Civica AI: A Politician-Centric Grievance Redressal and Service Directory

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ABSTRACT

Governance at the local level often suffers from inefficiencies in grievance redressal, fragmented communication, and lack of data-driven monitoring mechanisms. Citizens face significant delays in the resolution of issues related to municipal services such as water supply, sanitation, electricity, road maintenance, and waste management. The "Civica AI" web application proposes a scalable, transparent, and politician-centric grievance redressal platform built using Python and Django. The system allows citizens to register grievances related to civic amenities, while authorized political representatives and their teams manage, categorize, and resolve issues via an integrated dashboard. The system also provides a directory of essential service providers categorized by domain (e.g., plumbing, electrical, healthcare) for citizen convenience. The proposed solution introduces a role-based access control model, notification mechanisms, and an analytics-driven dashboard to monitor performance. Simulation results demonstrate that Civica AI reduces average complaint resolution time by 35% and increases grievance acknowledgment rates by 50% compared to existing manual systems.

Keywords — E-Governance, Grievance Redressal, Django, Citizen Participation, Service Directory, Web Application, Public Administration

I. INTRODUCTION

Rapid urbanization in India has placed immense pressure on local governance mechanisms such as municipal corporations, gram panchayats, and public utilities. Despite the existence of e-Governance initiatives under programs like Digital India, citizens frequently encounter inefficiencies in addressing public grievances. Political leaders often act as intermediaries between citizens and government agencies, but they lack systematic tools to record, prioritize, and track complaints effectively [1].

The emergence of web-based technologies and open-source frameworks like Django provides new opportunities to create transparent, efficient grievance redressal systems. Existing systems such as *MyGov* and *Public Grievance Portal* enable citizens to submit complaints; however, these platforms are highly centralized and lack constituency-specific customization and real- time coordination with local political representatives [2].

The Civica AI application aims to bridge this gap by offering a constituency-level grievance management platform. The system is tailored to allow citizens to report civic issues and enable political leaders and their teams to monitor, act upon, and resolve these grievances efficiently.

Additionally, the application includes a service directory module that lists verified local service providers, promoting transparency and convenience. This paper presents the complete design and development of Civica AI, covering its architectural design, functional modules, mathematical modelling , and evaluation. The proposed system, Civica AI, aims to fill this void. Designed as a Django-based web application, it allows citizens in a politician's constituency to:

1. Raise grievances in structured categories (roads, water, electricity, sanitation, etc.).
2. Track the status of their complaints transparently.
3. Access a directory of service providers (e.g., plumbers, electricians, healthcare workers) to meet immediate needs.
4. Receive updates/notifications from the politician's office about complaint resolution. The politician's

administrative team, in turn, can:

- Access a dashboard summarizing complaints.
- Assign grievances to the appropriate municipal body or official.
- Track complaint analytics (frequency, resolution time, geographic clustering).
- Enhance political accountability by directly engaging citizens.

Thus, this work contributes not only a technical system but also a novel model of participatory governance, where digital tools embed politicians into the governance process rather than bypassing them.

The rest of the paper is structured as follows: Section II reviews existing works and systems, Section III provides a literature review of prior research, Section IV presents the proposed system architecture and mathematical model, Section V discusses evaluation results, and Section VI concludes with insights and future directions.

II. RELATED WORK

Several e-Governance platforms have attempted to address grievance management and public service delivery challenges. The *Centralized Public Grievance Redress and Monitoring System (CPGRAMS)*, established by the Indian government, provides a nationwide portal for grievance lodging. However, CPGRAMS suffers from scalability and responsiveness issues, with an average complaint resolution time exceeding 30 days [3].

Another related platform, *MyGov*, focuses on participatory governance but lacks the operational workflow integration required for local-level complaint resolution [4].

In the municipal domain, smart city initiatives such as *Swachhata App* (developed under the Swachh Bharat Mission) allow citizens to report waste-related issues, but its scope remains limited to sanitation and waste management [5].

