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# Women Safety Device

Vikas Gupta[1], Mohamedali Fateh[2], Muddasir Shaikh[3], Sulemian Patel[4]
Guide: Prof. Shahjahan Shaikh

*University of Mumbai, Rizvi Education Society's, Rizvi College of Engineering, Department of Computer Engineering*

***Abstract*-- The IoT-Based Women Safety Alert System is a smart and reliable safety solution designed to provide immediate assistance to women during emergency situations. The system consists of a compact, wearable or portable device integrated with a panic button, GPS module, and wireless communication technology. In case of danger, when the user presses the emergency button, the device instantly captures the real-time location and sends an alert containing location coordinates and predefined emergency details to the nearest police station and registered emergency contacts such as family members or friends. This ensures quick response and timely help. The system operates in real time and works independently of smartphones, making it highly effective even in critical situations where manual phone usage is difficult. The collected data can be monitored through a centralized server or mobile/web application, allowing authorities to track the victim's location accurately.**

## I. Introduction

Women's safety has become a major concern in today's society due to the increasing number of harassment and crime incidents in both public and private spaces. Despite advancements in technology and stricter laws, ensuring immediate protection and timely assistance for women in emergency situations remains a significant challenge. Traditional safety measures such as helplines and mobile applications often depend on manual intervention and may not provide instant support when required.

With the rapid growth of embedded systems and Internet of Things (IoT) technologies, it has become possible to design smart and efficient safety solutions. These technologies enable realtime monitoring, instant communication, and location tracking, which are essential features for an effective safety system. A reliable women safety device should be capable of sending alerts quickly, sharing accurate location information, and attracting nearby attention to ensure faster response during emergencies.

The proposed Women Safety Device is designed as a compact and user-friendly system that provides immediate assistance at the press of a button. The device integrates a microcontroller (such as ESP32), GPS module, and communication system (GSM/Wi-Fi) to transmit real-time alerts to predefined contacts. In addition, features such as a buzzer and LED indicators are included to draw attention and enhance safety during critical situations.

The main objective of this project is to develop a low-cost, portable, and efficient safety device that can be easily carried and used by individuals in their daily lives. The system focuses on reducing response time and ensuring reliable communication, even in challenging conditions. By combining multiple functionalities into a single device, the proposed solution aims to overcome the limitations of existing systems.

This project not only demonstrates the practical application of embedded systems and communication technologies but also contributes towards addressing an important social issue. By providing a quick and dependable safety mechanism, the Women Safety Device aims to empower users and promote a safer environment.

## II. Review Of Literature

### *2.1 Limited Reliability of Existing Safety Systems*

Many existing women safety systems are dependent on manual activation through mobile applications or wearable buttons. In real-life emergency situations, users may not always be in a position to access their phones or trigger the system due to panic, physical restriction, or sudden threats. This significantly reduces the reliability of such systems. Additionally, accidental triggers and false alarms are also common issues, which may reduce trust in the system over time. Hence, there is a need for a more responsive and reliable mechanism that can function effectively under critical conditions.

### *2.2 Dependence on Internet Connectivity*

A majority of current safety solutions rely on internet-based communication for sending alerts and location information. While this works well in urban environments, it becomes a major limitation in areas with poor or unstable network connectivity. Situations such as traveling in remote areas, basements, or during network failures can prevent alerts from being delivered. This dependency on the internet reduces system robustness and highlights the need for alternative communication methods that can function even in low-connectivity scenarios.

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*2.3 Delayed Emergency Response*

Timely response is crucial in emergency situations; however, many existing systems suffer from delays due to network latency, inefficient processing, or slow communication modules. Even a delay of a few seconds can have serious consequences. Systems that rely on cloud processing or multiple intermediate steps tend to increase response time. Therefore, reducing latency and enabling instant alert transmission is a critical requirement for improving the effectiveness of safety devices.

*2.4 Limited Feature Integration*

Most available safety devices focus on a single functionality, such as sending an SOS message or providing GPS tracking. However, relying on a single feature limits the effectiveness of the system. An ideal safety device should integrate multiple functionalities such as real-time tracking, emergency alerts, audible alarms, and visual indicators. The absence of such integration reduces the chances of attracting immediate attention and delays assistance.

*2.5 High Power Consumption and Efficiency Issues*

Continuous use of GPS modules and communication technologies like GSM or Wi-Fi leads to high power consumption in many safety devices. This reduces battery life and makes the system unreliable for long-term use. Users may forget to recharge the device regularly, which can result in system failure during emergencies. Designing an energy-efficient system that optimizes power usage while maintaining performance is therefore essential.

