ISSN (Online): 2583-648X

IJIRID

International Journal of Ingenious Research, Invention and Development

An International, High Impact Factor, Double-Blind Peer-Reviewed, Open-Access, Multidisciplinary Online Journal

Volume 5 | Issue 1 | February 2026

www.ijirid.in

Crowdsourced Civic Issue Reporting and Resolution System

Somen Diliprao Gadekar[1], Vedant Neeraj Thakare[2], Radhika Vilas Sable[3], Tanvi Govardhan Hingankar[4], Alisha Narendra Dongare[5], Dr. M. D. Tambakhe[6]

[1,2,3,4,5]*Students, Sipna College of Engineering & Technology, Amravati (MS), India*

[6]*Assistant Professor, Sipna College of Engineering & Technology, Amravati (MS), India*

Abstract: *The Crowdsourced Civic Issue Reporting and Resolution System is a web-based application aimed at improving communication between citizens, government departments, and administrative authorities. The system enables users to report civic issues such as sanitation problems, road damage, and infrastructure faults by uploading live images and detailed descriptions, thereby promoting active citizen participation. The platform is divided into three main modules: User, Department, and Admin. Users can securely register through an email verification process and submit complaints. They receive real-time updates about their complaints via email and can track progress through their accounts. Additionally, users can provide feedback after issue resolution, ensuring transparency and accountability. Departments can register, log in, and view assigned complaints. They manage the resolution process by updating complaint status in two stages: "In Progress" and "Completed." Upon completion, departments upload live images of the resolved issue as proof, which is visible to users. Departments can also manage their profiles and review feedback submitted by users. The Admin module acts as a supervisory authority, allowing management of departments, monitoring of complaints, and enforcement of timely resolution. If any issue remains unresolved beyond a specified time, the admin can send email notifications to the respective department to mark urgency. The system also provides analytical dashboards with charts for performance evaluation, along with features to manage usernames and passwords. To enhance security, user credentials are protected using the MD5 hashing technique, ensuring that passwords are stored in encrypted form within the database, thereby reducing the risk of unauthorized access.*

Keywords: Crowdsourcing, Civic Issue Reporting, Complaint Management System, Email Notification System, MD5 hashing, User Authentication, Image-Based Reporting, Feedback System, Admin Dashboard, Data Analytics, E-Governance, Issue Resolution System.

I. INTRODUCTION

In recent years, rapid urbanization and population growth have significantly increased the number of civic issues such as poor sanitation, damaged roads, water leakage, and waste management problems. Traditional methods of reporting these issues, such as visiting government offices or making phone calls, are often inefficient, time-consuming, and lack proper tracking mechanisms. As a result, many complaints remain unresolved or are delayed, leading to public dissatisfaction and reduced trust in governance systems.

To address these challenges, the Crowdsourced Civic Issue Reporting and Resolution System is proposed as a digital solution that enables citizens to directly report issues through an online platform. Developed using the ASP.NET framework with C# (version 4.5), the system provides a structured and

 DOI 10.5281/zenodo.19402303

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Volume 5 | Issue 1 | February 2026

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transparent mechanism for communication between users, administrative authorities, and respective departments [1].

The system empowers users to register securely with email verification and submit complaints along with real-time images and detailed descriptions. This ensures accurate representation of issues and helps departments understand the severity and location of the problem. Users can also track the status of their complaints and receive updates via email notifications, improving transparency and engagement [2].

On the administrative side, the system introduces an efficient monitoring mechanism. The admin can manage departments, oversee all reported issues, and ensure timely action. If a complaint remains unattended for a prolonged period, the admin can send reminder emails to the concerned department, emphasizing urgency and accountability.

Additionally, the platform provides analytical dashboards that help in evaluating system performance and identifying frequently reported issues [3].

Departments play a crucial role in resolving complaints. They can update the status of issues in phases—"In Progress" and "Completed"—and upload live images as proof of resolution. This feature enhances trust and ensures that users can verify the work done. Furthermore, users can provide feedback on resolved issues, creating a feedback loop that helps improve service quality [4].

To maintain security and protect user data, the system incorporates the MD5 hashing technique for password encryption, ensuring that sensitive information is not stored in plain text [5].

