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Implementation of Safety Device for Women

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A B S T R A C T:

This project presents a compact, easy-to-use portable device aimed at improving the personal safety and health monitoring of women in various settings. It continuously measures essential health indicators such as heart rate, blood oxygen level (SpO_2), and body temperature, with real-time readings displayed on a built-in screen for quick and convenient access.

A standout feature of the device is its emergency alert function, which can be activated by pressing a dedicated panic button. In emergency situations, this immediately engages the GPS module to pinpoint the user's exact location. The device then sends this information, along with a predefined alert message, to a list of selected emergency contacts—such as family members, close friends, or relevant authorities—using mobile communication methods like GSM or SMS.

Designed to be lightweight, discreet, and highly portable, the device is especially useful for women who travel alone, work in remote areas, or have specific health concerns. Its simple and responsive interface ensures it can be operated quickly, even under stress. By integrating continuous health tracking with rapid emergency communication, the device offers a practical and reliable solution for enhancing the safety and well-being of women.

Keywords: Women's safety, emergency, personal safety, immediate, communication, health parameters.

Introduction

This advanced device provides an effective way to enhance women's safety and health with real-time support. It seamlessly integrates vital sign monitoring with an emergency alert feature, enabling users to access assistance promptly when necessary. Its small, lightweight design ensures easy portability, and the user-friendly interface allows for swift operation during emergencies. Suitable for everyday commutes, remote work environments, or medical situations, the device serves as a dependable tool that fosters a sense of security and self-reliance.

Problem Statement

Women's safety remains a pressing issue, particularly in situations where access to immediate assistance is limited. Timely responses during emergencies can make a crucial difference. This project presents a smart, wearable safety device powered by the ESP32 microcontroller, featuring integrated sensors to track body temperature, heart rate, and blood oxygen levels. It also includes GPS and GSM modules, an OLED display, an IoT-enabled alert system, and an emergency activation button. The device continuously monitors both health indicators and the user's location. If abnormal health readings are detected or the emergency button is activated, it promptly sends an alert with the user's real-time location to pre-selected emergency contacts. Compact, lightweight, and easy to operate, this device is built to deliver quick and dependable support in critical situations.

Proposed System

This concept introduces a smart wearable, such as a wristband or smartwatch, designed to enhance women's safety and provide support in emergencies. The device is equipped with sensors that continuously monitor key health metrics, including heart rate, body temperature, and oxygen saturation levels. The device operates in two primary modes:

- **Automatic Alerts**: It automatically triggers an alert if it detects sudden or abnormal changes in the user's health parameters.
- **Manual Activation**: The user can manually initiate an emergency alert by pressing a dedicated panic button on the device.

When activated, the system instantly sends a distress message with the user's live location to a list of trusted contacts, ensuring prompt assistance. A small, built-in display keeps the user informed about their health status and notifies them of any alerts, offering both ease of use and situational awareness.

This wearable is designed to be a dependable solution for personal safety, particularly in critical situations where traditional methods of seeking help may not be feasible.

