International Journal of Engineering & Extended Technologies Research (IJEETR)

|ISSN: 2322-0163| www.ijeetr.com | A Bimonthly, Peer Reviewed, Scholarly Indexed Journal |

| Volume 8, Issue 2, March - April 2026 |

DOI:10.15662/IJEETR.2026.0802129

Vikaspath: Crowdsourced Civic Issue Reporting and Resolution System

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Publication History: Received: 25.02.2026; Revised: 20.03.2026; Accepted: 25.03. 2026; Published: 28.03.2026.

ABSTRACT: The rapid expansion of urban areas has heightened the intricacy of civic management, resulting in ongoing issues such as traffic congestion, infrastructure breakdowns, waste overflow, and disturbances related to crowds. Traditional civic grievance systems tend to be reactive, disjointed, and lacking in transparency, which leads to slow responses and a decline in public trust. This paper presents Vikas Path, an AI-driven urban intelligence platform aimed at facilitating real-time, citizen-focused, and predictive city management. The system consolidates various inputs—including images, text, voice, and geolocation—through a single mobile application. Utilizing computer vision, natural language processing, and data deduplication methods, the platform automatically classifies, verifies, and prioritizes civic issues, while crowd validation improves data accuracy. A conversational interface allows for natural language reporting, and predictive analytics pinpoint potential urban risk hotspots. Experimental findings indicate enhanced classification accuracy, decreased complaint redundancy, quicker resolution times, and heightened civic engagement, underscoring the platform's efficacy in fostering transparent, proactive, and sustainable governance in smart cities.

KEYWORDS: Smart City, Urban Intelligence, Civic Issue Reporting, Multimodal Artificial Intelligence, Agentic Systems, Computer Vision, Natural Language Processing, Predictive Analytics, E-Governance, Crowd Validation

I. INTRODUCTION

Smart cities demand robust, transparent, and responsive systems to monitor, manage, and resolve everyday civic problems that directly influence citizens' quality of life. Urban areas commonly experience issues such as deteriorated roads, faulty street lighting, waste accumulation, water leakage, traffic congestion, and crowd-related safety risks. While residents are typically the first to notice such problems, existing civic reporting and grievance redressal frameworks often fail to convert citizen inputs into timely and effective remedial actions. This disconnect between issue identification and resolution continues to pose a serious challenge for modern urban governance. Conventional grievance handling mechanisms—including telephone calls, email-based complaints, and manual record keeping—are predominantly reactive and fragmented. These approaches frequently suffer from delayed responses, limited transparency, inadequate accountability, and minimal feedback to citizens, leading to a gradual decline in public confidence. Moreover, most traditional systems do not leverage historical data or predictive analytics, which restricts their ability to anticipate future civic issues or optimize resource allocation. As urban populations expand, these shortcomings increasingly undermine efficient civic management. The widespread use of smartphones, improved internet accessibility, and advancements in artificial intelligence and cloud computing have opened new avenues for reimagining civic engagement platforms. Citizens now contribute substantial volumes of real-time urban data in the form of images, text, voice inputs, and geospatial information. However, managing this diverse and unstructured data remains challenging due to redundancy, inconsistencies, and noise. Repeated reporting of the same issue from nearby locations can overwhelm municipal authorities, reducing operational efficiency in the absence of intelligent data filtering and prioritization strategies. Recent progress in artificial intelligence, particularly in computer vision and natural language processing, provides effective tools for addressing these challenges. Computer vision facilitates automated analysis of visual evidence such as damaged infrastructure or overflowing waste bins, while natural language processing enables meaningful interpretation of textual and voice-based complaints. When integrated with

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geospatial analysis, data deduplication techniques, and human-in-the-loop validation, these methods substantially enhance the accuracy, scalability, and reliability of civic issue management systems. Predictive analytics further supports proactive governance by identifying emerging urban risk hotspots before they escalate. Within this framework, this paper introduces **Vikas Path**, an intelligent and agentic urban intelligence platform aimed at enabling real-time, citizen-centric, and transparent civic governance. Through a mobile application, citizens can submit complaints using multiple input modalities—images, text, or voice—which are automatically analyzed using AI-driven processing and GPS-based localization. The reported issues undergo crowd validation to ensure credibility before being routed to municipal authorities via a centralized administrative dashboard. Authorities can then assign tasks, monitor resolution progress, and upload completion evidence, while citizens receive real-time status updates and can track outcomes. The platform also incorporates gamification elements to promote engagement and analytics dashboards to support informed decision-making. By converting dispersed civic complaints into structured, intelligent, and actionable information, **Vikas Path** seeks to improve municipal responsiveness, strengthen citizen participation, and rebuild trust between the public and governing institutions. The proposed system contributes to sustainable smart city development by enabling transparent workflows, proactive urban management, and efficient utilization of public resources.

