SMART CIVIC ISSUES REPORTING SYSTEM FOR LOCAL AUTHORITIES

Tinashe P Chaitezvi (h190592p), Mr Makondo

[#]*Department of Software Engineering, School of Information Sciences and Technology*

tinashepresleychaitezvi00@gmail.com

**Harare Institute of Technology P. O. Box BE 277, Belvedere, Harare, Zimbabwe*

***Abstract*—** This paper presents the development of an Android mobile application that uses crowdsourcing to improve civic complaint reporting. The traditional grievance systems can be time-consuming and inconvenient for citizens, leading to dissatisfaction and a lack of communication between citizens and government agencies. The proposed system aims to make it easy for citizens to report complaints and participate in the decision-making process. The application allows citizens to report complaints easily and geo-tags them automatically. The system also includes a web portal where officials can manage the reported issues, highlight areas of reported issues on a map using map markers, classify feedback from citizens using image processing techniques, and generate data-driven analysis reports. The proposed system will be developed using a combination of agile and waterfall methodologies and will use various tools and technologies to ensure its effectiveness.

***Keywords*—** *Mobile Application, Android, Citizen Complain, Interface, App.*

I. INTRODUCTION

The use of crowdsourcing through smartphones has the potential to revolutionize the way we engage with our communities. Crowdsourcing empowers citizens to solve complex problems and improve our cities in ways that were never before possible. One of the most important ways that crowdsourcing can be used to improve our cities is through citizen complaints. Traditional grievance systems can be time-consuming and inconvenient for citizens. The proposed Android mobile application addresses this challenge by providing an easy-to-use platform for citizens to report complaints with just two clicks. It aims to provide a transparent and efficient way for civil servants to address complaints while making it accessible to everyone, regardless of their age or technical expertise.

II. PROBLEM STATEMENT

Citizens are often dissatisfied with the surrounding or urban infrastructure, but may not prefer traditional grievance systems that have to go through lengthy procedures such as going to the office and waiting in line for hours. This can lead to a lack of communication between citizens and government agencies, which can make it difficult to identify and address problems. In addition, traditional grievance systems can be time-consuming and inefficient, which can delay the resolution of problems.

III. LITERATURE REVIEW

Crowdsourcing has emerged as a promising approach to tackle complex problems that are beyond the capacity of a single individual or organization. In recent years, there has been growing interest in using crowdsourcing to improve public services and urban infrastructure. Several studies have examined the use of crowdsourcing in various domains, including citizen participation, urban planning, and civic engagement.

A study by Cheng et al. [1] explores the use of crowdsourcing for urban planning and design. The authors argue that crowdsourcing can provide valuable feedback on urban design projects and help to involve citizens in the decision-making process. The study also identifies several challenges to implementing crowdsourcing for urban planning, including issues related to data quality, data privacy, and the need for effective communication between citizens and government agencies.

Another study by Zhang et al. [2] investigates the use of crowdsourcing for citizen participation in local governance. The authors propose a framework for evaluating the effectiveness of crowdsourcing in local governance, based on criteria such as transparency, accountability, and responsiveness. The study also identifies several factors that can affect the success of crowdsourcing initiatives, including the level of trust between citizens and government agencies, the availability of resources, and the quality of communication between stakeholders.

In the domain of civic engagement, a study by Gupta et al. [3] explores the use of crowdsourcing to improve citizen engagement in public services. The authors argue that crowdsourcing can help to bridge the gap between citizens and government

agencies and enable citizens to participate in the decision-making process. The study also identifies several challenges to implementing crowdsourcing for civic engagement, including issues related to data privacy, trust, and the need for effective communication channels.

Overall, these studies highlight the potential benefits of crowdsourcing for improving public services and urban infrastructure. However, they also point to several challenges that must be addressed in order to realize the full potential of crowdsourcing. The proposed system aims to address some of these challenges by providing a user-friendly interface for citizens to report complaints, and a transparent and efficient mechanism for civil servants to address them.

IV. SOLUTION

We propose an Android application called "Complaint Reporting and Management System" that allows citizens to report complaints related to civic issues and infrastructure problems with just two clicks. The application will automatically geo-tag the reported complaints using the GPS location of the user's mobile device. This feature will help the local authorities to identify the exact location of the issue and take appropriate actions.

The application will also allow citizens to attach images of the reported problem along with the complaint, which will help the local authorities to classify the feedback from citizens and gain an overview of the damage severity using image processing techniques. This classification will help the authorities to prioritize the issues based on their severity and take immediate actions on high-priority issues.

The Complaint Reporting and Management System will provide a web portal for civil servants to manage the reported issues. The officials will be able to view the issues reported by citizens on a map, marked with map markers highlighting the areas of the reported issues. The officials will then assign the complaint to the appropriate department for resolution, and the assigned department will be able to update the complaint resolution status via the web application.

