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ComplaintHub: A Full-Stack Smart Complaint Management System with Real-Time Tracking and Intelligent Resolution Framework

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Abstract: A Smart Complaint Management System is a digital platform designed to streamline the process of registering, tracking, and resolving complaints efficiently. This research paper presents *ComplaintHub*, a MERN stack-based system that integrates modern web technologies to enhance transparency, accountability, and user engagement. The system supports role-based access (User, Staff, Admin), real-time updates, analytics, and secure authentication. Furthermore, it proposes advanced features such as AI-based categorization, SLA-based escalation, and real-time communication. The study highlights system architecture, implementation, enhancements, and future scope. This paper demonstrates how digital transformation improves grievance redressal mechanisms in institutions and organizations.

Keywords: Complaint Management System, MERN Stack, Web Application, MongoDB, Express.js, React, Node.js, Real-Time Tracking, User Feedback System, Grievance Redressal, Role-Based Access Control, Data Analytics, Secure Authentication, REST API, Automation, Notification System.

I. INTRODUCTION

Complaint management is a critical function in organizations, educational institutions, and government bodies. Traditional systems rely heavily on manual processes, leading to inefficiencies, delays, and lack of transparency.
The *ComplaintHub* system aims to address these issues by providing :i.A centralized complaint handling platform, ii.Real-time tracking and communication, iii.Secure and scalable architecture. With the growth of web technologies, modern systems now use frameworks like React, Node.js, and MongoDB to deliver dynamic and responsive applications. *ComplaintHub* leverages these technologies to create an efficient and user-friendly solution.

II. RELATED WORK & GAP ANALYSIS

Existing complaint systems use email, SMS, and phone calls, but lack centralized tracking, transparency, and proper documentation. Emails may be ignored, SMS is limited, and calls are not recorded systematically. These methods also lack real-time updates and analytics. ComplaintHub fills this gap by providing a centralized, automated, and real-time solution.

- **Complaint handling via email, SMS, and phone calls**.
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III. PROPOSED SYSTEM ARCHITECTURE

The proposed system utilizes a decoupled full-stack architecture to ensure high performance and scalability:

- Frontend Layer: Built with React and Vite for fast rendering, reusable components, and a responsive user interface for complaint submission and tracking.
- Backend Layer: Utilizes Node.js with Express.js for handling
- RESTful APIs, business logic, and asynchronous request processing, while MongoDB ensures flexible and scalable data storage.
- Real-Time Communication: WebSockets (Socket.io) enable instant updates for complaint status, notifications, and user–staff interactions, ensuring timely communication and transparency.
- Quality Verification Layer: A feedback and rating system along with threaded comments allows users to evaluate resolutions, improving accountability and service quality.

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IV. METHODOLOGY

The development of ComplaintHub follows a structured and systematic methodology to ensure efficiency, scalability, and reliability. The process begins with requirement analysis, where user needs and system functionalities are identified. This is followed by system design, which includes creating architecture diagrams, database schemas, and API structures. The implementation phase involves developing the frontend using React and the backend using Node.js and Express.js, with MongoDB as the database. Agile methodology is adopted to allow iterative development and continuous feedback. Testing is performed at multiple levels, including unit testing, integration testing, and system testing, to ensure proper functionality and security. Finally, the system is deployed on a cloud platform, and regular monitoring is conducted to maintain performance and resolve issues.

V. CONCLUSION AND FUTURE SCOPE

ComplaintHub provides an efficient and modern solution for managing complaints by using MERN stack technologies. It improves transparency, reduces manual effort, and ensures real-time tracking of complaints. The system enhances communication between users and administrators, leading to faster and more reliable resolutions. Future development will focus on:

- Integration of AI for automatic complaint categorization
- Use of chatbots for instant user support
- Development of a mobile application for better accessibility
- Addition of multilingual support for wider user reach
- Implementation of advanced analytics for better decision-making
- Use of blockchain technology to enhance data security and transparency

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