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DESIGN AND DEVELOPMENT OF DISASTER ALERTING APPLICATION:SAJAG

Dr. Ravi Prakash[1]
[1]*Computer Science, KCCEMSR, India*
jravi54@gmail.com

Omkar Chauhan[2]
[2]*Computer Science, KCCEMSR, India*
chauhanomkar2002@gmail.com

Deepak Mishra[3]
[3]*Computer Science, KCCEMSR, India*
mickeymishra2244@gmail.com

Satyam Maurya[4]
[4]*Computer Science, KCCEMSR, India*
satyam21603@gmail.com

Pradeep Kori [5]
[5]*Computer Science, KCCEMSR, India*
pravinkori125@gmail.com

Abstract - The SAJAG application aims to be a crucial tool for disaster warning and management, particularly targeting flood- prone regions like the Republic of India. Its primary objective is to reduce injuries resulting from natural disasters, especially floods, by integrating with local emergency services. SAJAG delivers real- time disaster information, including location, severity, and estimated impact duration, enabling users to make informed decisions about evacuation and safe areas. Additionally, the app facilitates proactive disaster preparedness through self-awareness planning features. Leveraging wireless networking technology and artificial intelligence, SAJAG ensures timely and accurate information dissemination to users, even in adverse conditions suchas power outages.

Keywords: Disaster alert, Natural disaster, Floods, Real-time information, Artificial intelligence.

1. INTRODUCTION

In an era where natural disasters increasingly threaten lives and communities, the imperative for innovative disaster warning and management tools becomes evident. This report introduces a groundbreaking mobile application, SAJAG, specifically tailored to address the pressing issue of flood-related disasters, with a primary focus on flood-prone regions, notably the Republic of India (ISO: Bhārat Gaṇarājya).The overarching objective of SAJAG is to mitigate the devastating impact of floods by providing seamless integration with local emergency services[1], thereby facilitating efficient communication and coordination between app users and first responders during emergencies. Unlike conventional approaches, SAJAG emphasizes proactive disaster preparedness by equipping users with tools to create personalized self-awareness plans, empowering individuals and families to effectively plan for and respond to a variety of crisis scenarios. One distinguishing feature of SAJAG is its utilization of a hybrid approach, combining wireless networking and artificial intelligence (AI) technologies to ensure the reliability and immediacy of information dissemination. By leveraging wireless networks, SAJAG can directly transmit vital updates to users' smartphones, circumventing potential disruptions caused by power outages or connectivity issues. Concurrently, AI processes real-time data, furnishing users with invaluable insights into the evolving disaster situation. This integration of cutting-edge technologies not only enhances the timeliness and accuracy of disaster information but also augments users' capacity to make informed decisions and take proactive measures in safeguarding lives and property.[2]

2. LITERATURE SURVEY

The literature survey delves into existing research and developments pertinent to disaster management applications, offering valuable insights into the landscape of technological interventions aimed at mitigating the impact of natural disasters. The following studies havebeen identified as particularly relevant:

Title & Publication Year	Author's	Key Findings
[1]. Development ofa smartphone application for disaster response (2015)	Hyoungseon g, Park/ Si-bum, Cho/ Dongseag, Kim/ Sungjin-hong	The study highlights the importance of effective disaster response to tsunami, emphasizing the role of smartphone applications
[2]. Early warning system for Disasters. management in rural area (2015)	Z.N. Khalil Wafi / Mohd Fareq Abd.Malek/ Sateaa Hikmat alnajjar/ R. Badlishah	The paper discusses the challenges of rural disaster communication and proposes the use of Smart Communication Platform System (SCPS)
[3]. A Disaster Risk Reduction Monitoring and Incident Reporting System Geolocation and SMS Technology (2020)	Jessie Richie N. de los Santos Michelle G. de los Santos Rochel C. Copino	The App, a Disaster Risk Reduction and Incident Reporting System, is a robust solution in Tanauan, Leyte, Philippines, using ICTs for coordination, planning,and humanitarian activities
[4]. IMPLEMENTAT ION OF DISASTER MANAGEMENT APPLICATION USING REACT-NATIVE (2022)	Shivansh Srivastava/ Rohan Kumar	The paper introduces an app for disaster management, utilizing technologies like React Native, Node.js, Firebase, and TensorFlow

