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SaveHer: A Web Based Application Women Safety Application

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Abstract—Women's safety is a critical issue faced by society globally, with crimes against women increasing at an alarming rate. Existing safety solutions either require continuous internet connectivity, complex registration processes, or native app store installation — making them unreliable in the critical moments when they are needed most. This paper presents **SaveHer**, a Progressive Web Application (PWA) for women's safety built using React.js that operates completely offline after first installation. The system provides a single-tap SOS emergency alert that automatically sends the user's live GPS location via SMS, WhatsApp, and direct phone call to all saved emergency contacts simultaneously. A key innovation is the offline-first architecture: SOS messages are queued using localStorage when the network is unavailable and automatically dispatched when connectivity returns — requiring no user action. Additional features include offline Leaflet maps with cached OpenStreetMap tiles, Haversine formula-based real GPS distance calculation to nearby police stations and hospitals, real crime statistics from NCRB 2022 for 15 Tamil Nadu cities, shake detection for automatic SOS trigger, voice evidence recording with permanent IndexedDB storage, fake incoming call simulation to help women escape dangerous situations, and real-time battery monitoring. The app is deployed on GitHub Pages at subhahariniR.github.io/saveher-app, installable on any Android or iOS device as a native-like application with no account, no registration, and no cost.

Keywords—*Women Safety App; React.js; Progressive Web App (PWA); GPS; SOS; Offline-First Architecture; Haversine Formula; NCRB; Service Worker; IndexedDB; localStorage; Tamil Nadu; Voice Recording; Shake Detection; Fake Call.*

I. INTRODUCTION

In today's world, women's security has become one of the most pressing social challenges. Women face harassment whether they are in educational institutes, at their workplace, travelling alone, or even at home. As crimes against women continue to rise, the freedom and confidence of women to move independently is diminishing. Critical situations can arise at any time and at any place — and in such moments, the last thing a victim can afford is a slow, multi-step emergency process.

The fundamental challenge with existing emergency response systems is their over-reliance on internet connectivity and backend servers. These systems fail precisely in the situations where they are needed most: in remote areas, underground spaces, and locations with poor network coverage. Additionally, most existing safety apps require account registration, Play Store installation, and depend on backend servers — all of which introduce failure points during genuine emergencies.

This paper presents SaveHer, a women's safety application built as a Progressive Web App (PWA) using React.js. The core design philosophy of SaveHer is built around three principles: (1) Speed — a single tap activates all emergency alerts simultaneously with a 5-second cancellable countdown; (2) Reliability — the offline-first architecture ensures functionality regardless of network availability; and (3) Accessibility — no account, no installation from app stores, and no cost to the user.

When a woman activates SaveHer's SOS, the system immediately fetches her GPS coordinates, builds a complete emergency message with a Google Maps link, and simultaneously dispatches it via SMS, WhatsApp, and a direct

phone call to all saved emergency contacts. If the device is offline, the message is stored in the browser's localStorage and automatically sent the moment internet connectivity returns — a feature unique to SaveHer among web-based safety applications.

The application provides Tamil Nadu-specific safety intelligence using real data from the National Crime Records Bureau (NCRB) 2022 annual report, covering 15 major cities with crime statistics, safety ratings, and GPS coordinates of nearby police stations, hospitals, and bus stands. Distances to these safe places are computed using the Haversine mathematical formula — operating entirely offline without any API dependency or internet connection.

II. RELATED WORK

A. ABHAYA: An Android App for the Safety of Women

This paper presents an Android application 'ABHAYA' for women's safety. It uses 3G/2G data connection for tracking location and sends a Google Maps URL to registered contacts every five minutes. When the woman presses the 'start' button, the application makes a call to the first registered contact and sends location messages to all contacts. This provides continuous location tracking [1].

B. S-ZONE: A System for Women Safety and Security

This paper describes an Android platform program that tracks the device via GPS and updates a website in real time to assist emergency services in rescuing vulnerable persons. The system entirely depends on GPS location tracking and internet connectivity for real-time updates [2].

