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DEPARTMENT OF COMPUTER ENGINEERING

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Project Stage-I

Presentation on

"HostelHQ: An Intelligent Hostel Management System"

Presented By: G-14

S.N.	Name of the student	Roll No
1.	Sanjana Kamlesh Kusalkar	B21067
2.	Suyash Sanjay Kadam	B22014
3.	Anushka Ajay Kamble	B22017
4.	Devika Anil Patil	B22060

Guided By:

Prof. Dhanashri Londhe

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INTRODUCTION

HostelHQ is a web-based hostel management system built using Django to replace outdated manual processes with a modern, centralized digital platform. It streamlines essential operations such as student management, room allocation, payments, attendance tracking, and complaint handling. The system is divided into three modules—Manager, Warden, and Student—each offering role-based access and tailored dashboards for smooth workflow. Managers oversee the entire system, wardens handle day-to-day hostel activities, and students get easy access to their information and services. By bringing all functionalities onto one platform, HostelHQ ensures better coordination, reduces administrative workload, and minimizes errors.

OBJECTIVE

- **To automate hostel processes** such as registration, room allotment, and fee tracking.
- **To digitally track complaints** for better safety and management.
- **To improve transparency and efficiency** in hostel operations.
- **To Provide role-based access** for **admins, wardens, and students**.
- **To enable centralized monitoring** and reduce dependency on manual paperwork.
- **To implement AI chatbot** that will work as an assistant for users.

PROBLEM STATEMENT

To overcome the limitations of traditional hostel management systems, a modern and scalable platform is needed—one that does more than basic registration, room allotment, and fee tracking. Current systems often lack strong analytics, mobile access, multi-hostel management, efficient complaint handling, and smooth communication, leading to delays and poor transparency. To resolve these gaps, the proposed system offers an integrated, user-friendly platform with automation, real-time monitoring, structured data management, and chatbot-assisted support, ultimately improving hostel administration and enhancing the student experience.

MOTIVATION

To overcome delays and communication gaps, real-time updates and a centralized information flow are necessary for smooth operations. To ensure data security, research highlights the growing need for secure role-based access in modern hostel environments. To improve accountability and reduce workload, studies emphasize digital attendance tracking and automation, which together enhance transparency and overall hostel management efficiency.

LITERATURE REVIEW

Publisher	Author	Year	Name of the paper	Objective	Methodology	Limitation
International Journal for Research in Applied Science & Engineering Technology (IJRASET).	Prof. Deepali Narkhede, Rutuja Bamgude, Mayuri Sonawane, Mandar Shevade.	2022	Hostel Management System (HMS)	To automate hostel operations and replace manual processes by managing rooms, rent, payments, and student records efficiently.	The system was developed using SDLC, requirement analysis, UML diagrams, and implementation with PHP, MySQL, HTML, CSS, and JavaScript on XAMPP.	Limited security, no mobile support, basic automation, technology dependency on PHP/XAMPP, and no cloud scalability.
IEEE – 2022 Fourth International Conference on Emerging Research in Electronics, Computer Science and Technology (ICERECT)	Shashank Bhardwaj, Venkadeshwarn K, Meraj Farheen Ansari	2022	Hybrid Technology Based Smart Hostel Management System Using Artificial Intelligence and Internet of Things	To identify challenges in hostel management and propose a smart, AI and IoT-based framework that improves efficiency, safety, and user satisfaction.	The study used surveys of hostel residents to find issues, then designed a modular smart system with AI and IoT integration.	Most existing systems focus only on data administration, ignoring students' real needs.

LITERATURE REVIEW

IEEE – 2022 1st International Conference on Computational Science and Technology (ICCST).	Harina P, Kavya K K, Sharmikha Sree R, Meera S.	2022	Hostel Management	To automate hostel processes and replace manual management with a reliable, GUI-based online system.	Developed a modular web application (admin, student, dashboard, database) using PHP, MySQL, ReactJS, AJAX.	Limited to basic hostel operations, lacks advanced features like AI integration, mobile support, and multi-hostel scalability.
IEEE, in the 2023 3rd International Conference on Mobile Networks and Wireless Communications (ICMNWC)	Chua Tien Chye, Siti Azreena Mubin	2023	APResidence: Development of Online Student Accommodation Management System for Asia Pacific University	To design an online accommodation management system that addresses inefficiencies of manual processes at Asia Pacific University	The system was developed using data from questionnaires and interviews with tenants and staff, and implemented with Angular, PHP, MySQL, and QR code integration.	Manual processes in the current system cause inefficiencies, errors, and lack proper automation in room allocation, payment, and tenant management.
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)	Prof. G. L. Borhade, Bagul Lalita, Dagale Sonali	2023	Smart Energy Management and Overload Control of Hostel Management using IoT	To design an IoT-based system that monitors hostel room energy use, prevents overloads, and reduces wastage.	The system integrates IoT smart meters, current sensors, PIC microcontroller, GSM/Wi-Fi modules, and an LCD/web app to monitor and control power consumption.	The system requires higher initial cost compared to conventional methods and depends on proper IoT setup.