II. LITERATURE REVIEW

The development of the Crowdsourced Civic Issue Reporting and Resolution System is supported by various studies in the fields of e-governance, web-based systems, and software engineering. A study by A. Kumar and P. Singh proposed an e-governance-based online complaint management system that allows citizens to submit complaints through a web interface, enabling authorities to track issues and update their status in real time. Their research highlighted that such digital systems significantly reduce response time and improve communication between citizens and government departments. Similarly, S. Sharma and M. Gupta developed a web-based complaint management system for smart cities using a centralized database, which allows administrators to monitor issue resolution efficiently. Their findings emphasized improved transparency and accountability in municipal services.

In addition, foundational principles from software engineering have played a vital role in system development. R. S. Pressman discussed essential methodologies such as system analysis, modular design, and testing, which ensure the reliability and efficiency of web applications. These principles are crucial for building a robust civic reporting platform. Furthermore, T. Connolly and C. Begg explored relational database design techniques that enable efficient handling of large volumes of structured data, which is essential for managing user information, complaints, and feedback within the system. Lastly, M. Fowler introduced enterprise application architecture and design patterns, particularly the layered architecture approach, which separates presentation, business logic, and data layers. This approach has been adopted to enhance the scalability and maintainability of the system.

ISSN (Online): 2583-648X

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Table 1: Literature Survey

Author and Year	Methods	Future Scope
A. Kumar and P. Singh (2019)	Proposed an e-governance based online complaint management system with web interface for complaint submission and real-time tracking by authorities.	Can be enhanced with mobile application support, AI-based issue prioritization, and integration with GIS for location-based complaint tracking.
S. Sharma and M. Gupta (2020)	Developed a web-based complaint management system for smart cities using a centralized database and admin monitoring features.	Future improvements include IoT integration for automatic issue detection and advanced analytics for predictive maintenance of city infrastructure.
R. S. Pressman (2014)	Explained software engineering methodologies including system analysis, modular design, and testing for building reliable web applications.	Scope for integrating agile methodologies, DevOps practices, and automation tools to improve development efficiency and system scalability.
T. Connolly and C. Begg (2015)	Discussed relational database design and management techniques for handling large-scale structured data efficiently.	Future scope includes adoption of cloud databases, NoSQL systems, and big data technologies for handling high-volume civic data.
M. Fowler (2002)	Introduced enterprise application architecture and design patterns with layered architecture (presentation, business logic, data layer).	Can be extended with microservices architecture, cloud-native deployment, and improved API-based integrations for scalability.

III. WORKING METHODOLOGY

The Crowdsourced Civic Issue Reporting and Resolution System follows a structured workflow that integrates three main modules: User, Department, and Admin. The system is developed using the ASP.NET framework with C# (version 4.5), ensuring a robust and scalable architecture. The methodology describes how data flows through the system and how each stakeholder interacts with it.

1. User Module

The process begins with user registration, where citizens create an account using email verification to ensure authenticity. Passwords are securely stored using the MD5 hashing technique. After successful login, users can:

- Submit complaints by providing a title, description, and uploading a live image of the issue.
- Each complaint is stored in the database and assigned to the relevant department.
- Users receive email notifications regarding complaint submission and status updates.
- Track complaint status (Pending, In Progress, Completed).
- Provide feedback after issue resolution.
- Manage and update their profile information.

ISSN (Online): 2583-648X

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2. Department Module

Departments are responsible for handling and resolving reported issues. Their workflow includes:

- Registration and login to the system.
- Viewing assigned complaints along with images and descriptions.
- Updating complaint status in two stages:
    - In Progress – when work has started.
    - Completed – after resolving the issue.
- Uploading two live images as proof of completed work.
- Viewing feedback provided by users.
- Managing their profile details.
- This structured approach ensures accountability and transparency in the resolution process.

3. Admin Module

The Admin acts as the central controller of the system. The workflow includes:

- Secure login and management of departments (add/update/delete).
- Monitoring all complaints submitted by users.
- Identifying complaints that remain unresolved for a long duration.
- Sending email notifications to concerned departments to mark urgency.
- Viewing system analytics through charts and reports for performance evaluation.
- Managing credentials such as username and password.

