

Women Safety Mobile Application Using Flutter

Rutuja Hemant Bhusare¹, Shamal Namdev Shinde², Sharvari Shivaji Patil³, and Samruddhi Krushnat Suryavanshi⁴, Prof. R.D. Jadhav⁵

Diploma, Department of Computer Engineering, K.P. Patil Institute of Technology, Mudal, Kolhapur, Maharashtra, India

Abstract - Women's safety has become one of the most critical social challenges in recent years due to the increasing number of harassment and crime cases. Immediate response during emergency situations is often delayed due to panic, lack of communication, or unavailability of support systems. This research paper presents the design and implementation of a Women Safety Mobile Application developed using the Flutter framework. The proposed system provides a one-touch SOS emergency feature that instantly shares the user's real-time GPS location with registered contacts and nearby authorities.

The application integrates Firebase Authentication for secure login, Firestore for real-time database management, and Firebase Storage for storing recorded multimedia evidence. Upon SOS activation, the system sends SMS alerts, initiates emergency calls, starts automatic video recording, and uploads data to the cloud server. The system also supports offline SMS alerts when internet connectivity is unavailable.

The primary objective of this application is to reduce emergency response time, provide secure evidence collection, and enhance personal safety through smart mobile technology. The application is lightweight, user-friendly, and optimized for Android devices. Experimental results show that the system responds within 2-3 seconds under stable network conditions, making it an efficient and reliable safety solution.

Keywords: Women Safety, SOS Alert, Flutter, GPS Tracking, Firebase, Emergency System

1. INTRODUCTION

The rising crime rate against women has necessitated the integration of technology into personal safety measures. Traditional methods of seeking help often fail due to panic or lack of time. To address this, we propose a robust mobile application developed using Flutter framework, ensuring cross-platform compatibility (Android). The application bridges the gap between the victim and emergency responders by automating the alert process. Unlike conventional applications that rely solely on SMS, this system integrates cloud-based data storage, real-time map visualization, and multimedia evidence recording to provide a holistic safety solution.

2. OBJECTIVE

The main objectives of the proposed system are:

1. To provide instant SOS alert functionality.
2. To share real-time GPS location with emergency contacts
3. To enable automatic calling to police helpline numbers.
4. To record audio/video evidence automatically.
5. To design a secure and user-friendly mobile application.

3. PROBLEM STATEMENT

Despite the availability of helpline numbers and safety applications, many women fail to receive immediate assistance during distress situations. Existing systems lack integrated real-time tracking, automatic multimedia recording, and offline alert support. Therefore, there is a need for a reliable mobile-based safety system that ensures instant communication, accurate location tracking, and secures evidence storage.

4. LITERATURE REVIEW

Existing literature highlights several approaches to women's safety systems. Early iterations relied heavily on hardware buttons or distinct wearable devices, which are often costly or cumbersome.

- **SMS-Based Systems:** Many existing apps send simple text messages. However, they lack real-time tracking updates if the victim keeps moving.
- **GPS Trackers:** Hardware-based trackers are effective but require maintenance and charging.

The proposed system overcomes these limitations by integrating dynamic GPS tracking with a user-friendly software interface, eliminating the need for external hardware while ensuring high accuracy through mobile sensors.

5. SYSTEM ARCHITECTURE

The system architecture is designed to be modular and scalable. It operates on a client-server model where the mobile application acts as the client and Firebase serves as the backend.



Figure 1: System Architecture Flow

6. TECHNOLOGIES USED

- Flutter – Cross-platform mobile development
- Dart – Programming language
- Firebase Authentication – Secure login system
- Firebase Firestore – Real-time database
- Firebase Storage – Store multimedia evidence
- Google Maps API – Live location display
- GPS Module – Fetch coordinates

7. METHODOLOGY

The development methodology follows an Agile approach, allowing for iterative testing of the SOS features. The execution flow is as follows:

- **User Initialization:** The user grants necessary permissions (Location, SMS, and Camera) upon first install.
- **Contact Configuration:** The user defines a priority list of emergency contacts (Family, Police).
- **Emergency State:** When the SOS button is tapped, the app enters 'Distress Mode'. Background services are killed to prioritize the location thread.
- **Data Transmission:** Encrypted location packets are sent to the cloud database, which updates the observer clients (registered contacts) in real-time.

