

Myalert: Disaster Preparedness Application for Kota Kinabalu Residents, Sabah

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ABSTRACT

Natural disasters such as floods, landslides, and storms are frequent occurrences in Malaysia, leading to significant damage, loss of life, and disruption. In regions like Kota Kinabalu, the lack of accessible real-time disaster information and reliable communication channels often exacerbates the impact of such events. MyAlert, a community-centric disaster response and real-time monitoring system, was developed to address these challenges by providing users with essential disaster related information and safety features. The objective of this project was to create an app that centralizes disaster alerts, emergency contact directories, shelter locations, and community reporting, using data from trusted sources like the Malaysia Open Data API and Firebase cloud infrastructure. The app aims to empower users with timely and accurate disaster information, while also allowing them to track the real-time locations of friends and family during crises. MyAlert was developed using Android (Kotlin/Jetpack Compose) and integrates the Malaysia Open Data API for disaster data, Firebase for real-time synchronization and cloud storage, and other essential tools to ensure smooth functionality. The project follows the Waterfall methodology, ensuring thorough planning, development, and testing phases. Evaluation was conducted through functional testing, integration testing, and user feedback analysis using the System Usability Scale (SUS). The results indicate that MyAlert is an intuitive, efficient, and reliable tool for disaster preparedness, offering an integrated solution to enhance safety, communication, and community resilience. The app's positive user feedback demonstrates its potential to improve disaster response in Malaysia, making it an effective resource for local communities during critical times.

Keywords: Disaster Preparedness, Mobile Application, Real-Time Alerts

INTRODUCTION

This introduces the MyAlert project, a mobile-based disaster preparedness application aimed at improving disaster response and preparedness in Kota Kinabalu. It highlights the challenges faced by communities in flood-prone and disaster affected regions, particularly the lack of real-time, localized alerts and community driven platforms for effective response. The chapter outlines the project's objectives, defines the scope and limitations of the MyAlert app, and presents the expected outcomes, including its role in enhancing disaster resilience through real-time alerts, emergency resource mapping, and community reporting.

Problem Statement

Based on the challenges discussed in the previous section, several issues in Kota Kinabalu's disaster preparedness landscape can be addressed through a more systematic, technology-driven approach. The following key problems have been identified: 1. The current disaster alert systems do not have real-time and localized alerts, resulting in late response and increased risks during disasters. 2. Existing systems do not offer a centralized platform for accessing important disaster information, leaving residents uncertain about available resources and

how to respond. 3. A localized community-based platform for real-time reporting and sharing of disaster information does not exist, which results in a disjointed communication and increased emotional distress during disasters.

Objectives

Based on the issues identified, the objectives of this project are as follows:

1. To gather and analyze user awareness and preparedness on natural disasters in Kota Kinabalu.
2. To develop MyAlert mobile app using waterfall methodology.
3. To evaluate usability of the app using System Usability Scale with questionnaire-based feedback analysis.

The primary users are Kota Kinabalu residents; secondary users are disaster-response authorities or administrators. Eight modules are included: Profile Management, Admin Dashboard, Disaster Alerting, Shelter Finder, Community Reporting, AI Chatbot, Emergency Contact Directory, and Friends and Family Locator.

Selected Survey Evidence

Survey indicator	Finding
Interest in mobile disaster application	72.5% showed higher confidence/interest in a mobile approach
Interest in real-time disaster data	70% indicated interest in real-time disaster information and related resources

LITERATURE REVIEW

The original literature review compares disaster-management applications and identifies differences in alerting, mapping, reporting and support functions. The review supports the need for an integrated and localized platform.

Existing-System Comparison:

System	Alerts	Map/Shelter	Community	AI/Guidance	Family
MyRadar	✓	Limited	—	—	—
Emergency App	✓	✓	Limited	—	—
FEMA	✓	✓	Limited	—	—
RakanMET	✓	✓	—	—	—
Disaster Alert	✓	✓	Limited	—	—
MyAlert	✓	✓	✓	✓	✓

Research Gap

Many solutions emphasize alerts/weather information but do not integrate the full set of response functions in one localized platform.