*2.6 Lack of Real-Time Monitoring and Automation*

Existing systems generally operate only when triggered manually and do not provide continuous monitoring of the user's condition. In many critical situations, the user may not be able to activate the device. The absence of automated detection mechanisms, such as sensing unusual movements or distress signals, limits the effectiveness of these systems. Real-time monitoring and automation can significantly enhance safety by reducing dependency on manual input.

*2.7 Limited Portability and User Convenience*

Several safety devices are bulky, complex, or inconvenient to carry, which discourages regular usage. A device that is not user-friendly or portable may not be used consistently, reducing its practical value. Therefore, compact design, ease of use, and comfort are essential factors for ensuring widespread adoption and usability in daily life.

*2.8 Security and Privacy Concerns*

Many existing applications and devices do not implement strong security mechanisms to protect user data. Sensitive information such as location and personal details may be transmitted without proper encryption, making it vulnerable to cyber threats. This raises serious privacy concerns and can discourage users from adopting such systems. Ensuring secure data transmission and privacy protection is critical for building trust and reliability.

*2.9 Scalability and Adaptability Issues*

Most current systems are designed for individual use and lack scalability for broader applications such as integration with public safety networks or law enforcement systems. Additionally, they are not easily adaptable to different environments or user requirements. A scalable and flexible system design is necessary to extend the functionality and usability of safety devices in real-world scenarios.

## III. METHODOLOGY

*1. Problem Analysis*

The project focuses on addressing the rising safety concerns faced by women in public and isolated areas. The aim is to design a system that provides immediate help during emergencies through a simple trigger mechanism.

Identified need for quick response system
Focus on real-time communication and location sharing

*2. Requirement Gathering*

The system requirements were collected based on user safety needs and technical feasibility. The device should be simple, fast, and reliable.

Emergency SOS button
GPS for location tracking
GSM/Wi-Fi for sending alerts
Portable and user-friendly design

*3. System Design*

The system is designed by dividing it into hardware and software modules to ensure smooth functioning and scalability.

*Hardware:* Microcontroller, GPS module, GSM module, button, battery

*Software:* Arduino programming, API integration, message system

*4. Working Mechanism*

The device operates when the user presses the emergency button. It immediately triggers the system to send alerts with location details.

Button press activates system
GPS fetches real-time coordinates
Alert message sent to saved contacts
Message includes Google Maps link

*5. Implementation*

The project is implemented by assembling hardware components and coding the logic into the microcontroller. Proper integration ensures accurate functioning.

Circuit connections completed
Code uploaded and tested
Modules integrated for real-time response

*6. Testing and Evaluation*

The system is tested under different conditions to ensure reliability and performance in real-life situations.

Tested in indoor and outdoor environments
Checked response time and accuracy
Verified message delivery success rate

*7. Result and Improvements*

The device successfully provides quick alerts and accurate location sharing, making it effective for emergency use. However, some improvements can enhance performance.

