



HOSTEL ADMINISTRATION AND STUDENT ACCOMMODATION MANAGEMENT PORTAL

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ABSTRACT:

The **Hostel Administration and Student Accommodation Management Portal** is a web-based system designed to streamline hostel operations and improve the student accommodation experience. Built using the **MERN stack (MongoDB, Express.js, React, and Node.js)**, this platform offers an **efficient, secure, and user-friendly** solution for managing hostel facilities, student allocations, and administrative tasks. Traditional hostel management systems often rely on manual processes, leading to inefficiencies, data mismanagement, and communication gaps. This portal **digitizes** key aspects of hostel administration, including **student registration, room allocation, fee management, complaint tracking, and security monitoring**. Through an interactive dashboard, hostel administrators can easily manage room availability, track student check-ins and check-outs, and handle maintenance requests. Students can register online, apply for accommodation, make payments, and raise concerns seamlessly through the system. A key feature of this platform is its **automation and real-time data management**, allowing for instant updates on room occupancy, fee transactions, and complaint resolution. The integration of **online payment gateways** ensures a hassle-free and transparent fee management system. Additionally, built-in **notifications and alerts** keep students informed about important announcements, payment deadlines, and maintenance schedules.

The **use of the MERN stack** enables a highly scalable and responsive system, ensuring a smooth user experience. **MongoDB** serves as a robust database for managing student and hostel records, while **Express.js and Node.js** handle backend processing efficiently. **React.js** provides an intuitive frontend, making navigation seamless for both students and administrators.

Keywords-Hostel Management, MERN Stack, Student Accommodation, Online Room Allocation, Fee Management, Attendance Tracking, Complaint Handling, Visitor Management, Mess Subscription.

1. INTRODUCTION:

Efficient hostel administration is crucial for educational institutions, ensuring smooth operations related to student accommodation, fee management, complaint handling, and security. Traditional hostel management relies on manual processes, leading to inefficiencies such as delayed room allocation, errors in fee tracking, and lack of a centralized complaint system. These challenges highlight the need for an automated and scalable solution.

This project introduces a **Hostel Administration and Student Accommodation Management Portal**, designed to **digitize and streamline hostel operations** using the **MERN stack** (MongoDB, React, Express.js, Node.js). The system replaces conventional methods with an integrated, **cloud-based platform** that provides **real-time room allocation, automated fee collection, complaint resolution tracking, attendance monitoring, visitor logging, and mess subscription management**.

A key feature of the system is **role-based access control**, where students, administrators, and security personnel have designated permissions. Students can easily register, apply for rooms, pay fees online, submit complaints, and manage their mess subscriptions through a user-friendly interface. Administrators can allocate rooms efficiently, monitor hostel occupancy, handle fee transactions, and track student attendance in real time. Security personnel can maintain visitor logs, enhancing hostel security and access control.

The system is built with **scalability and efficiency in mind**, ensuring that institutions can handle a large number of students and dynamic hostel requirements. **Data security and user authentication** are prioritized through encryption and secure login mechanisms. With features like **automated notifications, real-time analytics, and cloud storage**, the portal enhances administrative efficiency and student satisfaction. By replacing outdated manual processes with a **modern digital solution**, this system ensures **transparency, efficiency, and accuracy** in hostel management. Future advancements will include AI-based room allocation, IoT-based attendance monitoring, and predictive analytics for resource optimization.



2. LITERATURE SURVEY:

Bansal & Sharma (2021) explored how **cloud computing** enhances hostel management by improving efficiency, scalability, and accessibility. Their study highlights features like **automated room assignment, online fee payments, attendance tracking, and digital complaint resolution**, ensuring better resource management and communication.

Gupta & Kumar (2020) proposed an **AI and IoT-based hostel management system**, integrating **biometric attendance, smart sensors, AI-driven room allocation, and chatbot assistance**. Their approach improves **security, energy management, and real-time monitoring**, reducing manual intervention.

One key aspect of hostel management is **room allocation optimization**. Traditional methods allocate rooms based on first-come, first-served policies, often leading to dissatisfaction among students. Recent studies explore **AI-driven allocation models** that consider student preferences, room availability, and facility constraints. Mishra et al. (2023) proposed a **machine-learning-based room allocation system** that achieved a **30% improvement in space utilization** compared to conventional methods.

Singh & Mehta (2019) developed a **facial recognition-based attendance system** for hostel security. Using **deep learning algorithms and high-resolution cameras**, their system ensures **contactless, secure access**, reducing identity fraud and improving efficiency.

Patel & Agarwal (2020) presented an **AI-based intrusion detection system** leveraging **computer vision and motion sensors** to identify unauthorized access. Their study demonstrates **enhanced security, reduced false alarms, and improved response times** in hostel environments.

Based on the above research, the proposed **Hostel Administration and Student Accommodation Management Portal** integrates these advanced features, ensuring **efficiency, security, and scalability**.

