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COMMUNITY-BASED REPORTING AND MONITORING TOOL FOR WOMEN'S SAFETY

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ABSTRACT

In spite of all the advances made across the world, violence against women still remains a huge obstacle to the attainment of gender equality. Schools and colleges, which are otherwise supposed to be safe places for young women, become arenas for harassment and violence. Most such cases remain unreported because reporting mechanisms are inefficient, or women fear social stigma, or simply because they don't trust authorities.

This project aims to create a community-based reporting and monitoring system that is intended to improve women's safety with real-time reporting of incidents, community participation, and data analysis. The mobile app will have SOS alarms, voice and gesture input for reporting, and geolocation capabilities to enable women to report threats rapidly and under their radar.

Apart from technological interventions, this project attempts to instil a culture of responsibility and mutual accountability on college campuses, making them safer places for women students. Through the use of state-of-the-art technology and the promotion of participatory community involvement, the project hopes to develop a scalable and flexible model that can be used to enhance women's safety across institutions.

I. INTRODUCTION

The environment of higher learning is supposed to be a setting for learning, development, and growth. Higher education must be a place of learning and development, but most female students experience threats to safety while on campus. Harassment, stalking, and gender violence are common, creating fear and insecurity. These occurrences become obstacles to academic success, restrict involvement in campus activities, and curtail personal liberty.

This project seeks to solve these problems with an out-of-the-box solution that merges technology and activism to make campuses safer. It proposes a reporting and monitoring system meant to empower women by facilitating real-time reporting of incidents. This is not just a technology-driven solution but one that promotes a culture of collective responsibility between students, professors, and administrators.

Conventional reporting channels frequently collapse as a result of bureaucratic lag, absence of confidentiality, and distrust, producing unreported incidents as well as unchecked offenders. The project breaks these barriers with a simple-to-use interface that maintains anonymity, facilitates rapid reporting, and links up to local authorities for joint responses.

Beyond immediate safety measures, the project supports long-term cultural change. By analysing reported incidents, the app can identify patterns, optimise resource allocation, and influence policy decisions. Machine learning algorithms will help predict threats and suggest preventive actions, making campuses not just reactive but proactively safer.

Gender-based violence, legal rights, and personal safety educational materials will be accessible to everyone on campus. A platform for community engagement will also facilitate students sharing their experiences, offering support, and working together on safety campaigns. This project acknowledges that campus safety is not merely about preventing something from happening but about establishing an environment in which women feel safe and empowered. Through the combination of technology and community-based initiatives, it aims to create a new benchmark for campus safety.

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II. METHODOLOGY

Methodology for Women's Safety App

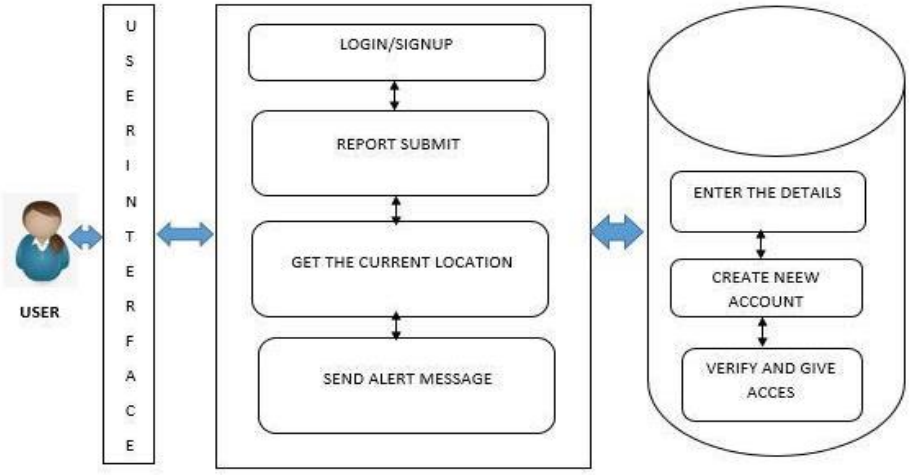
1. Requirement Gathering User Research: Interview and survey female students to learn about their safety issues. Stakeholder Input: Work together with campus officials to ensure that the app's functionalities conform to safety measures. Feature Prioritisation: Prioritise basic features such as real-time GPS location tracking, panic button, and emergency contact alerts.

