

Guardian Insight: Empowering Safety through Advanced Data Analytics

Rafael Claveria ¹, John Mark Amar ², Kristine T. Soberano, PhD ³

^{1,2,3} State University of Northern Negros, Philippines

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C/A: Rafael Claveria

Abstract: Ensuring community peace, order, and the safety of the people is one of the most pressing issues in today's world. In this age of technological progress, the rise of information technology in today's era plays a huge part in providing efficient and convenient solutions to every problem. With the assistance of web and mobile applications, individuals may easily access and transmit information with just a single click. Innovative solutions facilitated by technology pave the way for a safer and more connected community for generations to come. This study aims to develop guardian insight. Design a system that minimizes emergency response times by leveraging advanced data analytics to analyze and process real-time data from safety and emergency situations. This study used the descriptive developmental method of research. This method involves the systematic study of putting into the design, developing, and thoroughly assessing instructional programs, processes, and products to ensure they adhere to specific standards or criteria. There were a total of ten (10) community members who participated in the survey. After the participation, the app helps the barangay officials respond faster and more accurately. The app also helps community members send an emergency incident faster. All the data gathered by the researchers was enough to help the app analyze the emergency faster. This data will also help and be used by the barangay official to understand how to respond in a certain emergency situation. Good response time in every emergency situation helps lessen the percentage of the risks of a certain emergency. The app helped the barangay officials act accurately and boosted their response time by a higher percentage. It can also generate reports for barangay officials to evaluate in emergency situations. This made the community members feel secure because the app is just one click away to ask for assistance or help in real-time. The community members cannot access the application if they do not have a phone or a device that is compatible with the application to be installed. This app should have enough data for it to analyze the emergency accurately. This app will not function properly if the user has no internet connection, but the barangay officials offered an internet connection in areas with a higher percentage of emergency rates. The barangay officials also recommended the app for them to monitor their community members and strategize for their future plans in their community.

Keywords: Guardian Insight, Empowering Safety, Advanced Data, Innovative solutions, technology,

INTRODUCTION

One of the pressing issues in the community is maintaining peace, order, and the safety of the people. In this age of technological progress, the rise of information

technology in today's era plays a huge part in providing efficient and convenient solutions to every problem. With the assistance of web and mobile applications, individuals may easily access and transmit information with just a single click. Innovative

solutions facilitated by technology pave the way for a safer and more connected community for generations to come. E-Government systems have significantly changed the way public services are delivered today (Bautista, 2023). A secure and safe environment is crucial for promoting investment and economic growth (Antonio, 2020). In light of the prevailing pandemic, public demands must be managed with utmost precautions while ensuring better and faster services for the people (Lim, 2022). Information and communications technology (ICT) represents a disruptive innovation developed by humanity (Bustillo, J. C. M. 2020). The increased use of health information technology, combined with digitized records and planning systems, has generated massive volumes of data. Recently, innovative approaches, analytical tools, and disruptive technologies have leveraged this data to improve healthcare outcomes, including patient safety (Ummar et al., 2022). Public and private organizations collect vast amounts of safety data each year for various reasons, such as compliance requirements, practice improvements, or performance measurement towards improvement goals (Gnomi et al., 2023). Analytics play a crucial role in navigating emergency situations. Emergency operations management must develop analytics empowerment capability (ANEC) to prepare for uncertainty, support continuity, and address disruptions (Aker et al., 2021). Crime incidents are a significant public safety concern. The Philippines has launched 911 and 8888 emergency numbers to respond to disasters and emergencies like fires, typhoons, terrorist attacks, civil disturbances, and vehicular accidents. Reporting incidents helps coordinate responses and encourages witnesses or victims to bring offenders to justice, preventing future crimes (Ignaco, M. A. E. 2021). Traditional methods of reporting incidents, such as short messaging systems and telephone calls, are tedious and prone to errors and misinterpretations. Developing a mobile application to transmit incident type, location, and images can significantly improve assistance in emergency situations (Bulusan, J. P. et al. 2019). Reporting incidents is vital for monitoring environmental quality, enabling authorities to promote safety and improve technical systems (Winckler et al., 2013).