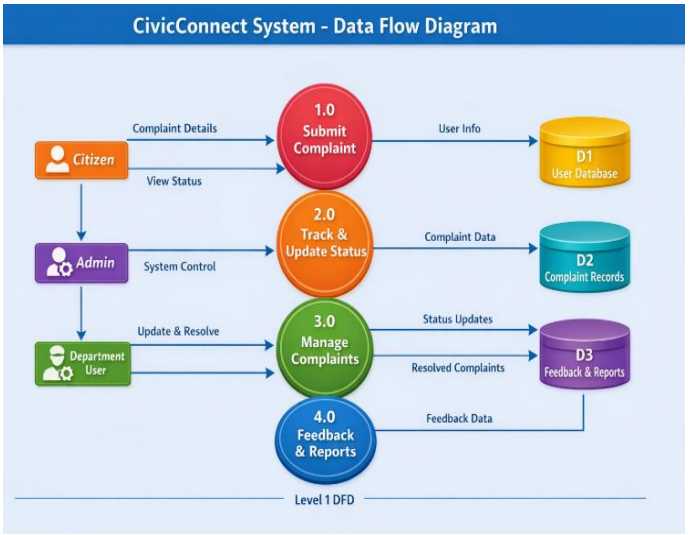

Figure 1: *DFD Diagram*

4. System Workflow

- User registers → logs in → submits complaint with image.
- Complaint is stored and forwarded to the respective department.
- Department reviews complaint → updates status to “In Progress.”

ISSN (Online): 2583-648X

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- After resolution, department marks it “Completed” and uploads proof images.
- User receives updates via email and verifies the resolution.
- User provides feedback based on satisfaction.
- Admin continuously monitors the system and ensures timely resolution through alerts and analytics.

5. Data Handling and Security

- All user credentials are encrypted using MD5 hashing.
- Database operations are handled securely using server-side validation.
- Email notifications ensure real-time communication between users and departments.
- Image uploads serve as evidence for both complaints and resolutions.

