

Result Paper On Gramnagar live - Humanity in service, Unity in future

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Peer Review Information	Abstract
<p>Type: Article Received: 22 March 2026 Revised: 06 April 2026 Accepted: 24 May 2026 Published: 05 June 2026</p>	<p>Gramnagar Live is an integrated digital platform designed to enhance the efficiency and Connect, Serve, Unite! The project proposes a comprehensive community development platform that bridges the gap between rural and urban are as through digital technology. By lever aging web technologies, mobile applications, and data analytics, Gramnagar Live aims to create a unified ecosystem that promotes social welfare, community engagement, and sustainable development. The proposed system involves developing an integrated platform that connects local authorities, service providers, and community members to address various social challenges including healthcare access, education, employment opportunities, and disaster management. This project not only addresses the need for digital transformation in rural communities but also contributes to the fields of social computing and community-driven development.</p>
	<p>Keywords: Smart Waste Management; Machine Learning; Cleanliness Monitoring; Citizen Engagement Platform; Geospatial Hotspot Detection.</p>

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Introduction

Gramnagar Live is more than just a technological solution; it is a community-centric digital platform developed to bridge the widening digital divide between rural and urban areas. In many regions, rural communities continue to face challenges in accessing essential services, information, and digital resources. This platform aims to address these issues by fostering inclusivity, connectivity, and collaboration among all stakeholders. Rural areas often encounter significant obstacles such as limited access to healthcare and education, inadequate coordination among administrative bodies, and a lack of transparency in governance. Gramnagar Live addresses these challenges by leveraging web and mobile technologies, supported by data-driven insights, to build smarter and more connected communities.

The project is guided by two fundamental principles: “Humanity in Service” and “Unity in Future.” These principles emphasize inclusive growth, trust-building, and community empowerment. The platform focuses on key development sectors including healthcare, education, employment and skill development, disaster management, and public participation.

Literature Survey

According to the authors Shridevi Chitti et al., this paper focuses on developing an IoT-based smart waste monitoring system for sustainable urban management. The major problem addressed in this research is the rapid increase in waste production due to population growth and improper waste disposal practices, which create environmental and health problems. The proposed system uses smart bins equipped with ultrasonic sensors connected to an Arduino microcontroller to monitor garbage levels in real time. The data is transmitted through wireless networks with GPS integration, and a mobile or web dashboard helps authorities track waste collection efficiently. The future scope includes integrating Artificial Intelligence for predictive waste collection, automated route optimization, and using autonomous vehicles for garbage collection. [1]

The research paper by Md. Arafatur Rahman et al. discusses an IoT-enabled garbage management system designed for smart cities. The main issue addressed is the unfair distribution of workload among garbage trucks, which leads to inefficiency in waste collection services. The system uses IoT-based smart bins with LoRa communication technology and fairness-based vehicle routing algorithms to balance garbage truck utilization. The future scope includes implementing AI-driven dynamic routing and deploying the system in larger metropolitan cities for improved waste management. [2]

According to Tsung Hsun Wu and Pei-Yin Chen, this research focuses on improving the efficiency of electric garbage compactor trucks. The problem addressed is the excessive fuel consumption and pollution caused by conventional garbage trucks during compression operations. The authors designed a Battery Management System using the Nuvoton Cortex-M4 chip to monitor battery performance through State of Charge and State of Health estimation methods. The future scope includes improving battery management algorithms and expanding the system to full electric waste collection fleets. [3]

The research by Muhammad Saad et al. proposes a blockchain-based smart waste management system integrated with Vehicular Ad-hoc Networks (VANET). The study addresses the challenges of inefficient waste collection, lack of transparency, and delayed services in traditional waste management systems. The proposed system uses IoT sensors to detect waste levels and blockchain technology to ensure secure and transparent communication between waste bins, collection vehicles, and municipal authorities. The future scope includes integrating AI-based predictive analytics and expanding the system to large smart city infrastructures. [4]

According to Deepti Aggarwal, Sonu Mittal, Kamal Upreti, and Pinki Nayak, this research introduces a reward-based garbage monitoring system that encourages citizens to maintain cleanliness. The study addresses the problem of improper garbage disposal near water bodies, which contributes significantly to environmental pollution. The proposed system utilizes IoT sensors, Arduino microcontrollers, and a mobile application integrated with QR code-based reward mechanisms to motivate citizens to dispose of waste responsibly. The authors suggest that future enhancements should focus on improving the durability of smart bins and expanding the reward-based waste management system across multiple cities [5].

