RAKSHA: RESPONSIVE ALERT, KEEPING SECURITY & HELPLINE ACCESS – A WOMEN SAFETY APPLICATION

Dr. Avinash G M[1], Shreya J N[2], Gagana B M[3], K P Nandini[4], Kusuma T[5]

[1] Assistant Professor, Department of CS&E, SJMIT, Chitradurga India.

[2] 7th semester Student, Department of CS&E, SJMIT, Chitradurga India.

[3] 7th semester Student, Department of CS&E, SJMIT, Chitradurga India.

[4] 7th semester Student, Department of CS&E, SJMIT, Chitradurga India.

[5] 7th semester Student, Department of CS&E, SJMIT, Chitradurga India.

Abstract: Women's safety remains a major concern across public and private environments. To address delayed emergency responses and complex safety applications, RAKSHA is developed as a minimal, fast, and reliable women's safety tool. This mobile application provides single-tap and shake-based SOS activation along with real-time GPS tracking delivered to trusted contacts via SMS. The system omits multimedia evidence capture and OTP-based registration to ensure simplicity and immediate usability.

Index Terms — Women safety, SOS alert, GPS tracking, emergency response, mobile safety application.

1. INTRODUCTION

Women frequently encounter situations that demand immediate assistance. Traditional methods such as calling a family member or manually typing a message often fail during panic or physical restriction. RAKSHA aims to bridge this gap by automating emergency alerts and ensuring that help can be reached quickly. This system focuses exclusively on core safety functions and intentionally avoids multimedia recording and OTP registration to maintain reliability, speed, and ease of use.

2. PROBLEM STATEMENT

Many existing safety applications rely on stable internet, complex menus, or multi-step authentication. These limitations slow down the process of seeking help during emergencies. Additionally, several systems fail to provide continuous location sharing or automated alert triggers, making them unreliable in real-world situations. RAKSHA addresses these issues by offering a streamlined, offline-capable, and automated emergency alert system.

3. OBJECTIVES

- **Instant Emergency Activation & Reliable Communication:** Ensures immediate SOS triggering through a single tap or shake gesture, with continuous GPS-based location sharing via SMS, without relying on OTPs or multimedia services.
- **User-Centric and Accessible Design:** Provides a clean, intuitive, and easily navigable interface suitable for users of all ages and technical backgrounds.
- **Optimized Performance & Future Scalability:** Aims to reduce emergency response time through dependable system operations while supporting seamless expansion and integration of additional features in the future.

4. LITERATURE REVIEW

Women's safety remains a pressing concern worldwide, particularly in developing nations where emergency response systems are still strengthening. Rising incidents of harassment, stalking, domestic violence, kidnapping, and unsafe public spaces highlight the urgent need for dependable, technology-driven support. Reports from the National Crime Records Bureau (NCRB) consistently show an annual increase in crimes against women, indicating gaps in awareness, delayed emergency responses, and the absence of reliable tools to seek help quickly. Although smartphones are widely used, many women still rely on traditional methods such as calling family members or dialing helpline numbers during distress. These approaches often fail in situations involving panic, physical restraint, unconsciousness, or shock, where manual operation becomes nearly impossible. Studies confirm that the "fight, flight, or freeze" response during emergencies slows a victim's ability to act, creating a dangerous delay.

Modern smartphones offer an opportunity to develop intelligent systems that automate alerts, track real-time movement, and connect victims quickly to emergency services. Yet, several existing safety applications are complicated, internet-dependent, or unreliable in low-network conditions. This underscores the need for a simple, fast, and resilient mobile solutions that minimizes user effort and functions effectively even under unpredictable circumstances. The RAKSHA system is designed to bridge this gap by offering one-tap SOS, shake-based triggers, voice-activated alerts, AI-enabled threat analysis, abnormal movement detection, SMS-based location updates, and multi-language accessibility. Its primary aim is to empower women with a smart, unified, and easily usable safety platform that ensures immediate assistance when every second truly matters.

5. Existing System & Limitations

Existing systems commonly suffer from issues such as internet dependency, absence of continuous tracking, multi-step authentication, and lack of automatic triggers. Many apps also require manual dialing or complex navigation, which users cannot perform under stress. RAKSHA eliminates these limitations through a hybrid SMS-GPS alert mechanism and simplified design.