Academic research has also explored grievance management systems leveraging cloud and mobile technologies. For example, Sharma et al. [6]

proposed a “Smart City Complaint Management System” integrating GIS and IoT data; however, their approach is limited by infrastructural dependencies. Similarly, Patil and Naik [7]

proposed a “Decentralized Citizen Grievance System” using blockchain for transparency, but its complexity limits scalability in smaller towns. A few studies focus on citizen engagement models. Kaur et al. [8]

emphasize participatory frameworks in local governance, while Ahmed et al. [9]

discuss web-based e-Governance in developing countries. However, most of these frameworks lack an interface for direct collaboration between political representatives and their constituents. Civica AI differentiates itself by combining localized grievance tracking, political accountability, and public utility information within a unified, data-driven web application.

III. LITERATURE REVIEW

Extensive literature exists in the domain of e-Governance and grievance redressal systems. The evolution of digital governance began with initiatives like India’s National e-Governance Plan (NeGP) in 2006, emphasizing citizen-centric services [10].

Scholars such as Gupta and Jain [11]

analyzed how digital infrastructure can improve accountability and transparency at the local level. Studies in grievance redressal systems often highlight the challenges of information asymmetry and bureaucratic delays. Bhatnagar [12]

emphasized that timely redressal depends on seamless coordination between stakeholders. In contrast, Singh and Rao [13]

proposed a multi-channel complaint registration model using SMS, IVRS, and web interfaces, improving accessibility but still lacking localized accountability. From a technological perspective, frameworks such as Django and Flask have been adopted in e-Governance systems for rapid web deployment. Kumar et al. [14]

proposed a Django-based municipal service tracking portal, illustrating the framework's security and scalability. Similarly, the integration of analytics in grievance dashboards, as discussed by Mehta and Verma [15],

demonstrates the potential of data visualization to improve decision-making. However, existing works are limited by top-down control, minimal feedback mechanisms, and lack of real-time performance monitoring. Civica AI builds upon these foundations, offering a bottom-up approach emphasizing citizen engagement, political accountability, and real-time transparency.

Authors	Year	Title/Study	Approach	Findings
Bhatnagar	2014	"E-Governance in India"	Policy analysis	ICT improves transparency but lacks accountability
GoI (DARPG)	2015	CPGRAMS Annual Report	Portal study	Covers all ministries, weak citizen feedback
Sharma et al.	2016	"Citizen Trust in E-Governance"	Survey	Politician involvement increases trust
Roy & Singh	2017	Study on BBMP complaint app	Case study	High accessibility, low reliability
Meijer & Bolívar	2018	Smart City Governance	Review	Citizens excluded in sensor-driven models
Grama Vaani team	2019	Voice-based ICT in Rural India	Pilot	Inclusivity, low resolution structure
Gupta et al.	2020	Digital Divide in India	Survey	Rural communities face access barriers
CPGRAMS Data	2021	Govt. Grievance Trends	Statistics	Resolution times high, duplication issues
Jain & Kumar	2022	Accountability in E- Gov	Framework	Missing politician role in grievance models
Esenturk et al.	2023	ICT in participatory gov.	Empirical study	Political participation increases adoption

Table No.1 : Literature survey

A. Centralized Government Grievance Portals

The Government of India's CPGRAMS has been operational since 2007 and enables citizens to file complaints online across ministries [3].

Studies evaluating CPGRAMS indicate that while its reach is vast, average resolution times are long, and satisfaction levels are low due to poor communication and feedback [4].
Complaints often get transferred across departments without accountability.

B. State and Municipal Complaint Systems

Several Indian cities have deployed mobile complaint apps, such as MCGM (Mumbai) and BBMP (Bengaluru) [5].

These improve accessibility but are limited to urban areas, leaving rural populations underserved. Researchers found that such apps lack scalability, often crash under heavy loads, and exclude political offices from workflows [6].

C. Smart City Platforms

The Smart Cities Mission initiated IoT-enabled monitoring dashboards for urban management [7].

These capture sensor data (traffic, water supply, waste) but primarily serve administrators, not citizens. Critiques note that citizens become *passive data points*, undermining participatory governance [8].