3. METHODOLOGY:

The Hostel Administration and Student Accommodation Management Portal is designed to automate and streamline hostel management processes, ensuring efficient room allocation, fee management, security, attendance tracking, complaint resolution, and mess subscription management. The MREN stack—MongoDB, React, Express.js, and Node.js—is used to build the system, which makes use of cloud computing, real-time data processing, and secure authentication methods.

3.1 System Architecture

The architecture of the system consists of the following **three main layers**:

3.1.1 Frontend (Client-side) – React.js:

- Provides an **interactive user interface** for students, administrators, and security personnel.
- Uses **Redux** for state management and **Axios** for API calls.
- Implements **responsive design** for accessibility on **both web and mobile devices**.

3.1.2 Backend (Server-side) – Node.js & Express.js:

- Manages **API endpoints** and business logic.
- Uses **JWT-based authentication** for secure access control.
- Handles **real-time operations** such as complaint tracking and visitor logging.

3.1.3 Database – MongoDB:

- Stores **student records, room allocation details, fee transactions, complaints, attendance logs, and mess subscriptions**.
- Uses **NoSQL schema flexibility** for dynamic data management.

3.2 Functional Modules

3.2.1 Student Registration and Profile Management:

- New students can **register online** by submitting personal details, academic information, and required hostel documents.
- A **profile dashboard** allows students to view and update their information.
- **OAuth-based authentication (Google/Microsoft login)** ensures secure access.

3.2.2 Room Allocation System:

- Admins allocate rooms based on **availability, student preferences, and predefined rules**.
- **AI-based room allocation (future enhancement)** can optimize space utilization based on **batch**,

gender, course, and special preferences.

3.2.3 Fee Management System:

- Supports **multiple payment options** (UPI, Net Banking, Credit/Debit Cards, and Wallets).
- **Automated invoice generation** and email/SMS reminders for pending payments.
- Students can track **payment history and upcoming due dates**.
- **Admin dashboard** provides insights into **total revenue, pending dues, and financial reports**.

3.2.4 Complaint Management System:

- Students can **file complaints online**, categorized into **room maintenance, electricity issues, water supply, WiFi problems, and security concerns**.
- The system **assigns complaints to the relevant department** automatically.
- **Status tracking and real-time notifications** keep students informed about complaint resolution progress.

3.2.5 Attendance and Security Management:

- Uses **RFID-based smart ID cards or QR-code scanning** for student attendance tracking.
- Security personnel can **log visitor details** with **photo and ID verification**.
- **Real-time alerts for unauthorized access attempts** enhance security.

3.2.6 Mess Subscription and Management:

- Students can **subscribe, modify, or cancel mess plans online**.
- A **dynamic meal booking system** allows students to select meals based on availability, reducing **food wastage**.
- Integration with **mess staff dashboard** ensures **real-time meal counts and inventory updates**.

3.2.7 Notification and Alerts System:

- **Push notifications, SMS, and emails** for **fee reminders, complaint updates, room allocation**.
- **Emergency notifications** (fire alarms, security breaches) sent in real time to students and admins.

3.3 Technology Stack

The **MREN stack** is chosen for its **scalability, efficiency, and performance**.

Component	Technology Used
Frontend	React.js, Redux, Bootstrap, Material-UI
Backend	Node.js, Express.js
Database	MongoDB (NoSQL)
Authentication	JWT (JSON Web Tokens), OAuth (Google Login)
Hosting & deployment	AWS, Firebase, Vercel, DigitalOcean
API testing	Postman

Table 1: tools and technology used

3.3.1 DFD Diagram

A **Hostel Administration and Student Accommodation Management Portal** is a digital platform designed to streamline the management of hostel facilities, student accommodations, and related administrative tasks. It ensures efficient handling of student registrations, room allocations, fee payments, complaint management, and overall hostel supervision.

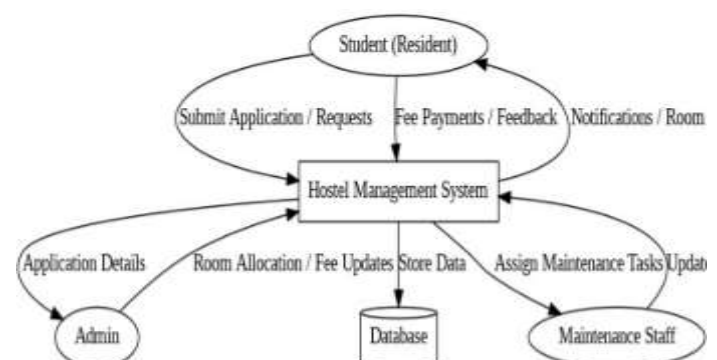


Fig 1: DFD diagram



3.3.2 Flow Diagram

The flowchart outlines the workflow for a thermal imaging analysis system based on first-order statistical feature extraction. Here's a detailed explanation of each step:

The process begins when the system is initiated. The goal is to extract meaningful statistical features from thermal images to analyze temperature variations

