SiSafe: a Comprehensive Mobile Application Solution for Women Safety

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Abstract

Women are the nurturers of life, often putting their own lives on the line for the sake of their families. However, a pressing ques- tion arises: are we doing enough to ensure their safety? The safety of women is a subject of grave concern[1]. Women often find themselves the target of unsolicited attention and, in more alarming cases, acts that threaten their dignity and safety. The SiSafe app will emerge as a pio- neering solution, which will address this pressing need through a blend of innovative features and user- centric design. The application will offer a discreet means to request emergency assistance when physical activation is not feasible. Fundamental to the app is an on-screen emergency option, prominently featured on the user's home or lock screen, providing quick access in times of distress. Users will be able to personalise their activation phrases, which will enable secure and discreet activation through a responsive voice recognition system. The app will leverage cutting- edge technology to transmit precise location data to predefined contacts, authorities, and nearby individuals when activated. In areas lacking net- work connectivity, the app will employ mesh networking technology to establish a local network with nearby devices, which will ensure that help reaches the user. The SiSafe App will foster community involvement by notifying individuals in the vicinity about ongoing emergencies, reducing response times and enhancing user safety. This user-friendly and privacy conscious application solution will empower women to feel safer and more confident when they need help the most. This could be understood by the application's drawing that we have included in this research paper.

Keywords: Women's Safety · Activation Phrases · Voice Recognition System · Location Data Transmission· Digital Innovation· Safety Con- cerns· Technological Advancements.

Introduction

Despite living in an age where digital innovation is at its peak, women continue to navigate a world riddled with safety concerns, significantly limiting their freedom and peace of mind. The widespread feeling of vulnerability and the imminent risk of criminal activities significantly affect the lives of women. This constant fear not only restricts their daily activities, such as work and social engagements but also hampers their ability to use public spaces or travel freely at night. This limitation extends to their financial independence and has broader implications for their families and children[2].

The issue of women's safety has increasingly become a focal point of concern in modern times. Given the physical differences typically found between men and women, women may often find themselves at a disadvantage in protecting themselves from potential threats.The urgency of women's safety has escalated to unprecedented levels, demanding innovative solutions that align with the technological advancements of our time. As we advance in our quest for a safer and more equitable society, SiSafe will stand as a

testament to the power of technology in making a tangible difference in the realm of personal security and empowerment. The SiSafe App will feature an on-screen emergency option prominently featured on the user's home or lock screen.

The app will leverage an app-specific voice recognition system to listen for user-defined activation phrases. When activated, it rapidly connects to nearby individuals, and police departments while transmitting the user's precise loca- tion. Importantly, the app will ensure that these actions are carried out secretly, without alerting potential aggressors. In areas with no network connectivity, the app will employ mesh networking technology, which will enable the transmission of location data to predefined contacts, authorities, and nearby individuals. This will foster community involvement by notifying those nearby and encouraging their vigilant response to emergencies. In this research paper we have discussed our application idea. Furthermore, the app has not been implemented yet in real life.

Our paper involves theoretical work, explaining through flowchart and use-case model and comparative analysis of already existing applications. The subsequent sections of the paper are as follows structured.Section II presents the literature review. In Section III, the proposed solution is introduced and its working is explained through diagrams. Section IV consists of a comparison table with existing systems. Section V includes the result, in which we have provided drawings of the application solution with a brief description of drawings. Finally, Section VI presents this paper's conclusion.

Literature Review

The literature review explores various women's safety applications, highlighting unique features and addressing specific challenges in enhancing personal security for women. In the "Abhaya: Women's Safety Android App" by Bramarambika Thota and Ravi Sekhar Yarrabothu, the app utilizes 3G/2G for real-time track- ing, immediate calls, and periodic updates, with continuous location tracking enhancing monitoring. However, usability concerns arise in areas with a spotty network or older devices, and success hinges on user awareness, impacted by mar-keting and reluctance, potentially leading to over-reliance and security risks[3].

The "S-ZONE: Women Safety and Security System" by Alisha Maruti Gawade, Amruta Rajendra Jadhav, and Sachin Shankarkum Bhar emphasises swift re-sponse through GPS tracking. Despite its strengths, challenges such as real- time restrictions, network reliance, and battery usage affecting dependability are noted[9]. Additionally, system vulnerability in areas with signal fluctuations may hinder real-time data transmission, and the application's success depends on prompt local authorities' response.

