



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 14, Issue 11, November 2025

Smart Exam Seat Finder: Integrating Database Systems and Flask Framework for Academic Efficiency

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ABSTRACT: The increasing complexity of examination management in educational institutions necessitates the adoption of automated systems that ensure accuracy, efficiency, and transparency. The Smart Exam Seat Finder is a web-based application designed to automate the seat allocation and verification process for students during examinations. This system enables students to easily access their seat information, including seat number, hall name, date, and time, through a simple roll number validation mechanism. Teachers and administrators can manage student data, allocate seats, and ensure that each student receives a unique seat assignment without duplication. The system is implemented using HTML, CSS, JavaScript for the frontend and Python Flask as the backend framework, with SQLite serving as the database for efficient data storage and retrieval. Additionally, the Report Lab library is used for generating downloadable PDF seat information. The proposed system minimizes manual errors, enhances operational efficiency, and streamlines the overall examination process, providing a reliable digital solution for academic institutions.

KEYWORDS: Smart Exam Seat Finder, Examination Management System, Automated Seat Allocation, Python Flask, SQLite Database, Report Lab, Web-Based Application, Roll Number Validation, PDF Generation, Educational Automation, Student Information System, Flask Framework.

I. INTRODUCTION

examinations are an essential component of the educational evaluation process. in educational institutions which serve to measure student performance and learning outcomes managing examinations effectively requires careful planning and organization especially in allocating seating arrangements for a large number of students traditional methods of manual seat allocation are often time-consuming error-prone and inefficient leading to confusion duplication and administrative burden with the increasing demand for automation and digitalization in education management there is a growing need for intelligent systems that can streamline the examination process and ensure accuracy in seat distribution recent advances in web-based technologies have enabled the development of automated systems for managing a variety of academic activities including examination scheduling attendance monitoring and grading however very few systems focus specifically on automating exam seat allocation and making seat information easily available to students studies in educational technology emphasize the importance of user-centered design and real-time data management to increase institutional efficiency and reduce human dependency the integration of web frameworks like python flask with frontend technologies like html css and javascript provides a reliable foundation for building interactive and scalable solutions for educational applications

Smart Exam Seat Finder System has been developed to address these challenges by automating the process of seat allocation and providing a convenient interface for both students and administrators. The system validates student roll numbers, displays exam details including seat number, hall, date and time, and enables users to download seating information in PDF format. For teachers and administrators, it provides secure login access to efficiently manage student

data and seating arrangements, ensuring that each student is allotted a unique seat.

II. LITERATURE SURVEY

A number of studies and technological solutions have been developed to improve the efficiency of examination management and seat allocation systems in educational institutions. Earlier methods primarily relied on manual seat distribution, which was prone to human error, redundancy, and data inconsistency. With the growth of digital education systems, researchers have explored automated frameworks to streamline these administrative processes.

Patel and Mehta (2022) proposed a Flask-based examination management system that enabled dynamic allocation of seats and simplified faculty-level monitoring. Their approach demonstrated the potential of lightweight Python frameworks for institutional automation. Similarly, Nagpal and Sharma (2021) emphasized the use of web technologies to automate exam-related workflows, reducing the reliance on paper-based systems and improving accessibility for both students and staff.

Recent research by Sinha and Kumar (2023) introduced a digital automation model to enhance examination efficiency by leveraging database-driven seat allocation algorithms, ensuring uniqueness and accuracy. In another work, Verma and Nair (2020) discussed database normalization techniques that support efficient data retrieval and reduce redundancy in academic management systems. Additionally, Grinberg (2018) highlighted the flexibility of the Flask micro-framework for developing modular and scalable web applications suited for educational institutions.

Building upon these existing studies, the Smart Exam Seat Finder integrates multiple technological components — Flask for backend processing, SQLite for structured data management, and Report Lab for PDF generation—to create a comprehensive and user-centric platform. Unlike prior systems, it focuses specifically on seat validation, duplication prevention, and automated PDF generation, thereby ensuring transparency, usability, and operational accuracy.