Overall, this study shows that the Guardian Insight application can help people seek help and assistance faster from

the barangay monitoring center. Data analytics will be used to spot patterns and trends in emergency incidents, allowing the system to act effectively and provide accurate reporting. Real-time data from any safety and emergency situations will be collected in a centralized database for the barangay. The system will collect the location of the sender to provide help and assistance. Real-time alerts will be sent to the monitoring team of the barangay. With this, the safety of the people will be strengthened, and support can be provided faster.

OBJECTIVES OF THE STUDY

This study aims to develop Guardian Insight: Empowering Safety through Advanced Data Analytics. Specifically, it aims to:

1. Design a system that minimizes emergency response times by leveraging advanced data analytics to analyze and process real-time data from safety and emergency situations.
2. Develop features that utilize GPS technology to accurately determine the location of individuals in distress, ensuring a targeted and efficient deployment of assistance resources.
3. Create a centralized communication platform that facilitates seamless interaction between community members and the barangay monitoring center, optimizing the exchange of information during emergency situations.
4. Design mechanisms for efficient real-time data collection and storage in a centralized database, ensuring the availability of accurate and up-to-date information for emergency response teams.
5. Utilize data analytics to identify potential risks and trends, allowing for the implementation of proactive safety measures to address and mitigate emerging concerns within the community.

METHODS AND MATERIALS

This study used the descriptive developmental method of research. This method involves the systematic study of putting into the design, developing, and thoroughly assessing instructional programs, processes, and products to ensure they adhere to specific standards or criteria.

DATA GATHERING PROCEDURE

A. System Design

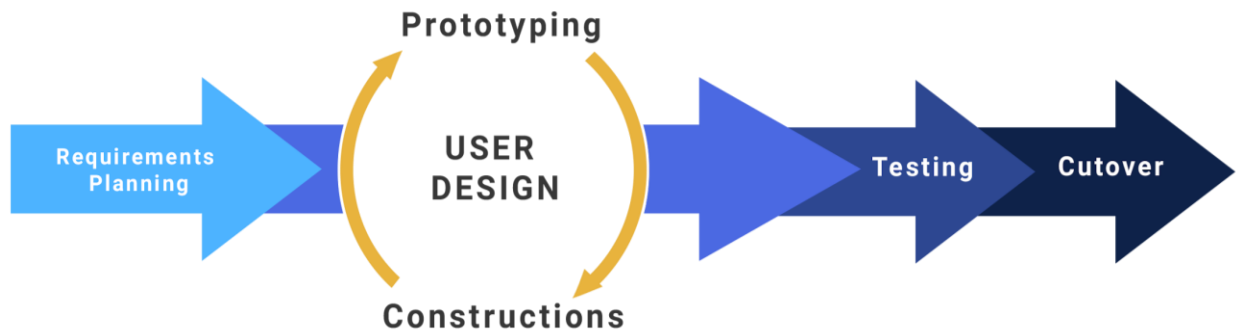


Figure 1. Rapid Application Development

The Rapid Application Development (RAD) model is a software development approach that prioritizes rapid prototyping and iterative cycles over comprehensive planning. It centers on quickly building prototypes, gathering feedback from stakeholders, refining them, and then proceeding with further development. Rad enables faster software delivery and better adaptation to changing requirements compared to traditional waterfall methodologies. This method requires close collaboration between developers and stakeholders to deliver usable software within shorter time frames.

Requirements Planning - During this stage, it involves gathering and analyzing requirements from stakeholders. Unlike conventional approaches that entail gathering all requirements at the outset, in RAD, the focus lies on identifying high-priority requirements that can be quickly implemented.

User Design - In this phase, rapid prototyping methods are employed to generate prototypes of the software. These prototypes are frequently presented to end-users for feedback, allowing for early validation of design choices.