In "SHIELD: Personal Safety Application" by Sagar Khan, Harish Shinde, Ankita Zaroo, Rashmi Koushik, and F. S. Ghodichor provides instant protection with GPS tracking, while concerns exist regarding data privacy, GPS signal disruptions, device compatibility, and UI intuitiveness. Addressing these concerns, such as improving compatibility and UI intuitiveness, is crucial for the broader effectiveness of the application[10].

"SafeShe: Women's Safety Mobile App" by Ipsit Anoop and Dr. S.K. Manju Bargavi incorporates continuous fingerprint scanning for security. However, challenges such as network reliance, GPS signal errors, battery drain, and false alarms need attention to avoid compromising real-time communication and ensure pro- longed emergency use[11].

The "A Mobile Application for Women's Safety: WoSApp" by Dhruv Chad, Sunil Nayak, Karthik S.Bhat, Shivani Parikh, Yuvraj Singh, and Amita Ajith Kamath enables discreet emergency calls with features like shake-triggered calls and adaptive algorithms for GPS tracking. It adapts to network dynamics, en-

suring uninterrupted communication, and addresses GPS signal fluctuations for accurate tracking.

In the "A Female Safety Mobile Application: FEMSAPP" by Shubham Nikam, Jay Hiray, Kalpesh Gaikwad, Sanket Patil, and Prof. Smita K Thakare, the app addresses women's safety concerns but faces challenges with GPS signals, net- work connectivity, and real-time restrictions. Ongoing concerns include interface responsiveness, battery efficiency, and real-time refinement, particularly in areas with poor network reception.

"M-WPS: Mobile-based Ladies Protection System" by Vallidevi Krishna- murthy, Saranya S, Sharanya Srikanth, and Simran Modi, being an internet- free Android app, faces challenges such as real-time limitations, network com- plexities, and GPS signal reliance. Overcoming these challenges and ensuring real-time accuracy are crucial for the effectiveness of M-WPS[14].

"NiDar – A Women Safety Application" by Kirti Rai, Janvi Gupta, and Ajay Kumar Srivastava emphasizes real-time GPS tracking, emergency sirens, and dis- creet image sharing, with noted limitations including dependence on technology, potential issues in areas with poor infrastructure, and privacy concerns due to camera access[2].

"Suraksha: An Android App for the Safety of Women" by Payal Chaud- hary, Aditya Limaye, Girish Usakoyala, and Allan Lopes integrates with Google

Maps API for location-based services. Challenges include outdated crime data, network dependency, and manual activation limitations. Ensuring detailed loca- tion information, overcoming network dependency, and addressing limitations in automatic SOS activation are crucial for Suraksha's effectiveness[4].

The "Lifecraft for Android" by Rabbina Ridan Khandoker, Shahreen Khon- daker, Fatiha-Tus-Sazia, Fernaz Narin Nur, and Shaheena Sultana offers pro- tection for both women and men with SOS key and voice command activation. Notable features include continuous position monitoring, offline mode, and vic- tim safe zone visualization. However, the app lacks evidence-solving capabilities, compensated by audio recording for evidence preservation, enhancing user safety with offline mode and victim safe zone visualization[3].
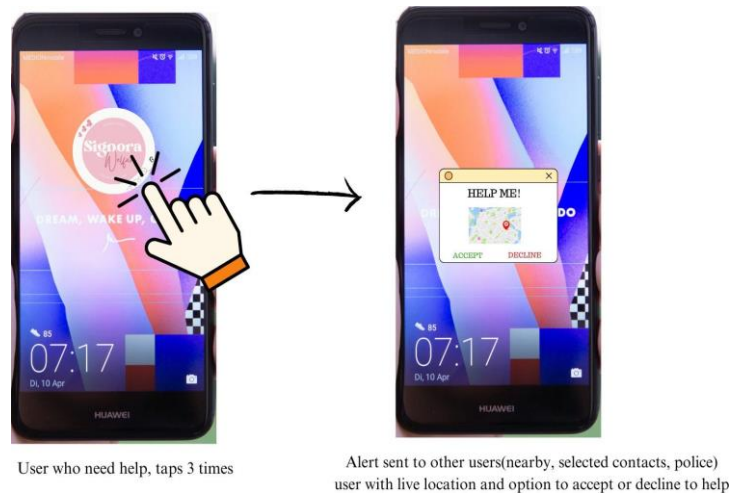
Proposed Solution

This system will be designed in such a way that it will aim to be a one stop solution for enhancing women safety in various situations. The SiSafe will make use of mobile technology to provide a number of features and functionalities that will cater to various areas of women's safety concerns. This section tells us about the solution's i.e app, features and their usage, app's configuration and basic idea about what technologies and softwares could be involved.

