



# SMART EXAM SEAT ALLOCATION SYSTEM USING ANDROID APPLICATION

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**Abstract:** Smart Exam Seat Allocation System is an Android-based application designed to automate the process of assigning seats to students during examinations. The system reduces manual effort, ensures fairness, and optimizes classroom utilization. It integrates modules such as login authentication, classroom creation, student data management, seat generation, and student view. This paper discusses the motivation, objectives, system architecture, methodology, technology stack, features, advantages, limitations, and future scope of the system.

**Keywords:** Seat Allocation, Android Application, Java, Firebase, Automation, Classroom Management, Exam System

## I. INTRODUCTION

Examinations require strict organization to maintain fairness and discipline. Traditional seat allocation methods involve manual chart preparation, which is prone to duplication, bias, and human error. Institutions often struggle with large datasets, multiple classrooms, and last-minute changes.

The Smart Exam Seat Allocation System addresses these challenges by providing a **mobile-based solution**. Teachers can generate seating charts instantly, while students can check their assigned seats directly through the app. This reduces administrative workload, improves transparency, and enhances the overall examination process.

## II. LITERATURE SURVEY

Several systems have been proposed for exam management:

- **Manual Allocation:** Paper-based seating charts; high error rate and inefficiency.
- **Web-based Systems:** Introduced automation but lacked portability and real-time usability.
- **Existing Apps:** Focused on classroom management but not optimized for exam seating.

Table I. Literature Review Summary

Study / Platform	Focus	Identified Gap
Manual Allocation	Paper-based planning	High error rate, time-consuming
Web-based Systems	Automation	No mobile support
Existing Apps	Classroom management	Limited scalability
Proposed System	Android seat allocation	Real-time, mobile-friendly

## III. OBJECTIVES

- Automate exam seat allocation with minimal human intervention.



- Ensure fairness by avoiding consecutive roll numbers together.
- Optimize classroom utilization across multiple rooms.
- Provide mobile accessibility for teachers and students.
- Maintain transparency and reduce human error.

#### IV. PROPOSED SYSTEM

The system follows a **three-tier architecture**:

1. **Presentation Layer (Frontend):** XML layouts for Android UI.
2. **Application Layer (Backend):** Java classes implementing seat allocation logic.
3. **Data Layer (Database):** Firebase/SQLite storing student and classroom data.

#### Workflow:

- Teacher login → Classroom creation → Student data upload → Seat generation → Save data → Student view.

#### V. SYSTEM ARCHITECTURE AND METHODOLOGY

##### A. Frontend Technologies

- **HTML (Structure):** Defines skeleton of login pages, dashboards, classroom setup forms, and student seat-checking interfaces.
- **CSS (Design & UI):** Enhances layout with card designs, bench-style seating grids, and responsive spacing.
- **JavaScript (Logic):** Implements authentication, CSV file handling, student management, seat allocation algorithms, and dynamic layout generation.

##### B. Data Storage

- **LocalStorage:** Stores classrooms, student lists, seating layouts, and seat mappings directly in the browser.
- **Advantages:** Offline functionality, no server required.
- **Limitations:** Data remains only on the same device.

##### C. File Input System

- **CSV Uploads:** Enables bulk student entry with attributes such as roll number, name, division, class, and department.

##### D. Hosting Technology

- **GitHub Pages:** Provides free hosting and a public URL for deployment.

##### E. APK Conversion

- **PWA Builder:** Wraps the hosted web app into an Android WebView, generating an installable APK.



F. Progressive Web App (PWA) Features

- **Manifest.json:** Defines app metadata such as name, icon, theme, and start page.
- **Service Worker:** Handles offline caching and background loading.

