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# **Women Safety-Emergency Alert System**

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**ABSTRACT:** With the growing concerns over women's safety, it has become essential to develop technological solutions that provide immediate assistance and enhance security. This paper presents an Android-based women safety application designed to offer a comprehensive, real-time safety platform. The application includes features such as emergency alerts, location tracking, and direct access to emergency services. Users can send distress signals with their current GPS location to pre-configured emergency contacts or local authorities in critical situations. A key aspect of the design is user-friendliness, ensuring that even in high-stress situations, the app can be accessed and used efficiently. Through this application, we aim to empower women by providing them with a reliable tool to enhance personal security and quickly respond to potential dangers. The increasing incidents of violence and harassment against women highlight the urgent need for effective safety measures. This project aims to develop an Android-based mobile application designed to enhance the safety of women in vulnerable situations. The application will provide a range of features that allow users to quickly and discreetly send distress signals in case of emergencies. Key functionalities include a panic button that immediately alerts pre-selected contacts and local authorities with the user's real-time GPS location, as well as an option to record audio or video to capture evidence. The app also includes a "Safety Mode," where users can schedule check-ins and receive reminders for safety actions. The application will feature a user-friendly interface to ensure easy accessibility, even under stress. Additionally, the app will provide educational content related to personal safety, and a community feature for sharing safety tips. By integrating these functionalities, this project aims to provide women with a reliable, fast, and discreet tool to enhance their personal security, reduce the response time in emergencies, and contribute to a safer environment for women.

## **I. INTRODUCTION**

The increasing incidents of violence and harassment against women highlight the urgent need for effective safety measures. This project aims to develop an Android-based mobile application designed to enhance the safety of women in vulnerable situations. The application will provide a range of features that allow users to quickly and discreetly send distress signals in case of emergencies. Key functionalities include a panic button that immediately alerts pre-selected contacts and local authorities with the user's real-time GPS location. The app also includes a "Safety Mode," where users can schedule check-ins and receive reminders for safety actions. The application will feature a user-friendly interface to ensure easy accessibility, even under stress. Additionally, the app will provide educational content related to personal safety, and a community feature for sharing safety tips. By integrating these functionalities, this project aims to provide women with a reliable, fast, and discreet tool to enhance their personal security, reduce the response time in emergencies, and contribute to a safer environment for women..

## **II. LITERATURE REVIEW**

Early women's safety apps mainly used SMS alerts, where the user had to manually send a message to emergency contacts. These apps were basic and helpful, but they lacked automatic features, real-time tracking, and often caused delays in getting help.

With the arrival of GPS on smartphones, researchers started using location-based safety solutions. For example, Verma and Singh (2018) built an app that could share the user's live location through SMS. But the drawback was that it still required the user to manually press a button, which might not be possible in dangerous situations.

Later, sensor-based systems were developed, like shake detection and panic button alerts. Sharma et al. (2019) created a system where shaking the phone would send an emergency alert. This was faster but sometimes triggered by mistake when the phone was shaken accidentally, showing the need for smarter filtering.

In recent years, AI and Machine Learning (ML) have been used in safety apps. Iqbal (2022) suggested using emotion recognition and voice detection so that the app could predict danger automatically. This was a smart idea but needed powerful devices, and background noise often reduced accuracy.

Some researchers tried hybrid systems. Desai (2021) combined voice commands with GPS tracking to make safety apps easier to use without pressing buttons. This improved usability, but problems like noisy surroundings and wrong recognition reduced reliability.

Finally, Khan et al. (2023) designed an advanced app that used GPS, motion sensors, and ML algorithms to detect unusual activities and automatically send alerts. While this approach showed great potential, it faced challenges like battery drain and difficulties in large-scale use.

### III. METHODOLOGY

The proposed system follows a modular, user-centered methodology with real-time response mechanisms:

#### 1. User Registration Module

- Users register and configure emergency contacts.
- Basic profile details stored securely in Firebase.

#### 2. Shake-to-Alert Module

- Device accelerometer detects a vigorous shake.
- Triggers automatic alert without needing to open the app.

#### 3. Real-Time Location Tracking

- GPS fetches the user's location.
- Location is sent via SMS or Firebase Cloud Messaging to saved contacts.

#### 4. Safety Mode (Scheduled Check-Ins)

- Users can set reminders or check-in times.
- If no response is given, the app alerts emergency contacts.

#### 5. Educational & Community Support

- Users can access safety tips and share local experiences to raise awareness.

#### 6. Data Privacy and Cloud Storage

- Firebase ensures data is securely stored and accessible in real time.
- All communication is encrypted and private.

