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Women Safety Using Arm Cortex

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ABSTRACT
Ensuring women's safety is a growing concern in today's world. In emergency situations, immediate help is essential. This project proposes a Women Safety Device, which provides real-time tracking and emergency alert functionality using an ARM-based microcontroller, GPS, and GSM modules. In distress situations, the user can press a panic switch, which activates the GPS module to find the user's location and sends an SMS alert to up to five trusted contacts and emergency services. The system also makes automated sequential calls to emergency contacts to ensure immediate action. This compact and efficient safety solution allows women to seek help quickly, providing security and peace of mind.

Keywords: Emergency Alert System, Real-Time Tracking, GSM Communication, GPS, Women Safety.

1. INTRODUCTION

Women's safety remains a major social concern, and cases of harassment, abuse, and other emergencies require immediate action to protect individuals. Many existing solutions rely on mobile applications, which may not always be accessible during critical situations. In emergencies, people may not have the time or ability to unlock their phone, open an app, and send alerts.

To address this issue, this project presents a Women Safety Device that offers real-time tracking and emergency alert transmission via SMS and automated calls. The device is powered by an ARM-based microcontroller, making it efficient and cost-effective. By pressing a panic switch, the system retrieves the GPS location and transmits it through the GSM module to multiple emergency contacts. The inclusion of automated voice calls to given five contacts.

2. EXISTED SYSTEM

In the existing women's safety solutions, various technologies and methods have been developed to enhance security and provide emergency assistance. However, these approaches often come with limitations that reduce their reliability and effectiveness in critical situations. Many existing solutions rely on smartphones, manual activation, or external assistance, which may not always be feasible when the victim is in distress. Additionally, factors such as battery dependency, internet connectivity, and delayed response times pose significant challenges in ensuring immediate and effective safety measures.

2.1 Dependency on Smartphones

Many safety solutions, such as mobile applications and smart devices, rely on smartphones for activation and communication. However, in emergencies, unlocking a phone and navigating through an app may not be practical. Additionally, if the phone's battery is dead or the device is lost, these solutions become ineffective.

2.2 Limited Communication Capabilities

Existing solutions often depend on internet connectivity or network availability to transmit distress signals. In areas with poor network coverage or during technical failures, victims may struggle to send alerts to emergency contacts or authorities, leading to delayed responses.

2.3 Lack of Real-Time Location Tracking

GPS-based safety solutions offer tracking features, but many of them lack an automatic distress alert mechanism. This means that unless the victim manually shares their location or activates the emergency feature, the system does not notify trusted contacts or law enforcement agencies in real- time.

3. PROPOSED SOLUTION

To overcome the limitations of existing systems, this project introduces a **Women Safety Device** that ensures immediate assistance without relying on smartphones, internet connectivity, or manual intervention. The device is designed to provide quick and effective emergency alerts, improving response times and enhancing personal security.

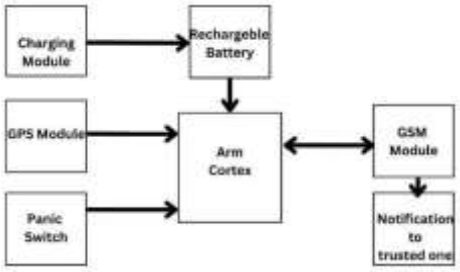


Fig.3.1.1: Block Diagram

4. Selection of Communication Modules

To ensure reliable real-time tracking and emergency alert transmission, the proposed system incorporates dedicated communication modules that operate independently of smartphones and internet connectivity. The **GPS module** is selected for its high accuracy, fast position acquisition, and low power consumption, making it suitable for continuous location tracking even in remote areas.It enables precise determination of the user's coordinates, ensuring that emergency contacts receive accurate location updates.

The **GSM module** is chosen for its ability to send distress messages and make automated calls over cellular networks, providing a dependable communication channel even in areas with limited internet access. Its compact design, low power consumption, and compatibility with multiple network bands make it ideal for real-time emergency communication. By integrating these modules, the system ensures a seamless and efficient safety mechanism, enhancing the chances of a timely response in critical situations.

5. Microcontroller Integration

The proposed system is built around the **ARM Cortex-based STM32G070RB microcontroller**, selected for its efficient processing capabilities, low power consumption, and seamless integration with communication modules. This microcontroller plays a crucial role in managing real-time tracking and emergency alerts by coordinating data exchange between the GPS and GSM modules. It processes location data, ensures accurate and timely transmission of distress signals, and optimizes power usage for prolonged battery life. Its advanced architecture allows for smooth execution of multiple tasks, ensuring reliable system operation even in critical situations. By utilizing this microcontroller, the device achieves an optimal balance between performance, power efficiency, and real-time responsiveness, making it a highly effective solution for emergency safety applications.

6. Power Management System

The Women Safety Device incorporates an efficient power management system to ensure long-lasting operation. A **3.7V, 2000mAh lithium-ion battery** powers the device, providing **6-8 hours of continuous usage** on a single charge. The **TP4056 charging module** is integrated to enable safe and efficient charging while preventing overcharging and battery damage. To extend battery life, the **microcontroller operates in a low-power mode** when not actively transmitting data. This optimization reduces unnecessary power consumption and enhances overall efficiency. The system is designed to function reliably in emergency situations without frequent recharging. By implementing these power-saving strategies, the device remains operational when needed the most.

