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AI Smart City Issue Reporting System

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Abstract: *Civic grievance handling in most Indian municipal bodies still relies on manual channels — phone calls, ward-office visits, and basic web forms — that store complaints as unstructured text with no automatic categorisation, duplicate checking, or real-time status. This causes slow triage, duplicated staff effort, inconsistent routing, and low citizen trust.The AI Smart City Reporting System addresses these gaps with a full-stack platform built on a FastAPI (Python) backend, a Supabase/PostgreSQL data and realtime layer, and a lightweight vanilla HTML/CSS/JavaScript front end styled to India's UX4G standards. Citizens report issues — potholes, garbage, broken streetlights, water leakages — via web or WhatsApp, submitting text, a photo, and geolocation. The Groq LLM and vision APIs classify each report into a structured summary, category, and severity, while a geo-aware duplicate-detection step prevents redundant work orders and classified incidents are auto-routed to the correct department. Three roles — Citizen, Authority/Admin, and Field Worker — each get a dedicated dashboard. Authorities assign incidents to workers, who resolve them with photo evidence, while Supabase realtime channels push live status updates to all parties. Role-based access and Row-Level Security keep each user's data scoped appropriately.*

Keywords: Smart City, Civic Grievance Redressal, Artificial Intelligence, FastAPI, Supabase, Groq, Duplicate Detection, Realtime Dashboard, e-Governance

1. INTRODUCTION

The AI Smart City Issue Reporting System is a web-based platform built to help people report civic problems fast: potholes, garbage piles, broken streetlights, water leaks, drainage clogs, and the other messes that make city life harder than it should be. The point is plain enough. Citizens get a direct way to send complaints to municipal authorities without the usual detours. It runs on FastAPI (Python) for the backend, uses Supabase/PostgreSQL for the database, and depends on HTML, CSS, and JavaScript for a frontend that works on any device. Old grievance systems are tired and inefficient. Most cities still expect phone calls, clunky forms, or even in-person visits to a municipal office.

Those ways are painfully slow and, honestly, pretty unclear. A lot of complaints get buried, filed wrong, or simply sit there for far too long. After a while, people get annoyed and quit reporting problems, mostly because nothing seems to happen anyway. And once a complaint is submitted, tracking it is a mess. You usually have no idea where it went or who is handling it. The AI Smart City Reporting System fixes that weak spot directly. It uses Artificial Intelligence to handle the tedious part: a Large Language Model (LLM) and an AI Vision Model (through the Groq Inference API) read the written report and inspect uploaded photos. Then the system quickly identifies the issue, judges how serious it looks, writes a useful summary, spots duplicates, and sends it to the correct city department.

That cuts down manual work, trims mistakes, and speeds up responses—exactly what matters when a complaint needs attention. The system is divided into clear layers: presentation, business logic, AI processing, and database. That structure keeps it organized, and honestly, it makes bug fixes or new features much easier later on. It has three main roles. Citizens sign up, submit complaints, upload photos, and track their cases. Authorities review complaints, assign jobs, monitor progress, and pull reports.

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A. Statement of the problem

Most local agencies deal with civic matters in a way that should not cause a tangle. Officials deal with potholes, piles of trash, broken pipes, clogged drains and broken lights every day. Residents wait for answers for long time, staff spend hours just to process complaints and still nothing happens. And that cause problem. People use emails, phone conversations, and even handwritten notes, there is no way to track or organize them. Staff have to go through each one to find out what is wrong, where it goes and who it is to go to. It is slow, takes a lot of energy and time. If you let the backlog then the problem will not get solved and other people too send the same problem that makes even hard to check but still staff will ignore. Many workers occasionally come out to fix the same streetlight.

And routing? That's another mess. Complaints are dismissed or misdirected to the wrong department, until someone steps in. Normally, after filing a complaint, people don't hear anything else, no tracking, no updates, just silence. You can see how trust falls apart. Field workers are responsible for their own messes."Something has to change because the way we are just isn't working.

B. Motivation

Cities keep getting denser, and that pushes pressure onto everything at once: roads, streetlights, water lines, trash collection. City offices are buried in complaints about potholes, overflowing bins, dead lamps, leaking pipes. Most of the time, they still rely on the same tired routine: phone calls, stacks of forms, or those awkward online portals that never feel easy to use. The process drags. Problems get missed. Then a storm hits, or some other disruption, and the system buckles fast. People end up waiting, and frustration spreads.Almost everyone has a smartphone now, and with cheap internet, people can send complaints the second something happens. They take a photo, add a short note, and that's it. Sounds simple, honestly. The real issue is that city systems were never built for this constant stream of messy reports. Someone in city hall still has to read each one, work out the actual problem, decide what matters first, then pass it to the right team. That eats time fast.

