WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Women Safety Device Using GSM Module

Prof. P. Ebby Darney[1], R Abhilash[2], Spandana N[3], Yathish S[4], Sagar T[5]

1Asst.Professor, Electrical & Electronics Engineering, RajaRajeswari College of Engineering
[2,3,4,5]UG Students, Electrical & Electronics Engineering, RajaRajeswari College of Engineering

ABSTRACT

Women's safety has become a major concern in today's society due to the increasing number of harassment and emergency situations. This project presents the design and implementation of a women safety device using a GSM module to provide immediate assistance during danger. The device is capable of sending alert messages containing the user's location information to pre-registered emergency contacts with a single button press. An Arduino-based control unit processes the input and activates the GSM module to ensure fast communication. The proposed system is compact, cost-effective, easy to use, and reliable, making it suitable for real-time safety applications. This device aims to enhance personal security and enable quick response during critical situations.

Experimental results demonstrate that the system provides fast and accurate location updates with minimal delay, even in low-network environments. The proposed solution contributes to enhancing personal security by leveraging embedded systems and mobile communication technologies and can be further extended with IoT integration, mobile applications, and biometric sensing for improved safety in smart city applications.

Keywords: Women Safety Device, GSM Module, GPS Tracking, Emergency Alert System, Arduino Microcontroller, Embedded System

1. INTRODUCTION

Ensuring women's safety has become a significant challenge in modern society due to the rising number of incidents related to harassment, assault, and emergency situations. Despite technological advancements, immediate access to help during critical moments remains a major concern. Traditional safety measures and smartphone-based applications often fail due to delayed response, lack of internet connectivity, or unavailability of the device during emergencies. Hence, there is a need for a reliable, standalone safety system that can provide instant alerts and location information.

This paper presents a women safety device based on a GSM module that enables fast and effective communication during danger situations. The proposed system is designed using an embedded microcontroller integrated with a GSM module and a GPS unit. When the user activates the panic button, the system sends an emergency alert message containing real-time location details to predefined contacts and authorities through the GSM network. This ensures quick assistance without dependence on smartphones or internet services..

2. PROBLEM STATEMENT

Despite rapid technological advancement, ensuring women's personal safety remains a major social challenge, especially in emergency and high-risk situations such as harassment, assault, or isolation during travel. Existing safety mechanisms often fail due to delayed response, lack of real-time communication, or dependence on smartphones and internet connectivity. Many women are unable to manually seek help during emergencies because of panic, physical restraint, or unavailability of immediate support. Therefore, there is a critical need for a compact, cost-effective, and reliable women safety device capable of automatically generating emergency alerts and communicating with predefined contacts using a GSM module, independent of internet access.

3. LITERATURE SURVEY

1. GSM-Based Women's Safety Device — (project/paper on ResearchGate, 2018)

Objective: Prototype a pocket/wearable emergency device that sends an SMS containing latitude/longitude to pre-stored contacts when the panic button is pressed.

Method: Arduino microcontroller + GPS receiver + GSM modem; pressing panic button triggers GPS read and SMS with coordinates.

Main result: Demonstrated reliable SMS delivery with coordinated payload in test scenarios; low-cost, easy to implement.

Limitations/gaps: No field evaluation for urban GNSS multipath / indoor situations; limited discussion of power management, false triggers, or police integration.

2. Smart Women Safety Device using IoT — IJERT (≈2021)

Objective: Extend the basic GSM+GPS prototype to an IoT architecture with Raspberry Pi, camera, and multiple alert modes (GSM, internet).

Method: Raspberry Pi central unit, GPS, GSM, camera module — sends images + location via internet to cloud/dashboard and SMS fallback via GSM.

Main result: Adds multimedia evidence (image) and two-path alerting (GSM + Internet) improving context for responders.

Limitations/gaps: Higher cost and power needs than pure microcontroller solutions; dependency on cellular data for the richer features.

3. IoT-Based Automatic Women's Safety Device (ScitePress, 2024)

Objective: Build an automatically-operated safety device (not only manual button) with additional sensors and automated triggers.

Method: Raspberry Pi + IoT stack; automatic triggering via sensor thresholds (e.g., motion pattern, heart rate) and GSM/Internet alerts.

Main result: Shows potential to catch events when victims cannot press a button (automatic detection), and provides richer automated workflows.

Limitations/gaps: Risk of false positives from sensor noise; ethical/privacy concerns with continuous sensing and automatic data transmission.

4. Women Safety System Using GPS and GSM Tracking — IJIRSET (2024)

Objective: Modular system to send alerts to predefined contacts and the nearest police station with location tracking.

Method: Arduino + GPS + GSM; SMS alerts include location; optional continuous tracking via periodic SMS.