2. Design Technology Stack: The application is developed based on the MERN stack (MongoDB, Express, React and Node.js) for scalability. User Interface (UI/UX): Create an intuitive UI, which enables users to register, access emergency contacts and send alerts swiftly. System Architecture: Create backend APIs for real-time location sharing. emergency contact notifications, and authentication of users.

3. Development Frontend: Use React to create a user interface and make it easy to navigate and access things quickly. Backend: Design RESTful APIs using Node.js and Express to manage user registration, geolocation, and SMS notification. Security: Use data encryption and protect user data during transmission to safeguard environmental data.

4. Testing Unit and Integration Testing: Test individual components as they should work and interact nicely. User Testing: Beta test the app with students to get feedback on usability. Security Testing: Security tests the app for possible vulnerabilities, maintaining data privacy and GDPR compliance.

III. SYSTEM ARCHITECTURE



User Interface: The user interacts with the system through a graphical interface, starting with the login or sign-up process.

Login/Signup: The user either logs in if they have an account or signs up for a new one

Report Submit: After logging in, the user can submit a report, possibly about an issue or request.

Get the Current Location: The system retrieves the user's current location, which might be used for reporting purposes or sending alerts.

Send Alert Message: Based on the report and location, the system sends an alert message.

Database Interaction: On the backend, the system interacts with a database:

Enter the Details: The user's details are entered into the database.

Create New Account: For new users, an account is created.

Verify and Give Access: The system verifies the entered details, allowing access to the system if everything is correct.

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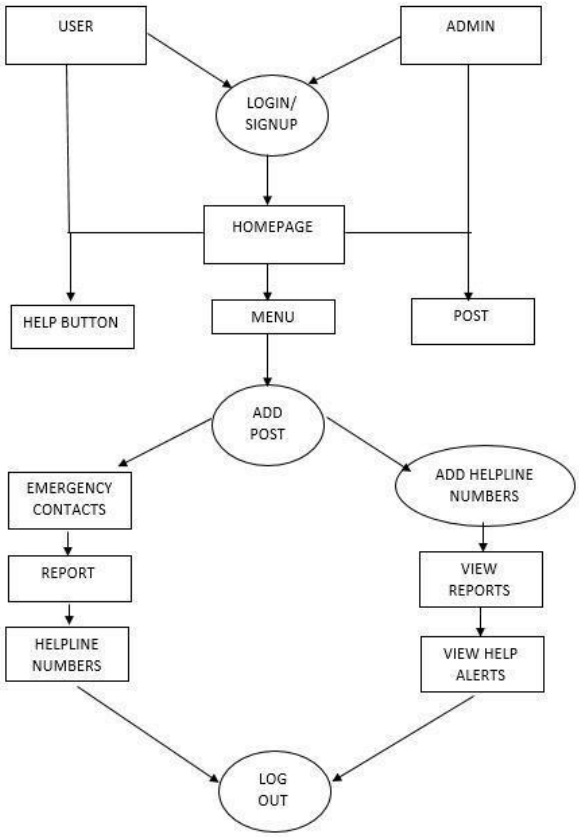
Data flow dig:



Actors:

1. **User** – The general user of the application.
2. **Admin** – The administrator who manages reports and helpline numbers.

Flow of Data:

1. **Login/Signup:** Both Users and Admins need to log in or sign up to access the system.
2. **Homepage:** After authentication, users are directed to the homepage. The homepage provides navigation options such as the Help Button, Post, and Menu.
3. **Help Button (For Users):** Users can use the Help Button to quickly send alerts or access emergency contacts.
4. **Menu:** The menu provides the option to Add Post, which allows users to submit reports.
5. **Post (For Admins):** Admins can manage posts and view reports submitted by users.
6. **Add Post:** Users can add posts regarding incidents or safety concerns.
7. **Emergency Contacts:** Users can access emergency contacts related to women's safety.
8. **Report:** Users can report incidents related to safety concerns.
9. **Helpline Numbers:** Users can view helpline numbers for quick assistance.
10. **Add Helpline Numbers (For Admins):** Admins can add helpline numbers to the system.
11. **View Reports (For Admins):** Admins can view reports submitted by users.
12. **View Help Alerts (For Admins):** Admins can monitor help alerts generated by users.
13. **Logout:** Users and admins can log out after using the system.

