

CIVICROUTE: An AI-Powered Online Complaint Management System

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ABSTRACT: In today's rapidly growing urban environment, effective communication between citizens and municipal authorities is crucial for maintaining public infrastructure and services. Traditional complaint enrollment systems are frequently slow, paper-based, and inefficient, resulting in delayed resolutions and lack of transparency. E-governance initiatives and smart city frameworks emphasize the need for digital platforms for public service management. Civicroute – An AI-Powered Online Complaint Management System is a web-based platform designed to provide a simple, effective, and transparent way for citizens to register complaints related to municipal issues such as road damage, garbage collection, water supply, streetlights, drainage, and other public services. The proposed system allows users to submit complaints online, track their status in real-time, and receive updates until the issue is resolved. The system also provides an administrative dashboard for municipal authorities to manage, assign, monitor, and resolve complaints efficiently. By digitizing the complaint handling process, Civicroute reduces manual workload, improves response time, increases accountability, and enhances citizen satisfaction.

KEYWORDS: AI-Powered Online Complaint System, E-Governance, Smart City, Web Application, Municipal Issues, Transparency, Catalytic Service Management.

I. INTRODUCTION

Urbanization and population growth have put tremendous pressure on municipal infrastructure and services. Citizens constantly face issues such as potholes, irregular garbage collection, water leakage, and non-functioning streetlights. Many municipal corporations still rely on manual or semi-digital complaint handling methods, which results in delays and lack of proper monitoring.

The Government of India and other authorities have strongly promoted e-governance and smart city initiatives to improve transparency and efficiency in public services. Online grievance redressal systems help establish a direct communication channel between citizens and government authorities. These systems are not only tools for service delivery but also mechanisms to strengthen democratic participation, as they empower citizens to hold authorities accountable. With the advancement of information technology, web-based public grievance systems have become an essential element of modern governance.

However, many existing platforms suffer from challenges such as poor categorization of complaints, lack of timely escalation, and limited feedback mechanisms. As a result, citizens frequently lose trust in the system, and authorities struggle to monitor staff performance effectively.

Civicroute aims to overcome these limitations by providing a centralized, AI-powered platform where citizens can lodge complaints, track their progress, and receive timely updates. The integration of artificial intelligence ensures that complaints are distributed correctly, routed to the correct department, and escalated automatically if unresolved within a specified timeframe. At the same time, authorities can manage complaints efficiently, monitor staff performance, and generate analytical reports for decision-making.

By combining AI, transparency, and citizen-centric design, Civicroute contributes to the vision of smart governance. It not only reduces delays in complaint resolution but also enhances accountability, fosters citizen trust, and provides valuable insights for urban planning and infrastructure management.

II. LITERATURE SURVEY

Several researchers have worked on online grievance and complaint management systems. Kumar and Verma [2] conducted a survey on online grievance redressal systems and found that such systems significantly decrease response time and increase transparency.

Sharma and Gupta [3] discussed the role of web technologies in municipal service management and emphasized the importance of centralized digital platforms. Mehta et al. [4] proposed a smart city framework in which digital governance and citizen participation play a crucial role.

Patil and Deshmukh [5] designed an online complaint management system to reduce paperwork and manual tasks in public offices. Singh and Khandelwal [6] introduced a web-based public grievance redressal system and highlighted the importance of real-time tracking and updates.

Beyond India, international initiatives also demonstrate the potential of digital grievance systems. The FixMyStreet platform in the United Kingdom allows citizens to report local issues such as potholes and broken streetlights, directly connecting complaints to municipal authorities. Similarly, SeeClickFix in the United States provides a mobile-first grievance system that emphasizes community involvement and transparency. These systems underline the importance of citizen engagement, yet often lack advanced automation like AI-driven categorization and escalation.