Construction - After approval of the design, development starts. RAD prioritizes the utilization of rapid development tools and methods for promptly crafting software solutions. This phase entails frequent cycles of coding and ongoing integration to maintain rapid progress.

Prototyping - This is where the real development occurs. Instead of following a rigid set of requirements, developers

create prototypes with different features and functions as fast as they can. These prototypes are presented to clients for feedback, allowing them to express their preferences. Typically, these prototypes are rapidly assembled to highlight essential features. This iterative process is standard practice, with the final product being refined during the finalization stage, where the client and developer are in agreement with the final product.

Testing - Testing occurs at various stages of the development process, with a focus on detecting and resolving defects. This phase includes both functional testing to ensure the software meets the requirements and usability testing to assess the user experience.

Cutover - This is the implementation phase, where the completed product is prepared for its launch. This involves converting data, conducting tests, and a changeover to the new system, as well as user training. Throughout this phase, both developers and clients remain vigilant for any remaining bugs in the system while making final adjustments.

B. Research Design

Local of the study

This study was taken in Bacolod City, Negros Occidental, Philippines. Specifically, the main participants will be the barangay officials and community members.

Sample Size

Table 1.0

No. of participants	Classification
2	Barangay Officials
8	Community Members
10	Total

This table presents the total number of participants and the classification of the barangay community. There are eight (8) community members and two (2) barangay officials who participated because of the convenience of the app being implemented. The researchers were able to gather enough data to increase the accuracy of the app.

Sampling Technique

The researcher will gather data for emergency alerts and barangay officials using the purposive sampling technique and the community member will use the simple random sampling technique.

Research Instruments

The researchers used the self-made surveys and the gathered results of the developed application for the system evaluation.

Context Flow Diagram

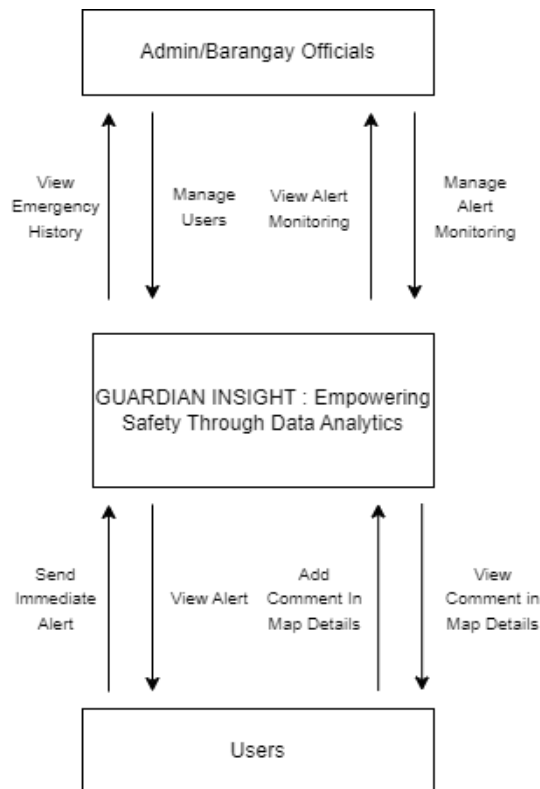


Figure 2. Context Flow Diagram

In Figure 2, The researcher illustrates how the features and components of the entire system will function together based on its intended purpose.

