International Journal of Information Technology & Computer Engineering

ISSN 2347–3657

Volume 14, Issue 1, 2026

Women Safety Device With GPS Tracking And SMS Alert

N Sony[1],M Padma Lakshmi[2],K Prerna[3],G Saika Reddy[4]

[1]Assistant Professor; Department Of Electronics And Communication Engineering, Bhoj Reddy Engineering College For Women, Hyderabad, India.

[2,3,4]B.Tech Students; Department Of Electronics And Communication Engineering, Bhoj Reddy Engineering College For Women, Hyderabad, India.

Mail Id; saikareddy08@gmail.com[4]

Abstract

The growing concern for women's safety has highlighted the need for reliable technological solutions capable of providing immediate assistance during emergency situations. Conventional safety measures often depend on external intervention, which may delay response time. To address this issue, this paper presents the design and implementation of a compact Women Safety Device with GPS Tracking and SMS Alert, developed to provide rapid communication and location sharing during distress conditions.The proposed system is built around an Arduino Uno microcontroller that coordinates the operation of all hardware components. A Neo-6M GPS module is utilized to obtain the real-time geographic location of the user, while a GSM module (SIM800/SIM900) enables the transmission of alert messages to predefined emergency contacts. The device incorporates a dedicated panic button that activates the emergency protocol instantly. Upon activation, the system retrieves the current GPS coordinates and sends them via SMS, allowing recipients to identify and track the user's precise location. Additionally, a buzzer provides audible confirmation of alert activation, and a 16×2 I2C LCD displays system status information for user awareness.The embedded firmware is developed in Embedded C using the Arduino IDE. Libraries such as SoftwareSerial and LiquidCrystal_I2C are employed to ensure efficient communication between modules and simplify hardware interfacing. The device is designed to operate independently of internet connectivity, making it suitable for deployment in both urban and remote environments. Emphasis is placed onlow power consumption, quick response time, and ease of use.The developed system demonstrates how embedded technologies can be effectively applied to enhance personal safety. By integrating GPS tracking and GSM-based communication in a single portable unit, the proposed solution provides a proactive mechanism for emergency response, potentially reducing rescue time and improving safety outcomes. The device can be further customized for broader applications, including elderly care, child safety, and lone-worker monitoring.

Keywords— *Women Safety Device, GPS Tracking, GSM Communication, Arduino Uno, SMS Alert System, Emergency Response System.*

INTRODUCTION

Ensuring the safety of women has become a significant social and technological challenge worldwide. Incidents such as harassment, stalking, domestic violence, kidnapping, and physical assault continue to pose serious threats to women's security in both urban and rural environments. Although several legal measures and smartphone-based safety applications have been introduced, their effectiveness during emergencies is often limited. In many critical situations, victims may not have sufficient time to unlock their phones, launch an application, or manually contact emergency services. This highlights the need for a dedicated, quick-response safety device that operates independently and requires minimal user interaction.In India, women's safety remains a widely discussed concern. Social awareness has improved over time; however, women still face insecurity while traveling alone, especially during late hours or in isolated locations. Fear of harassment and violence affects not only individual confidence but also participation in education, employment, and social activities. Providing reliable safety mechanisms can therefore contribute to empowering women and supporting societal development.Technological advancements in embedded systems and wireless communication offer new opportunities to develop compact and efficient personal safety solutions. Devices equipped with GPS tracking, wireless communication, and emergency alert mechanisms can significantly reduce response time during distress situations. Such systems enable immediate notification to trusted contacts along with accurate location details, allowing quick assistance.To address these challenges, this project proposes a **Women Safety Device with GPS Tracking and SMS Alert**. The device is designed as a compact and portable unit capable of sending emergency alerts instantly. It operates using an Arduino Uno microcontroller as the main control unit. A Neo-6M GPS module is used to determine the user's real-time geographic coordinates, while a GSM module (SIM800/SIM900) transmits alert messages to

predefined emergency contacts.The system includes a panic button that activates the emergency protocol with a single press. Once triggered, the device retrieves the current location and sends an SMS containing latitude and longitude details. A buzzer provides audible confirmation, and a 16×2 I2C LCD displays system status information. The proposed device functions without internet connectivity, making it suitable for both urban and remote areas.
By integrating location tracking and SMS communication into a standalone device, the system aims to provide a reliable safety tool that enhances confidence and ensures rapid response during emergencies.

