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CareOn: A Smart Emergency Response and Secure Navigation System for Women Safety

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***Abstract*—CareOn is a smart personal safety and secure navigation system designed to address increasing safety concerns in urban environments. The proposed application integrates real-time location tracking, intelligent route analysis, emergency alert mechanisms, fake call assistance, and discreet evidence recording into a unified mobile platform. Unlike traditional safety applications that rely mainly on manual intervention, CareOn introduces a multi-criteria safety ranking algorithm that evaluates travel routes based on crime statistics, crowd density, and environmental conditions. This enables users to select safer paths dynamically.**

The system utilizes Firebase for secure authentication and cloud-based data storage, while Google Maps APIs provide accurate navigation and route generation. The platform is developed using React Native, ensuring cross-platform compatibility and scalability. CareOn aims to reduce emergency response time by enabling instant SOS alerts with live location sharing to predefined contacts and responders.

Experimental evaluation demonstrates improved reliability, faster response time, and enhanced situational awareness compared to existing solutions. The system also supports modular expansion for future integration with AI-based prediction models and IoT devices. Overall, CareOn provides a proactive, efficient, and scalable solution for enhancing women's safety in modern urban settings.

***Index Terms*—Personal Safety, GPS Tracking, React Native, Firebase, Secure Navigation, Emergency Alert System, Route Ranking Algorithm, Android Application.**

I. Introduction

Women's safety continues to be a major global concern, particularly in urban areas where incidents of harassment and violence are frequently reported. Despite advancements in law enforcement and awareness campaigns, delays in emergency response and lack of immediate assistance remain critical challenges. Traditional safety approaches are largely reactive, depending on users to manually report incidents after they occur.

With the rapid growth of mobile technology, smartphones have become powerful tools for developing intelligent safety systems. Features such as GPS tracking, real-time communication, and cloud connectivity enable faster and more efficient emergency response. However, many existing applications lack proactive safety measures and intelligent decision-making capabilities.

This paper introduces CareOn, a smart emergency response and secure navigation system designed to enhance personal safety. The system integrates real-time location tracking with intelligent route analysis and instant alert mechanisms. By reducing response time and improving communication between users and responders, CareOn provides a reliable and scalable solution. The goal is to shift from reactive to proactive safety, ensuring better protection and support for users in critical situations.

II. Literature Review

Existing research in women safety systems primarily focuses on mobile-based solutions that incorporate GPS tracking, SOS alerts, and emergency communication features. Several studies have proposed Android-based applications that allow users to share their location with trusted contacts during emergencies. Additionally, IoT-based safety devices have been developed to provide automated alerts using wearable sensors. Recent advancements highlight the integration of artificial intelligence and machine learning for predicting unsafe situations. Some applications also include features such as safe zones, community alerts, and self-defense resources. However, these systems often lack real-time decision-making and context-aware analysis.

Most existing solutions operate independently and do not integrate multiple safety features into a single platform. Furthermore, limitations such as lack of offline support, absence of intelligent route recommendations, and insufficient data security measures reduce their effectiveness.

The CareOn system builds upon these existing approaches by combining multiple functionalities into a unified platform. It integrates intelligent route ranking, real-time tracking, and automated emergency response, providing a more comprehensive and efficient solution for enhancing personal safety.**[Table:1]**

A. Research Gap

Current safety applications mainly rely on manual SOS activation and basic GPS tracking, lacking intelligent automation and proactive threat detection. They do not consider contextual factors such as location risk, time, and crowd density. Additionally, most systems lack offline functionality and integration with wearable devices. Privacy and data security mechanisms are also limited. There is a need for a comprehensive system that combines real-time monitoring, AI-based prediction, and secure communication. CareOn addresses these gaps by