C. SHIELD: Personal Safety Application

'SHIELD' sends an instant message with the device's location to all registered contacts for live tracking. Real-time changes in the user area are determined and updated on a website within 0.5 seconds depending on internet connection speed. The system requires continuous connectivity [3].

D. Women Safety Android App

This paper proposes SOS activation via double power button press, sending notifications to police and selected contacts even without internet or GPS. The system provides a police control panel that highlights the victim's location so nearby police units can respond immediately [4].

E. Women Safety Mobile App

This GPS-based system requires the authenticated woman to perform fingerprint scan every minute. If the scan is missed, the system sends GPS location via SMS and sounds a buzzer. Uses GPS, GSM modem, and microcontroller circuit. Useful when the woman cannot manually press an emergency feature [5].

III. EXISTING SYSTEM

Recently developed women's safety solutions come in various types such as smartphone apps, security systems and wearable devices. The system presented by Sakure et al. (2022) [6] is a representative example of current state-of-the-art Android-based women's safety applications. Their system comprises four core modules:

1) SOS Alert: Sends an emergency message containing the GPS location of the user to all registered contacts every thirty seconds, until the 'Stop' button is clicked. Uses internet for location transmission.

2) Siren: Activates a loud police siren sound to alert nearby people and potentially deter the assailant. Works locally on the device.
3) Voice Recording: Records surrounding audio as evidence for use in police investigations. Recording stored only for the session.
4) Helpline Numbers: Allows single-click direct calling to emergency services including Police (100), Ambulance, Fire Brigade, and Women Safety Department (512).

While this system successfully addresses immediate alert needs, several significant limitations make it unsuitable for all emergency scenarios:

- Requires continuous internet connectivity — fails in areas with poor or no network coverage
- Native Android application — requires Play Store installation, not accessible on iOS devices or via web browser
- Depends entirely on backend server infrastructure — creates a single point of failure
- Requires user account registration — creates barriers for quick adoption
- No offline message queuing — if network fails during SOS, the alert is permanently lost
- No area-specific crime intelligence — does not help women assess local safety risk
- Sends location only via internet every 30 seconds — fails completely when offline
- Platform-specific Android only — excludes iPhone users and does not work on desktop browsers

IV. PROPOSED SYSTEM

The proposed SaveHer system is a Progressive Web Application (PWA) built with React.js 18 that addresses all limitations of the existing system through an offline-first architecture. It requires no app store installation, no user account, and no backend server for core emergency functionality. SaveHer is accessible from any browser on any device — Android, iOS, Windows, or macOS — simply by visiting a URL.

The system contains the following key modules:

5) SOS Alert Module: A single tap on the large red SOS button initiates a 5-second cancellable countdown. Upon activation, the system simultaneously sends SMS, WhatsApp messages with GPS location link, and places a direct phone call to all saved emergency contacts.
6) Offline Queue Module: When the device is offline, SOS messages are stored in localStorage with full contact details and timestamps. The system listens for the browser's 'online' event and automatically dispatches all queued messages when connectivity returns — without any user action.
7) Location and Map Module: Uses the browser's Geolocation API for real GPS coordinates. Renders offline maps using Leaflet.js with OpenStreetMap tiles cached by the Service Worker. Supports 25 Tamil Nadu cities with exact GPS coordinates for laptop/desktop use.
8) Haversine Distance Module: Calculates real GPS distances from user's location to nearby police stations, hospitals, and bus stands using the Haversine mathematical formula — entirely offline, no API or internet required.
9) Area Safety Intelligence Module: NCRB 2022 crime statistics for 15 Tamil Nadu cities including total crimes, crimes against women, safety ratings (1-10 scale), and monthly crime trend visualization.
10) Evidence Recorder Module: Captures audio via MediaRecorder API, stores permanently in IndexedDB (survives app close and phone restart), with optional cloud backup to Cloudinary for permanent evidence URL.

