IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 4, May 2025
Impact Factor: 7.67

Women Safety Device with Voice Sharing, Live Location, SMS Alert and Calling

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Abstract: *The Women Safety Device is an innovative solution designed to enhance personal security through real-time location tracking, emergency messaging, and audio monitoring functionalities. Utilizing the Seeed Studio C3 microcontroller and the A9G GPS + GSM module, this compact device allows users to share their live location and send automatic emergency messages in critical situations. Powered by a small LiPo battery, the device remains portable and convenient for everyday use. Its SOS button triggers location sharing and places an automatic call to a pre-configured emergency contact, enabling the contact to listen to audio from the user's environment, ensuring timely response and assistance. The system operates efficiently in areas with limited internet access, making it a reliable safety tool for women. By combining GPS accuracy, GSM communication, and user-friendly design, this device provides an essential safeguard, empowering women with quick access to help during emergencies.*

Keywords: Personal safety, Emergency response, Hands-free assistance, Quick distress signal, Reliable safety technology, Safety in remote areas, Smart security solution

I. INTRODUCTION

In today's world, personal safety—especially for women—remains a critical issue due to the rising cases of harassment, assault, and various threats. Despite technological advancements, many individuals still struggle to access help quickly during emergencies. Conventional safety methods, such as making phone calls or using mobile apps, may not be practical when someone is in immediate danger or unable to use their hands. This emphasizes the need for a dedicated, user-friendly safety device that can provide real-time support with minimal effort.

The inspiration for developing the Women Safety Device arises from the growing demand for fast, reliable personal safety tools. This project aims to utilize GPS and GSM technologies to design a device that can instantly share the user's live location, send emergency alerts, and enable emergency contacts to listen to the surroundings through hands-free calling. These features are especially valuable when the user is unable to make a call or operate their phone.

Additionally, the device is intended to be compact, portable, and energy-efficient, making it easy to carry and discreet to use. Its capability to work in areas with poor or no internet connectivity enhances its usefulness, particularly for women traveling in remote or low-network regions. By delivering instant location tracking and real-time communication, this device aims to offer a dependable solution to the pressing need for personal safety in modern society.

II. LITERATURE REVIEW AND OBJECTIVE

OBJECTIVE

- Extensive literature survey on locker system.
- Draw block diagram of system.
- Hardware interfacing of circuit.
- Implementation and Coding of system.
- Troubleshooting & Testing of system.
- Validate the result.

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LITERATURE REVIEW

[1] Vedant Naukarkar et al. proposed a GSM and GPS-based wearable device designed to send location alerts during emergencies. The system ensures timely notifications to both emergency contacts and authorities, enabling swift responses in critical situations. Future enhancements could include voice recognition features for improved user interaction during distress.

[2] Kota V. Navya Priya et al. developed a system integrating GPS and GSM modules that can detect sudden impacts and trigger emergency alerts. It offers real-time location tracking to facilitate quick actions by responders. Further work is needed to improve the comfort of the device for everyday use and to extend its battery llogicl

[3] Dr. D. Vishnu Vardhan et al. introduced a discreetly designed wearable that provides continuous location tracking and emergency notifications. The device activates alerts when the user is in danger, promoting faster response times. Future improvements could focus on enhancing durability and the speed of alert transmission.

[4] Varasiddhi Jayasuryaa Govindraj et al. presented a smart jacket integrated with GPS, GSM, and panic buttons. It enables real-time location tracking and emergency alerts, offering both safety and comfort. Future developments could incorporate additional sensors, such as those for temperature and heart rate monitoring, to detect potential health issues.

[5] Pavithra Neelam et al. designed a smart helmet equipped with GPS, GSM, and motion sensors, primarily for women in high-risk environments. It detects hazardous situations and sends immediate alerts to supervisors and emergency contacts. Future work could focus on enhancing the helmet's comfort and durability using smart materials.