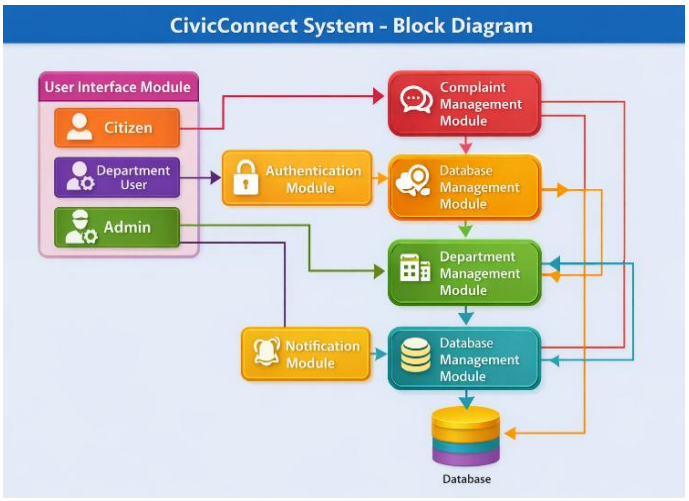

***Figure 2**: System Diagram*

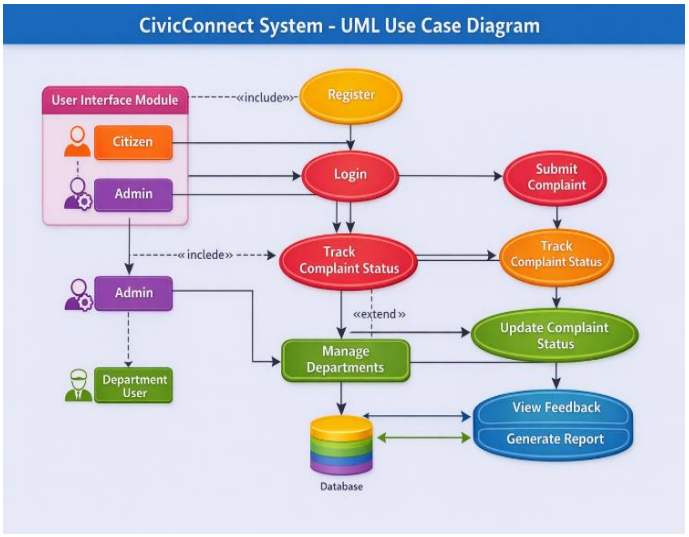

***Figure 3:** ULM Diagram*

 DOI 10.5281/zenodo.19402303

ISSN (Online): 2583-648X

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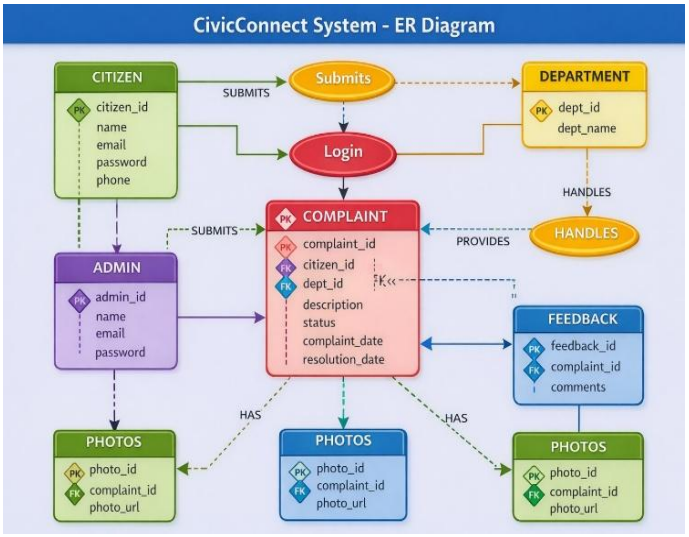

***Figure 4**: ER Diagram*

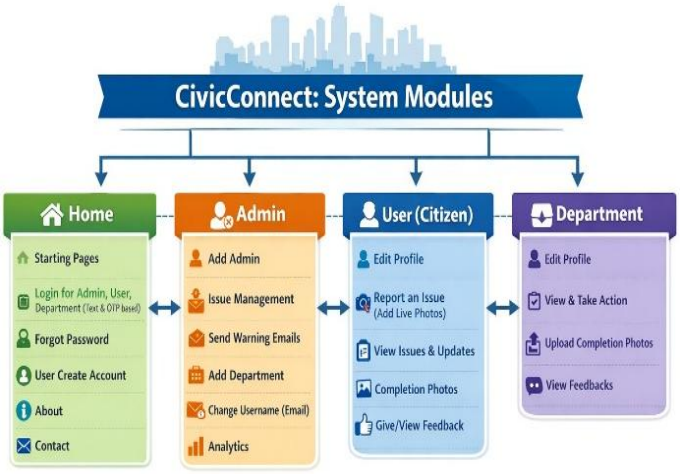

***Figure 5:** Flow Diagram*

iV. RESULT AND DISCUSSION

The implementation of the Crowdsourced Civic Issue Reporting and Resolution System using the ASP.NET framework with C# (version 4.5) demonstrates a significant improvement in the process of reporting, monitoring, and resolving civic issues. The system was tested with multiple users, departments, and administrative operations to evaluate its efficiency, usability, and reliability.

1. Results

The system successfully achieved its primary objectives:

a) Efficient Issue Reporting:

 DOI 10.5281/zenodo.19402303

ISSN (Online): 2583-648X

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- Users were able to register, verify their email, and submit complaints with live images and descriptions without difficulty. The inclusion of image-based reporting improved clarity and authenticity of issues.
- Real-Time Status Tracking: Users could track complaint progress (Pending, In Progress, Completed) and receive timely email notifications, which enhanced transparency and user satisfaction.

b) Structured Resolution Process:

- Departments effectively managed complaints by updating statuses in two phases and uploading proof images upon completion. This ensured accountability and reduced false claims of resolution.
- Admin Monitoring and Control:
- The admin dashboard enabled centralized control, allowing monitoring of all complaints, management of departments, and sending reminder emails for delayed actions. Analytical charts provided insights into system performance and issue trends.

c) SecureAuthentication:

- The use of MD5 hashing ensured that user passwords were stored securely, protecting sensitive information from unauthorized access.

2. Discussion

The system introduces a transparent and user-centric approach to civic issue management. Compared to traditional manual systems, this platform reduces delays, eliminates communication gaps, and ensures proper tracking of complaints.

a) Transparency and Accountability:

- The ability to upload live images during both complaint submission and resolution increases trust between users and departments. Feedback mechanisms further strengthen accountability.

b) Improved Communication:

- Automated email notifications keep all stakeholders informed, reducing the need for manual follow-ups.

c) Administrative Efficiency:

- The admin's ability to identify unresolved issues and send urgent reminders ensures that no complaint is neglected. Analytical dashboards help in decision-making and resource allocation.

d) User Engagement:

- The system encourages citizen participation by providing an easy-to-use interface and continuous updates, leading to higher engagement in civic activities.

