

# DIVYA KAVACH: The Guardian Bangle for Women

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**Abstract**—In an era where women's safety is an ongoing concern, especially amidst the rising incidents of harassment and violence, conventional safety mechanisms such as mobile applications and emergency helplines have proven to be inadequate during real-time emergencies. Divya Kavach, a smart wearable safety device designed as a culturally acceptable bangle, aims to bridge this critical gap. The project integrates advanced technology into an aesthetically traditional form, providing women with a discreet yet powerful tool for personal protection. The bangle is equipped with features such as GPS for real-time location tracking, GSM modules for sending emergency alerts, a panic button for silent activation, voice-command recognition, heart rate monitoring, and an optional electroshock mechanism for immediate self-defense. Furthermore, it supports dual-mode charging through USB and solar energy, making it especially useful in power-deficient or rural environments. Developed using an Arduino UNO microcontroller and tested under various field conditions, the prototype demonstrated accurate location tracking and swift alert delivery. Divya Kavach presents a socially acceptable, technologically advanced, and scalable solution that addresses the real-time safety needs of women, contributing meaningfully to the field of wearable technology with a social impact.

**Index Terms**—Women's safety, wearable technology, GPS tracking, GSM module, panic alert, voice activation, embedded systems, electroshock defense, solar charging, Arduino-based device.

## I. INTRODUCTION

Women's safety remains a significant issue across the globe, particularly in countries where gender-based violence is prevalent. Despite numerous technological advancements, most current safety tools are not well-suited for emergency situations. Many women face difficulty accessing their phones in times of distress due to panic, fear, or physical restrictions. Traditional safety tools, such as mobile applications or emergency numbers, require user interaction which is not always feasible. As a response to this critical challenge, the concept of wearable safety devices has emerged as a promising

solution, offering convenience, instant accessibility, and discreet operation. Divya Kavach is an innovative attempt in this direction, conceptualized and developed as a smart safety bangle that combines modern technology with traditional design aesthetics.

## II. PROPOSED SYSTEM

The proposed system, Divya Kavach, is an intelligent, compact, and culturally compatible wearable safety device designed to address real-time emergency scenarios, particularly for women. At the center of the system is the Arduino UNO microcontroller, which serves as the primary controller, managing and processing all incoming data from various sensors and coordinating system responses. It efficiently handles inputs from activation mechanisms and environmental sensors and controls outputs such as alert messages and defensive actions. The device incorporates a GSM module (SIM800L) and a GPS module (NEO-6M), which operate in unison to deliver live location tracking and immediate distress alert transmission via SMS to predefined emergency contacts. This ensures that the wearer's precise location is communicated as soon as the system is activated. To provide flexibility under diverse conditions, the bangle offers two activation modes: a discreetly embedded panic button for manual use and a voice recognition module for hands-free operation. The voice-based trigger is particularly crucial in situations where physical access to the button is not feasible due to panic, restraint, or injury. For direct self-defense, the system includes a high-voltage electroshock generator, designed to deliver a non-lethal but effective electric pulse to temporarily deter attackers, granting the user crucial time to escape or call for help. The bangle also includes a Bluetooth module (HC-05) for smartphone connectivity, allowing users to configure settings, monitor battery levels, and access emergency logs through a paired mobile device. Power is supplied by a rechargeable lithium-ion battery, supported by dual-mode charging capabilities — USB charging for standard power supply and solar charging for off-grid

usage, enhancing the device's utility in rural or remote areas. The entire circuitry and modules are carefully integrated within a custom bangle-like enclosure that replicates traditional jewelry, ensuring cultural acceptance, especially in conservative societies. The design emphasizes comfort, lightness, and daily usability while offering robust safety functionalities. This modular and scalable

architecture not only allows for efficient maintenance but also provides room for future upgrades such as additional sensors or cloud-based services. Overall, Divya Kavach offers a powerful convergence of embedded electronics, real-time communication, self-defense technology, and cultural integration, making it a reliable, user-friendly, and socially impactful solution to modern-day safety concerns.