From the literature, it is evident that although many systems exist, there is a need for a simple, scalable, and user-friendly platform that integrates complaint registration, tracking, management, and reporting into one system. Most current solutions heavily depend on manual categorization and human intervention, which can cause delays and inefficiencies. Few systems use artificial intelligence to automate complaint handling, ensure timely escalation, and provide proactive communication.

Civicroute addresses these gaps by incorporating AI-driven categorization, automated escalation, and real-time communication through SMS and email. Unlike traditional systems, Civicroute emphasizes both citizen convenience and administrative accountability, making it a comprehensive solution aligned with smart city and e-governance principles.

III. SYSTEM OVERVIEW

The Civicroute system is a centralized, AI-powered complaint management platform designed in alignment with modern e-governance principles [1],[4]. The main entities involved are Citizen (user), Administrator, and Department/Staff. Unlike traditional municipal service systems [3],[5], Civicroute integrates an intelligent AI agent that automates complaint categorization, escalation, and status updates, thereby ensuring transparency, efficiency, and accountability.

A. Citizen Registration and Login

Citizens begin by registering on the platform using their personal details such as name, email, phone number, and address. A secure authentication mechanism ensures that only verified users can lodge complaints. Login credentials are stored securely in the database, with password encryption techniques (e.g., hashing) applied to protect user data. This step establishes a trusted identity for each citizen, which is crucial for accountability and follow-up [7][8].

B. Complaint Submission

Once logged in, the citizen can submit a complaint by selecting a category (e.g., sanitation, electricity, water supply), entering the location, providing a detailed description, and optionally uploading an image for evidence. The AI agent analyzes the description and automatically categorizes the complaint, ensuring that it is routed to the correct department without manual intervention. This reduces misrouting and accelerates the resolution process [9].

C. Centralized Database Storage

All complaints are stored in a centralized database with attributes such as complaint ID, user ID, category, description, location, timestamp, and status. The database serves as the backbone of the system, enabling efficient retrieval, tracking, and reporting. Proper indexing and normalization ensure scalability, while audit logs maintain transparency by recording every action taken on a complaint [10].

D. Administrator Supervision and Monitoring

Administrators access a dashboard that displays all incoming complaints, system-generated escalations, and staff performance metrics. Their role is primarily administrative monitoring – overseeing undetermined complaints, reviewing escalations, and ensuring compliance with resolution timelines. Civicroute reduces manual oversight by allowing the AI agent to automatically escalate complaints that remain unresolved for more than seven days [11].

E. Staff Action and AI-Driven Status Updates

Once a complaint is assigned, department staff take necessary action to resolve it. Staff upload reflections or evidence of resolution (e.g., “garbage cleared,” “streetlight repaired”), but the AI agent is responsible for updating the complaint status to Pending, In Progress, or Resolved. Status transitions are determined by predefined rules, time thresholds, and feedback inputs. These updates are reflected in the central database and communicated to the citizen in real time, ensuring accountability at the operational level [12][13].

F. Real-Time Citizen Tracking

Citizens can log into the system at any time to track the progress of their complaints. The tracking interface displays the complaint ID, assigned department, current status, and timeline of actions taken. Real-time notifications via SMS and email proactively inform citizens of updates, reducing the need for repeated portal checks. This transparency builds trust and encourages active municipal participation [14],[15].

G. Feedback Collection

After resolution, the system prompts the citizen to provide mandatory feedback on the quality and timeliness of the service. Feedback is stored in the database and analyzed to generate performance reports for departments. This mechanism ensures continuous improvement, as authorities can identify recurring issues, monitor staff effectiveness, and implement corrective measures. Feedback also empowers citizens by giving them a voice in assessing public services [16],[17].

IV. PROPOSED SYSTEM

The proposed Civicroute system builds upon the foundational concepts introduced in existing web-based grievance redressal platforms [5],[6], offering a more integrated, intelligent, and transparent solution aligned with modern e-governance principles.

