


A Review on AI Based Women Safety Guardian System

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Abstract: Women safety has become one of the most important social concerns in modern society because of the increasing number of harassment incidents, crimes, and emergency threats faced by women in daily life. In many dangerous situations, immediate communication and rapid emergency response are essential to protect the victim and reduce delay in receiving help. The proposed AI-Based Women Safety Guardian System is designed as an intelligent mobile-based safety application that provides emergency support through multiple triggering methods integrated into a Smartphone; including a manual panic button, voice emergency activation, shake detection, and emergency call functionality. Once activated, the system sends emergency alert messages along with the victim's live GPS location to pre-registered emergency contacts, while conceptually supporting nearby police station and SHE team alerting through GPS-based emergency communication for future deployment. To improve victim protection, the system also includes victim PIN authorization, a hidden safe confirmation mechanism, and a fake cancellation screen that prevents attackers from identifying safety controls during emergency situations. The project applies lightweight AI through shake intensity classification and voice keyword intelligence, enabling intelligent trigger recognition and emergency decision flow based on sensor behaviour and voice commands. In addition, an optional manual alert sound can be activated by the victim when nearby public attention is required. The proposed model aims to reduce emergency response time, improve emergency communication efficiency, and provide a practical mobile safety solution for women during critical situations.

Keywords: women safety, emergency alert, panic button, shake detection, voice recognition, GPS tracking, emergency communication, artificial intelligence, mobile safety application.

1. INTRODUCTION

Women safety has become a major concern in recent years because of the increasing number of harassment cases, violence, and unsafe situations faced by women in both public and private environments. Although Smartphone's provide communication facilities such as calling, messaging, and location sharing, these methods often require manual operation and may not be practical during sudden danger situations where the victim has limited time to react. To address this issue, many mobile-based safety systems have been proposed using GPS tracking, emergency messaging, and sensor-based triggering methods to provide faster emergency support. However, most existing systems are limited to simple alert mechanisms and do not include intelligent safety control features that can protect the victim during attacker presence. The proposed AI-Based Women Safety Guardian System is developed to provide a practical mobile safety solution by integrating multiple emergency activation methods such as a panic button, shake detection, and voice trigger recognition within a single application. The system sends emergency SMS alerts and live location details to registered emergency contacts and supports direct emergency calling for immediate communication. In addition, advanced safety features such as hidden safe confirmation, victim PIN verification, fake cancellation interface, and optional manual alert sound improve user protection during critical conditions. The project also introduces lightweight artificial through shake intensity classification and voice keyword intelligence, which help the system identify emergency conditions more effectively. This review focuses on recent women safety technologies, existing limitations, and the need for intelligent multi-trigger mobile safety systems for real-world emergency response.

2. LITERATURE REVIEW

Various researchers have proposed mobile-based emergency alert systems, GPS tracking methods, and sensor-based safety mechanisms to improve women safety during dangerous situations. Existing studies mainly focus on sending alert messages, sharing location details, and enabling quick communication with emergency contacts. Some recent approaches also introduced intelligent methods such as voice triggering and motion detection. However, many systems still depend on manual activation and have practical limitations during real emergency conditions.

