

OneTap Civic: A Voice-Based Smart System for Single-Problem Complaint Handling

Dharshana R¹, Harini S², Shre Harini AK³, and Dr. D. Nithya⁴

^{1,2,3}UG Students, ⁴Associate Professor, Department of Computer Science and Engineering,
School of Engineering, Avinashilingam Institute for Home Science and Higher Education for Women,
Coimbatore 641108, Tamil Nadu, India

Abstract

Civic issue reporting remains a cumbersome process for most citizens, who are often required to navigate multi-step forms, select from rigid category lists, and manually describe the nature and location of a problem. OneTap Civic, presented within the application under the name NagarSeva, is a voice-first, single-problem civic complaint management platform that allows a user to register a complaint by speaking, with an optional photograph for added context. The system automatically captures the user's location, converts the spoken complaint into text, and applies natural language processing to classify the issue into a predefined civic category such as garbage, water, road, or street lighting. A sentiment-driven priority engine estimates the urgency conveyed in the complaint, while a confidence evaluation module gauges the reliability of the automatic classification and flags ambiguous inputs for closer review. The platform also performs location-aware duplicate-issue detection so that repeated reports of the same problem are linked rather than logged separately. An administrative dashboard presents complaints on an interactive map with category filters, status tracking, and downloadable reports, while citizens can track their own submissions from a dedicated tracking view. The bilingual English-Tamil interface and minimal interaction model are intended to widen accessibility for users who find text-heavy reporting systems difficult to use.

Key Words — *Voice-Based Complaint Reporting, Civic Issue Management, Speech-to-Text, Natural Language Processing, Sentiment Analysis, Priority Detection, Confidence Scoring, Duplicate Detection, Smart City.*

I. INTRODUCTION

Reliable civic infrastructure management depends on issues such as uncollected garbage, water leakage, damaged roads, and non-functional street lighting being reported quickly and routed to the right authority. Most civic complaint platforms in current use, however, are built around multi-step text entry: the citizen must select a category from a long list, type a description, and in some cases manually pin a location before the complaint is registered. This workflow assumes a level of comfort with digital forms and written description that does not hold for all sections of the population, including elderly residents, users less fluent in written English, and citizens reporting an issue while in transit or in poor lighting. The result is under-reporting of genuine civic issues and inconsistent prioritisation once they are reported.

Existing systems are also largely silent on two further dimensions: the urgency conveyed by the complainant and the reliability of any automatic classification applied to the complaint. A pothole described in alarmed language and a minor, low-urgency garbage complaint are frequently treated identically by systems that classify content alone, without

weighing tone or context. OneTap Civic is proposed to close this gap with a voice-driven, single-problem interaction model, supported by automatic classification, sentiment-based prioritisation, and confidence-aware decision-making, so that civic issue reporting can be made faster, simpler, and more dependable for the citizen while giving administrators richer, more trustworthy data to act on.

II. LITERATURE SURVEY

A focused survey of recent work on civic complaint platforms, NLP-based classification, and sentiment-aware feedback systems was conducted to position the proposed work. Eight representative studies were reviewed. Key observations follow.

Khan et al. [1] proposed Civic Dock, a multimodal complaint system that combines voice, text, and image input with automatic classification and routing, serving as the base paper for this work. The system demonstrates the value of flexible input capture but supporting multiple input modes simultaneously increases interaction complexity for the user, a friction point OneTap Civic is designed to remove through a single, voice-first submission path.

David [2] presented FixMyCity, a mobile-based reporting system that uses GPS tagging and image upload to localise civic issues. While effective for geo-tagging, the platform still depends on manual text entry to describe the issue, leaving the core reporting effort largely unchanged for the citizen.

Walwadhar [3] developed a Smart Civic Issue Reporting System that performs GPS-based sensing on a mobile device combined with image capture. The system remains dependent on typed input alongside the image, which limits its accessibility for users who find text-based description difficult.

Kumar et al. [4] applied NLP to automatically classify typed complaint text in a smart city application for citizen complaint management. The approach is limited to text input and offers no voice-based interaction, restricting its use for citizens who prefer or need to report issues by speaking.

