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Women Security & Women Empowerment (WSWE)

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Abstract

The Women Security and Empowerment System is designed to enhance women's safety and promote their professional development through innovative technology. It incorporates live location tracking to enable real-time sharing with emergency contacts, an SOS button for immediate distress alerts, and latest location retrieval via OTP verification for authorized contacts. The system also includes a safe place locator to guide users to nearby secure locations such as police stations and hospitals. On the empowerment front, the Workshop module allows users to create and participate in workshops upon admin approval, with regex-based filtering and an RSVP feature for better accessibility. The Jobs module supports job postings, requiring admin approval, and offers job filtering along with an advanced job-matching system leveraging tokenization and keyword analysis. A Chat Section enables both individual and community discussions, fostering a support network. Additionally, an Admin Dashboard streamlines approvals and system oversight. By integrating safety features with empowerment tools, this system provides a holistic approach to enhancing women's security while creating pathways for professional growth, ensuring they can navigate both personal and career challenges with confidence.

Chapter 1

Introduction

Women's safety and empowerment are essential, given rising security concerns and limited access to growth opportunities. The Women Security and Empowerment System addresses this by integrating live location tracking, an SOS button and a nearby safe place locator for emergencies. Beyond safety, it fosters independence through educational resources, self-defence training, and financial empowerment programs. The system also includes workshop and job modules, an intelligent job-matching system, and a community chat feature for networking. An admin dashboard ensures smooth management, making this system a holistic solution for security and empowerment.

1.1 Project Idea

This project is a website designed to enhance women's safety and empowerment, offering a simple yet powerful feature: the ability to share live location with emergency contacts at the press of a button. In uncomfortable or dangerous situations, users can activate the SOS alert, instantly notifying pre-selected contacts, such as family members or local authorities, with their real-time location. The system continuously updates their movement, ensuring help can reach them quickly. Beyond safety, the platform empowers women with educational resources, self-defence tutorials, legal rights awareness, and financial independence programs. With its intuitive interface and a seamless blend of security and empowerment features, the platform provides women with both security and empowerment, ensuring they have the necessary tools to navigate challenges and achieve independence.

Chapter 2

Review of Literature

A literature survey was carried out to find various papers published in international journals related to Women Safety and Empowerment to get the best algorithm for the same.

2.1 Existing System

Creating a women's safety website requires a multidisciplinary approach that integrates various existing system theories to effectively address social issues and user engagement. Social Systems Theory highlights the influence of societal norms and community structures on women's perceptions of safety, informing how the website can foster a supportive environment. User-Cantered Design (UCD) principles ensure the platform is intuitive and responsive to user needs, facilitating easy access to crucial features like emergency contacts and safety resources. The Theory of Planned Behaviour (TPB) underscores the importance of understanding user attitudes and perceived behavioural control, which can guide the development of interventions that motivate proactive engagement. dditionally, the Diffusion of Innovations Theory provides insights into effectively promoting the platform to different segments of the population, ensuring broad accessibility and utilization. Protection Motivation Theory (PMT) can inform how to present risks and encourage users to adopt protective measures, such as utilizing SOS features. Furthermore, adopting Safety Management Systems (SMS) concepts allows the website to function

as a comprehensive safety tool, enabling users to report incidents and access safety information. Lastly, employing Participatory Design ensures that the voices of women and community stakeholders shape the website, creating a truly user-cantered platform that addresses real needs and fosters a safer environment. By weaving together these theories, the women's safety website can become a powerful resource for enhancing safety and empowerment within the community.

The Women Security and Empowerment System is designed to improve women's safety and independence. It includes live location tracking, an SOS button for emergencies, safe route suggestions, and locators for nearby safe places like police stations. The system also offers educational resources, self-defense training, and empowerment tools, all aimed at promoting women's security and confidence.

2.2 Literature Survey

We have reviewed several research papers and studies in the field of women's security, safety technologies, and empowerment systems. This literature review has provided valuable insights into the current solutions available for enhancing women's safety and promoting independence. Table 2.1 offers a survey of the research papers and studies considered for this project, outlining the contributions and limitations of the existing approaches in the domain of women's security and empowerment systems.

Table 2.1 – Literature Survey table

Sr. No.	Paper Name	Year of Publication	Author	Publication	Proposed Work	Research Gap
1	Creating App o Android for Women's Safety.	2024	Ms.S.Jayapratha, C. Subashini	IJERT	User Friendl and Real tim data	Limited Integratio with devices.

2.	Dear Sakhi Women Securit Web App	2024	Akhshata Jadhav Sanvi Patil	IJCRT	Women Complaint receive, access resolve	Only for complaint registration
3.	Maximizing Women's Safet with an Effectiv System	2023	Prarthan P, Mourya B D, N Shaik Safi	IJIRSET	Provides liv audio and vide recording	No Large scal application
4.	Women Empower throug Digital Educatio in India	2021	A.Kumar, M.Gupta	JIWS	Digital platforms for women's education aime at enhancing their social and economic independence .	Focuses only on education, lacking a comprehensive framework for combining safety and empowerment.
5.	Empowerment and Safety o Women	2019	K. Bansa R.Singh	Int.J. Comput. Eng. Res.	A mobil application providing	Lacks AI-drive solutions and focuse primarily

2.3 Problem Statement and Objective

Despite technological advancements, women still face significant safety challenges, particularly in unsafe environments or emergencies. Traditional methods like manually calling for help or sharing location details are often inefficient in critical situations. Additionally, while multiple initiatives aim to empower women through education and resources, they remain fragmented and lack accessibility. The absence of a unified platform combining real-time safety measures with empowerment resources creates a gap in addressing both immediate threats and long-term personal growth. The Women Security and Empowerment System aims to bridge this gap by integrating live location tracking, SOS alerts, safe route recommendations, job listings, workshops, and community chats, ensuring women have the necessary support to feel secure and independent in all aspects of life.

2.4 Project Scope

The Women Security and Empowerment System is a web-based platform designed to provide a comprehensive approach to women's safety and self-sufficiency. It offers real-time protection tools, including live location tracking and SOS alerts, allowing users to instantly share their location with emergency contacts, including family members and local authorities. Additionally, the platform supports workshops, job listings with job matching, ensuring professional growth. Community chat sections enable interaction and support among users, while an admin dashboard ensures efficient oversight of approvals and system management. Through these integrated features, the system delivers a robust solution that enhances security, facilitates career advancement, and empowers women with vital resources.

