International Journal of Advances in Engineering and Management (IJAEM)
Volume 8, Issue 5 May. 2026, pp: 55-58 www.ijaem.net ISSN: 2395-5252

SHIELD: "An Intelligent and Automated Women Safety Framework"

Hirdesh Sharma,Priyanshu Kumar, Aditya Srivastava, Om Tiwari, Sambhav Jain
Department of Computer Science and Information Technology, Dronacharya Group of Institutions, Greater Noida, India,

Date of Submission: 25-04-2026 Date of Acceptance: 04-05-2026

Abstract: Women's personal safety remains a major concern due to increasing incidents of harassment and delayed emergency response. Although smartphones are widely used, many existing safety applications rely on manual activation and offer limited functionality. This paper presents SHIELD, an intelligent mobile-based safety application that enables rapid emergency response through SOS activation, background scream detection, GPS-based SMS location sharing, and fake call diversion. Developed using Flutter with Firebase backend support, SHIELD provides low-latency response, secure data handling, and partial offline functionality. Experimental results indicate improved responsiveness and usability, demonstrating the system's potential as a scalable and reliable women safety solution.

Keywords: Women Safety, Mobile Emergency System, Flutter Application, GPS Tracking, Scream Detection, SOS Automation

I. INTRODUCTION

The safety of women remains a critical social and technological challenge across urban and rural environments. Despite significant progress in communication technologies, emergency response mechanisms often remain slow, manual, and ineffective during moments of distress. Reports from global health agencies indicate that a considerable percentage of women experience physical or sexual violence at some point in their lives, resulting in severe physical, emotional, and psychological impacts [1].

In many real-world situations, victims are unable to make phone calls or send messages due to panic, physical restraint, or sudden danger.

In recent years, smartphones have become an effective medium for personal safety solutions due to their widespread use and constant availability. Equipped with capabilities such as GPS-based location tracking, motion and audio sensors, and real-time communication, mobile devices are well suited for emergency assistance applications [2].

However, many existing women safety applications fail to fully utilize these built-in features and continue to depend largely on manual user interaction, which limits their effectiveness during critical situations.

To address these limitations, this research proposes **SHIELD**, a mobile-based safety app designed to provide automated, real-time assistance with minimal user interaction. The system focuses on rapid emergency detection, parallel alert mechanisms, and ease of use, ensuring effective response during critical situations.

II. RELATED WORK AND LITERATURE REVIEW

Previous studies have examined the role of mobile applications in enhancing women's safety by enabling faster access to assistance and support services. Westmarland et al. explored the use of smartphone applications in contexts related to domestic and sexual violence, highlighting how mobile platforms can facilitate discreet communication and quicker access to help resources [3].

Mandapati et al. [4] proposed *I Safe Apps*, an Android-based women safety application that allows users to trigger SOS alerts, share location information, simulate fake calls, and access first-aid guidance. Their study demonstrated that mobile-based safety solutions can improve accessibility, scalability, and cost efficiency, and showed that a single-button emergency trigger significantly reduces response time during distress situations.

User behavior research further indicates that individuals often balance the benefits of mobile communication technologies against potential risks, particularly in sensitive scenarios involving domestic violence [5].

Moreover, many early safety applications relied heavily on explicit user interaction for emergency activation. In situations where users are unable to operate their devices, the effectiveness of such systems becomes limited. Additionally, features such as automated distress detection, continuous

International Journal of Advances in Engineering and Management (IJAEM)
Volume 8, Issue 5 May. 2026, pp: 55-58 www.ijaem.net ISSN: 2395-5252

background monitoring, and advanced security mechanisms were largely absent.

With the rapid growth of smartphone adoption and sensor-enabled devices, mobile platforms now support real-time safety solutions through location tracking, messaging services, and intelligent monitoring capabilities [6].

Building on these advancements, recent research has explored sensor-based and context-aware safety mechanisms, including audio-based distress detection. However, despite improved detection accuracy, many existing solutions still lack seamless integration with emergency communication workflows, limiting their effectiveness in real-world emergency scenarios.

III. PROBLEM STATEMENT AND OBJECTIVES

A. Problem Statement

Although smartphones are widely available, there is no comprehensive safety application that can respond instantly, intelligently, and reliably during emergencies without heavy user involvement. Existing solutions are often fragmented, internet-dependent, or limited in scope, making them insufficient for real-life crisis scenarios.