Patel et al. [5] built a Speech Recognition-Based Smart Complaint System that converts spoken complaints to text via speech recognition. The system demonstrates the feasibility of voice-driven reporting but lacks sentiment analysis or priority-based handling, so all complaints are treated with equal urgency regardless of tone.

Reddy et al. [6] proposed a Cloud-Based Framework for Smart Complaint Management System, offering a cloud architecture for storing and managing complaint records. The contribution is backend-focused and lacks intelligent content processing, leaving classification, prioritisation, and reliability assessment unaddressed.

Verma et al. [7] introduced a Hybrid Machine Learning Model for Complaint Categorization that combines multiple ML algorithms to improve classification accuracy. The approach is

computationally heavy and not user-centric, making it less suited to a lightweight, citizen-facing reporting workflow.

Singh et al. [8] applied sentiment analysis to gauge urgency in public service feedback using machine learning. The technique works on feedback only and is not integrated into a complaint pipeline, so its urgency-detection capability is not connected to complaint classification, storage, or routing.

The surveyed literature shows that voice input, image-based context, geo-tagging, NLP-based classification, and sentiment analysis have each been explored individually, but no single system combines all of these with a confidence-aware decision layer and duplicate detection in one low-friction interaction model. Systems supporting multiple input modes, such as the base paper [1], tend to increase interaction complexity rather than reduce it, while text-only or feedback-only systems leave voice users and urgency signals unaddressed. OneTap Civic is positioned to address this gap by combining a single voice-first interaction path with classification, sentiment-driven prioritisation, confidence evaluation, and duplicate detection within one streamlined complaint pipeline.

III. OBJECTIVES

Several citizens who wish to report a civic issue such as uncollected garbage, water leakage, a damaged road, or a non-functional streetlight feel a significant gap between the problem they want to report and how much effort the reporting process demands of them.

Due to the nature of the complaint systems presented to citizens today, further widening the gap, many of these systems are multi-step and text-intensive, requiring category selection from long lists and manual typed description before a complaint is even registered. They rarely indicate how reliable the system's own classification is, nor do they assess the urgency conveyed in the complaint itself.

OneTap Civic will address this gap by offering a voice-first civic complaint reporting system centred on a single problem per submission; fast, low-effort complaint submission with optional image support and automatic location capture; automatic classification and category-based routing of complaints; sentiment analysis and priority detection so urgent issues are surfaced first; confidence evaluation and duplicate detection to improve the reliability of stored complaint data; and a bilingual, minimal-interaction interface to enhance accessibility for all citizens.

IV. EXISTING SYSTEM

Existing civic complaint systems typically support multimodal inputs such as text, image, and voice. However, these systems involve complex user interactions and require multiple steps for complaint submission. Most systems rely on manual or semi-automated classification and lack a user-centric design. Additionally, they do not provide mechanisms to evaluate the reliability or confidence of the processed complaints, which limits their overall effectiveness and leaves administrators with little basis to triage incoming reports.

V. PROPOSED SYSTEM

The proposed system, OneTap Civic, is a one-tap, voice-first intelligent civic complaint platform designed to simplify user interaction while enhancing decision-making capability on the administrative side. It enables users to submit a complaint using voice input, supported by an optional image upload for

additional context, with the device location captured automatically. The system integrates automatic classification, sentiment analysis, priority detection, confidence evaluation, and location-aware duplicate detection to ensure accurate and efficient complaint handling. A bilingual English-Tamil interface and a focus on a single problem per submission keep the interaction model minimal, improving accessibility, usability, and overall system performance.

VI. SYSTEM ARCHITECTURE

A. Block Diagram

The system architecture, shown in Fig. 1, organises the platform into seven cooperating components. The user interacts with the system through the Voice & Image Input module, which forwards the captured complaint to the Classification Module. Output from classification feeds two parallel stages: Sentiment Analysis & Priority Detection, which derives an urgency level from the complaint text, and Confidence Evaluation, which scores the reliability of the classification. Verified complaint records are persisted in the Database, from where the Admin Dashboard retrieves data for review and the Tracking System exposes status updates back to the citizen.

