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Stree Raksha: An Intelligent Women Safety System using Smart Technologies

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Abstract - **Women's safety remains a major concern, especially during travel and late working hours. This project aims to develop an AI-based Women Safety Application that ensures both physical security and emotional well-being. The app allows users to enter start and end destinations for real-time location tracking and sends safety alerts at preferred intervals. If the user fails to respond, an automatic SOS is triggered, sending alerts to guardians, nearby police stations, and community users in the vicinity. A dedicated SOS button enables immediate help by sharing the user's name, contact number, and live location with the nearest police station. For night-shift workers, a continuous alert mode provides frequent safety checks. In addition to safety, the app includes emotional wellness features such as a personal journal, music recommendations, and an AI chatbot for support and comfort. Unlike existing solutions this app combines safety technology and mental wellness, providing holistic protection for women.**

Keywords: Women Safety, SOS System, Location Tracking, Community Alert, Emotional Well-being, AI Chatbot, Music Therapy, Safety Monitoring, Smart Security, Emergency Response.

I. INTRODUCTION

Women's safety is a growing global concern, especially with rising urbanization and crime rates. Many incidents occur where immediate help is unavailable, and delays in response can lead to serious consequences, highlighting the need for effective technological solutions.

Traditional safety methods rely on manual actions like emergency calls, which can be unreliable due to delays, panic situations, and lack of coordination. Existing mobile applications offer basic features such as SMS alerts or location sharing but often lack automation, real-time tracking, and intelligent response.

With advancements in mobile computing, GPS and it is now possible to develop smarter systems that respond instantly. Stree Raksha is proposed as a comprehensive solution that integrates these technologies into a single platform. The main objectives are:

- Reduce response time
- Provide real-time assistance
- Enhance communication efficiency
- Improve overall safety for women

II. LITERATURE REVIEW

Numerous research studies and applications have been developed to enhance women's safety using technology. Most systems focus on either location tracking or emergency messaging but lack a complete integrated approach.

Limitations of Existing Systems:

- Lack of real-time communication
- Limited automation
- Poor user interface
- Inefficient response mechanisms

Need for Improvement:

- Integrated functionalities
- Real-time performance
- Minimal user interaction
- Reliable communication

III. METHODOLOGY

A. *User Registration and Authentication*

User registration is the initial step of the system, enabling personalized safety services. Users provide essential details such as name, phone number, and emergency contacts, which are used to send alerts during emergencies.

The system performs data validation to ensure accuracy, such as verifying phone number formats and avoiding duplicate entries. Secure authentication methods like passwords or

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OTP verification are used to restrict access to authorized users only.

B. *Emergency Alert Activation*

The emergency alert activation is the core feature of the system, designed for quick use during stressful situations. A prominently placed panic button allows users to trigger alerts instantly with a single tap.

Once activated, the system automatically captures the user's location, generates an alert message, and notifies emergency contacts within seconds. It is optimized to function in low-network conditions by using SMS as a fallback, ensuring reliable communication.

C. *Location Tracking*

Location tracking is a critical component of the system, as it enables emergency contacts to identify the exact position of the user. The system uses Global Positioning System (GPS) technology to obtain accurate geographic coordinates.

Once the panic button is pressed, the system captures the user's real-time location. In addition to this, it continues to track the user's movement by updating location data at regular intervals. This continuous tracking is essential in situations where the user is moving, such as in a vehicle or while being followed.

The system ensures that the location data is:

- Accurate
- Updated frequently
- Easily shareable

D. *Alert Communication*

The alert communication module sends emergency notifications to predefined contacts,Community(registered user's of Stree Raksha in 5km radius)when the panic button is activated. The alert message includes a predefined message, the user's location, and a timestamp.

Alerts are delivered through multiple channels such as SMS and internet-based messaging (email) to ensure reliability. SMS acts as a fallback in low-network conditions.

The system ensures low latency, enabling alerts to be sent instantly and improving the chances of timely assistance.

E. *Data Management*

Data management is crucial for ensuring system reliability and efficient operation. The system securely stores user data, emergency contacts, alert logs, and location history using structured databases.

This ensures:

- Efficient storage
- Quick retrieval
- Data consistency

Additionally, alert history can support legal or safety investigations when required.