II. RELATED WORK

The main goal of the AI Smart City Issue Reporting System is pretty clear: it makes reporting and dealing with city problems easier, quicker, and more transparent.

This platform takes a lot of the headache out of filing and tracking complaints. No more wrestling with slow, outdated systems.

TABLE I. Summary of Literature Reviewed

SOUCES	Key Findings
SmartReporter (2026)	AI classifies and routes complaints.
AI classifies and routes complaints.	AI prioritizes and detects duplicates.
SCIRS (2026)	AI improves complaint analysis.
Crowdsourced Reporting (2026)	Improves transparency and participation.
Risk Analysis (2021)	Generates risk reports.
Image Recognition System (2022)	Uses image and GPS for routing.

A. Limitation and Existing Systems

Before AI people reported problems, but the process crawled along—slow, disconnected, and barely tracked in real time. Delays piled up. Paperwork got heavier. Staff ended up buried in extra work. Public service was always tripping over inefficiencies. Here's how it works: First, everything was manual. People used mobiles to complaint and everything has to be written by hands and then that was distributed , so it will take lot of times. After that the online complaining was in process but still they had to read and then sort things that was also troublesome.

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They routed it manually. Because of that no one knew what projects other teams were working on. To track a complaint moving from one department to another, you had to guess and hope someone would notice. Things didn't improve much either, even with a helpline.

B. Research Gap

A careful review of the literature shows that, although many digital platforms for civic grievance management have been proposed, important gaps still remain. Most systems address only one part of the process: complaint registration, image classification, natural language processing, or location tracking. A few do more, yet very few bring Artificial Intelligence, real-time communication, and role-based workflow management together in a single usable platform. That absence matters. There is little difference between text and image AI remains a major gap in complaint processing. Some studies use computer vision to analyze submitted photos, while others use natural language processing (NLP) to analyze written complaints. Few research actually check both , such that the classification accuracy is improved and the system dependability is increased . This matters for civic reporting because incomplete analysis can seriously hamper follow-up and delay response.

III. THEMES AND SCOPE

A. Goals

Automated Incident Triage.
Duplicate Complaint Detection.
Transparent and Real-Time Complaint Tracking.
Role-based workflow management.
Real-time analytics dashboard.
Multi-language support and WhatsApp complaint submission.

B. Objectives

The primary aim of the **AI Smart City ISSUE Reporting System** is to build an intelligent and efficient platform for managing civic complaints. The project's specific objectives are:
Automated Incident Triage.
Duplicate Complaint Detection.
Transparent and Real-Time Complaint Tracking.
Role-Based Workflow Management.
Real-Time Analytics Dashboard.

IV. SYSTEM ARCHITECTURE PROPOSED

The presentation layer consists of the citizen web application, the authority dashboard, the worker app, and the WhatsApp intake channel, all of which communicate with the backend over HTTPS/REST. The FastAPI application layer exposes endpoints under /api/v1/ for authentication, incident handling, dispatch, and analytics, and delegates business logic to dedicated service modules. The Groq AI inference layer performs text classification and image analysis on demand. The Supabase data layer stores all persistent data in PostgreSQL, enforces access rules through Row-Level Security, stores incident media, and pushes live updates through realtime channels.

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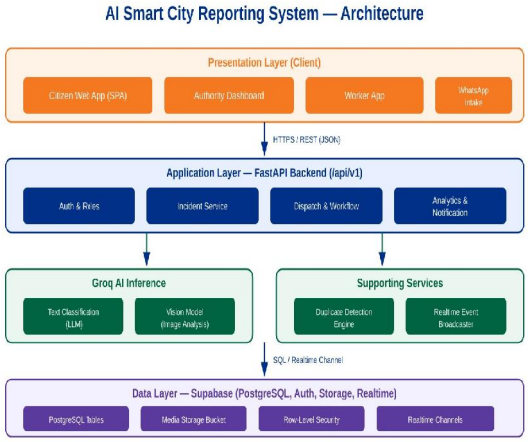

Fig. 1. Layered system architecture .

A. Presentation Layer

The Presentation Layer consists of the citizen web application, the authority dashboard, the worker app, and the WhatsApp intake channel. It provides an interactive web interface through which citizens, administrators, and field workers access the application. All components communicate with the backend over HTTPS/REST..

