable internet or institutional LAN connection is required for application deployment, remote access, and system maintenance.
- Client Devices: Desktop or laptop computers with standard input devices such as keyboard and mouse are required for user interaction.

Software Requirements (What tools/programs you need)

- Operating System: The system can be developed and deployed on Windows 10/11, Linux, or macOS operating systems.
- Integrated Development Environment (IDE): Eclipse IDE for Enterprise Java Developers is recommended for coding, debugging, and project management.
- Programming Language: Java (JDK 8 or higher) is used for backend development and server-side processing.
- Front-End Technologies: Java Server Pages (JSP), HTML, and CSS are used to design the user interface.
- Back-End Technologies: Java Servlets are used to implement business logic, booking workflows, and approval processing.
- Database: MySQL is used as the relational database management system for storing user credentials, auditorium details, booking records, and approval statuses.
- Database Connectivity: JDBC (Java Database Connectivity) is used to establish secure communication between the application and the database.
- Web Server / Servlet Container: Apache Tomcat (version 9 or higher) is used to deploy and run the web application.
- Web Browser: Google Chrome, Mozilla Firefox, or Microsoft Edge is required for accessing and testing the application.
- Version Control: Git (optional) can be used for source code versioning and change management during development.

B. Feature Implementation

• **Authentication Module:** The system implements a secure user authentication mechanism using session-based login. User credentials are stored securely in the database, and access to system features is restricted to authenticated users only. Role-based access control ensures that students, faculty members, and administrators are granted permissions according to their responsibilities, preventing unauthorized access to administrative functionalities.

• **Auditorium Booking and Management Module:** The auditorium booking module allows authorized users to submit reservation requests by providing event details such as auditorium name, date, time, duration, and purpose. The system validates input data and records booking requests in a centralized database with a default pending status. Users can view their booking history and current request status through the dashboard.

• **Conflict Detection Module:**To prevent double bookings, the system automatically checks newly submitted booking requests against existing approved reservations for the same auditorium. If overlapping time slots are detected, the system restricts the booking or flags it for administrative review. This automated conflict detection mechanism ensures fair and optimal utilization of auditorium resources.

• **Approval and Alert Notification Module:** Administrators access a dedicated dashboard to review pending booking requests. Based on availability and institutional policies, requests can be approved or rejected. Once a decision is made,

DOI: 10.17148/IJARCCE.2026.151141

the system updates the booking status and generates alert notifications that are displayed to users upon login. This feature improves transparency and eliminates the need for manual follow-up.

• **User Interface and Interaction:** The system provides an intuitive, web-based user interface with role-specific dashboards for students, faculty, and administrators. Users can easily submit booking requests, track approval status, and receive alerts. The interface is designed to be simple and user-friendly, ensuring ease of use even for users with limited technical knowledge.

C. Evaluation Methodology

The system was evaluated based on three primary performance metrics:

1. **System Effectiveness:** The system was evaluated based on its ability to manage auditorium bookings accurately and efficiently. Key factors included successful submission of booking requests, correct detection of scheduling conflicts, and proper execution of approval and rejection workflows. The evaluation verified that the system prevented double bookings and ensured consistent updating of booking statuses.
2. **Usability:** Usability testing was conducted to ensure that users with minimal technical knowledge could easily navigate the system. Students and faculty members were able to submit booking requests, view booking status, and receive alerts without external assistance. Administrators were able to review and manage booking requests through a dedicated dashboard, confirming the effectiveness of the user interface and interaction design.
3. **Reliability:** The system was tested under various operating conditions, including incomplete booking data, invalid date or time inputs, and simultaneous booking requests. The evaluation verified that the system handled errors gracefully, provided appropriate feedback messages, and maintained data consistency without system failure. Stable performance under multiple user interactions confirmed the reliability of the application.

D. Results and Observations

The experimental evaluation demonstrates the effectiveness of the proposed Auditorium Utilization and Alert System under realistic institutional usage conditions:

• Booking Accuracy and Conflict Prevention: The system accurately processed auditorium booking requests and successfully detected scheduling conflicts. Overlapping time slots for the same auditorium were identified and restricted, preventing double bookings and ensuring proper allocation of resources.

• Approval Workflow Efficiency: The automated approval and rejection mechanism functioned as intended, allowing administrators to review and respond to booking requests efficiently. Booking status updates were reflected immediately in the system, improving transparency and reducing administrative workload.

• User Experience: The web-based interface provided a smooth and intuitive user experience for students, faculty members, and administrators. Users were able to submit booking requests, track approval status, and view alert notifications with minimal effort. The role-specific dashboards enhanced clarity and ease of navigation across different devices.

• Alert Notification Effectiveness: The alert mechanism successfully notified users of booking decisions upon login. This real-time communication eliminated the need for manual follow-ups and improved coordination between users and administrators.