IV. System Architecture

A. *Frontend Layer*

The frontend layer is the user-facing part of the application. It is responsible for providing an intuitive and user-friendly interface that allows users to interact with the system easily.

The design of this layer focuses on simplicity and accessibility. Since the application is intended for emergency use, it is crucial that users can navigate it quickly without confusion. Key features include:

- User registration and login screens
- A clearly visible panic button
- Real-time location display

B. *Backend Layer*

The backend layer handles all core functionalities of the system. It acts as the central processing unit, managing communication between the frontend and the database.

Key responsibilities include:

- Authenticating users
- Processing emergency alerts
- Managing communication services

When an alert is triggered, the backend processes the request, retrieves required data, and ensures messages are delivered to the correct contacts. It also manages errors and maintains system reliability.The backend is designed to handle multiple requests simultaneously, ensuring smooth performance and responsiveness even during high usage.

C. *Database Layer*

The database layer is responsible for storing all system data in an organized manner. It maintains:

- User profiles
- Emergency contact lists
- Alert records
- Location history

The database ensures data integrity and consistency, meaning that information remains accurate and reliable over time.Security measures such as encryption and access control are implemented to protect sensitive information. Efficient database design also ensures fast data retrieval, which is crucial for real-time operations.

V. System Design

A. *Sequence Diagram*

The sequence diagram visually represents the interaction between the user, the system, and emergency contacts. It shows the step-by-step process that occurs after the panic button is pressed.

This includes:

- User initiating the alert
- System processing the request
- Backend sending notifications
- Contacts receiving alerts

This diagram helps developers understand the communication flow and ensures proper system implementation.

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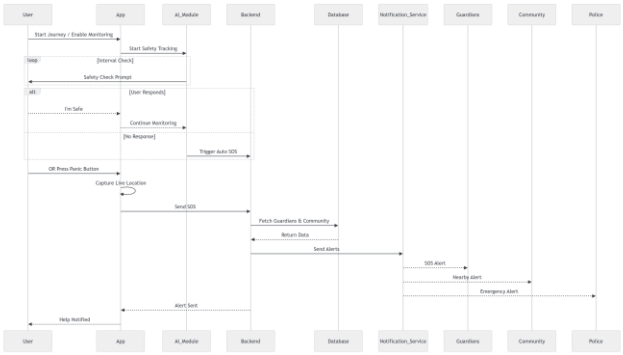

Fig. 1. Enter Caption

B. *Emergency Flow*

The emergency flow describes the exact sequence of operations during an emergency situation.

When the user presses the panic button, the system immediately captures the GPS location. It then generates an alert message containing the user's details and location. This message is sent to emergency contacts without any delay.

The process is fully automated, which eliminates the need for manual intervention and ensures quick response.

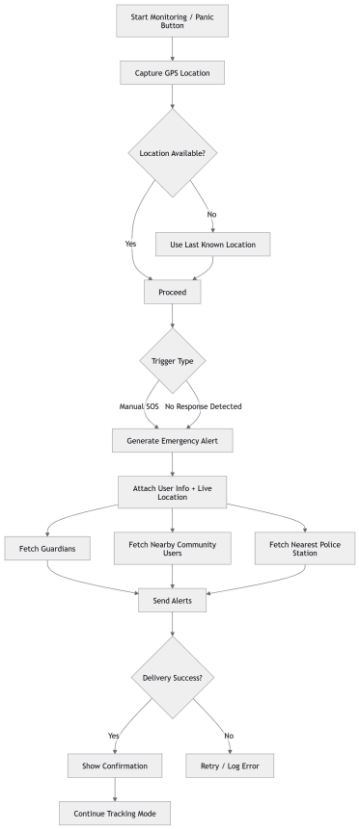

Fig. 2. Enter Caption

C. *Flowchart*

The flowchart provides an overall view of the system workflow. It starts from user login and continues through alert activation, communication, and tracking.

This representation helps in understanding system logic and identifying potential improvements.