6. Proposed System

The proposed RAKSHA system includes a one-tap SOS function, shake-to-alert feature, SMS-based alerting, continuous GPS tracking, built-in helpline calling, multilingual support, and a lightweight UI. No multimedia capture and no OTP login are used to avoid delays. The architecture is structured to allow quick deployment of emergency alerts while functioning reliably in background mode.

7. Methodology

The methodology covers requirement analysis, careful module design, and the development of workflows for GPS tracking, SMS dispatch, and background service operations. When an emergency is detected, the system immediately activates the SOS module and retrieves the user's live location. It then sends periodic GPS updates to the registered emergency contacts to ensure timely assistance. Each component is crafted to operate smoothly with minimal delay, prioritizing speed and reliability. Overall, the approach focuses on delivering a simple, responsive, and user-friendly safety experience.

8. System Architecture

The RAKSHA Women Safety Application is designed with a layered and modular architecture to ensure dependable performance, easy scalability, and quick response during emergencies. Built using .NET MAUI, it works efficiently on Android devices and also supports integration with wearable devices like smart watches. The system is organized into three main layers: the Presentation Layer, which offers a clean user interface with SOS buttons, shake triggers, voice commands, and multi-language options; the Application Logic Layer, which manages emergency workflows such as SMS alerts, real-time GPS tracking, AI-based threat detection, and sensor coordination; and the Service Layer, which connects with device hardware such as GPS, accelerometer, SMS services, phone dialer, alarms, and Google Maps API.

A dedicated Background Service Manager ensures that essential features—shake detection, voice activation, GPS tracking, and threat monitoring—function continuously even when the app is minimized. Local storage through SQLite allows the system to store emergency contacts and preferences securely, enabling full offline usability. SMS APIs provide reliable communication in low-network areas, while Maps APIs help locate nearby police stations and hospitals. The overall architecture is lightweight, battery-efficient, and highly responsive, ensuring that all sensors, AI modules, communication tools, and UI elements work seamlessly together to deliver fast and trustworthy protection for women in critical moments.
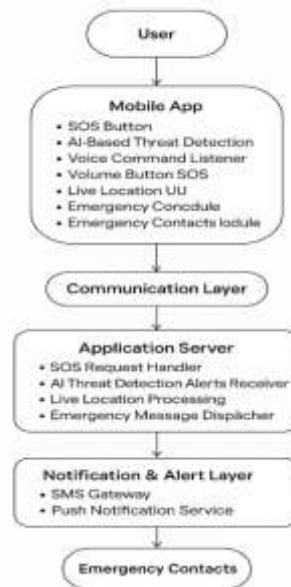
Figure-8.1: Raksha System Architecture.

The system design of RAKSHA is built on a clear layered structure that includes the user interface, trigger detection through sensors, GPS tracking, SMS alerting, emergency contact management, and background service control. Each module works independently yet stays well-coordinated to support quick and reliable emergency responses. This organized architecture ensures simplicity, easy maintenance, and smooth scalability for future enhancements.
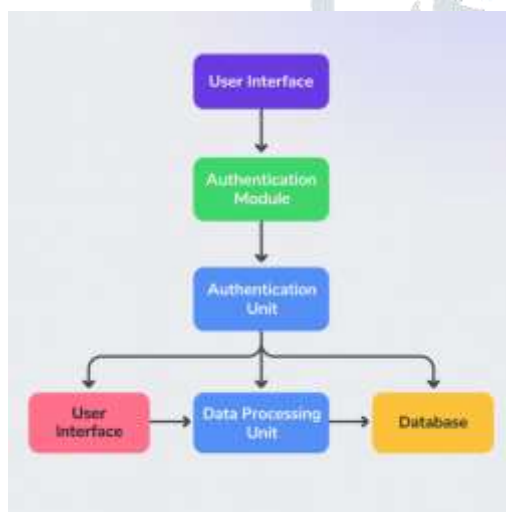
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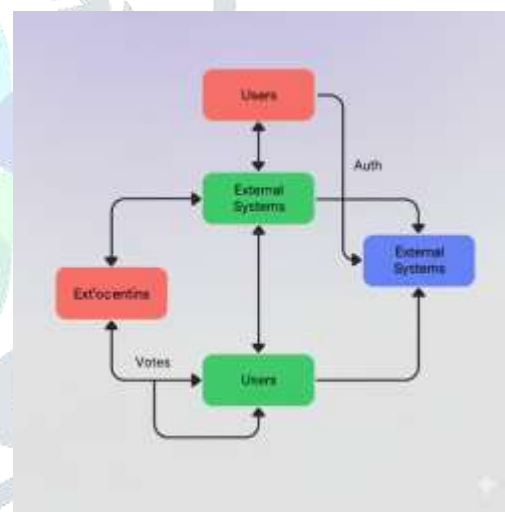
Figure-8.2: Component diagram of raksha   **Figure-8.3:** Data Flow Diagrma of Raksha