• System Stability and Reliability: The application operated reliably during testing, handling multiple simultaneous booking requests and administrative actions without significant delays or failures. The system maintained data consistency and demonstrated stable performance, confirming its suitability as a practical and scalable auditorium management solution.

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 1, January 2026

DOI: 10.17148/IJARCCE.2026.151141

Fig 1. Login page

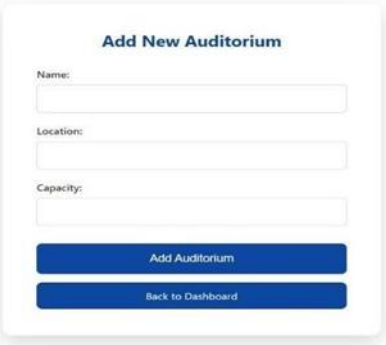


Fig 2. Add New Auditorium

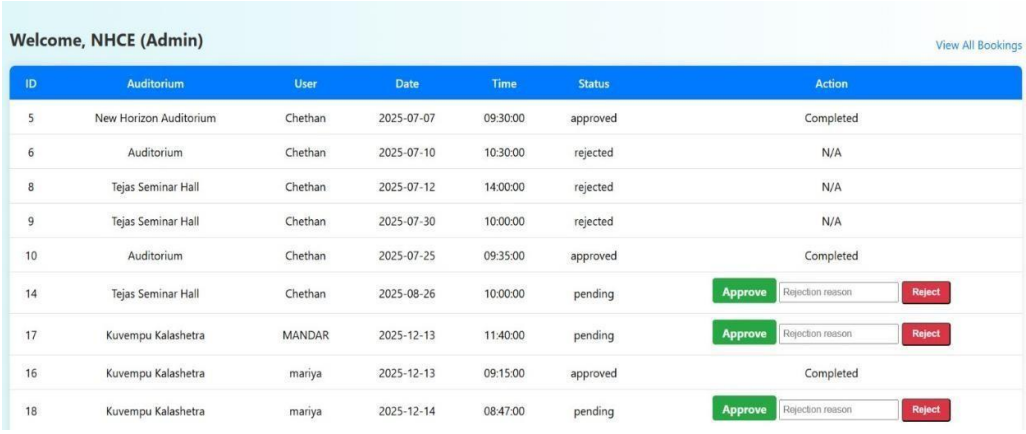


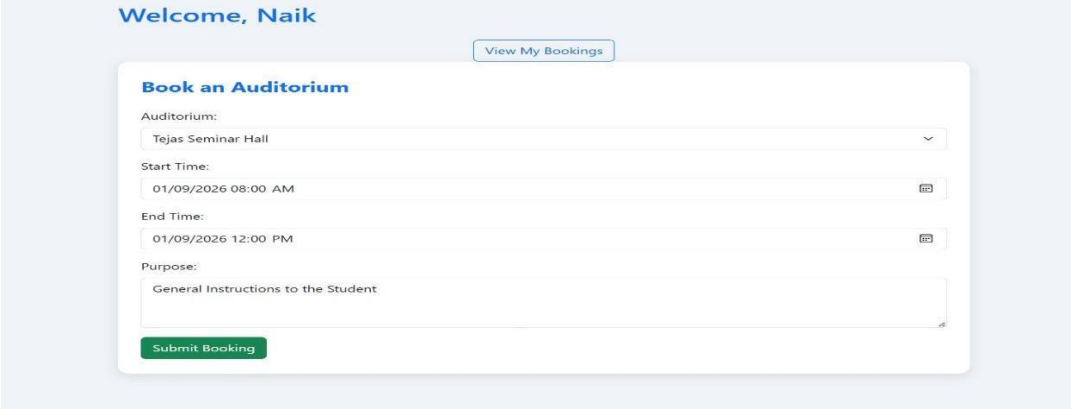
Fig 3. Admin Login

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

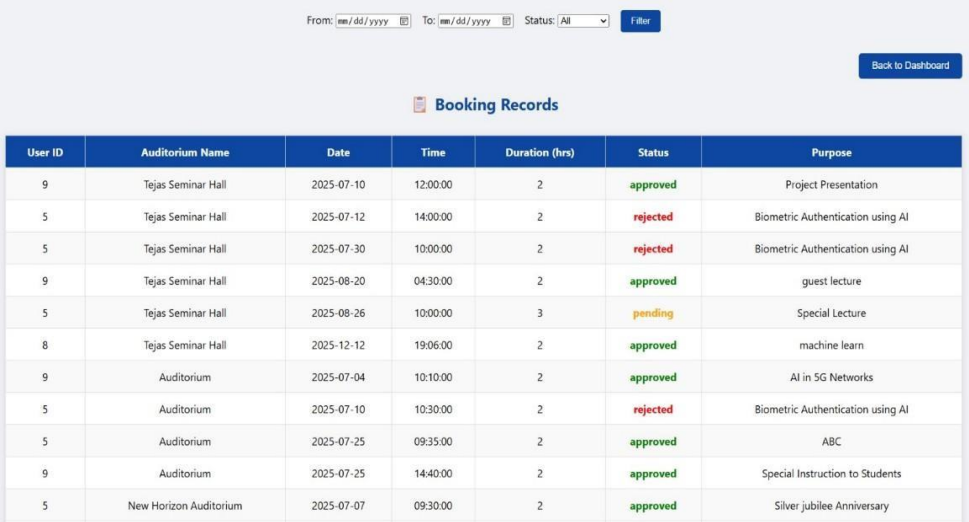
International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 1, January 2026

