

Smart Citizen Complaint and Resolution Platform using AI

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Abstract—In contemporary urban governance, the absence of a unified digital platform for civic grievance redressal has led to inefficiency, lack of transparency, and reduced public trust in local administration. Citizens often rely on fragmented, paper-based, or phone-based complaint systems that do not provide real-time tracking, accountability, or audit trails.

This paper presents the Smart Citizen Complaint and Resolution Platform using AI, a full-stack e-governance web application designed to provide a centralized and intelligent complaint management system. The platform allows citizens to register, submit complaints with photographic evidence, and track grievance status in real time. Government officers can manage, update, and resolve assigned complaints through a structured dashboard.

The system uses React for the frontend, Django REST Framework for the backend, PostgreSQL for database management, MinIO for image storage, JWT authentication with OTP verification for secure access, and Google Gemini API for AI-powered chatbot assistance. Admin users can view analytics charts and complaint distribution reports for data-driven governance decisions.

The proposed platform improves transparency, accountability, and efficiency in civic grievance redressal. It supports multilingual access using i18next and containerized deployment using Docker, making it scalable and suitable for modern smart city and Digital India initiatives.

Index Terms—Smart Citizen Portal, Complaint Management System, E-Governance, Artificial Intelligence, Django REST Framework, React, PostgreSQL, MinIO, JWT Authentication, Google Gemini API, Civic Grievance Redressal.

I. INTRODUCTION

The Smart Citizen Portal is a comprehensive e-governance web application designed to enhance communication and transparency between citizens and local government authorities. In many urban and semi-urban regions, traditional complaint management systems are inefficient, lacking proper tracking mechanisms, accountability, and timely resolution.

This project addresses these challenges by providing a centralized digital platform where citizens can register, submit complaints related to public services, and monitor their status in real time. The system also provides government officers with an intuitive dashboard to manage, update, and resolve grievances efficiently.

The system is built using modern technologies such as React for the frontend and Django REST Framework for the backend. It provides secure login using JWT authentication and OTP verification. Citizens can upload images as proof while submitting complaints, and government officers can view and update complaint status through their dashboard.

The platform also includes an AI-powered chatbot that helps users navigate the system and assists them in writing complaints more effectively. The main goal of this project is to make the complaint process faster, more transparent, and user-friendly.

The rest of this paper is organized as follows: Section presents the problem statement and objectives. Section explains the literature survey. Section IV describes the proposed system architecture. Section V presents the methodology.

Section VI explains system requirements. Section VII discusses implementation details. Section VIII presents result analysis and testing. Section IX explains limitations and future scope, and Section X concludes the paper.

II. PROBLEM STATEMENT AND OBJECTIVES

A. Problem Statement

Citizens currently lack a unified digital channel to report and track civic complaints. Local government offices often operate in silos, and grievance redressal lacks standardization, leading to delays, loss of complaints, and lack of accountability. There is no proper mechanism for citizens to check whether their complaint has been received, assigned, or resolved.

The problem addressed in this paper is to develop a secure, role-based, AI-assisted citizen complaint and resolution platform that enables citizens to submit complaints, track status, upload evidence, and receive support, while helping government officers manage and resolve complaints efficiently.

B. Objectives

The main objectives of the proposed system are as follows:

- To develop a secure, role-based multi-user web application for civic complaint management.
- To enable citizens to register, submit, and track complaints with photo evidence uploads.
- To provide government officers with a dashboard for managing, updating, and resolving complaints.
- To implement JWT-based authentication with OTP email verification.
- To integrate AI-powered chatbot assistance using Google Gemini API.
- To support multilingual interfaces using i18next for regional accessibility.
- To containerize the application using Docker and Docker Compose for portability.

III. LITERATURE SURVEY

Several research works have contributed to the development of intelligent and efficient citizen complaint management systems. AI-based systems have been proposed for automating complaint

lodging and tracking using Natural Language Processing. These approaches improve efficiency by routing complaints to relevant departments and reducing resolution time.

