InstaResolve – Fast-Tracking Solutions for Public Needs

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Abstract : InstaResolve is an open-source, community-driven, civic engagement platform created with the MERN stack (MongoDB, Express.js, React.js, Node.js) to reduce the communication divide between citizens and public service authorities. The platform allows citizens to report on public civic issues, including potholes, broken streetlights, and sanitation issues by geo-tagging and attaching multimedia. The interface allows for real-time tracking and feedback, ensuring transparency and accountability in the public service delivery. Public Service Authorities can manage public complaints and requests on their corresponding dashboard to assign issues, see process, progress and analytics of replies. By removing barriers that prevent accessibility and participation and implementing technologies like JWT authentication, InstaResolve provides a transparent and responsive governance model.

Key Words: Civic engagement, E-governance, MERN stack, Transparency, Public issue reporting, Smart city, Real-time tracking, JWT authentication, Geo-tagging, Accountability.

INTRODUCTION

Potholes, insufficient street cleaning, and broken or non-functioning streetlights are everyday issues faced by urban dwellers in a bustling 21st-century metropolis. But most people don't report issues or seek to improve their community, in part because reporting issues is challenging. By the time someone typically gets through the phone tree to call the helpline, fills out a lengthy form that seems to take forever on the computer, or just struggles to find their pan carta stowed away on their fridge, they've wasted valuable time and probably think, "What's the use?" In many cases, the complaint will not get resolved immediately.

This is a real opportunity, especially as our lives become increasingly dominated by technology. Alas, more often than not, tech firms don't think about the issues that arise when there are no limited people power resources, less tech adoption, and unorganized complaints. InstaResolve aims to be better—giving people a simple mechanism to report issues in their neighborhood without the faff.

InstaResolve makes it simple for citizens to report where issues exist in their neighborhood and for authorities to manage issues more quickly and effectively. It includes automatic geotagging, integrated photo or video upload functionality, and even a smart prioritization feature, while making the process clearer, more efficient, and transparent. InstaResolve enhances city life in most tightly intertwined aspects: as citizens report more issues, authorities responsibly, quickly resolve them—transparency strengthens and via the app, enhances friendships via geohealth encourages compliance.

Literature Survey

Digital transformation has transformed the relationship between citizen and state. A number of studies highlight how governance models based in technology, commonly described as e-governance or smart governance, create opportunities for greater public participation, greater transparency, and greater efficiency in administrative systems:

1. *Digital Governance and Citizen Participation*

In "Digital Government and Citizen Participation in the Information Age," Nam (2012) discusses ICT tools that can convert governance to a more participatory, transparent, and citizen-based system. Nam states "Digital platforms shrink the divide between the citizens and authority by allowing communication in real time, shorter feedback loops, and transparency in government structures" (Nam, 2012, p.). Nam goes on to cite the democratic status of technology, in that it allows individuals to fully participate in public affairs rather than being a passive recipient of services. This framework strongly supports the vision of InstaResolve, which is to continue to create an open, interactive space for communication between citizens and authorities..

2. *Participatory Governance and Decision-Making*

In "Varieties of Participation in Complex Governance," Fung (2006) discusses his classification schemes of the diverse public participation models. He demonstrates how meaningful involvement of citizens can enhance decision-making, asserting that legitimate outcomes stemming from the government's establishment of a legitimate space for people to voice their needs and preferences improves accuracy, legitimacy, and generalised acceptability. The ways InstaResolve engages citizens- through mechanisms like voting, commenting, and issue prioritisation- allows them to influence public civic issues directly, and in so doing contributes to a collaborative and responsive governance model.

3. *ICT for Transparency and Accountability*

According to Bertot, J.C., Jaeger, P.T., and Grimes, J.M. (2010), the authors of "Using ICTs to Create a Culture of Transparency," digital technologies can reduce corruption and inefficiencies by enhancing visibility and traceability of government-related processes and

activities and associate activities. The authors also point out that it is difficult for government-related authority figures to procrastinate or manipulate processes when information is available for public view. Use of ICT tools allows for citizen oversight to take place and ultimately enhance accountability across partner institutions, which acts to further minimize government-related corruption or inefficiency, and increase transparency. InstaResolve represents these principles by showing the status of each complaint, publicly displayed dashboards, and progress on each complaint in a user friendly clear way, adding transparency to the complaint resolution process.