B. Objectives

The primary objectives of the SHIELD framework are:

1. To automate emergency response processes
2. To ensure rapid location sharing using SMS
3. To detect distress through continuous background audio monitoring
4. To protect user privacy through secure data handling
5. To provide an intuitive and minimal user interface
6. To support offline operation for critical features

IV. SYSTEM ARCHITECTURE

A. Architectural Overview

SHIELD follows a modular architecture consisting of:

- User Authentication and Management Module
- Emergency Trigger and Alert Module
- Scream Detection Module
- Location Tracking and Geocoding Module
- Fake Call Simulation Module
- Community Interaction Module

The frontend is developed using Flutter, while Firebase Authentication and Firestore manage backend services.

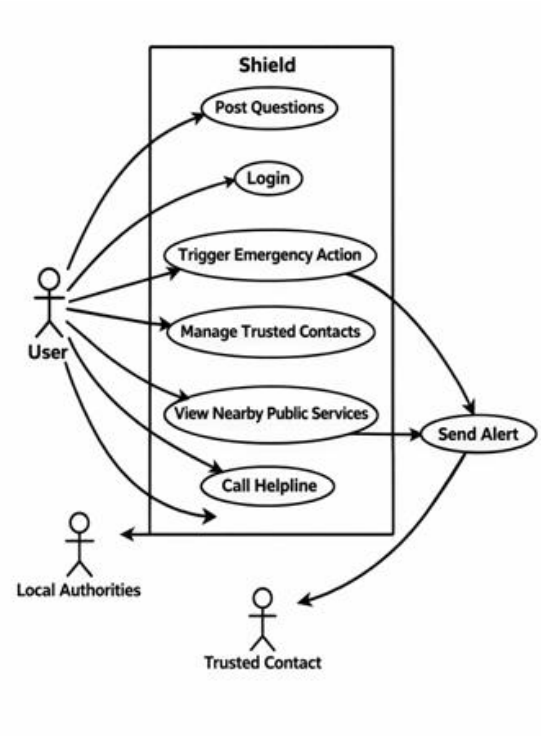
B. Use Case Description

The primary actors involved in the system are:

- User
- Trusted Contacts
- Emergency Services

Key interactions include login, emergency activation, contact management, service discovery, and helpline access.