[6] M. Arun Athithyan et al. developed a wearable safety system combining GPS and GSM technologies to deliver real-time tracking and emergency alerts, specifically aimed at women's safety. Upcoming upgrades may involve integrating wearable health sensors for vital sign monitoring and transmitting health data during emergencies.

[7] Uma Maheswari K. et al. proposed a smart bracelet incorporating GPS and GSM modules, along with a panic button and fall detection, to monitor a woman's location and send distress alerts. Future enhancements could include voice recognition and battery optimization for extended usage.

[8] Priti Kandekar et al. introduced a GPS-enabled IoT safety band that sends location-based alerts to emergency contacts during distress or sudden impacts. The GSM module enhances real-time communication. Future improvements may involve extending battery life and incorporating sensors to detect health anomalies like pulse rate and temperature drops.

[9] Chatterjee M. et al. developed a system utilizing IoT and GPS technologies to send emergency alerts and location details to pre-registered contacts and nearby authorities. Future upgrades could include heart rate monitoring and facial recognition to improve functionality, especially when the user is incapacitated.

[10] Mahajan T. et al. designed a safety device for women that integrates GPS tracking and emergency alert features. It enables users to send their location to designated contacts during distress, ensuring prompt response. Future enhancements may focus on incorporating biometric data like heart rate and temperature monitoring for better emergency detection.

III. MATERIALS AND METHODS

The Women Safety Device is built using an A9G module for GPS tracking and GSM communication, a microcontroller (Arduino/ESP32) for control, a microphone for real-time audio transmission, and an SOS button for emergency activation. It also includes a SIM card for SMS and calls, a buzzer for alerts, and an LED indicator for status updates, all housed in a compact, portable case with a rechargeable battery for power efficiency.

When activated via the SOS button or voice command, the device fetches the user's live location, sends an emergency SMS with a Google Maps link, and initiates a hands-free call to emergency contacts. The GSM module ensures functionality even in areas with limited internet connectivity. Additional features like automatic call looping, AI-based voice activation, and mobile app integration can further enhance safety.

Our system contains following steps:

- Develop a women safety device.

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- Develop a system for real-time location tracking.
- Develop an emergency SMS alert system.
- Develop an automatic hands-free calling feature.
- Develop a push-button activation mechanism.
- Develop a voice-activated SOS trigger.
- Develop a power-efficient portable design.
- Develop a system for emergency contact management.
- Develop a status indication using LED and buzzer.
- Develop a retry mechanism for failed messages or calls.

Existing work

The area of women's safety devices describes how such systems use GPS and GSM technology to provide real-time location tracking and emergency communication. Additionally, it highlights the use of SMS alerts, hands-free calling, and push-button activation to ensure quick response during emergencies.

Proposed Work

The proposed system is built around the Seeed Studio XIAO ESP32-C3, a compact microcontroller designed for IoT applications. It integrates an A9G GSM/GPS module, a push button, an LED indicator, and a LiPo battery for portability. The ESP32-C3 manages communication, data transmission, and user interactions, leveraging Wi-Fi, BLE, and GSM for seamless connectivity.

When the push button is pressed, the system retrieves GPS coordinates and sends an emergency SMS or call via the A9G module. The LED provides real-time status feedback, while the built-in microphone enables voice communication in emergencies. This system is ideal for GPS tracking, personal safety, and remote monitoring applications.

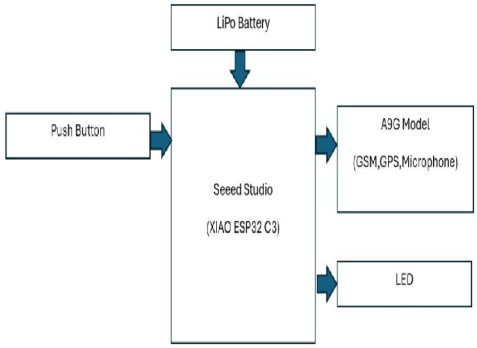

Fig 3.2.1. System Architecture

With low power consumption, secure data transmission, and cloud integration capabilities, it ensures reliable performance in various fields, including transportation, healthcare, and security. Its compact design and adaptability make it a practical solution for real-world IoT applications.

