



Project Proposal: Smart Hostel System

Project Title:

Smart Hostel System: A Real-Time Resident and Facility Management System

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Submitted To:

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Project Overview:

Currently at IST, hostel registrations and management are handled manually through paperwork, leading to inefficiencies, data loss risks, and difficulty in tracking student accommodations across the three hostels. To modernize and streamline the process, we propose building a "Smart Hostel Management System," a web-based application that digitizes the complete hostel registration, booking, complaint handling, and management process.

The system will also integrate Artificial Intelligence (AI) to assist the administration with room recommendations based on student preferences and automate the classification of maintenance complaints, helping hostel administrators work more efficiently.

There will be two separate portals:

- **Student Portal:** For registration, booking, payments, and filing complaints.
- **Admin Portal:** For managing applications, allocating rooms (with AI recommendations), handling complaints, and overall hostel management.

At the start of each semester, a new cycle of student data collection will be initiated. Students will be required to fill out fresh registration forms for hostel accommodation, ensuring that the system stays updated with current student information.

Core Features:

Student Portal:

- Online Registration: Students can apply for hostel accommodation digitally at the start of every semester.
- Room Booking Requests: Students can request room bookings.
- Payment Management: Track hostel fees, deposits, and automate invoice generation.
- Complaint Management: Students can file maintenance complaints online.
- Profile Management: Students can update personal and emergency contact information.
- Visitor Management: Pre-register visitors for security purposes.
- Booking History: Students can view past booking history.

Admin Portal:

- Application Approval: Admins can approve or reject student hostel applications.
- AI-based Room Recommendation: Suggests optimal rooms for student allocation (admin-side only).
- Room Allocation Management: Manual override and management of room bookings.
- Complaint Classification and Handling: Automated categorization of complaints (e.g., electrical, plumbing) using Natural Language Processing (NLP).
- Hostel Fee Management: View and track payments.
- Vacant Room Dashboard: Easily view and manage unoccupied rooms.
- Admin Statistics Panel: Show counts like "Rooms Occupied", "Pending Complaints", etc.
- Email Notifications: Send automatic email alerts to students regarding booking confirmations, payment reminders, and complaint status updates.

Technologies to Be Used:

| Layer | Technology |

- Frontend | React.js, Angular, Next JS etc
- Backend | Python FAST API / Django (Node.js alternative if needed)
- Database | MySQL / PostgreSQL / MongoDB / Supabase / Firebase
- AI/Machine Learning | Python (Scikit-learn, SpaCy) |
- Deployment | Local Server or Render/Vercel (if online deployment is needed)

Special Note:

Given that IST has three hostels, the system will include:

- Separate data management for hostel-II.
- Hostel-specific room allocation, fee structures, and complaint tracking
- Admin access differentiated based on hostel authority (if needed)
- Semester-based reset and new registration cycle to capture updated student information every term

Limitation:

- **Time Constraints:** Limited time may prevent completing all phases, especially AI integration and testing, and deployment might be restricted to a local environment.
- **Access to Real Data:** Lack of access to real student data may require using dummy data, affecting feature accuracy like room allocation and fee management.

Conclusion:

This project will help IST transition from outdated manual hostel management to a modern, digital, and AI-enhanced system, improving operational efficiency, transparency, and the student experience. It will also showcase practical skills in database design, web development, and AI/ML integration, making it an ideal semester project.