A. Key Features

- 1) Online Complaint Registration:** Citizens can easily submit complaints through a user-friendly interface, eliminating the need for physical visits or paperwork. This feature ensures accessibility and encourages municipal participation [2].
- 2) Complaint Categorization and Department-wise Allocation:** The system uses AI-driven logic to analyze complaint descriptions and automatically assign them to the applicable department, reducing misrouting and manual intervention [3].
- 3) Real-Time Status Tracking:** Users can monitor the progress of their complaints through a dynamic dashboard, receiving timely updates via SMS and email. This fosters transparency and keeps citizens informed throughout the resolution process [6].

4) Administrative Dashboard and Monitoring: Administrators have access to a centralized dashboard that displays complaint statistics, pending actions, and staff performance metrics. This enables better oversight and resource allocation [5].

B. Advantages

1) Reduction in Paperwork and Manual Processing: By digitizing the entire complaint lifecycle, Civicroute minimizes administrative burden and streamlines operations [5].

2) Improved Response Time and Service Efficiency: By automating complaint categorization and escalation, Civicroute ensures that issues are routed to the correct department instantly. This reduces delays, improves service delivery, and enhances overall efficiency [5].

3) Enhanced Transparency and Accountability: Real-time tracking and feedback collection promote openness in governance and hold departments responsible for timely resolution [1],[4].

4) Centralized Data Management: All complaint records, user interactions, and resolution logs are stored in a unified database, facilitating easy retrieval, auditing, and performance analysis [3].

V. MODULES

The Civicroute system is architected as a modular framework to ensure scalability, maintainability, and clear separation of responsibilities. Each module plays a critical role in delivering a seamless complaint management experience for both citizens and administrators.

A. Citizen Login/Signup

This module provides secure access to the platform for users. It supports new user registration with email/mobile verification and login authentication using encrypted credentials. Role-based access control ensures that citizens, administrators, and system agents interact only with authorized components. The module also maintains user profiles and complaint history for personalized service [7][8].

B. Complaint Registration (AI-Guided)

The complaint registration module is enhanced with Natural Language Processing (NLP) to guide users through intuitive complaint submission. As users describe their issue, the system automatically extracts keywords, classifies the complaint category, and suggests relevant departments. This reduces ambiguity and ensures accurate routing. The module also supports multimedia uploads (images, location tags) for contextual clarity [9].

C. Admin Dashboard

The administrator dashboard serves as the control center for complaint lifecycle management. It provides real-time visibility into registered complaints, categorized by status (new, in-progress, resolved, escalated). Admins can assign complaints to field officers, update resolution status, and monitor performance metrics. The dashboard includes filters, search tools, and analytics to support efficient decision-making [11].

D. Escalation Engine

To prevent delays and ensure accountability, the escalation engine automatically forwards unresolved complaints to higher authorities based on predefined time thresholds. The engine uses rule-based logic and complaint priority levels to determine escalation paths. Notifications are triggered at each stage, and escalated cases are flagged for urgent attention in the admin dashboard [12][13].

E. Notification and Feedback System

This module ensures transparent communication between the system and its users. Citizens receive real-time updates via email/SMS on complaint status changes, assignment, and resolution. Once a complaint is marked resolved, the system prompts users to submit feedback and rate their experience. This feedback loop helps improve service quality and builds public trust [15][16][17].

VI. CONCLUSION

The Civicroute system presents a robust, AI-powered solution for centralized complaint management in urban governance. By integrating intelligent automation with real-time tracking and feedback mechanisms, the platform addresses key limitations of traditional grievance redressal systems. The use of an AI agent for complaint categorization, status updates, and escalation significantly reduces manual workload, enhances operational efficiency, and ensures timely resolution. Citizens benefit from a transparent interface with proactive notifications and mandatory feedback collection, fostering trust and civic engagement. Administrators gain actionable insights through performance dashboards and analytics, enabling data-driven decision-making. Overall, Civicroute exemplifies the principles of modern e-governance by delivering a scalable, responsive, and citizen-centric service framework.

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