Resident Alert and Complaint Management System: Bridging the communication gap between the local residents and the authorities

PROJECT SYNOPSIS

by

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1. Introduction

In today's era of vast metropolitan cities, there is always a need for various facilities and services to better enhance the quality of living and give the residents peace of mind. Even though we live in a digital era where everything is connected and online 24-7, these technologies only satisfy personal needs and not society or the environment. The main objective of this Android Application is to provide the citizens and the authorities of each area in the country an application portal to receive valuable information and updates regarding events in the local area.

The residents can login to the application using their login credentials. Each user is associated with their respective areas which helps them in getting alerts regarding events in their area. The user can view the alerts and news about their area on the home page. If desired, the application offers the convenience of sorting out the alerts based on its category such as electricity, water, road works, etc. On selection of any of the categories, the resident user can view the entire history of the alerts based on the selected category as well as raise a complaint regarding the same.

On the other hand, the local authorities can also login to this application where they can alert the residents about any event or situation that is taking place in that area. Furthermore, the authorities can see the complaints that each resident has raised and can thus assign the task to the subordinates concerned.

2. Literature Survey

a. Lu et al. examines how the City of Edmonton provides municipal 311 services through a variety of channels by using a case study of the city. There are four ways to access 311 services: by phone, online form, email, and mobile app. Each of these channels is distinguished by the proportion of 311 requests it received over a three-year period, its geographic hotspots, and the relationship between sociodemographic traits and contributions by channel type. These three types of analysis are combined to examine the VGI contributions of different people, highlighting distinctions depending on type, location, and links to sociodemographic traits. An important shift in the proportion of service requests by channel has been detected after three years of City of Edmonton 311 data analysis. In any case, this case study shows a channel shift in 311 usages from the conventional voice methods requiring one-on-one interaction between citizens and municipal employees to what might be called more passive forms of communication, with a range from 20-35% of all requests over the last year being made via a combination of a mobile app, web form, and email. The overall number of requests does not increase with the addition of additional channels but rather noticeably declines with time, indicating a transition from voice-based to Internet-based channels. While it is difficult to draw a distinction between mobile uses and non-mobile uses (such as those contributions made `in the field` when a respondent encounters an issue, compared to a request made from a fixed location, such as home or work), this shift in the channel should demonstrate to government the importance of providing multiple channels for citizen input in any 311 system. A shift from traditional telephone reporting to a greater dependence on Internet-based reporting was seen in the categorization of contributors. As seen in the figure, traditional reporting techniques, such the telephone, were primarily concentrated around regions with a high residential density, excluding the city centre and its outskirts. In contrast, Internet-based tactics like email, web forms, and mobile apps focused on less densely populated industrial districts and outlying residential areas. In addition, this hotspot study demonstrated that Internet-based approaches displayed more notable hotspots of activity when compared to methods that covered a wider geographic area, such as the telephone channel. This pattern may point to the fact that Internet-based response routes are more mobile, reflecting reporting that is more instantaneous or in response to a specific kind of encountered issue. For

concerns that have recently occurred, such as breakage, the disposal of dead animals, or specific incidences, Internet-based response channels may be more appropriate. The results of this hotspot study can also be used by the municipal administration to enhance proactive service delivery activities, such as identifying prospective "problem" regions in the City of Edmonton. This hotspot research also provides municipal government feedback that might be used to improve proactive service delivery initiatives, such as pinpointing potential "problem" areas within the City of Edmonton. Once more, additional analysis that considers the sort of request might be performed to find out whether certain locations can be identified as having reoccurring problems and whether these problems have a spatial component. To find channel utilisation hotspots and associated gaps, spatial analysis of 311 requests can also be employed. For instance, if the adoption of mobile apps increases, the government can use the 311 request channels to evaluate the relative benefits of maintaining historical channels going forward, as well as to focus on certain location-based campaigns or follow-up citizen services. There are several intriguing relationships found in this study between sociodemographic traits and the route of 311 service requests. Additionally, the level of education is crucial in the email, web form, and mobile app models but not in phone calls [1].