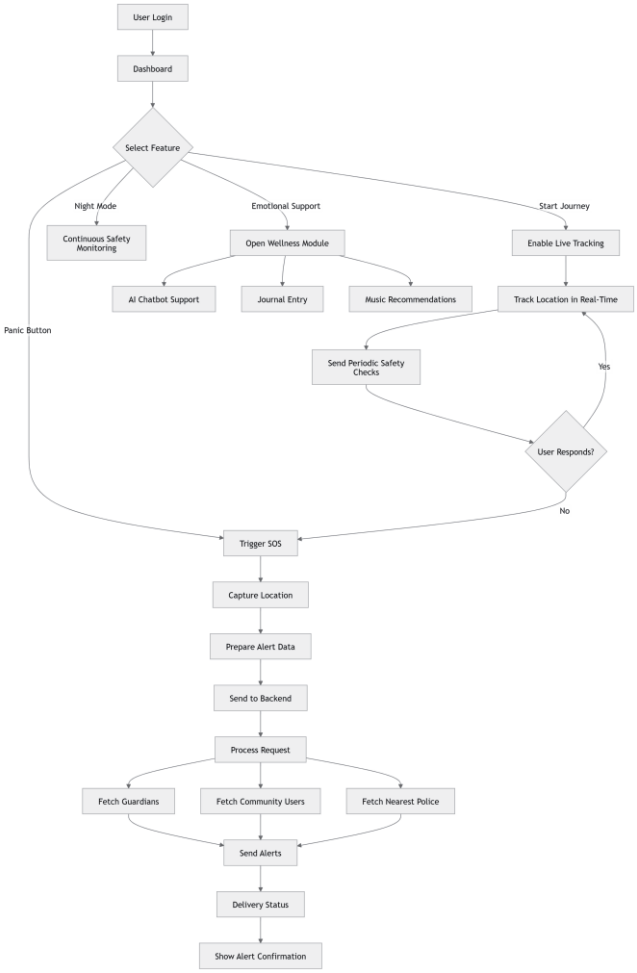

Fig. 3. Enter Caption

D. *UI Screens*

The UI screens of the Stree Raksha system are designed for quick and easy access during emergencies. It includes login, dashboard, SOS alert, and location tracking screens. The interface is simple, responsive, and allows users to send alerts instantly, ensuring fast and reliable safety support.

VI. TECHNOLOGIES USED

- Frontend: React Native
- Backend: Node.js, Express.js
- Database: MongoDB
- APIs: geoapfy, Twilio, Nodemailer, OpenAI API

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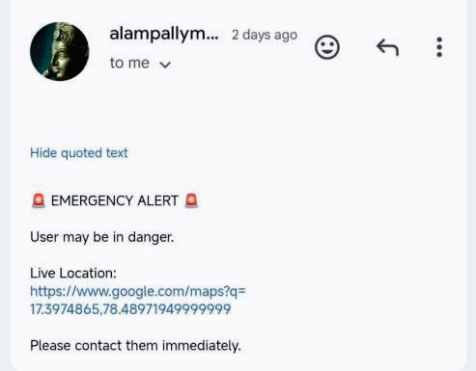

Fig. 4. Email alert

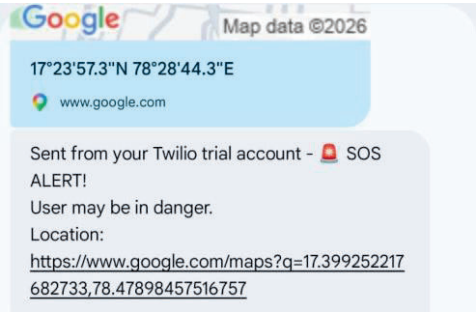

Fig. 5. SMS Alert

VII. Results

A. *Emergency Alert Testing*

A key feature of the system is its ability to send emergency alerts instantly after the panic button is activated. Testing showed that alert messages were generated and delivered within a few seconds.

These alerts included the user's location and a predefined message. The use of both SMS and internet-based messaging improved reliability, especially in low-network conditions.

The results confirm that the system provides a fast and reliable response, which is essential in emergency situations.

B. *GPS Accuracy Evaluation*

Accurate location tracking is a key feature of the system. The GPS module was tested in various environments such as open areas, urban regions, and indoor locations.

Results showed that the system provided real-time location data with high accuracy and regular updates for continuous tracking. Although minor variations occurred in weak signal areas, overall performance remained reliable.

Additionally, the system can use alternative location services when GPS signals are weak, ensuring consistent functionality across different real-world conditions.

