

CivicEase: Complaint Registration and Management System for Smart Cities

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Abstract—Rapid urbanization has led to an increase in civic challenges such as damaged roads, waste disposal problems, drainage issues, and other public infrastructure concerns. In many cities, the existing complaint handling process is slow, fragmented, and lacks proper communication between citizens and authorities. To address these limitations, this research presents CivicEase, a web-based civic issue management platform designed to simplify the reporting and resolution of public grievances. The system allows citizens to submit complaints along with image evidence, monitor the progress of their requests, and receive status updates through an intuitive interface. On the administrative side, authorized personnel can review, categorize, prioritize, and manage complaints using a centralized dashboard. The platform is developed using React for the frontend and Supabase for secure authentication, cloud storage, and real-time database operations. The integration of modern web technologies enables efficient data synchronization, improved transparency, and faster response times. By encouraging active citizen participation and streamlining communication between residents and local authorities, CivicEase supports the vision of smarter and more responsive urban governance. The proposed solution demonstrates how digital platforms can contribute to effective public service management and enhance the overall quality of life in urban communities.

Index Terms—CivicEase, Civic Issue Management, Smart City, Complaint Management System, React, Supabase, Real-Time Monitoring, Urban Governance, Citizen Participation, Web Application, Cloud Computing, Digital Public Services.

I. INTRODUCTION

Cities today face a growing number of public issues, including damaged roads, improper waste disposal,

water supply problems, drainage failures, and other infrastructure-related concerns. As urban populations continue to increase, managing these issues efficiently has become essential for ensuring a better quality of life and supporting sustainable urban development. Quick identification and resolution of civic problems not only improve public services but also strengthen trust between citizens and local authorities.

Despite technological advancements, many municipal complaint management processes still rely on traditional methods that are often slow, fragmented, and difficult to monitor. Citizens frequently experience challenges when reporting issues, receiving updates, or tracking the progress of their complaints. Similarly, government authorities may struggle with organizing large numbers of complaints, assigning tasks, and maintaining transparency throughout the resolution process. These limitations can lead to delayed responses, inefficient resource utilization, and reduced public satisfaction.

With the rise of smart city initiatives and digital governance, there is an increasing demand for modern platforms that can simplify communication between citizens and administrative bodies. An effective civic issue management system should provide a user-friendly reporting mechanism, real-time status updates, and a structured approach for handling complaints.

To address these requirements, this paper proposes CivicEase, a web-based platform developed to improve the reporting, tracking, and management of civic issues. The system enables users to submit complaints along with relevant descriptions and image evidence, allowing authorities to better understand and verify reported problems. Citizens can monitor the

progress of their complaints through real-time updates, ensuring greater transparency and accountability.

On the administrative side, the platform provides a centralized dashboard that helps officials review, prioritize, and resolve complaints efficiently. The application is built using React for the user interface and Supabase for backend functionalities, including authentication, cloud-based data storage, and real-time database synchronization.

The primary objectives of CivicEase are to simplify complaint registration, enhance communication between citizens and authorities, improve transparency through real-time tracking, and support efficient urban issue resolution. By leveraging modern web technologies, the proposed system contributes to the development of smarter, more responsive, and citizen-centric urban governance.

II. SYSTEM ARCHITECTURE

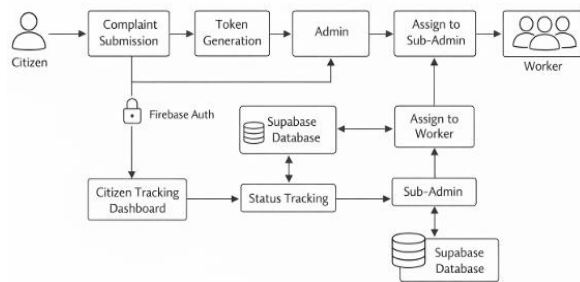


Figure:1 System Architecture

The architecture of CivicEase is designed to provide a structured, secure, and efficient approach to managing civic complaints. The system follows a role-based architecture that connects citizens, administrators, sub-administrators, and field workers through a centralized platform. This design ensures smooth communication, effective complaint handling, and real-time monitoring throughout the complaint lifecycle.