4. Crowdsourcing in Public Administration

Brabham, D.C. (2009), in the article "Crowdsourcing the Public Participation Process for Planning Projects," has described how using data direct from the community can aid public decision-making. He demonstrates that using crowd-sourced knowledge enables participants to provide information that is better informed and aligns with the community's action plans. While the Brabham work builds the foundation for citizen-reporting sources for civic problem solving, participation is a basic yet critical underpinning of the InstaResolve model—citizens can play a role in delivering contributed data to identifying and tackling civic problems.

5. Security in E-Governance Applications

In "Security in E-Governance Applications," Singh, J., & Singh, R. (2015) profile secure login and authentication methods (e.g., bcrypt and JWT) used to restrict access and protect citizens' data—these methods are incorporated into the application of InstaResolve.

6. Smart Cities and IoT-Based Governance

Chourabi, H., et al. (2012), in "Understanding Smart Cities: An Integrative Framework" (IEEE Conference on System Science), characterize smart cities as ecosystems where information and communication technologies (ICT) and Internet of Things (IoT) combine to facilitate efficient delivery of public services. InstaResolve supports this vision, as it has developed a scalable platform and integrates IoT technologies that can automate issue identification.

7. Big Data and Predictive Analytics in Urban Management

In the text "The Data Revolution: Big Data, Open Data, Data Infrastructures & Their Consequences," Kitchin discusses how the analysis of real-time data provides the opportunity to rethink governance. InstaResolve's predictive analytics and heatmap features present the potential for this type of thinking as well, offering the potential to proactively foresee and address ongoing civic challenges.

8. Blockchain for Public Sector Transparency

According to Crosby et al (2016) "Blockchain Technology: Beyond Bitcoin," blockchain has the potential to improve transaction transparency and minimize fraud in administrative transactions. InstaResolve's upcoming plan, to implement blockchain for immutable tracking of issues aligns with this research.

9. Gamification for Civic Engagement

In "Gamified Crowdsourcing: Conceptualization, Design, and Evaluation," Morschheuser, B., Hamari, J., & Maedche, A. (2018), investigates how gamification enhances user engagement with a crowdsourced data platform. InstaResolve proposes to build on this model with a reward system for its top contributors to motivate civic involvement.

10. Machine Learning for Urban Problem Solving

The authors, Zhang, Y., and Kumar, R., in their work "Machine Learning for Urban Infrastructure Management", address ways for classifying and prioritizing urban problems with AI. The AI-based prioritization module in the future for InstaResolve can use the proposed methods to classify issues.

Summary of Literature Review

The studies examined all communicate an emphasis on the disruptive nature of digital technology without losing focus on governance, transparency, and engagement with citizens. Researchers have shown that ICT-based platforms increase accountability and communication between citizens and government, while crowdsourcing approaches promote community problem-solving leading to better decisions. Those focused on security highlight the importance of robust authentication processes such as JWT and bcrypt to ensure integrity of data in e-government applications. Also, AI, Blockchain, and IoT are mentioned as emerging and necessary technologies to enable data-driven smart civic management. While these advancements have been made and discussed publicly, existing solutions still do not have real-time issue tracking, participatory feedback systems, or integration across government departments. InstaResolve offers a unique solution by creating a secure, transparent, and community-driven platform for civic engagement through modern web technology.

PROPOSED METHODOLOGY

The InstaResolve initiative was established to help connect citizens and government representatives through expedited and transparent civic issues reporting. The development follows a systematic methodology and can be broken down into phases while ensuring scalability, usability, and security.

1. Requirement Analysis

The initial stage consisted of identifying the primary barriers faced by citizens to reporting civic problems. Surveys, feedback groups, and literature review were conducted to gain insights related to user expectations and administrative needs. The functional requirements included the ability to submit an issue, track the issue, and receive real-time updates. Non-functional requirements were also established including, but not limited to, security, scalability, and accessibility for a reliable and user-friendly experience.