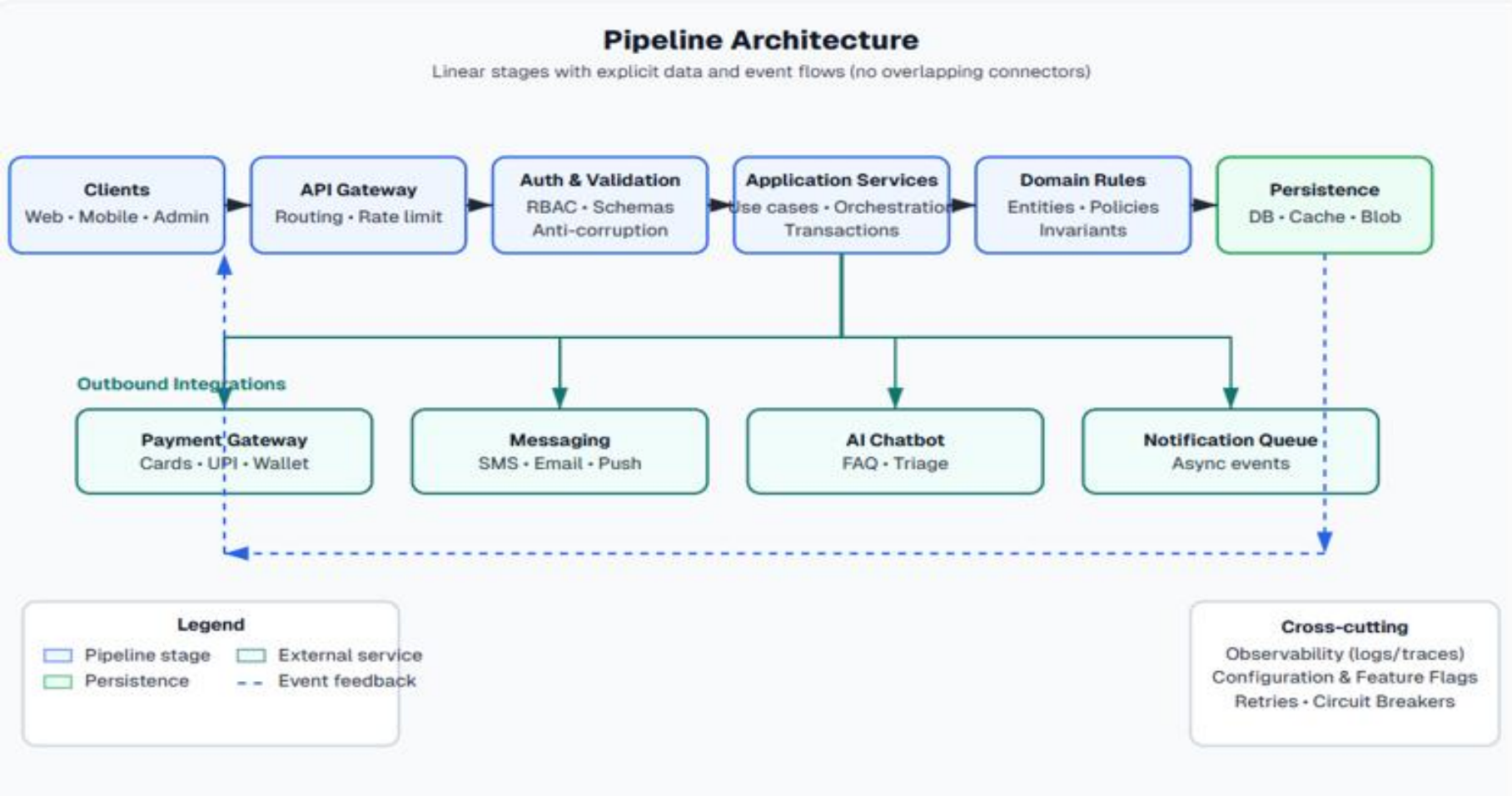
LITERATURE REVIEW

International Journal of Innovative Science and Research Technology (IJISRT)	Akorede M. Diyaolu, Omolara B. Abodunrin, Abdullateef A. Adedamola	2024	Development of an E-Based Hostel Management System	To design and implement an efficient e-based hostel management system that replaces the manual paper-based system, automates hostel allocation.	Reviewed the manual hostel management process, identified its challenges, then designed and implemented an online system to automate room allocation, booking, and record management for improved efficiency.	Existing/manual systems suffered from limited functionality, weak security, inefficiency, poor UI, lack of integration, and compatibility issues.
International Research Journal of Modernization in Engineering, Technology and Science (IRJMETS)	V. R. Sugumaran, G. Abishek Singh, B. Joseph, Ruben Kevin	2024	Smart Hostel Authentication System Using Android	To create an Android-based hostel authentication system that records student in/out timings and alerts parents for security.	The system was built using MIT App Inventor to develop an Android app with login, registration, admin control, and automated alerts.	This systems faced issues like low security, redundancy, and difficulty in updating data.
IEEE – 2025 3rd International Conference on Communication, Security, and Artificial Intelligence (ICCSAI).	Siddharth Kumar Yadav, Ujjwal Tyagi, Neha Singh.	2025	Smart Hostel Booking System for Efficient Room Allocation and Management	To create an online hostel marketplace integrating AI, geolocation and VR, for efficient booking and management.	Designed a three-tier architecture with web technologies, AI chatbots, Google Maps API, VR tours, and secure MySQL database.	Scalability, post-booking interaction, and long-term adoption challenges were identified for future work.

LITERATURE REVIEW

British Journal of Computer, Networking and Information Technology.	Eweoya Ibukun, Awoniyi Amos, Adeniyi Oluwabamise, Okesola Kikelomo, Udosen Alfred, Adigun Taiwo, Fatade Oluwayemisi, Amusa Afolarin.	2025	Development of Web-Based Hostel Management System	To create a web-based hostel management system that improves efficiency, transparency, and room allocation in educational institutions.	The study uses the incremental software development model and builds the system using ASP.NET Core, SQL Server, and ReactJS.	The system faces limitations such as security challenges, limited scalability, and incomplete integration of some features like maintenance tracking.
