Grievance redressal system for educational institution

Asha S Manek, Shalini KV, Kritik Munot, Sri Harsha T, Bindhu Monika, Shivalingayya

Department of Artificial Intelligence and Machine Learning, T. John Institute of Technology, Bangalore, India

Abstract—This paper focuses on developing a web-based college grievance and feedback management system to replace the existing manual and time-consuming complaint process. The proposed system enables students, faculty, and staff to file, track, and manage complaints efficiently through a user-friendly interface. It is built using three main components: a JSON database for secure complaint storage and retrieval, a backend developed with Node.js and Flask to handle the logic, and a frontend using HTML and CSS for accessibility and ease of use. Key features such as role-based access, notifications, and report generation enhance transparency, accountability, and data-driven decision-making. This system ensures quick and fair redressal of grievances while improving campus facilities, faculty performance, and overall satisfaction. In the future, AI automation such as complaint categorization and routing using large language models (LLMs) can further enhance efficiency, responsiveness, and create a more student-centered and transparent campus experience.

Keywords— Grievance Management System, Complaint Redressal, Web-Based Application, Student Feedback, Transparency, Accountability, Node.js, JSON, Automation, Campus Management, User-Friendly Interface.

I. INTRODUCTION

Grievances and complaints are an inevitable and perpetual part of any educational institution, arising from the diverse needs, experiences, and concerns of students, faculty, and other stakeholders. A grievance, at its core, represents a

formal expression of discontent or a perception of injustice, whether it is a valid complaint or not. Establishing an efficient and effective system for addressing these grievances is not merely an administrative convenience but is paramount for maintaining a harmonious and productive campus environment. A well-structured system provides a vital platform for students to voice their concerns, seek resolutions, and obtain fair outcomes. It is a critical tool for institutional governance, serving as an important indicator of both institutional effectiveness and the overall quality of education. The fundamental purpose of such a system is to ensure that all stakeholder concerns are not only heard but are also promptly and impartially acted upon, a process that is designed to uphold and reinforce principles of transparency, fairness, and accountability.[1][2].

The function of a grievance system extends well beyond simple dispute resolution. Research indicates a progression in the understanding of a grievance system's purpose, from a basic reactive mechanism to a strategic tool for cultivating a healthy campus climate. Documents on the subject describe its role as a "moral and ethical imperative" for institutions that are committed to creating a supportive and inclusive learning environment. In essence, the system functions as a proactive feedback loop, providing the administration with a mechanism to identify its own strengths and weaknesses as an educational service organization. By centralizing complaints and analyzing the data they provide, institutions can make informed decisions to improve the educational experience for all students, transforming a reactive process into a data-driven mechanism for continuous institutional improvement and accountability.[3].

Modern higher education institutions commonly employ a tiered, multi-level system for grievance resolution, which strategically encourages informal processes before escalating to a formal review. The

"informal first" approach is a foundational principle of this model, designed to resolve misunderstandings and disputes at the "lowest possible level". This initial phase typically involves direct communication between the student and the employee or department head with whom the issue originated. This de-escalation strategy is an effort to minimize bureaucratic involvement and resolve conflicts efficiently and with minimal institutional overhead. To facilitate this, institutions often provide confidential, thirdparty resources such as an ombuds or a student advocate who can offer guidance and support without fear of reprisal. This is a crucial mechanism for overcoming psychological barriers to reporting, such as the fear of retaliation.[5].

The organizational structure of a grievance system is a critical factor in its effectiveness, and institutions grapple with the choice between centralized and decentralized models. In a decentralized structure, individual academic units, colleges, or departments maintain control over their own complaint resolution processes and platforms. While this approach may appear to align with traditional academic autonomy, it often leads to significant inefficiencies, including a lack of consistent navigation and disjointed communication efforts. Complaints data can become fragmented and difficult to aggregate, making it challenging to identify and address systemic issues across the institution. Furthermore, decentralization can disperse accountability so widely that no single group is responsible for the overall success or failure of the system.[4][6]

II. RELATED WORKS

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Student Complaint Management System —Al-Waeli & Hassan(2022) [8]

*Project developed for a university context (Yemen) describing a web-based complaint management system that enables students to submit complaints, and the university to track and resolve them using a MySQL database and web interface .*Directly aligned with your domain (student complaints, online system) which makes it a strong fit.

Web-based Campus Complaint Management System (WCCMS) — Fabiyi et al. (2022)[9].This paper presents a campus-wide complaint management system in a higher education setting, discussing design, stakeholders (students & staff), tracking and resolution. Very relevant to your system for educational institutions; good for comparison of functionalities.