Figure-1: System Architecture Overview

II. LITERATURE SURVEY

Walwadkar, Dnyanesh; Patil, Jayesh; Hussain, Mujahid; Yadav, Saurav (2022).
Smart Civic Issue Reporting System.
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 1, March 2022. DOI: 10.48175/IJARSCT-2659
Walwadkar et al. proposed a smart Android-based application to simplify the reporting of civic and infrastructure-related issues such as road damage, waste overflow, streetlight failure, and sanitation problems. The system enables citizens to submit complaints using images and GPS-based location data. A hybrid CNN–RNN image processing algorithm along with an SVM–NLP model is used to determine the severity of complaints, ensuring that critical issues receive higher priority. Although the system improves complaint registration and prioritization, it mainly focuses on issue reporting and routing and lacks advanced feedback mechanisms, crowd validation, and predictive analytics for large-scale smart city governance.

Lee, Myeong; Wang, Jieshu; Janzen, Shawn; Winter, Susan (2021).
Crowdsourcing Behavior in Reporting Civic Issues: The Case of Boston's 311 Systems.
Academy of Management Proceedings, 2021(1):16532.
DOI: 10.5465/AMBPP.2021.16532 Lee et al. examined civic issue reporting patterns using Boston's 311 system to analyze how individual behavior and community characteristics influence data contribution. The study highlights biases arising from the digital divide and uneven technology usage, which may result in civic data that does not represent all socio-economic groups equally. While the research provides valuable insights into crowdsourcing behavior and data

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bias, it does not propose an automated AI-based framework for issue classification, validation, or predictive decision-making.

Prasad, Satish Kumar; Patil, Ritesh; Beldare, Sagar; Shinde, Anita.
Civic Complaint Application under Smart City Project.
This paper presents an online civic complaint application designed to reduce the procedural burden associated with traditional grievance systems. The platform allows citizens to submit complaints digitally with minimal effort, improving accessibility and response efficiency. The system emphasizes ease of use and faster communication between citizens and civil servants. However, the approach relies on static workflows and does not incorporate intelligent automation, AI-based analysis, or predictive resource allocation mechanisms.

Kumar, Dinesh.
Smart City App for Citizen Complaint Management.
Avanthi Institute of Engineering & Technology.
Dinesh Kumar proposed a mobile-based smart city application that enables citizens to report civic issues such as potholes, garbage overflow, water leakage, and streetlight failures through a centralized digital platform. The system allows municipal authorities to manage complaints via an administrative dashboard and provides real-time status updates to citizens. While the application improves transparency and engagement, it depends on manual categorization and does not integrate advanced artificial intelligence techniques such as computer vision, natural language processing, or predictive analytics.

Sidlambe, Vaishanvi; Bhalerao, Anushka; Jadhav, Anjali; Dhadake, Swati.
AI-Powered Urban Community Service Hub: A Smart Complaint and Society Management System. This study introduces an AI-powered platform for handling civic complaints and community management tasks. The system integrates image processing, natural language processing, and sentiment analysis to automatically classify complaints and assess urgency. Multimodal inputs such as text, images, and voice enhance accessibility and reduce manual effort for administrators. However, the platform focuses primarily on complaint handling and lacks predictive analytics.

Reddy, Gaddam Tejas; Indravardhan, Galeti; Reddy, Harsha Vardan V; Bhagawati, Kshitij B; Bhulakshmi, Dasari.
Civic Complaint Tracker Using Mobile Application.
This research presents an Android-based civic complaint tracking system that allows users to submit complaints with photographic evidence and GPS-based location tracking. The platform improves accountability by providing predefined complaint statuses such as Pending, In Progress, and Resolved. Although effective in improving traceability, the system does not address duplicate complaint elimination or intelligent prioritization, which can reduce efficiency in high-density urban environments.