arXiv	Riddhi Heda, Sidhant Singh, Umair Yasir, Tanmay Jaiswal	2025	DHMS: A Digital Hostel Management System Integrating Campus ChatBot, Predictive Intelligence, and Real-Time Automation.	To create a modular digital hostel management platform that streamlines room allotment, complaints, gate passes, and communication using AI and automation.	The system was designed using MERN stack, AWS Lex chatbot, predictive analytics, sentiment analysis, and anomaly detection for real-time and intelligent hostel management.	The prototype still needs large-scale integration testing, ERP connectivity, and multilingual/ biometric support before full deployment.

PROPOSED SYSTEM'S ARCHITECTURE:



ALGORITHMS/METHODOLOGY:

Student Side Algorithm

1. Student registers with personal, academic, and guardian details, which are validated and stored.
2. Student logs in using secure credentials with multi-factor authentication.
3. Student requests or books a room; system checks availability and allocates dynamically.
4. Student makes payment via gateway; system updates billing, mess, and utility records.
5. Student submits complaints/feedback with proof.
6. Student receives push notifications for fees, announcements, and complaint updates.
7. Student interacts with AI chatbot or voice assistant for queries and guidance.
8. Student logs out securely; session auto-expires for safety.

ALGORITHMS/METHODOLOGY:

Warden Side Algorithm

1. Warden logs in securely using verified credentials.
2. Warden views and updates student information stored in the database.
3. Warden checks room availability and allocates rooms to students based on simple availability logic.
4. Warden reviews student room requests and processes them according to current occupancy and hostel rules.
5. Warden reviews student complaints, assigns them to the appropriate staff, and updates the status.
6. Warden sends digital announcements, notices, and mess menu updates to all assigned students.
7. Warden monitors occupancy, fee status, and complaint patterns through the dashboard.
8. Warden logs out securely, and the system saves all updates and actions.