Image-processing-based complaint systems have also been studied for sorting and categorizing civic complaints such as potholes, waste accumulation, and streetlight failures. Such systems achieve better results when image data is combined with textual complaint descriptions.

AI-driven complaint management frameworks using NLP and sentiment analysis have been used to prioritize complaints based on urgency and emotional tone. Mobile civic complaint applications under smart city initiatives have also highlighted the importance of GIS-based tagging, department-wise routing, and user feedback.

Deep learning-based complaint distribution systems have shown effective performance in automatically classifying and prioritizing complaints from unstructured data. Chatbot-based complaint systems further improve user experience through natural language interaction.

The reviewed literature shows that AI, image processing, chatbot support, and digital governance can improve complaint management. However, many systems still lack a complete integrated platform with secure authentication, media storage, analytics, multilingual support, and scalable deployment. The proposed system addresses these limitations.

IV. PROPOSED SYSTEM ARCHITECTURE

The proposed Smart Citizen Complaint and Resolution Platform is designed as a full-stack web application that manages the complete complaint lifecycle from registration to resolution. The major modules include Presentation Layer, Authentication Layer, Complaint Management Layer, AI Assistance Layer, Storage Layer, Analytics Layer, and Data Storage Layer.

A. Input Layer

The Input Layer collects complaint-related information from citizens. This includes user registration details, complaint title, description, category, priority, and image attachments. Officers and administrators also provide status updates, resolution notes, and management inputs.

B. Preprocessing Layer

The Preprocessing Layer validates the submitted data before processing. It checks required fields, verifies user authentication, validates uploaded media files, and ensures that the complaint data is properly formatted before being stored or assigned.

C. Prediction Layer

The AI Assistance Layer supports complaint drafting and user guidance through Google Gemini API. The chatbot accepts natural language queries and provides useful responses related to portal navigation and complaint writing. In future versions, AI can be used for automatic complaint categorization and priority prediction.

D. Backend Layer

The Backend Layer is developed using Django REST Framework. It handles API requests, authentication, role-based access control, complaint lifecycle management, user management, and analytics generation. JWT tokens are used for secure session handling.

E. Presentation Layer

The Presentation Layer is developed using React and Tailwind CSS. It provides separate dashboards for Citizens, Officers, Admins, and Super Admin. Citizens can submit complaints and track status, officers can update complaint progress, and

administrators can view analytics and manage users.

F. Data Storage Layer

The Data Storage Layer uses PostgreSQL for structured data storage and MinIO for storing complaint images and attachments. PostgreSQL stores users, complaints, roles, status history, and analytics data, while MinIO securely handles media files using object storage.

Overall, the proposed architecture provides a scalable, se-cure, and user-friendly solution for civic complaint management. It improves transparency, accountability, and communication between citizens and government authorities.

V. METHODOLOGY

The methodology of the proposed system is divided into several stages including problem identification, requirement analysis, system design, data collection, backend processing, AI assistance, output generation, storage, analytics, and vali-dation.

A. Data Collection

The system collects structured user inputs at multiple stages. Citizens provide registration details, complaint title, description, category, priority, and image attachments. Officers pro-vide status updates and resolution notes, while administrators manage users, officers, and local government data.