At the user layer, citizens can submit complaints by providing relevant details such as issue category, description, location, and supporting images. Once a complaint is submitted, the system generates a unique complaint ID that allows users to track its progress. Separate dashboards are provided for administrators, sub-administrators, and workers, enabling each role to perform its assigned responsibilities efficiently.

The application layer manages the complete complaint workflow. Administrators review newly submitted complaints and assign them to the appropriate departments. Sub-administrators further distribute tasks to field workers responsible for resolving the reported issues. Throughout this process, complaint status is continuously updated, ensuring transparency and accountability.

The backend of the system is powered by Supabase, which handles database operations, real-time synchronization, and API communication. Firebase Authentication is used to provide secure login and user verification. These technologies ensure reliable communication between users and the system while maintaining data security.

All complaint records, user information, status updates, and related data are stored in a centralized database. Supporting images are securely linked to complaint records, enabling efficient management and retrieval of information whenever required.

A key feature of CivicEase is its real-time tracking mechanism. Citizens can monitor the progress of their complaints through different stages, including Submitted, Under Review, Assigned, In Progress, and Resolved. This feature improves transparency and keeps users informed throughout the resolution process.

Overall, the proposed architecture provides a scalable, user-friendly, and secure framework that improves civic issue management while strengthening collaboration between citizens and municipal authorities.

2.1. Role-Based Workflow Management

The system operates through four primary roles:

- Citizen – Registers complaints and tracks their status.
- Administrator – Reviews complaints and assigns them to the relevant department.
- Sub-Administrator – Manages department-specific complaints and allocates tasks.
- Worker – Resolves issues on-site and updates the complaint status.

This structured workflow ensures efficient task distribution, accountability, and timely resolution of civic issues.

2.2. Complaint Registration and Tracking

Citizens can report issues by selecting a complaint category, entering details, uploading images, and specifying the location. A unique complaint ID is automatically generated for each complaint, allowing users to track its progress from submission to resolution.

2.3. Security and Data Management

Secure authentication is implemented using Firebase Authentication, ensuring that only authorized users can access system resources. Supabase manages data storage, real-time updates, and communication between different system components. This approach ensures data integrity, security, and reliable system performance.

2.4. System Performance Metrics

The effectiveness of CivicEase is evaluated using key performance metrics:

- Response Time – Time required to assign a complaint to the responsible authority.
- Resolution Time – Time taken to completely resolve a reported issue.
- User Satisfaction – Feedback collected from citizens regarding service quality.
- System Availability – Ability of the platform to remain accessible and operational without interruption.

These metrics help measure system efficiency and support continuous improvement in service delivery.