Works efficiently in network-enabled areas

Limitations: network dependency, battery life

Future scope: mobile app, wearable device, voice activation

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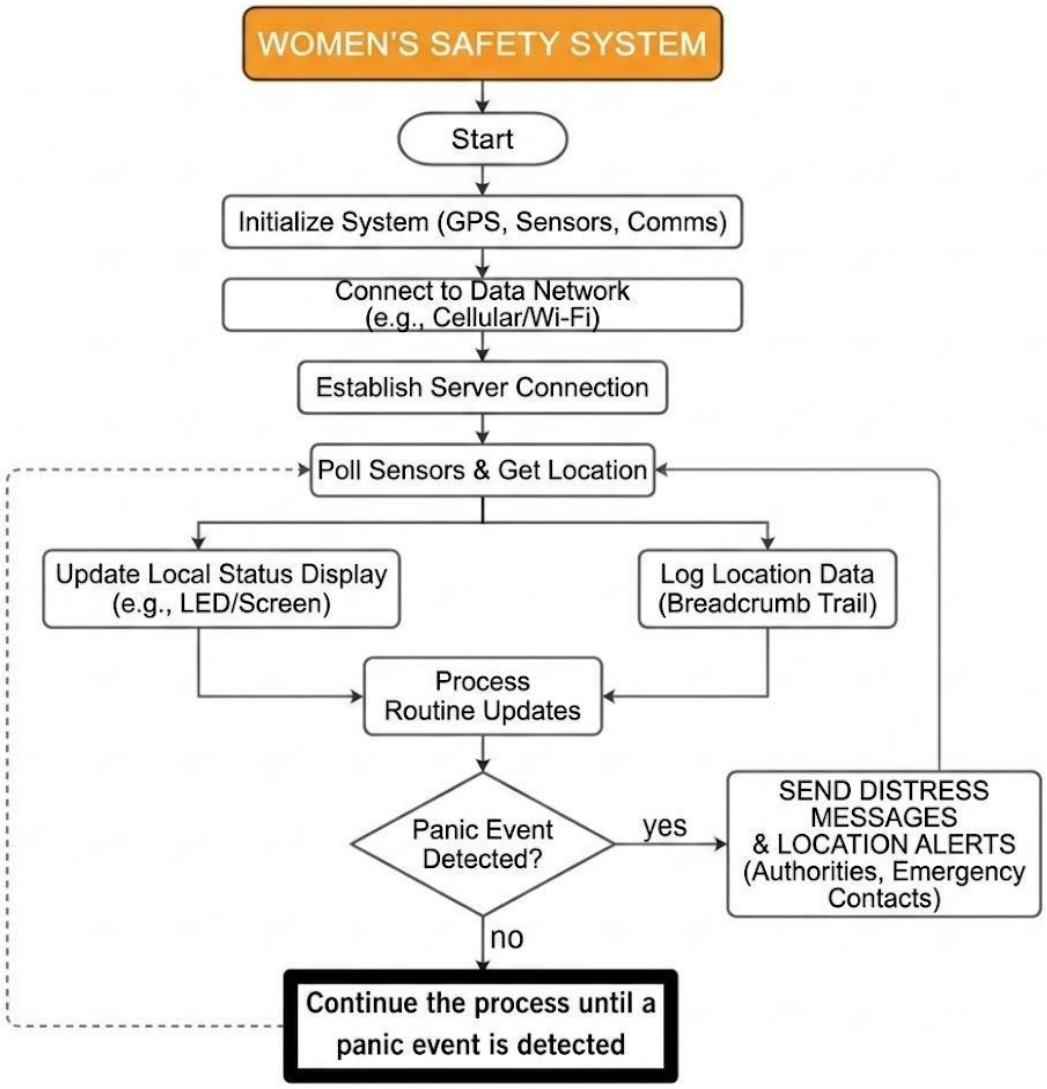
*Block Diagram*



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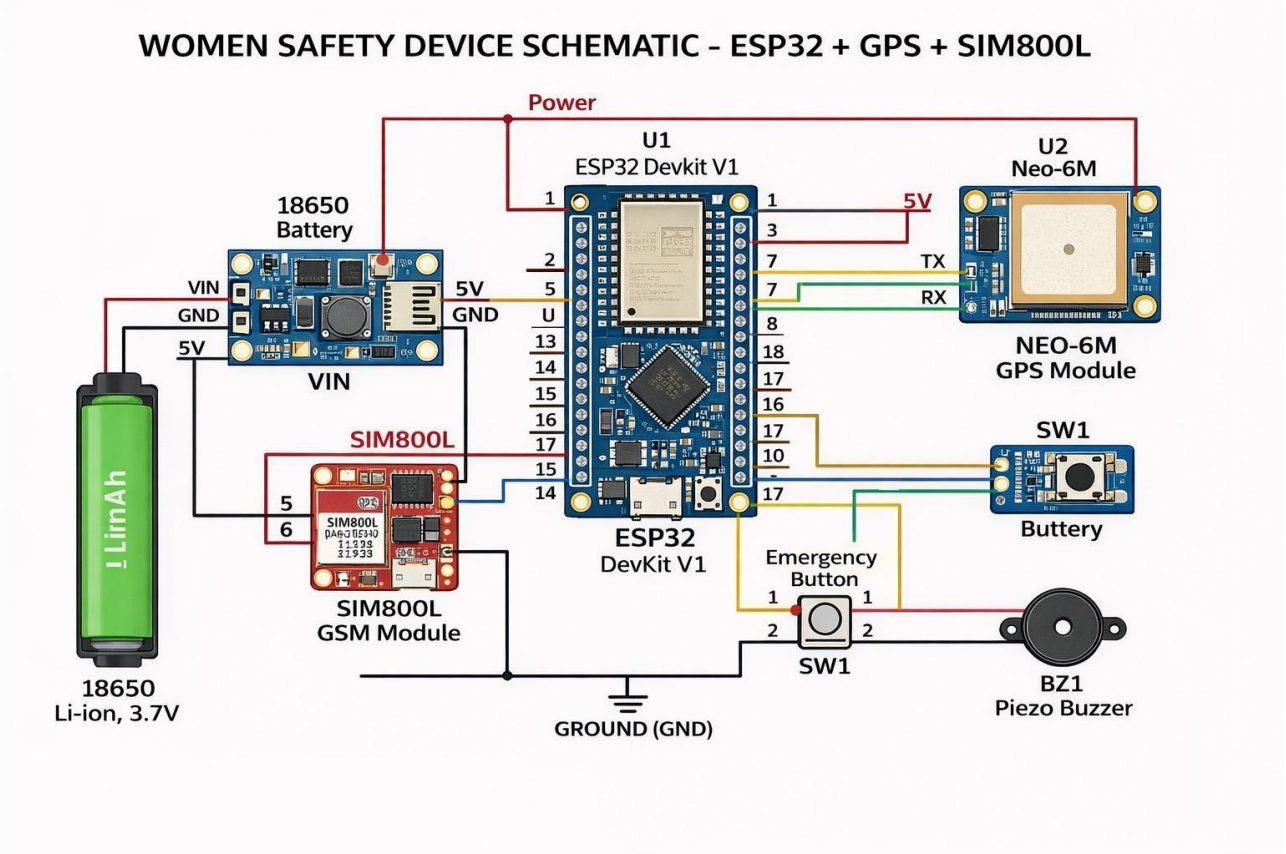
*Circuit Diagram*