3. PROPOSED SYSTEM

3.1 APPROACH DETAILS

The mobile app will collect water-related data from citizens and open sources, fostering citizen involvement and transparency. The collected data will undergo precise data preprocessing, including error detection and removal, to ensure accuracy and consistency.[2]

The preprocessed data will be subjected to data analysis techniques, including machine learning, to identify valuable patterns and trends. The results of the analysis will be accessible to citizens, government agencies, and other stakeholders.[4] The app will feature data visualization on a map, providing user-friendly, geospatial representations of water-related data.[3]

3.2 FLOWCHART

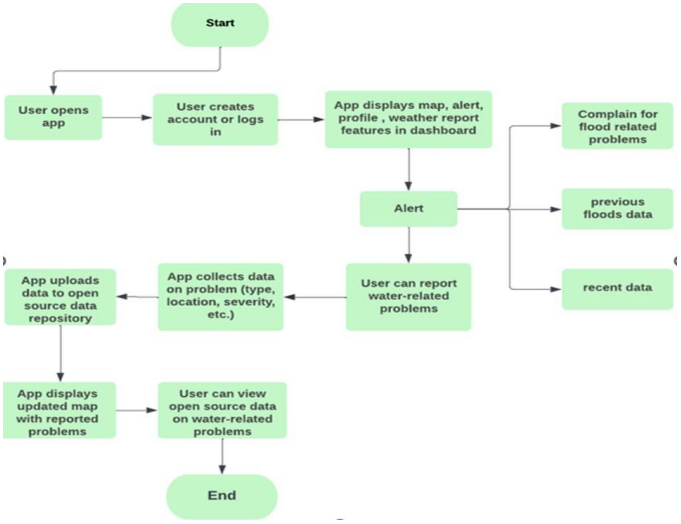


Fig (a). FLOW CHART FOR SAJAG APPLICATION

3.3 DEPENDENCIES

User registration and authentication are crucial for data security, restricting unauthorized users' access to reports, and preserving the accuracy of the data.

➢ Location Services: Accurate GPS and manual input allow for the accurate tracking of reported water concerns.

➢ Robust Database: A strong database system maintains reports submitted by users, enabling efficient issue tracking and resolving.

➢ Data Integration: Our information pool and analytical skills are improved through seamless connection with open- source data sources and APIs.

➢ Mapping Services: Essential for presenting issue reports graphically on a map with place markers to improve user comprehension.

➢ Notification system: Actively notifies users of any new issue reports in the area, encouraging interaction and timelyawareness.

➢ User Feedback Mechanism: By adding user feedback into the resolution process, it improves it and ensures user happiness.

3.4 TECHNOLOGY STACK

a variety of technologies that can be used to create a disaster alert application for Android.

• Firebase: Firebase is a mobile platform that helps developers buildbetter apps, grow their user base, and earn more money. Firebase provides a set of tools and services that can be used to develop and manage Android applications.

• Android Studio: Android Studio is the official integrated develop ment environment (IDE) for Android app development. It provides a comprehensive set of tools and features to help you develop, test, and debug your Android apps.
Backend:

• TensorFlow: TensorFlow is an opensource machine learning library developed by Google. It can be used to develop a variety ofmachine learning models, including models for disaster prediction.

• Google Cloud Platform: Google Cloud Platform (GCP) is a suiteof cloud computing services that runs on the same infrastructure that Google uses for its enduser products, such as Google Search and YouTube. GCP provides a variety of services that can be usedto develop and deploy disaster alert applications.

3.5 METHODOLOGY

The system functions by allowing users to report water-related issues via the mobile app. Upon receiving reports, the system validates and processes the data, determining the severity and impact duration of each issue. Real-time disaster alerts are then generated and disseminated to users and emergency services for prompt action. Users can also access self-awareness plans and receive guidance on evacuation and safety measures. Through seamless integration with local emergency services, the system facilitates efficient coordination and response efforts during emergency situations

3.5.1 Sequence Diagram

Following is the sequence diagram describing the sequential flowof the proposed system.