III. IMPLEMENTATION

3.1 Object oriented design

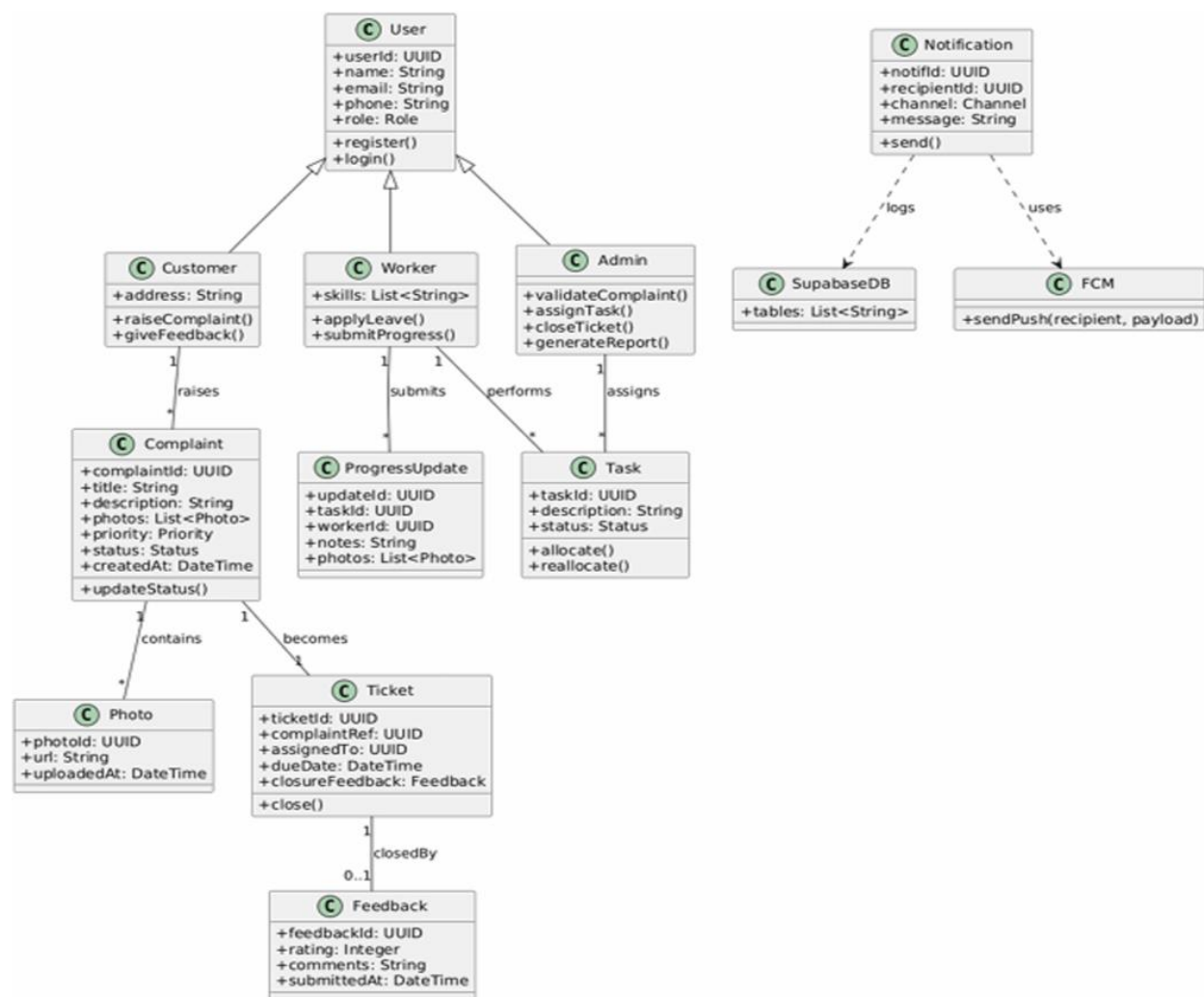


Figure: 2 Class Diagram

3.2 Data Flow Diagram:

A dataflow diagram could be a device for alluding to information movement from one module to the following module as appeared in Figure 3. This chart

gives the information of each module's information. The outline has no control stream and there are no circles at the same time.

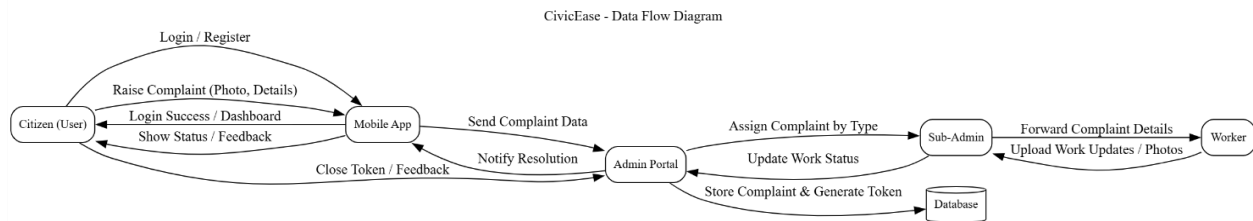


Figure: 3 Data Flow Diagram

3.3 Use Case Diagram:

A Use Case Diagram represents the interaction between different users and the CivicEase system. It illustrates the functionalities available to each user role, including Citizen, Administrator, Sub-Administrator, and Worker. The diagram shows how users interact with the system to perform tasks such as complaint registration, complaint assignment, status tracking, and issue resolution. It provides a high-level view of the system's functionality and helps in understanding the responsibilities of each actor within the complaint management process.