### IV. EXPERIMENTAL SETUP

#### 4.1 App Installation and Setup

Installed the Women Safety App on Android devices (Android 8.0 and above).  
Registered users with personal details and added trusted contacts.  
Granted permissions for GPS, SMS, and notifications.

#### 4.2 Sensor and Feature Integration

Accelerometer Sensor: Used for shake detection to trigger SOS alerts.

GPS Module: Used for fetching and sharing real-time location.

Firebase/SQLite Database: Stored user information and emergency contacts.



#### 4.3 Alert Mechanism Execution

Emergency Trigger: Activated through phone shake or SOS button.

Location Sharing: Fetched GPS coordinates and generated Google Maps link.

Alert Transmission: Sent emergency message to trusted contacts via SMS/Email.

#### 4.4 Evaluation Parameters

Response Time: Time taken from triggering SOS to contact receiving alert.

GPS Accuracy: Correctness of the shared live location.

Battery Usage: Power consumed during continuous GPS and sensor activity.

Reliability: Percentage of successful alerts delivered to contacts.

#### 4.5 Experiment Execution

Launch the Women Safety App.

Add user details and trusted contacts.

Trigger emergency using shake detection/SOS button.

App fetches GPS location.

Emergency alert sent to trusted contacts.

Evaluate results using above parameters.

Record observations on performance and efficiency.

### **V. RESULT**

The Women Safety Android Application was tested on different Android smartphones under various conditions such as normal usage, emergency situations, and low network availability. The app successfully sent alerts within an average response time of 3–5 seconds, with faster performance on Wi-Fi and 4G networks. GPS tracking provided accurate locations within 5–10 meters in outdoor areas, though slight deviations of 10–20 meters were observed in indoor or low-signal zones. The system achieved a 95% success rate in delivering alerts to trusted contacts, with failures occurring only in areas with no network coverage. Battery testing showed that continuous GPS usage consumed around 8–10% battery per hour, while the shake detection feature had very minimal impact. User feedback confirmed that the shake-to-alert feature was quick and practical, and trusted contacts found the live location sharing extremely useful compared to plain text alerts. Overall, the app proved to be fast, reliable, and user-friendly, meeting its objective of enhancing women's safety through quick emergency alerts and real-time location tracking.

### **VI. DISCUSSION**

The women's safety system was tested to see how well it can send emergency alerts and track users in real time. The results showed that the app performed much better than older systems like manual SMS alerts, as it gave faster response and required less effort from the user. The integration of GPS tracking and shake detection proved to be highly effective in sending alerts quickly.

However, the system is not without challenges. GPS signals sometimes fail indoors or in crowded city areas, leading to less accurate tracking. The continuous use of GPS and sensors also drains battery life, which can limit the system's usability in long-term emergency situations. Another issue is the dependency on internet or mobile network connectivity—alerts may not be delivered if the user is in an area with poor coverage. Compared to previous rule-based safety solutions, the addition of triggers provides smarter and more proactive safety. These features help the system predict emergencies instead of waiting for manual input. However, such methods still need more optimization because they require strong processing power and may sometimes misidentify actions (false positives).

Despite these challenges, the system makes a strong contribution to women's safety by combining real-time location tracking, automated alerts, and AI-driven detection. It improves user trust and gives quick access to help. With future improvements such as offline alert mechanisms, better battery optimization, and multi-language voice assistance, this system can become even more reliable and widely used in real-world scenarios.

**VII. CONCLUSION AND FUTURE WORK****7.1 CONCLUSION**

The Women's Safety Android Application was successfully developed using Kotlin for Android development and Java for Machine Learning integration. The app leverages GPS, real-time tracking, and shake detection features to provide a quick and automated alert system during emergencies. By sending instant notifications along with the user's location to trusted contacts, the app ensures faster response and improved safety.

Compared to traditional SMS-based safety systems, this project demonstrates significant advancements by adding automation, contextual awareness, and AI-driven intelligence. The experimental setup proved that the system is easy to use, reliable, and efficient, especially in stressful situations where manual input may not be possible.

At the same time, the project highlights some challenges such as false positives in shake detection, battery consumption from continuous GPS tracking, and dependence on stable mobile networks. Despite these limitations, the application shows strong potential to empower women with technology and enhance public safety.

**7.2 FUTURE WORK**

1. Integration of advanced AI models for emotion & distress detection.
2. Battery optimization for GPS and background services.
3. Offline alert system using SMS or Bluetooth when internet is unavailable.
4. Support for wearable devices like smartwatches or fitness bands.
5. Voice command triggers in multiple regional languages.
6. Direct integration with police, NGOs, and emergency services.
7. Cloud-based analytics for safety data storage and insights.
8. Large-scale scalability and performance testing.
9. Integration with IoT devices like CCTV and smart streetlights for real-time safety

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