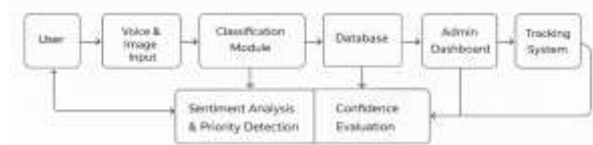


Fig. 1. Block diagram of the OneTap Civic system

B. Data Flow Diagram

The data flow diagram in Fig. 2 traces a complaint from capture to resolution. The user's voice, and optionally an image, is converted to text and passed through Processing & Classification. The Sentiment & Priority Detection stage assigns urgency based on keyword and sentiment cues, while Confidence Evaluation rechecks classification accuracy before the record reaches the Database, which stores and updates complaint information. The Admin stage displays, updates, and manages complaints, and monitors complaint resolution and status on behalf of the citizen.

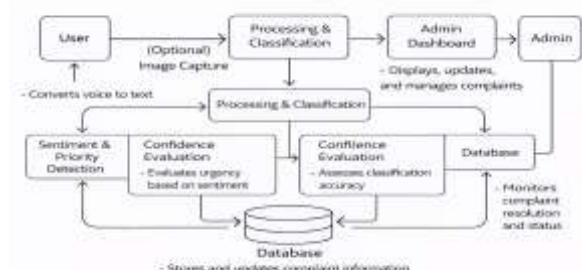


Fig. 2. Data flow diagram of the OneTap Civic system

VII. METHODOLOGY

The implementation is organised into four sequential phases: (1) Input and Preprocessing, (2) Classification and Analysis, (3) Confidence Evaluation and Storage, and (4) Admin Processing and Tracking.

A. Input and Preprocessing

The system begins with user interaction through a simple bilingual interface, shown in Fig. 3. The user submits a complaint using voice input and has the option to upload an image for added clarity. The application automatically captures the user's location to associate the complaint with a specific area. The recorded voice input is converted into text using speech recognition, and the resulting text is further processed to extract keywords relevant to the complaint.



Fig. 3. Bilingual problem-selection and location-capture screen

B. Classification and Analysis

The processed text is used to automatically classify the complaint into a predefined category such as garbage, water, road, or light, identifying the type of civic issue reported. The system then performs sentiment analysis on the same text to gauge urgency. Based on the detected keywords and sentiment, a priority level is assigned so that critical issues are surfaced for faster handling.

C. Confidence Evaluation and Storage

After classification, the system computes a confidence score that reflects how reliable the assigned category is, improving the overall trustworthiness of the pipeline. Ambiguous or unclear inputs are flagged rather than silently misclassified. All complaint details, including category, priority, confidence score, image, and location, are stored in the database. Submissions are additionally checked against existing records using location proximity, so that two reports of the same underlying issue in the same area are linked as a duplicate rather than treated as separate complaints.

D. Admin Processing and Tracking

Stored complaints are displayed on the admin dashboard, where authorities can view, filter, and manage submissions, including an interactive map view by category, as shown in Fig. 4. Administrators can update the status of a complaint as it progresses from pending to in-progress to resolved. The system also provides a tracking feature, illustrated in Fig. 6, that lets citizens monitor their own complaint from submission through to resolution.

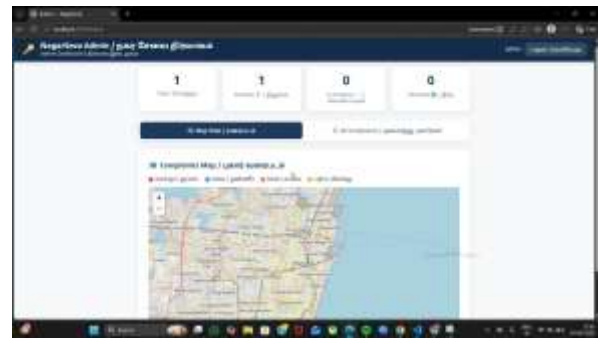


Fig. 4. Admin dashboard with category-wise complaint map

VIII. RESULTS AND DISCUSSION

The implemented prototype was exercised end-to-end across its citizen-facing and administrative interfaces. Fig. 3 confirms that complaint capture works as intended: the bilingual problem-selection screen lets a user pick a category and auto-fetch their current location with a single tap, in keeping with the project's single-problem, low-friction design goal. The admin dashboard in Fig. 4 demonstrates that submitted complaints are correctly geo-plotted and colour-coded by category, with live pending, in-progress, and resolved counters.