Aim of the Project

The aim of this project is to design and develop a compact, cost-effective, and user-friendly safety device that enables women to send immediate emergency alerts along with real-time location information to predefined contacts. The system utilizes GPS technology for location acquisition and GSM communication for transmitting alert messages through SMS.
The proposed device is intended to operate independently of smartphones and internet services, ensuring reliability even in areas with limited connectivity. The project also aims to demonstrate the practical application of embedded systems in personal safety solutions. By combining GPS tracking and GSM communication in a single portable unit, the system provides a proactive safety mechanism that helps reduce response time during emergencies and improves overall personal security.

Objectives

The primary objectives of the proposed system are as follows:

- To design and implement a compact and portable women safety device.
- To integrate a GPS module capable of capturing accurate real-time location coordinates.
- To incorporate a GSM module for transmitting SMS alerts to predefined emergency contacts.
- To develop a quick-response mechanism activated by a single panic button press.
- To ensure the device operates without requiring internet connectivity.

LITERATURE SURVEY

Several researchers have proposed technological solutions to improve women's safety using embedded systems, IoT, and wireless communication. A review of existing works provides valuable insight into current approaches and highlights areas for improvement.
In 2018, an IoT-based child and women safety system was presented using a Raspberry Pi 3 Model B as the central processing unit. The system utilized Python programming for interfacing hardware components such as GPS, GSM, and voice recognition modules. A MySQL database was incorporated to store user information and location data. The device enabled emergency alerts and location tracking; however, the complexity and power consumption of Raspberry Pi limited portability.
A smart security solution based on IoT was proposed in 2016, which aimed to provide safety features through GPS and messaging services. The design incorporated Bluetooth Low Energy (BLE) technology to minimize power consumption. The system focused on communication between a wearable device and smartphone application, allowing alerts to be transmitted when required. While the approach improved connectivity, dependence on smartphone integration restricted standalone operation.
In 2020, a smart security device for women was introduced using an Arduino microcontroller integrated with multiple sensors such as temperature, pulse rate, and sound detection. The system monitored both environmental conditions and the health status of the user. When abnormal readings were detected, an alert message containing location information was transmitted. Although the system improved monitoring capabilities, the inclusion of multiple sensors increased device complexity.
Another approach presented a women safety device synchronized with an Android application using Bluetooth communication. The system employed an ARM controller and allowed independent triggering from both hardware and mobile application. This design enhanced flexibility but relied heavily on smartphone connectivity, which may not be reliable during emergency situations.
Rachana B and colleagues developed a wearable safety device integrated into clothing. The system included GPS, GSM, buzzer, camera, and shock mechanism circuits. The device was designed to assist women in distress by capturing images and sending location information. While this approach provided enhanced security features, it increased cost and reduced portability.
D. Kale and co-authors proposed a Raspberry Pi-based safety system equipped with GSM and GPS technologies, along with a camera and buzzer. The device aimed to provide location tracking and emergency alerts. However, the system required higher power consumption and was less suitable for compact wearable applications.
S. Rakesh and team introduced a smart device incorporating sensors such as pressure, temperature, and pulse rate. The system automatically detected abnormal conditions and generated alerts. It also transmitted location information to emergency contacts. Although the automation improved response time, the design increased hardware complexity and cost.

From the reviewed literature, it is evident that most systems focus on location tracking and alert transmission. However, many designs rely on smartphones, require high power consumption, or involve complex hardware configurations. These limitations highlight the need for a simple, compact, and standalone safety device.

Motivation

Women's safety continues to be a major concern despite advancements in technology and awareness initiatives. Many existing safety measures depend on smartphones or internet connectivity, which may not always be available during emergencies. Victims often require a quick and reliable mechanism to notify others without performing multiple actions.