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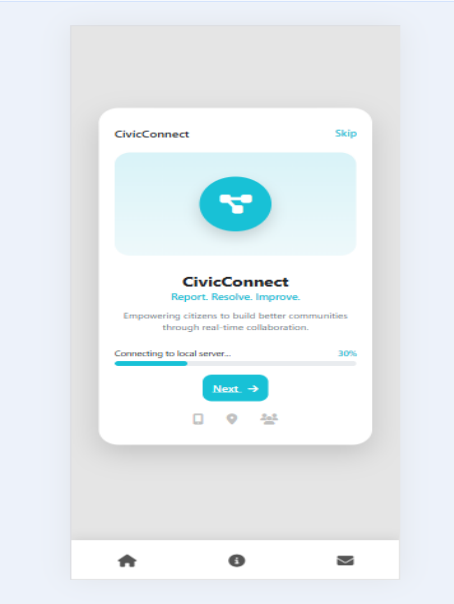
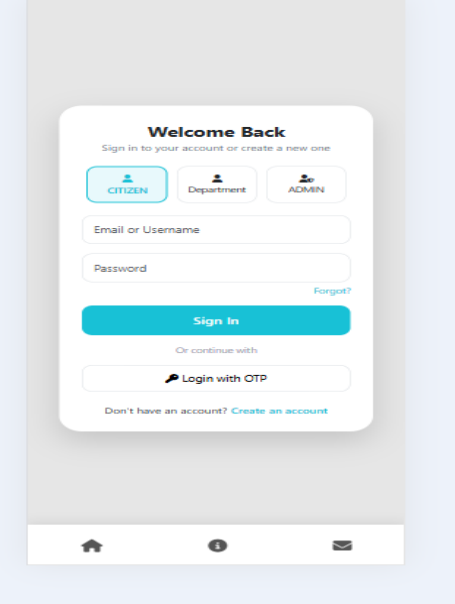
3. Overall Outcome

The developed system proves to be an effective solution for managing civic issues in a structured and transparent manner. It enhances coordination between users, departments, and administrators, ultimately contributing to better governance and faster resolution of public problems.