III. METHODOLOGY

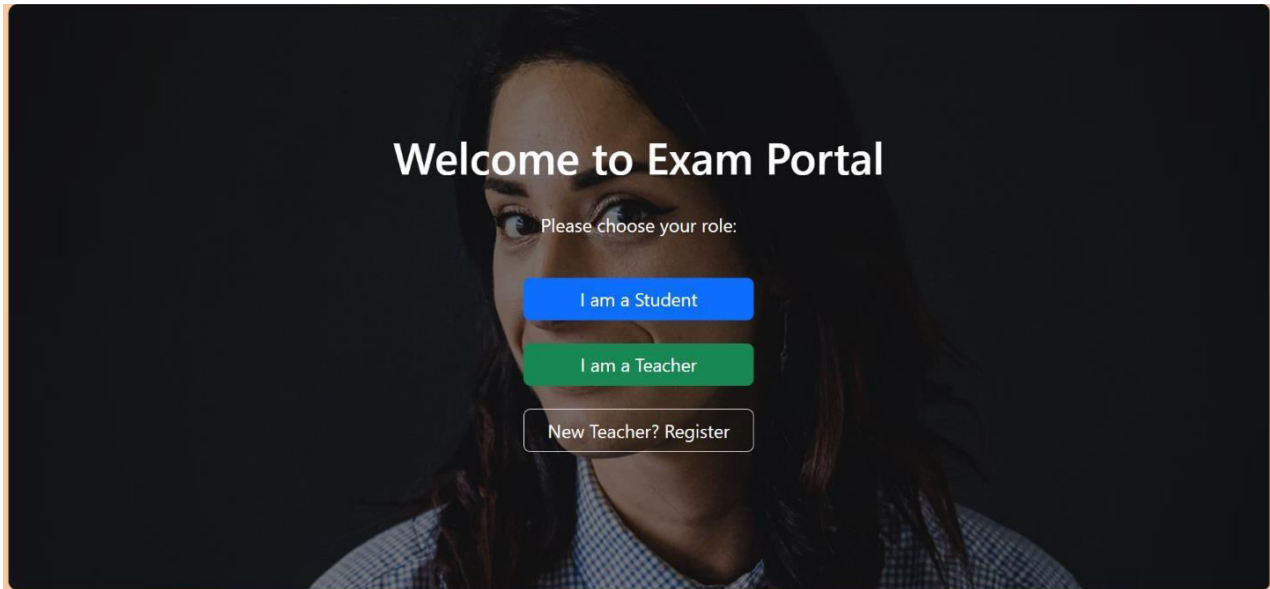
The proposed Smart test Seat Finder System follows a modular approach for effective design and development. The entire system is divided into two main modules — Student Module and Teacher (Admin) Module — to insure smooth functionality and secure data operation. The system is developed using HTML, CSS, and JavaScript for the frontend interface, Python Flask for backend sense, and SQLite as the database for storing and managing pupil and seating data. Data Collection and Validation The schoolteacher module allows authorized teachers to add, update, or cancel pupil details. Each pupil entry includes the roll number, name, and test details. The system validates all inputs to help crimes and duplication of seat assignments.

Seat Allocation sense: A core algorithm ensures that each pupil is assigned a unique seat number. The system prevents conflicts by vindicating seat vacuity in real-time before allocation. The schoolteacher can also modify seating arrangements if needed.

Seat Information Retrieval scholars can enter their roll number on the gate. The system validates the roll number and, upon successful verification, retrieves details such as seat number, test hall name and number, test date, and time. PDF Generation Using the Report Lab library in Python, the system allows scholars to download their seat information as a well-formatted PDF document. This enhances availability and convenience for offline reference.

Functional and confirmation testing was performed to insure system trustability, database integrity, and customer experience effectiveness. The system was tested with multiple datasets to corroborate that no indistinguishable seats are allocated and all modules work as intended.

IV. EXPECTED RESULTS



V. CONCLUSION

The Smart Exam Seat Finder System provides a reliable, automated, and user-friendly solution for managing examination seating arrangements. By integrating web technologies and Python Flask, the system simplifies complex administrative tasks, ensuring unique seat allocation and accurate student data handling. The inclusion of PDF generation improves accessibility and record keeping. Overall, the system enhances operational efficiency, reduces human errors, and supports a transparent and organized exam management process. Future enhancements may include QR-code integration on seat PDFs and cloud-based scalability for large institutions.

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