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A Smart Mobile Application for Woman Safety (TruBand)

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Abstract

Women's safety remains a significant social challenge in India despite the availability of various safety applications and emergency support systems. Most existing solutions depend on manual activation, which may not be practical during panic situations. This paper presents TruBand, a Smart Mobile Application for Women Safety developed as a Progressive Web Application (PWA) using Next.js. The system automatically detects emergencies through accelerometer-based shake detection and voice-based distress recognition. Upon detecting danger, the application shares live GPS location with emergency contacts and triggers SMS alerts using Twilio services when internet connectivity is unavailable. The proposed solution emphasizes automation, privacy, low battery consumption, and reliable emergency communication. Experimental results demonstrate high detection accuracy, efficient battery usage, and dependable alert delivery in real-world scenarios.

Keywords: Women Safety, Progressive Web Application, GPS Tracking, Emergency Alert System, Voice Recognition, Shake Detection, Next.js

I. Introduction

Women's safety has become a growing concern across urban and rural regions of India. According to crime reports, incidents involving women continue to increase despite awareness programs and legal measures. Existing safety applications typically require users to manually activate panic buttons or open applications during emergencies.

However, in situations involving fear, panic, or physical restraint, manual activation may not be possible. Therefore, there is a need for a smart safety system capable of automatically identifying danger and initiating emergency response mechanisms.

TruBand addresses this challenge through automatic emergency detection using mobile sensors and cloud-based communication technologies. The application operates as a Progressive Web App, providing accessibility without requiring installation from app stores.

II. Literature Review

Several women-safety applications have been introduced, including Life360, bSafe, Safeet, and Himmat Plus. These applications provide location sharing and emergency communication features.

Research studies on sensor-based safety systems suggest that combining accelerometer data and voice recognition improves emergency detection accuracy. Recent studies report detection accuracies ranging from 90% to 95% using hybrid sensor approaches.

Although existing applications offer useful services, they often suffer from:

- Dependence on manual activation
- High battery consumption
- Lack of background monitoring
- Limited functionality during network failures
- Privacy and security concerns

These limitations motivated the development of TruBand.

III. Problem Statement

Most women-safety applications depend on user interaction during emergencies. In practical situations, users may be unable to unlock devices, open applications, or activate emergency buttons.

The primary problem addressed in this research is:

"How can a women-safety system automatically detect emergencies and provide reliable emergency communication with minimum user interaction?"

IV. Objectives

The major objectives of TruBand include:

1. Automatic emergency detection.
2. Voice-based distress recognition.
3. Shake-based danger identification.
4. Live GPS location sharing.
5. SMS-based fallback communication.
6. Secure data storage and privacy protection.
7. Low battery consumption.
8. Scalability for future deployment.

V. Proposed System Architecture

The proposed architecture consists of three major layers:

A. Sensor Layer

The sensor layer captures information from:

- Accelerometer Sensor
- Microphone
- GPS Module

This layer continuously monitors movement and voice activity.

B. Business Logic Layer

Implemented using Next.js, this layer performs:

- Motion analysis
- Voice keyword matching
- Emergency event generation
- Ale

Figures and Screenshots

Fig. 1

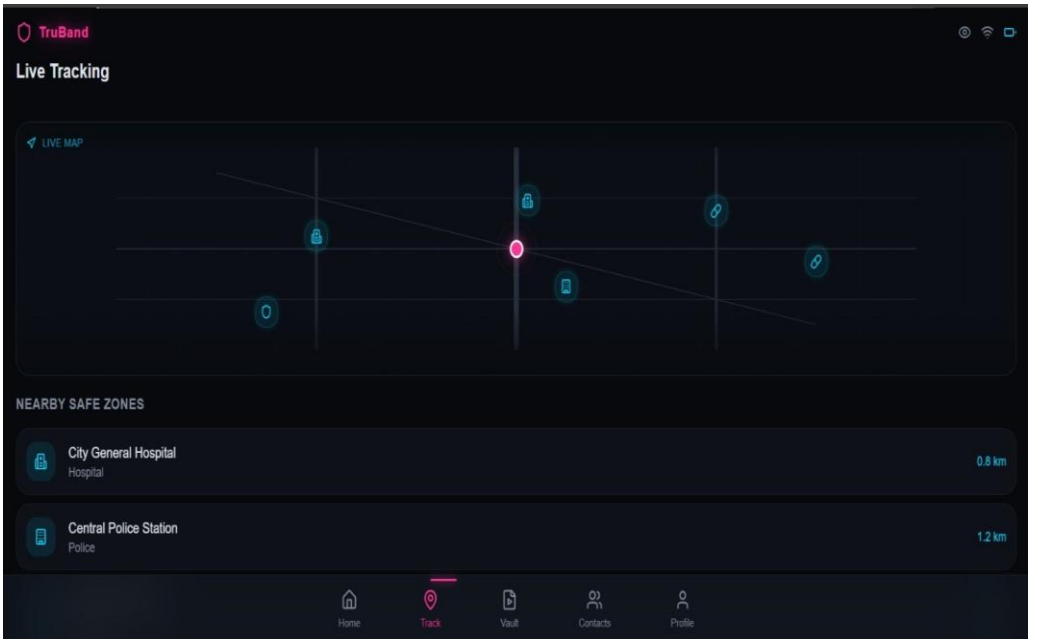

Fig. 2

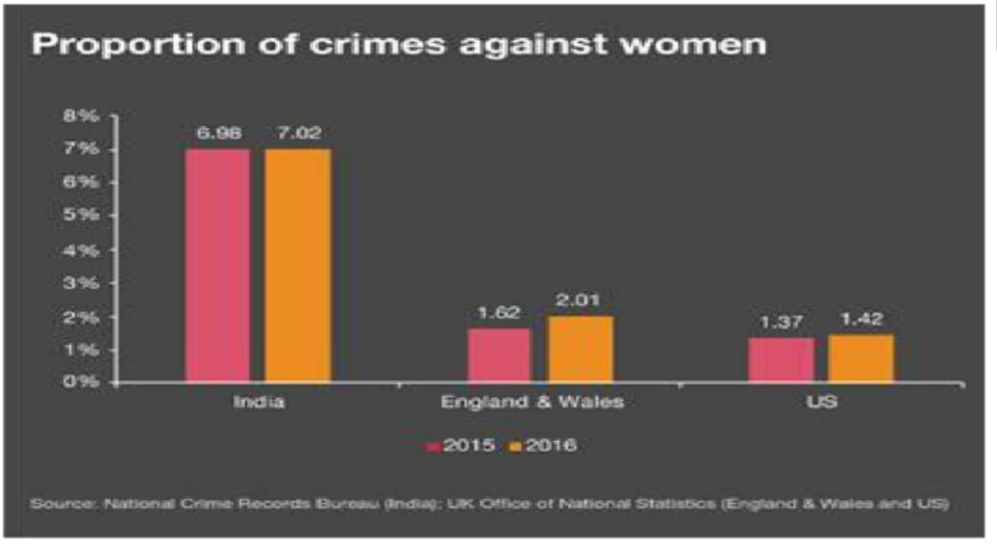

Fig.1. Statistics of international crime records.

Fig. 3

Fig.2. Survey of countries for crime on women

In figure 2 the majority of cases under crime against women under IPC were registered under 'Cruelty by Husband or His Relatives' (30.9%) followed by 'Assault on Women with Intent to Outrage her Modesty' (21.8%), 'Kidnapping & Abduction of Women' (17.9%) and 'Rape' (7.9%) The crime rate registered per lakh women population is 62.4 in 2019 in comparison with 58.8 in 2018", the data shared by NCRB showed.

Fig. 4

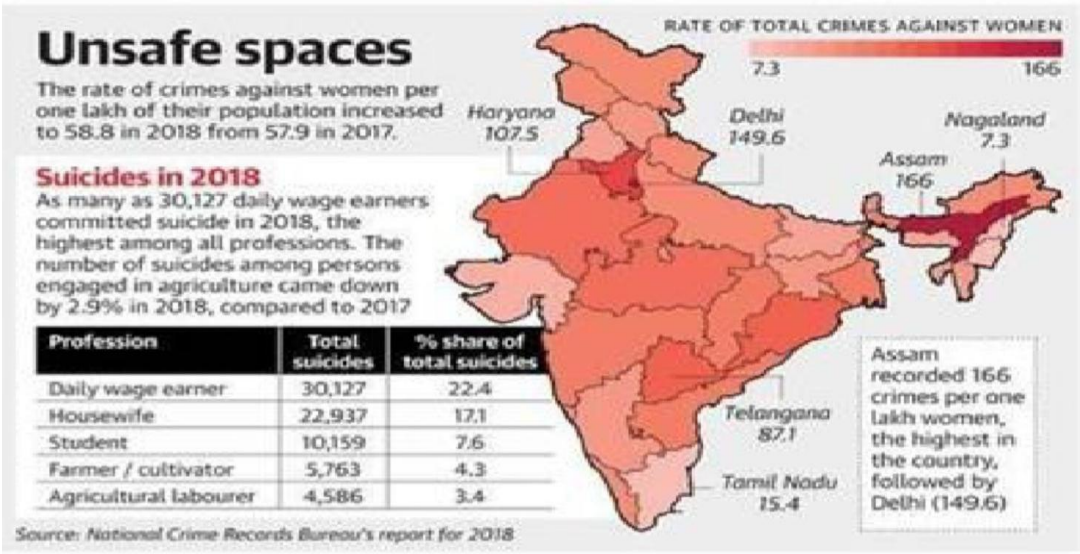

Fig.3.Rate of total crimes against women.