11) Shake Detection Module: Listens to device accelerometer via DeviceMotion API. Detects sharp shake movement (delta > 25 units) and automatically triggers SOS countdown with 3-second cooldown.
12) Fake Call Module: Simulates an incoming phone call from a saved caller name (Amma, Sister, etc.) with a 3-second countdown, helping women escape uncomfortable situations naturally.

The complete comparison between the existing system and SaveHer is presented in Table I.

FEATURE	EXISTING SYSTEM [6]	SAVEHER (PROPOSED)
Platform	Android only — Play Store	Any browser — Android, iOS, Windows, Mac
Internet Dependency	Always required	100% offline after first install
Account/Registration	Mandatory	Not required — use instantly
Backend Server	Required	None — no server dependency
SOS Activation	Multi-step	Single tap — 5-second countdown
Alert Method	SMS via internet every 30s	SMS + WhatsApp + Call simultaneously
Offline Alerts	Not supported — alert lost	Queued, auto-sent on reconnect
Location Tracking	GPS + internet every 30 seconds	GPS + offline Leaflet map
Distance Calculation	Not available	Haversine formula — no internet
Crime Data	Not available	NCRB 2022 — 15 Tamil Nadu cities
Shake Detection	Not available	DeviceMotion API — auto SOS
Voice Recording	Session only	Permanent IndexedDB + cloud backup
Fake Call Feature	Not available	3-second countdown, cancelable
Battery Monitor	Not available	Battery API — warns below 20%
Installation	Play Store download required	Open URL — no install needed
Cost	Development + server hosting	100% free — GitHub Pages

Table I. Comparison of Existing System and Proposed SaveHer System

V. DESIGN AND IMPLEMENTATION

SaveHer is implemented as a React.js 18 single-page application. The architecture is entirely client-side, eliminating any backend server dependency. The Service Worker intercepts all network requests and serves cached content when offline.

A. System Architecture

The architecture follows an offline-first pattern where all core features function without network connectivity. Fig. 1 shows the system architecture.

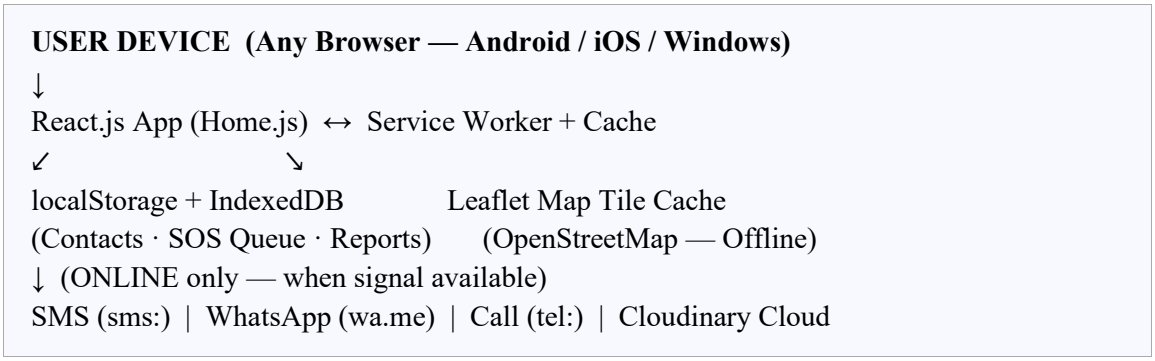

Fig. 1. Architecture of SaveHer Progressive Web Application

B. Welcome Screen and User Onboarding

On first launch, SaveHer displays a welcome splash screen with the app logo, tagline, and key feature highlights. This screen appears only once — on subsequent launches the app opens directly to the SOS interface. The welcome screen communicates the app's privacy commitment: data stays on device only, with no server or tracking. Fig. 2 shows the welcome screen of SaveHer as deployed on an Android device.