Chapter 3 Proposed System

This chapter includes a brief description of the proposed system and explores the different modules involved along with the various models through which this system is understood and represented.

3.1 Analysis/Framework/ Algorithm

Ensuring women's security and empowerment through technology requires real-time, reliable, and responsive solutions. Twilio, a leading cloud communications platform, provides a robust API toolkit that enables developers to integrate communication features seamlessly. Leveraging Twilio in combination with geospatial data and safety analytics can help create an effective safety application. This system can instantly send alerts, share live locations, and recommend the safest routes based on various security parameters, ensuring timely assistance in critical situations.

Step 1: Retrieve User’s Real-Time Location. Capture the latitude and longitude of the user’s current location through GPS.

Step 2: Identify Nearby Safe Locations. Utilize Google Maps Platform API to fetch nearby safe places such as police stations, hospitals, and well-lit public areas.

Step 3: Process and Sort Data Based on Safety Metrics. Apply filters such as distance, availability of emergency services, and security factors (e.g., crowd density, lighting conditions, crime rate statistics). Normalize data for consistency across various locations and user preferences

Step 4: Calculate Distance to Safe Locations. Use the Haversine formula to compute the great-circle distance between the user and the identified safe locations.

Step 5: Sort Locations in Ascending Order of Distance. Implement a sorting algorithm (e.g., QuickSort or MergeSort with O(n log n) complexity) to rank the closest safe zones.

Step 6: Select Top k Safe Location. Based on predefined criteria (e.g., nearest police station, well-lit area, or hospital), extract the top k safest zones.

Step 7: Analyze and Rank Safety Features. Compare the selected locations against safety metrics like proximity to emergency services, population density, and environmental factors. Prioritize zones with the highest safety ratings and relevance to user preferences.

Step 8: Send Emergency Alerts and Recommendations. Utilize Twilio's SMS and call APIs to send instant alerts to emergency contacts, including the user's live location. Provide users with the safest recommended routes or places along with real-time navigation assistance.

3.2 System Requirements

This section will provide the user the required specification of the hardware and software components on which the proposed system is to be implemented.

3.2.1 Hardware Requirements

This subsection will provide the minimum requirements that must be fulfilled by the hardware components. The hardware requirements are as follows: -

A smart phone with

1) Storage – minimum 200 megabytes free
2) RAM – minimum 2 gigabytes
3) Processor – minimum dual core

A desktop with

1) RAM – minimum 2 gigabytes
2) Storage – minimum 100 gigabytes
3) Processor – minimum quadcore or hexacore

3.2.2 Software Requirements

This subsection will provide the versions of software website application that must be installed. The software requirements are as follows: -

- Backend Framework: Node.js (v14.x or higher) Express.js (v4.x or higher)
- Database: MongoDB (v4.x or higher)
- Frontend Framework: React.js (v16.x or higher)
- Geolocation API: Navigator geolocation ((HTML5 API)
- Messaging API: Twilio API (latest version)
- Internet connection.

3.3 Design Details

In design details, we analyze the System Architecture and System Modules in detail. We study the flow and process of the entire project in order to develop the project in an orderly and systematic manner. The system is divided into three core modules:

- User Registration & Emergency Contact Setup
- SOS Activation & Location Sharing
- Twilio API Messaging & Notification System.

3.3.1 System Architecture

The Women Safety and Empowerment Project follows a client-server architecture using the MERN stack (MongoDB, Express.js, React.js, Node.js) to provide a secure and scalable platform. The frontend, built with React.js, offers an intuitive user interface with features like real-time location tracking, an SOS button, and access to educational resources, self-defence tutorials, and job listings. The backend, powered by Node.js and Express.js, handles user authentication, real-time location updates, SOS alerts, and integrates with third-party services for SMS/email notifications using the Twilio API and mapping functionalities via map services. MongoDB stores user data, including profiles, location history, and resources, while the system uses Web Sockets or Firebase for real-time communication and location tracking. The platform integrates with map APIs for safe route tracking and safe place identification. Hosted on a cloud platform (e.g., Heroku), the system ensures scalability and security. This architecture enables the platform to offer seamless real-time safety features and empowerment resources to users.