Techniques to be used:

Frontend (React) – Builds a dynamic UI with state management for real-time updates. Uses React Router for seamless navigation. Ensures a user-friendly experience for reporting and tracking.

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Backend (Node.js & Express) – Handles API requests, incident reporting, and user management. Integrates Socket.io for live incident updates. Ensures smooth communication between frontend and database.

Database (MongoDB) – Stores user profiles, incidents, and geolocation data. Uses geospatial indexing for efficient location-based queries. Implements encryption for securing sensitive user information.

Real-Time Geolocation Tracking – Implements GPS tracking and geofencing for alerts. Maps high-risk zones using clustering algorithms. Helps users avoid unsafe areas in real time.

SOS & Emergency Features – Provides an SOS button for real-time alerts and evidence recording. Uses multi-step confirmation to prevent false alarms. Notifies predefined contacts and authorities instantly.

Community-Based Reporting – Allows users to report, validate incidents, and mark areas as safe/unsafe. Uses sentiment analysis to detect false reports. Encourages community participation in enhancing safety.

Privacy & Security – Implements AES-256 encryption and role-based access control. Integrates with law enforcement for immediate action. Conducts regular security audits to identify and fix vulnerabilities.

IV. FUTURE WORK

The AI-Powered Incident Detection and Prediction module will leverage advanced machine learning models like Neural Networks and RNNs to enhance incident prediction accuracy. By analysing large datasets, the system can recognize patterns in user behaviour and detect potential threats before they are reported. Real-time anomaly detection will further identify suspicious activities using user data and, if integrated, camera footage.

Wearable Technology Integration will extend safety features to smart watches and safety gadgets, enabling real-time biometric tracking and SOS alerts. Voice command integration will provide hands-free emergency activation, ensuring safety in critical situations.

Offline Features Enhancement will allow incident reporting without an internet connection, with automatic sync once online. SMS-based reporting will serve as a backup for SOS messages when the network is unavailable.

Data Analytics for Safety Improvements will include incident heat maps that visualize safety trends and an analytics dashboard for authorities to monitor incidents and optimize resource allocation.

Integration with CCTV and Smart City Systems will connect real-time CCTV feeds and smart city data (traffic, public lighting, etc.), offering real-time safety updates and emergency assistance.

Social and Community Features will introduce peer-to-peer safety tracking, allowing trusted contacts to assist users in emergencies. A safety badge and reward system will incentivize users to validate reports and promote safety awareness.

Multi-Lingual Support and Accessibility will expand language options for diverse users, especially international students. Accessibility features like voice-to-text, screen readers, and large-text support will ensure usability for all.

V. CONCLUSION

The **Community-Based Reporting and Monitoring Tool for Women's Safety** aims to address both immediate safety concerns and long-term cultural change on college campuses. With features like real-time incident reporting, geolocation tracking, and predictive analytics, the app offers a proactive approach to combating harassment and violence. Its user-friendly interface empowers women to report incidents confidently, backed by a responsive community. Integration with campus security ensures swift action, while predictive analytics helps administrators allocate resources efficiently, preventing potential threats before they escalate.

Prioritizing privacy and security, the app uses encryption and anonymization to comply with global data protection standards like GDPR. Designed for scalability, it can be adapted for various institutions and regions. Future enhancements, such as wearable device integration, voice-activated SOS, and AI-driven incident prediction, further enhance its impact. By fostering a community-driven approach to safety, the project not only improves campus security but also promotes gender equality and inclusivity, setting the stage for a safer future in academic and societal contexts.

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[2] Patel, K., & Shah, S. (2017). "A Study on the Effectiveness of Mobile Applications in Improving Campus Safety." Journal of Safety Research, 61, 87-93.

This study explores how mobile applications can improve campus safety, focusing on user engagement and the effectiveness of quick reporting features, which directly aligns with the goals of this project.

[3] Smith, R., & Jones, L. (2015). "Community Safety and Technology: A Case Study of Community-Based Reporting Networks." Community Development Journal, 50(4), 605-619.

This paper analyzes community-driven safety networks, similar to the community engagement aspect of our app, where users can validate incidents and interact with each other for collective safety.

[4] Brown, A., & White, C. (2019). "Campus Safety: Emerging Technologies and Future Challenges." Journal of Higher Education Policy and Management, 41(5), 480-495.

This article discusses the future directions in campus safety technologies, including wearable devices and AI, which are potential future enhancements for the app.

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