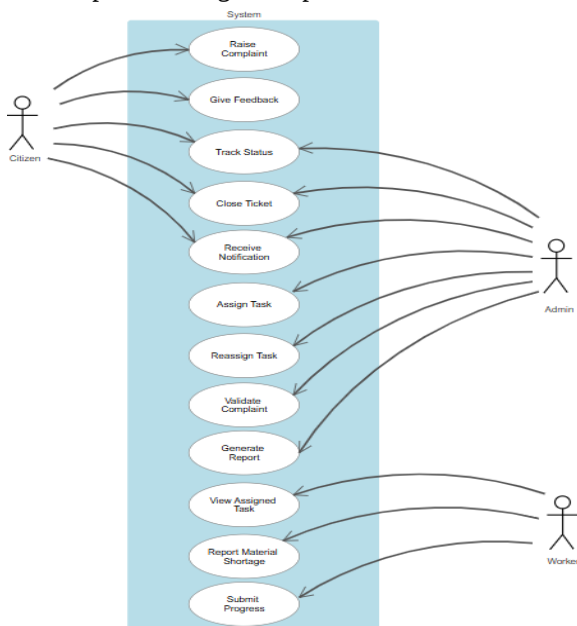


Figure: 4 Use Case Diagram

how messages are exchanged among different actors, including Citizens, Administrators, Sub-Administrators, Workers, and the database. The diagram represents the chronological flow of activities, starting from complaint registration and proceeding through assignment, status updates, and issue resolution. It helps in understanding the order of operations and communication between system components.

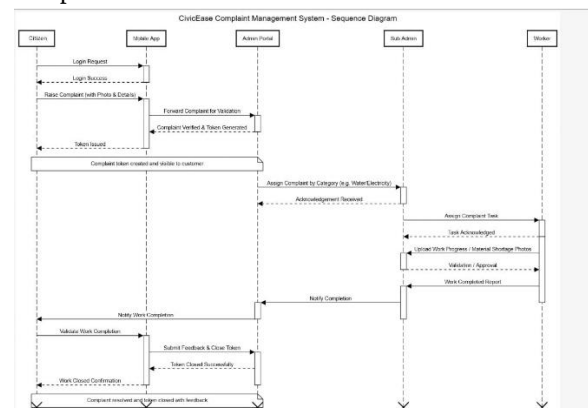


Figure: 5 Sequence Diagram

IV.RESULTS

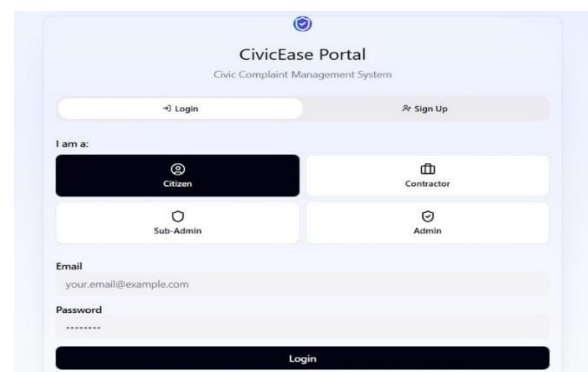


Figure: 6 Log-in Portal

3.4 Sequence Diagram of System Workflow

A Sequence Diagram illustrates the sequence of interactions between users and the CivicEase system during the complaint management process. It shows