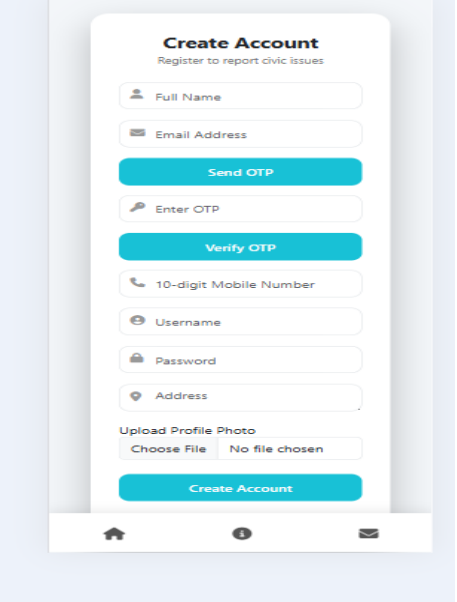
Home Page



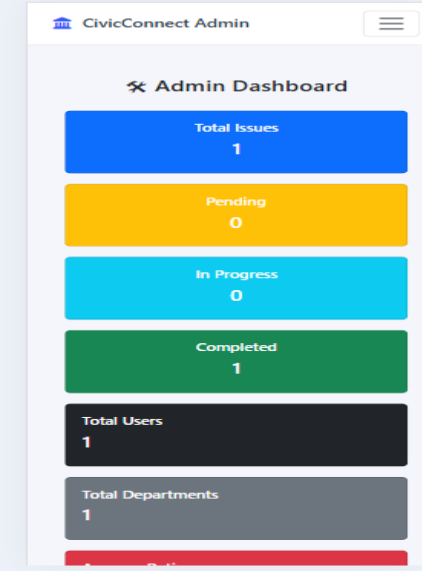
Sing In



Sign Up



Admin Dashboard



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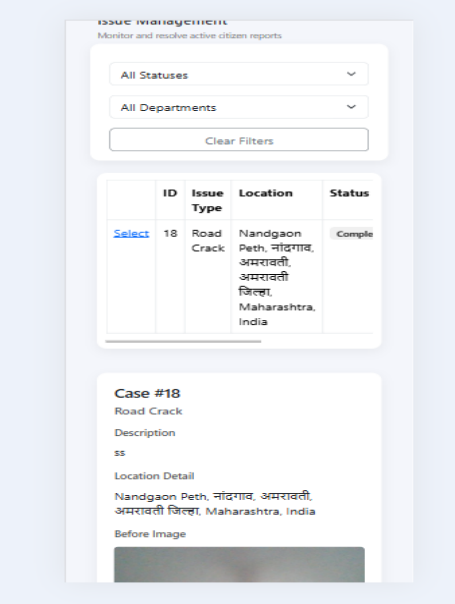
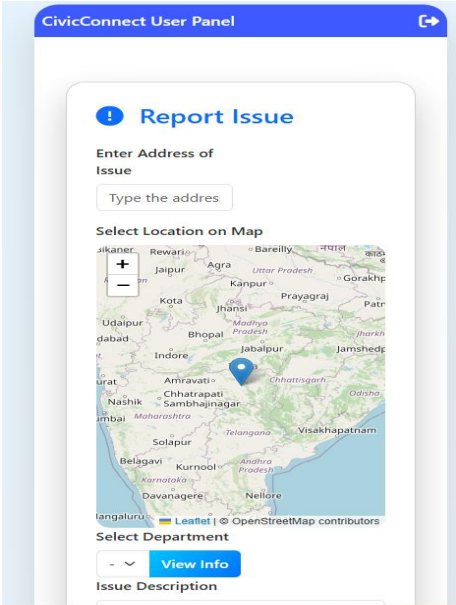
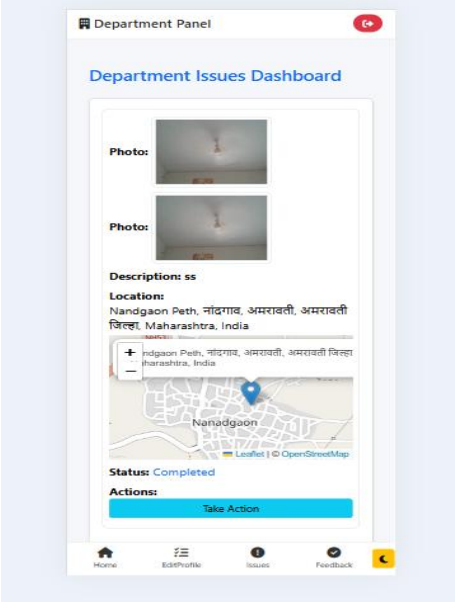
Admin View Issue



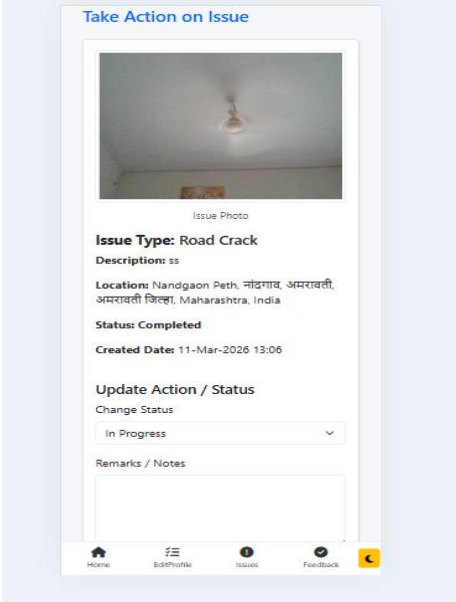
User Report Issue



Department View Issue



Department Track Issue



V. CONCLUSION

The Crowdsourced Civic Issue Reporting and Resolution System developed using the ASP.NET framework with C# (version 4.5) provides an effective and structured solution for addressing everyday civic problems. The system successfully bridges the communication gap between citizens, government departments, and administrators by offering a centralized platform for reporting, tracking, and resolving issues.

ISSN (Online): 2583-648X

IJIRID

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The implementation demonstrates that integrating features such as real-time complaint submission with image evidence, status tracking, email notifications, and feedback mechanisms significantly improves transparency and accountability. The role-based modules—User, Department, and Admin—ensure smooth workflow management, while the admin's ability to monitor unresolved complaints and send urgent notifications enhances overall efficiency.

Security is maintained through the use of MD5 hashing for password protection, ensuring safer handling of user credentials. Additionally, the use of analytics helps in understanding system performance and identifying frequently occurring civic issues, which can support better decision-making.

In conclusion, the system not only simplifies the process of civic issue reporting but also promotes active citizen participation and responsible governance. It serves as a reliable and scalable platform that can be further enhanced with advanced security techniques, mobile integration, and real-time location tracking to make civic management more efficient and accessible in the future.

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