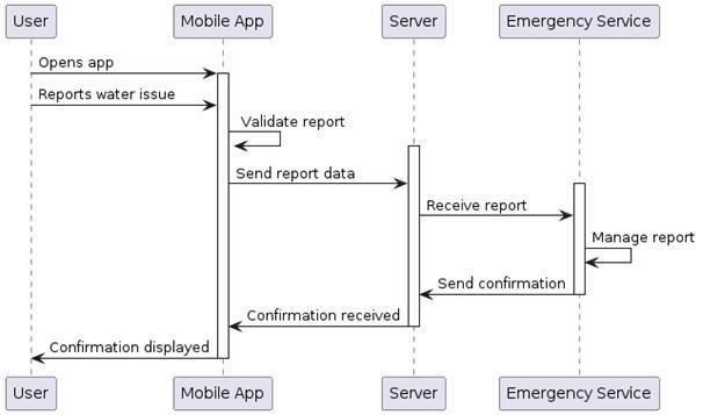


Figure 3.5.1 Sequence Diagram

3.5.2 Data Model Diagram

The following is the ER diagram describing the data model of theproposed system.

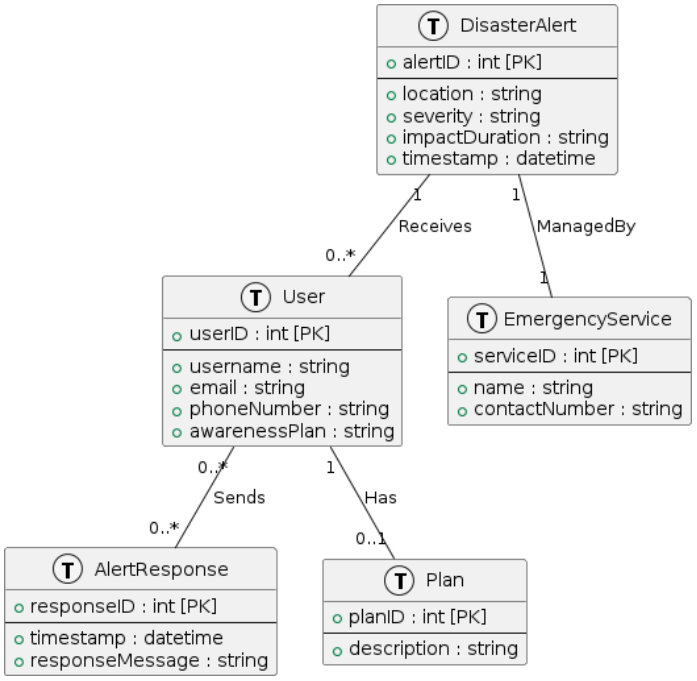
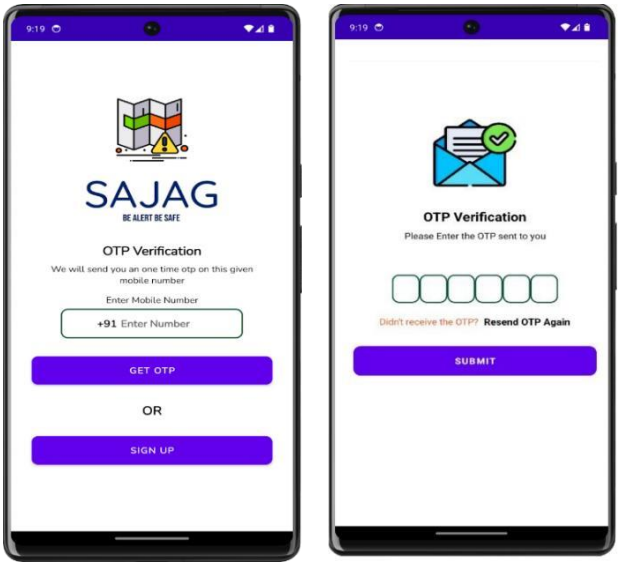


Figure 3.5.2 ER Diagram

3.6 RESULTS

I. OTP VERIFICATION

The OTP Verification page of the Sajag App ensures secure user authentication through a one-time password, enhancing account Security.

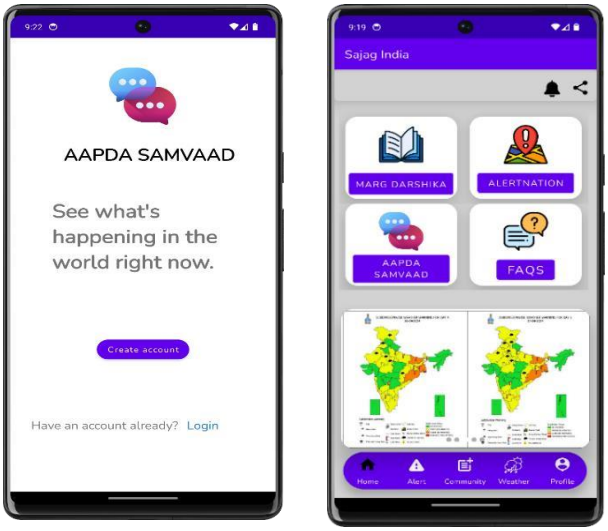


II. SIGN UP

The SAJAG sign-up page features a user-friendly interface with intuitive design elements, facilitating seamless onboarding for enhanced user experience.