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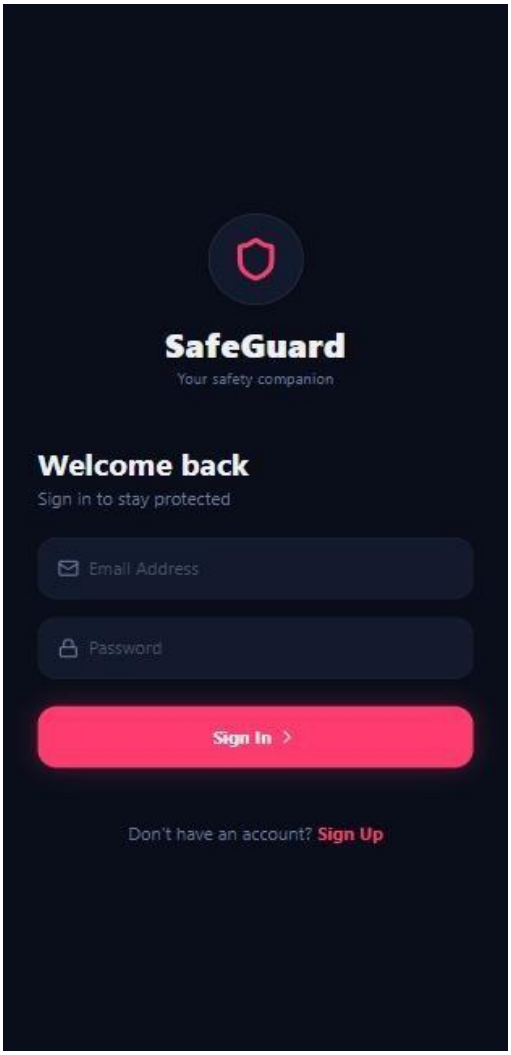
## IV. Results And Discussions