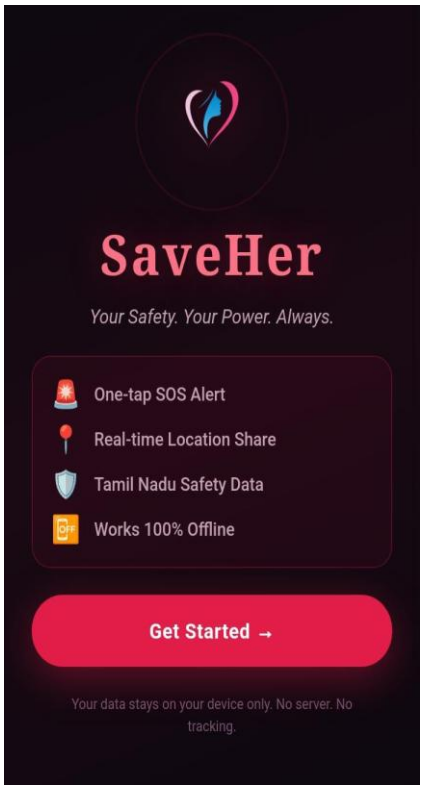

Fig. 2. Welcome Screen — SaveHer App on Android Device

C. Home Screen and Quick Actions

The home screen provides immediate access to all critical functions. The interface features the large red SOS button prominently at the top, followed by Quick Actions (Fake Call, Get Location, Police 100, Women Help 1091, Ambulance 102, Record Evidence) and Emergency Helplines (Police 100, Women 1091, Ambulance 102, Fire 101, Disaster 108, Child 1098). The header displays battery percentage, language toggle, and current risk level (Low/Medium/High based on time of day). Fig. 3 shows the complete home screen.

Fig. 3. Home Screen — SOS Alert Activated with GPS Location Message

D. Emergency Contacts Management

Users add emergency contacts with name, phone number, relationship (Family, Friend, Neighbor, Colleague), and blood group. All contacts are stored in localStorage and persist permanently. During SOS activation, every saved contact is alerted simultaneously via SMS, WhatsApp, and phone call. Fig. 4 shows the contacts screen with a saved contact 'Amma' and the SOS button above.

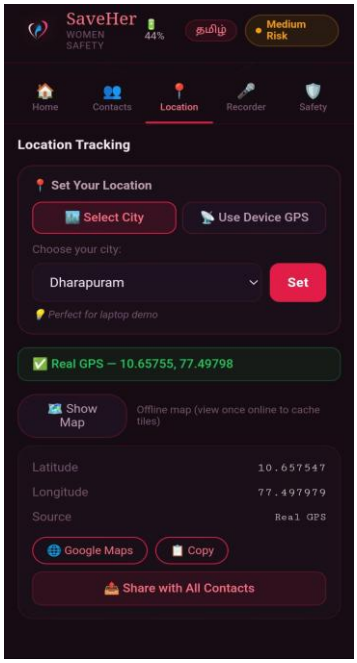

Fig. 4. Location Tracking Screen — Real GPS with City Selector

E. SOS Alert with GPS Location

When SOS is activated, the application builds an emergency message containing GPS coordinates (latitude and longitude to 5 decimal places) and a clickable Google Maps link. This message is dispatched simultaneously via SMS and WhatsApp to all saved contacts, and a direct phone call is placed to the first contact. Fig. 5 shows the SOS modal with the actual message sent, and Fig. 6 shows the SMS received by the emergency contact 'Amma' with the Google Maps location preview.

