

## Women Safety Device

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### ABSTRACT

Women's safety has become a critical concern in modern society due to the increasing number of harassment and crime incidents. This paper presents the design and development of a smart wearable safety device in the form of a watch that provides immediate assistance during emergency situations. The proposed system is based on an IoT-enabled architecture and integrates a SIM808 module, which supports Bluetooth compatibility along with GSM/GPRS/GPS functionalities for real-time communication and location tracking.

The system is built using an Arduino Nano microcontroller that controls the overall operation of the device. It includes a panic button and push button mechanism, allowing the user to quickly trigger an emergency alert. When activated, the device captures the user's current GPS location and sends an alert message via GSM to pre-registered contacts. The Bluetooth feature enables optional connectivity with mobile devices for extended functionality.

The hardware is designed using a zero PCB for compactness and reliability, making the device lightweight and wearable. It is powered by a 7.4V, 370mAh rechargeable battery, ensuring portability and sufficient backup for continuous operation. The system is efficient, cost-effective, and easy to use, making it suitable for real-time safety applications.

Overall, the proposed wearable safety device provides a reliable solution for enhancing women's security by combining communication, tracking, and emergency alert features into a single compact system.

**KEYWORDS:** Women safety, sm, wearable, IoT, SOS, IMU, GPS, automatic detecte emergency alerting

### INTRODUCTION

In today's world, women's safety has become one of the most critical social issues. The rapid growth of urbanization, changing lifestyles, and increasing cases of harassment, assault, and violence against women have raised serious concerns about their security and independence. Women, whether at home, workplace, educational institutions, or while traveling, often face situations where their safety is at risk. Hence, there is a strong need for a technological solution that can provide immediate help and protection during emergencies.

To address this growing concern, the concept of a "Women Safety Device" has been developed. This device aims to ensure the safety of women by enabling them to send alerts or emergency signals to their family members, friends, or nearby authorities when they are in danger. The device is typically IoT-based (Internet of Things), which means it uses internet connectivity and smart sensors to perform automated actions like sending live location, triggering alarms, and contacting emergency services. The main purpose of this project is to design and implement a compact, portable, and easy-to-use gadget that empowers women to protect themselves. The device integrates GPS (Global Positioning System) and GSM (Global System for Mobile communication) modules to track the real-time location of the user and send it to predefined emergency contacts along with an alert message. In addition, modern versions of this project also include panic buttons, shock

### I.METHODOLOGY

The proposed system is designed as a compact and wearable women safety device that provides immediate assistance during emergency situations. The system integrates both hardware and communication technologies to ensure real-time alerting and location tracking.

The core component of the system is the Arduino Nano microcontroller, which acts as the central processing unit. It controls all the connected modules and manages the data flow between different components. The device is equipped with a SIM808 module, which is a multifunctional module supporting GSM, GPRS, GPS, and Bluetooth communication. This module enables the system to send SMS alerts, provide real-time location tracking, and support optional wireless connectivity with mobile devices.

The device includes a panic button and a push button, which serve as emergency triggers. When the user presses the panic button, the signal is sent to the Arduino Nano, which immediately activates the SIM808 module. The GPS feature of the module fetches the current latitude and longitude of the user. This location data is then sent as an SMS alert via the GSM network to pre-registered emergency contacts such as family members or nearby authorities.

Additionally, the Bluetooth capability of the SIM808 module allows the device to connect with a smartphone for extended features such as monitoring, configuration, or alert management. The entire circuit is designed using a zero PCB, which ensures a compact, lightweight, and reliable hardware structure suitable for wearable applications.

The system is powered by a 7.4V, 370mAh rechargeable battery, which provides sufficient power for continuous operation. A proper voltage regulation mechanism is used to ensure stable power supply to all components.

Overall, the methodology focuses on creating a reliable, fast, and user-friendly safety device that can operate efficiently in real-world conditions. The integration of GSM, GPS, and Bluetooth technologies ensures that the system provides accurate location tracking and instant communication during emergencies.

## II. SYSTEM ARCHITECTURE

The system architecture of the proposed women safety wearable device is designed to provide a fast, reliable, and real-time emergency response system. The architecture consists of interconnected hardware modules including the Arduino Nano microcontroller, SIM808 module (GSM/GPRS/GPS/Bluetooth), panic button, push button, power supply unit, and communication interfaces.

The process begins with the user interacting with the device through the panic button or push button, which acts as the primary input mechanism. When the user senses danger, pressing the panic button sends a signal to the Arduino Nano. The microcontroller continuously monitors these inputs and, upon activation, initiates the emergency response process.