Yamuna, Mrs. S.; Akil, R.; Vallikandan, S. K.; Pravanan, Yathindra T. V.
AI-Social Activity: A Web-Based Platform for Civic Issue Reporting. The I-Social Activity platform is a web-based system designed to promote civic engagement by enabling citizens to report public infrastructure issues. The system emphasizes accessibility and simplicity to encourage widespread participation. While it supports transparency and community involvement, the platform relies heavily on manual verification and lacks AI-driven analytics and automation for large-scale urban data processing.

FixMyStreet and PublicStuff.
Crowdsourced Civic Issue Reporting Platforms.
FixMyStreet and PublicStuff are well-established crowdsourced civic reporting platforms that allow users to report civic issues through web and mobile interfaces. Complaints are automatically routed to relevant authorities using geolocation data. Although these platforms demonstrate the effectiveness of crowdsourcing in civic engagement, they lack advanced AI-based classification, predictive analytics, sentiment analysis, and intelligent prioritization features required for modern smart city applications.

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III. PROPOSED DESIGN

Crowdsourced Civic Issue Reporting Platforms.
FixMyStreet and PublicStuff are well-established crowdsourced civic reporting platforms that allow users to r

PROPOSED SYSTEM:

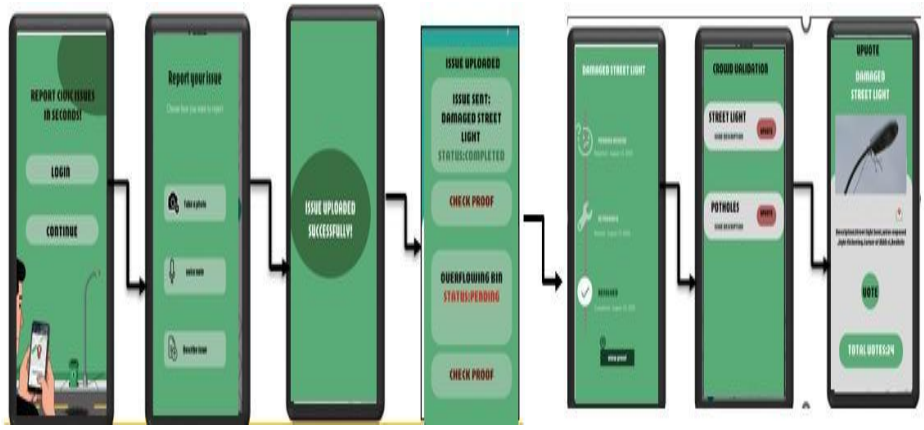

Figure-2: Proposed System Workflow

PROPOSED SYSTEM:
The proposed platform that links residents and local
authorities in real time, the proposed system seeks to streamline the process of reporting civic issues. In order to reduce delays and increase transparency in the resolution of civic issues, the system is intended to do away with the necessity for written complaints or in-person visits to municipal offices.

Figure-3: Citizen Reporting concept

A. Citizens' Issue Reporting

Through a mobile application, citizens can report civic issues. Multiple input modes, including voice input, text description, and image capture, are supported by the application. This adaptability guarantees that people from various backgrounds can submit complaints without encountering any technical challenges. In order to guarantee precise identification of the impacted area, the system immediately uses GPS to record the location once the issue is received.

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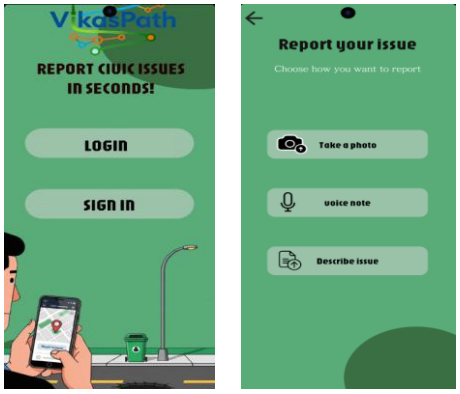

Figure-4: Mobile App User Interface

B. Automated Classification of Issues

An intelligent classification module processes the reported issue after it has been submitted. In order to determine the type of problem—such as potholes, rubbish overflow, broken streetlights, or water leaks—this module examines the submitted data. The system determines an initial priority level based on the indicated category and severity. This automation expedites the complaint management process and lessens manual labor.