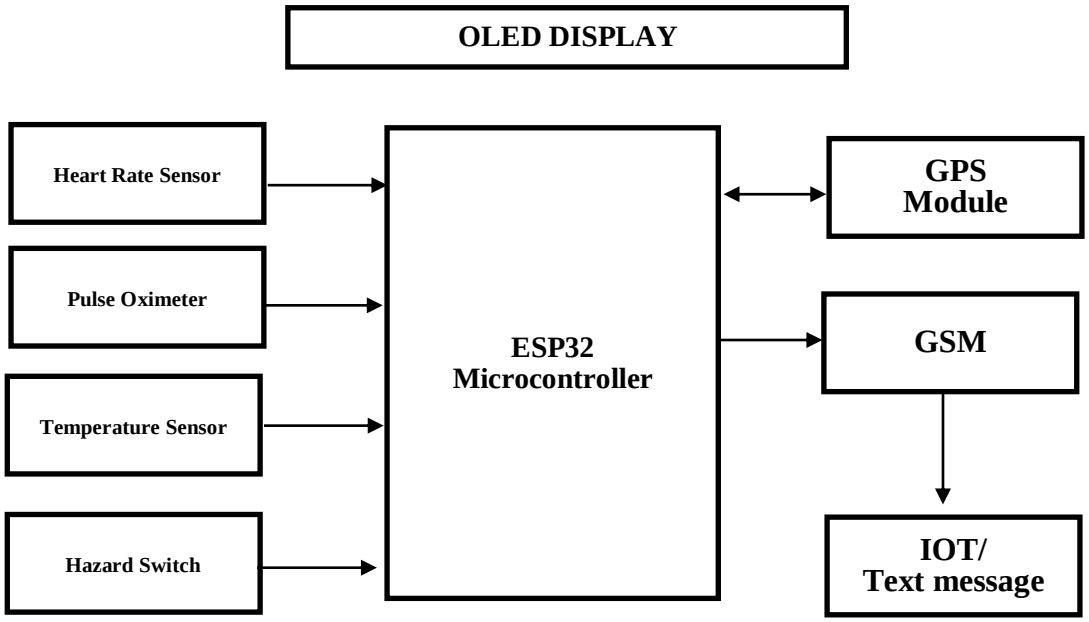

Figure 1: Block Diagram

4. System Components

- Controller (Microcontroller): This is like the brain of the device. It connects and controls all other parts.
- Heart Rate and Oxygen Sensor:This sensor checks the woman's heart rate and oxygen level. If there's a sudden change, the device understands something might be wrong.
- Temperature Sensor:It measures body temperature to see if there's anything unusual.
- Location Tracker (GPS): This shows where the person is. It helps send the exact location in case of an emergency.
- Mobile Network Module (GSM): This part is used to send a text message or make a call to emergency contacts.
- Display (OLED Screen): A small screen that shows important information like heart rate or system status.
- Emergency Button (Panic Button): If the woman feels unsafe, she can press this button to quickly send an alert.
- Sound Alert (Buzzer): It makes a loud noise to get attention and scare off attackers.
- Battery: Powers the whole device so it can work without needing to be plugged in.

5. Working Modules

This wearable safety device is specifically tailored for women, continuously monitoring vital health parameters and environmental factors through integrated sensors. It tracks key metrics such as heart rate, body temperature, and oxygen saturation to detect any signs of distress or irregular conditions.

The device offers both automated and manual emergency response options. If abnormal readings are detected or if the user feels at risk, they can activate the alert system by pressing a dedicated emergency button. Upon activation, the device uses GPS technology to pinpoint the user's exact location and sends this information, along with a distress signal, to a list of pre-selected contacts via a GSM module. Additionally, a loud buzzer is triggered to alert those nearby.

An onboard display provides real-time updates on health metrics and system status. Powered by a rechargeable battery and controlled by a central microcontroller, the device is compact, efficient, and designed for everyday use.

6. Result

The results of testing the women's safety device demonstrate its ability to quickly detect emergencies and respond effectively. When the sensors detect abnormal changes in heart rate, body temperature, or oxygen levels, or when the panic button is pressed, the system promptly sends an alert with the user's location to designated emergency contacts. Additionally, the buzzer activates immediately to attract attention from those nearby. The OLED screen clearly displays the user's health data, and the device's overall response time is fast and dependable. These findings confirm that the device is a valuable tool for ensuring women's safety and enabling rapid assistance in critical situations.

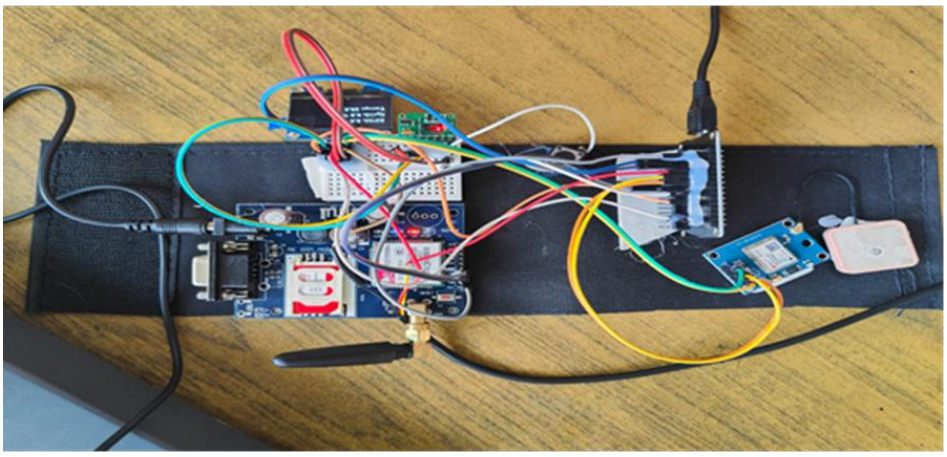

Figure 2: Sample photo of prototype of the model

7.Observation

- The device accurately tracks heart rate, body temperature, and oxygen level.
- It quickly detects unusual health signs or stress conditions.
- The panic button works well for sending immediate alerts.
- GPS provides the user's location correctly in emergency messages.
- The GSM module sends SMS alerts to saved contacts without delay.
- The buzzer gives a loud sound to grab attention during danger.
- The OLED screen shows real-time health and system updates.
- The device is portable and works smoothly on battery power.
- It can be helpful in real-life emergency situations for women's safety.

8. Merits

- Quick Emergency Response: Sends alerts and location information instantly during danger.
- Health Monitoring: Keeps track of vital signs like heart rate and oxygen level.
- Easy to Use: Simple design with a panic button for fast action.
- Portable: Small and lightweight, easy to wear or carry anywhere.
- Real-Time Location Tracking: GPS helps find the exact location of the user.
- Alert Nearby People: The buzzer makes a loud sound to catch attention.
- Increases Safety: Helps women feel more secure, especially when alone.
- Battery-Powered: Works without needing constant charging or connection to power.
- Low Cost: Can be made using affordable components.

9. Conclusion

In conclusion, the women's safety device is a smart and reliable solution designed to help protect women in unsafe situations. By combining health monitoring, location tracking, and emergency alert features, it provides quick support when needed most. The system is easy to use, portable, and works efficiently in real-time. With its ability to send alerts and share the user's location, it can play an important role in preventing harm and ensuring help reaches on time. This device can greatly improve personal safety and give women more confidence in their daily lives.

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