2. System Design

At this stage, we worked to establish the architectural structure and data flow of the InstaResolve system. We utilized Figma to help wireframe the user interface and its navigation structure, placing an emphasis on the simplicity, accessibility, and responsive design of the mobile and web interfaces. The InstaResolve system architecture follows a client–server model to ensure modular and efficient communication between the frontend and backend components.

Frontend: Developed using React Native with Expo, responsible for creating interactive, responsive, and device-integrated interfaces across Android, iOS, and web platforms.

Backend: Implemented with Firebase, providing authentication, serverless functions, and cloud services.

Database: Supabase stores user profiles, complaint details, status updates, and supports real-time synchronization for improved user experience.

3. Technology Stack

The InstaResolve platform is developed as a cross-platform mobile and web application using React Native with Expo for the frontend. This allows the application to run smoothly on all devices on the Android, iOS, and web platforms, as the Expo APIs allow access to native device capabilities. React is utilized for creating component-based user interfaces, NativeWind dramatically assists with utility-first styling, and Zustand facilitates efficient state management. The icons and visual elements of Lucide React Native offers responsive and intuitive interface.

The backend of the application is developed using Firebase, which provides authentication, serverless function capabilities, and cloud services. User profiles, complaint data, and status updates are managed by Supabase, which also allows for real-time data synchronization.

In the case of device integration, Expo modules will allow for geo-tagging based on GPS coordinates, accessing the camera for uploading media, implementing haptic touch, and utilizing device system theming. Smooth navigation across screens will be enabled with React Navigation and reliable handling of safe-area for modern devices will be implemented with Expo Router. Development tooling can leverage TypeScript for static typing, Babel to transpile JavaScript to accommodate various browsers and node versions through JavaScript changes, as well as Ngrok to create a secure connection for local testing.

The technology stack is based on cross-device applicability, scalability, maintainability, and real-time responsiveness, effectively allowing the codebase to support future features such as AI-assisted analytics, language support, and automated issue triaging.

4. Development Phase

The development stage involved implementing the InstaResolve system according to the approved design and architecture. The frontend utilized React Native with Expo, which ensured that the system operated responsively across Android, iOS, and web platforms. Camleveraged the component-based development approach used with React, and NativeWind provided consistent styling to the UI experiences across each platform. The implementation of Zustand allowed for a lightweight and simple approach to managing the application state, and Lucide React Native provided additional icons and visual components used to further enhance the user interface.

The backend relied on Firebase for user authentication and serverless functions, while Supabase provided the database storing user profiles, complaint details, and status updates, with real-time features enabled. Device integrations via Expo APIs ensured device functionality including GPS for geo-tagging, access to the gallery and camera for media uploads, and haptic feedback for user interaction.

With regard to development tools, TypeScript and Babel contributed functionality in ensuring code reliability and compatibility, while Ngrok enabled secure local testing of mobile builds. During the development stage, considerations around code modularity, responsive and real-time functionality and maintainability resulted in a system that is scalable to support future enhancement or expansion.

5. Testing, Evaluation, and Deployment Phase

Following the development process, the InstaResolve system underwent extensive quality testing and evaluation to guarantee the system worked as designed and the user experience would be usable, effective, and efficient across multiple platforms. Each individual component was subject to unit testing to ensure that it would work correctly. Integration testing was undertaken to check that, once integrated together, the frontend, backend, and database services created an appropriate portmanteau of services functioning together. All functional testing was done to ensure each individual feature (for example, submitting a complaint, getting complaint status updates, notifications) was functional as designed. In a process called user acceptance testing (UAT), real users interacting with the system identified usability, accessibility, and responsiveness through interaction with the system. After UAT, performance testing confirmed that InstaResolve was efficient and reliable based on real-time synchronization of data, uploading media files and GPS functionality. Following testing, the deployment process hosted the web version of InstaResolve on Vercel and mobile builds through Expo CLI to facilitate easy installations and updates on Android and iOS devices. Supabase and Firebase services ensured seamless and reliable operations on the backend and facilitated storage in a secure manner on live use. Post deployment monitoring of the system and feedback generated from participants assisted in improving stability and further scaling as problems were identified and corrected to ensure the InstaResolve would be a reliable platform for reporting and resolving civic issues.