User Interface Design

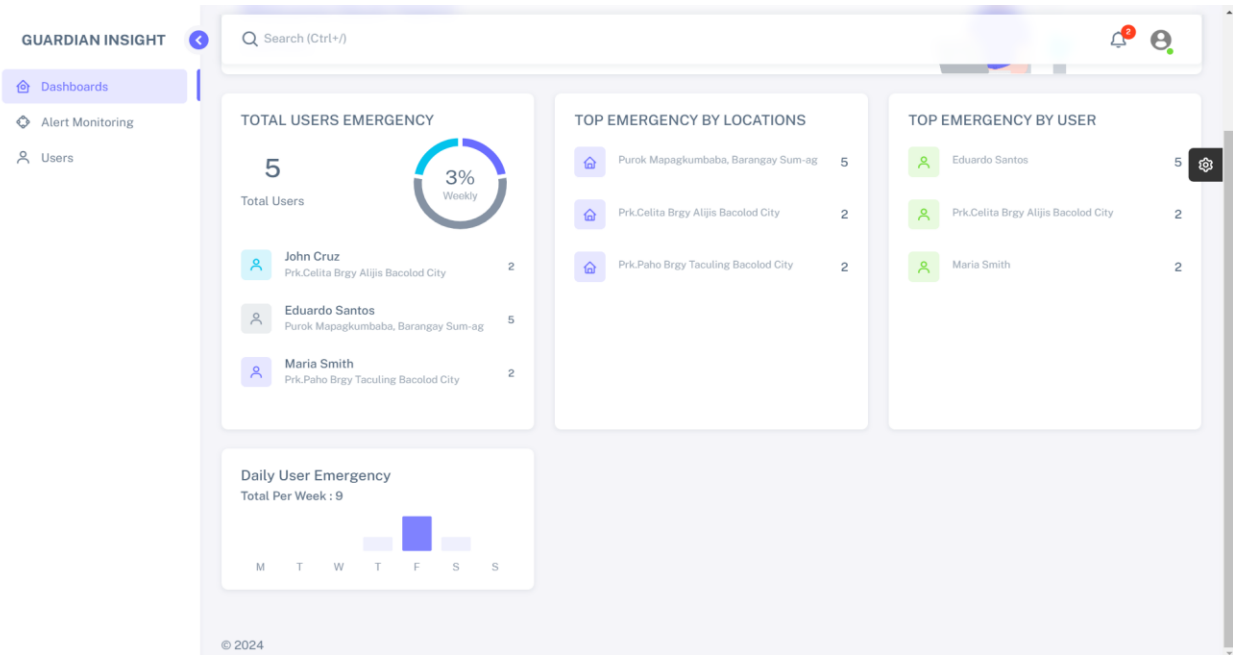


Figure 3. Admin/Barangay Official Dashboard

In figure 3, shows the dashboard of admin/barangay officials which consist of the total users emergency with graph, top emergency by locations, top emergency by users, and also daily user emergency. It aims to provide the admin/barangay officials with a summarized view of data on the dashboard.