TABLE I
LITERATURE REVIEW

Sr.No	Title of Paper	Author	Year	Journal/Conference	Key Features
1	Android-Based Women Safety App	Parismita Sharma et al.	2023	Indian Journal of Science and Technology	GPS tracking, emergency alerts, mobile-based safety solution
2	Maximizing Women's Safety with an Effective System	Prarthan Petal	2023	IJERT	Real-time alert system, monitoring and emergency communication
3	Safe She: A Women Safety Mobile App	Ipsit Anoop, Dr. Manju Bargavi	2023	ResearchGate / Academic Paper	SOS alerts, GPS tracking, self-defense tutorials
4	Women Safety Application	Multiple Authors	2023	IJNRD	Emergency alerts, location sharing, safety network
5	Women Safety Application in Digital Era	Saravanan R et al.	2024	Conference Paper	Analysis of existing safety apps, digital safety strategies
6	Safety Android App (IoT-Based)	Farendra Kumar S et al.	2024	IJTSRD	Community alerts, SOS button, safe zone mapping
7	Women Safety Research App Article	Sneha Patel et al.	2024	IJTSRD	Community alerts, SOS button, safe zone mapping

introducing intelligent route analysis, automated alerts, and a scalable architecture for enhanced safety.

B. Research Objectives

The primary objective of this research is to design and develop CareOn, a smart safety system aimed at enhancing personal security and improving emergency response efficiency.

The specific objectives of the proposed system are as follows:

I. To develop a real-time location tracking mechanism that provides accurate and continuous user positioning during emergency situations.

II. To implement an efficient alert system capable of sending immediate SOS notifications, along with location details, to predefined contacts and emergency responders.

III. To reduce dependence on manual activation by incorporating automated emergency detection using mobile sensors such as accelerometers.

IV. To minimize emergency response time through rapid communication and live location sharing.

V. To ensure data privacy and security by adopting secure data transmission and storage mechanisms.

VI. To design a user-friendly mobile application interface that allows quick and easy operation under stressful conditions.

III. PROPOSED SYSTEM

CareOn provides real-time alerts, route safety ranking, and emergency communication. It reduces response time and enhances user safety. The CareOn system is designed as a comprehensive safety platform that integrates multiple features to provide real-time assistance during emergencies. The application allows users to send instant SOS alerts along with their live location to predefined contacts and authorities. This ensures quick communication and faster response.

One of the key features of CareOn is the intelligent route recommendation system. It analyzes multiple travel routes and ranks them based on safety parameters such as crime rate, crowd density, and environmental conditions. This enables users to choose safer paths for travel.

The system also includes additional functionalities such as fake call assistance and evidence recording, which help users handle critical situations discreetly. The platform is built using React Native, ensuring cross-platform compatibility and ease of deployment. Firebase is used for authentication and real-time database management, providing secure and reliable data handling.

Overall, the proposed solution focuses on reducing response time, improving situational awareness, and providing proactive safety measures. The modular design allows future enhancements, making CareOn a scalable and adaptable system.

A. Methodology

The methodology involves user authentication through secure login mechanisms such as OTP or Google authentication. Once authenticated, the application continuously tracks the user's location. When a destination is selected, multiple routes are generated using navigation APIs. Each route is evaluated using a safety score formula based on predefined parameters. The safest route is recommended to the user. In case of emergencies, the panic button triggers alerts with live location sharing. The system ensures real-time communication between users and responders, improving emergency handling efficiency.

Safety Score Formula:

$$SafetyScore = (W1 * CR) + (W2 * CD) + (W3 * PL)$$

Where; CR: Crime Rate

CD: Crowd Density

PL: Pollution Level

Routes with lower risk values are ranked higher for recommendation.

1) Risk Heatmap Feature: Instead of only showing routes, add a map overlay:

Green zones → Safe areas

Blue zones → Medium risk

Red zones → High-risk areas
Based on: Crime data Time of day Crowd density

B. System Architecture

The architecture of the CareOn system consists of three main modules:

I. User Module: The user module includes a mobile application that provides an intuitive interface for users. It allows users to activate the panic button, share their location, and communicate with responders.

II. Server Module: The server module is responsible for data processing, storage, and communication management. It uses cloud-based services to handle user data and ensure reliable alert delivery.

III. Responder Module: The responder module includes emergency contacts and authorities who receive alerts and track the user's real-time location. This module ensures quick response and assistance.