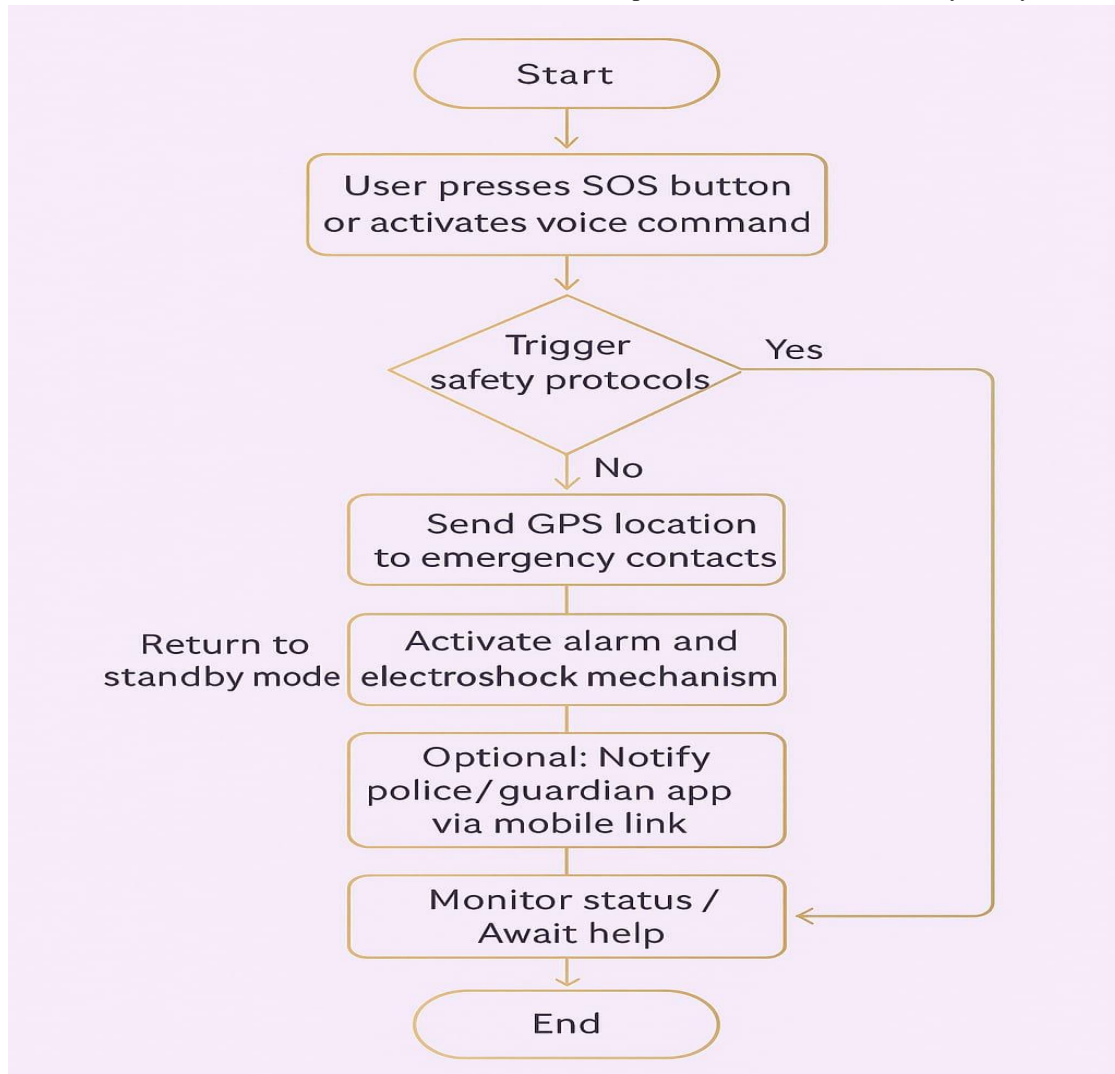


Fig 1: Flowchart

### III. METHODOLOGY

The development process of Divya Kavach involved a systematic approach beginning with component selection, circuit design, programming, and hardware assembly. The primary controller, Arduino UNO, was selected for its versatility and ease of integration with modules such as GPS, GSM, and sensors. The system architecture consists of modular layers: the input layer includes the panic button, heart rate sensor, and microphone for voice activation; the processing layer is handled by the Arduino; and the

output layer includes the GSM-based alert system, buzzer, and electroshock module. Software development was carried out using the Arduino IDE in embedded C/C++, incorporating interrupt-driven programming for real-time responsiveness. The physical assembly involved embedding components into a custom bangle shell, ensuring minimal weight and user comfort. Rigorous testing was conducted under varied conditions to validate the system's reliability, response time, and effectiveness in both urban and rural environments.