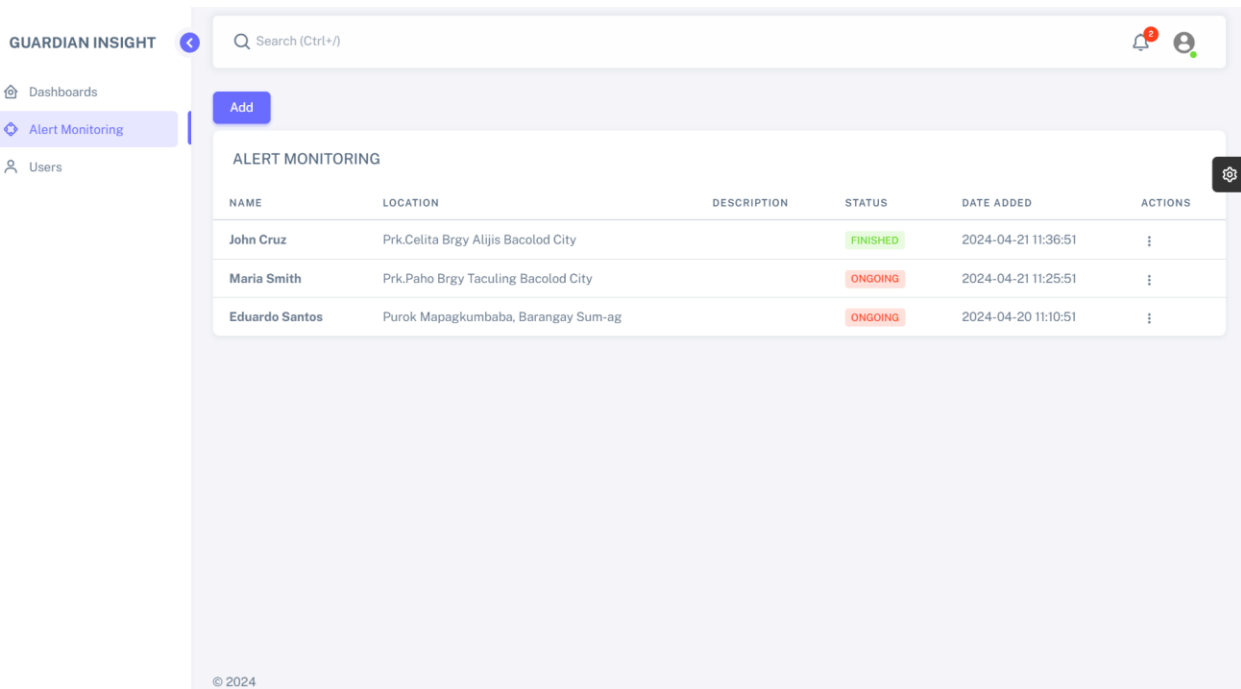


Figure 4. Admin/Barangay Official Alert Monitoring

Figure 4 show the list of all the users who send their alert, admin can add alert monitoring in Guardian Insight and can update the status of user alert by ongoing or finished.

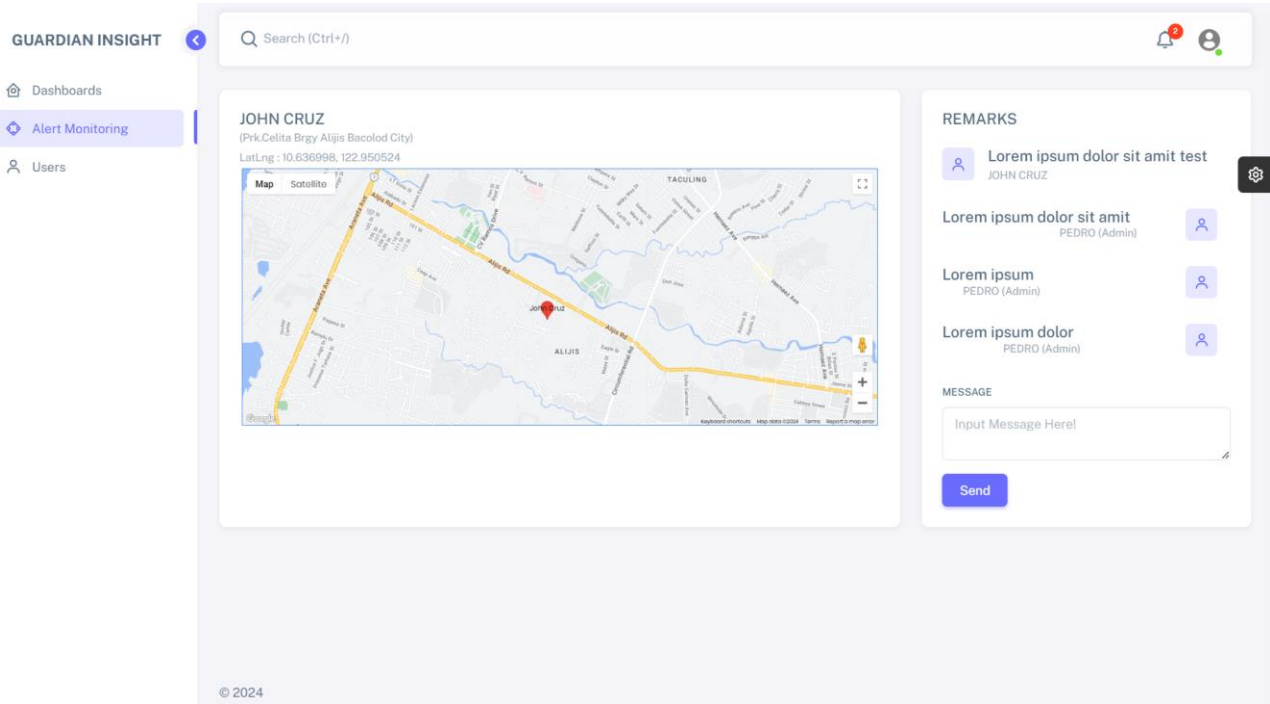


Figure 5. Official Alert Monitoring Details per User

Figure 5 illustrates the pin or the location of the specific user, admin can send a message to the user through the admin side, same goes with the user through mobile.

