SHESAFE+: MULTI-FEATURE PROTECTION FOR WOMEN AND THE DIFFERENTLY ABLED

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Introduction:

SheSafe+ is an innovative, multi-functional safety device aimed at enhancing personal security for women, differently-abled individuals, and the elderly during emergencies. The compact, user-friendly system features six physical buttons that trigger pre-recorded voice messages such as “Help me!”, “I am hungry!”, and “Give me medicine!”—allowing users to express critical needs without speaking.

A built-in GPS module provides real-time location tracking, while the GSM module sends SMS alerts with the user’s live coordinates to pre-registered emergency contacts, enabling swift response. The device also supports emergency calls with live two-way audio via an integrated microphone. For personal protection, SheSafe+ includes a non-lethal electric shock module designed to deter potential attackers. A buzzer confirms action completion (e.g., SMS sent, call initiated), enhancing user confidence and ease of use.

The hardware is powered by an Arduino Nano, along with essential modules such as SIM900A GSM, NEO-6M GPS, amplifier, speaker, and a rechargeable 2000mAh battery. Developed using Arduino IDE, the system offers seamless hardware-software

integration. SheSafe+ is affordable, lightweight, and portable, making it suitable for everyday carry. By combining voice alerts, GPS tracking, emergency communication, and self-defense, it offers a complete safety solution that prioritizes accessibility, responsiveness, and independence in emergency situations.

Objectives:

- Provide easy-access voice alerts for expressing urgent needs like help, hunger, or medical aid.
- Enable real-time GPS tracking and SMS-based emergency location sharing. Incorporate emergency call functionality using GSM and microphone integration.
- Implement a non-lethal electric shock feature for personal self-defense.
- Ensure portability, affordability, and user-friendliness for daily usage.

Methodology:

The project SheSafe+ system is developed using an Arduino Nano as the central controller to manage and coordinate all components. The device includes six tactile push buttons, each programmed with a unique function to address different emergency scenarios and user needs.

Buttons 1 through 4 are connected to a DFPlayer Mini MP3 module paired with a speaker and amplifier. Pressing any of these buttons plays pre-recorded voice alerts like “Help me!”, “Give me medicine!”, “I am hungry!”, and “Go to the washroom!” The messages are looped as long as the button remains pressed, ensuring they are clearly communicated and easily heard by nearby people.

The fifth button integrates the NEO-6M GPS module and the SIM900A GSM module to obtain the user’s live location and send it via SMS to a pre-registered emergency contact. Upon successful message delivery, a buzzer provides auditory feedback, assuring the user that their alert has been sent.

The sixth button initiates a voice call using the GSM module. A microphone captures the user’s live audio, enabling direct communication with the emergency contact for better understanding of the situation and faster assistance.For personal defense, a

separate button activates a non-lethal electric shock module, designed to deter attackers without causing lasting harm. Circuitry is carefully isolated to prevent accidental shocks, enhancing system safety and reliability.

The system is powered by a 2000mAh rechargeable Li-ion battery, ensuring several hours of uninterrupted operation. All logic and control are programmed using the Arduino IDE in C/C++, and careful attention is given to power efficiency and hardware-software synchronization.A buzzer acts as a universal feedback mechanism, beeping when any critical action (SMS, call, shock) is triggered successfully. This user feedback loop is essential, especially in high-stress situations where confirmation is crucial.

The internal logic continuously monitors button states and executes actions in real time. Visual aids such as circuit diagrams, UML class diagrams, and sequence diagrams were created to illustrate the system's architecture and workflows. These diagrams were used to support system planning, debugging, and presentation.

By combining voice-based alerts, real-time GPS tracking, emergency calling, and self-defense, SheSafe+ provides a holistic, accessible, and low-cost safety solution. The compact and modular design ensures ease of use, portability, and reliability—making it highly applicable in real-world emergency scenarios for women and differently-abled users.

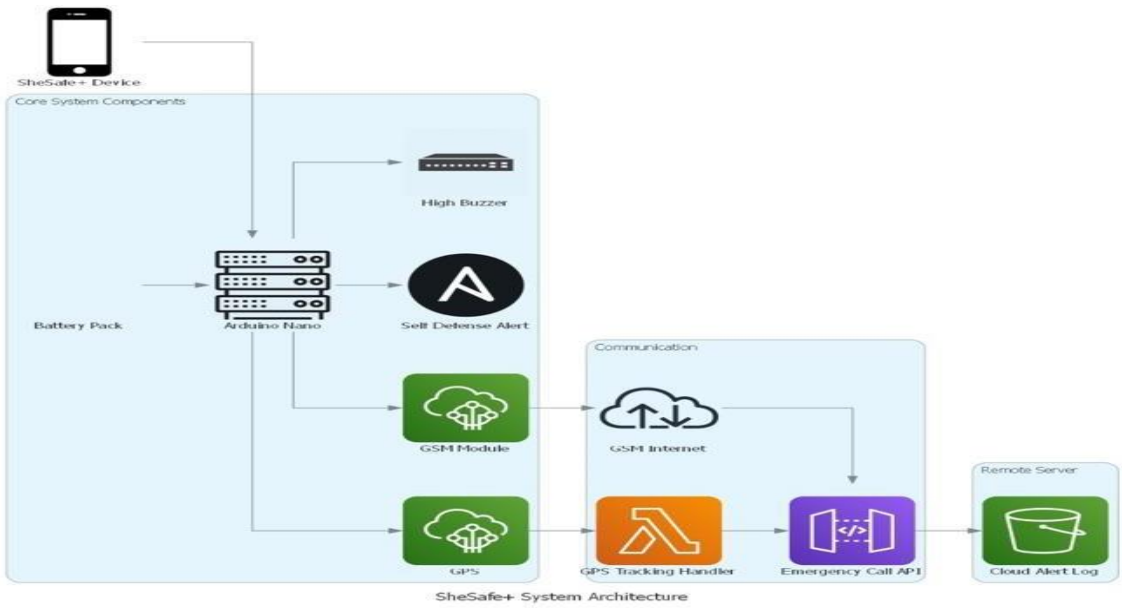

Figure 1: Shesafe+ System Architecture

Result and Conclusion:

The SheSafe+ device was successfully developed and tested in real-time environments, confirming the effectiveness of its safety and communication features. All six buttons functioned as intended, triggering specific actions including voice alerts, location sharing, emergency calling, and self-defense activation. The voice alert system provided loud and clear messages through the speaker, drawing immediate attention during simulations. The GPS module accurately retrieved live location data with a precision of ±5 meters, while the GSM module reliably delivered SMS messages to pre-registered emergency contacts. Emergency voice calls were successfully initiated, and the integrated microphone enabled clear two-way communication.

The electric shock module operated safely, offering a noticeable jolt without causing harm, and did not activate accidentally due to circuit isolation. The buzzer feedback proved vital in confirming successful operations like message delivery or call connection, especially under pressure. All components worked harmoniously under the control of the Arduino Nano, maintaining system stability during prolonged usage.

Photographic evidence includes images of the prototype assembly, circuit connections, and user interaction. Test screenshots show SMS alerts and call logs, validating successful communication.

In conclusion, SheSafe+ demonstrated high reliability, user-friendliness, and potential real-world impact. It provides a low-cost, multi-functional safety solution that empowers women and differently-abled individuals to act quickly and effectively during emergencies.

Figure 2: Prototype of shesafe+ device

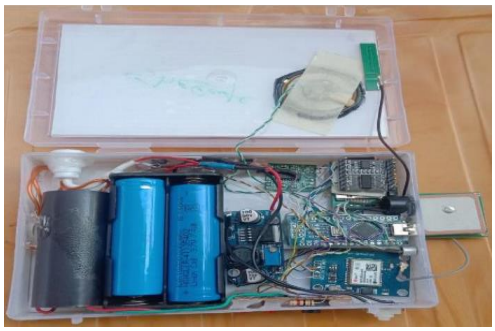

Figure 3: Circuit connection

Figure 4:Audio play buttons

Figure 5: Electric Shock

Figure 6: Sms,call,electric shock and switch button

Figure 7: Data input

Figure 8: Alert message

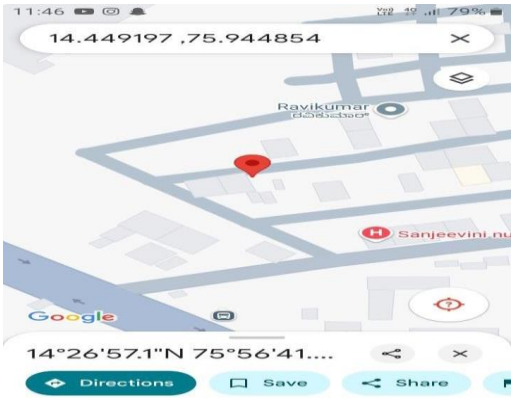

Figure 9: Live location

Figure 10: Alert call

Project Outcome & Industry Relevance:

The SheSafe+ project delivers a low-cost, portable, and highly functional safety device tailored for women and differently-abled individuals. It successfully integrates communication, location tracking, and self-defense into a single compact system, demonstrating the practical application of embedded systems and IoT in personal safety. In real-world settings, this device can be used by individuals in public spaces, institutions like schools or hostels, and care facilities for the elderly or differently-abled.

Its customizable nature makes it suitable for integration into smart wearables, medical alert systems, and public safety infrastructure. The project contributes significantly to the field of assistive technology and embedded system design, showing how accessible, low-power electronics can be leveraged for social good. Its relevance spans industries such as healthcare, security, consumer electronics, and smart city solutions, with potential for commercial development and deployment at scale.

Working Model vs. Simulation/Study:

The SheSafe+ project involved the development of a physical working model, not a simulation or theoretical study. All components—including the Arduino Nano, GPS and GSM modules, speaker, microphone, electric shock module, and buzzer—were assembled and tested in real-world conditions.

The prototype was fully functional, capable of executing live actions such as playing voice alerts, sending SMS with GPS data, making emergency calls, and triggering a self-defense shock. Extensive hardware integration and physical testing ensured the system's reliability, responsiveness, and suitability for real-life emergencies.

Project Outcomes and Learnings:

Outcomes:

- Successfully built a working safety device integrating voice alerts, GPS, GSM, and self-defense.
- Achieved accurate location sharing, real-time SMS alerts, and emergency calling.

- Ensured user feedback through a buzzer and safe shock mechanism.

Learnings:

- Gained practical experience with Arduino and sensor integration.
- Learned to manage real-time hardware responses and system reliability.
- Improved teamwork, debugging, and user-focused design skills.

Future Scope:

The future scope of this project includes:

- Add Bluetooth, Wi-Fi, or 5G for faster and more reliable connectivity.
- Develop a mobile app for real-time tracking, alert management, and device control.
- Enable voice command recognition for hands-free operation.
- Include gesture-based activation to assist users with limited mobility.
- Implement cloud data storage for remote access and historical tracking.
- Allow OTA (over-the-air) updates to improve and upgrade device software.
- Improve battery efficiency and add solar charging for long-term outdoor use.
- Design waterproof and rugged casing for harsh environments.
- Enable multi-language support in voice alerts for broader accessibility.
- Expand to institutional settings like schools, hostels, hospitals, and public transport.
- Partner with law enforcement or medical services for faster response integration.
- Customize for other vulnerable groups like elderly, children, or night shift workers.