1. Community reporting can complement official data by enabling residents to share incident information.
2. Shelter and emergency mapping is more useful when connected directly to disaster alerts and response workflows.
3. Social location sharing, emergency contacts and AI preparedness guidance extend the functionality of a conventional alert application.

Contribution

MyAlert combines government data, community reports, mapping, emergency contacts, social location sharing and preparedness guidance in one Android application. The intended contribution is reduced information fragmentation and faster access to actionable disaster resources.

METHODOLOGY

Waterfall Model

Phase	Activities	Output
Planning	Problem, objectives, scope, schedule	Project plan
Analysis	Survey/interview and requirements	Functional & non-functional requirements
Design	Architecture, DFD, ERD, UI	System design
Implementation	Eight modules and API/backend integration	Working Android application
Testing & Evaluation	Functional, integration and SUS	Validated system

Technology Stack

Technology	Purpose
Kotlin	Android development
Jetpack Compose	User interface
Firebase	Authentication, storage, real-time synchronization
Malaysia Open Data / METMalaysia API	Official weather/disaster information
Retrofit2	API communication and JSON parsing
Google Maps API	Mapping and geolocation
MVVM	Separation of application responsibilities
Postman	API testing

System Analysis and Design

Functional Requirements

Module	Main function
Profile Management	Register, authenticate and update profile
Admin Dashboard	Manage users, reports and shelters
Disaster Alerting	Display real-time location-based alerts
Shelter Finder	Locate shelters, hospitals and evacuation resources
Community Reporting	Submit and view disaster incidents
AI Chatbot	Provide disaster preparedness guidance
Emergency Contact Directory	Provide emergency service contacts
Friends & Family Locator	Share and view real-time locations

Non-Functional Priorities

1. Usability: clear navigation and accessible controls during stressful conditions.
2. Performance: responsive maps, alerts and data access.
3. Reliability: stable synchronization and consistent behaviour.
4. Security: authenticated access and protected user information.
5. Availability: timely access to disaster information when network connectivity is available.

System Flow

Resident/Admin → MyAlert application → Firebase + Malaysia Open Data API + Google Maps services → alerts, reports, shelters, contacts and location information. The design separates user functions from administrative management while maintaining shared data services.

Key Design Artefacts

Artefact	Purpose
Context Diagram	Defines external actors and system interactions
DFD Level 0/1	Shows movement and processing of application data
ERD	Defines data entities and relationships
UI Design	Defines navigation and interfaces for users/admins

System Analysis and Design (Continued)

User Interface Design

1. Large, clear controls and readable information to support use during emergencies.
2. High-contrast presentation and straightforward navigation.
3. Map-centred presentation for disaster alerts, shelters and locations.
4. Separate user and administrator interfaces.

Main Interface Components

Interface	Purpose
Register / Login	Secure user access
Community Alerts	View community incidents
Disaster Alerts	View alert details
Shelter Finder	Locate shelters/resources
Friends List / Requests	Manage trusted contacts
AI Chatbot	Ask preparedness questions
Admin Console	Manage users, reports and shelters

Data and Module Integration

Firebase stores and synchronizes user profiles, community reports and real-time location information. The external disaster API supplies official information, Retrofit2 retrieves and parses API data, and Google Maps supports spatial visualization. The architecture is designed so individual modules can be implemented and tested before final integration.

Design Summary

Design concern	MyAlert response
Rapid emergency access	Simple navigation and critical functions grouped in one app
Localized information	Location-based alerts and maps
Multiple information sources	Official API plus community reports
Emergency resources	Shelters, hospitals and contact directory
Social safety	Friends and Family Locator
Preparedness support	AI chatbot

Implementation

The implementation transformed the requirements and designs into an interactive Android application. Kotlin and Jetpack Compose were used for the front end. Firebase supports authentication, cloud storage and real-time synchronization; Retrofit2 communicates with the Malaysia Open Data API; Google Maps API supports mapping and geolocation.