The Complaint Reporting and Management System will provide citizens with real-time

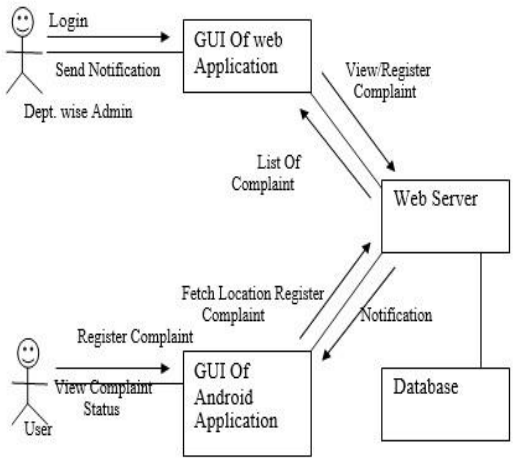
updates on the status of their complaints, including details about the actions taken and the expected timeline for resolution. This will help citizens to stay informed and track the progress of their complaints.

Overall, the Complaint Reporting and Management System will provide a transparent and efficient way for citizens to report issues related to civic infrastructure, and a streamlined process for local authorities to address these issues. The system will help to bridge the communication gap between citizens and government agencies, and provide a data-driven approach to identify and address problems in the community.

In order to address the problems denoted above, a system with the following objectives was implemented

In reference to the solution architecture illustrated above, Mushandirapamwe's solution architecture employs a multi-tiered approach to facilitate the complaint reporting process. The front-end component of the architecture consists of an Android mobile application that enables users to log in and report their complaints with the added ability to attach photos. The application also utilizes geolocation services to automatically geotag the location of the complaint, which is then transmitted to the server component.

A. Solution Architecture



The server component of the architecture is responsible for storing and processing the complaints submitted by users. The complaints are stored in a centralized database and made accessible to department-wise administrators (city officials) through a web portal. The web portal serves as the middle tier of the architecture and provides a user interface that enables administrators to

analyze complaints, generate reports, and update the status of complaints.

In addition, the solution architecture employs a data analytics component that leverages machine learning algorithms to gain insights from the data collected. This component analyzes the complaints and identifies patterns, trends, and areas that require attention. The insights obtained from the data analytics component are used by the administrators to make informed decisions and take appropriate actions.

Overall, the multi-tiered solution architecture employed by Mushandirapamwe provides an efficient and effective means of complaint reporting and management. Users can easily report complaints using the Android app, and administrators can easily access, analyze, and act on the complaints through the web portal. The data analytics component adds another layer of value by providing insights that can be used to improve the effectiveness of the complaint management system.

B. Coding Strategy

The android application was built using the React Native Framework.

React Native app development strategy:

Use the Expo CLI to create a new React Native project.

Install necessary packages such as react-navigation, react-native-maps, and axios for routing, maps, and API calls respectively.

Create separate components for login, complaint form, and camera functionality.

Integrate geotagging functionality using the react-native-geolocation package.

Use axios to make API calls to the backend server for submitting complaints and attaching pictures.

Use AsyncStorage to store user data such as login credentials and complaint history.

Laravel web development strategy:

Use the Laravel framework to create a new project.

Set up routes and controllers for handling user requests and API calls.

Create a model for the complaint data and use migrations to set up the database schema.

Implement authentication using Laravel's built-in Auth system.

Use the Intervention Image package to handle image uploading and resizing.

Use Eloquent ORM to query the complaint data and generate reports based on various filters.

Implement an admin dashboard for city officials to view and manage complaints

The methodology used in this project was the Agile Extreme Programming method.

Dept admin logs into web portal	Admin sees login screen	success
Admin views list of complaints	All complaints displayed	success
Upload a corrupted or incomplete image	The system should not process the image and display an error message	Success

C. Experimentation and Testing

TEST CASE	**EXPECTED OUTCOME**	**SUCCESS/ FAILURE**
User logs into mobile app	User sees login screen	success
User reports complaint with picture	Complaint and picture saved in database	success
App geotags complaint location	Complaint location accurately recorded	success

V. CONCLUSION

The implementation of this project has addressed the following research points:

- the development of a user-friendly interface for data input and visualization
  the implementation of a scalable cloud infrastructure for efficient data processing
- has demonstrated the feasibility of using machine learning and cloud computing to develop scalable and efficient solutions for data analysis and predictive modeling.

VI. FUTURE WORK

In future work, the proposed system could be extended to include more advanced features such as natural language processing, predictive analytics, and machine learning. This would enable the system to automatically categorize complaints, identify trends and patterns, and provide recommendations to improve the quality of urban infrastructure. Additionally, the system could be integrated with other civic engagement platforms to promote collaboration and participation between citizens and government agencies.

VII. BIBLIOGRAPHY

Tinashe Presley Chaitezvi is a final year student studying Software Engineering at Harare Institute Of Technology

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