

Women Safety Device - An IoT Solution

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Abstract - In this project, a women's safety gadget that can transmit emergency alerts and real-time location updates to pre-configured contacts in the event of difficulty is presented. Like a keychain, the device is small, wearable, and incorporates an A9G GSM/GPS module. When the SOS button is pressed, the device can initiate an automated call and send an emergency SMS with the saved emergency contact's current location. When an SMS request is made, the system can additionally send battery status updates. The goal of this initiative is to improve women's safety by offering a quick and effective emergency response system. A greater degree of security in daily circumstances is ensured by the device's design, which makes it dependable, portable, and accessible for all ladies.

Keywords: Women Safety, IoT, GPS Tracking, Emergency Alert, GSM Module, A9G, Arduino.

I. Introduction

Globally, women's safety is a major worry, and using technology to solve this problem can greatly improve protection. Crimes against women, such as assault, stalking, and harassment, continue to be significant social issues. Conventional safety measures, like self-defense methods and smartphone safety apps, are frequently constrained by things like manual activation, internet dependence, and battery life. The suggested women's safety gadget provides a reliable and self-sufficient solution that works well even in isolated locations, guaranteeing that assistance is only a button push away.

Researchers and technological developers have been compelled to create solutions that guarantee quick response mechanisms due to the rise in occurrences reported worldwide. Wearable safety technology has becoming more popular, especially in the personal security space. Women can feel more confident and reassured knowing that there is always quick assistance available when they utilize a device that is portable, discrete, and simple to use.

Additionally, this research considers a number of practical limitations, including price, accessibility, and power efficiency. The gadget guarantees extended battery life by

including a low-power consumption model, which makes it a practical choice for everyday usage. By providing women with a dependable and effective security system, this gadget seeks to close the gap between technology and personal safety.

II. Need of the Project

The need for this project arises from the increasing incidents of harassment, stalking, and assault against women, highlighting the necessity for a quick, efficient, and independent safety solution. Women around the world face numerous security challenges daily, whether traveling alone at night, commuting via public transport, or simply walking in unfamiliar environments. Ensuring their safety requires an advanced system that can work in all conditions, provide instant assistance, and alert emergency contacts in real time.

Traditional safety measures, such as self-defense training and mobile safety applications, often prove to be insufficient in critical situations. Self-defense skills require regular practice, physical strength, and presence of mind, which may not always be feasible during an emergency. Similarly, mobile applications require users to access their phones, unlock them, and manually activate an alert, which may not be possible in panic situations. Additionally, reliance on an internet connection makes many of these solutions ineffective in remote areas where connectivity is poor or unavailable.

Another major concern is the growing number of cases where women feel unsafe in public spaces but do not have immediate access to help. A wearable safety device that functions autonomously sends real-time location alerts, and initiates emergency calls ensures immediate assistance in distress situations. Unlike mobile apps, this device does not require internet connectivity, making it a more reliable and accessible option. With a simple SOS button press, the device can alert emergency contacts, ensuring timely intervention and potentially saving lives.

Beyond personal security, this device also holds significance in professional environments. Women working late shifts, traveling for work, or operating in high-risk professions (such as journalism or social work) can greatly benefit from an instant emergency response mechanism. The ability to send an SOS alert with precise location tracking can

provide reassurance and significantly improve safety in professional settings.

III. Literature Survey

The evolution of women safety measures has seen a shift from traditional, physical self-defense techniques to modern, technology-driven solutions. Several existing safety applications rely on smartphones, but they require internet connectivity and manual operation, limiting their effectiveness in critical situations. Over the years, researchers and engineers have explored different ways to provide quick and efficient emergency responses.

Wearable safety devices have emerged as a practical solution, leveraging GPS, GSM, and IoT-based technologies. Studies have shown that many women feel unsafe in public spaces, and access to a quick emergency alert system can significantly boost their confidence and sense of security. One notable approach involved mobile applications integrated with police networks; however, these were found to be unreliable in areas with poor network connectivity. Other research explored voice-activated systems, but these sometimes failed due to environmental noise or the inability to activate commands under distress.

Our device aims to bridge the gaps identified in previous studies by offering a completely independent safety mechanism. Unlike mobile apps, which require a smartphone, our device is designed to work autonomously with a simple SOS button press. The integration of a real-time location tracker ensures that emergency contacts receive accurate and immediate location details, reducing the time taken for help to arrive. Further studies support the integration of low-power consumption modes to extend battery life, which is a key feature of our proposed solution.