Features and Usage Users will begin by downloading the app from their device's respective app store. After installation, they launch the app and go through an initial setup process which includes the registration page , followed by configure settings option for setting up activation phrase, providing vari- ous permissions like location access, microphone access, contact access and lock screen access in which the placement of emergency option can be done.

Activation in an Emergency: In situations where the user (woman) feels threat- ened or require urgent assistance, users can activate the app in one of the fol- lowing ways mentioned below: By Tapping the On-Screen Emergency Button: If they have the on-screen emergency button enabled, users can quickly tap it 3 times within the time span of 3 seconds to trigger an emergency alert. By Speaking the Activation Phrase: Alternatively, users can speak their predefined activation phrase 2 times within the timespan of 1.5 seconds. The app's voice recognition system listents for this phrase, and when detected, it initiates the

emergency alert process.

Sending Location Data: Once activated, the app immediately starts gathering the user's real-time location data using the device's GPS and other location ser- vices and sends the location with the help me alert to the individuals nearby, pre-selected contacts and nearest police station. When the location is sent, other nearby users receive an alert notification with a prompt to accept or re- ject, if majority users reject to help then the vicinity increases to notify more individuals.


User who need help, taps 3 times

Alert sent to other users(nearby, selected contacts, police) user with live location and option to accept or decline to help

Fig. 1. This demonstrates the app's activation mechanism through tapping three times, and how other users receive alerts to provide assistance.

Speaking activation phrase 2 times

Listening to voice command

Alert sent to other users user with live location and option to accept or decline to help

Fig. 2. Illustrate the activation process through spoken phrases and the alerts received by other users to render assistance. The comprehensive set of figures outlines the user journey from registration to app activation and alert reception.

Mesh Networking (If No Network): If the user is in an area with no network con- nectivity, the app employs mesh networking technology to create a local network with nearby devices. The app securely shares the user's location data within this network, allowing it to reach predefined contacts and nearby individuals who can provide immediate assistance. After the immediate assistance is provided to the user and they are safe, they can later on login back to the app and notify that they are safe .
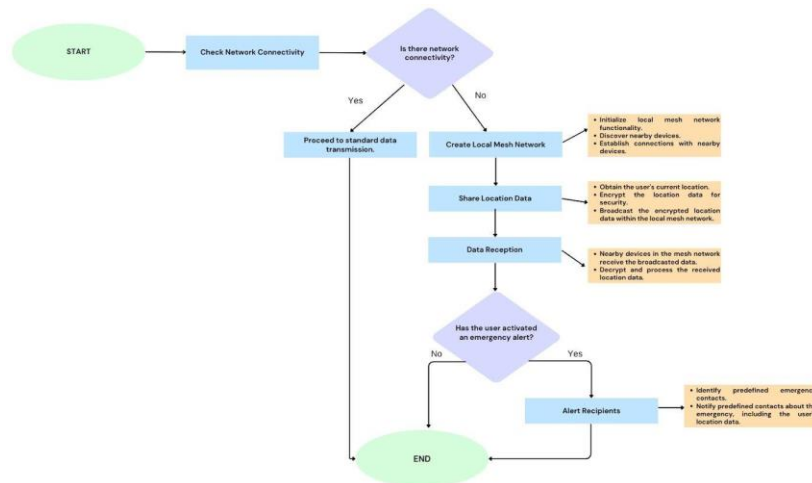
Fig. 3. Flow chart illustrating the working of the app using the mesh networking in case of no network connectivity .

Configuration When the app is first downloaded from the device's app store, the registration page will be presented to the user. After registering , users will see their Device ID, ensuring unique access to the app and activation phrase . After clicking on ok the user will see the home screen with configure settings options.

Configure settings will include account, permissions, receive alert and privacy and security options. Within the account option, a text box will be available for the user to insert his activation word or phrase. User will then be prompted to optimize permissions in which the user will be first asked to setup on-screen emergency button, which can be placed on either the home or lock screen based on user preference permission for location in which after selecting allow always, a prompt will be displayed to grant permission for mesh network usage in scenarios where network connectivity is unavailable.

Allow Always for location access is necessary to ensure the app's effectiveness. After completing lock screen and location access, the user needs to set up microphone access. The prompt will be displayed asking permission to record audio.

After allowing , the app will ask to record the phrase , this is done to prevent false positives.this recording will be used by the app's voice recognition system to identify the user's unique activation phrase accurately.