Main result: Practical design targeting quick notification of contacts and local authorities; several prototype deployments reported.

Limitations/gaps: Lacks integration with emergency dispatch systems (APIs), and does not evaluate message delivery reliability in network congestion.

5. Women Safety Device using Arduino (IJIPAR, 2023)

Objective: Low-cost Arduino implementation to provide real-time tracking and immediate alerts.

Method: Arduino + GPS + GSM; added features in variants: siren, heart-rate monitoring, and call functionality to emergency contacts.

Main result: Confirms that off-the-shelf modules provide functional prototypes that non-engineers can reproduce for community use.

Limitations/gaps: Most papers in this space stop at prototype stage; scant user-study data on acceptability, false alarm rate, or police response time.

4. EXISTING SYSTEM

The existing women safety systems mainly rely on smartphone based applications and basic emergency alert devices. Most mobile applications require continuous internet connectivity, GPS access, and manual user interaction to send distress messages. In critical situations, these solutions often fail due to network issues, battery drain, or the victim's inability to operate the device. Some hardware based systems using GSM and GPS modules provide SMS alerts on panic button activation. However, they lack automatic threat detection, indoor location accuracy, sufficient battery life, and direct integration with emergency response authorities, limiting their effectiveness during real time emergencies for widespread practical deployment.

5. PROPOSED SYSTEM

The proposed system is a compact and standalone women safety device designed using a microcontroller integrated with a GSM module and supporting safety peripherals. The system enables instant transmission of emergency alert messages to predefined contacts through GSM communication without relying on internet connectivity. Upon activation through a panic switch, the device automatically sends an SOS message along with critical information to ensure rapid assistance. A rechargeable battery with an efficient power management unit ensures portability and continuous operation. The proposed design focuses on reliability, low power consumption, ease of use, and affordability, making it suitable for real time safety monitoring and emergency response applications.

6. HARDWARE AND SOFTWARE IMPLEMENTATION

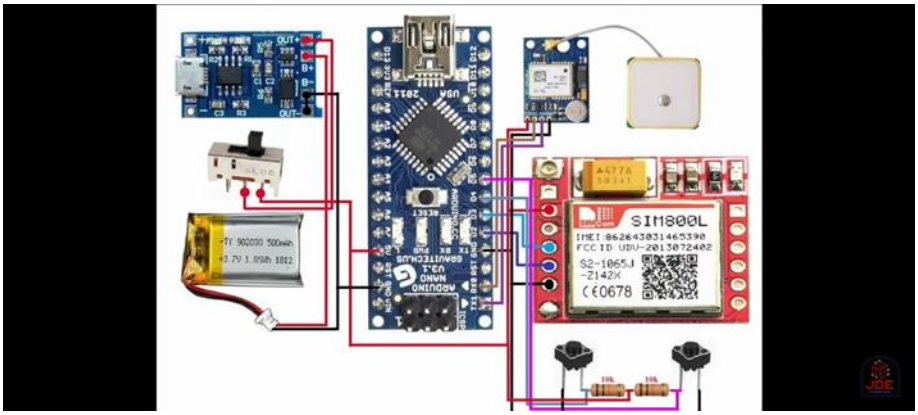
Hardware Implementation

The hardware of the proposed women safety device consists of a microcontroller (such as Arduino Nano), a GSM module, a panic switch, a rechargeable lithium-ion battery, and a charging module. The microcontroller acts as the central control unit, continuously monitoring the panic switch. When the switch is activated, the microcontroller communicates with the GSM module to send an emergency alert message to predefined contact numbers. The power supply unit ensures the device operates stably and remains portable, making it suitable for real-time use.

Software Implementation

The software implementation is carried out using the Arduino Integrated Development Environment (IDE). Embedded C programming is used to control the device operations. The program initialises hardware components, continuously checks input signals, and triggers GSM commands to send SMS alerts during emergencies. Logical conditions are implemented to ensure quick response, reliable communication, and low power consumption during standby mode**.**

7. CIRCUIT DIAGRAM



1. Arduino Nano

- Acts as the main controller of the system.
- Reads input from SOS push buttons.
- Receives location data from the GPS module.
- Sends AT commands to the GSM (SIM800L) module.
- Controls the overall working logic of the device.

2. GSM Module (SIM800L)

- Enables wireless communication using the GSM network.
- Sends SMS alerts to pre-stored emergency numbers.
- Can make automatic emergency calls when SOS button is pressed.
- Operates on a SIM card similar to a mobile phone.
- Requires sufficient current during data transmission.