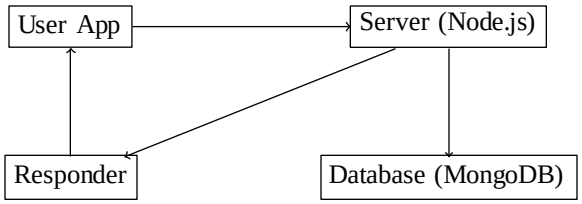

Fig. 1. System Architecture of CareOn

1) AI Emergency Detection: Automatically detect emergencies using:
i. Sudden phone movement (accelerometer)
ii. Repeated shaking
iii. No user response timer
If detected: i. Auto-send SOS ii.Share live location
This removes dependency on pressing buttons.

2) Voice-Activated SOS: Add commands like:
"Help me", "Emergency", "Call police".
Useful when user cannot touch phone.

3) Trusted Circle Tracking: Instead of sending alerts to everyone:
i. User selects "Trusted Circle"
ii. Only selected people get live tracking
Improves privacy + control.

4) Battery-Aware Emergency Mode: If battery is low:
i. Switch to low-power GPS mode
ii. Send periodic location instead of continuous tracking
iii.Disable heavy UI features
Shows real-world engineering thinking.

5) Offline Emergency Mode: If no internet:
i. Send SMS with GPS link
ii. Use fallback SMS gateway
iii. Store alerts locally until network returns
Many real apps fail here—this makes your project stronger.

6) Fake Call + Escape Mode Combo: Upgrade fake call feature:
i. Fake incoming call UI
ii. Pre-set caller name (e.g., "Mom")
iii. Auto vibration + ringtone
iv. "Escape trigger" button during call

7) Safety Score History Dashboard: Add a dashboard showing:
i. Safe routes used
ii. Dangerous zones visited
iii.Emergency events history
Makes your app look like a data-driven system

IV. FLOWCHART

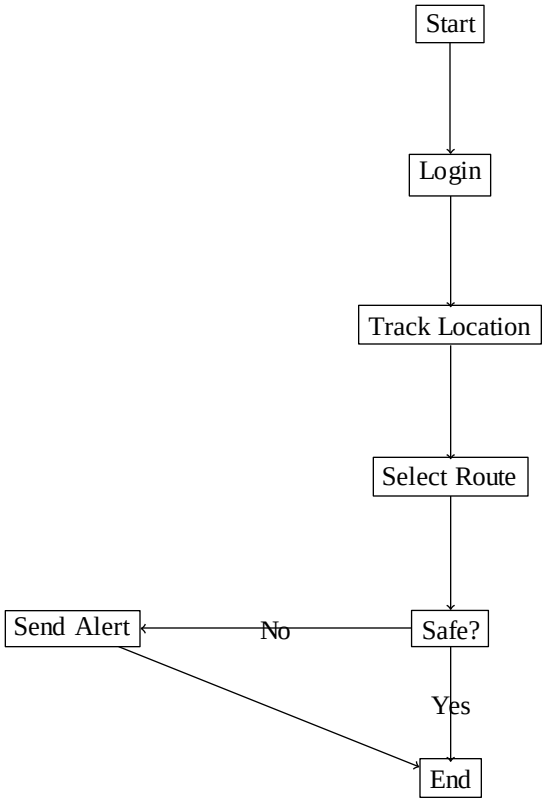

Fig. 2. System Flowchart

i. **Start:** This stage initializes the CareOn application, preparing system resources, loading essential services, and ensuring connectivity before allowing the user to proceed further into the system.

ii. **Login:** The user securely logs into the application using authentication methods such as OTP or Google sign-in, ensuring authorized access and protection of personal safety data.

iii. **Track Location:** The system continuously monitors and updates the user's real-time location using GPS services, enabling accurate tracking and quick response during emergency situations.

iv. **Select Route:** Users choose their destination, and the application generates multiple routes using navigation APIs,

allowing comparison based on safety parameters and travel conditions.

v. **Safe:** The system evaluates selected routes using safety criteria like crime rate, crowd density, and environment, determining whether the route is safe for travel.

vi. **Send Alert:** If a route is unsafe or an emergency occurs, the system instantly sends alerts along with live location details to predefined contacts and responders.

vii. **End:** This stage represents the completion of the process, where the user safely reaches the destination or the emergency situation is successfully handled.