B. Application Layer

The Application Layer is developed using FastAPI and exposes endpoints under **/api/v1/** for authentication, incident handling, dispatch, and analytics. It processes user requests, implements business logic, manages authentication, and coordinates communication between the frontend, AI services, and database through dedicated service modules.

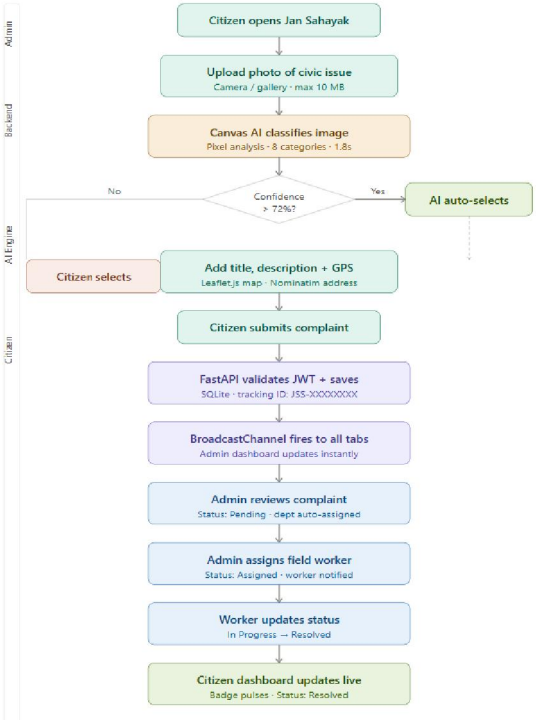

Fig. 2. System flowchart

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C. AI Inference Layer

The AI Inference Layer is powered by the Groq API. It performs intelligent analysis of complaint text and uploaded images to classify incidents, predict severity, and generate structured summaries. Text classification and image analysis are performed on demand.

D. Data Layer

The Data Layer is implemented using Supabase PostgreSQL. It stores user information, complaint records, department details, and status updates. The database enforces access rules through Row-Level Security, stores incident media, and supports authentication and real-time communication through realtime channels.

V. DETAILED DESIGN

The AI Smart City Reporting System is designed using a layered architecture consisting of the Presentation Layer, Application Layer, AI Inference Layer, and Data Layer. Each layer performs a specific responsibility and communicates through well-defined interfaces, reducing dependencies and simplifying development, testing, and future enhancements. This layered design follows the principles of Model-View-Controller (MVC) by separating presentation, business logic, AI processing, and data management, resulting in a flexible, secure, and efficient architecture for the proposed civic grievance management system.

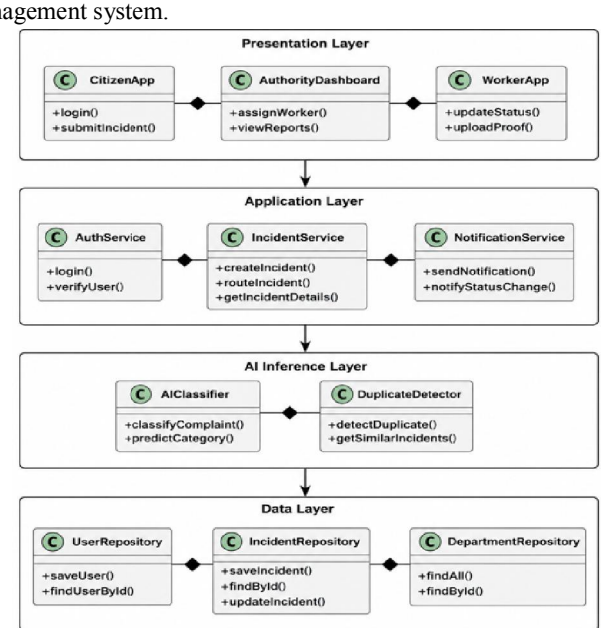

Fig. 3. Class diagram showing the static structure of the detection, response, and data layers.

The Entity-Relationship (ER) Diagram models the core entities of the system: Users (citizens, authorities, workers), Incidents, Categories, Departments, IncidentMedia, StatusHistory, and Assignments. A user reports many incidents; an incident belongs to one category, which maps to one department; an incident can have many media files and many status-history entries; and an incident is linked to a worker through an assignment record.

