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Smart Complaint Management System for College

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ABSTRACT

In many colleges, students often face difficulties in reporting issues such as electricity failures, Wi-Fi problems, classroom maintenance, and infrastructure complaints. Due to the absence of a centralized platform, students frequently do not know where to direct their concerns, and as a result complaints are delayed, misplaced, or ignored altogether. This paper presents the design, architecture, and implementation approach of a Smart Complaint Management System for colleges, developed to simplify and automate the complaint reporting and resolution workflow. The primary objective of the system is to provide a single digital platform through which students can register complaints, monitor their resolution status, and receive timely updates. Complaints submitted through a web-based interface are automatically categorized and routed to the concerned department electrical, IT, academic, hostel, or general maintenance eliminating the ambiguity and delay associated with manual reporting.

1. INTRODUCTION

Educational institutions house a diverse and constantly changing population of students, faculty, and administrative staff, all of whom rely on shared infrastructure and services. Given the scale and complexity of a college campus, issues ranging from electrical faults and non-functional Wi-Fi access points to classroom maintenance and academic grievances arise on a near-daily basis. Traditionally, complaint handling in colleges is carried out manually through written applications, suggestion boxes, or verbal communication with the concerned authority. This conventional process is time-consuming, lacks accountability, and offers no reliable mechanism through which a student can track the progress of a submitted complaint. In many cases, complaints get lost in administrative channels or are not taken seriously due to the absence of proper documentation and follow-up, leaving students dissatisfied and unheard.

The Smart Complaint Management System (SCMS) proposed in this paper is designed

to directly address these shortcomings by offering an efficient, reliable, and user-friendly digital platform for registering, managing, and resolving complaints. The system acts as a structured bridge between students and college administration, ensuring that every complaint is logged systematically, assigned a unique tracking identifier, and addressed within a reasonable and measurable time frame.

A key design principle of the proposed system is role-based access control. Students, department staff, and administrators each interact with a tailored view of the platform suited to their responsibilities: students submit and track complaints; department staff view and resolve complaints routed to them; and administrators oversee the entire complaint pipeline, reassign complaints where necessary, and generate analytical reports. Automated notifications keep all stakeholders informed at every stage of the complaint lifecycle, from submission to acknowledgement to resolution.

2. LITERATURE REVIEW

A number of studies have explored complaint and grievance management systems across different domains, ranging from customer relationship management (CRM) in commercial organizations to grievance redressal in government and healthcare institutions. Table 1 summarizes the key contributions and limitations of related work that informed the design of the proposed system.

Table1: Literature Survey

Sr. No.	Author(s) / Year	Title / System	Methodology Used	Key Findings	Limitations
1	Smith et al. (2019)	Complaint Management Systems in Organizations	CRM-based approach	Improved customer satisfaction and service quality	Not focused on educational institutions
2	Kumar & Sharma (2020)	Web-Based Complaint Management System	Web application using centralized database	Enables online complaint tracking and accessibility	Limited real-time notification features
3	Patel et al. (2021)	Online Grievance Redressal System	Cloud-based architecture	Faster complaint resolution and transparency	Lacks advanced analytics
4	Singh & Verma (2018)	Complaint Handling in Service Sector	Manual + semi-automated approach	Emphasizes importance of timely response	Manual processes cause delays
5	Healthcare Study (2017)	Patient Complaint Analysis System	Data analysis of complaints	Identifies service quality issues	Not suitable for college systems
6	Johnson et al. (2022)	Smart Complaint Management System	Automated categorization and tracking	Real-time tracking improves efficiency	High implementation cost
7	Lee & Park (2020)	Digital Complaint Platform	Web + mobile integrated system	User-friendly and accessible	Requires ongoing maintenance

The reviewed literature indicates a consistent trend: digitization of complaint handling improves accessibility, transparency, and resolution speed compared to manual processes. However, most existing systems are either designed for generic commercial or municipal use and are not tailored to the specific workflow of an academic institution, or they are limited in scope — lacking real-time notifications, automated department-wise routing, or analytical reporting. Furthermore, systems reviewed from Smith et al. (2019), Singh & Verma (2018), and the Healthcare Study (2017) confirm that manual or semi-automated processes consistently introduce delays and reduce accountability, reinforcing the need for a fully automated, college-specific solution such as the one proposed in this paper.

3. PROBLEM STATEMENT

Based on the review of existing literature and observation of current practices within college campuses, the following problems have been identified in traditional complaint handling mechanisms:

- Complaint handling in colleges is mostly manual or semi-manual, relying on paper forms or verbal reporting.
- Students face difficulty identifying the correct authority or department to which a complaint should be directed.
- Complaints may get lost, ignored, or delayed due to the absence of a proper tracking system.
- There is no centralized platform to manage, store, or retrieve historical complaint records.
- Students have no means of tracking the real-time status of a submitted complaint.
- There is a general lack of transparency and two-way communication between students and authorities.
- Administrative staff find it difficult to manage a large volume of complaints efficiently without a structured system.