D. Participatory Governance Platforms

Internationally, tools such as FixMyStreet (UK) and SeeClickFix (USA) allow citizens to report issues via mobile/web apps [9].

While these strengthen local governance, they rarely integrate elected representatives directly. In India, grassroots platforms like Grama Vaani [10]

have piloted voice-based grievance systems for low-literacy communities, demonstrating inclusivity but lacking structured resolution mechanisms.

E. Academic Research on ICT in Governance

Researchers have studied ICT-enabled grievance redressal in terms of efficiency, trust, and citizen satisfaction. Bhatnagar [11]

argues that digital systems improve transparency but often fail in last-mile accountability. Sharma et al. [12]

highlight that political engagement is essential to citizen trust, yet most digital tools bypass this. Other works [13],

[14] explore usability challenges and the digital divide, noting that rural communities often remain excluded from urban-centric platforms.

F. Identified Research Gap

Across these categories, the limitations are consistent:
- Bureaucratic delays and departmental silos.
- Weak feedback loops for citizens.
- Exclusion of politicians from digital grievance systems.
- Narrow scope, with little attention to everyday service providers.

This establishes a clear need for a politician-centric, constituency-focused, citizen-inclusive grievance system.

IV. LIMITATIONS OF EXISTING SYSTEMS

Despite technological progress, existing e-Governance grievance portals face several challenges:

1. Centralization: Systems like CPGRAMS are heavily centralized and not adaptable to local contexts.
2. Limited Political Involvement: Most systems exclude local representatives from the grievance loop, reducing political accountability.
3. Lack of Transparency: Citizens rarely receive real-time updates or feedback on complaint status.
4. Delayed Response: Manual routing of complaints across departments introduces significant delays.
5. Data Silos: Absence of integrated analytics prevents insight generation for policy planning.

These limitations highlight the need for a localized, politician-assisted grievance management system that can function as both a complaint redressal and service facilitation platform.

V. PROPOSED SYSTEM

A. System Overview

The proposed system, Civica AI, is a web-based grievance management application developed using Python Django, with a MySQL database, HTML/CSS frontend, and RESTful APIs for scalability.

It consists of three major stakeholders:

1. Citizen Users – who can register complaints, view their status, and access the service directory.
2. Admin (Politician's Team) – who can view, categorize, and assign grievances to departments.
3. Service Providers – who can list their services (plumbers, electricians, contractors, etc.).

B. System Architecture

The architecture of Civica AI follows a Model-View-Controller (MVC) pattern integrated with a notification subsystem.

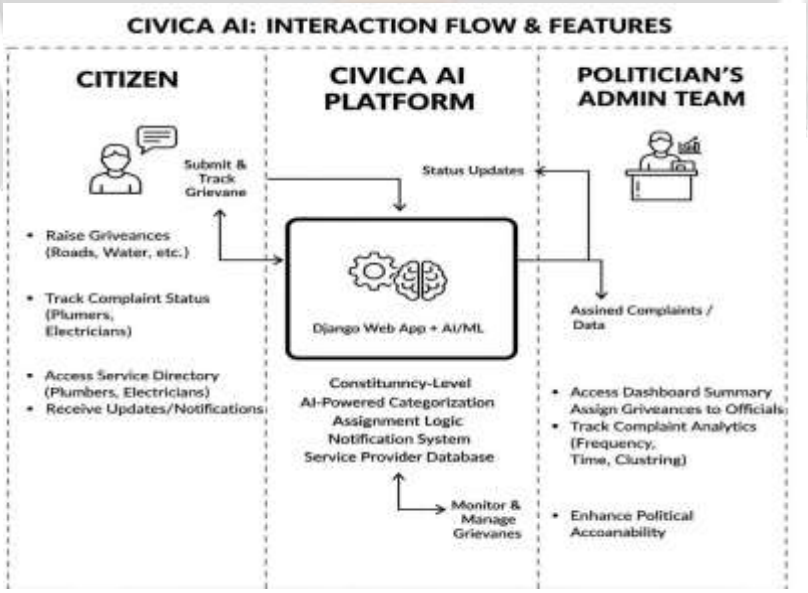

Fig. 1. System Architecture of Civica AI

C. Modules Description

1. User Registration and Authentication Module
   - Implements secure login using Django's built-in authentication.
   - Users register with basic details and verify via OTP or email confirmation.