1.1 Home page


2.2 SOS button


3.3 SOS send message

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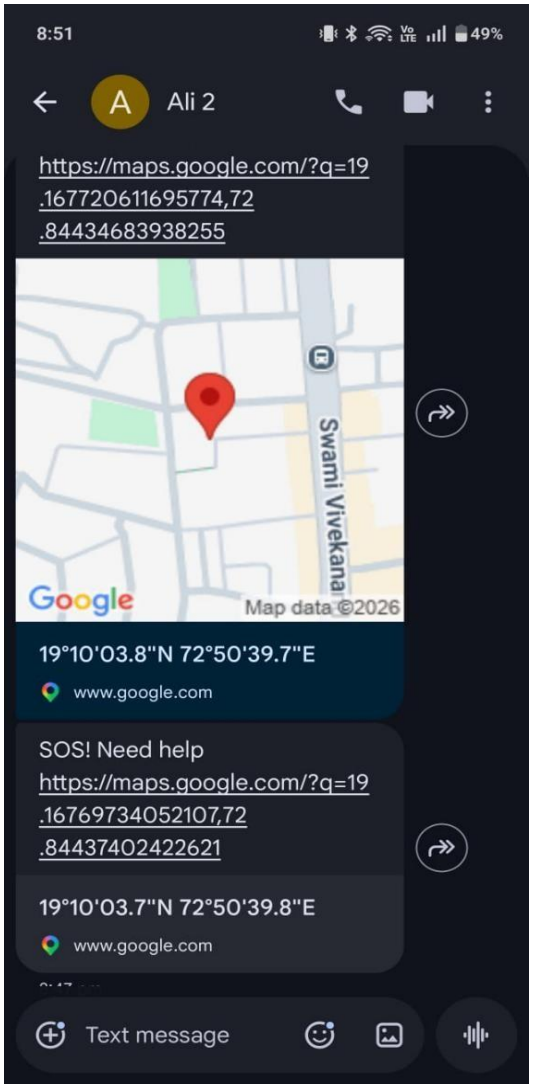
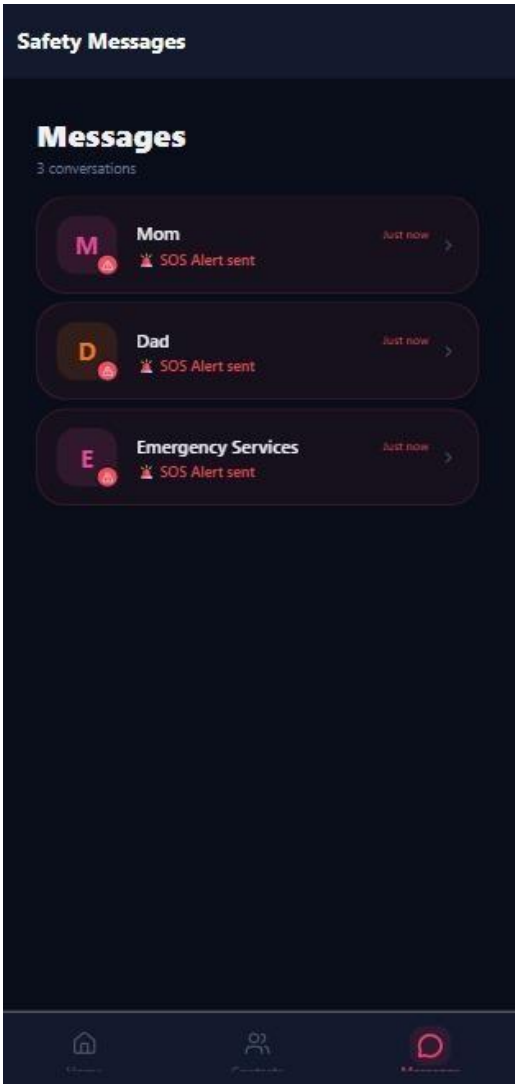



4.4 location send




5.5 Emeregncy contact

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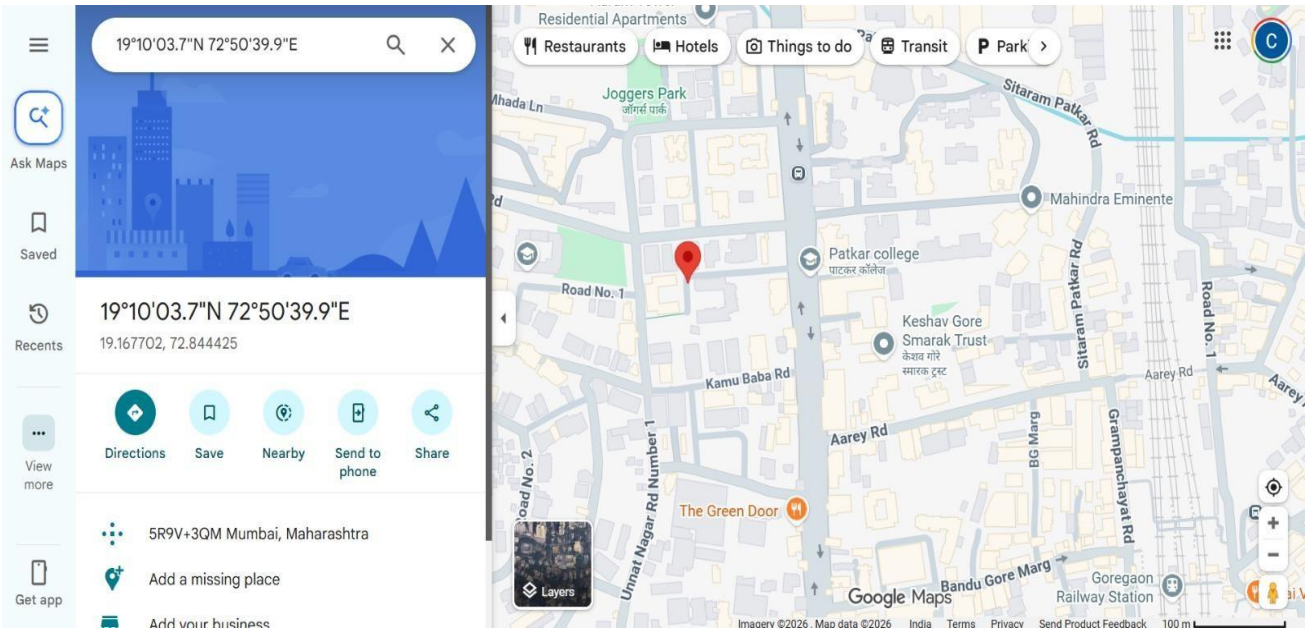