b. Bohoj et al. made the eGov+ project, which investigates e-governance services and infrastructure, includes the Mobile Democracy case. The project's main goal is to investigate how citizens might be encouraged to actively participate in the delivery of various types of public services. Exploring the use of GIS and mobile technology to enable user involvement through participatory design techniques is the main goal of the case study discussed in this paper. The author views the primary difficulty of incorporating public input into municipal planning as one of encouraging thought and action. Using a 3D visualisation over the real world, residents can consider a proposed change while using their phones, which opens new avenues for reflection. This also applies to instances in which participants in a discussion find that their own opinions are being contested or supported by others. This endeavour refers to how citizens are placed as well as the deliberations and actions they take. The authors use participatory design in their study endeavour, building on a long history of this methodology. They see design as a way to investigate present user behaviours and produce theories about how potential developments in technology might enhance such behaviours. According to Stolterman, theoretical frameworks can assist designers get ready for action, and prototyping can aid in defining and exploring a design area. Prototypes, according to the authors, can be used for a variety of tasks, such as weeding out bad design concepts and giving people practical design experience. A webserver that processes requests and serves the topic information through HTTP serves as the prototype's foundation for both the desktop and Android versions. Supporting both in-person and ex-person involvement enables citizens to participate in ongoing in-person and on-action reflection as a collaborative activity with other citizens, thereby motivating citizens to enhance their participation in democracy [2].
c. Imteaj et al. states that it is getting harder to keep Dhaka city safe and clean as the population rises each day. So, to assist people in this, the authors developed an android-based application. People can utilize this app to find local waste disposal locations with directions on the app. This application has an advantage over Google Map Maker in that the map data is accessible and used by anyone, whereas Google Map Maker is a closed data source. People may assist with cleaning their community by using this application. Through this application, users can locate nearby trash cans along paths, file a complaint with the municipal corporation, alert the local police station if anything suspicious is seen, or contact a volunteer in the area if necessary. Four choices dominate the application's home page: nearby trash cans, the city corporation, the police station, and the

volunteer section. The nearest dustbin is detected using Dijkstra's algorithm. Before creating the program, 500 users were surveyed. After analysing their responses, it was decided that a trash location detector and alarming system was necessary, and the application was put into use. The application can help manage the daily rise in waste and ensure that it is disposed of properly [3].

d. Zhu et al. proposes that smart cities, a growing viewpoint on urbanisation, promise sustainable growth and remedies for issues like traffic congestion and pollution. Innovative approaches, such as science fiction and creative prototyping, have been proposed in some ground-breaking work to involve individuals in the design and planning of future cities. Understanding how smart cities affect their residents requires taking into account the smart city App. New services, like smart city Apps, have emerged as a result of the democratisation of information and communication technologies, which has given residents more opportunities to voice their thoughts on crucial issues. The use of these services might make interacting with the government simpler for citizens. The development of Qlue, a mobile smart city app that enables city inhabitants to report a variety of service-related concerns, follow their resolution, and engage with their surroundings through neighbourhood conversations, was supported by the Jakarta municipality. Qlue is a key player in facilitating Jakarta's smart city programme by providing a platform that gathers, assembles, and organises data from multiple city sources. Data is managed using a GIS-based dashboard, which can be coupled with other city data to help address city concerns. Programmability, addressability, sensitivity, communicability, communicability, memorability, traceability, and associability were the features that were utilised in the development of this application. For individuals to actively comprehend the requirements and the necessity of this application, it is vital for them to be able to communicate with one another and with the government. To validate the research model, participant data analysis was done. They conducted mediation studies to see if empowerment significantly mediates the relationship between internal and external attributes and satisfaction. This inquiry mainly looked at two problems: How does the smart city app contribute to citizen empowerment, first? What specific features or characteristics of the app operate as important catalysts for empowerment and the subsequent satisfaction, if a smart city app empowers people? Based on the empowerment idea and the sociometric approach, they designed and evaluated a model of smart city App remnants, empowerment, and happiness with the app and the government [4].