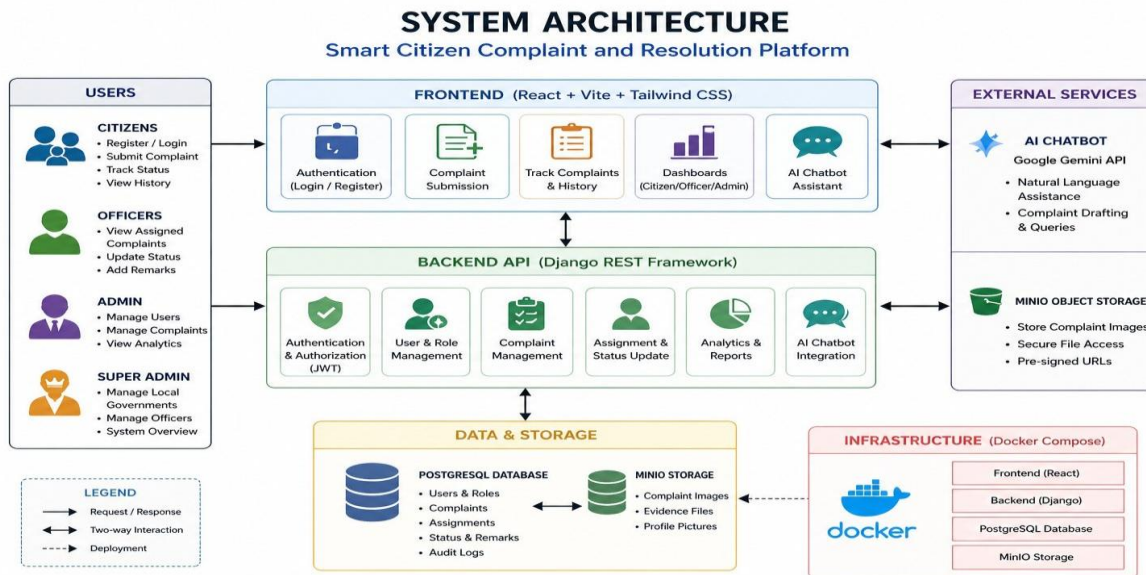


Fig. 1. Proposed System Architecture

B. Data Preprocessing

Data preprocessing includes form validation, required field checking, media file validation, and user authentication. Up-loaded images are securely stored in MinIO, while complaint metadata is stored in PostgreSQL. This ensures clean and reliable input for backend processing.

C. Feature Selection

Important features for complaint handling include com-plaint category, priority, user role, complaint status, date of submission, assigned officer, and uploaded evidence. These features help in filtering, tracking, analytics, and future AI-based classification.

D. Model Selection

The current system uses Google Gemini API for AI chatbot assistance. The chatbot helps citizens understand the portal and draft complaints. For future enhancement, AI-based complaint classification and priority prediction models can be added.

E. Prediction Generation

In the proposed enhancement, complaint priority and department routing can be predicted using AI techniques. The system can analyze complaint text, category, and evidence to suggest suitable departments and priority levels.

Table I Hardware Requirements

Component	Minimum Requirement
Processor	Intel i3 / AMD equivalent or higher
RAM	4 GB minimum, 8 GB recommended
Storage	5 GB free storage space
Monitor	Standard display monitor
Input Devices	Keyboard and Mouse
Network	Broadband / Wi-Fi Internet connection

F. Dashboard and User Access

The system provides role-based dashboards. Citizens can submit and track complaints. Officers can manage assigned complaints and update progress. Admins can view all com-plaints, analytics, and reports. Super Admin can manage higher-level

administration.

G. System Evaluation

The system is evaluated based on usability, response time, complaint tracking accuracy, secure authentication, role-based access, storage reliability, and dashboard performance.

VI. SYSTEM REQUIREMENTS

The proposed system requires both hardware and software components to support full-stack complaint management.

TABLE II Software Requirements

Software	Purpose
React / Next.js	Frontend interface development
Tailwind CSS	Responsive UI design
Django REST Framework	Backend API development
PostgreSQL / NeonDB	Database management
MinIO	Complaint image storage
Google Gemini API	AI chatbot assistance
Docker	Containerized deployment
JWT / OTP	Secure authentication

A. Hardware Requirements

B. Software Requirements

VII. IMPLEMENTATION DETAILS

The proposed system is implemented using modern full-stack technologies. The frontend is developed using React with Tailwind CSS to provide a responsive and user-friendly interface. The backend is developed using Django REST Framework to handle REST APIs, authentication, complaint management, user roles, and analytics.