The research conducted by Eunice Likotiko, Yuki Matsuda, and Keiichi Yasumoto focuses on improving waste classification in smart bins. The problem addressed is the limited capability of existing smart waste bins to classify different types of garbage accurately. The proposed Smart Garbage Bin System uses IoT sensors combined with machine learning algorithms to identify and classify garbage types automatically. The future scope includes expanding datasets for improved classification accuracy and adding anomaly detection capabilities for better waste monitoring. [6]

According to Xiaoning Shen et al., waste collection operations consume significant energy due to inefficient routing strategies. The research proposes an optimization model using Contribution-based Adaptive Particle Swarm Optimization to create energy-efficient multi-trip waste collection routes. This method helps reduce fuel consumption and environmental pollution. The future scope includes testing the model with real-world datasets and integrating traffic data for better route planning. [7]

The study by R. Patel et al. focuses on developing a smart waste monitoring system using IoT sensors and Artificial Intelligence. The problem addressed is the inefficiency of fixed waste collection schedules, which often leads to overflowing garbage bins. The system uses IoT sensors to monitor waste levels and AI algorithms to optimize garbage collection routes dynamically. The future scope includes large-scale deployment in smart cities and integration with electric vehicle fleets. [8]

According to Shiyu Cai et al., this research focuses on improving database performance in systems that use Non-Volatile Memory. The main problem addressed is the high latency and overhead caused by garbage collection processes in conventional database systems. The proposed solution uses advanced garbage collection techniques and data recovery mechanisms to improve system performance. The future scope includes faster garbage collection algorithms and integration with cloud-based distributed databases. [9]

The review paper by Inna Sosunova and Jari Porras discusses various IoT-based waste management solutions used in modern smart cities. The system uses IoT sensors, cloud platforms, and web-based dashboards to manage waste collection efficiently. The future scope includes integrating Artificial Intelligence for predictive waste generation analysis and improving interoperability among smart city systems. [10]

Proposed System

The proposed system, Gramnagar Live, is designed as an integrated digital platform to enhance the delivery of citizen-centric services in rural and semi-urban areas. It provides an online interface through which citizens can easily access various government services without the need for physical visits to local administrative offices such as the Gram Panchayat. Users can register, log in, and apply for essential services including certificates, tax-related information, and grievance submission.

The system incorporates a digital record management module, which maintains structured and centralized data of citizens, government schemes, and village-level information. This significantly reduces paperwork, improves data accuracy, and ensures efficient storage and retrieval of information. Additionally, the platform features an online complaint registration system that allows citizens to report local issues such as water supply, sanitation, road conditions, and electricity problems. These complaints can be tracked and managed by authorities in real time, ensuring timely resolution and improved accountability.

Furthermore, the system provides comprehensive and updated information on government schemes, enabling citizens to check eligibility criteria and apply directly through the platform. This enhances transparency and increases awareness about available benefits. The admin management module empowers government officials to oversee and control system operations, including managing citizen data, processing applications, updating scheme details, and monitoring overall activities.

To strengthen communication, the system includes a real-time notification and result mechanism, through which users receive instant updates regarding application status, approvals, and new announcements. Overall, the proposed system improves coordination between citizens and authorities, enhances service delivery efficiency, and promotes transparent and responsive governance.

System Architecture

The architecture of Gramnagar Live is built around a microservices-based model, allowing the platform to be highly scalable, easy to maintain, and adaptable to the unique needs of The design ensures clear separation of responsibilities, efficient data flow, and seamless integration of AI/ML models for content analysis and visualization.