The role of device id is to make sure that each user has unique access to the app and the phrase belongs to that device id. Next the user needs to set up the contact access in which the user will be asked to fill 3 contacts which should be contacted in case of emergency. The app will use these pre-selected contacts to send alert notification along with help me message and the live location.

Use-case model and a flowchart diagram of the proposed solution is given below which will make it easy to understand all the working methodology of the system.[2]
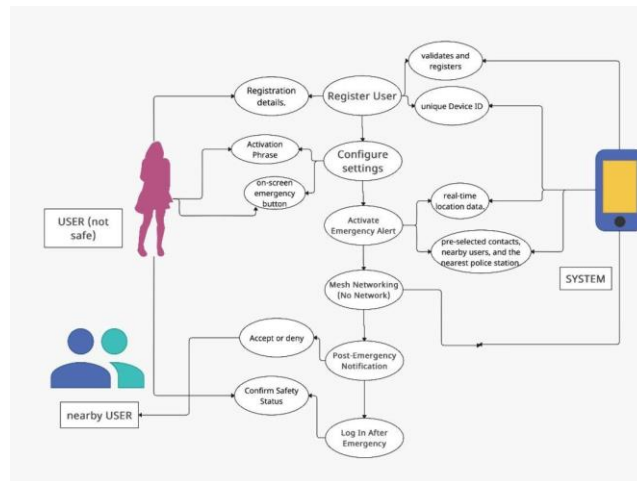
Fig. 4. Use-Case Model.

Figure 1 represents the use-case model for our proposed solution- "SiSafe" where the user can access the Registration page and enter the registration details, record their own activation phrase, configure on-screen emergency button, when in safe position can log back in app to confirm safety status; other app users who are nearby will get an alert to help with an option to choose accept or deny. The system validates and registers the user, generates a unique device id, uses real time location data and sends emergency alerts.
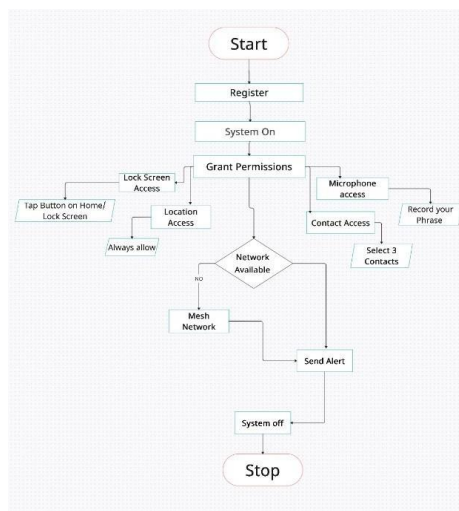
Fig. 5. Flowchart of the proposed system

Figure 2 represents the system flowchart . After registration, the system i.e app will start working in the background after granting certain permissions. After getting the instructions the system will start working following the previously discussed way.

Comparison with Existing System

In this section, we aim to highlight the key distinctions between our proposed solution "SiSafe," and other existing systems. Table I will be utilized for this comparison, allowing us to showcase the dependability and distinctive features of our work [3, 4, 5, 6, 7,8].

Features	Comparative Analysis						
	Life craft	Sur aks ha	Abhaya	NiDar	I Go Saf ely	Sak hi	Proposed Solution
Alert message	✓	✓	✓	✓	✓	✓	✓
Sent Alert to nearby people	✗	✗	✗	✗	✗	✗	✓
Live GPS tracking	✓	✓	✓	✓	✗	✓	✓
Offline mode	✓	✗	✗	✗	✗	✗	✓
Send Location	✓	✓	✓	✓	✓	✓	✓
Mesh Network	✗	✗	✗	✗	✗	✗	✓
Voice command	✓	✗	✗	✗	✗	✗	✓
Has all these features ?	No	No	No	No	No	No	Yes

Fig. 6. Comparison Between Existing Systems and our Proposed Solution.

Results

To visually represent the proposed solution, detailed drawings of the application interface were created.
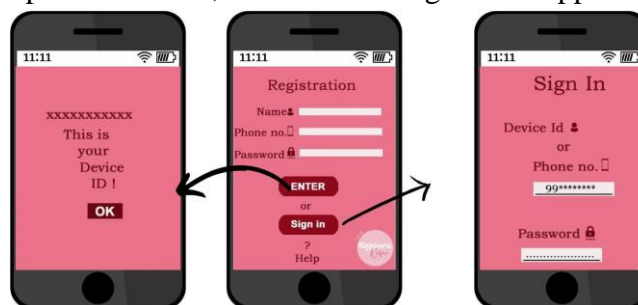