The motivation for this project arises from the need to provide a dedicated safety device that can instantly alert trusted contacts and share location information. By integrating GPS tracking and GSM communication, the system ensures accurate location identification and rapid message transmission. The proposed device aims to empower women by providing them with a portable tool capable of functioning independently of mobile applications.

The presence of such a device can also act as a preventive measure, increasing confidence and reducing fear when traveling alone. Immediate alert transmission enables faster response from family members or authorities, which is crucial in emergency situations. Therefore, the development of a compact and efficient safety device becomes essential to enhance personal security.

Problem Statement

Women frequently encounter safety challenges, particularly when traveling alone, working late hours, or staying in unfamiliar environments. Traditional safety measures such as helplines or emergency calls may not provide immediate assistance. In many cases, victims may not have sufficient time to unlock mobile phones or manually contact others.

Existing safety systems often depend on internet connectivity, smartphone applications, or complex hardware configurations. These limitations reduce their effectiveness in real-life emergency scenarios. Additionally, many available devices are bulky, power-consuming, or difficult to operate.

Therefore, there is a need for a compact, portable, and user-friendly safety device that can provide immediate assistance. The system should be capable of sending location-based alerts with minimal user interaction. It must operate independently of internet connectivity and ensure reliable communication.

The proposed solution aims to address these challenges by designing a women safety device using GPS and GSM technology. The device enables instant alert transmission and real-time location sharing, helping emergency contacts respond quickly. By reducing response time and simplifying operation, the system enhances personal safety and confidence.

HARDWARE REQUIREMENTS

This describes the hardware and software components used in the development of the Women Safety Device with GPS Tracking and SMS Alert. The proposed system is designed as a wearable device that allows a user to send an emergency alert along with real-time location information. When the panic button is pressed, the device collects the current GPS coordinates and transmits them via SMS to predefined contacts. This enables family members, friends, or authorities to quickly identify the user's location and provide assistance.

The system is built using an Arduino Uno microcontroller, which interfaces with a GPS module and GSM module for location acquisition and message transmission. In addition, an RF transmitter and receiver pair is incorporated to allow wireless communication between the wearable band and the receiving unit. Supporting components such as a buzzer, LCD display, and push button are included to provide user interaction and system feedback.

Arduino Uno

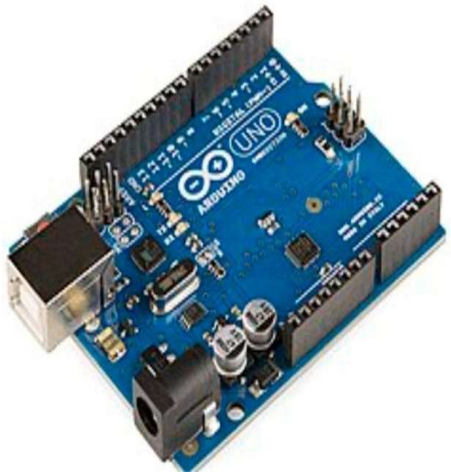

Figure 1 Arduino Uno

The Arduino Uno is an open-source microcontroller board based on the ATmega328P. It serves as the central processing unit of the proposed system. The board provides 14 digital input/output pins, six analog input pins, and supports Pulse Width Modulation (PWM) on selected pins. It can be programmed using the Arduino Integrated Development Environment (IDE) via a USB connection.The Arduino Uno is selected due to its simplicity, sufficient memory, and compatibility with multiple communication interfaces. It controls data acquisition from the GPS module, manages GSM communication, processes user input from the

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 14, Issue 1, 2026

panic button, and drives output devices such as the LCD and buzzer.