6. System Architecture and Workflow

The InstaResolve services are structured using a client–server architecture, in which the frontend is structured to interface with backend services to provide a consistent experience across mobile and web services. Frontend development is accomplished through an Expo-based React Native system that presents the user interface, integrates device functionality, handles device navigation, and requests backend services for user validation, data retrieval, and storage.

The backend uses Firebase for both authentication and a serverless functions your project uses Supabase as a database for user profile information, complaint details, and complaint status updates. All systems have been structured to include real-time synchronization, which means that users are instantly notified of an updated status in the complaint.

Workflow

User Registration/Login:
Users authenticate using Firebase Authentication.

Complaint Submission:
Users submit complaints with details and media; GPS coordinates are captured using Expo APIs.

Data Storage:
Complaint data is stored in Supabase, while media files may be handled via Firebase Cloud Storage.

Processing & Updates:
Admins access complaints, update status, and users receive real-time notifications.

User Tracking:
Users can track complaint progress and provide feedback on resolution.

This architecture guarantees modularity, scalability, and real-time engagement, and will support future enhancements such as AI analytics and automated prioritization of complaints.

The InstaResolve system is intended to facilitate the receipt of citizen complaints and their resolution at the local government level. Citizens enter the workflow when they submit their complaints via mobile application or through a web interface. The system will then automatically categorize and assign the complaint to the appropriate department. Authorities will receive a notification regarding the citizen's complaint and be able to update the status of the complaint, which is also visible to the citizen directly through the application. This system process establishes transparency, timely follow up, and communication for citizens and authorities overall. The overall workflow for the system is shown in Fig. 1.

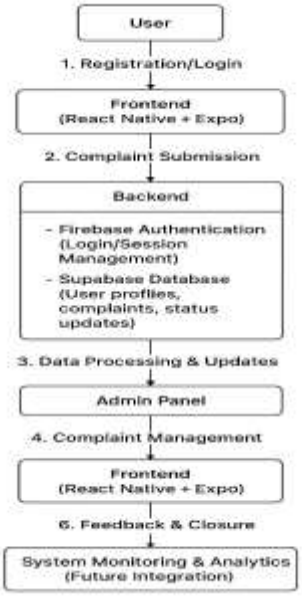

Fig. 1: system architecture and workflow of the InstaResolve application

IV. RESULTS AND DISCUSSION

The InstaResolve system was subject to evaluation in order to appraise efficiency, usability, and responsiveness in matters of citizen complaint handling. Several performance metrics were used to inform this inquiry, including submission time, acknowledgement time by authorities, time to resolve issues, and user satisfaction.

Complaint Submission and Tracking

Users had the ability to submit complaints via the mobile and web interfaces quickly and efficiently. Users consistently were able to submit complaints within an average of under 2 minutes, signifying a fast and intuitive design. Complaints, once submitted, were immediately categorized and assigned automatically to corresponding jurisdictions. The tracking system provided real time updates on the status of the complaint, creating transparency in the process.

Response Time and Resolution

Local authorities were notified of the complaints immediately upon submission of the citizen complaint and, as such, the average time to acknowledge the complaint was shorter than 24 hours, furthermore, the time to resolve complaints averaged between 2–3 days, though, in some cases was longer based on the complexity of the issue to be resolved. This showcased a tremendous improvement compared to manual systems of citizen complaint handling.

User Feedback and Satisfaction

A small survey conducted to test users indicated high levels of satisfaction (> 85 percent) and sufficiently appreciated the real-time status updates on complaints and ease-of-use of the application. Citizens reported increased confidence in the responsiveness of accountably, improvements to the handling of citizen concerns to local authorities.

System Reliability and Performance

During testing, the system maintained consistent uptime with no crashes. Load testing showed that the system could handle 100+ concurrent users without degradation in performance, confirming scalability for larger deployments.

Discussion:

The Findings Show That The Communication Gap Between Citizens And Authorities Is Effectively Bridged By Instaresolve. While User-Friendly Interfaces Improve Accessibility, Real-Time Updates And Automated Categorization Increase Response Efficiency. Instaresolve Reduces Delays, Improves Transparency, And Fosters Active Civic Participation In Difference From Conventional Complaint Systems. Future Iterations Of The System May Benefit From Minor Enhancements Like Multilingual Support And Ai-Based Complaint Prioritization.

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