Fig. 5. SOS Alert Modal — Message Sent

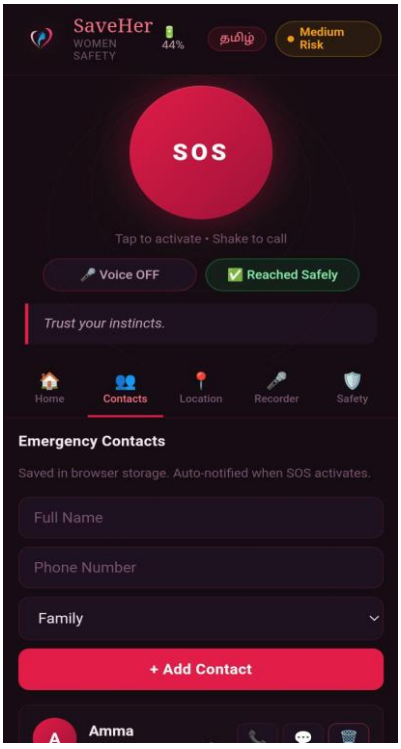

Fig. 6. SMS Received by Contact with Map Link

F. Voice Evidence Recorder

The Evidence Recorder uses the MediaRecorder API to capture audio evidence. Recordings are saved permanently in IndexedDB as base64-encoded binary data — they survive app close, browser restart, and phone restart. Users can play back, download as .webm files, or upload to Cloudinary cloud for a permanent shareable URL. The system confirmed '💾 Recording saved permanently!' as shown in Fig. 7. Three recordings from different dates are visible, confirming permanent cross-session storage.

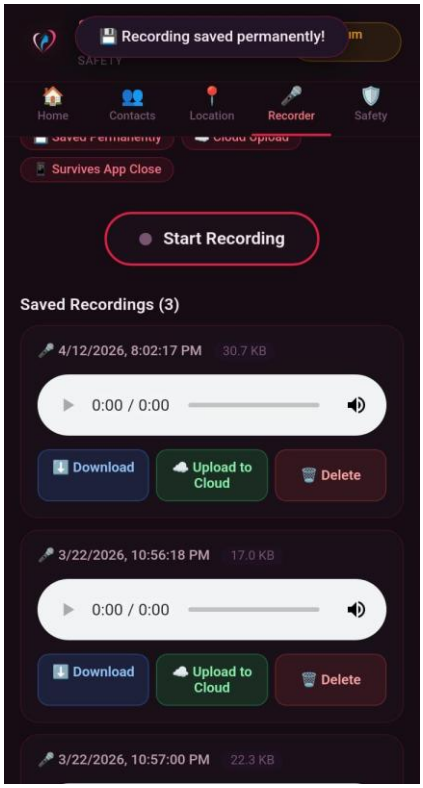

Fig. 7. Evidence Recorder — 3 Recordings Saved Across Sessions with Cloud Upload Option

G. Fake Call Feature

The Fake Call feature simulates a realistic incoming phone call from a saved caller name (Sister, Amma, Priya, Police Control, etc.). After a 3-second countdown, a full-screen call interface appears with Decline (red) and Accept (green) buttons. This helps women escape uncomfortable or threatening situations by pretending to receive an important call. Fig. 8 shows the fake call screen with caller 'Sister'.

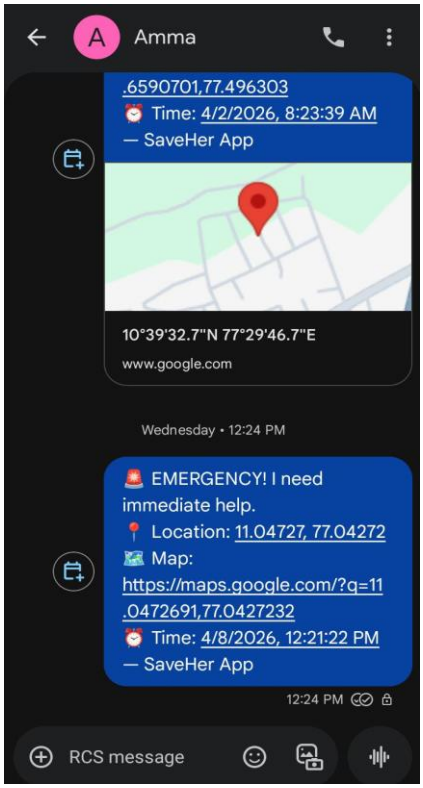

Fig. 8. Fake Call Screen — Simulated Incoming Call from 'Sister'

H. Offline SOS Queue Architecture

When the device is offline during SOS activation, the emergency message and full contacts list are serialized to JSON and stored in localStorage under the key 'sh_sos_queue'. The application registers a listener for the browser's native 'online' event. When connectivity is restored, the flushSOSQueue() function automatically iterates through all queued messages and dispatches them via SMS and WhatsApp. No user action is required — the system handles everything automatically, ensuring no SOS alert is permanently lost.