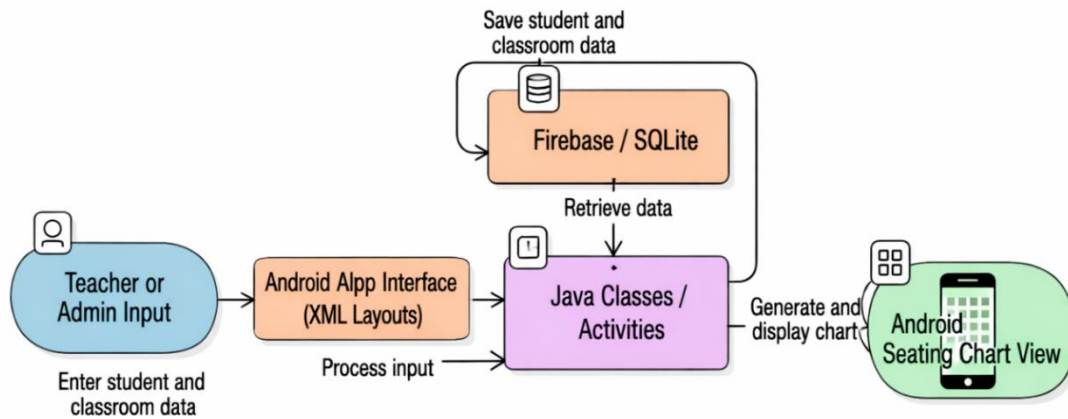
G. Seating Algorithm

Steps:

1. Load student data.
2. Sort by shuffle or roll number.
3. Apply rules (same/different department/class).
4. Assign seats row by row.
5. Map roll numbers to seat positions.
6. Store mapping in LocalStorage.

Although the system was implemented using web technologies (HTML, CSS, JavaScript, LocalStorage) and deployed as an Android APK via PWABuilder, the conceptual architecture is illustrated in Fig. 1 using Android components to highlight the intended mobile workflow.

Fig. 1: Flowchart of Smart Exam Seat Allocation System (Android).



Teacher/Admin input is processed through the mobile app interface (XML layouts), stored in Firestore/SQLite, and handled by Java classes/activities to generate the seating chart output for students.

Table II. Technology Stack Summary

Layer	Technology Used	Purpose
Structure	HTML	Defines UI skeleton
Design	CSS	Classroom layout & styling
Logic	JavaScript	Authentication, seat allocation



Layer	Technology Used	Purpose
Storage	LocalStorage	Persistent browser data
Input	CSV + FileReader API	Bulk student upload
Hosting	GitHub Pages	Free online deployment
APK Conversion	PWABuilder	Web app → Android APK
PWA Features	Manifest + Service Worker	Offline caching, app-like behavior

## VI. FEATURES

- Mobile-based seat allocation.
- CSV upload and manual student entry.
- Shuffle/roll number wise seat generation.
- Student view with highlighted seat position.
- Real-time output and reusable data storage.
- Multi-classroom support.

## VII. MODULE DESCRIPTION

1. **Authentication Module** – Secure login for teachers.
2. **Classroom Management Module** – Room creation with rows/columns.
3. **Student Data Module** – Upload or manually enter student details.
4. **Seat Allocation Module** – Algorithm ensures fairness and spacing.
5. **Student View Module** – Roll number input shows assigned seat.
6. **Dashboard Module** – Teacher overview of classrooms and seating charts.

## VIII. SYSTEM DESIGN

- **Design Principles:** Separation of concerns, scalability, maintainability.
- **Database Entities:** Students, Classrooms, Seats.
- **Relationships:** One classroom → many seats; one student → one seat.
- **UI Considerations:** Simple navigation, responsive design, clear seat visualization.



### IX. ADVANTAGES

- Saves time and effort.
- Reduces human error.
- Improves fairness and transparency.
- Portable and accessible via Android devices.
- Scalable for multiple classrooms.

### X. LIMITATIONS

- Requires internet access for Firebase.
- Limited customization of seating rules.
- Initial deployment restricted to institutional use.

### XI. FUTURE SCOPE

- AI-based seat optimization.
- Integration with exam timetables.
- Cloud deployment for scalability.
- Multi-institution support.
- Real-time notifications for students.

### XII. CONCLUSION

The Smart Exam Seat Allocation System demonstrates how Android applications can transform traditional exam management. By automating seat allocation, the system improves efficiency, fairness, and usability. With further enhancements, it can evolve into a comprehensive solution for educational institutions.