Neo-6M GPS Module

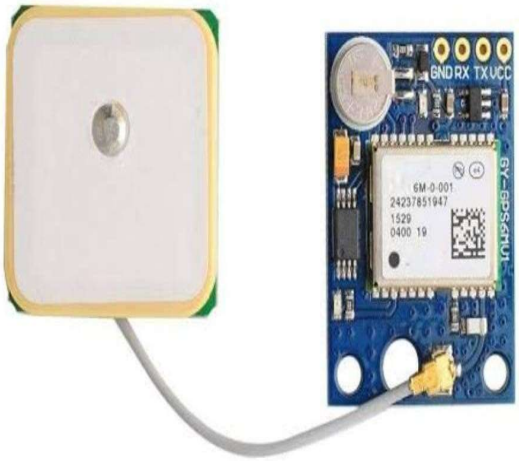

Figure 2 NEO 6M GPS Module

The Neo-6M GPS module is used to obtain real-time geographic coordinates of the user. It is capable of tracking multiple satellites simultaneously and provides accurate latitude and longitude information. The module communicates with the microcontroller using UART serial communication, typically operating at a default baud rate of 9600 bps.The GPS module includes four primary pins: VCC for power supply, GND for ground connection, TX for transmitting data, and RX for receiving data. The module continuously receives satellite signals and outputs location information, which is processed by the Arduino controller.

SIM800C GSM Module

Figure 3 SIM800C GSM Module

The SIM800C GSM module enables wireless communication by sending SMS alerts to predefined contacts. It operates using a SIM card and supports serial communication with the microcontroller. The module requires a regulated power supply and communicates using TX and RX pins.When an emergency is triggered, the Arduino sends AT commands to the GSM module. The module then transmits an SMS containing the GPS coordinates of the user. The GSM network ensures reliable long-range communication without requiring internet connectivity.

LCD Display

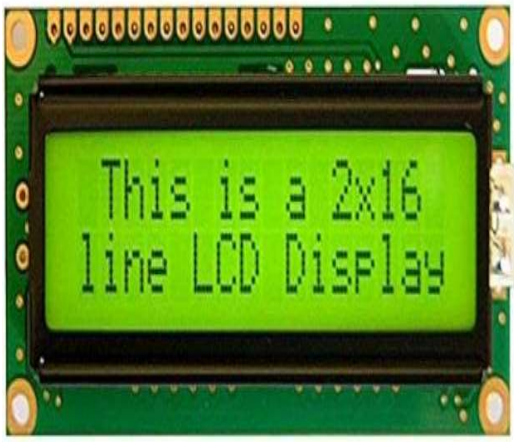

Figure 4 LCD Display

A 16×2 I2C LCD display is used to provide system status information. The display shows messages such as device initialization, GPS signal status, and SMS alert confirmation. The I2C interface reduces wiring complexity by using only two communication lines, SDA and SCL.The LCD improves usability by providing real-time feedback to the user and helps in debugging during system development.

Buzzer

Figure 5 Buzzer

A buzzer is incorporated to provide audible feedback. It activates when the panic button is pressed, indicating that the emergency alert has been triggered. The buzzer also serves as a warning signal that may deter potential threats and attract nearby attention.

Button Module

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 14, Issue 1, 2026

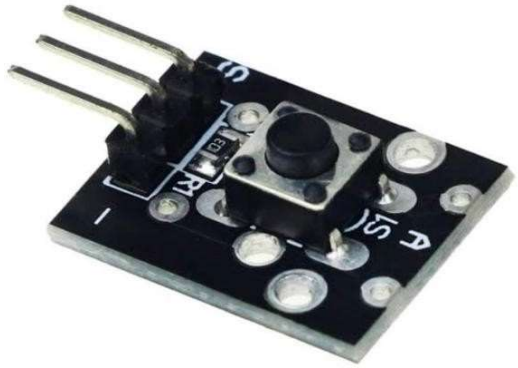

Figure 6 Button Module

The push button acts as the panic switch of the device. When pressed, it triggers the emergency alert process. The button module typically consists of three pins: VCC, GND, and output signal. The output pin is connected to a digital input pin of the Arduino The simplicity of a single-button activation ensures quick operation during stressful situations and reduces the need for complex user interaction.

