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SMART SAFTY WEARABLE FOR WOMEN

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***Abstract*—Women's safety remains a critical issue in society due to increasing incidents of harassment and assault. This paper proposes the design and development of a smart safety wearable device tailored for women. The wearable incorporates sensors, GPS, GSM, and alert mechanisms to provide immediate assistance in emergency situations. The device is compact, easy to use, and capable of transmitting real-time location information to guardians or authorities, thus ensuring rapid response and enhanced personal security.**

Index Terms— Women safety, wearable technology, IoT, GPS, GSM, smart devices.

I. INTRODUCTION

Women empowerment is strongly linked with their safety and security. Unfortunately, despite the presence of several laws and awareness programs, women continue to face threats in public and private spaces. Conventional safety measures like mobile apps or emergency hotlines often rely on the victim's ability to interact with the device during distress, which may not always be possible.

Wearable technology provides a feasible solution by integrating smart sensors, wireless communication, and emergency alert features into a device that can be worn as a bracelet, pendant, or wristwatch. This project introduces a Smart Safety Wearable that detects emergency situations and sends real-time alerts, thereby providing quick and reliable assistance.

LITERATURE SURVEY

Various safety solutions have been proposed in the past, ranging from mobile applications to GPS-enabled trackers. Mobile apps such as "SOS Alert" and "Himmat" provide location sharing and alert messages, but their dependency on manual operation reduces reliability. Dedicated safety devices like panic buttons or keychain alarms also exist but often fail due to limited range or lack of connectivity.

Recent research highlights the potential of IoT-enabled wearables for women's safety. Wearables using GPS and GSM modules provide real-time tracking, while biosensors such as accelerometers detect abnormal movements. However, existing systems often lack compactness, affordability, and integration of multiple safety features into one device.

Table I. Comparison of Existing Safety Solutions

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Solution Type	Features	Limitations
Mobile Applications	SOS alert, GPS tracking	Requires manual activation
Panic Buttons	Emergency alarm	Limited range
GPS Trackers	Real-time tracking	Bulky, expensive
Proposed Wearable	GPS + GSM + Sensors	Compact, integrated solution

PROPOSED SYSTEM

The Smart Safety Wearable integrates multiple technologies to ensure reliable performance in emergencies. The key components include:

- **Sensors:** Accelerometer and heart-rate sensor to detect abnormal conditions.
- **GPS Module:** To track real-time location.
- **GSM Module:** To send alert messages with coordinates to registered contacts.
- **Microcontroller:** Arduino/ESP32 for controlling the system and data processing.
- **Alert Mechanism:** A buzzer and vibration motor for instant feedback.

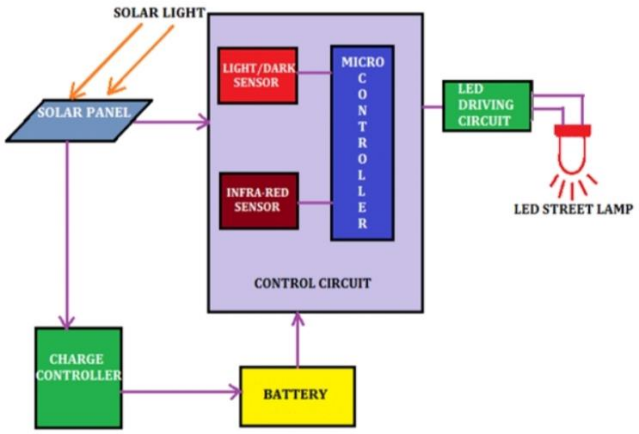

Fig. 1. Block Diagram of Smart Safety Wearable

The wearable remains in standby mode until activated by abnormal movement detection or manual trigger (panic button). Once triggered, it immediately sends the GPS location through SMS or mobile app notification and can activate a loud alarm to attract nearby attention.

RESULTS AND DISCUSSION

A prototype was developed and tested with volunteers under simulated emergency conditions. The system successfully sent alert messages to predefined contacts within 5–7 seconds of activation. The GPS accuracy was approximately 5–10 meters, sufficient for urban rescue scenarios.

Battery life was tested and found to last up to 8 hours of continuous standby, making the device practical for daily usage. Compared with mobile-only applications, the wearable showed better response time and reliability due to its dedicated hardware triggers.

CONCLUSION AND FUTURE SCOPE

The Smart Safety Wearable for Women provides an efficient and reliable means of ensuring personal safety. By combining sensors,

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GPS, GSM, and alert mechanisms, the device minimizes dependency on manual intervention and maximizes the chances of timely assistance.

Future enhancements could include AI-based activity recognition, integration with smart city surveillance systems, and miniaturization for better aesthetics and comfort. Cloud-based data logging could also provide additional safety insights.

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