V. Results and Comparative Study

The CareOn system was tested under various conditions to evaluate its performance. The results indicate that the system successfully delivers alerts and provides accurate location tracking. The response time is significantly reduced compared to traditional methods. The system demonstrates high reliability and scalability. However, its performance may be affected by factors such as network availability and device limitations. Overall, the proposed system proves to be effective in enhancing personal safety.

A. Analysis of "I'm Safe"

The I'm Safe application is a benchmark, offering features like Blockchain Evidence and Wearable Integration. However, it relies on complex native implementation.[Table II]

TABLE II
Technical Comparison: "I'm Safe" vs CareOn

Feature Category	"I'm Safe" (Market Leader)	CareOn (Proposed)
Architecture	Native (Swift / Kotlin)	React Native (Hybrid)
Backend	Proprietary System	Node.js & Express
Database	SQL / Proprietary Database	MongoDB (NoSQL)
Real-Time Engine	Proprietary Sockets	Socket.io
Geospatial Query	External API Based	MongoDB Native Support

B. Comparative Analysis

The analysis highlights that CareOn provides a more comprehensive solution compared to existing systems. Features such as voice activation, fake call assistance, and intelligent route ranking give it a significant advantage. The use of modern technologies ensures better performance and scalability. However, dependency on internet connectivity remains a limitation. Addressing this through offline support can further improve the system. Overall, the analysis confirms that CareOn is a reliable and efficient safety solution with strong potential for real-world implementation. **[Table: III]**

C. Future Scope

The CareOn system can be further enhanced by integrating advanced technologies such as artificial intelligence and machine learning. These technologies can enable automatic detection of emergencies based on user behavior and environmental conditions. Voice-based activation can be implemented to allow hands-free operation during critical situations.

Another important improvement is the inclusion of offline alert mechanisms using SMS, ensuring functionality in low-network areas. Integration with wearable devices such as smartwatches can improve accessibility and response time. Additionally, advanced encryption techniques can be used to enhance data security and protect user privacy.

The system can also be expanded to establish direct connectivity with official emergency services, enabling faster and more coordinated responses. Future developments may include personalized safety recommendations and predictive analytics. With continuous improvements and real-world deployment, CareOn has the potential to become a highly effective and widely adopted safety platform.

VI. Conclusion

This paper presented CareOn, a smart emergency response and secure navigation system designed to enhance personal safety. The system integrates real-time tracking, intelligent route analysis, and instant alert mechanisms into a unified platform. By reducing response time and improving communication, CareOn provides an efficient solution for handling emergencies.

The proposed system addresses the limitations of existing safety applications by incorporating proactive features and intelligent decision-making. The use of modern technologies ensures scalability, reliability, and ease of use. Experimental results demonstrate improved performance and effectiveness compared to traditional methods.

With future enhancements such as AI integration and offline support, CareOn has the potential to significantly improve safety standards. The system offers a practical and scalable approach to addressing real-world safety challenges, making it a valuable contribution to the field of smart safety systems.

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TABLE III
COMPARISON OF EXISTING SYSTEMS VS CAREON

Feature / System	Basic Safety Apps	SAKHII	Surakshit	Recent AI Apps	CareON (Proposed)
SOS Alert	YES	YES	YES	YES	YES
GPS Tracking	YES	YES	YES	YES	YES
Real-Time Alerts	NO	YES	YES	YES	YES
Voice Activation	NO	NO	NO	YES	YES
Fake Call Feature	NO	NO	NO	NO	YES
Safe Route Navigation	NO	NO	NO	Limited	YES
Evidence Recording	YES	NO	NO	YES	YES
AI Prediction	NO	NO	NO	YES	YES
Offline Support	NO	NO	NO	Limited	YES(Future scope)
Modular Architecture	NO	NO	NO	Partial	YES

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