**6.6 live location**

The developed women safety device was successfully designed, implemented, and tested under different conditions. The system was able to respond immediately when the emergency (SOS) button was pressed. Upon activation, the device fetched the real-time location using the GPS module and sent alert messages to the predefined contacts through the GSM/Wi-Fi module. The message included a Google Maps link, allowing the receiver to accurately track the user's location.

During testing, the device showed quick response time and reliable performance in outdoor environments. The GPS accuracy was found to be satisfactory, with only minor variations depending on signal strength. The alert message delivery was fast and consistent when network connectivity was available. The system proved to be user-friendly, as it required only a single button press to operate in emergency situations.

However, some limitations were observed. The performance of the GPS module decreased in indoor or low-signal areas. The system also depended heavily on network availability for sending alerts. Battery life is another important factor, as continuous usage of GPS and communication modules consumes power.

Overall, the project demonstrates an effective and low-cost solution for enhancing women's safety. It provides immediate assistance by sharing real-time location and alerts, which can be crucial during emergencies.

## V. Future Scope

The project can be further improved by incorporating advanced features such as:

Mobile application integration for better tracking and control

Voice activation or gesture-based triggering system

Integration with police or emergency services

Wearable design (smart band or pendant)

Addition of camera/audio recording for evidence collection

## VI. Conclusions

The women safety device developed in this project provides a simple, reliable, and efficient solution to enhance personal safety during emergency situations. The system successfully integrates a microcontroller with GPS and GSM/Wi-Fi modules to enable real-time location tracking and instant alert messaging. With just a single press of the emergency button, the device can notify predefined contacts along with the user's exact location, ensuring quick response and assistance.

The project demonstrates that such a device can be built using low-cost components while maintaining good performance and usability. It is easy to operate, portable, and suitable for reallife applications. Although certain limitations such as network dependency and battery life exist, the overall functionality proves to be effective.

In conclusion, this project contributes towards improving women's safety by leveraging technology to provide immediate help in critical situations. With further enhancements, it has the potential to become a more advanced and widely used safety solution.

## VII. Appendix

Detailed information, lengthy derivations, circuit diagrams, source code, and raw experimental observations are provided in the appendices to support the main content of the report. These sections contain supplementary material that enhances understanding but is not included in the main body to maintain clarity and conciseness.

All appendices are numbered using **Roman numerals** (e.g., *Appendix I, Appendix II,* etc.) and are organized systematically based on their relevance to the project.

*Appendix I: Circuit Diagram*

This appendix includes the complete circuit diagram of the women safety device, showing connections between the microcontroller, GPS module, GSM module, push button, and power supply.

*Appendix II: Source Code*

This section contains the Arduino/embedded C code used to program the microcontroller for handling GPS tracking, button input, and alert message transmission.

*Appendix III: Experimental Observations*

This appendix presents raw data collected during testing, including response time, GPS accuracy, and message delivery performance under different conditions.

*Appendix IV: Component Details*

This section provides specifications and datasheets of the components used, such as microcontroller, GPS module, GSM module, and battery.

## VIII. Acknowledgements

I am profoundly grateful to Prof. Shahjahan shaikh for his expert guidance and continuous encouragement throughout to see that this project rights its target.

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