e. M. F. Sikder et al. state that many academics have worked to create an early warning system for disasters, to reduce losses. Some academics attempted to employ Short Messaging Service (SMS) as a disaster notification system. When a tragedy struck, they used Android to calculate the best evacuation routes to the shelter and displayed the information on a google map. The author's suggested method is an android-based application that determines the catastrophe level using weather updates from websites. Subscribers' data can be stored in this application's database. The major objective of the Smart Disaster Notification System is to warn the public ahead of time and provide them with the best route to the closest shelter. They segment the entire application of our system into various modules. The first is creating a database with subscriber data and locations where the likelihood of a disaster is assessed. The second is focused on areas where our suggested solutions use data from weather websites. If a user is not an Android user, they are provided with the location of the closest shelter after determining the best route to take to get there. Weather information is stored in a database by a smart disaster alerting system. To extract a pattern from these data, machine learning techniques are next applied. After that, it makes a disaster prediction using data that is currently being collected. Following the calculation of the minimum distance

following the receipt of updates from websites, a notification is delivered to the subscriber who has previously registered in the database. For rescue, this application locates the victim using GPS for Android or triangulates the location using a non-Android phone's mobile network and sends the information back to the rescue centre. With this system, SMS notifications are used to alert people to impending disasters and provide them with the best route to safety. Several works employ the same types of features, but what makes this work unique is that it measures the best route to the shelter position using a partition-based trajectory distance rather than another system that uses Dijkstra's algorithm or Euclidean distance. We must get ready to reduce the losses from these natural occurrences. We can access information from websites thanks to Android technology. And our mechanism for alerting people to disasters must be a way to aid and provide the information that would save countless lives [5].

f. Yeh and Hsiapong state that the factors of ICT-based SC services of government applications that contribute to an increase in the quality of life of its citizens were examined in this study, particularly from the standpoint of the citizens. A self-administrated questionnaire with questions taken from important and pertinent literature and modified to match the unique setting of this study was used as the instrument to verify the suggested framework. The participant's demographics and frequency of usage of ICT-based SC services were also collected in the questionnaire. A five-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"), was employed for all assessments of the construct variables. One finding of this study is that Taiwanese people who are more inventive personally, that is, who adapt to innovations more readily accept and employ ICT-based SC services comparably early than people who are less innovative. As a result, the ICT-based SC services in Taiwan have attained a certain level of dissemination due to the time-longitude and service latitude. The services tend to be more widely accepted across numerous demographic groups because they have been used often for a while. In addition, the successful diffusion of ICT-based SC services has not only occurred in a few offline clusters but has also had an impact on a larger population of citizens in the modern social networking environment, for example by Facebook and Mobile01, the top social media majoring on the introduction and discussion of ICT products and services in Taiwan [6].

3. Problem Definition

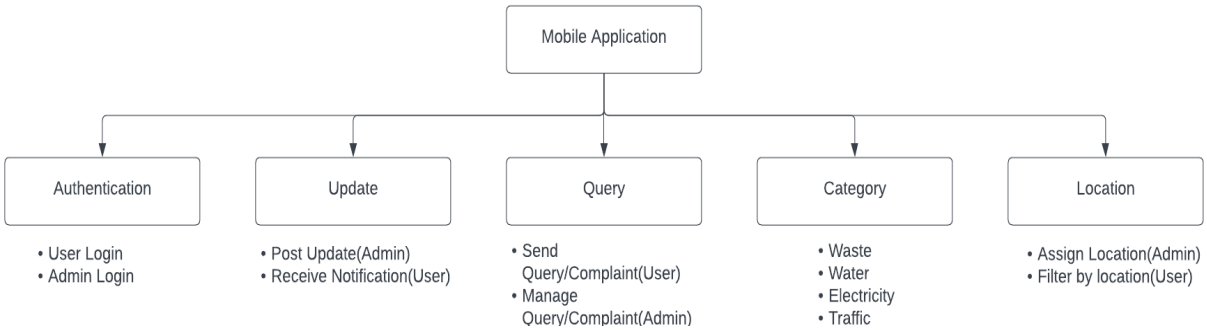
Although there are several smartphone applications that offer notification services for public issues, there is a need for an app that specialises in informing Indian citizens about maintenance work being done on public infrastructure. There is a need for a comprehensive app that covers all forms of public infrastructure in India because many existing applications only cover particular regions or categories of infrastructure. The lack of a unified platform to combine data from many government departments and organisations in charge of maintaining public infrastructure is another area of market weakness. The first of its type app in India will inform residents when repair work is being done on public infrastructure, filling current market gaps by offering a thorough, consolidated, and innovative platform that is available to all residents.