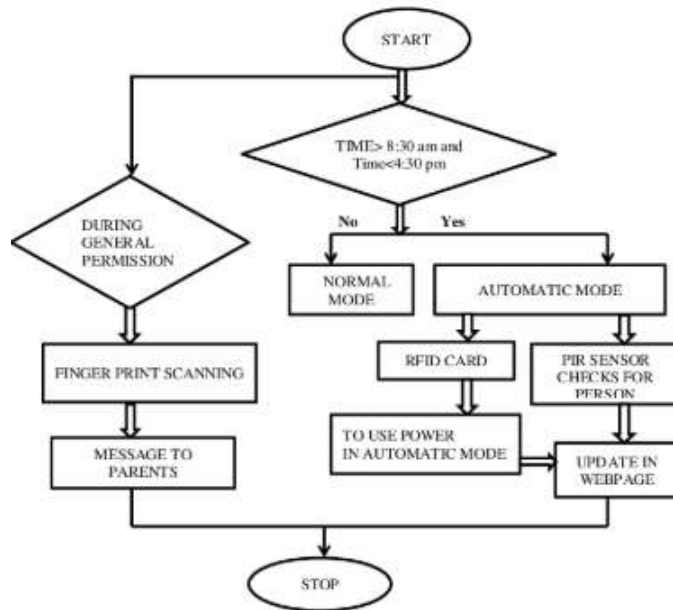


Fig 2: Flow Chart

The given **flowchart** represents a **student attendance and monitoring system** based on time and authentication methods. It ensures security and automated updates based on different conditions. Here's a step-by-step explanation:

1. Start – The system begins its operation.

2. Time Check (8:30 AM - 4:30 PM) – The system checks whether the current time falls within this range.

- a. **If No:** The system operates in **Normal Mode**, where no automatic monitoring occurs.
- b. **If Yes:** The system enters **Automatic Mode**, allowing automated processes to manage attendance and security.

3. Automatic Mode Process:

- a. Students must use an **RFID card** to verify their identity.

- b. Once verified, **PIR (Passive Infrared) sensors** check for a person's presence, ensuring an authorized entry.
- c. The system then updates the student's entry details in the **webpage/database** for records.
- d. Power management is controlled efficiently in **Automatic Mode**, ensuring optimized energy use.

3.4 System workflow:

3.4.1 User Authentication:

- Students, admins, and security staff log in with **secure credentials**.
- Authentication handled via **JWT tokens** and **OAuth integration**.

3.4.2 Room Allocation Process:

- Admin assigns available rooms to students.
- Students receive **instant room confirmation notifications**.
- Students can **request a room change** if needed.

3.4.3 Fee Payment and Tracking:

- Students pay **hostel and mess fees** through an **integrated payment gateway**.
- Payment receipts are generated automatically.
- Admins track fee collections** via the dashboard.

3.4.4 Complaint Handling:

- Students submit complaints through the portal.
- Admins assign complaints to the respective **maintenance teams**.
- The system provides **progress tracking and resolution status updates**.

3.4.5 Attendance & Security:

- Students scan **RFID cards** or use **QR codes** at entry points.
- Visitors register through the **visitor logging system**.
- Security personnel monitor **entry/exit logs** in real time.

3.4.6 Mess Subscription & Meal Selection:



- Students choose **weekly or monthly meal plans**.
- Mess staff receive **live updates on meal bookings**.
- AI-based **meal preference analysis (future enhancement)** optimizes **food preparation**.

3.5 Data Management & Security Measures:

3.5.1 Data Storage & Backup

- **MongoDB Atlas** for cloud-based data storage with **auto-scaling**.
- **Daily backups** ensure data recovery in case of system failures.

3.5.2 Security Implementation:

- **Password hashing** using **Bcrypt.js** for secure user authentication.
- **SSL/TLS encryption** to protect data during transmission.
- **Role-based access control (RBAC)** restricts data access.

3.5.3 Scalability & Performance Optimization:

- **Load balancing** and **caching mechanisms** improve response times.
- **Asynchronous operations** ensure **fast API responses**.
- **Optimized database indexing** enhances query performance.

3.6 Future Enhancements:

3.6.1 AI-Driven Room Allocation:

- Machine learning algorithms optimize **room assignments based on preferences, past occupancy trends, and availability**.

3.6.2 IoT-Based Attendance Monitoring:

- **Smart cameras & facial recognition** for **automated attendance marking**.

3.6.3 Chatbot for Instant Queries:

- AI-powered **chatbot** for **resolving student queries in real-time**.

3.6.4 Predictive Analytics for Resource Management:

- AI-based **analysis of student movement patterns** for **efficient resource planning**.

4. Conclusion

We have developed an application to predict the closing stock price of any given organization using an LSTM algorithm integrated with XGBoost. We have utilized datasets from Google and Microsoft and achieved over 95% accuracy for these datasets. In the future, we plan to expand this application to predict cryptocurrency trading and also incorporate sentiment analysis for improved predictions.

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