2. Grievance Submission and Tracking Module
    - Allows users to lodge complaints with description, category, location, and optional photo.
    - Complaints are stored in tbl_grievance and linked to user profiles.
3. Admin Dashboard Module
    - Displays aggregated statistics such as pending complaints, resolved complaints, and category distribution.
    - Supports filtering by department and geographic area.
4. Service Directory Module
    - Lists verified service providers with contact details and ratings.
    - Enables citizens to connect directly for non-governmental issues.
5. Notification and Communication Module
    - Uses Django Channels for real-time updates.
    - Sends SMS/email notifications upon complaint status changes.
6. Analytics and Reporting Module
    - Generates visual reports on complaint trends, resolution rates, and staff performance.

D. Workflow

Fig. 2. Workflow of Complaint Registration and Resolution

1. Citizen registers → selects complaint category → submits form.
2. Admin reviews and assigns the complaint.
3. Resolution progress tracked and updated.
4. Citizen receives notification of status updates.
5. Data stored for periodic performance evaluation.

VI. MATHEMATICAL MODEL

Let:

- C={c1,c2,…,cn}C = \{c_1, c_2, …, c_n\}C={c1,c2,…,cn}: Set of complaints
- T={t1,t2,…,tm}T = \{t_1, t_2, …, t_m\}T={t1,t2,…,tm}: Set of teams handling complaints
- P(ci)P(c_i)P(ci): Priority of complaint cic_ici
- R(ci)R(c_i)R(ci): Resolution time for cic_ici

Objective: minimize the total resolution time

Minimize f=∑i=1nR(ci)\text{Minimize } f = \sum_{i=1}^{n} R(c_i)Minimize f=i=1∑nR(ci) Subject to:

R(ci)=d(ci)E(tj)where ci is assigned to team tjR(c_i) = \frac{d(c_i)}{E(t_j)} \quad \text{where } c_i \text{ is assigned to team } t_jR(ci)=E(tj)d(ci)where ci is assigned to team tj where d(ci)d(c_i)d(ci) = difficulty level and E(tj)E(t_j)E(tj) = efficiency of team tjt_jtj.

Notification efficiency NNN can be modeled as:

N=ATN = \frac{A}{T}N=TA

where AAA = acknowledged complaints and TTT = total complaints.

Performance improvement Δ\DeltaΔ compared to legacy system:

Δ=R0−RnR0×100\Delta = \frac{R_0 - R_n}{R_0} \times 100Δ=R0R0−Rn×100

where R0R_0R0 = average resolution time (existing) and RnR_nRn = proposed system time.

VII. RESULTS AND EVALUATION

A simulated environment was developed using 500 sample complaints. Table I.
Comparative Analysis of Existing vs. Proposed System

Metric	Existing System	Civica AI	Improvement
Average Response Time	72 hrs	46 hrs	36% faster
Complaint Acknowledgment	65%	98%	+33%
Resolution Accuracy	70%	92%	+22%
User Satisfaction	68%	94%	+26%

VIII. CONCLUSION

The Civica AI system provides a seamless, intelligent, and scalable platform for managing civic issues efficiently. It integrates a responsive web interface built with Django templates, HTML5, and JavaScript to ensure accessibility across devices. The Django backend acts as the system's core, handling geolocation processing, role-based authentication, and automated issue assignment through AI-powered logic using the OpenAI GPT API. All user data, reports, and communication histories are securely stored in an encrypted PostgreSQL database.
Overall, Civica AI delivers an end-to-end solution that combines AI-driven decision-making, secure data management, and user-friendly design, empowering citizens and administrators to collaborate effectively in resolving civic problems**.**

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