- No fixed or enforced time frame exists for the resolution of complaints.
- The absence of real-time notifications means students are often unaware of updates to their complaints.
- There is no mechanism for data analysis to identify recurring or systemic issues on campus.

4. OBJECTIVE

The proposed system is designed with the following specific objectives:

- To develop a centralized system for managing all student complaints within a single platform.
- To provide an easy and intuitive user interface for complaint submission.
- To enable online complaint registration accessible anytime and from any location.
- To allow students to track the real-time status of their complaints.
- To ensure quick, efficient, and accountable resolution of complaints.
- To improve communication between students and college authorities.
- To provide transparency throughout the complaint handling process.
- To implement automated notifications for status updates and responses.
- To categorize complaints systematically for better organization and departmental routing.
- To maintain a secure and reliable database of all complaint records.
- To generate reports and analytics that support administrative decision-making.
- To reduce manual work, paperwork, and administrative overhead.
- To improve overall student satisfaction and the general campus environment.

5. PROPOSED SYSTEM AND ARCHITECTURE

The proposed Smart Complaint Management System is a three-tier web application comprising a presentation layer, an application/logic layer, and a data layer, as summarized below.

A. Presentation Layer

The presentation layer is a responsive web interface built using HTML, CSS, and JavaScript, accessible through any standard browser on desktop or mobile devices. It exposes distinct views for the three primary user roles: Student, Department Staff, and Administrator. Students can register, log in, submit new complaints with supporting descriptions and optional image attachments, and monitor a personal dashboard of complaint history. Administrators are presented with a consolidated view of all complaints across departments, filtering and sorting tools, and access to analytical summaries.

B. Application / Logic Layer

The application layer, implemented using Python or Node.js depending on deployment preference, handles core business logic including user authentication, complaint categorization, automatic routing of complaints to the relevant department, status-transition rules (Pending → In Progress → Resolved), and the triggering of notification events. A rule-based classification module inspects the complaint category selected by the student (e.g., electrical, IT/Wi-Fi, academic, hostel, general maintenance) and automatically forwards the complaint to the queue of the corresponding department, removing the ambiguity that exists in manual reporting.

C. Data Layer

The data layer is implemented using Supabase, a PostgreSQL-based backend-as-a-service platform that provides a managed relational database, built-in authentication, and real-time subscription capabilities. The core entities in the data model include Users (with role attributes for student, staff, or admin), Complaints (with fields for category, description, status, timestamp, and assigned department), Departments, and Notifications. Supabase's real-time subscription feature is leveraged so that status changes made by department staff or administrators are reflected instantly on the student's dashboard without requiring a page refresh, and notification triggers can be dispatched as soon as a status change is committed to the database.

D. Complaint Lifecycle

Every complaint submitted through the system progresses through a well-defined lifecycle: (1) Submission — the student fills a structured complaint form with category, description, location, and optional attachment; (2) Assignment — the system automatically routes the complaint to the relevant department based on category, generating a unique complaint ID; (3) Acknowledgement — the assigned department reviews the complaint and updates its status to "In Progress," triggering a notification to the student; (4) Resolution — once the issue is addressed, the department marks the complaint as "Resolved" and may attach resolution notes; and (5) Closure and Feedback — the student is notified of resolution and may optionally provide feedback or a satisfaction rating, which is logged for analytics purposes.

6. METHODOLOGY

The development of the proposed system followed a structured, iterative methodology to ensure the final product meets the practical needs of students and administrators:

- Requirement gathering from students and college authorities through informal surveys and discussions to identify common complaint categories and pain points in the existing manual process.
- Analysis of the existing complaint handling system to identify specific inefficiencies, bottlenecks, and gaps in accountability.
- Design of the system architecture, entity-relationship data model, and workflow diagrams describing the complaint lifecycle.
- Development of the database schema in Sup a base, including tables for users, complaints, departments, and notifications, along with appropriate foreign-key relationships and row-level security policies
- Development of the frontend and backend using web technologies, implementing core features such as authentication, complaint submission, automated routing, real-time tracking, and notifications.
- Testing of the system for functional correctness, performance under concurrent use, and security of user data, followed by iterative bug fixing.
- Deployment of the system in a representative college environment for pilot use.

CONCLUSION

The Smart Complaint Management System for College presented in this paper offers an effective and practical solution to the well-documented limitations of traditional, manual complaint handling methods. By providing a centralized, user-friendly, and efficient platform, the system enables students to register complaints with ease and allows college authorities to manage and resolve them in a systematic, accountable manner. The incorporation of online complaint submission, automated department-wise routing, real-time status tracking, and automated notifications collectively improves transparency, reduces resolution delays, and strengthens communication between students and administration. Furthermore, the centralized record-keeping and reporting capabilities of the system support long-term, data-driven decision-making by identifying recurring issues across campus infrastructure. Overall, the proposed system not only simplifies and modernizes the complaint management process but also contributes meaningfully to improved student satisfaction and a more responsive, well-managed campus environment. Future enhancements such as mobile application support, AI-based complaint classification, and ERP integration have the potential to further extend the system's impact and scalability.

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