The primary focus of this project is to create a device that is not just technologically advanced but also practical and easy to use in real-world scenarios. By learning from past approaches and incorporating the best elements, we aim to develop a safety device that truly empowers women, ensuring their security in various situations.

IV. System Implementation

A) Components Used

A9G GSM/GPS Module:

- Combines GSM and GPS capabilities.
- Enables SMS-based location sharing and emergency calling.
- Ideal for real-time location tracking and communication in emergencies.

Arduino Board:

- Acts as the microcontroller for the project.
- Can be programmed using the Arduino IDE for flexibility.
- Interfaces with the A9G module to process inputs and execute commands.

SOS Button:

- Triggers emergency alerts and location sharing.
- Easily accessible, often with a distinct color or shape for quick identification.
- Sends an immediate alert message with GPS location when pressed.

Rechargeable Battery:

- Provides necessary power for the entire device.
- Allows the device to be used without being plugged into a power source.
- Battery type (e.g., lithium-ion) affects size, weight, and operational duration.

SIM Card:

- Enables GSM functionality for SMS and voice calls.
- Must have an active mobile plan for connectivity.
- Choice of SIM card affects operational range and reliability in different areas.

B) Circuit Design

The circuit design of this wearable women safety device is built around an Arduino microcontroller integrated with an A9G GSM/GPS module for communication and location tracking. The system is designed to be compact, power-efficient, and responsive, ensuring immediate assistance in emergencies.

When the SOS button is pressed for 5 seconds, the Arduino triggers an emergency alert, sending an SMS with real-time GPS coordinates to pre-configured contacts while also making an automatic call for help. The A9G module handles both messaging and calls, ensuring reliable communication even in low-signal areas.

Power is supplied by a 3.7V Li-ion battery, regulated to provide stable voltage to all components. The system includes an optional buzzer for audible alerts and LED indicators to show power, GPS status, and emergency activation. To conserve battery, the device enters sleep mode after sending alerts but remains responsive to location and battery status requests via SMS.

The circuit is designed for easy integration into accessories like bracelets or pendants, making it a discreet yet powerful personal safety tool.

C) Working Principle

The women safety device operates through a simple and efficient process to ensure immediate assistance during emergencies. When the device is turned on, it first initializes by checking the status of the GPS and GSM modules to ensure they are functioning correctly. This is crucial because accurate location tracking and communication depend on these components.

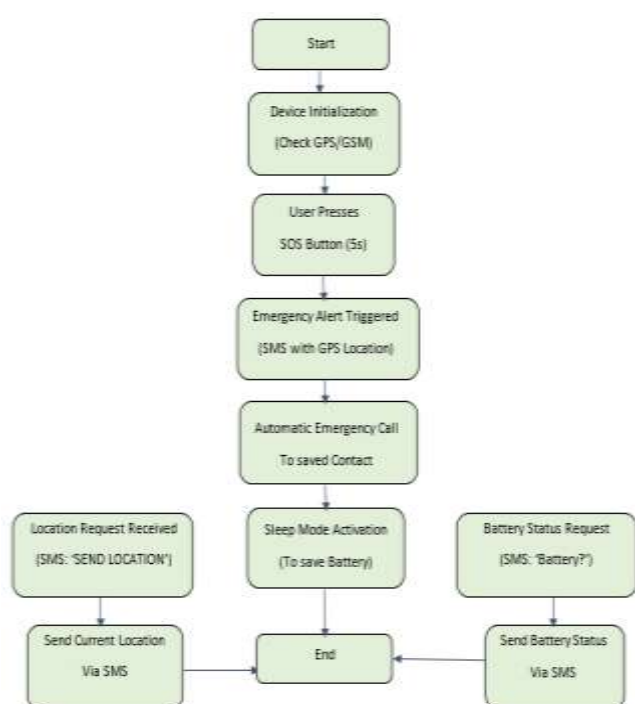


Figure 1: Working of device

In a distress situation, the user can press and hold the SOS button for five seconds. This duration helps prevent accidental activations. Once triggered, the device immediately sends an SMS containing the user's real-time GPS location to a pre-saved emergency contact. Simultaneously, it initiates an automatic call to the same contact, ensuring that help is alerted as quickly as possible.

To conserve battery life, the device then enters sleep mode after sending the emergency alerts. However, it remains responsive to specific requests. If an emergency contact sends an SMS with the message "SEND LOCATION," the device will wake up and respond by sending the user's current location. Additionally, if the contact sends an SMS saying "Battery?" the device will reply with the current battery status, ensuring that it remains operational when needed the most.