Design and Development of a Web-Based Complaints Management System at Syiah Kuala University

Integrated Laboratory— Mutiawani, Hafist & Dawood(2024)[10].

Describes the design and development of a web-based complaints management system in a university laboratory context. Good for showing recent work (2024) in educational institutions; you can compare technology stacks, user roles, features.

A Literature Review of a Web-Based Complaint Management System — Nandini et al. (2025)[11].A review paper that surveys web-based complaint

management systems, their architectures, key features such as role-based access, dashboards, tracking, analytics. Useful for your "related work" section to show thematic trends (e.g., role-based access, analytics) and identify gaps your system addresses.

Grievance Management System in PHP — Devkule & Palkar (2024)[12].Paper describing an online grievance management system (not limited to student complaints) using PHP and highlighting improved process efficiency. While not exclusively student-centred, it offers insights into generic grievance system features which you can adapt.

III.   METHODOLOGY

3.1 Architecture and Technology Stack The project employs a three-tier architecture simplified for a mini-project scope: Frontend (Presentation Layer): Standard HTML5 and CSS3 (with inline styling for the feedback module) providing the user interface.

Backend (Application Logic): Node.js runtime environment utilizing the lightweight Express.js framework .
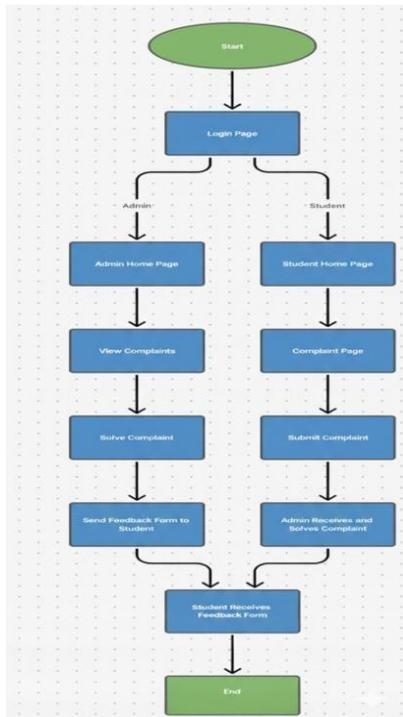

Fig 3.1 System workflow

Database (Data Layer): Local file system persistence using the built-in fs module and JSON files (complaints.json, feedback.json) instead of a traditional relational database, prioritizing simplicity and rapid prototyping.

3.2 Complaint Submission Flow

The backend system executed via Node.js/Express completely manages this process to guarantee that the submitted data is valid and unique. Frontend Request: The user completes a complaint, fills in the required details of the complaint form (frontend), and then sends a POST request with the completed complaint data (in JSON format) via the /api/submit-complaint URL. Server Processing and Validation: The Express route handler receives the request body (req.body). The logic (as confirmed in server.js) performs basic validation to check for the presence of mandatory fields, specifically title and description. A 400 Bad Request status is returned if validation fails.

To maintain the data file in sync and intact, fs.promises.writeFile is used to handle writing back the updated array to the data file. Upon confirmation of complaint submission, the server will send a response of "200 OK" back to the user with an indication of successful submission along with a generated Complaint ID assigned to the complaint submitted for subsequent tracking purposes.

3.3 System Workflow Implementation

The system facilitates complaint management between students and administrators, following a structured flow: Student Workflow

1.   Login Page: o Students authenticate to access the system.

2.   Student Home Page: o Provides navigation to complaint submission.

3.   Complaint Page:

   o   Students fill out a form with title and description 4. Complaint Submission:

   o   A   POST   request   is   sent   to /api/submitcomplaint.

   o   Server validates input, assigns a unique id (Date.now()), and adds a createdAt timestamp.

   o   Complaint is appended to complaints.json.

Admin Workflow

1.   Login Page:

   o   Admin   authenticate   to   access administrative tools.

2.   Admin Home Page: o Provides   access   to complaint management features.

3.   View Complaints:

o Admins retrieve and review complaints from complaints.json.

4. Solve Complaint:

o Admins mark complaints as resolved (status update logic can be added).

5. Send Feedback Form:

o Admins trigger feedback form delivery to the student.

3.4 Satisfaction Feedback Flow

This flow closes the loop by assessing the efficacy of the redressal process:

1. Trigger: Once the complaint's status is administratively updated to 'Resolved,' the system prompts the user to access the dedicated Feedback Form.