C. *Usability Testing*

The GPS module was tested in different environments and provided accurate real-time location with regular updates. Minor variations occurred in weak signal areas, but overall tracking remained reliable.

The system also uses alternative location services when GPS is weak, ensuring consistent performance in real-world conditions.

D. *Performance Analysis*

Performance testing evaluated the system's speed, responsiveness, and reliability using metrics like response time, message delivery time, and latency.

Results showed low latency with minimal delay between user actions and system responses. Alerts were delivered quickly and consistently, and the backend efficiently handled multiple requests without performance issues.

Overall, the system is suitable for real-time operations and reliable for deployment in real-world environments.

E. *Reliability and Stability*

The system was also tested for stability over prolonged usage. It was observed that the system maintained consistent performance without crashes or failures. Continuous tracking and repeated alert triggering did not affect system functionality.

This demonstrates that Stree Raksha is a reliable and robust system, capable of functioning effectively under various conditions.

F. *UI Screens*

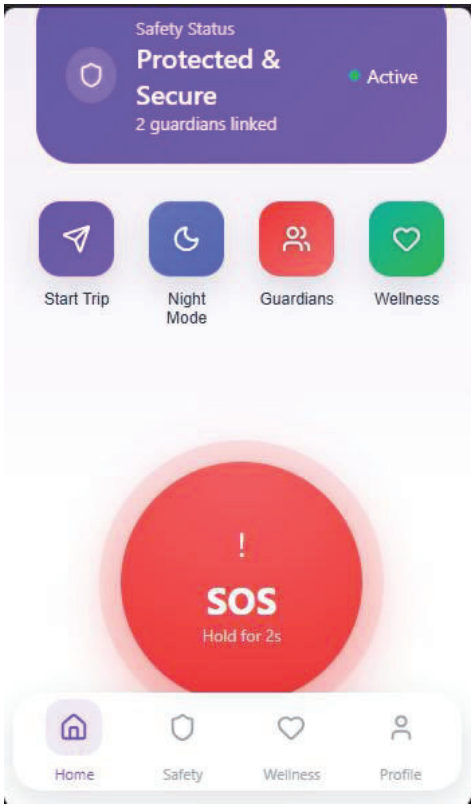

Fig. 6. Safety Dashboard

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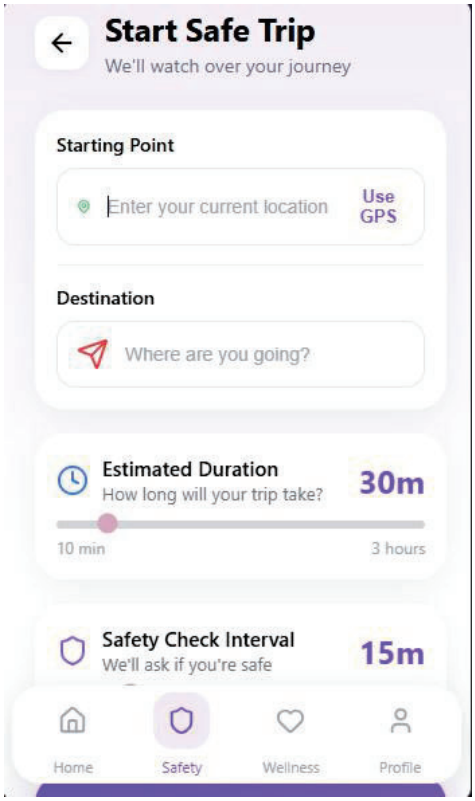