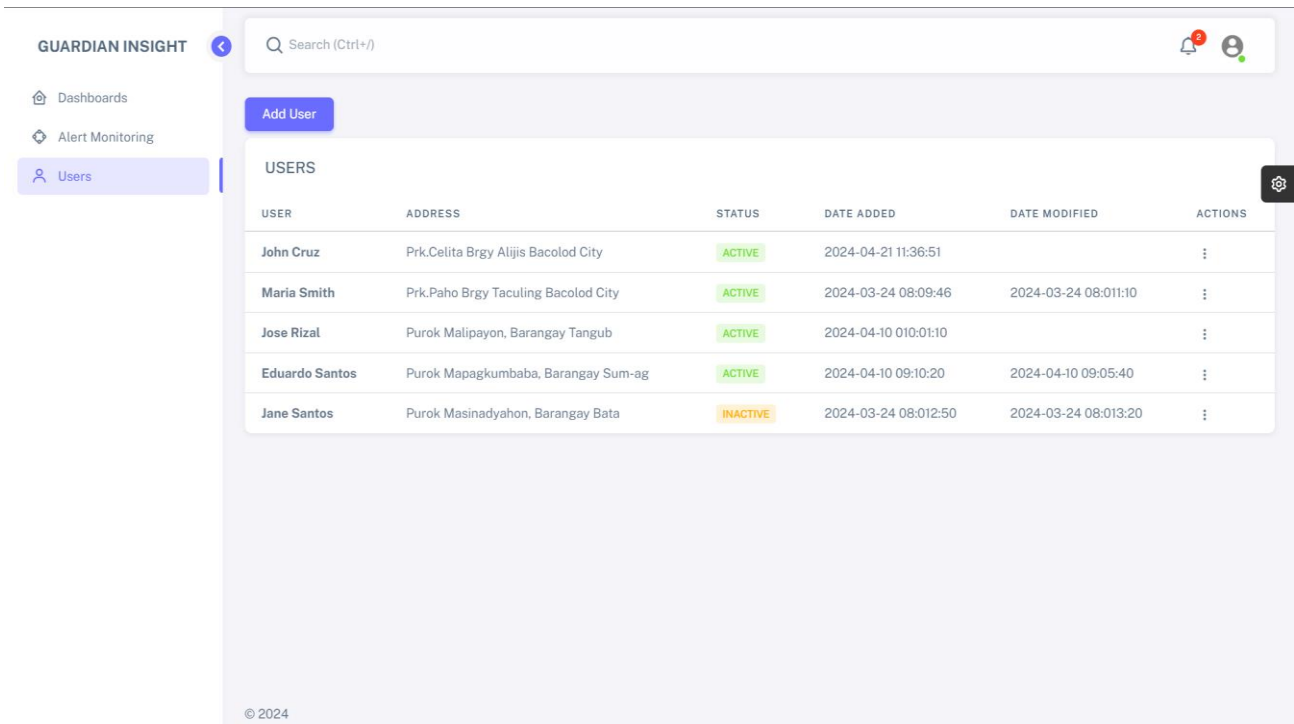


Figure 6. Users

Figure 6 shows a list of users, admin can add, update, remove, and view user emergency alert history.