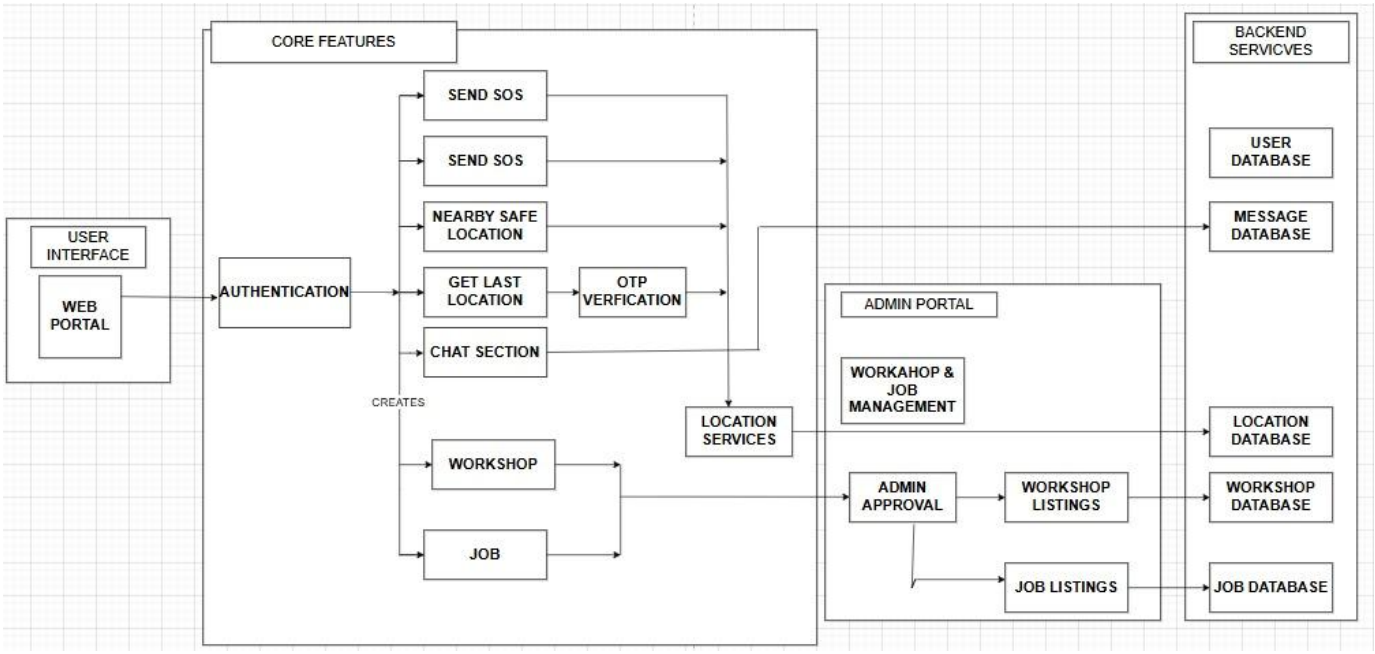


Figure. 3.1 – System Architecture

3.3.2 Details of Modules

The Women Safety and Empowerment System integrates various modules to provide real-time assistance during emergencies and enhance the efficiency of communication, location tracking, and user interaction. This system is designed to ensure women can get immediate help and support through streamlined processes. The modules are:

- SOS Activation
- Live Location Sharing
- Emergency Contact Notification via Twilio
- Nearby Safe Places
- Latest Location Fetch (via OTP Verification)
- Workshop
- Jobs
- Chat Section (Individual & Community Chats)

A. SOS Activation

In times of distress, women can easily activate the SOS feature through the platform's user-friendly interface. When the SOS button is pressed, the system immediately captures the user's current geolocation using the Geolocation API. The user's emergency contacts are pre-configured in the system, ensuring that as soon as the SOS is activated, help is dispatched quickly.

B. Live Location Sharing

After the SOS is activated, the system continuously shares the user's live location with their emergency contacts. The location is sent using a secure method through the backend and can be monitored in real-time by the contacts.

C. Emergency Contact Notification via Twilio

This module integrates the Twilio API to automatically send out emergency notifications via SMS to all pre-saved emergency contacts. The message includes the user's live location and a short customizable text indicating that the user is in an emergency situation.

D. Nearby Safe Places

The system helps users find the nearest safe places such as police stations, hospitals, and designated shelters. It uses location-based services to provide real-time information about these places to ensure the user can reach safety quickly.

E. Latest Location Fetch (via OTP Verification)

If an emergency contact needs to check a user's latest location, they can request it through the system. The system will send an OTP to the registered email of the user, and upon verification, the latest known location will be shared securely.

F. Workshop

- Users can create a website for workshops, which will be displayed after admin approval.
- RSVP feature allows participants to confirm attendance.
- Workshop filter using regex for efficient search and categorization.

G. Jobs

- Users can post jobs, which initially go to the unapproved section and require admin approval before appearing on the frontend.
- Job filter option for refined searches.
- Tokenization and scoring mechanism to find the best job matches based on keyword analysis.

H. Chat Section (Individual & Community Chats)

- A secure chat feature enabling one-on-one messaging.
- Community chat rooms where users can discuss safety concerns, job opportunities, and workshops.

I. Admin Dashboard

- Admin can approve or reject workshop and job postings.
- Provides an overview of the system, including emergency activations, user analytics, and other relevant information.
- Controls and moderates the community chat to ensure a safe environment for users.

This comprehensive system ensures a seamless approach to safety, empowerment, and community building while prioritizing user security and convenience.

3.4 Data Model and Description

Data Model describes the relationship and association among data which includes Entity Relationship Model.

3.4.1 Entity Relationship Model

Figure 3.4 illustrates the Entity Relationship Diagram (ERD) of the proposed Women Security and Empowerment System. The ERD is a data modeling technique used to graphically represent the system's entities and their relationships. In this system, the primary entities include: **User**, **Safe Zone**, and **Alert**. The diagram highlights the attributes of these entities and their relationships, such as how users interact with safe zones by receiving route suggestions, how users can trigger alerts like the SOS button, and how real-time data (e.g., location tracking, nearby police stations) is connected to user security preferences and notification.