Fig. 7. Trip Setup

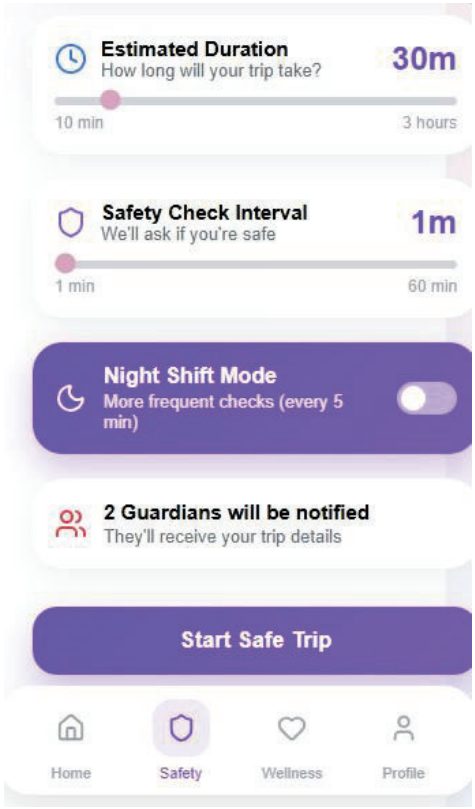

Fig. 8. Live Tracking

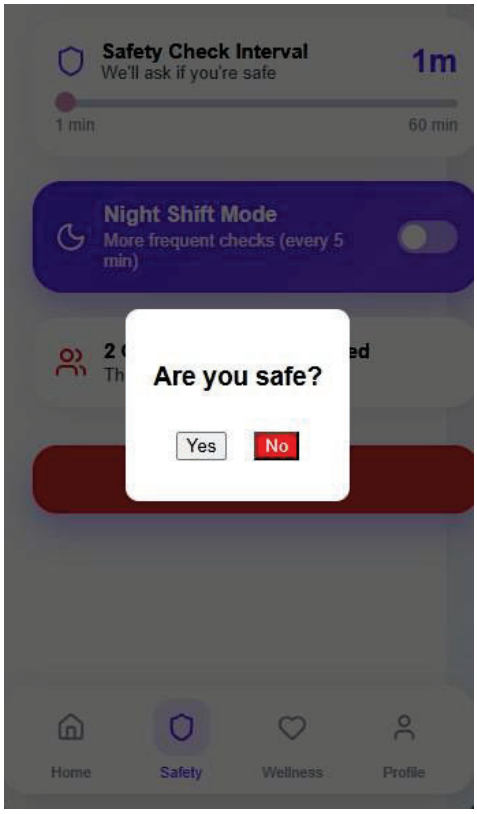

Fig. 9. Safety Check

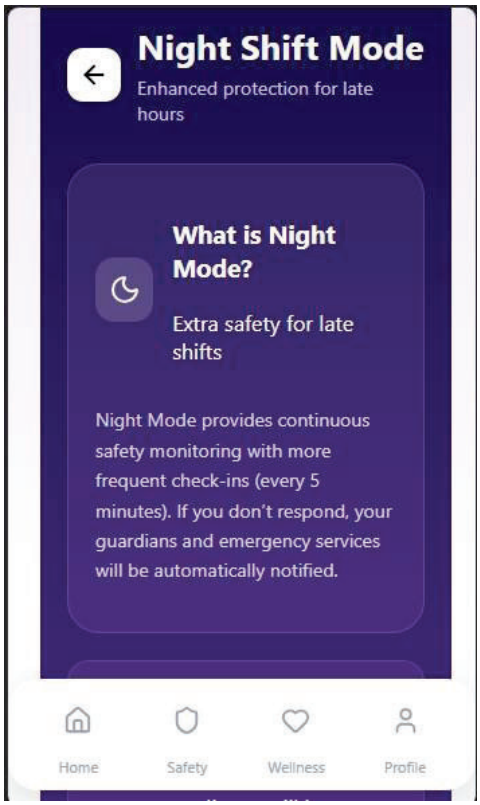

Fig. 10. Night Mode

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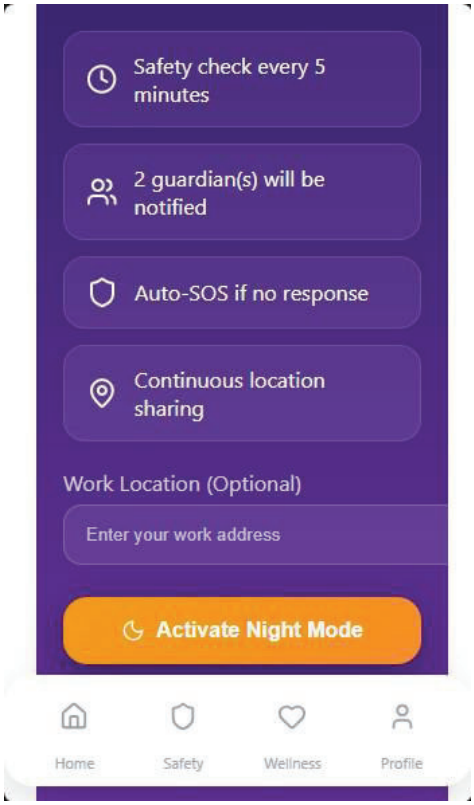