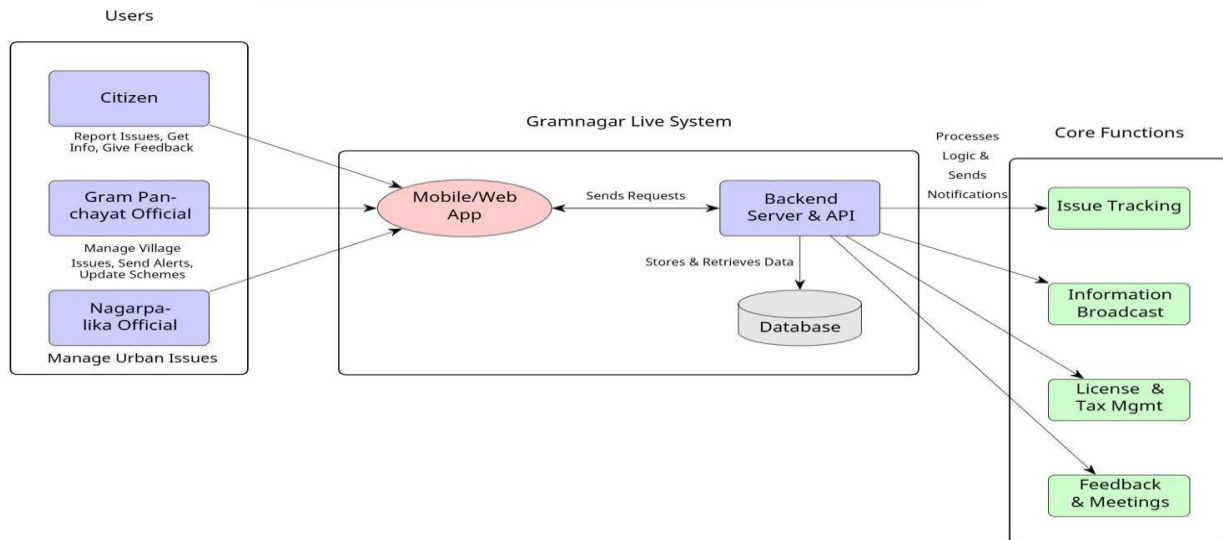


Fig. 1. System Architecture

The Gramnagar Live platform is designed as a hybrid, multi-service system that combines web and mobile access with a scalable backend and flexible data management. The architecture leverages React for the frontend web application, React Native for mobile applications, and a hybrid database approach with MongoDB and PostgreSQL, ensuring high performance, data integrity, and cross-device accessibility.

Implementation Details

The implementation of the proposed Gramnagar Live system was carried out using modern web technologies, ensuring high performance, scalability, and user accessibility. The system follows a modular architecture consisting of frontend, backend, database, and communication layers, enabling efficient interaction between users and services. The frontend of the system was developed using React with TypeScript, providing a component-based architecture with improved code reliability and maintainability. The use of Vite significantly enhanced development speed through fast server startup and efficient hot module replacement. Communication between the frontend and backend was handled using Axios, ensuring smooth data exchange.

The user interface was designed using CSS, resulting in a responsive and consistent design across devices. For visualization of analytical data, Recharts was used, while Lucide enhanced the overall UI experience. The backend was implemented using FastAPI, which provided high-speed API processing and automatic API documentation support. The system demonstrated efficient handling of multiple API requests, ensuring quick response times for operations such as authentication, complaint submission, and data retrieval. Data validation and serialization were performed using Pydantic, ensuring consistency and correctness of data exchanged between client and server.

For database management, SQLite was used due to its simplicity and ease of deployment. The database structure included tables such as users, complaint records, and monitoring data. Interaction with the database was handled using SQLAlchemy, which enabled efficient data operations using object-oriented methods. Secure authentication was implemented using JSON Web Token, ensuring that only authorized users could access protected system functionalities.