Implemented Modules

Module	Implementation
Profile Management	Sign-up, login and profile update
Admin Dashboard	User, report and shelter administration
Disaster Alerting	Disaster markers and detailed alerts
Shelter Finder	Interactive map, shelter details and navigation
Friends & Family Locator	Location sharing, friends and requests
Emergency Contact Directory	Emergency service information
AI Chatbot	Interactive disaster-preparedness assistance
Community Reporting	Incident submission and viewing

Architecture

MVVM separates Model, View and View Model responsibilities. Real-time Firebase services support application data, while external APIs provide official disaster and mapping information. Modules were implemented incrementally and then integrated.

Implementation Evidence

The original report documents interfaces for sign-up, login, profile management, administration, disaster alerts, shelter finder, friends'/family location, emergency contacts, AI chatbot and community reporting. In this condensed version, the key implementation functions are represented in the table above to preserve page space for analysis, results and evaluation.

Testing And Evaluation

Testing Strategy

Testing assessed functionality, module integration, usability and overall experience. Functional tests covered normal operations, boundary conditions and invalid inputs. Integration testing examined interactions among application modules, Firebase, external APIs and the AI chatbot.

Test area	Coverage	Result
Profile Management	Registration, login, profile	Pass
Admin Dashboard	Users, reports, shelters	Pass
Disaster Alerting	Alert display/details	Pass
Shelter Finder	Map/details/navigation	Pass
Community Reporting	Submit/view reports	Pass
AI Chatbot	Question/response flow	Pass
Emergency Contacts	Contact access	Pass
Friends & Family	Requests/list/location	Pass

Integration Testing

Integration testing verified that modules communicate and exchange data correctly, including Firebase synchronization, Malaysia Open Data API integration and AI Chatbot interaction.

User Evaluation

User feedback was collected through questionnaire-based evaluation. SUS was used as the standardized overall usability measure.

Testing And Evaluation (Continued)

System Usability Scale (SUS)

The original report contains SUS results from 40 respondents. Standard SUS scoring was applied: odd-numbered items are adjusted by subtracting 1; even-numbered items are adjusted by subtracting the response from 5; adjusted scores are summed and multiplied by 2.5. The mean of all 40 individual SUS scores is 83.80.

Metric	Result
Respondents	40
Average SUS	83.80
Benchmark	68
Interpretation	Excellent usability
Percentile stated in report	90th–95th percentile

Figure 6.1. MyAlert SUS score compared with the standard benchmark.

Evaluation Findings

- 83.80 is substantially above the benchmark of 68.
- The result indicates strong perceived intuitiveness and learnability.
- User feedback supports the conclusion that MyAlert meets its usability objective.
- MyAlert – 10-Page Condensed FYP |

CONCLUSION

MyAlert successfully introduces an integrated mobile solution for disaster preparedness and response in Kota Kinabalu, Sabah. It combines real-time disaster alerts, shelter mapping, community reporting, emergency contacts, an AI chatbot and Friends and Family Locator functions. The integration addresses fragmented information channels and provides residents with a unified platform for disaster-related information and response support.

Achievement of Objectives

Objective	Achievement
Analyse awareness and preparedness	Supported through surveys and user requirement analysis.
Develop MyAlert using Waterfall	Completed with eight integrated modules.
Evaluate usability using SUS	Completed with 40 respondents; average SUS = 83.80.

Future Work

Looking ahead, there are several exciting opportunities for expanding and enhancing MyAlert. One of the key areas for future work is the expansion to multiple locations. By extending MyAlert’s capabilities to other regions

in Malaysia, and potentially beyond, the app could reach a much broader user base, helping more people stay informed during disasters. Integrating MyAlert with local authorities and disaster management agencies is another important development. This would allow the app to provide the most accurate, up-to-date information directly from official sources, enhancing the reliability of the alerts and improving response times

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