4. Objective

This app's objective is to update citizens in real time and in-depth about maintenance activities taking place on India's public infrastructure. By offering a unified platform that incorporates data from several departments and agencies, the app seeks to close the information gap between citizens and government organisations in charge of maintaining public infrastructure. By giving users the knowledge, they need to plan their daily activities and avoid inconveniences brought on by repair work on public infrastructure,

the app will increase civic participation and empower residents to take part in local administration. By keeping track of maintenance activities on public infrastructure, individuals will also have access to a historical record of such activities, allowing them to monitor the advancement of projects and hold government organisations responsible for the quality and timeliness of maintenance work. Citizens will feel more ownership and responsibility as a result, which will motivate them to take part in local government and contribute to the improvement of their neighbourhood.
Furthermore, the app will facilitate government organisations to recognise and handle problems more rapidly by giving citizens a forum to report problems and offer comments. The discussion prompt is a crucial component of the app since it promotes citizen interaction and gives users a place to report problems and offer feedback. By using this function, residents may actively participate in local governance and ensure that the maintenance of public infrastructure is carried out in a professional and timely manner. The discussion topic also makes it possible for government organisations to see problems earlier and act, which improves the effectiveness of the maintenance programme. The degree of community interaction and satisfaction with the information supplied, as well as the decrease in inconvenience brought on by repair work on public infrastructure, will be used to assess the app's success.

5. Methodology



Authentication System: The application will feature a system of Authentication that lets users log in as an admin or ordinary user.
Location-Specific Administrator System: Admins will be assigned to each place using the application's location-based admin system, which will be present. The administrators of each location will only have access to users who have registered there.

User Dashboard: Users can view updates and raise questions or complaints through the user dashboard, which will show updates that the administrator has posted.

Admin Dashboard: The admin can check queries or complaints posted by users nearby and upload updates using the admin dashboard.

System for Managing Queries and Complaints: The application will contain a system for handling queries and complaints that divides user inquiries and complaints into many categories, such as water, garbage, energy, gas, traffic, etc.

Notification System: The application will contain a notification system that alerts users of updates posted by the administrator and alerts administrators to questions or complaints received by users nearby.

Advanced Concepts Used:

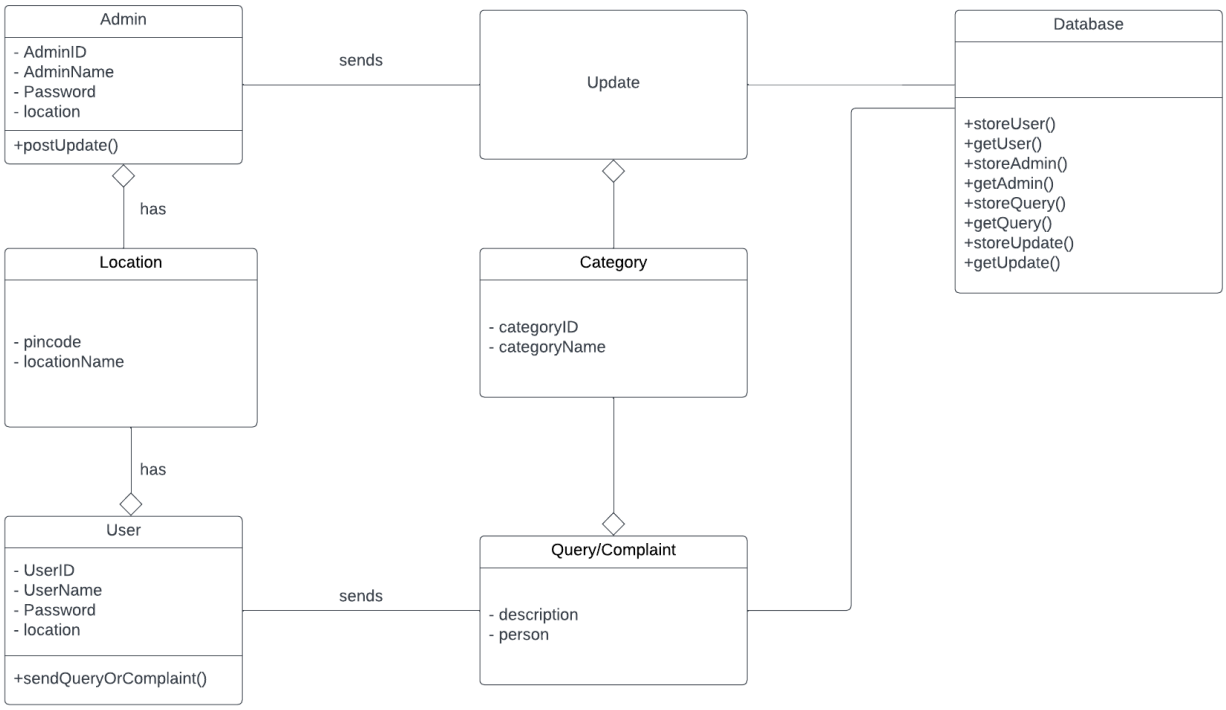
1. Java for Android Application Development
2. SQL queries to handle the backend for storing and fetching the datasets.