- [1] Arundhati, Garima Sinha(2024): They proposed a women safety system with emergency alert, analysis, and prediction using GPS-based communication and area-radius notification. Their model focused on sending alerts to nearby users and analysing crime trends using machine learning techniques. However, practical implementation became complex because it depended on analytical modules and nearby user connectivity.
- [2] GPS and GSM Based Women Safety Systems: Several researchers proposed GPS and GSM-based safety systems to send emergency messages along with live location details to predefined emergency contacts. These systems improved emergency communication but mainly depended on manual activation.
- [3] Sensor-Based Safety Applications: Smartphone accelerometer-based systems were introduced to detect sudden movement or shake patterns for emergency triggering. These systems reduced manual effort but often suffered from accidental motion detection.
- [4] Voice Activated Emergency Systems: Voice-based women safety applications used predefined emergency keywords to trigger alerts without manual interaction. Their performance was affected in noisy environments.
- [5] Wearable Safety Devices: Wearable safety devices integrated with GPS and GSM modules were developed to send alerts during emergencies. These systems required additional hardware support.
- [6] Mobile Emergency Alert Applications: Mobile applications with panic button support enabled quick SMS delivery to emergency contacts during danger situations. Their limitation was complete dependence on user action.
- [7] IoT Based Women Safety Systems: IoT-enabled systems used connected devices and sensors for emergency monitoring and alert communication. These systems improved automation but increased implementation complexity.
- [8] Real-Time Location Sharing Systems: Some models focused on continuous GPS tracking and location sharing during emergencies. They improved tracking accuracy but required stable internet connectivity.
- [9] Cloud Supported Safety Applications: Cloud-based emergency systems stored user safety data and improved remote communication. Data privacy and internet dependence remained major concerns.
- [10] Emergency Communication Using Android Applications: Android-based safety applications provided SMS and call support during danger situations. Most systems lacked advanced intelligent trigger mechanisms.
- [11] Self-Defence Assistance Systems: Certain studies integrated safety awareness and self-defence guidance into mobile safety applications. These systems improved preparedness but not emergency response speed.
- [12] Crime Prediction Based Safety Models: Some researchers applied machine learning methods to identify unsafe areas using crime datasets. These systems supported preventive safety planning but not immediate emergency support.
- [13] Multi-Trigger Safety Applications: Applications combining panic buttons and location tracking improved emergency response reliability but still lacked secure confirmation methods.
- [14] Smart Safety Monitoring Systems: Smart monitoring models used multiple sensors to detect emergency conditions automatically. Their major limitation was false trigger generation.
- [15] Intelligent Women Safety Applications: Intelligent safety applications introduced lightweight decision logic for trigger handling and emergency communication. However, many systems lacked attacker-aware safety controls and secure victim verification.

Table 2.1: Comparative Analysis of Women Safety Guardian System

S.No	Authors (Year)	Method Used	Technology/ Components Used	Outcomes	Identified Gaps
1	Arundhati, Garima Sinha (2024)	Emergency alert and safety prediction	GPS, machine learning Area- radius alert	Improved nearby alert support and safety analysis	Complex practical implementation
2	Various Researchers	Panic button emergency alert	Android, SMS communication	Quick emergency messaging	Fully manual activation required
3	Various Researchers	GPS location tracking	GPS, GSM	Accurate location sharing	Depends on network availability
4	Various Researchers	Shake detection alert system	Accelerometer sensor	Automatic trigger support	False triggering possible
5	Various Researchers	Voice activated emergency trigger	Speech recognition	Hands-free alert activation	Noise affects accuracy
6	Various Researchers	Wearable emergency safety device	GSM, GPS, microcontroller	Portable safety support	Additional hardware required
7	Various Researchers	IoT based safety monitoring	Sensors, IoT modules	Improved automation	Complex implementation
8	Various Researchers	Mobile emergency call support	Android call service	Immediate contact support	Limited intelligent decision flow

9	Various Researchers	Real-time location sharing	GPS, mobile internet	Continuous tracking support	Battery Consumption increases
10	Various Researchers	Cloud-based emergency communication	Cloud storage, mobile app	Remote safety monitoring	Internet dependency
11	Various Researchers	Crime prediction safety model	Machine learning algorithms	Preventive safety analysis	Not immediate emergency solution
12	Various Researchers	SMS based alert application	GSM, Android	Fast emergency messaging	Limited trigger options
13	Various Researchers	Multi-trigger safety systems	Sensors, GPS	Improved response reliability	Lacks secure confirmation
14	Various Researchers	Smart safety monitoring	Sensor integration	Automatic emergency support	False alerts possible
15	Various Researchers	Intelligent mobile safety system	Android, lightweight AI logic	Better trigger handling	Limited attacker-aware features

3. PROPOSED SYSTEM

This section outlines the workflow of the proposed Women Safety Guardian System, which integrates an Android-based emergency response application with lightweight AI-based trigger mechanisms to provide fast and reliable safety support during dangerous situations. The system combines manual panic activation, automatic shake intensity detection, and voice keyword intelligence to trigger emergency alerts. It sends SMS messages to predefined contacts, initiates emergency calling, and shares live GPS location for quick assistance. The proposed design aims to improve response speed, practical usability, and emergency communication accuracy.