7. Emergency Activation Switch

The Women Safety Device includes a **panic switch (SPST)** for quick emergency activation. A single press triggers the system, sending real-time location updates and distress alerts via GSM. The switch is designed for **easy accessibility**, ensuring immediate response in critical situations. It directly signals the microcontroller, enabling fast and automated emergency communication. This simple yet effective mechanism enhances user safety by providing instant alert functionality.

8. ADVANTAGES

8.1 Real-Time Location Tracking

The GPS NEO-6M module provides accurate real-time location updates, helping responders track the user instantly.

8.2 Instant Emergency Communication

The GSM SIM800L module enables immediate alert messages and sequential calls to predefined emergency contacts.

8.3 Standalone Operation

Does not rely on smartphones or internet connectivity, ensuring reliability even in areas with poor network coverage.

8.4 Long Battery Life

Equipped with a lithium-ion battery and TP4056 charging module, the device operates for 6–8 hours on a single charge.

8.5 Automatic Location Updates

Sends continuous location updates every 60 seconds, ensuring ongoing monitoring during emergencies.

8.6 User-Friendly and Quick Activation

A simple panic switch (SPST) allows users to trigger emergency alerts instantly with a single press.

8.7 Low Power Consumption

Designed to optimize power usage, making it suitable for prolonged use without frequent recharging.

8.8 Scalable and Affordable

The low-cost components and efficient design make the device scalable for mass production and deployment in both urban and rural areas.

9. APPLICATIONS

9.1 Women's Safety

Helps women in distress by sending immediate location- zbased alerts to trusted contacts and emergency services.

9.2 Children's Security

Parents can monitor their child's location and ensure their safety, especially in crowded places or while traveling.

9.3 Elderly Assistance

Useful for senior citizens who may need immediate help in medical emergencies or if they get lost.

9.4 Workplace Safety

Employees working late hours or in high-risk jobs can use the device for added security.

9.5 Emergency Response in Disasters

Can be used in disaster-prone areas to track people needing rescue and provide quick assistance.

9.6 Personal Security in High-Risk Areas

Beneficial for journalists, social workers, or individuals in unsafe environments.

9.7 Security for College and School Students

Ensures safety for students commuting alone or staying in hostels.

9.8 Defense and Law Enforcement

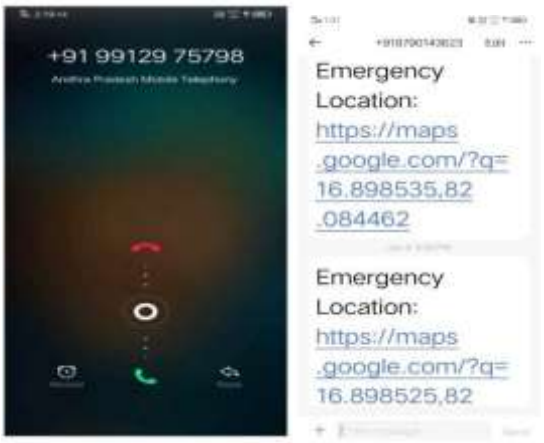
Can be used by military personnel and officers to send alerts in emergency situations.

9.9 Transportation and Public Transit Safety

Passengers using taxis or public transport can use the device for protection against potential threats.

10.EXPERIMENTAL RESULTS

The result obtained after completion the project is whenever the persons activates the switch,then it makes to send the messages to the given contacts using GSM as well. The thing that will be most helpful is high alert using live location in critical situations



11.FUTURE SCOPE

The future scope of the Women Safety Device includes advanced features like voice recording, IoT-based cloud monitoring, and RFID-based trusted locations for improved security. Enhancements such as AI-based threat detection, wearable integration, and solar charging can make the device more efficient and user-friendly. Additionally, voice- activated, law enforcement integration, and geofencing alerts can further enhance safety and response times. These upgrades aim to make the device more reliable, scalable, and accessible, ensuring better protection for women, children, and elderly individuals in emergencies.

- **Voice Recording and Audio Transmission**

Integrating a microphone to record and transmit live audio to emergency contacts for additional security evidence.

- **IoT Based Cloud Monitoring**

Connecting the device to a cloud server for real-time tracking and data storage, enabling authorities or families to access location history.

- **AI-Based Threat Detection**

Implementing artificial intelligence to analyze movement patterns and detect potential threats, triggering automatic alerts.

- **Wearable Integration**

Developing a smartwatch or smart jewelry version for seamless, discreet use.

- **Enhanced Battery Life**

Using low-power sensors and solar charging to extend battery life beyond **8 hours**, ensuring prolonged operation.

12.CONCLUSION

The Women Safety Device is a compact and innovative solution for real-time tracking and emergency assistance. Using GPS and GSM modules, it continuously updates and shares the user's location with trusted contacts. Powered by an ARM Cortex STM32G070 microcontroller, a TP4056 charging module, and a lithium-ion battery, it ensures efficient processing and long-lasting reliability. The device operates independently, without internet or a smartphone, making it suitable for Females.Future enhancements like IoT monitoring, voice activation, and AI-based threat detection can further improve its functionality. Affordable and scalable, this device enhances personal safety in both urban and rural.

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