III. HOME

The Home page of the "Sajag App" screenshot serves as a comprehensive survival guide and hub for All India Alerts, providing essential information at a glance.

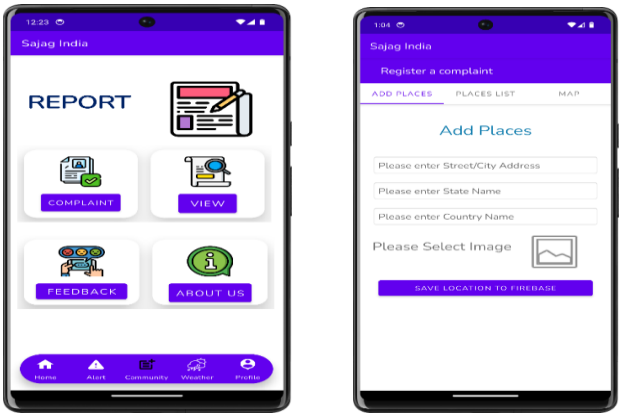


IV. MAPS

In the map section, users have the ability to identify areas experiencing water-related issues. This feature allows individuals to visually pinpoint locations where water-related challenges orconcerns exist.

V. REPORT

Seamlessly navigate between reporting complaints and viewing them, with options for user feedback and easy contact access, ensuring a streamlined and a user-friendly experience.

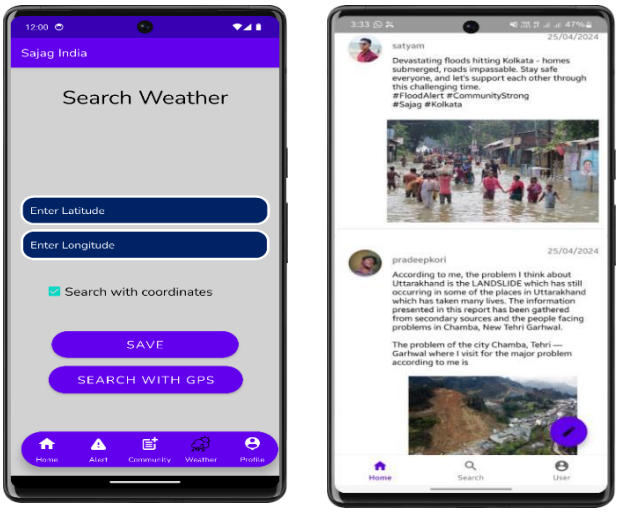


VI. SEARCH WEATHER

Effortlessly check weather updates by searching for any city or country, including precise coordinates, providing comprehensive and accurate reports.

VII. AAPDA SAMVAAD

real-time meteorological information, offering users a comprehensive shows user interactions with the climate conditions.

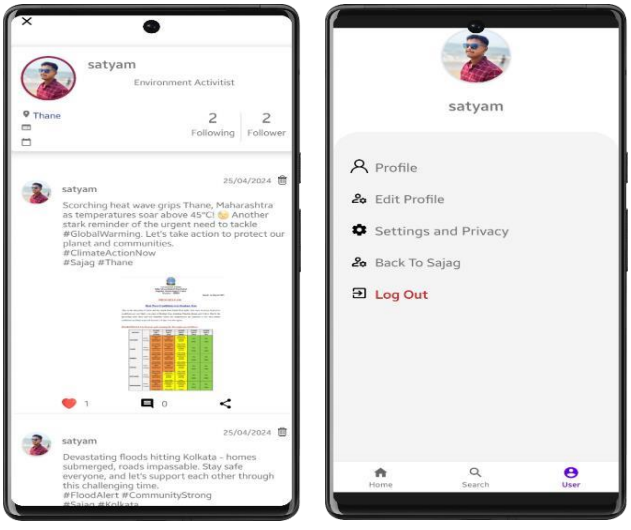


VIII. UPLOAD IMAGE

The "Sajag App" Disaster Page screenshot captures real-time visual data, providing a visual overview of the ongoing disaster for comprehensive analysis in the report.