The component diagram illustrates how the system's core modules—Alert Trigger, Location Tracker, Security Manager, and Helpline Access—interact to deliver fast assistance. Each component communicates smoothly through a centralized controller that processes sensor inputs and user actions. The design ensures instant SOS activation, secure handling of user details, and direct access to emergency services. Overall, the components work together to create a reliable and responsive safety environment.

The data flow diagram shows how emergency data moves from user triggers or sensors to the SOS engine, which then fetches the live location and forwards it to trusted contacts. Information flows securely to the helpline access module, enabling quick calls or messages during crises. Each step is streamlined to reduce delay and ensure accurate delivery of alerts. The flow ensures that the user's request for help reaches the right people at the right time.

9. IMPLEMENTATION

The application is developed using standard Android tools and makes use of essential features such as GPS APIs, accelerometer sensors, SMS services, and efficient background processing. Each component is implemented to ensure quick responses during emergencies. The design emphasizes lightweight performance so the app can operate smoothly even on lower-end devices. It avoids dependence on OTP verification or multimedia functionality, ensuring reliability in all situations. Overall, the implementation

focuses on creating a fast, stable, and user-friendly safety tool that works whenever it is needed.

10. TESTING

Testing involved verifying SOS trigger responsiveness, GPS accuracy, SMS delivery time, background execution stability, and sensor-based shake detection. All modules were validated through functional and stress testing to ensure reliability.

11. Results and Discussion

RAKSHA consistently triggered SOS alerts within 2–3 seconds, delivered accurate GPS coordinates via SMS, and maintained stable background tracking. The system behaved reliably even under low-network conditions.

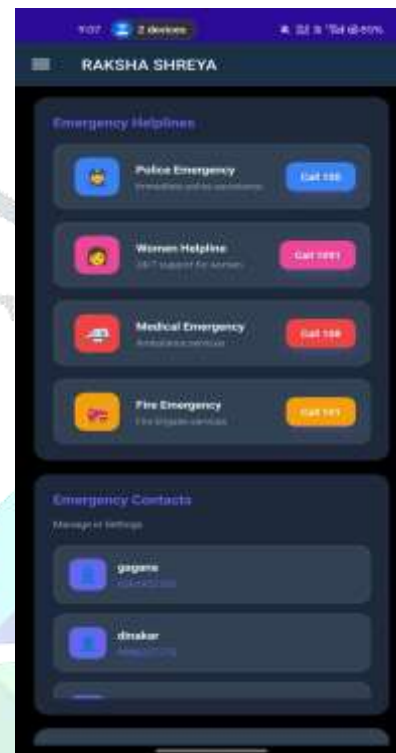**Figur-11.1:** Dashborad of Raksha .net Application   **Figure-11.2:** Dashboard of Raksha with quick helpline numbers

12. Conclusion

RAKSHA provides a reliable and user-friendly solution designed to enhance women's safety during critical situations. By avoiding multimedia and OTP dependencies, the app stays quick, simple, and consistently responsive. Its streamlined design ensures immediate alert activation and precise location updates. Overall, it meaningfully strengthens the speed and effectiveness of emergency response.

13. Future Enhancements

Future enhancements include integrating AI-driven risk prediction and geo-fencing alerts to provide smarter and more proactive safety responses. The system will also support SOS activation through compatible smart watches, making emergency access even quicker and more discreet. Additionally, optional cloud backup features will help securely store essential data for improved reliability and continuity.

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