3. Use of indexes in SQL to reduce the query time and improve the performance by approximately three times more

6. Work Done So Far:

Design:

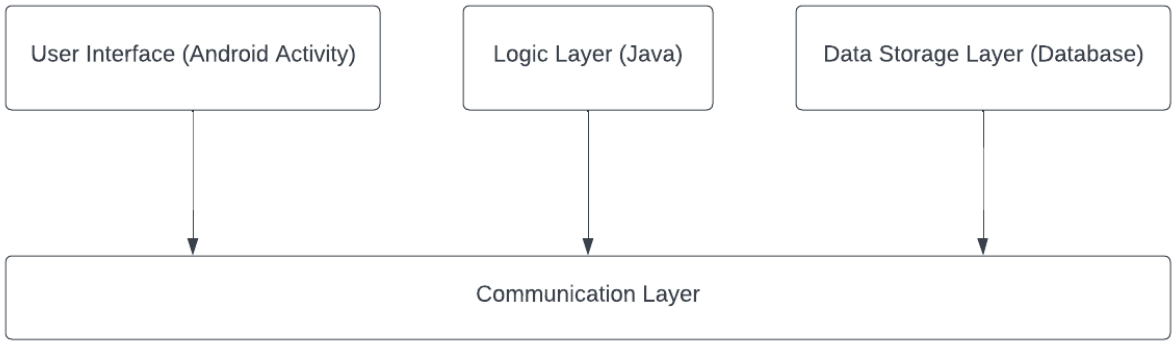
High Level Design:



The main classes in this design are User, Location, Admin, Database, Query/Complaint, Updates and Category. Each user has a distinct userId, username, and password, as well as a locationId field that links them to a unique location. LocationId and locationName are specific to each location. An admin is connected to a specific location via the locationName field and has their own adminId, username, and password.

Users and administrators can view the updates the admin posts represented by the Update class. Complaints and queries, represented by the Complaint/Query class, can also be sent by users. The Category class, which has a distinct categoryId and categoryName, is used to describe categories, which are shared by Update and Complaint/Query objects. Person details, queries/complaints, changes, and other application-related data are stored and retrieved by the Database class.

Low-level design:



Authentication System: The login screen for the authentication system will let users log in as either a regular user or an administrator. The login page will validate the user's information and give them access to the relevant dashboard.
Location-specific administrator system: The location-based admin system will assign an admin to each location. A dashboard that only displays users registered in that area is available to each admin.
User Dashboard: Updates submitted by the administrator will appear in the user dashboard. In categories including water, waste, energy, gas, traffic, etc., users can monitor the updates and submit questions or complaints. Moreover, the user's location and contact information will be shown on the dashboard.
Admin Dashboard: The administrator's dashboard will enable them to publish updates and examine any questions or concerns received by users nearby.
Query/Complaint System: User enquiries and complaints will be divided into multiple groups by the query/complaint management system. Users can provide information about their inquiry or complaint after choosing the appropriate category. The system will alert the administrator to the new inquiry or complaint.
Notification System: Users will be notified of updates posted by the administrator, and administrators will be notified of any questions or complaints received by users nearby. The system will send notifications to deliver alerts to the user's mobile device.
Database: A database will be used by the application to hold user credentials, location information, questions, complaints, and admin-posted updates.