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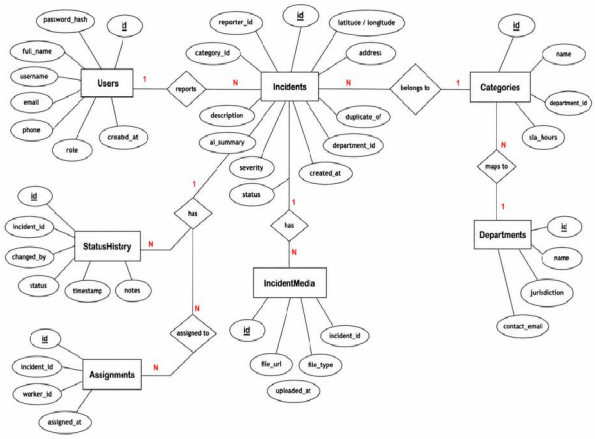

Fig. 4. Entity-relationship diagram of the AEGIES-AUTO database schema.

VI. IMPLEMENTATION

The AI Smart City Issue Reporting System is implemented using Python, FastAPI, Supabase PostgreSQL, Groq API, HTML5, CSS3, JavaScript, and the WhatsApp Business API. FastAPI is used to build RESTful APIs, Supabase provides the PostgreSQL database, authentication, storage, and realtime services, while the Groq API performs AI-based text and image analysis. The system supports complaint registration, AI classification, duplicate detection, department routing, real-time tracking, and analytics.

A. AI Classification and Duplicate Detection

The AI Classification Module uses language models to classify complaint descriptions, predict severity, and generate structured summaries. Image classification analyzes uploaded photos, while duplicate detection compares new incidents with similar active cases in the same area to prevent repeated reports.

B. Complaint Processing

Citizens submit complaints with descriptions, photographs, and location details through the web application or WhatsApp. The system classifies complaints, checks for duplicates, routes them to the appropriate department, assigns field workers, and provides real-time complaint tracking and notifications throughout the resolution process.

C. Authority Dashboard

The Authority Dashboard provides a real-time view of incident numbers, categories, and department workload. It allows authorities to manage incidents, assign work to field workers, manage users and departments, and generate reports on incident counts and resolved incidents.

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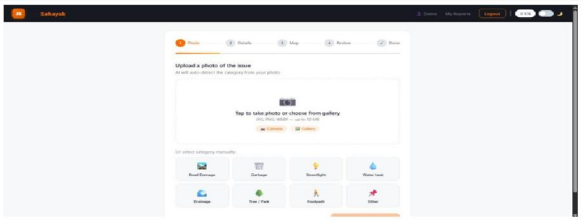

Fig 9.2.2 Citizen Incident Reporting Form

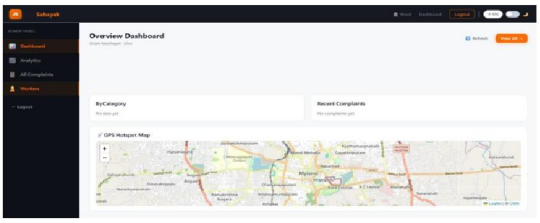

Fig 9.2.3 Authority Dashboard

Fig. 5. Snapshots

VII. USES

The AI Smart City Issue Reporting System is designed to help citizens report civic issues such as potholes, garbage, broken streetlights, water leaks, and drainage blockages. Citizens can submit complaints through the web platform or WhatsApp, upload photographs, provide location details, and track complaint status. Authorities can monitor complaints, assign field workers, generate reports, and manage departments through a centralized dashboard. AI-based complaint classification, duplicate detection, automated routing, and real-time tracking improve grievance management and municipal service delivery.

IX. CONCLUSION AND FUTURE SCOPE

The AI Smart City Issue Reporting System shows, in a fairly direct way, how web technologies, cloud computing, and Artificial Intelligence can reshape civic grievance handling into something more transparent and efficientIts main role was to address the apparent shortcomings of conventional complaint systems like manual classification, paper records, uncoordinated departmental communication and ignorance of the individuals about the status of their complaints. The solution automates the key steps, thereby reducing administrative effort and improving the speed and accuracy of grievance handling. The platform can be used to report potholes, accumulation of garbage, water leaks, drainage blockages, broken lighting and other problems with public infrastructure in a centralized manner.

Although the proposed system handles the core functions of intelligent civic grievance management well, it still has room to grow in ways that matter in practice.Future work should focus on adding more AI techniques, widening the communication channels, improving access for different users, and linking the platform with existing municipal systems so it can work as a fuller digital governance tool. Here specialized mobile apps could be really useful. A strong cross platform option or native Android and iOS apps would give a much faster, more useful interface for field workers and citizens to report grievances, organize tasks, sync data offline and receive quick push alerts without the annoying delays of a web-only configuration. Predictive analytics is another useful approach.

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