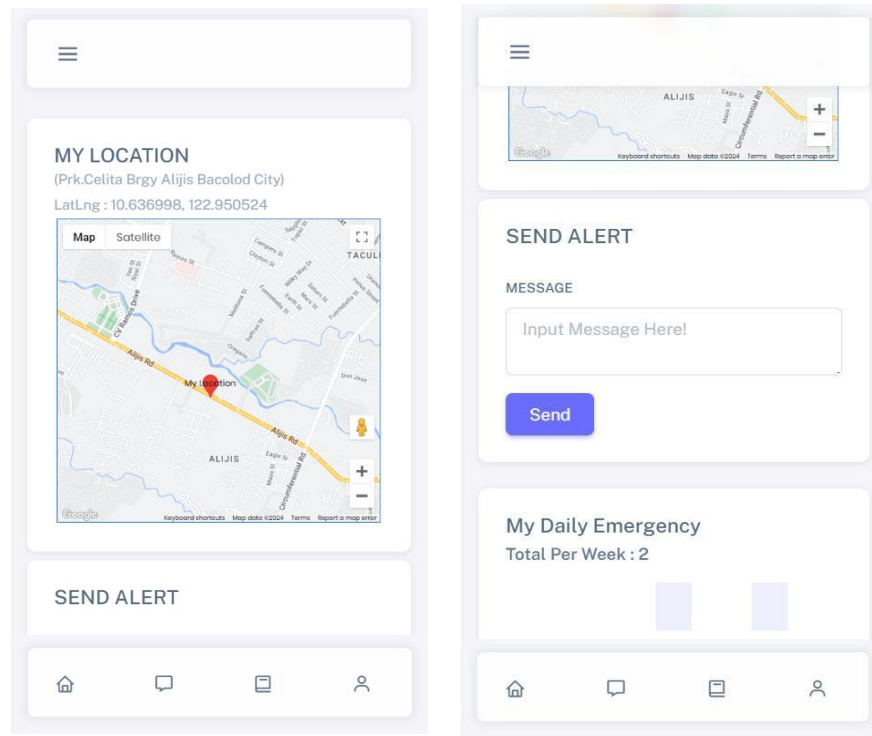


Figure 7. Guardian Insight Mobile App

Figure 7 shows the mobile interface dashboard where it displays the user location and daily emergency, the mobile application allows the user to send an alert through mobile with a message and the admin/barangay officials receive the alert on the web, the user can also view the history of the alert he/she sends.

RESULTS AND DISCUSSION

Table 2.0 In terms of minimizing emergency response time, analyze and process real-time data.

	Mean	Verbal Interpretation
The system can receive immediate emergency data.	4.5	Very Good
The system can provide a proper solution for a specific emergency.	4.5	Very Good
The system can analyze and process real-time data.	4.6	Very Good
TOTAL	4.53	Very Good

Table 2.0 shows that the user feedback in Guarding Insight can receive immediate emergency data, provide a proper solution for a specific emergency, and analyze and process real-time

data with a mean value rating of 4.53, which is interpreted as very good.

Table 3.0 In terms of utilizing GPS technology.

	Mean	Verbal Interpretation
The system can determine the location of individuals in distress.	4	Good

The system can ensure a targeted and efficient deployment of assistance resources.	4.3	Good
The system can generate a map report that can view all the ongoing emergencies that are sent by community members.	4	Good
TOTAL	4.1	Good

Table 3.0 shows that the user feedback in Guarding Insight in utilizing GPS technology indicates that the system can determine the location of individuals that are in distress, it can ensure a targeted and efficient deployment of assistance

resources, and the system can also generate a map report that can view all the ongoing emergencies that are sent by community members with a mean value rating of 4.1, which is interpreted as good.

Table 4.0 In terms of a centralized database and communication platform.

	Mean	Verbal Interpretation
The system can facilitate a seamless interaction between community members and barangay monitoring centers.	4	Good
The system can optimize the exchange of information during emergency situations.	4.5	Very Good
The system design mechanisms for efficient real-time data collection and storage in a centralized database.	4	Good
The system can generate reports based on the emergency that is stored in the database.	4.5	Very Good
TOTAL	4.25	Good

Table 4.0 shows that the user feedback in Guarding Insight shows that in terms of centralized databases and communication platforms, the system can facilitate a seamless interaction between the community and members and the barangay monitoring center. It can also optimize the exchange of information during emergency situations, and the system can generate reports based on the emergency that are stored in the database with a mean value rating of 4.25, which is interpreted as good.