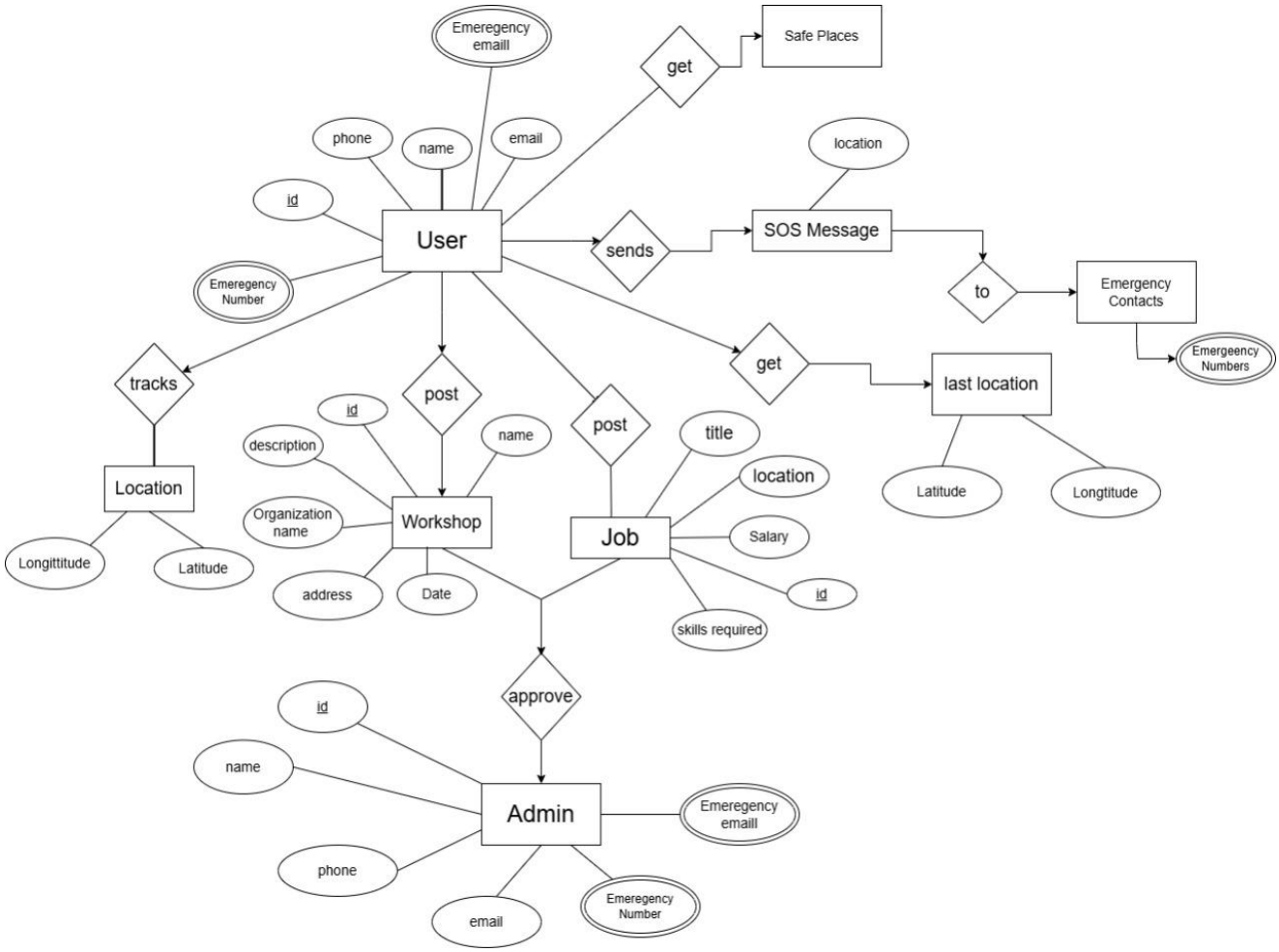


Figure 3.2 - Entity Relationship Diagram

3.5 Fundamental Model

Fundamental model of the project gives overall idea about the project. How the entities are related to each other, what are the attributes of the entities, how the data flows between the entities is shown by the fundamental model.

3.5.1Data Flow Model

Data Flow Diagram (DFD) shows graphical representation of the" flow" of data through an information system, modelling its process aspects. It includes data inputs and outputs, data stores, and the various subprocesses the data moves through. DFDs are built using standardized symbols and notation to describe various entities and their relationships.