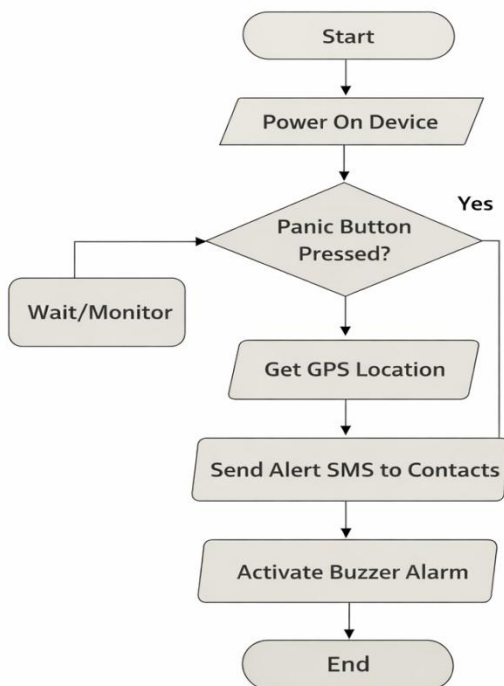
The Arduino Nano then communicates with the SIM808 module using serial communication (UART). The GPS functionality within the SIM808 module is activated to retrieve the real-time geographical coordinates (latitude and longitude) of the user. This location data is processed and formatted into a Google Maps link for easy access.

Simultaneously, the GSM functionality of the SIM808 module is used to send an emergency SMS alert to pre-registered contacts such as family members, friends, or nearby authorities. The message includes the user's current location along with a predefined alert message indicating distress.

Additionally, the Bluetooth feature of the SIM808 module allows the system to connect with a smartphone for extended functionalities such as device configuration, monitoring, and alert management. This enhances user interaction and system flexibility.

The entire system is powered by a 7.4V, 370mAh rechargeable battery, ensuring portability and continuous operation. A voltage regulation mechanism is used to supply stable power to all components. The hardware is implemented on a zero PCB, making the device compact, lightweight, and suitable for wearable use.

Overall, the system architecture integrates sensing, processing, and communication modules effectively to ensure immediate response during emergency situations. The combination of GPS for location tracking and GSM for communication makes the system highly reliable and efficient for real-world safety applications.



### III.RESULTS AND IMPLEMENTATION



Fig. safety device

The implementation of the proposed women safety wearable device involves the integration of hardware components and embedded software to create a compact, efficient, and real-time safety solution. The system is designed on a zero PCB board to ensure a lightweight and wearable structure that can be easily mounted on a wristband. The core of the system is the Arduino Nano microcontroller, which controls all operations and manages communication between different modules. The SIM808 module is integrated into the system to provide GSM, GPRS, GPS, and Bluetooth functionalities. This module plays a key role in location tracking and communication. The hardware components used in the implementation include a panic button, push button, SIM808 module with antenna, Arduino Nano, and a 7.4V, 370mAh rechargeable battery. All components are properly connected using jumper wires and soldered onto the zero PCB for stability. A voltage regulator is used to maintain a stable power supply to the microcontroller and SIM808 module. When the device is powered ON, the Arduino Nano initializes all connected modules. The system continuously monitors the state of the panic button. When the user presses the panic button, the Arduino Nano sends commands to the SIM808 module using AT commands through serial communication. The SIM808 module activates its GPS functionality to obtain the real-time location of the user. The latitude and longitude values are extracted and

formatted into a Google Maps link. This information is then transmitted via GSM as an SMS alert to pre-defined emergency contacts such as family members or authorities. Additionally, the Bluetooth feature allows the device to connect with a smartphone for configuration and monitoring purposes. The buzzer or alert mechanism (if included) is also activated to attract nearby attention during emergency situations. The entire system is powered by a rechargeable 7.4V battery, which ensures portability and continuous operation. The compact design of the wristband makes it comfortable to wear and suitable for daily use. After assembling the hardware, the system is tested under different conditions to verify performance. The testing includes checking GPS accuracy, SMS delivery time, and overall system reliability. The results confirm that the device responds quickly and effectively during emergency situation.

#### IV. CONCLUSION

In conclusion, the IoT-based Women Safety Device successfully fulfills its goal of providing a reliable and efficient personal safety solution for women. The integration of GPS and GSM technology enables real-time location tracking and instant alert communication, ensuring that help can be reached quickly during emergency situations. The system is simple to use, cost-effective, and suitable for daily use as a wearable gadget. This project demonstrates how IoT can be leveraged to improve safety and security in society. In the future, the device can be enhanced by incorporating additional features such as a heartbeat sensor to monitor health conditions, voice command activation, mobile app integration for real-time tracking on maps, and cloud-based data storage. The use of advanced communication technologies like 4G/5G modules or LoRa networks can further improve coverage and reliability. With these improvements, the Women Safety Device can evolve into a more powerful and comprehensive smart safety solution for women worldwide.

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