ALGORITHMS/METHODOLOGY:

Manager Side Algorithm

1. Manager logs in securely using multi-factor authentication.
2. Accesses a unified dashboard showing hostels under their management.
3. Adds, edits, or removes hostel details including capacity, facilities, and warden assignments.
4. Views consolidated student, staff, and warden data across multiple hostels.
5. Manager monitors real-time payment status and identifies fee defaulters.
6. Reviews analytics on hostel performance, resource usage, and satisfaction trends.
7. Manager manages system-level chatbot settings and general information updates. Compares performance of multiple hostels using predictive analytics dashboards.
8. Logs out securely.

HARDWARE AND SOFTWARE REQUIREMENTS:

- **Software Requirements**

1. Operating System: Windows 10/11, Linux, or macOS.

2. Frontend Development: HTML, CSS, JavaScript (ReactJS optional).

3. Backend Development: Python with Django framework.

4. Database: MySQL or SQLite

6. IDE/Code Editor: VS Code, PyCharm, or Sublime Text.

7. Browser: Latest versions of Chrome, Firefox, or Edge for testing.

8. AI Integration: API Integration of Gemini AI

HARDWARE AND SOFTWARE REQUIREMENTS:

- **Hardware Requirements**

1. Processor: Intel i3 or equivalent (minimum), Intel i5 or higher (recommended).

2. RAM: Minimum 8 GB, 16 GB recommended for smooth development and testing.

3. Storage: At least 256 GB HDD/SSD, SSD recommended for faster performance.

4. Internet Connection:Stable connection for API calls and deployment testing.

COMPARISON WITH EXISTING SYSTEMS :

Feature	Existing Systems	HostelHQ
Room Allocation	Manual allocation or basic automated tools	Smart, automated room allocation with centralized control
Fee Management	Basic fee tracking; often requires manual updates	Automated fee tracking with online payment integration (future scope)
User Roles	Limited role-based dashboards (Admin, Warden, Student)	Role-based access for students, wardens, and administrators with clear separation of tasks
Analytics and Insights	Little to no advanced analytics; mostly record-keeping	AI-powered analytics dashboard for predictive insights (room demand, fee defaults, complaint patterns)
Complaint Handling	Either manual (register book) or standalone complaint systems	Digital complaint handling with real-time tracking and updates

EXPECTED OUTCOMES:

- **Centralized Hostel Management**: HostelHQ will provide a single platform where multiple hostels can register, manage their rooms, student data, and facilities efficiently.
- **User-Friendly Interface**: Students and hostel managers will have an intuitive and easy-to-use interface to interact with the system.
- **AI-Enabled Assistance**: Integration of an AI chatbot will allow instant query resolution for students and staff, improving communication and support.Secure
- **Data Handling**: Sensitive information such as student details, payments, and hostel records will be securely stored and accessed, ensuring privacy and data protection.
- **Scalable & Multi-Hostel Support**: The platform will support multiple hostels simultaneously, making it scalable for larger networks or future expansion.Improved
- **Efficiency & Organization**: Overall, HostelHQ will reduce manual paperwork, minimize errors, and streamline hostel operations, saving time and effort for both staff and students.

APPLICATIONS:

- **Educational Institutions**: Manage student hostels in schools, colleges, and universities efficiently.
- **Multi-Institution Management**: Scalable system for managing multiple hostels under one platform.
- **Complaint Tracking**: Digital platform for students to raise and track complaints with faster resolution.
- **Fee and Room Management**: Simplifies fee payment tracking and room allotment processes.
- **Mobile Accessibility**: Provides students and staff with real-time updates through a mobile app.
- **Smart Facility Integration**: Future-ready integration with IoT for energy usage monitoring and access control.
- **Data Analytics**: AI-powered dashboard helps administrators gain insights into hostel trends and make better decisions.

CONCLUSION:

In conclusion, HostelHQ is designed to transform the way hostels are managed, making the entire experience smoother and more reliable for students, wardens, and administrators. By bringing everything together on one platform, it removes barriers, improves communication, and saves valuable time. More than just a system, it is a step toward creating smarter, more connected, and student-friendly hostels. With HostelHQ, hostel management becomes not just easier, but truly empowering for everyone involved.

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Thank You....!!!!