3. GPS Module

- Used to determine the real-time location of the user.
- Provides latitude and longitude coordinates.
- Communicates with Arduino using serial communication.
- Helps in tracking the victim’s location accurately.
- Works with an external GPS antenna for better signal reception.

4. Lithium-Ion Battery (3.7V)

- Acts as the portable power source for the device.
- Supplies power when the device is used in real-time situations.
- Rechargeable and lightweight.
- Ensures device works even without external power.
- Suitable for compact wearable safety devices.

5. TP4056 Charging Module

- Used to safely charge the lithium-ion battery.
- Protects against over-charging and over-discharging.
- Supports USB charging.
- Provides stable power output to the circuit.
- Increases battery life and safety.

6. Slide Switch

- Used to turn ON/OFF the entire device.

Overall Working

1. When the device is switched ON, the Arduino Nano initializes the GSM and GPS modules and waits for an emergency input.

2. On pressing the SOS push button, the Arduino immediately activates the alert sequence.

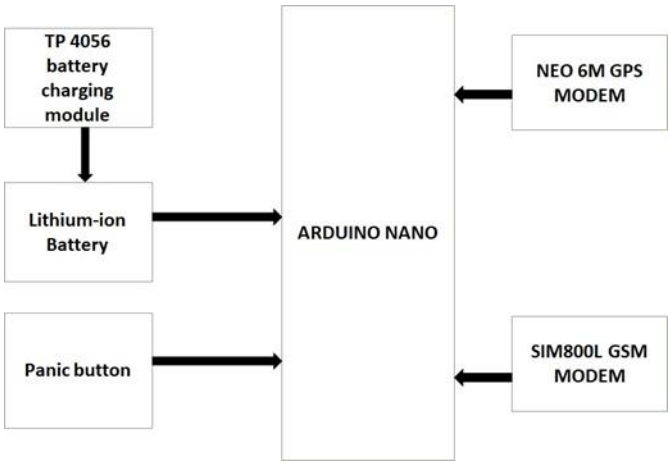
3. The GPS module collects the real-time latitude and longitude of the user.

4. The Arduino processes the location data and prepares an emergency message.

5. The GSM (SIM800L) module sends an SMS and/or makes a call to the pre-stored emergency contacts.

6. The device continues sending alerts until help arrives or the system is manually turn.

8. BLOCK DAIGRAM



Block Diagram

1. Power Supply Unit (TP4056 Charging Module and Lithium-Ion Battery)

The power supply unit consists of a 3.7 V lithium-ion battery and a TP4056 charging module. The lithium-ion battery serves as the primary power source for the system, ensuring portability and continuous operation. The TP4056 charging module is used to safely recharge the battery via a USB source and provides protection against overcharging, over-discharging, and short-circuit conditions. This unit supplies the required power to the Arduino Nano and other interfaced modules.

2. Arduino Nano (Control Unit)

The Arduino Nano acts as the central control unit of the women safety device. It coordinates the operation of all connected components. The microcontroller receives input signals from the panic button, collects location data from the GPS module, and communicates with the GSM module using serial communication. Based on the programmed logic, the Arduino Nano initiates alert actions during emergency situations.

3. Panic Button (Input Unit)

The panic button is provided as a user input device to activate the emergency alert system manually. When the button is pressed, it sends a trigger signal to the Arduino Nano. This enables immediate activation of the GSM and GPS modules, allowing the system to respond quickly in critical situations.

4. NEO-6M GPS Module (Location Tracking Unit)

The NEO-6M GPS module is responsible for determining the real-time geographical location of the user. It provides latitude and longitude information to the Arduino Nano through serial communication. This location information is included in the emergency alert message, enabling accurate tracking of the victim's position.

5. SIM800L GSM Module (Communication Unit)

The SIM800L GSM module enables wireless communication using a GSM network. It is used to send SMS alerts and make emergency calls to predefined contact numbers. Upon receiving commands from the Arduino Nano, the GSM module transmits alert messages containing the user's location details, ensuring timely communication during emergencies.

9. RESULTS

The proposed women safety device using GSM and GPS modules was successfully designed and tested. The system demonstrated reliable performance in detecting emergency situations through the panic button and transmitting alerts in real time. Upon activation, the device accurately acquired the user's geographical location using the NEO-6M GPS module and processed the data through the Arduino Nano.

The SIM800L GSM module successfully sent SMS alerts containing location coordinates to predefined emergency contact numbers within a short response time. Call initiation functionality also worked effectively during testing. The TP4056 charging module ensured safe and stable battery charging, and the lithium-ion battery provided adequate backup for continuous operation. The compact design and low power consumption made the device suitable for portable and wearable applications. Overall, the results confirm that the developed system is efficient, reliable, and suitable for real-time women safety applications.