CONCLUSION AND RECOMMENDATION

Good response time in every emergency situation helps lessen the percentage of the risks of a certain emergency. The app helped the barangay officials act accurately and boosted

their response time by a higher percentage. It can also generate reports for barangay officials to evaluate in emergency situations. This made the community members feel secure because the app is just one click away to ask for assistance or help in real-time. The community members cannot access the application if they do not have a phone or a device that is compatible with the application to be installed. This app should have enough data for it to analyze the emergency accurately. This app will not function properly if the user has no internet connection, but the barangay officials offered an internet connection in areas with a higher percentage of emergency rates. The barangay officials also recommended the app for them to monitor their community members and strategize for their future plans in their community.

REFERENCES

- [1] Jeffred, Lim. (2022). Barangay Integrated Management System with Mobile Support. *International journal of computer science and mobile computing*, doi: 10.47760/ijcsmc.2022.v11i07.011
- [2] A., Guglielmi., Giuseppe, Campo., Diego, De, Merich., A., Leva. (2023). The power of safety data to prevent work related incidents: empirical evidence from pilot projects in Italy. *AHFE international*, doi: 10.54941/ahfe1003077
- [3] Akter, S., Bandara, R.J. and Sajib, S. (2021), "How to empower analytics capability to tackle emergency situations?", *International Journal of Operations & Production Management*, Vol. 41 No. 9, pp. 1469-1494. <https://doi.org/10.1108/IJOPM-11-2020-0805>
- [4] M. Ummar, M. Ramadan and M. C. E. Simsekler, "A Review on Data Analytics in Patient Safety," 2022 *Advances in Science and Engineering Technology International Conferences (ASET)*, Dubai, United Arab Emirates, 2022, pp. 1-5, doi: 10.1109/ASET53988.2022.9735045. keywords: {Data analysis;Hospitals;Decision making;Organizations;Machine learning;Safety;Planning;data analytics;healthcare analytics;patient safety;quality outcomes;big data},
- [5] Antonio, Lilibeth, Enhancing Barangay Justice System Through the Development of a Web-Based Crime Monitoring Module (July 3, 2020). Available at SSRN: <https://ssrn.com/abstract=3642023> or <http://dx.doi.org/10.2139/ssrn.3642023>
- [6] Bautista, M.T.T. et al. (2023). BALANGAY: A Web-Based Document Request and Incident Reporting System with Decision Support for Barangay Program Development. In: Nagar, A.K., Singh Jat, D., Mishra, D.K., Joshi, A. (eds) *Intelligent Sustainable Systems. Lecture Notes in Networks and Systems*, vol 579. Springer, Singapore. https://doi.org/10.1007/978-981-19-7663-6_13
- [7] Bulusan, J. P., Cabaluna, B. M., Macaraig, D. J., & Cruz, A. (2019). Design and Development of an Incident Reporting Mobile Application. *Abstract Proceedings International Scholars Conference*, 7(1), 1725–1736. <https://doi.org/10.35974/isc.v7i1.1573>
- [8] Cloyd M. Bustillo, J. (2020). Automated Incident Reporting Management System Using Mobile Technology. *International Journal of Innovation, Management and Technology*, 18–26. <https://doi.org/10.18178/ijimt.2020.11.1.870>
- [9] Ignaco, M. A. E. (2021). Mobile Application for Incident Reporting. *JOIV : International Journal on Informatics Visualization*, 5(4), 388. <https://doi.org/10.30630/joiv.5.4.741>
- [10] Winckler, M., Bach, C., & Bernhaupt, R. (2013). Identifying User Experience Dimensions for Mobile Incident Reporting in Urban Contexts. *IEEE Transactions on Professional Communication*, 56(2), 97–119. <https://doi.org/10.1109/tpc.2013.2257212>