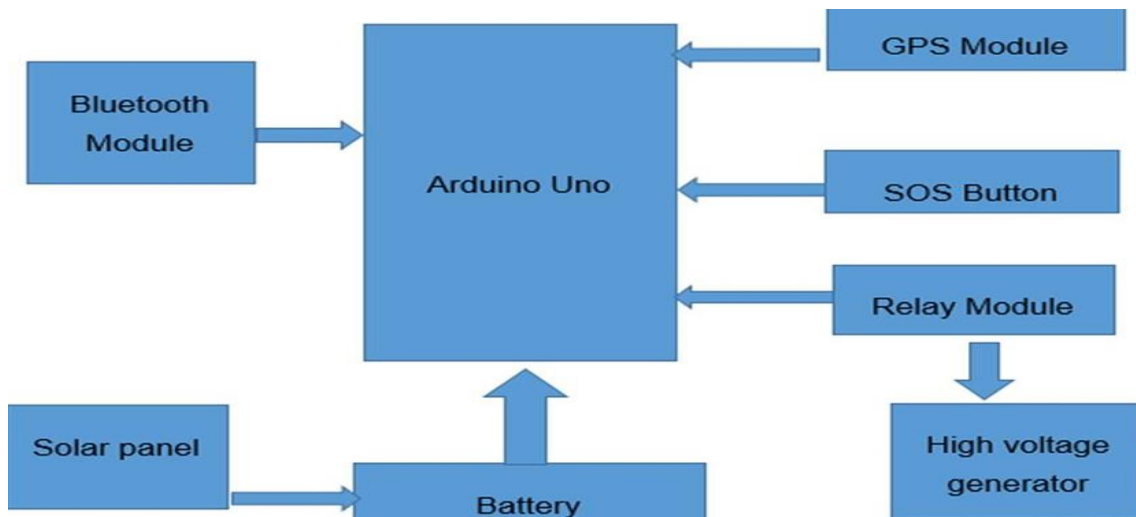


Fig 2: Block Diagram

#### IV. RESULTS

Functional testing of the Divya Kavach prototype was conducted in controlled and semi-real-world environments. Upon pressing the panic button or using a voice command, the device promptly sent an SMS containing real-time GPS coordinates to pre-configured emergency contacts. The GPS module consistently provided accurate location data. The

buzzer successfully emitted a loud sound. The electroshock module delivered a safe yet effective deterrent-level electric pulse. Battery performance was evaluated over a 24-hour period, with solar charging extending operational time significantly. Feedback highlighted convenience and discreet usability, while technical validation affirmed core functions like alert dispatch and GPS accuracy.

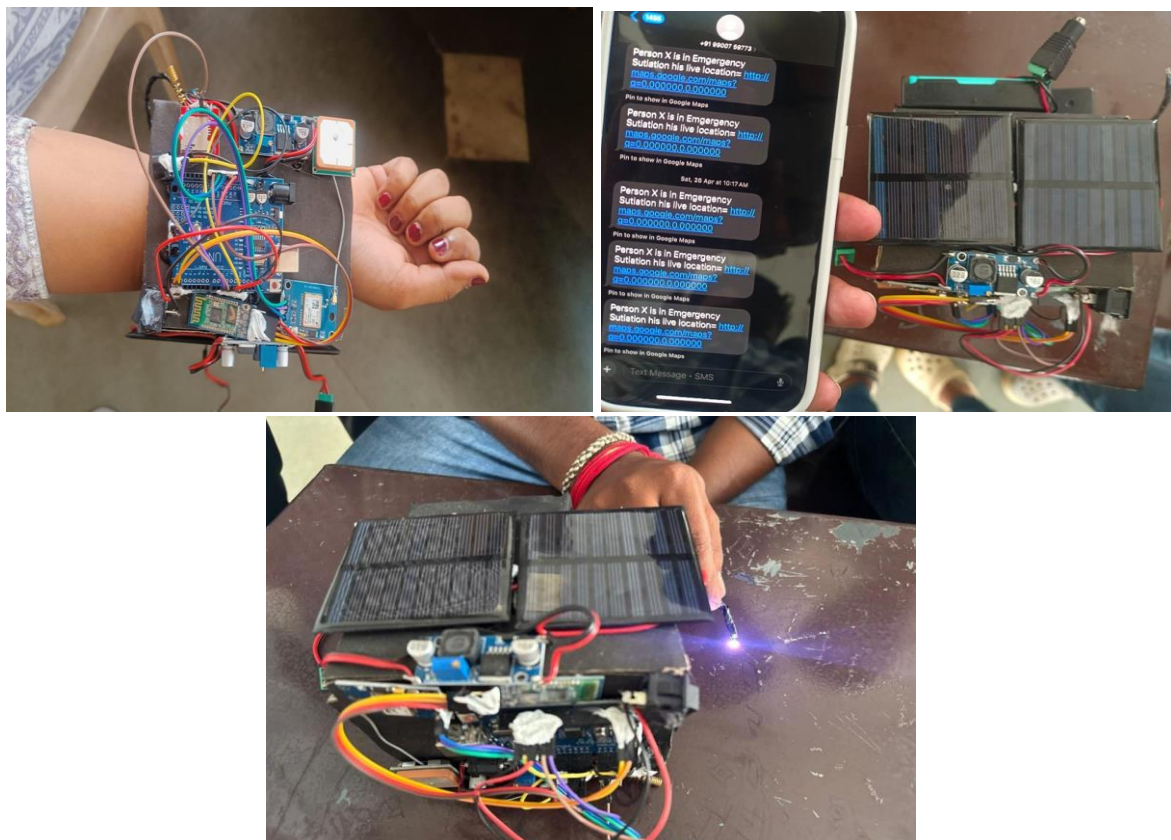


Fig 3: Functionality Testing Result

## V. CONCLUSION

Divya Kavach represents a pioneering step toward integrating embedded technology into culturally sensitive, real-time safety devices for women. By offering a seamless blend of aesthetics and function, the bangle empowers women to act instantly in emergencies. The prototype demonstrated potential through instant alert generation, accurate tracking, and user-friendly design. The dual-mode charging system ensures operation in low-resource settings, thereby enhancing its relevance in rural contexts. This innovation stands as a testimony to how engineering can empower social change.

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