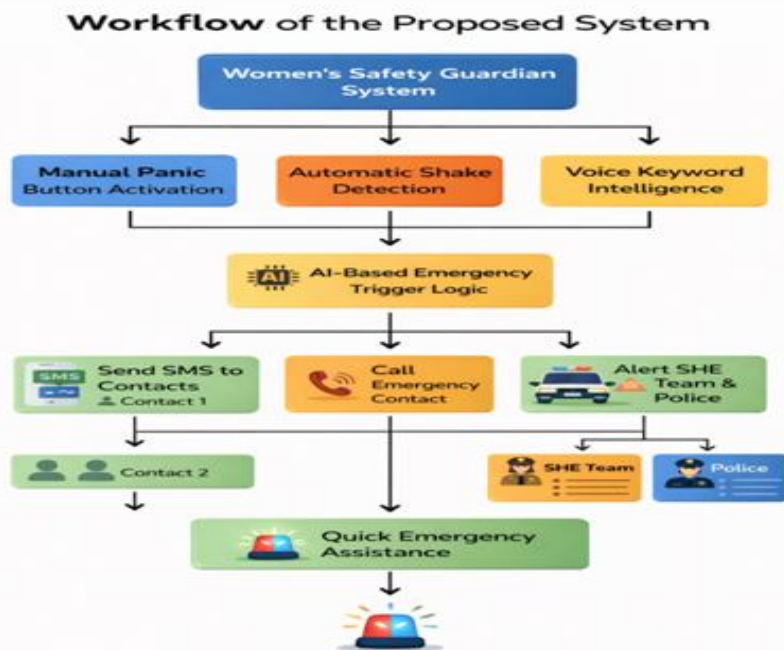


Fig 3.1: Proposed System Architecture for Women Safety Guardian System

4. CHALLENGES AND LIMITATIONS

Despite the improvements introduced in mobile-based women safety systems, several practical challenges still affect reliable emergency support during real-time deployment. These limitations are observed in both manual emergency applications and intelligent multi-trigger safety models developed using mobile technologies. One of the primary challenges lies in network dependency. Emergency SMS delivery, calling functionality, and GPS location sharing require stable mobile signal strength, and poor network conditions may delay emergency communication during critical situations. Another important limitation is related to sensor sensitivity. Shake detection systems may generate false alerts when sudden non-emergency phone movements are interpreted as emergency conditions, affecting trigger reliability. A further challenge exists in voice recognition accuracy. Emergency keyword detection may become less effective in noisy surroundings, crowded environments, or when voice input is unclear during panic situations. In addition, authority integration remains a practical limitation because direct communication with police stations and SHE teams requires official deployment permissions, verified emergency databases, and legal communication support for large-scale implementation.

5. CONCLUSION AND FUTURE SCOPE

The proposed AI-Based Women Safety Guardian System provides a practical mobile safety solution by combining emergency communication, live location sharing, and intelligent trigger mechanisms within a single application. The integration of panic button activation, shake detection, voice keyword intelligence, and emergency calling improves response speed during critical situations and supports immediate alert generation to predefined emergency contacts. The system also introduces secure victim protection features such as hidden safe confirmation, PIN verification, and fake cancellation support, which improve safety during attacker presence. Lightweight AI-based trigger classification further strengthens emergency detection by distinguishing meaningful sensor and voice inputs. In future scope, the system can be extended through official integration with police stations, SHE teams, and authorized emergency communication platforms. Advanced AI models for behaviour prediction, abnormal voice analysis, and continuous background monitoring can also improve large-scale real-time deployment.

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