DFD LEVEL 0

Figure 3.5 represents the Level 0 Data Flow Diagram (DFD) of the Women Safety and Empowerment System, showing the interaction between three key entities: the User, the Women Safety Application, and the Emergency Contact. The User initiates the process by activating the SOS button, which sends their live location to the system. This diagram gives a high-level overview of how data flows from the user to the emergency contacts through the system during an emergency.

Figure 3.3 – DFD Level 0

DFD Level 1

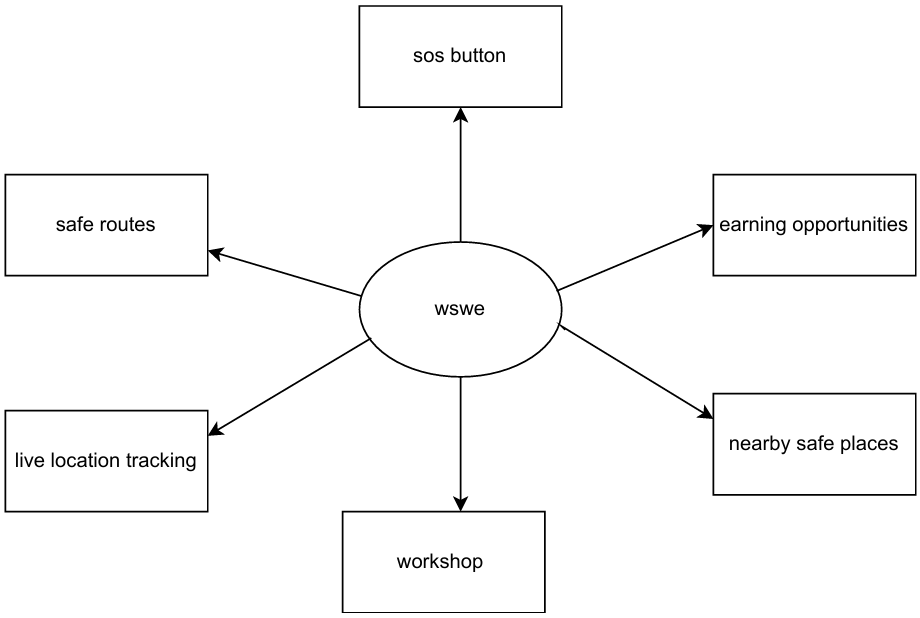
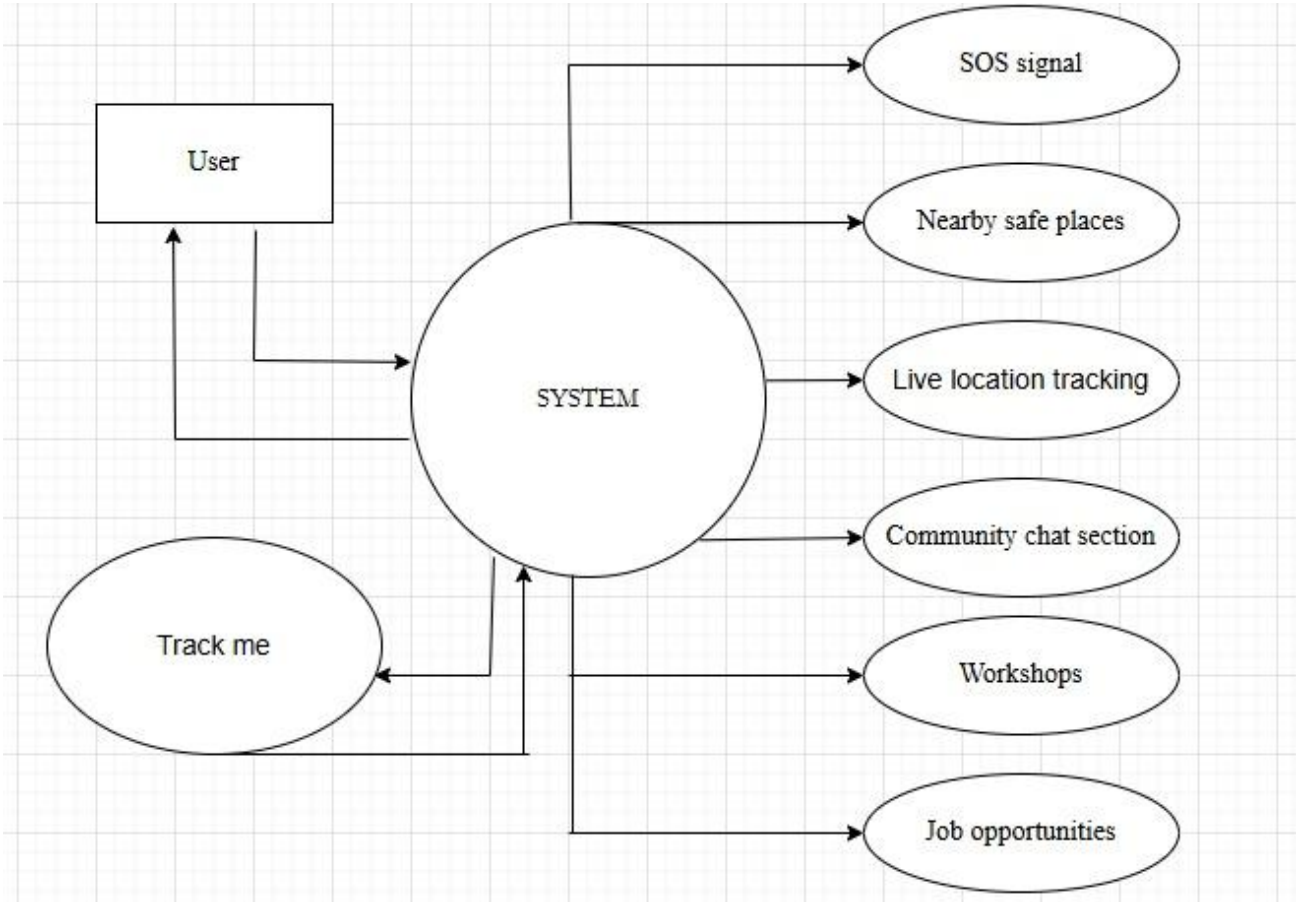


