
Echoguard: Voice-Driven Safety for Women in the Digital Age

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Abstract.

Women are entitled to live, work, and travel in areas with inadequate safety and security measures. To stop crimes against women, such as human trafficking, domestic abuse, and harassment, strong legal frameworks must be implemented. The proposed application is a voice-activated safety application that allows for an improved personal safety situation by enabling unobtrusive distress signals with a preset voice command. On activation, it automatically transmits the user's real-time location to trusted contacts and emergency response teams for an immediate response. A built-in panic button also extends the emergency reach through sending bulk SMS alerts. Advanced technologies such as speech recognition, GPS tracking, and secure cloud storage are used for seamless functionality in the system. Prioritizing a speedy, easy-to-use application with the highest regard for confidentiality, it instantiates a robust support system for individuals in crises and offers real-time proactive approaches to personal safety and emergency responses.

Keywords. Women Safety, SMS Alerts, GPS Tracking, Data Security, Emergency Response, Mobile Application.

1. INTRODUCTION

The problem is essentially the safety and security of people, especially women, when they are at risk of being harmed. With the increasing concerns about personal safety, there is a pressing need for solutions that provide rapid response mechanisms in emergency situations. The core issue is the lack of a simple, accessible, and effective way to alert nearby authorities or trusted individuals during critical situations. These safety solutions are either complex, involve too much interaction, or are less efficient for timely intervention. Moreover, there is a lack of a system that will support location-based, real-time alerts so that the probability of a quick and apt response is maximized[9]. Additionally, there is a need for the integration of voice-activated technology, enabling hands-free operation during emergencies when the user may not have the ability to interact manually with their device, ensuring that safety measures can be activated under stressful and critical conditions.

2. LITERATURE SURVEY

Author and Year	Methodology	Merits	Limitations
R. P. S. Manikandan, Ashwin G, Chandru A, Murali prasad. 2024 [10]	AI, GPS.	The key features include a panic button to automatically alert the user's case of distress, emergency contact list with customizable settings, AI-based alerts that pick early signs of danger, and alert the user in real- time.	The Women Safety Project can enhance with smart home security, machine learning, voice alarms, an AI chatbot, and wearable compatibility.
Ms. T N Aruna, Naveen Kumar S, Newton Habakuk S , Nivethitha S, Pooja B. 2023 [7]	Firebase.	The app comes with features like GPS tracking, Emergency SOS, which allows distress signals to be sent to guardians and a control room, panic button with a siren sound to deter the attacker, and a database of safe locations for improved safety features.	Voice-activated features, community-based safety, the option to share real-time location with trusted contacts, and features that analyse data for providing users with personalized safety recommendations and alerts.
Nitish Mishra, Ananya Puri ,Rishita “A Mobile Application for Women’s Safety: Myguard”. 2023 [2]	Artificial Intelligence	The app integrates unique features for an efficient user experience, including formal registration for accountability, destination tracking with SOS alerts, and voice assistant guidance with a panic command for enhanced user safety.	Lack of prompt police response due to location constraints. Difficulty in discreetly reaching out to law enforcement.
IEEE – “SafeTrack: Empowering Women's Security with GPS Location Tracking and Messaging”.2023 [3]	Global Positioning System	The mobile-based safety device offers real-time tracking, recording, and self- defence features, utilizing advanced technology to enhance women’s security.	The device may face limitations, such as potential failure of components like the spark generator and buzzer, and it only activates when the attacker physically contacts the victim.

3. RESEARCH GAP

The incorporation of Call Alert Verification (CAV) into women's safety applications holds promise but is hindered by factors such as high expense and compatibility[8]. SafeSpeak fills these loopholes through real-time location tracking, voice-based controls, and integration with Google Maps. Utilizing Firebase authentication and a Speech-to-Text API, it maintains security and smooth data sharing. With ease of use, encryption, and community orientation, SafeSpeak provides improved safety, empowerment, and responsiveness to changing threats.

