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Smart Wearable Device

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Peer Review Information	Abstract
<p><i>Submission: 1 Sept 2025</i></p> <p><i>Revision: 28 Sept 2025</i></p> <p><i>Acceptance: 12 Oct 2025</i></p> <p>Keywords</p> <p><i>Internet of Things (IoT), GPS Tracking, SMS Notification System, Wearable Technology.</i></p>	<p>Women's safety remains a critical issue globally, with alarming rates of harassment, molestation, and assault reported across various demographics. Despite historical respect for women in society, contemporary challenges persist, with estimates indicating that 35% of women experience harassment in their lifetime. To address this pressing issue, this work presents the development of a smart wearable device aimed at enhancing women's safety through the Internet of Things (IoT). The proposed device is designed for daily use and activates in emergencies to provide real-time protection. Key features include GPS tracking, which allows for continuous location monitoring via a dedicated Android application. Additionally, the device is equipped with an SOS alert system to attract attention from nearby individuals, and it sends SMS notifications to family members and local police stations when activated. This innovative wearable device aims to provide a comprehensive solution to the safety challenges faced by women and improve their overall protection in critical situations.</p>

INTRODUCTION

Smart wearable devices for women's safety represents a transformative step in personal security technology. These innovative gadgets, ranging from stylish smart watches to discreet jewellery, are designed to empower women by providing essential safety features such as emergency alerts, GPS tracking, and health monitoring. With capabilities like panic buttons that send immediate distress signals and real-time location sharing, these devices offer peace of mind in potentially unsafe situations. Their discreet design ensures that users can maintain a fashionable appearance while having access to vital safety tools. As awareness of women's safety issues grows, smart wearables play a crucial role in fostering confidence and security, allowing women to navigate their environments with greater assurance.

LITERATURE REVIEW

In recent years, there has been a growing emphasis on leveraging technology to address the safety concerns of women, particularly in urban environments. This literature survey explores key research and developments in the intersection of women's safety, GPS tracking systems, and alert mechanisms.

Wearable Safety Devices:-

The advent of wearable technology has spurred the development of safety devices designed to empower individuals, especially women, in emergency situations. Research explores the effectiveness of wearable safety devices equipped with GPS for location tracking and emergency alerts. The study emphasizes the importance of user-friendly interfaces and real-time communication capabilities.

GPS-Based Safety Applications:-

Numerous mobile applications focus on utilizing GPS technology to enhance personal safety. A study investigates the accuracy and reliability

of GPS-based safety applications in urban environments. Findings suggest that integrating GPS technology into safety applications improves the precision of

location tracking, enabling quicker response times from emergency services.

Arduino-Based Safety Systems:-

Arduino microcontrollers have gained popularity in developing innovative safety systems. explores the integration of Arduino Nano in a safety device, incorporating GPS and GSM modules. The study demonstrates the feasibility of creating a compact and customizable safety solution, providing a foundation for the present project.

Dual-Alert Mechanisms:-

The concept of dual-alert mechanisms, encompassing both SMS and call alerts, is gaining attention in safety device literature. investigates the efficacy of dual-alert systems in ensuring that distress signals reach recipients through multiple communication channels. This approach aligns with the goal of the current project to enhance the reliability of emergency alerts.

Community-Based Safety Initiatives:-

Beyond individual safety devices, community-based safety initiatives are explored in the literature. examines projects that integrate GPS tracking to create community safety networks. This approach fosters collective responsibility for safety and emphasizes the potential for collaborative

emergency response, contributing valuable insights to the broader context of women's safety.

Integration of Mobile Networks:-

The integration of GSM modules for communication in safety devices is a pivotal aspect of the current project. delves into the challenges and opportunities associated with GSM technology in safety applications. The study highlights the need for standardized communication protocols and efficient use of mobile networks, aligning with the goals of the "Women Safety and GPS Tracking System."

Real-Time Location Tracking:-

Real-time location tracking, facilitated by GPS technology, is a crucial feature in safety devices. explores the benefits and challenges of real-time tracking in emergency situations. The study emphasizes the importance of accuracy, low latency, and user- friendly interfaces, providing valuable insights for the present project.

OBJECTIVES

1. To enhance the safety and security of women by providing a reliable, real-time protection solution.
2. To develop user-friendly smart wearable devices that offers immediate assistance during emergencies. Customer happy and satisfied.
3. Implement real-time GPS tracking for continuous location monitoring.
4. Integrate an SOS alert system that notifies nearby individuals, family, and local authorities.