Results Analysis Discussion

The evaluation of the proposed Gramnagar Live system demonstrates significant improvements over traditional governance and service delivery methods. The system effectively addresses key limitations observed in existing manual and semi-digital systems by introducing a fully integrated digital platform.

In terms of service access, the results indicate that the proposed system reduces dependency on physical visits to government offices. Citizens are able to access services such as applications, certificates, and information online, resulting in time savings and improved convenience. This shift from manual to digital processes enhances overall service efficiency and accessibility.

With respect to communication, the system shows a notable improvement through the implementation of real-time notifications. Unlike traditional methods that rely on offline or delayed communication, the proposed platform provides instant updates regarding applications, services, and government announcements. This ensures timely information delivery and reduces communication gaps between citizens and authorities. The complaint tracking mechanism introduced in the system significantly enhances transparency and accountability. In contrast to existing systems where tracking is limited or unavailable, users can monitor the status of their complaints in real time. This feature improves trust in the system and ensures that issues are addressed more efficiently.

Furthermore, the platform promotes increased community participation by providing an interactive digital interface. The results suggest that citizens are more engaged in governance activities as they can easily communicate with local authorities, submit feedback, and participate in decision-making processes. This leads to stronger collaboration between the community and administrative bodies.

In terms of governance transparency, the use of digital records and centralized data management improves monitoring and accountability. Unlike traditional systems with limited visibility, the proposed system enables clear tracking of activities, service requests, and administrative actions. This enhances trust and reliability in governance processes.

Overall, the results demonstrate that the Gramnagar Live system provides a more efficient, transparent, and participatory governance model, making it a suitable solution for modernizing rural and semi-urban administrative systems.