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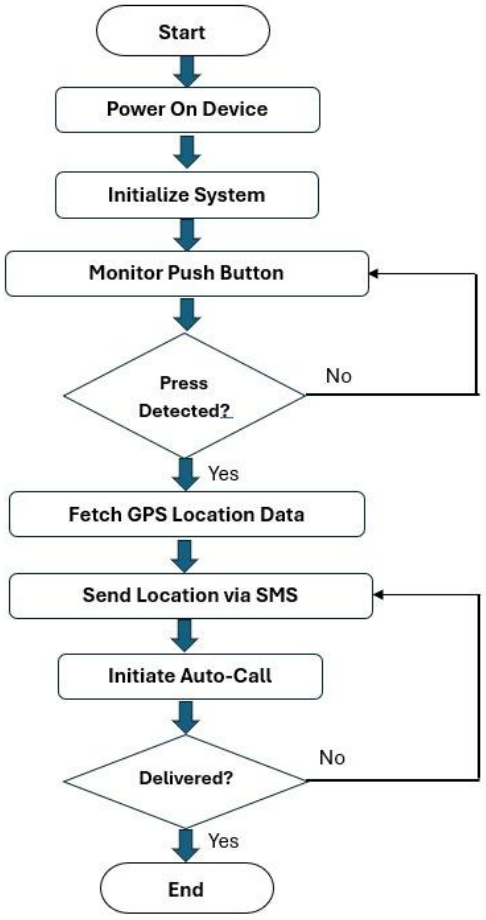

Fig 3.2.2 Flow diagram

Algorithm

- Start the device.
- Power on the device.
- Initialize the system.
- Monitor the push button.
- If the button is not pressed, continue monitoring.
- If the button is pressed, fetch GPS location data.
- Send the location via SMS.
- Initiate an auto-call to emergency contacts.
- If the message and call are delivered, end the process.
- If not delivered, retry or handle failure.

IV. RESULTS AND DISCUSSION

The proposed system is an efficient real-time tracking and communication solution, integrating GSM, GPS, Wi-Fi, and BLE technologies. The Seeed Studio XIAO ESP32-C3 acts as the central controller, ensuring low power consumption and seamless connectivity. The A9G module provides real-time GPS tracking and GSM-based communication, transmitting location data to remote servers or predefined contacts. The push button-triggered emergency alert system

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enhances safety by sending SOS messages with GPS coordinates, while the built-in microphone allows voice communication during emergencies. The LED indicator provides visual feedback, ensuring users receive real-time system updates. The LiPo battery makes the system portable and energy-efficient, making it ideal for remote monitoring, asset tracking, and emergency applications.

The system's versatility allows its application in transportation, healthcare, and security. It enables fleet tracking, personal safety monitoring, and industrial IoT solutions. However, GSM network dependency, battery limitations, and security concerns pose challenges, which can be addressed by solar charging and enhanced encryption. Overall, this cost-effective, scalable, and reliable IoT solution seamlessly integrates tracking, communication, and emergency alert features. Future improvements can focus on power optimization, security enhancements, and AI-based predictive analytics. By bridging real-world applications and smart technology, this system enhances safety, efficiency, and connectivity across industries.

V. CONCLUSIONS

The Women Safety Device enhances personal security by integrating GPS and GSM for real-time location sharing, emergency messaging, and hands-free calling. Its compact, power-efficient design ensures reliability in critical situations. By leveraging modern technology, this project offers a practical safety solution, with future improvements like fall detection and advanced audio analytics further enhancing its effectiveness.

ACKNOWLEDGEMENTS

I thank Ms. N. S. Sapike, Prof of B.E Electronics and Computer Engineering, PREC, Loni, for her continuous support and encouragement for completing this research paper and also thanks to PREC Electronics and Computer department for the continuous support.

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