Proposed System:

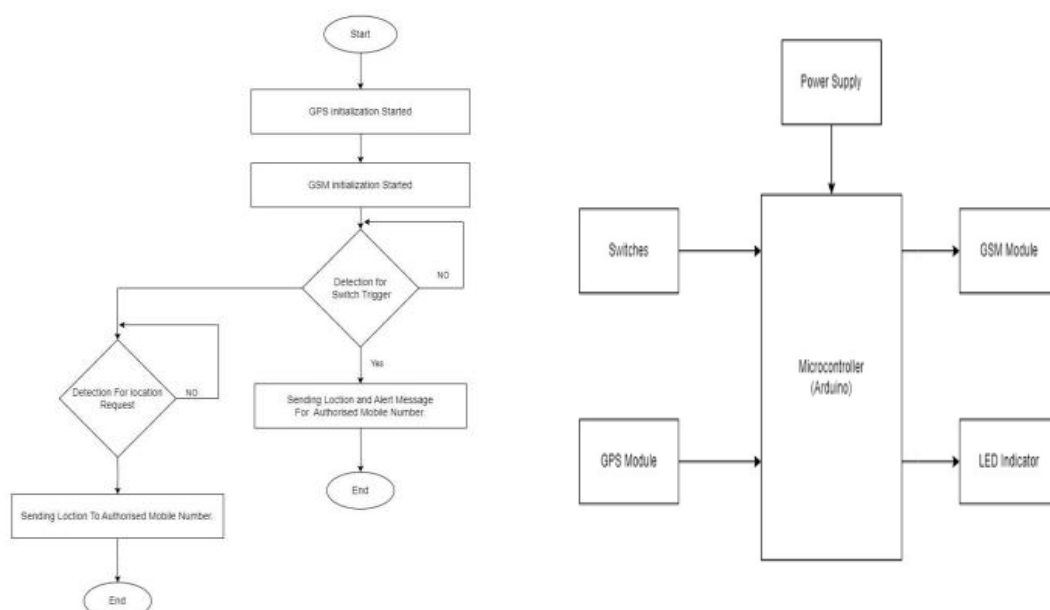


Fig 1: Flowchart of Proposed System

Working Flow of Flowchart for Women Safety and GPS Tracking System The flowchart shows the working flow of the Women Safety and GPS Tracking System using Arduino Nano, GPS, and GSM. The flowchart starts by checking if the SMS alert switch is pressed. If the switch is pressed, the Arduino Nano sends an SMS message to the pre-programmed phone

Number with the user's current location. The current location is obtained from the GPS module. If the SMS alert switch is not pressed, the flowchart checks if the Call alert switch is pressed. If the switch is pressed, the Arduino Nano makes a call to the pre-programmed phone number. If neither the SMS alert switch nor the Call alert switch is pressed, the flowchart does nothing and the program ends.

METHODOLOGY

A. Algorithm

The system's workflow is broken down into four key steps, as outlined below:

1. User Registration and Authentication:

The user initiates the system by registering and logging in with credentials, ensuring secure access and personalized health tracking. Users enter essential health details, which help in tailoring pregnancy guidance and monitoring.

2. Health Data Collection:

Manual Input: Users can log health parameters such as weight, symptoms, and blood pressure manually. **Sensor Integration:** If integrated with wearable devices, the system fetches real-time physiological data such as heart rate, oxygen levels, and fetal movements.

3. AI-Based Health Analysis:

Data Processing: AI and machine learning models analyze collected data to detect abnormalities and predict potential pregnancy risks.

Risk Assessment: The system evaluates health trends and flags potential complications like gestational diabetes or hypertension for early intervention.

4. Personalized Recommendations and Alert System:

Emergency Alerts: If the system detects abnormal readings, automatic notifications are sent to the user and their registered healthcare provider.

Customized Guidance: The system provides trimester-specific recommendations, including diet plans, exercise routines, and medical checkup reminders.

Continuous Monitoring: The AI engine continuously tracks user inputs and health trends, updating recommendation dynamically for better maternal care.

CONCLUSION

In conclusion, the "Women Safety and GPS Tracking System" project represents a significant stride towards leveraging technology for enhancing personal safety, with a specific focus on addressing the concerns of women in various environments. The integration of Arduino Nano, GPS, and GSM technologies has resulted in a comprehensive wearable safety device that combines accurate real-time location tracking with a dual-alert mechanism, allowing users to discreetly signal for help through both SMS alerts and phone calls. The project not only emphasizes technical proficiency, including the efficient use of semiconductor components and communication protocols, but also underscores the importance of user-friendliness, ethical considerations, and practicality in real-world scenarios. By developing a tangible interface physical switches and incorporating features like customizable settings, the system aims to be accessible to users with varying levels of technical expertise. The dual-alert mechanism enhances the reliability of distress signals, ensuring a higher likelihood of prompt assistance. As technology evolves, the "Women Safety and GPS Tracking System" stands not only as a practical safety solution but also as a foundation for potential future innovations in wearable safety devices. The ethical framework, energy efficiency, and adaptability of the system contribute to its significance in fostering a safer and more inclusive society, reflecting the transformative power of technology when applied to critical societal challenges.

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