C. Validation Through Crowds

The system uses a community validation approach to increase dependability and avoid false or duplicate complaints. Users in the vicinity can examine issues that have been reported and verify their legitimacy by upvoting or performing verification actions. Unverified or inaccurate reports may be rejected, but those that are sufficiently validated are sent to the relevant authorities.

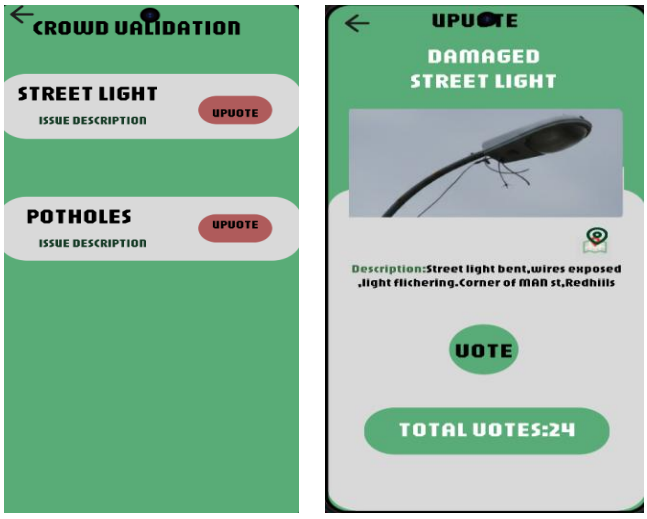

Figure-5: Community Validation Interface

D. Task Assignment and Authority Dashboard

Government officials can view validated complaints on an administrative dashboard. Complete information is available on the dashboard, including the issue type, location, timestamp, and comments from citizens. Officials may designate tasks to field workers or departments in charge of resolution based on availability and priority.

E. Monitoring Resolutions and Submitting Proof

Authorities use the dashboard to upload proof of resolution, such as pictures or completion remarks, after the assigned work is finished. Citizens can monitor the complaint's progress from submission to completion thanks to the system's real-time updates.

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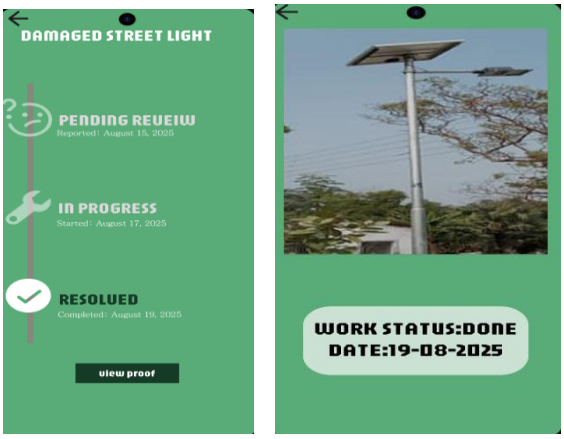

Figure 6: Issue Resolution Tracking

F. Insights and Analytics

Additionally, the system has an analytics module that aids in identifying high-risk areas and recurring problems. Authorities can use this information for better planning, preventive maintenance, and well-informeddecision-making.Long-term advancements in urban infrastructure management are eventually supported by the analytics.