7. Remaining Work:

As per the current progress of our project, the work that is remaining in order to have a fully-fledged application are as follows:

a. Design of the user interface by modifying the XML files in the built project using Android Studio.
b. Creation of Java classes and programs in order to enable the functionality of the user interface as well as to pass and fetch values from the database.
c. Build a database and create the necessary tables and queries using SQL.
d. Program the connection between the frontend and the backend by using the necessary codes while ensuring compatibility between the Android Application and the database.

8. Scope:

Normally big metropolitan cities have tremendous issues regarding their services and infrastructure considering the vast and diverse population. With the help of this application, the residents of any area are aware of any alerts related to water, electricity, roads, etc. in their locality. As a result, the people can take the necessary actions and plan their routine accordingly rather than encountering this issue, thus ensuring peace of mind. The residents can even raise their concerns to the local authorities and draw their attention without any delay, aiding them to take the necessary action.
Hence, this application can reduce the communication gap between the citizens and the authorities. Furthermore, as the application can categorize and display the timeline of the alerts and the citizen's complaints, the authorities can focus their solutions properly without wasting unnecessary resources and immediately before the problem becomes severe, which in some cases can have serious impact towards the environment. Also, as all the information regarding the alerts and the grievances are stored in a database which the application will fetch and display accordingly, there will be no need for physical copies of it, therefore saving paper and the environment. The database systems that we are using are all operated on the local host system which require minimal power and thereby reducing the carbon footprint given that the latest updates of Windows operating systems using its own AI (Artificial Intelligence) to keep this in check.

9. Applications of The App:

The Resident Alert and Complaint Management System (RACMS) can serve as a valuable tool for bridging the communication gap between local residents and authorities. As an Android app, it can provide several applications and benefits, some of which are listed below:

1.Reporting Complaints: The RACMS app allows residents to easily report complaints or issues they encounter, such as broken infrastructure, street lights not working, garbage pileup, or any other concerns. Users can provide detailed descriptions, attach photos or videos, and submit their complaints directly through the app.

2.Real-time Communication: The app facilitates real-time communication between residents and authorities. It can send instant notifications or alerts to residents regarding important announcements, road closures, emergency situations, or any other relevant information. Similarly, authorities can use the app to broadcast updates or messages to keep residents informed.

3.Efficient Complaint Management: The RACMS app streamlines the complaint management process. It organizes and categorizes complaints, allowing authorities to prioritize and address them effectively. Authorities can track the status of each complaint, assign them to the appropriate department or personnel, and update residents on the progress made.

4.Feedback and Follow-up: The app enables residents to provide feedback on the actions taken by the authorities regarding their complaints. This feedback loop helps to foster transparency and accountability, ensuring that residents' concerns are adequately addressed. Residents can also track the progress of their complaints and receive notifications when they are resolved.

5.Community Engagement: RACMS can serve as a platform for community engagement. The app can

include features like discussion forums, surveys, or polls to gather residents' opinions on various local matters. It can also promote community events, initiatives, or volunteer opportunities, fostering a sense of belonging and active participation among residents.

6.Data Analysis and Insights: The app can accumulate a significant amount of data on complaints, feedback, and community engagement. Authorities can analyze this data to identify recurring issues, prioritize areas for improvement, and make informed decisions regarding resource allocation and infrastructure development.

7.Emergency Response: In times of emergencies or natural disasters, the app can act as a crucial communication channel between residents and authorities. Authorities can quickly disseminate emergency alerts, evacuation instructions, or safety guidelines to ensure the well-being of residents. The app can also provide a platform for residents to report emergencies or request immediate assistance.

8.Performance Monitoring: RACMS can facilitate performance monitoring of local authorities. The app can include features that allow residents to rate the quality of services provided, such as waste management, street cleaning, or public transportation. This feedback can help authorities gauge their performance, identify areas of improvement, and strive for better service delivery.

Overall, the Resident Alert and Complaint Management System (RACMS) Android app can enhance communication, accountability, and community participation in addressing local issues. It empowers residents to actively engage with authorities, leading to more efficient problem-solving and improved quality of life within the community.

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