Software Requirements

Arduino IDE

The Arduino Integrated Development Environment (IDE) is used for writing, compiling, and uploading code to the Arduino Uno. It provides a simple interface and supports multiple operating systems including Windows, macOS, and Linux. The IDE includes a serial monitor for debugging and supports external libraries required for hardware interfacing.The firmware for the proposed system is developed using Arduino IDE version 1.8.19. The platform allows easy integration of GPS, GSM, LCD, and other peripheral modules.

WOMEN SAFETY DEVICE WITH GPS TRACKING AND SMS ALERT

Women's safety has become an important concern due to the increasing number of incidents related to harassment and violence. Although legal frameworks and awareness programs exist, immediate assistance during emergencies remains a challenge. A dedicated safety device capable of sending real-time alerts can significantly improve response time and enhance personal security.The proposed Women Safety Device with GPS Tracking and SMS Alert is designed to provide a dual-layer safety mechanism. The first layer allows manual activation through a panic button, while the second layer automatically triggers alerts if the user fails to authenticate within a specified time interval. This dual-alert approach ensures that assistance can be requested even if the user is unable to manually activate the system.The device integrates a microcontroller-based system with GPS and GSM communication modules. The GPS module continuously tracks the user's location, while the GSM module sends SMS alerts to predefined emergency contacts. Additional components such as a buzzer and LCD display provide feedback and system status information. The device is portable and suitable for use in both urban and remote environments.The system is particularly useful for individuals traveling alone, working late hours, or moving through isolated areas. By providing automatic and manual alert mechanisms, the device enhances user confidence and reduces the risk of delayed assistance during emergencies.

Block Diagram and Explanation

The block diagram of the proposed system consists of the following major components:

- Microcontroller (Arduino Uno)
- GPS Module
- GSM Module
- Panic Button
- Fingerprint Sensor (Authentication Unit)
- LCD Display
- Buzzer
- Power Supply

The microcontroller acts as the central control unit and coordinates all system operations. It receives input from the fingerprint sensor and panic button, processes GPS data, and controls the GSM module for sending alert messages.The GPS module continuously retrieves the user's location coordinates. These coordinates are transmitted to the microcontroller, which formats them into an SMS message. The GSM module then sends this message to predefined emergency contacts.The fingerprint sensor is used for user authentication. Once activated, the system requires periodic fingerprint verification. If the user fails to authenticate within a defined time interval, the device automatically triggers an alert. This ensures safety even if the user becomes unconscious or unable to press the panic button.The panic button provides manual activation of the alert system. When pressed, the device immediately sends an SMS containing location information. The buzzer provides audible feedback, and the LCD display shows system status messages such as initialization, authentication success, and alert transmission.The power supply unit provides the required voltage to all modules, enabling portable operation of the device.

Results

The developed women safety device was tested under multiple emergency scenarios to evaluate its reliability and responsiveness. When a user experiences distress, pressing the SOS button activates the emergency protocol. Once triggered, the system immediately sends alert messages to pre-registered contacts, which may include parents, relatives, friends, or emergency authorities. This multi-contact notification approach ensures that several individuals are informed simultaneously,

ISSN 2347–3657
Volume 14, Issue 1, 2026

thereby increasing the chances of rapid assistance.In addition to SMS alerts, the system also initiates automatic calling to the stored phone numbers. The combination of repeated SMS transmission and voice calls enhances redundancy in communication and ensures that the alert reaches at least one responsible contact even in unstable network conditions.