### XIII. SCREENSHOTS OF THE PROPOSED SYSTEM

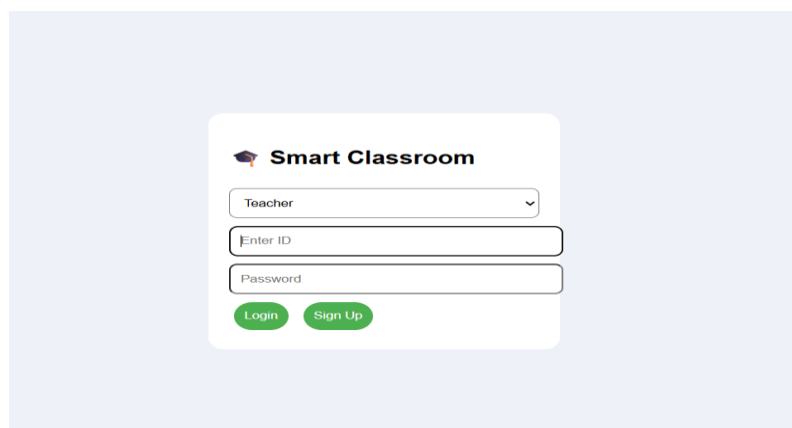


Fig 2: Login Page

Secure login screen for teachers and administrators. Students can directly check their seat allocation without login credentials.



The form is titled "Manual Entry" and contains five text input fields: "Name", "Roll No", "Class", "Division", and "Department". Below the fields are two green buttons: "Add Student" and "Next →".

Fig 3: Classroom Creation Form

Form interface for defining classroom structure. Teachers enter room number, rows, and columns to generate seating capacity.

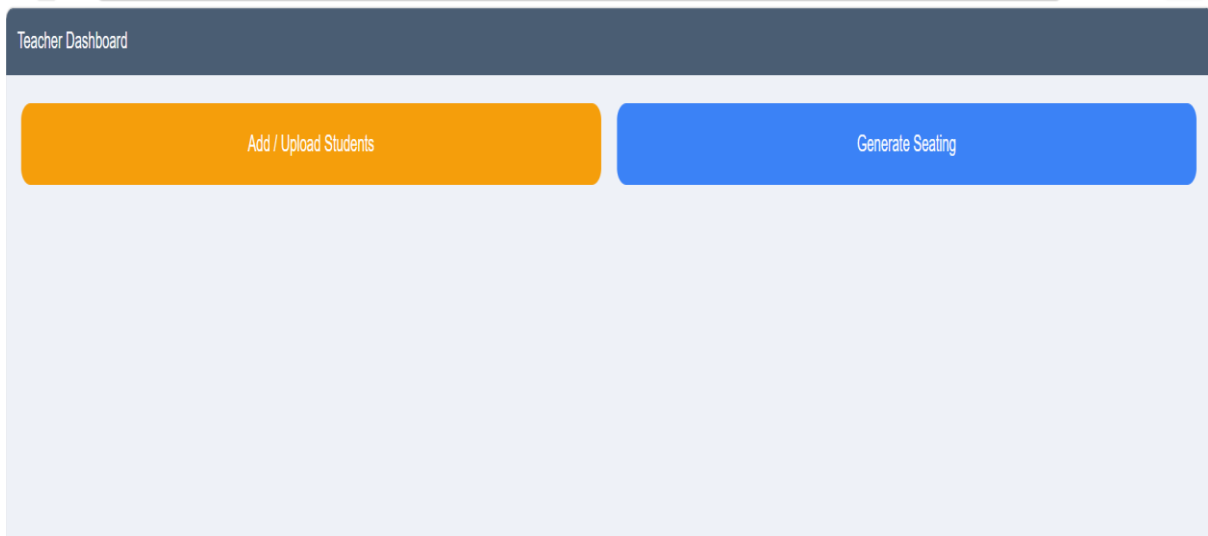


Fig 4: Teacher Dashboard

Dashboard view showing classroom overview and seating charts. Provides administrators with quick access to student distribution and seat allocation status.



Fig 5: Student Upload Interface

Interface for uploading student data in bulk using CSV files. Supports attributes such as roll number, name, division, and department.

Fig 6: Classroom Layout

Visual representation of the seating arrangement. Displays desk positions row by row with assigned student IDs for clarity.



Fig 7: Seating Chart Output

Final seating chart displayed on the student’s mobile screen. Shows the assigned seat location (row and column) with highlighted seat position.

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