IX. PROFILE

Sajag App's Page showcasing 'Edit Profile' and 'Sign Out' options for user customization and account management, captured in the screenshot for the report.

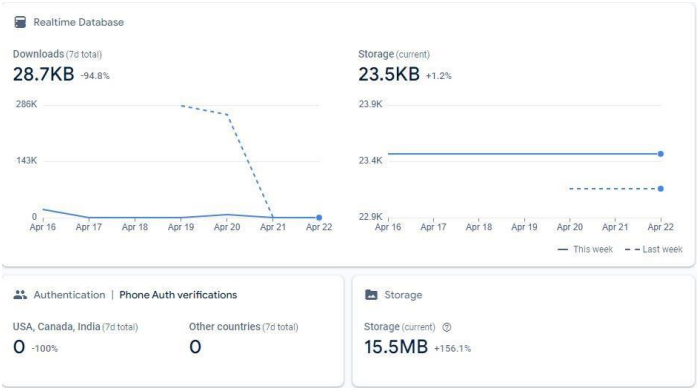


3.6.1 ANALYTICS

The analytics of this project can provide valuable insights into various aspects of its functionality and usage, contributing to informed decision-making and continuous improvement

3.6.2 REALTIME DATABASE

Firebase Realtime Database could be a suitable choice due to its scalability, real-time synchronization, and ease of use.



3.6.3 EVALUATION METRICES

The evaluation metrics for this project are crucial for assessing its effectiveness and performance. Here are some key metrics:

Response Time: Measure the time taken for the system to respond to user requests, ensuring prompt interaction and a smooth user experience.

Scalability: Assess the system's ability to manage increasing loads without degradation in performance, ensuring it can accommodate growing user bases and data volumes.

Reliability: Evaluate the system's uptime and availability to ensure consistent access for users, especially during critical situations such as disaster events.

Throughput: Measure the rate at which the system can process requests, ensuring it can efficiently manage multiple concurrent interactions.

Resource Utilization: Monitor the utilization of server resources such as CPU, memory, and disk I/O to optimize performance and minimize operational costs.

Error Rates: Track the occurrence of errors and exceptions to identify potential issues and ensure the system operates smoothly without disruptions.

User Satisfaction: Gather feedback from users to assess their satisfaction with the app's usability, functionality, and responsiveness.

Data Accuracy: Ensure the accuracy and reliability of data reported and displayed by the app, minimizing misinformation, and enhancing decision-making capabilities.

3.7 LIMITATIONS

Data Accuracy: The quality of crowd-sourced data may vary, leading to inaccuracies or false reports that can hinder effective decision-making.

Digital Divide: Access to the app may be limited in areas with poor internet connectivity or among populations with limited access to smartphones, potentially excluding marginalizedcommunities.

Privacy Concerns: Collecting and sharing location-based data may raise privacy concerns among users, necessitating strong data protection measures.[4]

Maintenance: Ensuring the ongoing functionality and accuracy of the app requires continuous monitoring and updates, which can be resource-intensive.[3]

Resource Allocation: Governments and organizations may not prioritize app-generated data in their decision-making processes, limiting its impact.

Security Risks: As the app gathers sensitive information, it may become a target for cyberattacks or misuse of data.

4. FUTURE WORK

The application plans to expand its geographic coverage to flood- prone regions, integrate advanced technologies like drones and sensors, and collaborate with government agencies for better response. It will diversify disaster types, enhance public awareness, and strengthen community engagement through educational modules and interactive features. It will form global partnerships, improve AI capabilities, gather user feedback, collaborate with private sector entities, engage in policy advocacy, and expand multi- language support.

5. CONCLUSION

The development of a mobile app aimed at crowdsourcing water- related problems and open sourcing data within a community holds great promise for enhancing community engagement, data- driven decision-making, infrastructure improvements, and environmental impact monitoring. However, it is essential to acknowledge and address potential limitations such as data accuracy, the digital divide, privacy concerns, and resource allocation challenges. By effectively overcoming these hurdles, this innovative project has the potential to pave the way for a more sustainable future, where technology and community involvement work hand in hand to address critical water-related challenges and ensure the safety and well-being of communities worldwide.

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