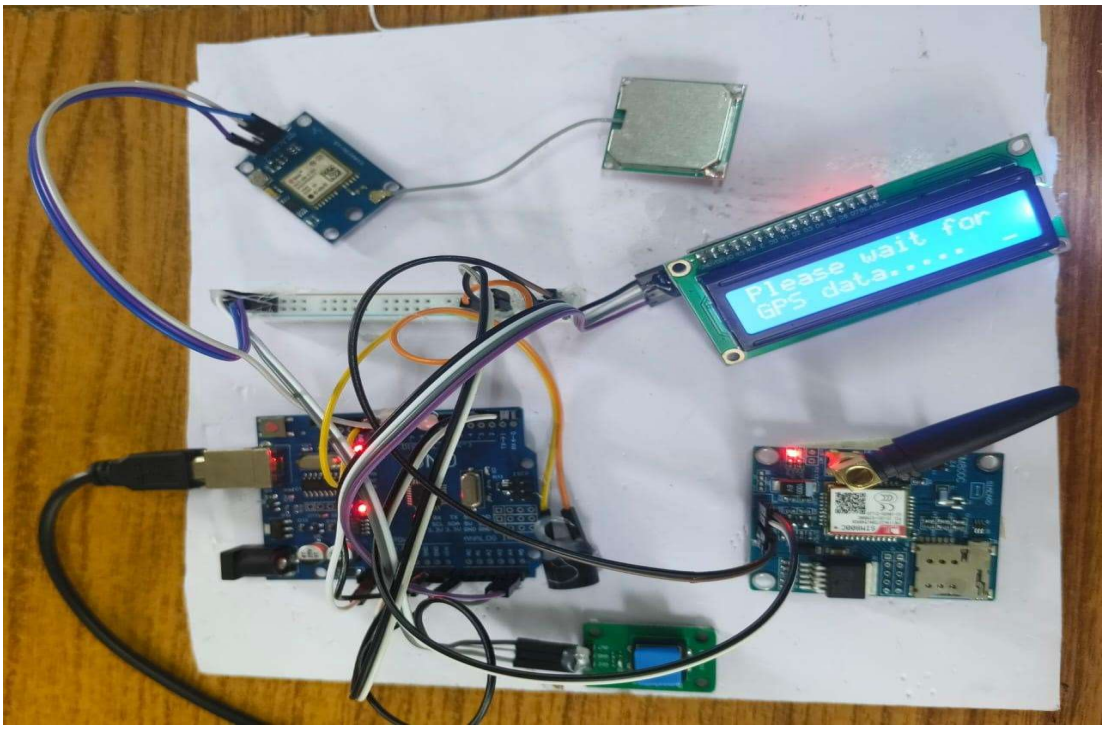

Figure 7 Activating the device

Figure 8 Location Coordinates

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 14, Issue 1, 2026

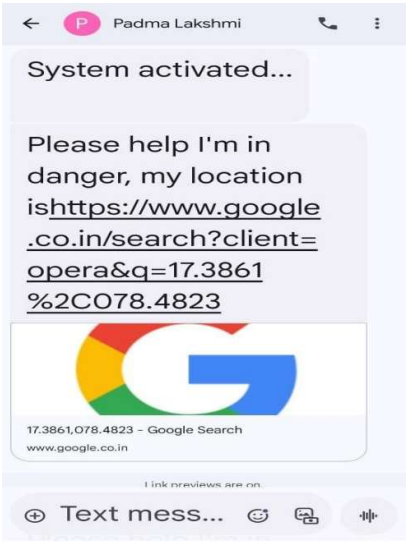

Figure 9 Emergency SMS to phone with location.

A key feature of the proposed device is continuous live location tracking. By using the Neo-6M GPS module, the device retrieves real-time geographic coordinates and includes them in the emergency messages. This capability enables responders to locate the victim accurately and take immediate action. The live tracking functionality significantly improves emergency response efficiency by providing precise location information.The device is designed with simplicity and ease of use in mind. The single-button activation allows users, including children or individuals under stress, to trigger the system quickly. This user-friendly design ensures minimal delay during critical situations.Cost efficiency is another important aspect of the system. The use of affordable and readily available components reduces the overall manufacturing cost, making the device accessible to a larger population. The integration of low-cost hardware with essential safety features ensures that the solution can be widely adopted.

The IoT-enabled safety device demonstrates the potential of embedded systems in improving personal security. With features such as emergency alerts, real-time tracking, and audible alarms, the system provides a reliable and practical safety solution. The prototype successfully demonstrated all functionalities, including device activation, GPS coordinate acquisition, and emergency SMS transmission to registered contacts.