8. ALGORITHM

The internal logic for the SOS trigger is optimized for speed and low latency.

Algorithm 1 Emergency SOS Trigger Sequence

- 1: **Start**
- 2: **Input:** User Taps SOS Button

3: **if** Network Available OR GPS Available **then**

4: Loc ← GetCurrentGPScoordinates ()

5: Contacts ← FetchEmergencyContacts ()

6: **Parallel Process:**

7: Send SMS (Loc, Contacts)

8: Initiate Call (Police Helpline)

9: Start Background Video Recording

10: Upload Data to Cloud Server

11: **else**

12: Send Last Known Location via SMS

13: **end if**

14: **Stop**

9. SECURITY MECHANISM

- Secure Firebase Authentication
- OTP-based login system
- End-to-End encrypted location sharing
- Cloud Storage access control
- Role-based access management

10. PERFORMANCE ANALYSIS

The application was tested on Android smartphones with a minimum of 4 GB RAM.

Average SOS Response Time: 2–3 seconds

GPS Accuracy: ±5 meters

SMS Delivery Time: 3–5 seconds

11. ADVANTAGES

1. Latency Reduction: The use of Flutter ensures high performance (60fps), ensuring the app does not lag during critical moments.

2. Evidence Integrity: Automated video/audio recording provides tamper-proof evidence for legal proceedings.

3. Offline Capability: The system is designed to queue SMS alerts even if the internet connection is unstable.

4. Cross-Platform: A single codebase serves both Android, maximizing reach.

12. LIMITATIONS

- Requires GPS access
- Internet needed for cloud storage
- SMS charges may apply
- Battery usage increases during video recording

13. FUTURE SCOPE

The current system lays the foundation for advanced safety features. Future iterations will include:

- **Gesture Recognition:** Activation of SOS (e.g., “Help”) using Natural Language Processing (NLP).
- **IoT Integration:** Pairing with smart wearables to detect sudden vitals changes (pulse rate spikes) indicating panic.
- **Safe Route Analytics:** Using machine learning to suggest safer travel routes based on historical crime data density.

14. CONCLUSION

The “Women Safety Mobile Application” is a technological intervention designed to empower women. By combining real-time tracking, secure cloud storage, and immediate alert systems, the application provides a reliable safety net. The successful implementation of this system can significantly contribute to crime deterrence and faster emergency response times in society.

15. REFERENCES

- [1] Google Developers, “Flutter - Build apps for any screen,” Flutter Documentation, 2024. [Online]. Available: <https://flutter.dev.00>
- [2] National Crime Records Bureau (NCRB), “Crime in India - Statistics,” Ministry of Home Affairs, Govt. of India, New Delhi, 2024.
- [3] Govt. of India, “Women Helpline Scheme (181) - Mission Shakti,” Ministry of Women.
- [4] A. Sharma and P. Gupta, “Android based Emergency Alert System for Women Safety,” in Int. Journal of Engineering Research, vol. 9, no. 5, pp. 23-27, 2023.
- [5] Google Firebase, “Firebase Authentication Documentation,” Google Developers, 2024. [Online]. Available: <https://firebase.google.com/docs/auth>.
- [6] Google Maps Platform, “Google Maps API Documentation,” Google Developers, 2024. [Online]. Available: <https://developers.google.com/maps>.
- [7] World Health Organization (WHO), “Violence against Women – Global Statistics Report,” WHO Publications, Geneva, 2023.
- [8] S. Mehta and R. Kulkarni, “Design and Implementation of Women Safety System Using Mobile Technology,” in International Journal of Advanced Research in Computer Engineering, vol. 11, no. 3, pp. 112-118, 2022.