Figure 3.6 illustrates the Level 1 Data Flow Diagram (DFD) of the proposed Women Safety and Empowerment System, building on the Level 0 DFD by breaking the system into sub- systems. The Level 1 DFD offers a more detailed view of the system's internal processes, showing how each subprocess handles specific data flows. The system is divided into key subprocesses: User Login, SOS Activation, Location Sharing, Notification Sending, and Logout. Each subprocess manages distinct aspects of the data flow—User Login authenticates the user, SOS Activation initiates the emergency process, Location Sharing continuously sends the user's real-time geolocation, Notification Sending triggers the Twilio API to alert emergency contacts, and Logout terminates the session. This detailed breakdown allows for in- depth analysis and improvement of each subprocess, ensuring smooth system functionality during emergencies.

Figure 3.4 – DFD Level 1



3.6 Methodology

The development of a Women's Safety and Empowerment System using the MERN stack follows a structured approach to ensure efficiency, security, and user-friendliness. The process begins with requirements gathering, where user needs are analyzed to define core features such as live location tracking, an SOS emergency alert system, safe route recommendations, a nearby safe place locator, and empowerment resources for financial and personal growth. MongoDB is implemented to store user data securely, including profiles, real-time location updates, emergency contacts, and job listings tailored for women's career advancement. Express.js is used to develop a robust RESTful API, enabling seamless data exchange between the frontend and backend. React.js powers the user interface, ensuring an intuitive experience with features like real-time tracking, SOS activation, and access to educational and employment opportunities. The Node.js backend manages server-side logic, handles authentication, and integrates third-party services such as SMS and email notifications to alert emergency contacts during distress situations. The safe route mapping system leverages real-time and historical crime data to suggest secure travel paths, while the safe place locator helps users quickly find nearby police stations, hospitals, and women's shelters. Additionally, the system includes an empowerment section offering self-defense training, online courses, and job opportunities to promote women's independence. Thorough testing, including security assessments, usability evaluations, and real-world simulations, is conducted to ensure reliability. The final step involves cloud deployment, allowing for scalability, accessibility, and real-time updates, ensuring that women from various backgrounds can benefit from the platform's safety features and empowerment resources.

Chapter 4 Result and Discussion

This chapter includes the snapshots of the actual outputs that were seen by the user and this chapter also contains the results of the proposed system.

4.1 Proposed System Result

The proposed system that is implemented will help common citizens actively participate in ensuring women's safety and empowering them. It will facilitate the process of reporting incidents and provide women with necessary resources, thus lessening the workload on police staff and legal support systems. The system will allow users to register a new complaint, update their personal safety details, and instantly call the nearest police station or emergency services in case of danger. Figure 4.1 shows the GUI of the Home Page of the Women Security and Empowerment Mobile App, which has functionalities such as registering a new complaint, updating safety information, accessing empowerment resources like skill development programs, and connecting directly with legal or emergency help.