Conclusion

The proposed women safety device based on Arduino and GPS tracking technology provides an effective and practical solution for enhancing personal security. The system integrates real-time location monitoring with emergency alert mechanisms, allowing users to quickly communicate distress situations to predefined contacts. By utilizing the Arduino Uno as the central controller, the device efficiently coordinates various modules such as GPS, GSM, buzzer, and SOS button to ensure rapid response during emergencies.The GPS module plays a vital role in providing accurate geographical coordinates, which are transmitted through the GSM module to emergency contacts via SMS. This feature significantly improves the chances of timely rescue by enabling responders to locate the user precisely. The inclusion of an SOS button offers a simple and immediate way for users to activate the emergency protocol, ensuring ease of operation even under stressful conditions.In addition to communication and tracking capabilities, the system can be extended with self-defense features such as a shock generator and evidence collection through camera integration. These enhancements provide both preventive and reactive safety measures. The shock circuit may help deter attackers, while the camera module can record audio or video data for use as supporting evidence.The proposed device focuses on providing a compact, cost-effective, and user-friendly solution. By employing low-cost components and a simplified architecture, the system can be made accessible to a wider population. The successful implementation of the device demonstrates its ability to deliver prompt assistance, minimize risks, and empower women to handle emergency situations until help arrives. Overall, the developed system highlights how embedded and IoT technologies can be effectively applied to address real-world safety challenges.

Future Scope

The proposed women safety device can be further enhanced by integrating it with existing emergency infrastructure such as police stations, hospitals, and disaster response teams. Direct communication with these services would reduce response time and improve the effectiveness of emergency handling. Establishing connectivity with centralized of assistance during emergencies and improve overall community safety.

The system can also be extended for use by individuals working in isolated environments such as field workers, delivery personnel, and night-shift employees. By incorporating route monitoring and deviation detection, the device can provide additional protection in unfamiliar or remote areas.Integration with wearable technology such as smartwatches and fitness bands offers continuous monitoring without requiring users to carry separate devices. This improvement would increase usability and ensure constant safety tracking throughout daily activities.

Future versions may also include additional environmental sensors such as temperature, humidity, and gas sensors. These additions would allow the device to detect hazardous environmental conditions and alert users proactively. Incorporating artificial intelligence algorithms for threat prediction and behavior analysis can further transform the device into a proactive safety solution.Moreover, improvements in communication technologies, battery optimization, and miniaturized hardware design can enhance portability and efficiency. The integration of mobile applications for live tracking and cloud-based data storage will also improve monitoring systems can create a comprehensive safety network for users.Another potential enhancement is the development of community-based safety networks. Multiple devices can be connected to a centralized server, enabling a security team to monitor alerts in real time. Such a collaborative approach would allow quick dispatch accessibility and real-time monitoring capabilities.In summary, the proposed system can evolve into a comprehensive and intelligent safety platform by incorporating advanced technologies, wearable integration, and connectivity with emergency services. Such developments will provide proactive protection and enhance confidence among users.

REFERENCES

[1] M. Budebhai, “IoT Based Child and Woman Safety,” International Journal of Computer Science and Mobile Computing, vol. 7, no. 8, Aug. 2018.

[2] G. C. Harikiran, K. Menasinkai, and S. M. Shirol, “Smart Security Solution for Women Based on IoT,” International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT), 2016.

[3] T. V. Sai Kalyani, V. Mounika, P. Pooja, V. Sai Sahith, B. Pranay Kumar, and C. Akhil Kumar, “A Novel Approach to Provide Protection for Women Using Smart Security Device,” International Research Journal of Engineering and Technology (IRJET).

[4] K. Ravikiran, Y. Sharvani, and C. Rajendra Prasad, “Smart Gadget for Women Safety,” Journal of Critical Reviews, vol. 7, no. 17, 2020.

[5] B. Chougula, A. Naik, M. Monu, P. Patil, and P. Das, “Smart Girls Security System,” International Journal of Application or Innovation in Engineering & Management, vol. 3, no. 4, Apr. 2014.