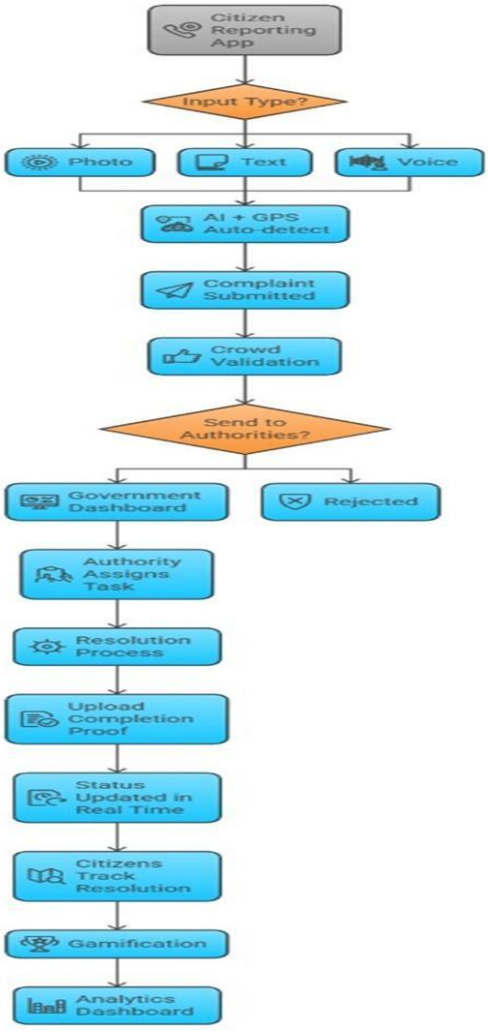

Figure-7: Flow Diagram

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2. TECHNOLOGY STACK

The proposed system is designed using a modular and scalable technology stack to support real-time civic issue reporting, classification, and resolution.

A. Frontend Layer
Mobile App: React Native
Inputs: Camera API, GPS, Voice-to-Text
B. Backend Layer
Server: Node.js
API: REST APIs for data exchange
Authentication: Firebase Auth / OAuth
C. AI & ML Layer
Model: CNN for image classification
Framework: TensorFlow /
Tasks: Issue detection, priority assignment
D. Database & Cloud
Database: Firebase
Cloud Storage: Firebase Storage
E. Dashboard & Analytics
Dashboard: Web-based admin panel
Analytics: Heatmaps, trend analysis

3. PROPOSED ALGORITHM

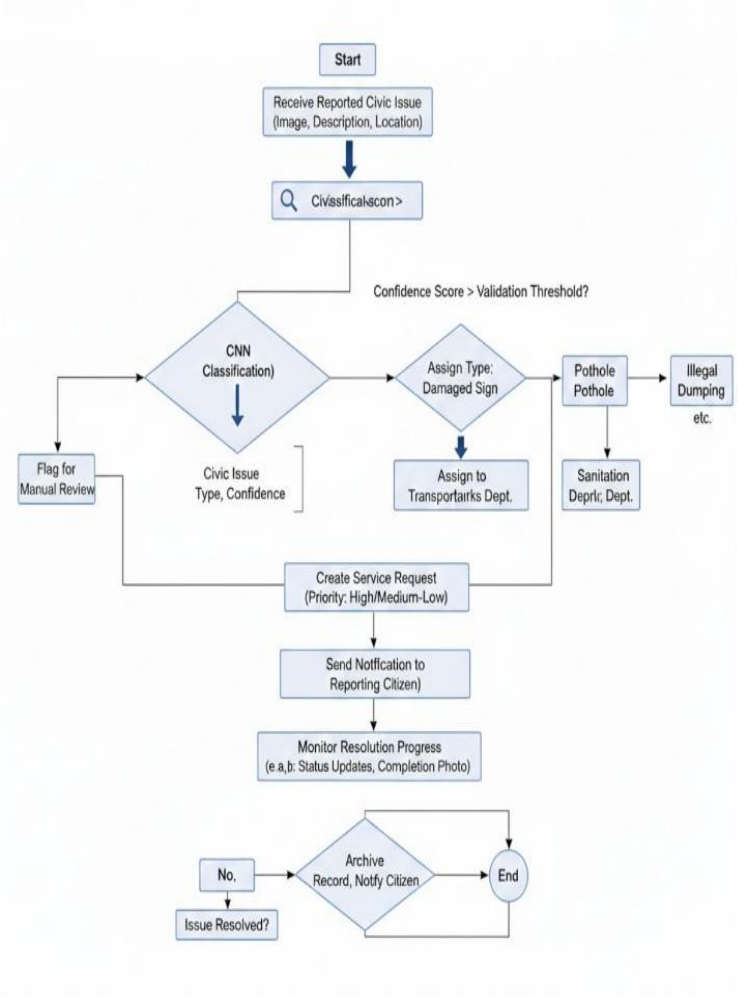

Figure-8: Proposed Algorithm Flowchart

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Algorithm 1: AI-Based Civic Issue Reporting and Resolution
Input: Captured image I, optional text/voice D
Output:Classified issue C, priority level P, resolution status
Steps:
1.User captures image I via mobile application
2.Extract GPS coordinates (lat, long)
3.Preprocess image I (resize, normalize, noise removal)
4.Extract features using CNN model
5.Classify issue type C
6.Assign priority level P based on issue severity
7.Publish issue for crowd validation
8.If validation score ≥ threshold:
9.Forward to authority dashboard
10.Assign task to relevant department
11..Authority updates status S
12.Upload resolution proof image
13. Store data for analytics