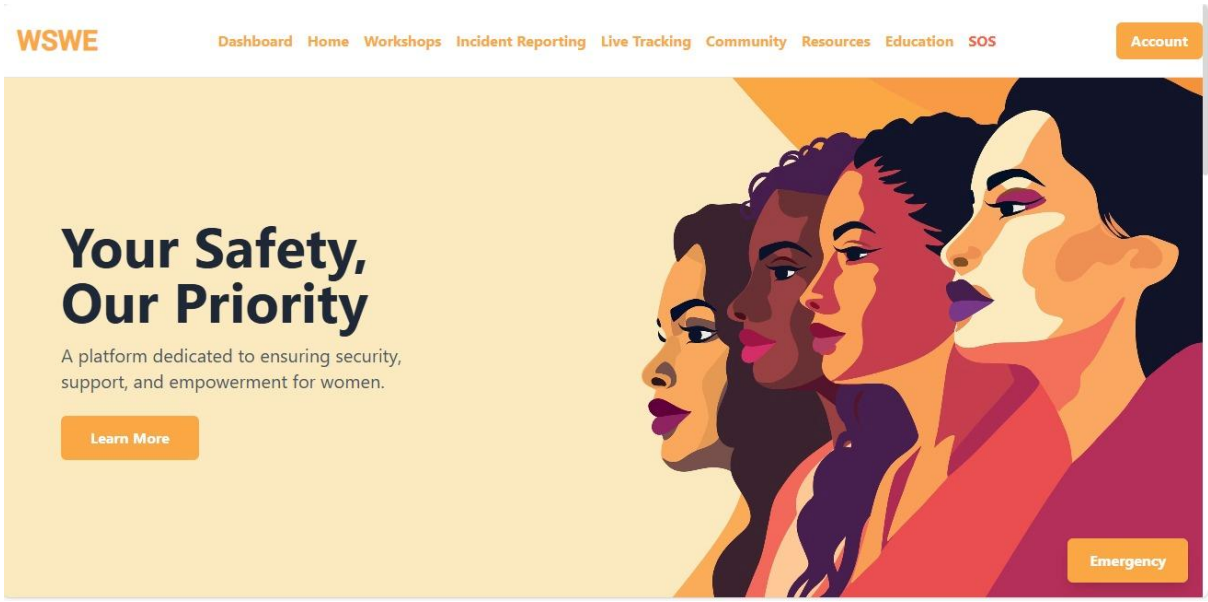


Figure 4.1 – GUI of Home Page

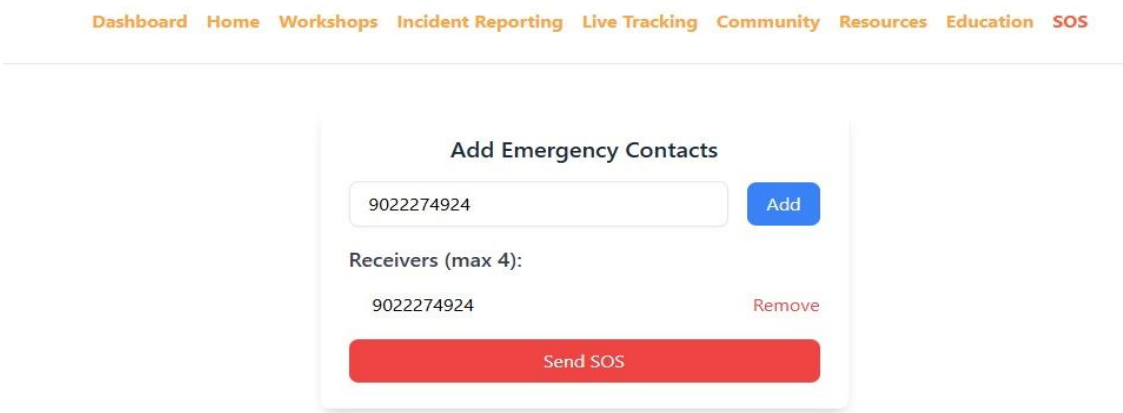


Figure 4.2 – GUI of SOS

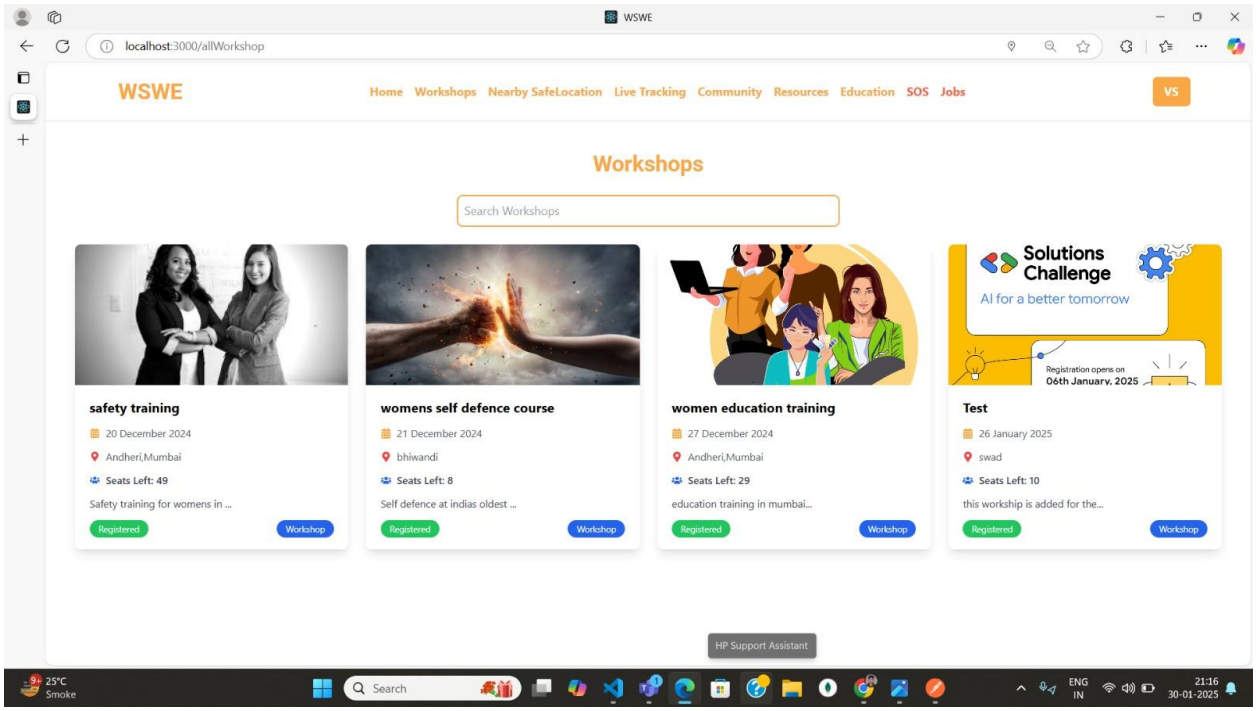


Figure 4.3 – GUI of Workshops

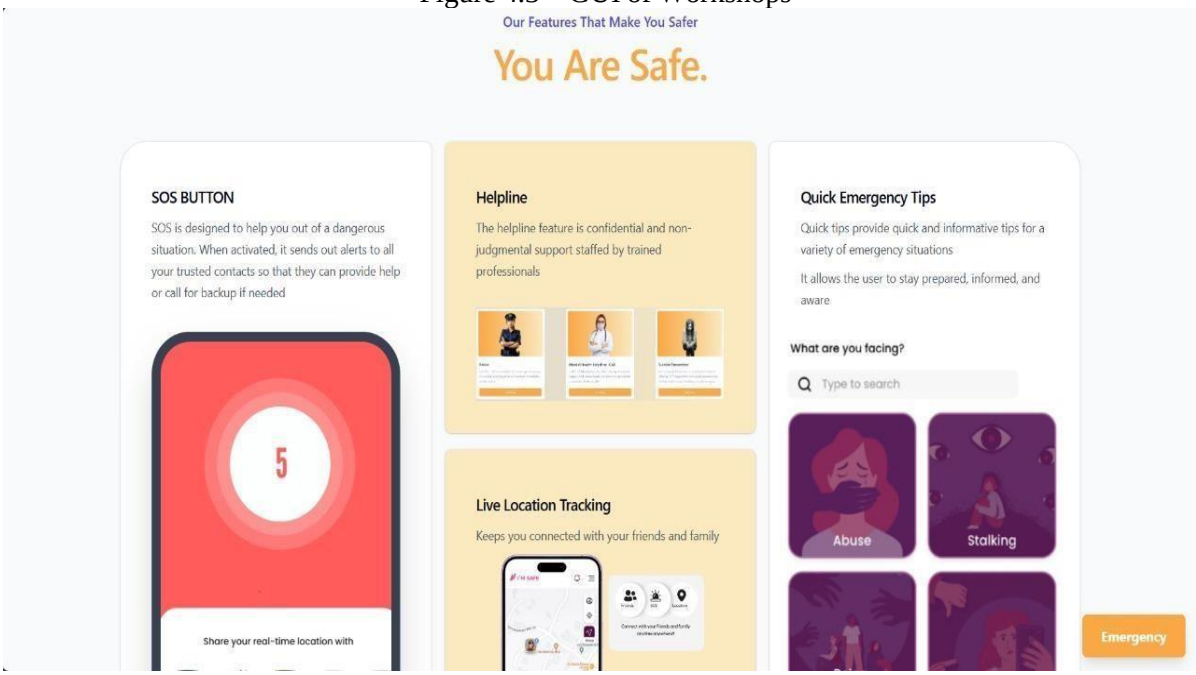


Figure 4.4 – GUI of Features

Figure 4.4 demonstrates a feature where users can tap their location, and the app automatically opens the nearest emergency contact in the dialer. This ensures quick connection to local authorities, enhancing safety in urgent situations. It empowers women by providing fast and efficient access to emergency services.