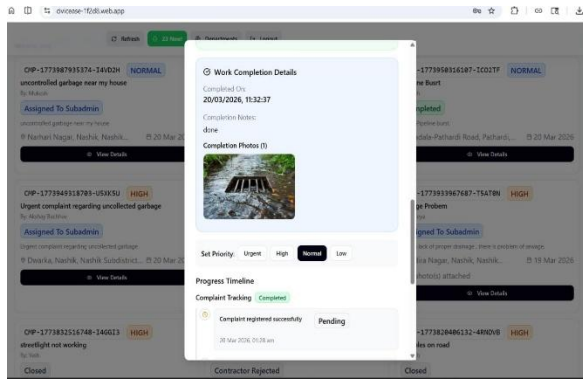


Figure: 7 Registering complaint

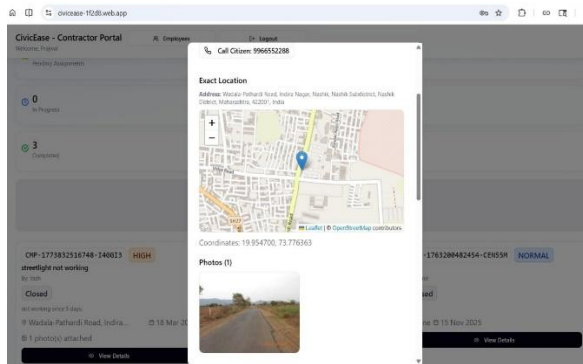


Figure: 8 Registering complaint

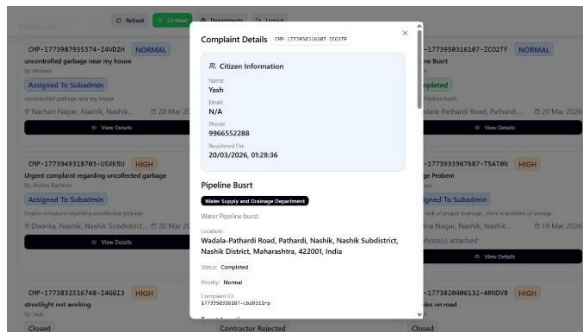


Figure: 9 Complaint Details

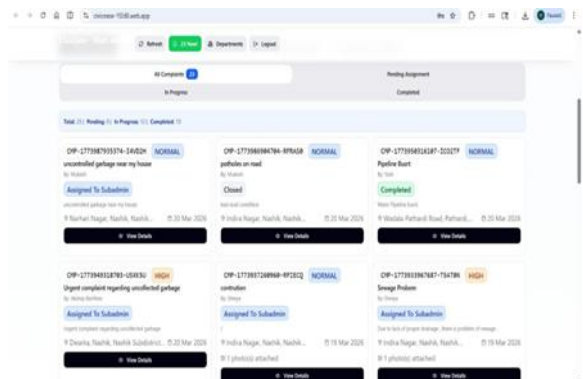


Figure: 10 All Complaints

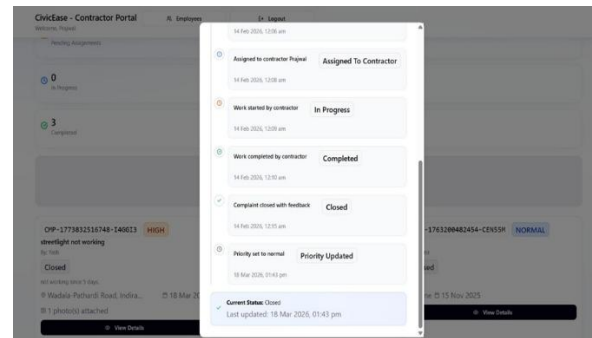


Figure: 11 Complaint Status

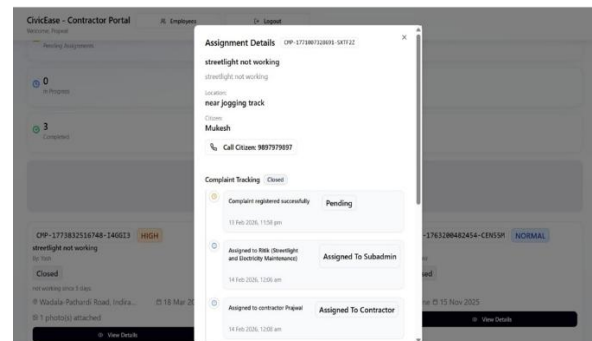


Figure: 12 Assignment Details

V. CONCLUSION

This paper introduced CivicEase, a web-based civic issue management platform designed to simplify the process of reporting and resolving public complaints. As cities continue to grow, the need for efficient communication between citizens and local authorities becomes increasingly important. CivicEase addresses this need by providing a single platform where users can easily report issues, upload supporting images, and track the progress of their complaints.

The system helps overcome many challenges associated with traditional complaint management methods, such as delayed responses, lack of transparency, and inefficient record handling. Through real-time updates and a centralized dashboard, both citizens and administrators can stay informed throughout the complaint resolution process. This improves accountability, reduces communication gaps, and enables faster decision-making.

By utilizing modern web technologies, the platform offers a reliable, scalable, and user-friendly solution that can be adopted by municipalities and smart city initiatives. The proposed system not only improves the efficiency of civic issue management but also

encourages greater public involvement in community development.

Overall, CivicEase demonstrates how digital solutions can strengthen the relationship between citizens and governing authorities. By promoting transparency, faster service delivery, and active citizen participation, the platform contributes toward building smarter, more responsive, and sustainable urban communities.

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