2. Data Capture: The form captures two critical types of data:

Quantitative Data: The user's selection on the 5-star rating scale (e.g., a numerical value from 1 to 5) measures satisfaction level.

Qualitative Data: The input from the description box captures detailed, actionable suggestions or reasons behind the rating.

3. Persistence: This feedback data is sent via a separate API request and is securely saved to the dedicated feedback.json file, ensuring that redressal metrics are segregated from the initial grievance records for clear analysis.

IV. IMPLEMENTATION

The three-tier architecture of the system is implemented by means of functional code (Node.js) on the back end for reliable operation and operations for storing the system's data. This section covers how to configure the server, the specific Application Programming Interface (API) endpoints to be used by the system, and how to structure the data persistence layer of the application

4.1 Backend Implementation (Node.js & Express.js) The backend application logic is managed by an Express.js server, which handles all client requests and file operations. The core implementation involves setting up the server, defining middleware, and creating the API endpoint for complaint submission.

A. Server Setup and Middleware

The server.js file initializes the Express application and sets up necessary middleware for processing JSON

requests and serving static frontend files:

B. Complaint Submission API Endpoint

The primary function of the backend is executed by the POST /api/submit-complaint endpoint. This asynchronous route handles the complete complaint lifecycle described in the methodology: validation, unique ID assignment, and data persistence.

4.2 Data Layer Implementation (JSON Persistence) The data layer is implemented using structured JSON files for

storage, providing a simple, readable, and highly accessible database structure for the prototype.

A. Data Structure (complaints.json)The primary data file, complaints.json, stores all grievances as an array of JSON objects. Each object maintains a consistent schema that supports the tracking and analysis requirements

B. Feedback Data Structure (feedback.json)A separate file, feedback.json, is allocated for the satisfaction data captured post-resolution. While the API endpoint for this is not shown, the implementation requires a structure that links the feedback to the original complaint and stores the quantitative and qualitative data

4.3 Frontend Implementation (Feedback Module) The frontend's implementation focuses on providing a clean, accessible interface using basic HTML and CSS. The crucial component is the post-resolution satisfaction feedback page, which was designed to capture both a numerical rating and detailed text input.

5-Star Rating: The 5-star rating system is implemented using CSS radio buttons (<input type="radio">) and Unicode star characters (★) within <label> elements Description Box: A standard HTML <textarea> element is used to provide the open-ended text input, allowing users to provide detailed, qualitative feedback that is essential for understanding the context behind their numerical rating.

V. RESULTS AND CONCLUSION

5.1 Functional Results

The completed prototype has produced a working solution for users utilizing the HTML/CSS front-end framework and React.js as an enhancement that provides one simple, unified platform to allow individuals to submit their issues or recommendations. Additionally, direct access includes

a dedicated entry for both students and administrators for easy access and management of the associated flow of information between users and within the system. The Node.js/Express server is used to host the API and provide application logic and provides an interface for handling any requests. The API has been developed to handle submissions of complaints and validate them for integrity before being stored in the database.

Every entry is stored with a unique identifier (ID, e.g., Date.now()) and a timestamp, fulfilling the requirement for transparency and accountability through secured data storage.

The system includes a data view that allows categorization and status tracking, showing both "Unsolved" and "Solved" complaints (e.g., 19 Unsolved, 50 Solved in the prototype dashboard).

Structured Feedback and Anonymity Module: The system successfully implemented a dedicated final feedback interface featuring a custom 5-star rating and a description box, allowing for the collection of structured, quantifiable user satisfaction data on the resolution process.

5.2 Impact and Discussion

A. Operational Efficiency and Time SavingsThe replacement of manual processes (i.e. physical letters, verbal communication and email) with a CGFMS has resulted in a significant reduction in both the amount of time and the complexity associated with registering and processing a complaint. Time for Submission Reduced: Instead of needing to visit the physical location and engage in a time-consuming process, the submission of complaints can now be completed online and in real- time. Therefore, the amount of time it takes for a complaint to reach the appropriate authority has been reduced greatly. Automated Notifications of Resolution: The design of the CGFMS also contains support for the ability to automatically notify appropriate authorities of receipt of a complaint and provide them with an immediate response regarding that complaint. When done in conjunction with the System's ability to assign time limits for the purposes of expediting dependencies, this functionality will greatly increase the speed at which complaints are resolved and ensure a more accurate process.

B. Enhanced Transparency and AccountabilityThe digital platform enforces clarity and oversight across the entire grievance lifecycle, addressing a major weakness of manual systems.