**Fig. 7.** In Figure 6, the drawing illustrates the registration page for new users of the SignoraWelfare App,

where users can input their personal information to create a new account.After a successful registration, each user is allocated a unique Device ID. This Device ID serves as a distinctive identification method, ensuring accurate recognition of the user's activation phrase by the app's voice recognition system, thereby enhancing security and preventing false positives.It also displays the sign-in page designed for existing users.
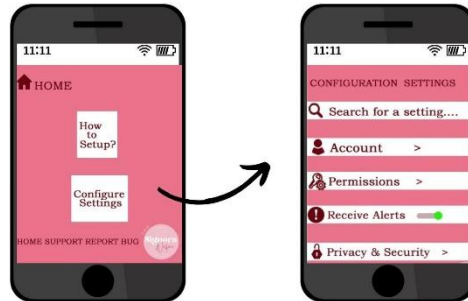
Fig. 8. In Figure 7, the home page is presented with two options: how to set up the app and configure settings. Figure also provides a closer look at the options available under the configure settings section.
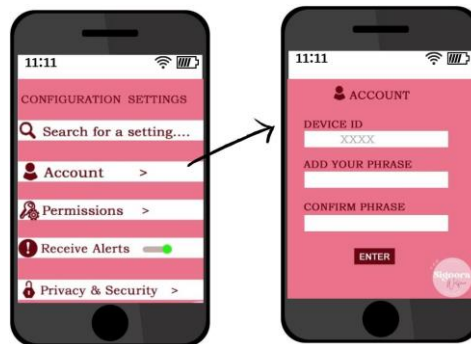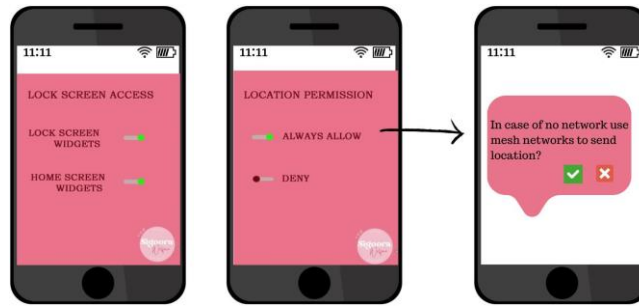

Fig. 9. .Figure 8 showcases the account page, allowing users to view their allotted Device ID and set up the activation phrase.
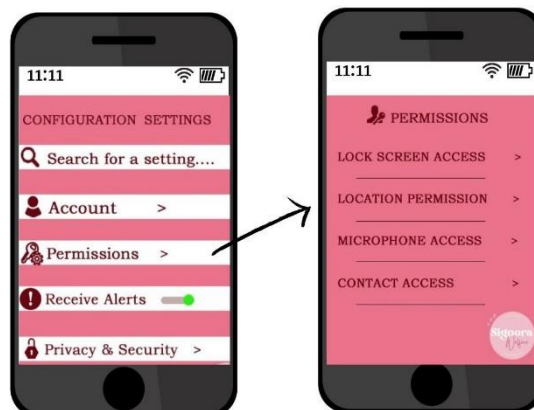
Fig. 10. In Figure 9, the permission page is depicted, where users can manage location access, contact access, lock screen access, microphone access, and receive alerts.
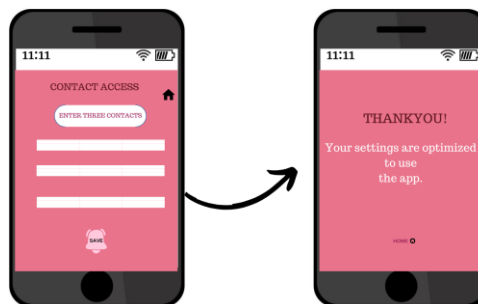
Fig. 11. These figures delve into specific details, such as configuring lock screen access, granting location permission with mesh network connectivity. .

Fig. 12. This figure shows setting up microphone access to record a unique activation phrase, and inputting contacts for alert purpose.

Fig. 13. This concludes the setup process, displaying a thank you page for successfully configuring the app.

Conclusion

This paper presents an innovative solution- "SiSafe" app to address the critical issue of women's safety. Recognizing the persistent challenges faced by women in terms of personal security, the app employs a user-friendly interface and ad- vanced technologies to provide a discreet and efficient means of seeking emer- gency assistance. The integration of on-screen emergency options, personalized activation phrases, and mesh networking technology ensures a comprehensive approach to women's safety, promoting community involvement and timely re- sponse to emergencies. While the app is currently in the conceptual stage, its potential impact on empowering women and enhancing their safety is evident.

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