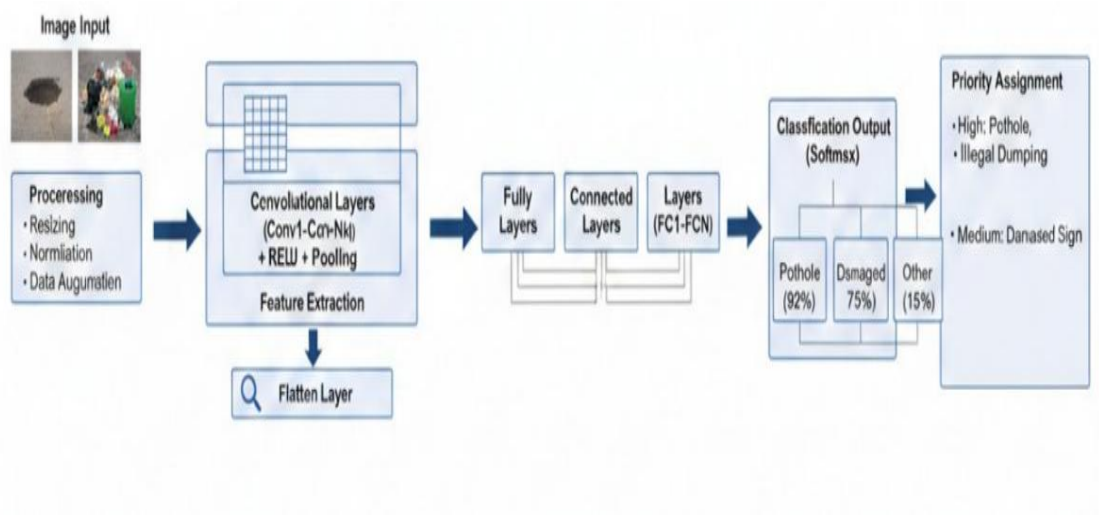

Figure-9: CNN Feature Extraction Process

IV. RESULTS AND DISCUSSION

The Vikas Path system was developed and tested as a prototype to evaluate real-time civic issue reporting, data organization, and administrative support. The system successfully integrates citizen inputs, AI-based issue detection, and centralized monitoring.

Users can report issues like road damage, waste, water leaks, and streetlight faults using images, text, and GPS location. AI modules accurately classify issues, reducing manual work. Duplicate complaint detection minimizes repeated entries. Authorities can track complaints, assign tasks, and update statuses (Received, In Progress, Resolved), while citizens receive real-time notifications, improving transparency and trust.

Predictive analytics helps identify high-risk areas, enabling preventive planning.
From a feasibility perspective, Vikas Path targets municipal bodies and aligns with smart city initiatives. With an estimated cost of ₹5–6 lakhs, it is affordable and scalable for both large and small urban authorities.

The platform improves efficiency for authorities through automation and centralized control, while citizens benefit from easy reporting and transparent tracking. Its modular design using mobile apps, cloud, AI, and geolocation ensures scalability.

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However, success depends on active government participation. Risks include unattended complaints ("Black Hole" issue) and data quality limitations. These are mitigated through real-time updates, alerts, and improved data collection over time.

Overall, Vikas Path enhances efficiency, transparency, and responsiveness compared to traditional systems by transforming unstructured complaints into actionable insights for better urban management.

V. CONCLUSION

In order to improve the reporting, monitoring, and resolution of civic issues in urban settings, this article introduced the Vikas Path, an intelligent and citizen-centric platform. suggested approach successfully overcomes the drawbacks of conventional complaint management systems by fusing real-time citizen inputs with cutting-edge artificial intelligence techniques like computer vision, natural language processing, data deduplication, and predictive analytics. According to the findings, the platform's centralized data administration and real-time status tracking greatly increase transparency, speed up reaction times, and improve citizen-municipal authority collaboration. For both citizens and officials, features including an interactive map, an administrative dashboard, and a chatbot-based interface further improve usability, accessibility, and user engagement. All things considered, Vikas Path promotes proactive, data-driven decision-making, maximizes resource usage, and encourages active civic engagement, all of which support sustainable urban development. The system has the potential to be a foundational paradigm for future smart city programs and is in line with the goal of clean, green, and digitally empowered cities.

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