Fig. 11. Night Mode Setup

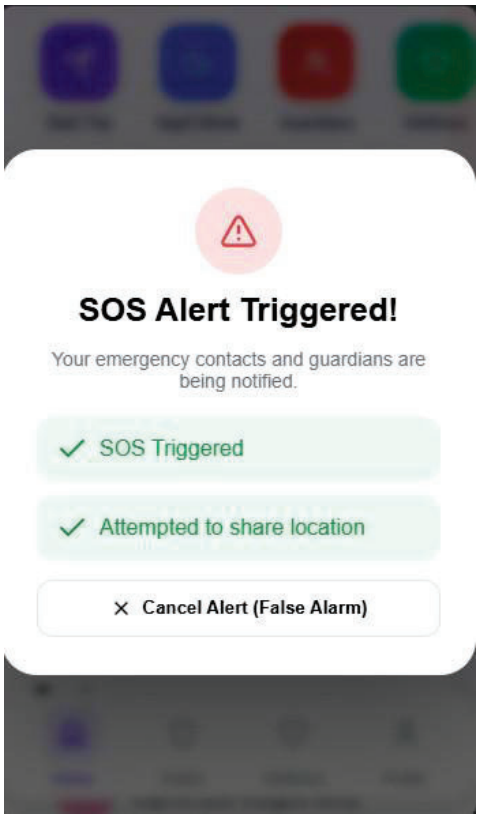

Fig. 12. SOS Triggered

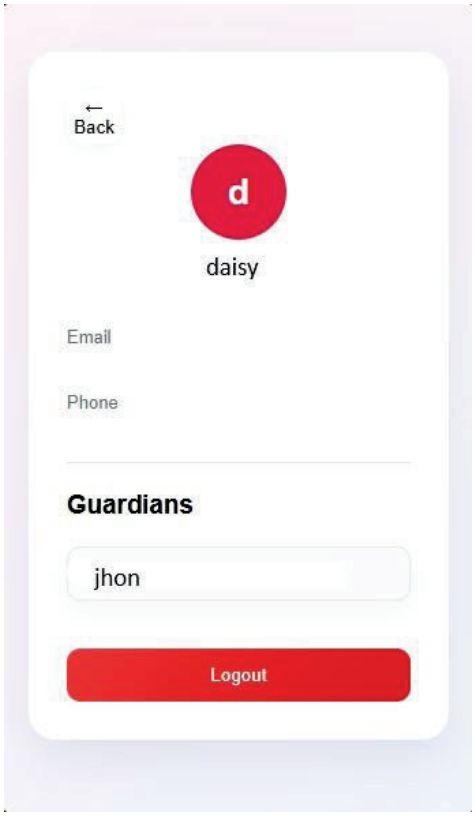

Fig. 13. Profile page

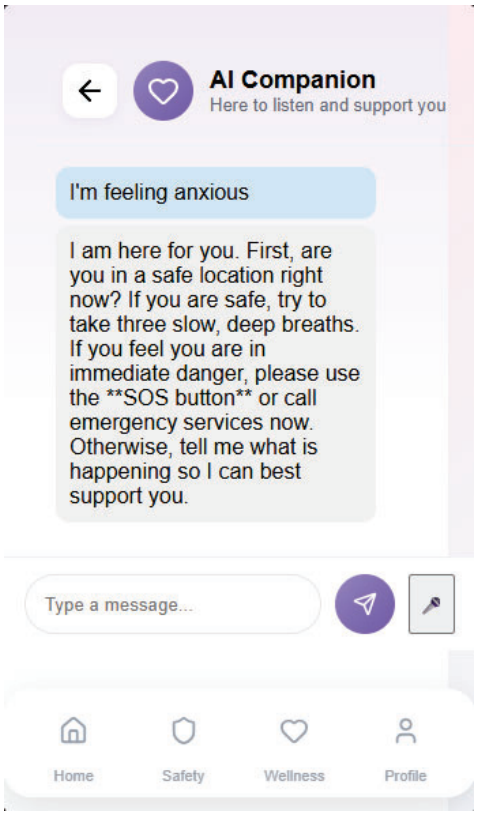

Fig. 14. AI Chat

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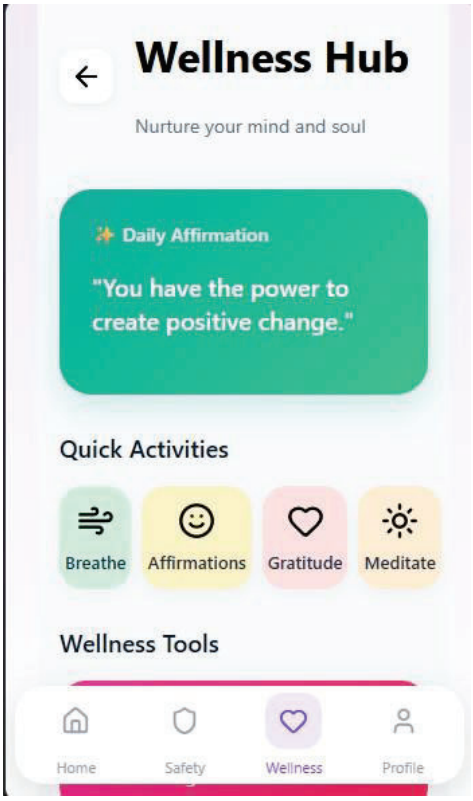

Fig. 15. Wellness Hub

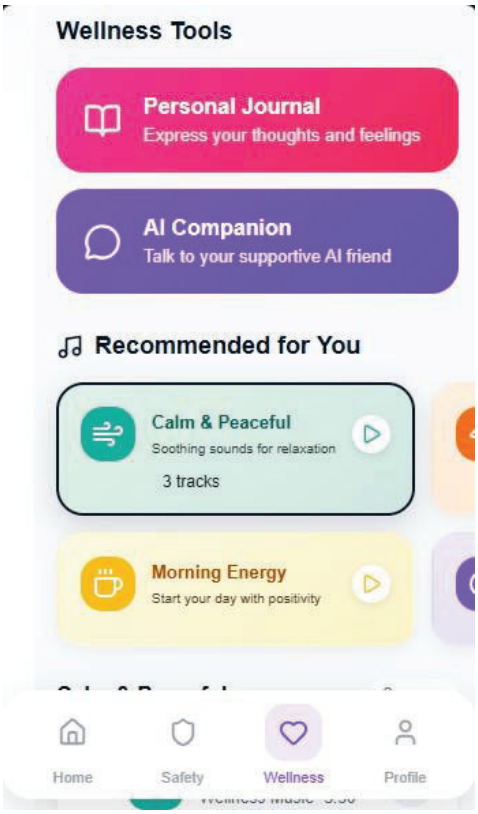

Fig. 16. Wellness Tools

VIII. FUTURE SCOPE

While Stree Raksha provides a strong foundation for women's safety, there is scope for further enhancements using advanced technologies. Voice-based activation can enable users to trigger alerts through voice commands, especially when they cannot access their phones. AI-based risk detection can analyze user behavior and surroundings to identify potential threats and provide proactive alerts. Integration with wearable devices like smartwatches allows users to send alerts more conveniently without using their phones. Connecting the system with police and emergency services can further improve response time and ensure faster assistance. Additionally, multi-language support can make the application accessible to a wider audience, improving usability and adoption across different regions.

- Voice-based activation
- AI-based risk detection
- Wearable device integration
- Multi-language support
- Offline alert mechanisms

IX. CONCLUSION

In conclusion, Stree Raksha is a comprehensive and intelligent women safety system that uses modern technologies to provide immediate assistance during emergencies. It addresses key issues in traditional methods, such as delayed response, lack of automation, and inefficient communication.

With features like real-time GPS tracking, instant alerts, and continuous communication, the system ensures quick and effective support. The panic button simplifies alert activation, making it easy to use even in stressful situations.

The system is designed for scalability and reliability, making it suitable for real-world deployment. Its user-friendly interface allows people with different technical skills to use it effectively.

Testing results show strong performance, including low latency, high accuracy, and reliable communication. Future enhancements like AI integration, wearable support, and police connectivity further highlight its potential.

Overall, Stree Raksha is a practical and impactful solution that enhances safety and empowers women through technology

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