Figure 2: Use Case Diagram

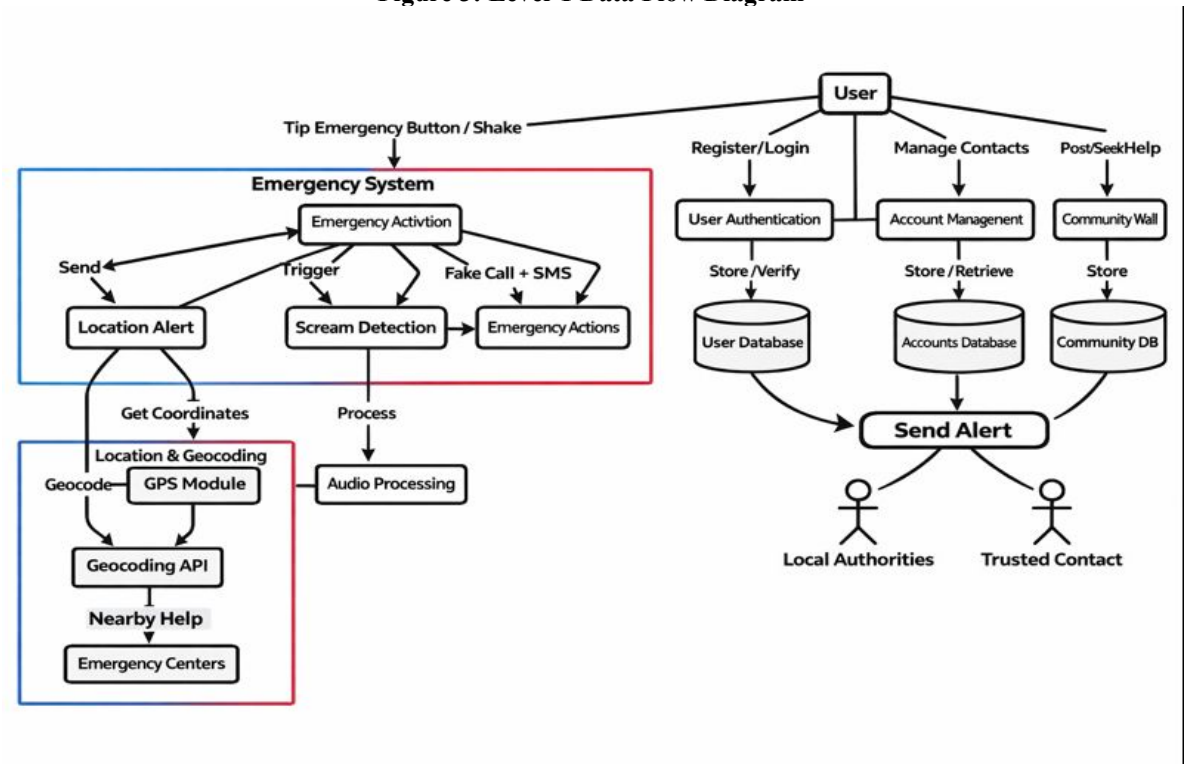


C. Data Flow Representation

The data flow diagram illustrates how information moves between system components during emergency and non-emergency states.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 8, Issue 5 May. 2026, pp: 55-58 www.ijaem.net ISSN: 2395-5252

Figure 3: Level-1 Data Flow Diagram



V. IMPLEMENTATION DETAILS

The SHIELD application is implemented using:

- **Frontend:** Flutter
- **Backend:** Firebase Authentication and Firestore
- **Location Services:** Geolocator and Geocoding APIs
- **Audio Processing:** flutter sound
- **Communication:** Telephony-based SMS services

Upon emergency activation, multiple actions are executed simultaneously, including SMS dispatch, audio monitoring, fake call initiation, and event logging.

VI. PERFORMANCE EVALUATION AND RESULTS

A. Testing Methodology

The system was evaluated using unit testing, integration testing, and manual testing on real Android devices and emulators.

B. Observed Results

- Average emergency trigger response time: < 1 second
- Scream detection accuracy:
  - Controlled environment: ~92%
  - Noisy environment: ~74%

C. User Experience Feedback

- Fake call realism: 4.6/5
- Interface usability: 4.7/5
- Emergency responsiveness: 4.8/5

Figure 4: Application Screenshots – Login, Home, SOS, Fake Call, Community – PLACEHOLDER

VII. CONCLUSION

This paper presented **SHIELD**, an intelligent and automated mobile safety framework designed to enhance women's safety through rapid response, automation, and multi-layered protection. By integrating scream detection, GPS-based SMS alerts, fake call diversion, and community engagement, the system addresses critical gaps in existing safety applications. The results demonstrate that SHIELD offers a reliable and practical solution suitable for real-world deployment. With further enhancements, the framework has the potential to evolve into a comprehensive, technology-driven safety ecosystem.

REFERENCES

[1]. World Health Organization, *Global and Regional Estimates of Violence against Women: Prevalence and Health Effects of Intimate Partner Violence and Non-Partner Sexual Violence*, Geneva, Switzerland: WHO, 2013.

[2]. MappSafe, "Three reasons why mobile technology will reduce violence against women," 2014. [Online]. Available: http://www.mappsafe.com/blog-1-feb-14-three-reasons-why-mobile-technology-will-reduce-violence-against-women

[3]. N. Westmarland, M. Hardey, et al., "Protecting women's safety? The use of smartphone apps in relation to domestic and sexual violence," Durham Centre for Research into Violence and Abuse, Durham University, UK, 2013.

[4]. S. Mandapati, S. Pamidi, and S. Ambati, "A mobile based women safety application (I Safe Apps)," *IOSR Journal of Computer Engineering*, vol. 17, no. 1, pp. 29–34, 2015.

[5]. J. P. Dimond, C. Fiesler, and A. S. Bruckman, "Domestic violence and information communication technologies," *Interacting with Computers*, vol. 23, no. 5, pp. 413–421, 2011.

[6]. L. Dennison, L. Morrison, G. Conway, and L. Yardley, "Opportunities and challenges for smartphone applications in supporting health behavior change: A qualitative study," *Journal of Medical Internet Research*, vol. 15, no. 4, e86, 2013.

[7]. World Health Organization, "Violence against women: Key facts," 2024. [Online]. Available: https://www.who.int/news-room/fact-sheets/detail/violence-against-women