Results

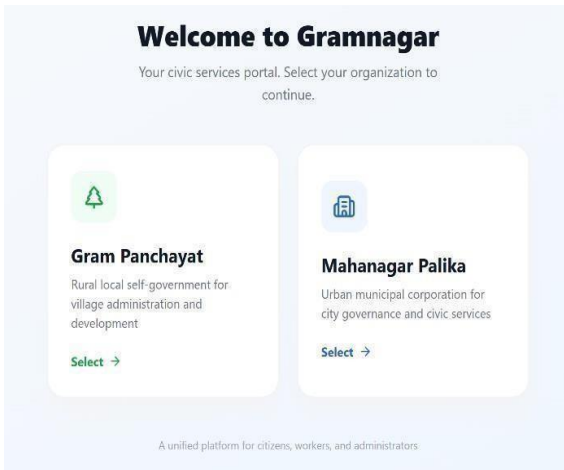


Fig. 2. Homepage

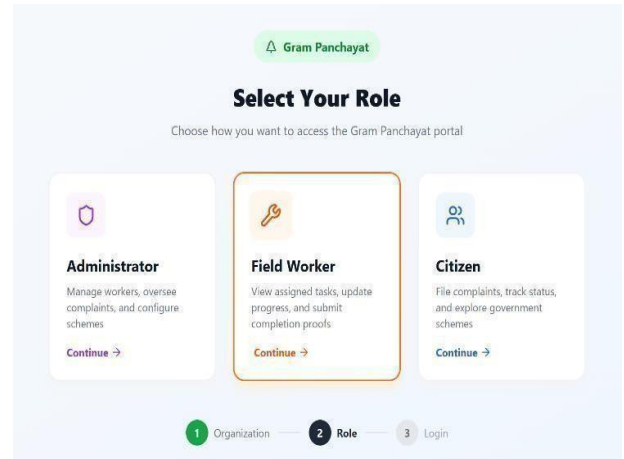


Fig. 3. Role

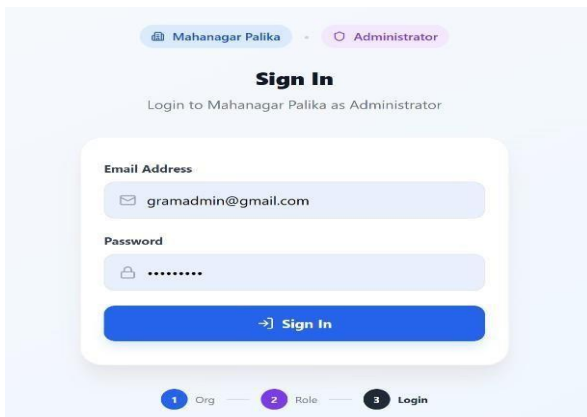


Fig. 4. Sign In Page

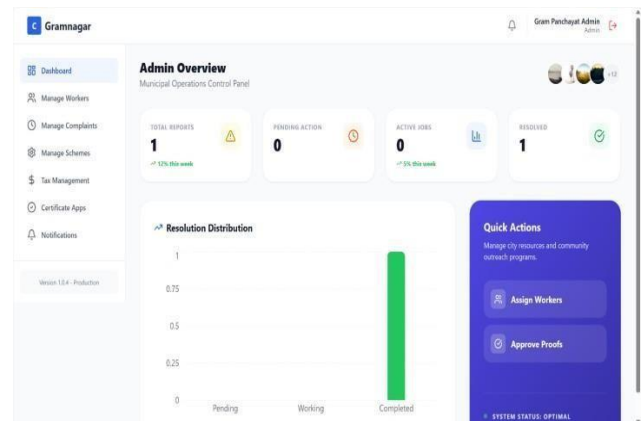


Fig. 5. Admin Page

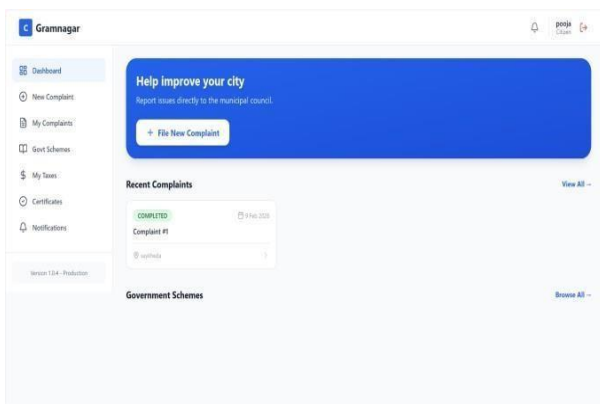


Fig. 6. Citizen Page

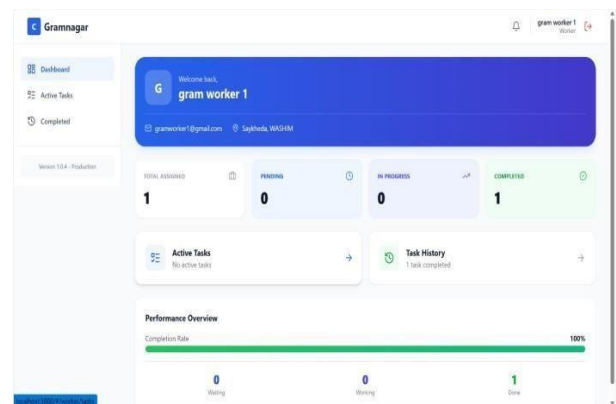


Fig. 7. Worker Page

Conclusion and Future Work

Conclusion

The Gramnagar Live system provides a unified web-based platform that connects citizens, local authorities, and service providers in a single digital environment. The main objective of the system is to improve communication, service accessibility, and transparency in local

governance. Through the website, citizens can easily access information about government schemes, submit complaints, and track the status of their applications. The system reduces manual work and paperwork by digitizing important services of Gram Panchayat and municipal administration. By providing a centralized online platform, the Gramnagar Live system enhances efficiency, accountability, and citizen participation in local governance. Overall, the proposed system contributes to the development of a smart and digitally connected rural administration system.

Future Work

The proposed Gramnagar Live system can be further enhanced by integrating Artificial Intelligence (AI) for predictive analytics and improved decision-making. Future development may include cloud deployment to support scalability and large-scale data management. A dedicated mobile application can be developed to increase accessibility for rural users. Additionally, integration with other government services and digital platforms can expand system functionality and provide a more unified service ecosystem.

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