V. Features and Advantages

- **Standalone Functionality:** Works without the smartphone or internet connection.
- **Small and Wearable:** Can be incorporated into a keychain for ultimate mobility.
- **Live Location Tracking:** Establishes communication and live-tracks the user to emergency contacts.
- **Automated Emergency Calling:** Provides functionality for making SOS calls when called for.
- **Battery Update:** Reports on battery status updates to ensure uninterrupted operation.
- **Low Power Consumption:** Uses sleep mode for energy-saving efficiency.
- **Immediate Alert:** Sends out alerts instantaneously to ensure a minimum reaction time in times of distress.
- **User Interface:** Requires minimum interaction by the user, hence fit for emergencies.

VI. Future Scope

- **Integration with Police and NGO Networks:** Having direct links with law enforcement agencies and emergency response networks.
- **Voice Activation:** Incorporating voice commands to turn the emergency alert system on.
- **Biometric Authentication:** Fingerprint or voice recognition to avoid unauthorized access.
- **Geo-fencing Alerts:** Sending alerts when the user moves beyond a predefined safe zone.
- **Smartphone App Integration:** Providing additional features via a companion mobile application.
- **Cloud Storage for Incident Logging:** Storing emergency event logs for future reference and analysis.
- **Wearable Variants:** Expanding the design to rings, necklaces, or bracelets for increased accessibility.
- **Multilingual Support:** Enabling alerts to be sent in multiple languages for wider usability.

VII. Results and Discussion

- Successfully sends an emergency SMS with a Google Maps link to predefined contacts.
- Initiates an emergency call upon SOS button press.
- Responds with location when receiving an "SEND LOCATION" SMS.
- Provides battery status when queried via "Battery?" SMS.
- Operates offline, ensuring reliability in remote areas.
- Compact, lightweight, and easy to wear as a bracelet or pendant.
- Ensures instant response, improving emergency assistance.
- Energy-efficient design extends battery life.
- Simple one-press activation for all users.

- Future-ready for enhancements like voice activation and biometric security.

This device offers a fast, reliable, and user-friendly safety solution, ensuring quick emergency response when needed.

SOS Alert:

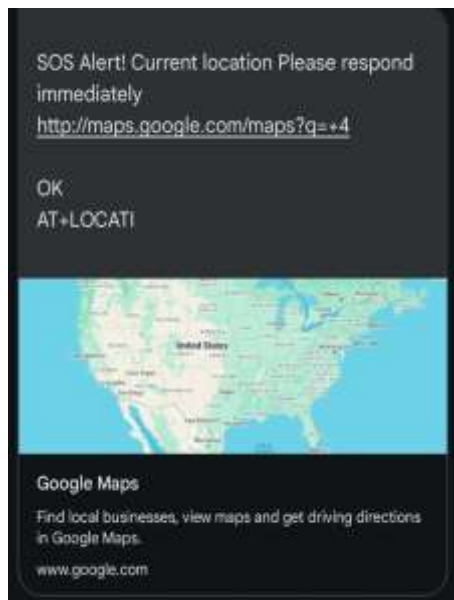


Figure 2: SOS Alert

Battery Status:



Figure 3: Battery Status

Location Request:

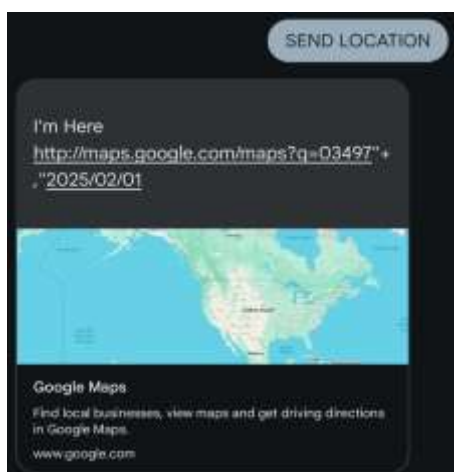


Figure 4: Location Request

VIII. Conclusion

The new women safety device offers an innovative and convenient method of responding in emergency situations. With GPS, GSM, and emergency call support, the device offers instant real-time alerts regardless of whether an area is connected to the internet or not. Future enhancement possibilities include voice commands, biometric identification, and geo-fencing features for enhanced security. Introduction of the device can make a substantial difference towards minimizing offenses against women and safeguarding their welfare in both private and public settings.

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