PostgreSQL is used as the primary database for storing users, complaints, roles, and status history. MinIO is used for storing complaint images and attachments securely. JWT authentication and OTP email verification are implemented for secure access. Docker and Docker Compose are used for containerized deployment.

The system checks the role of each user after login.

Citizens can submit and track complaints. Officers can manage assigned complaints and update their status. Admins can monitor complaint distribution and system activity using analytics dash-boards. The AI chatbot assists citizens in complaint drafting and portal navigation.

A. Working Algorithm

The working algorithm of the proposed system is as follows:

- 1) Start the Smart Citizen Complaint and Resolution Plat-form.
- 2) User registers or logs in using secure authentication.
- 3) OTP verification and JWT token generation are per-formed.
- 4) Citizen submits complaint with title, description, cate-gory, priority, and image evidence.
- 5) Backend validates complaint data using serializers and permission classes.
- 6) Complaint data is stored in PostgreSQL and images are stored in MinIO.
- 7) Officer views assigned complaints and updates status.
- 8) Admin monitors complaints and analytics dashboard.
- 9) AI chatbot provides assistance for complaint drafting and navigation.
- 10)Complaint status history is maintained until resolution.

B. Prediction Result Format

The complaint status result generated by the system contains the following information:

- Complaint ID
- Citizen name
- Complaint title and category
- Uploaded image evidence
- Current status
- Assigned officer
- Resolution note
- Complaint history

A sample complaint message is shown below:

Complaint Submitted: Your civic issue has been successfully registered. The assigned officer will review and update the status shortly.

VIII. RESULT AND DISCUSSION

The proposed system was tested using sample civic com-plaint records and user interactions. The system successfully allowed citizens to register, log in, submit complaints with images, and track complaint status. Officers were able to view complaints, update status, and add resolution notes.

The admin dashboard displayed complaint analytics such as category-wise and status-wise distribution. The AI chatbot provided helpful responses for complaint drafting and portal navigation. The system showed effective performance in man-aging complaint records and maintaining transparency.

The platform reduced manual effort by digitizing complaint submission, routing, tracking, and management. It also im-proved accountability by maintaining complete status history and role-based dashboards.

A. Detection Output

The complaint output includes the following details:

- Complaint title and description
- Complaint category and priority
- Uploaded image evidence
- Complaint status
- Assigned officer
- Resolution note

B. Alert Output

The system generates complaint status messages such as Complaint Status Update: Your complaint has been moved to In Progress. The assigned officer is currently reviewing the issue.

C. Result Images

The following figures show the practical output screens of the Smart Citizen Complaint and Resolution Platform.

D. Sample Testing Table

E. Performance Observation

The system performed effectively for complaint submission, tracking, and resolution. Response time depends on server capability, database performance, image size, and network connectivity. The system works better when stable internet and optimized APIs are available.