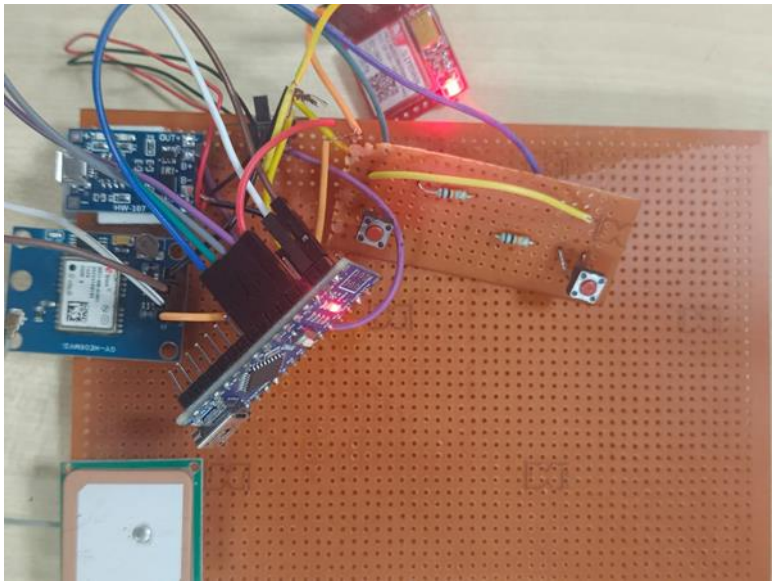


Fig :Top view of project

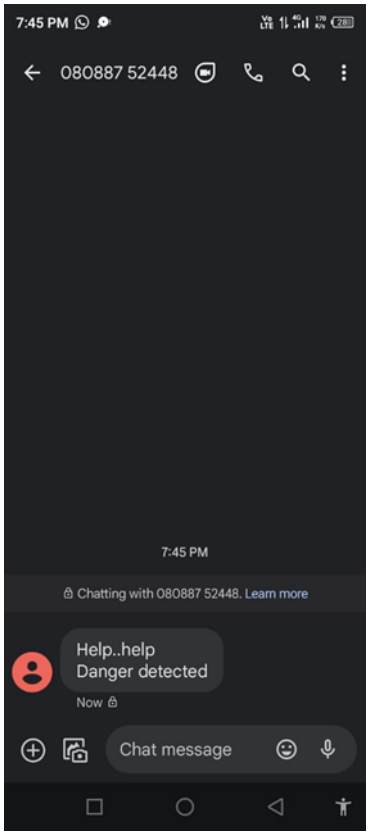


Fig: live streaming

10. CONCLUSION

This project successfully designed and implemented a women safety device using GSM and GPS technology to provide immediate assistance during emergencies. The developed system effectively integrates the Arduino Nano, SIM800L GSM module, and NEO-6M GPS module to detect distress conditions and transmit real-time location details to predefined emergency contacts. The use of a lithium-ion battery along with a TP4056 charging module ensures portable and reliable operation. Experimental results demonstrate that the device is capable of sending accurate alerts with minimal response time. Due to its compact size, low cost, and ease of use, the proposed system is suitable for real-world deployment and can contribute significantly to improving personal safety for women.

11. FUTURE SCOPE

1. The device can be connected with a mobile app for real-time monitoring and alerts.

2. Additional sensors such as heart rate or sound sensors can be included to detect distress automatically.

3. Internet of Things (IoT) support can be added for cloud-based location tracking.

4. The system can be enhanced with smaller and more efficient batteries to improve portability.

5. Integration with police or emergency service databases can enable faster response during emergencies.

12.REFERENCES

[1]. A. Kumar, S. Sharma, and R. Singh, “Women Safety Device Using GSM and GPS Technology,” International Journal of Engineering Research and Technology (IJERT), vol. 9, no. 5, pp. 234–238, 2020.

[2]. P. Verma and A. Jaiswal, “Design and Implementation of Smart Women Safety System,” International Journal of Scientific Research in Computer Science, Engineering and Information Technology, vol. 6, no. 3, pp. 112–116, 2019.

[3]. S. R. Patil, M. R. Bhaskar, and P. N. Kulkarni, “Arduino Based Women Safety and Security System,” International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, vol. 8, no. 4, pp. 1567–1571, 2019.

[4]. K. R. Nair and S. S. Menon, “GPS and GSM Based Tracking System for Emergency Applications,” International Journal of Innovative Research in Technology, vol. 5, no. 2, pp. 45–49, 2018.

[5]. R. Gupta and N. Choudhary, “Smart Women Safety System Using GSM and GPS,” International Journal of Research in Engineering, Science and Management, vol. 3, no. 6, pp. 98–102, 2020.