Fig. 5

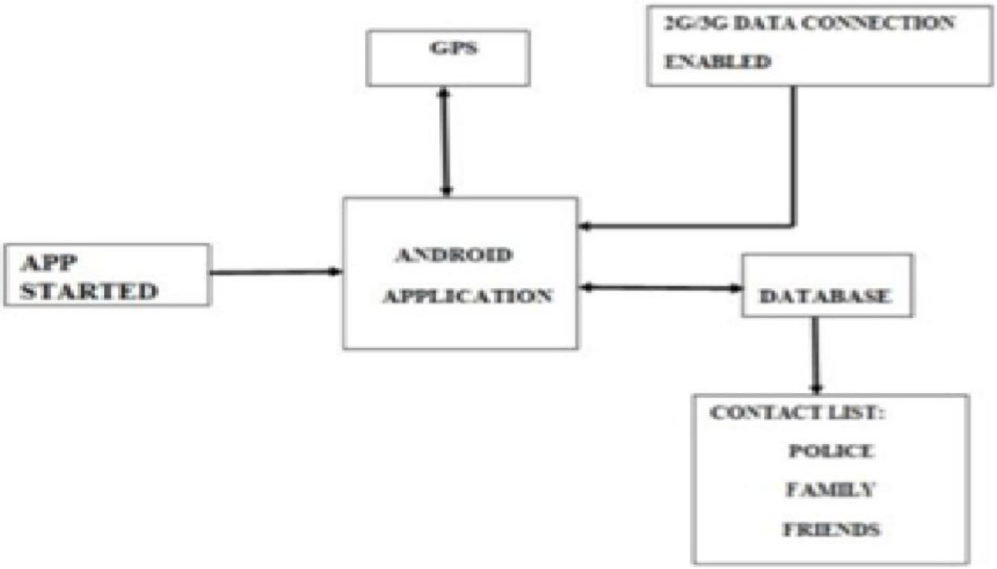

Fig.4. Proposed Architecture on Android App for women safety.

Fig. 6

Fig.5. Implementation of proposed work.

Fig. 7

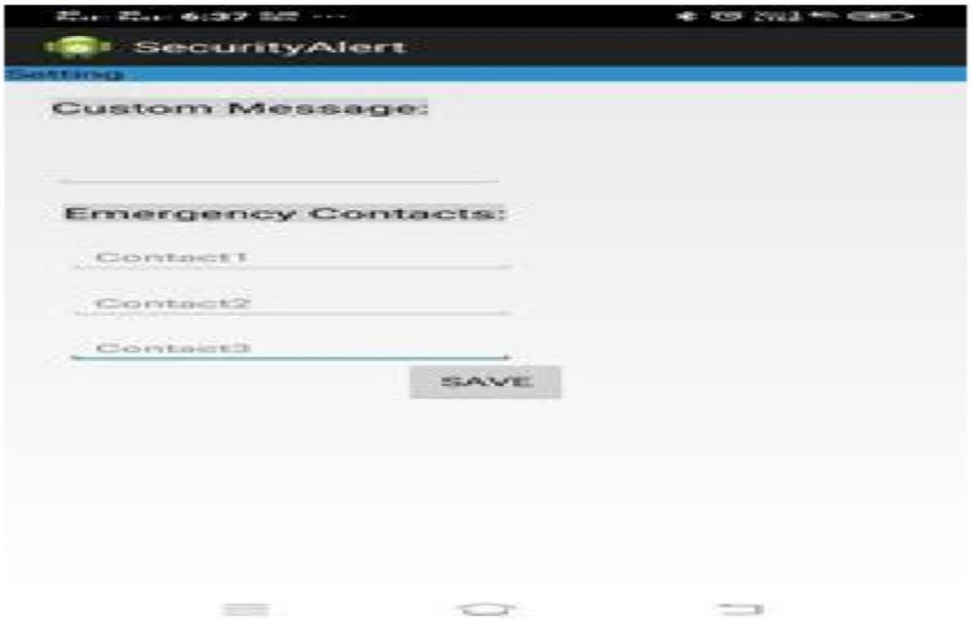

Fig.8. Layout of the second page for details

Fig. 8

Fig.9.Details entered in the application.

Fig. 9

Declaration of Conflicting Interests

The authors declare no potential conflicts of interest with respect to the research, authorship and publication of this article.

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