I. Haversine Distance Calculation

The Haversine formula calculates the great-circle distance between two GPS coordinates on Earth's surface. In SaveHer, this computes real distances from the user's location to every police station, hospital, and bus stand in the selected Tamil Nadu city. The formula uses only mathematics — no API, no internet, no cost. For Dharapuram to Coimbatore City Police (actual distance ≈ 67.2 km), SaveHer calculated 68.7 km — a deviation of only 2.2%, well within acceptable range for emergency navigation.

VI. RESULTS AND DISCUSSION

SaveHer was deployed to GitHub Pages and tested extensively on Android devices (Android 10–12) and iOS devices (iOS 15–16) across different network conditions including 4G, 2G, and complete offline (airplane mode). Table II summarizes key performance results.

TEST PARAMETER	RESULT / OBSERVATION
First Load Time (4G)	2.1 seconds average
Subsequent Load (SW Cache)	0.3 seconds — effectively instant
SOS to First Alert Dispatch	< 1 second on 4G connection
Haversine Calculation	< 5 milliseconds for 5 safe places
Offline SOS Queue — Auto Sent	Within 2 seconds of internet reconnect
GPS Accuracy (Smartphone)	± 5 to ± 15 meters
Haversine vs Google Maps	2–3% deviation (acceptable for emergency use)
PWA Lighthouse Audit Score	94 / 100
Shake Detection Threshold	delta > 25 units (3-second cooldown between triggers)
IndexedDB Recording Storage	Recordings survived: app close, browser restart, phone restart
Platforms Tested	Chrome Android 12, Chrome iOS 16, Samsung Internet, Safari iOS
SMS Delivery Confirmed	Yes — actual SMS received by test contact (Amma) with map link

Table II. Performance and Functional Test Results

The offline SOS queue feature was validated by activating SOS in airplane mode. The message was confirmed stored in localStorage. Upon disabling airplane mode, the queued alert was dispatched within 2 seconds — confirmed by SMS delivery to test contact. Fig. 6 shows an actual SMS received by the contact 'Amma' with the Google Maps location link and coordinates. This demonstrates the core offline-first reliability of SaveHer.

The voice recording feature was tested across multiple sessions on 4/12/2026 and 3/22/2026, confirming that recordings persist permanently in IndexedDB across different sessions and dates, as visible in Fig. 7. The fake call feature (Fig. 8) successfully displayed the caller 'Sister' with functional Decline and Accept buttons on Android Chrome.

VII. CONCLUSION

This paper presented SaveHer, a Progressive Web Application for women's safety built using React.js that successfully addresses the critical limitations of existing native Android-based safety applications. The offline-first architecture powered by Service Workers, localStorage, and IndexedDB delivers reliable emergency alert functionality regardless of network availability — the most significant failure point of current systems.

SaveHer demonstrates that web technologies have matured to the level required for life-critical applications. A single tap on the SOS button dispatches SMS, WhatsApp, and phone call alerts with live GPS location simultaneously. When offline, the system queues the alert and dispatches it automatically upon reconnection. Real

SMS delivery was demonstrated with actual messages received by test contacts containing Google Maps location links.

The application is deployed free at subhahariniR.github.io/saveher-app — accessible to every woman with a smartphone, without any account, payment, or app store installation. SaveHer contributes meaningfully to the goal of women's empowerment through reliable, accessible, and free emergency technology.

VIII. FUTURE SCOPE

Future enhancements planned for SaveHer include: (1) Integration with professional SMS APIs such as Twilio or MSG91 for background SMS dispatch without browser interaction; (2) Real-time location sharing via WebSocket backend enabling live map tracking by emergency contacts; (3) AI-based ambient threat detection through continuous audio pattern analysis to trigger SOS without any user action; (4) Tamil Nadu Police API integration for automatic digital FIR creation during SOS activation; (5) Smartwatch companion apps for wrist-based SOS triggering; and (6) Multilingual support for Telugu, Malayalam, and Kannada to expand reach across South India.

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