DOI: 10.17148/IJARCCE.2026.151141



5.1.1 Fig 4. Booking Auditorium



User ID	Auditorium Name	Date	Time	Duration (hrs)	Status	Purpose
9	Tejas Seminar Hall	2025-07-10	12:00:00	2	approved	Project Presentation
5	Tejas Seminar Hall	2025-07-12	14:00:00	2	rejected	Biometric Authentication using AI
5	Tejas Seminar Hall	2025-07-30	10:00:00	2	rejected	Biometric Authentication using AI
9	Tejas Seminar Hall	2025-08-20	04:30:00	2	approved	guest lecture
5	Tejas Seminar Hall	2025-08-26	10:00:00	3	pending	Special Lecture
8	Tejas Seminar Hall	2025-12-12	19:06:00	2	approved	machine learn
9	Auditorium	2025-07-04	10:10:00	2	approved	AI in 5G Networks
5	Auditorium	2025-07-10	10:30:00	2	rejected	Biometric Authentication using AI
5	Auditorium	2025-07-25	09:35:00	2	approved	ABC
9	Auditorium	2025-07-25	14:40:00	2	approved	Special Instruction to Students
5	New Horizon Auditorium	2025-07-07	09:30:00	2	approved	Silver jubilee Anniversary

Fig 5. Booking Record

VI. CONCLUSION

This paper presented a Web-Based Auditorium Utilization and Alert System designed to address the limitations of traditional and semi-digital auditorium management practices in educational institutions. Manual booking methods and spreadsheet-based systems often lead to scheduling conflicts, delayed communication, lack of transparency, and increased administrative workload. The proposed system overcomes these challenges by introducing a centralized, automated platform that streamlines auditorium booking, approval, conflict detection, and user notification.

The system implements role-based access control to ensure secure and structured interaction among students, faculty members, and administrators. Automated conflict detection prevents double bookings by validating new reservation requests against existing schedules, while the structured approval workflow enhances accountability and governance. The alert notification mechanism ensures timely communication of booking decisions, eliminating the need for repeated follow-ups and improving overall coordination among stakeholders.

VII. FUTURE WORK

While the proposed Auditorium Utilization and Alert System effectively automates auditorium booking, approval workflows, and alert notifications, several enhancements can be incorporated to further improve system functionality and scalability. One important area of future development is the integration of email and SMS-based notifications. Currently, alerts are displayed within the system upon user login; extending notifications to external communication channels would ensure timely updates even when users are not actively accessing the application.

REFERENCES

[1] I. Sommerville, *Software Engineering*, 10th ed., Pearson Education, 2016.
[2] R. Pressman and B. Maxim, *Software Engineering: A Practitioner's Approach*, 8th ed., McGraw-Hill, 2015.

International Journal of Advanced Research in Computer and Communication Engineering
Impact Factor 8.471 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 15, Issue 1, January 2026
DOI: 10.17148/IJARCCE.2026.151141

[3] K. Laudon and J. Laudon, *Management Information Systems: Managing the Digital Firm*, 15th ed., Pearson, 2018.
[4] A. Silberschatz, H. Korth, and S. Sudarshan, *Database System Concepts*, 6th ed., McGraw-Hill, 2019.
[5] IEEE Computer Society, *IEEE Standard for Software Requirements Specification*, IEEE Std 830-1998, 1998.
[6] J. W. Satzinger, R. B. Jackson, and S. D. Burd, *Systems Analysis and Design in a Changing World*, Cengage Learning, 2016.
[7] M. Fowler, *UML Distilled: A Brief Guide to the Standard Object Modeling Language*, 3rd ed., Addison-Wesley, 2004.
[8] T. Connolly and C. Begg, *Database Systems: A Practical Approach to Design, Implementation, and Management*, Pearson Education, 2015.
[9] Apache Software Foundation, "Apache Tomcat Documentation," [Online]. Available: https://tomcat.apache.org
[10] Oracle Corporation, "Java Platform, Standard Edition Documentation," [Online]. Available: https://docs.oracle.com/javase/