Auditable Records: The centralized JSON data store ensures no loss of data and maintains a clear, secured record of all problems and solutions done by administration, fulfilling the need for auditable recordkeeping.

Status Monitoring: The system promotes accountability by providing the necessary structure (IDs, timestamps, status) for future implementation of real-time updates on complaint status. This assurance that issues are being actively handled enhances user trust.

C. Data-Driven Institutional Improvement

The CGFMS transforms unstructured feedback into actionable data, promoting continuous improvement in campus quality.

Simplified Trend Analysis: Centralization of data simplifies the process of gathering previous complaint history and analyzing trends by category (e.g., academic, facilities). This allows the college to make data-driven decisions to improve college governance and the overall student experience.

D. Discussion of Limitations and Future ScopeWhile the prototype successfully demonstrated core functionalities, the decision to use a JSON file as the database prioritized rapid development and simplicity for the prototype stage.

Scalability Trade-off: This approach, however, poses a scalability limitation for a production environment with high traffic, as flat-file databases can suffer from concurrency issues and performance degradation.
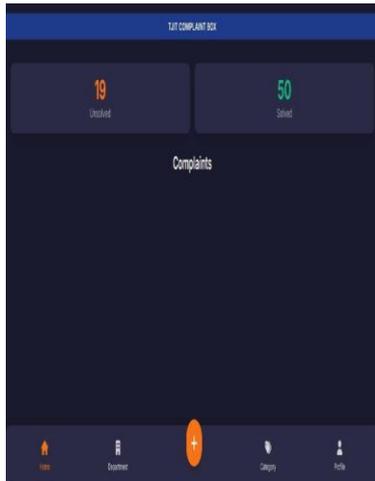

Fig 5.1 user login
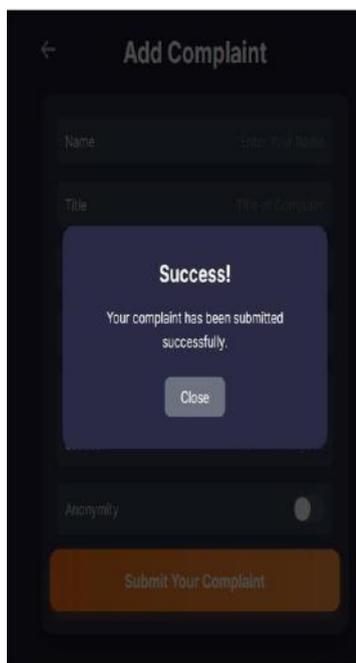
Fig 5.2 Student homepage
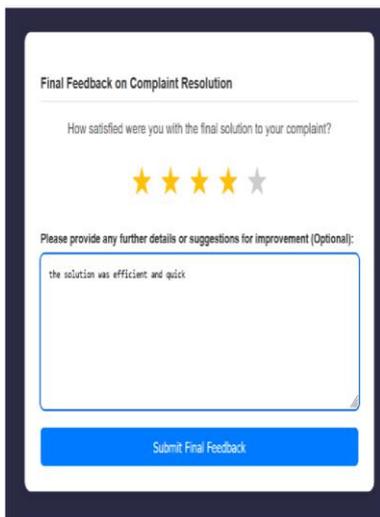

Fig 5.3 complaint successful registration

Fig 5.4 feedback forum after complaint resolved

Future Work: The next logical steps for the CGFMS involve migrating the data store to a more robust, dedicated database (SQL or NoSQL) to handle concurrent user operations and ensure long-term data security and integrity. Further enhancements will include the full implementation of automated notifications and real-time status tracking to meet the objective of faster resolution times

VI. CONCLUSION AND FUTURE WORK

The developed Web-Based College Grievance and Feedback Management System successfully meets its core objectives by providing a centralized, accessible, and accountable digital platform for handling student, faculty, and staff grievances. The use of the Node.js/Express stack with JSON file persistence proved to be an efficient and costeffective approach for creating a functional prototype that is superior to slow, manual methods.

6.1 Future Enhancements

To fully realize the potential benefits outlined in the project aims, future work should focus on the following:

- Role-Based Access Control (RBAC): Implementing secure login and access restrictions for administrators, faculty, and general users to view only relevant information.

- Notification System: Integrating email or in-app notifications to update users when their complaint status changes.

- Reporting Module: Developing a dashboard to generate analytical reports on common complaint categories, resolution times, and average satisfaction scores.

- Scalable Database: Migrating the data layer from local JSON files to a more robust, scalable database (e.g., MongoDB, PostgreSQL) to handle high volumes of data securely.

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