4. PROPOSED METHODOLOGY

Women's safety requires innovative solutions that go beyond human intervention. SafeSpeak is a cutting-edge safety app with voice-activated alerts, real-time location sharing, crime heatmap, and AI chatbot for instant response. It silently sends distress signals through voice commands, notifying trusted contacts and law enforcement. With Firebase authentication, Speech-to-Text API, and Google Maps, it provides security and ease of use[5]. The crime heatmap supports safer route planning, and the AI chatbot offers emergency advice. SafeSpeak incorporates offline security through the sharing of real-time locations with family members and police through SMS, guaranteeing alerts. The combination of real-time monitoring, voice-initiated alerts, provides a solid safety network, facilitating timely intervention and improved personal security.

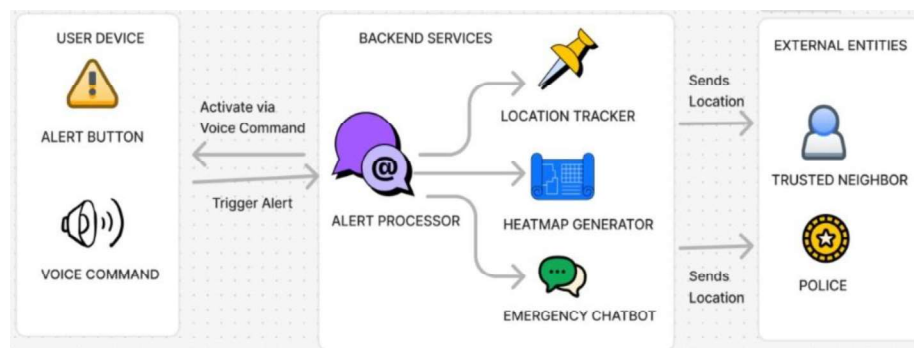


Figure 4.1 Architecture Diagram

6. IMPLEMENTATION

5.1 User Authentication Module: Employing Firebase Authentication for safe login through email. User information is safely stored during registration. Users create profiles and enter emergency contacts, providing secure access to app functionality [4]. Authentication safeguards personal information and adds security.

5.2 SOS and Panic Button Module: Offers immediate emergency access. Initiating the voice command notifies emergency contacts and officials with live location using Google Maps API. The hands-free function increases security, enabling direct response even in the event the user is not physically able to handle their phone.

5.3 Voice Command Module: Uses Google Speech-to-Text (STT) API for hands-free interaction. Recognizes preset voice command "Help" to trigger safety actions. Integrates with the Panic Button for seamless activation, ensuring quick access to emergency features when needed most [6].

5.4 Emergency Chatbot Module: AI-driven chatbot offers live emergency advice and self-protection advice. Employs natural language processing (NLP) for individualized support. Provides safe, real-time support in emergencies, boosting user trust and security [1].

5.5 Crime Heatmap Module: Employs crowdsourced, user-generated crime data to create a dynamic crime heatmap. Offers users the opportunity to report crimes or suspicious occurrences, which are confirmed and superimposed onto the map.

6. CONCLUSION

In an age of increasing personal safety, such technology-driven solutions must be integrated, as well as instant assistance and real-time protection, for emergency issues. This app provides voice-activated alert system, real-time location sharing, crime heatmaps, and AI-powered chatbot-for rapid response during emergencies through use of speech recognition, and secure data management to enhance security with protection of privacy and usability. With a strong backend, seamless integration, and real-time tracking, it stands as a reliable safety tool that empowers individuals, strengthens community support, and fosters a more secure environment for all users. Additionally, continuous improvements through AI-driven analytics and user feedback mechanisms will further enhance the application's accuracy, response time in weak networks, and processing efficiency on low-end devices for seamless emergency response.

7. REFERENCES

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BIOGRAPHIES



L. Leena Jenifer received the Bachelor's degree in Computer Science and Engineering from Anna University in the year 2009. She obtained her Post graduate degree in Computer Science and Engineering in 2013 and is pursuing a Ph.D. in the Faculty of Information and Communication Engineering, Anna University, Chennai. She has 10 years of teaching experience and is currently working as an Assistant Professor in the Department of Information Technology at Rajalakshmi Engineering College, Chennai. She has published more than five research papers in journals and conferences. Her area of research includes Data Security, Deep learning, and Data Analytics.



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