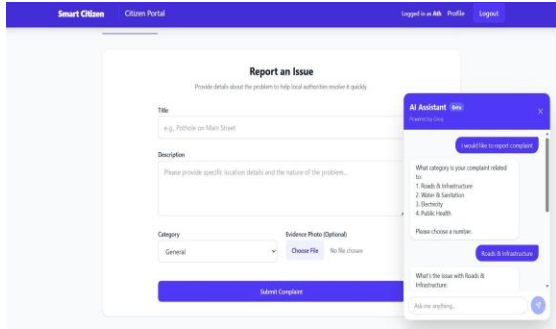


Fig. 2. Smart Citizen Portal Home Page

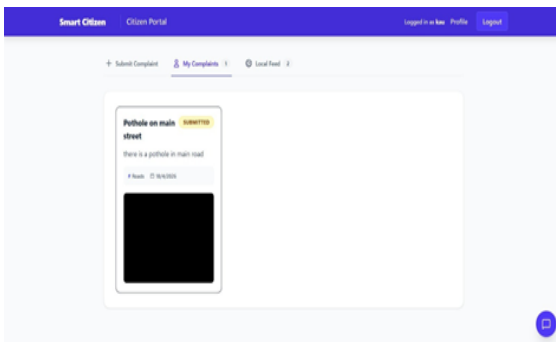


Fig. 3. Complaint Submission Output Page

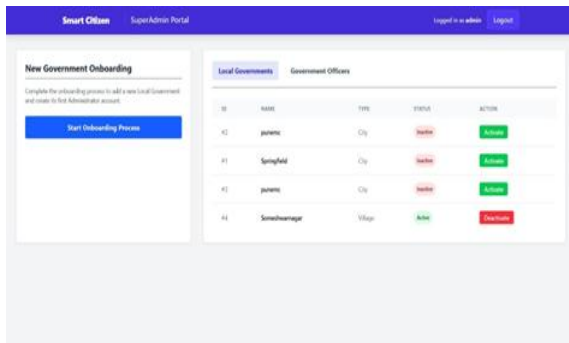


Fig. 4. Admin Dashboard and Analytics Output

TABLE III Sample Test Cases

Test ID	Input	Expected Output	Status
TC01	Open system	Home page loads successfully	Pass
TC02	User registration	OTP verification completed	Pass
TC03	User login	Role-based dashboard displayed	Pass
TC04	Complaint submission	Complaint stored successfully	Pass
TC05	Image upload	Image stored in MinIO	Pass
TC06	Officer update	Complaint status updated	Pass
TC07	Admin dashboard	Analytics displayed	Pass

The current implementation supports secure authentication, complaint history, image upload, and dashboard analytics. Future versions can improve real-time notifications, AI classification, mobile application support, and large-scale deployment.

IX. ADVANTAGES AND APPLICATIONS

A. Advantages

The proposed system provides several advantages over traditional complaint systems:

- Provides centralized complaint submission and tracking.
- Reduces dependency on paper-based or phone-based complaint systems.
- Supports image evidence upload for better complaint clarity.
- Provides role-based access for citizens, officers, admins, and superadmins.
- Improves transparency and accountability.
- Provides analytics for data-driven governance.
- Includes AI chatbot assistance for user support.

B. Applications

The proposed system can be used in various real-world applications:

- Municipal complaint management.
- Smart city grievance redressal.
- Village and local government complaint systems.
- Public service issue reporting.
- Sanitation and infrastructure issue tracking.
- Citizen-government communication platform.
- Digital India e-governance solutions.

X. LIMITATIONS AND FUTURE SCOPE

A. Limitations

Although the proposed system provides an effective digital complaint management solution, it has some limitations. The current implementation does not support real-time push notifications; citizens may need to refresh the system to view updates. Mobile application support is not included in the current release.

The AI chatbot is limited to text-based interaction and does not support voice input. Offline functionality is not supported, so active internet connectivity is required. Large-scale horizontal scaling and load balancing are outside the scope of

this academic implementation.

B. Future Scope

In the future, the system can be improved by adding the following features:

- Real-time push notifications for complaint updates.
- Mobile application for Android and iOS users.
- Voice-enabled AI chatbot support.
- AI-based complaint classification and priority prediction.
- GIS-based location tagging for complaints.
- Payment gateway integration for service-related fees.
- Advanced analytics and departmental performance re-ports.
- Large-scale cloud deployment with load balancing.

XI. CONCLUSION

This paper presented the Smart Citizen Complaint and Resolution Platform using AI. The proposed system uses React, Django REST Framework, PostgreSQL, MinIO, JWT authentication, OTP verification, Docker, and Google Gemini API to provide a secure and intelligent civic grievance redressal platform.

The system enables citizens to submit complaints with photo evidence, track status, and receive assistance through an AI chatbot. Government officers can manage and resolve complaints through structured dashboards, while administrators can monitor complaint distribution using analytics.

The proposed platform improves transparency, efficiency, and accountability in civic complaint management. With future improvements such as real-time notifications, mobile application support, voice chatbot, and AI-based complaint classification, the system can become a scalable digital governance solution for smart cities and local government bodies.

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