The reporting module, shown in Fig. 5, generates date-filtered complaint summaries and exportable PDF reports, supporting administrative review over a selected period. The citizen-facing tracking view in Fig. 6 shows status (pending), priority (high), and an embedded audio clip of the original voice complaint against each submission, and correctly raised a Duplicate Issue flag on a repeated report of the same problem at the same location, confirming that the proximity-based duplicate detection behaves as expected during testing.

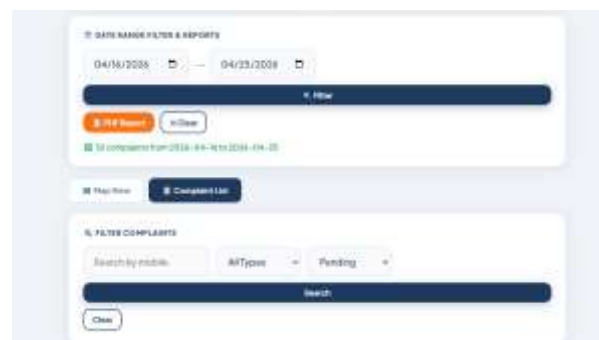


Fig. 5. Date-range filtering and report generation module

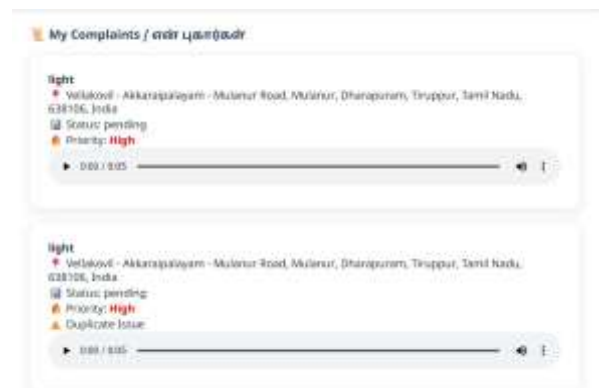


Fig. 6. Citizen complaint tracking view with duplicate-issue flag

Taken together, the results indicate that the core pipeline — voice capture, location tagging, classification, priority assignment, confidence-aware storage, duplicate detection, and

status tracking — functions as a coherent, low-friction reporting loop for a single civic issue at a time.

IX. CONCLUSION

The proposed system introduces a voice-first intelligent civic complaint platform that simplifies user interaction and enhances administrative efficiency. By integrating automatic classification, sentiment-based prioritisation, duplicate detection, and confidence evaluation, the system ensures accurate and reliable complaint handling. The approach improves accessibility, reduces manual effort for the citizen, and supports more effective decision-making for civic authorities, making it well suited to modern smart-city applications.

REFERENCES

- [1] R. Khan et al., "Civic Dock: A Smart, Multilingual, Voice-Text-Image Enabled Platform for Effective Civic Complaint Routing and Tracking," in Proc. IEEE Conf., 2025.
- [2] F. G. David, "FixMyCity: Geo-Based Smart Civic Complaint Management System," Int. J. Scientific Research and Engineering Development (IJSRED), 2021.
- [3] D. Walwadhar, "Smart Civic Issue Reporting System," Int. J. Advanced Research in Science, Communication and Technology (IJARSCT), 2022.
- [4] A. Kumar et al., "A Smart City Application for Citizen Complaint Management using NLP," in Proc. IEEE Conf., 2022.
- [5] M. Patel et al., "Speech Recognition-Based Smart Complaint System," in Proc. IEEE Conf., 2019.
- [6] S. Reddy et al., "Cloud-Based Framework for Smart Complaint Management System," in Proc. IEEE Conf., 2021.
- [7] T. Verma et al., "Hybrid Machine Learning Model for Complaint Categorization," IEEE Access, 2022.
- [8] P. Singh et al., "Sentiment Analysis for Public Service Feedback using Machine Learning," in Proc. IEEE Conf., 2020.