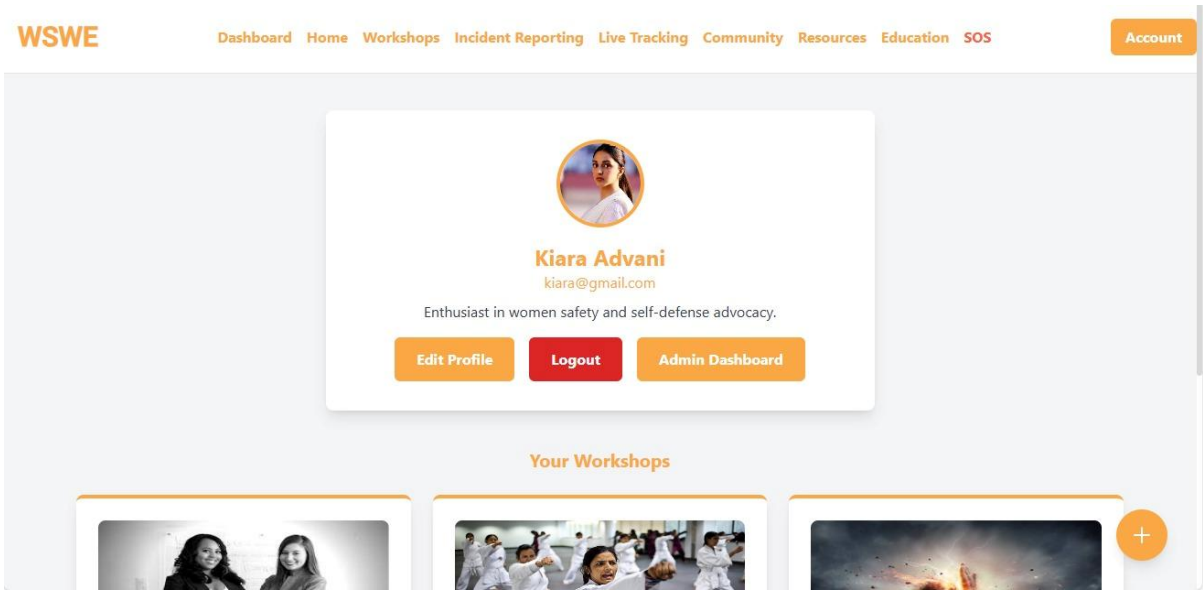


Figure 4.5 – GUI of User Profile Dashboard

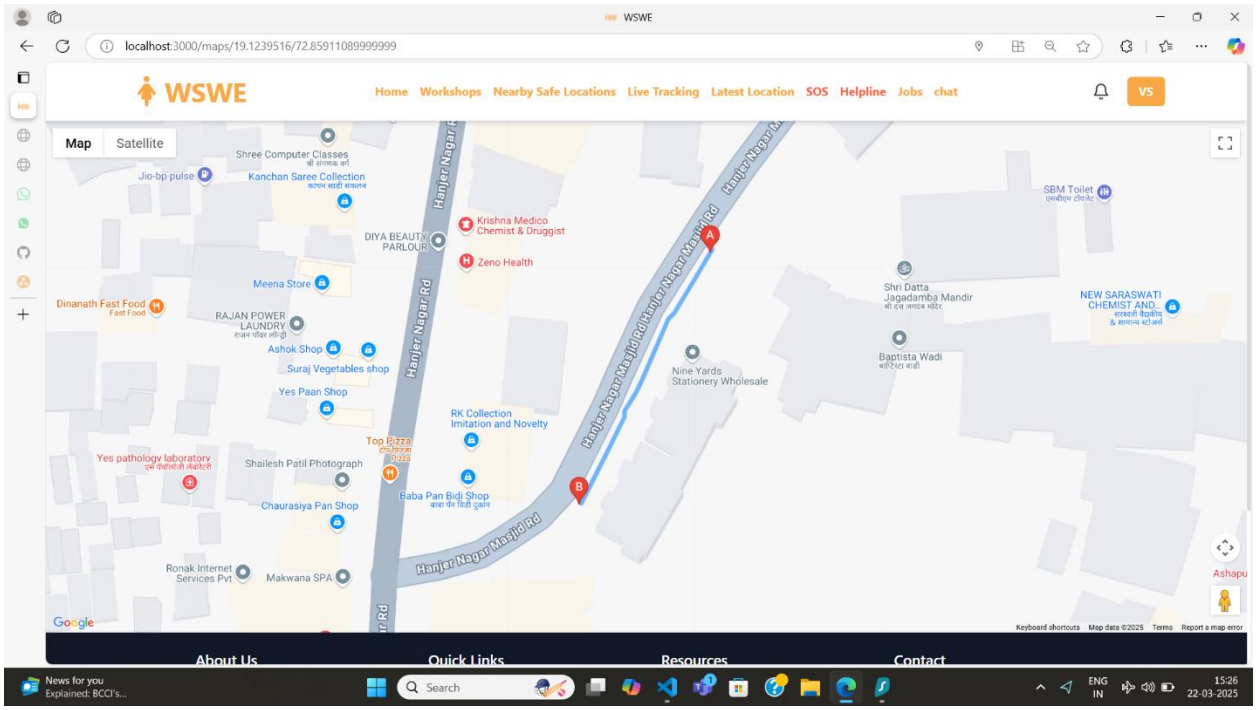


Figure 4.6 – GUI of User Live Tracking

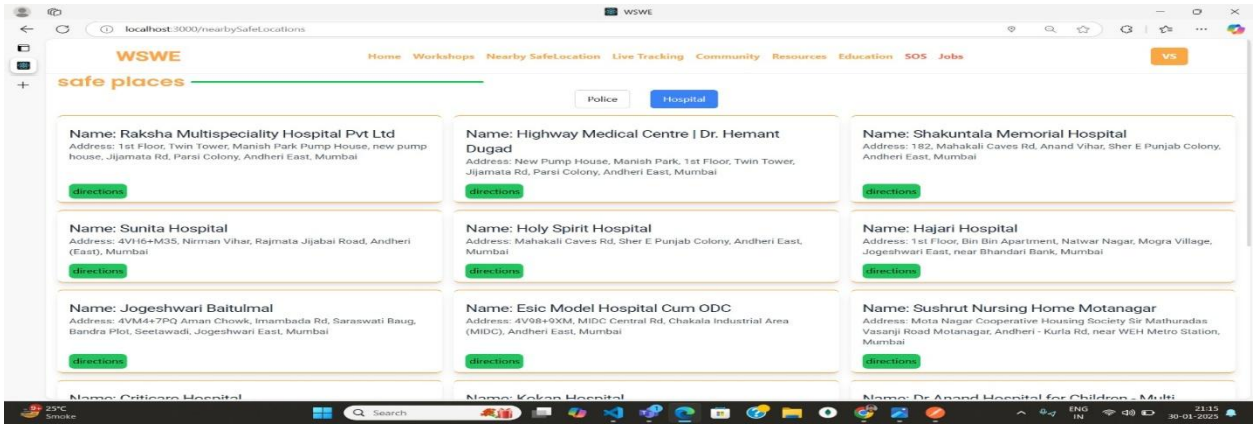


Figure 4.7 – GUI of Nearby Safe Locations

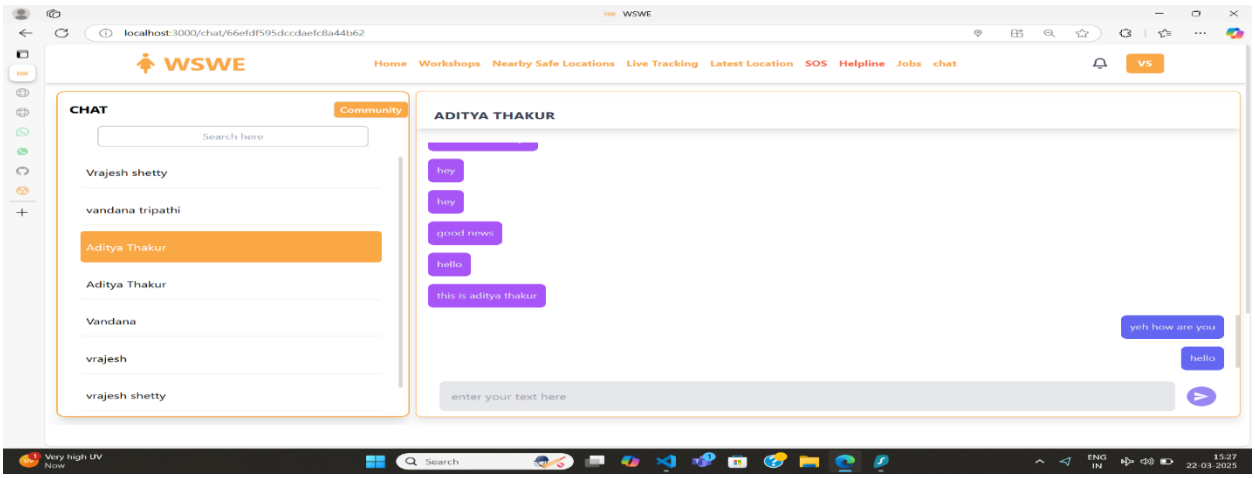


Figure 4.7 – GUI of Chat Section

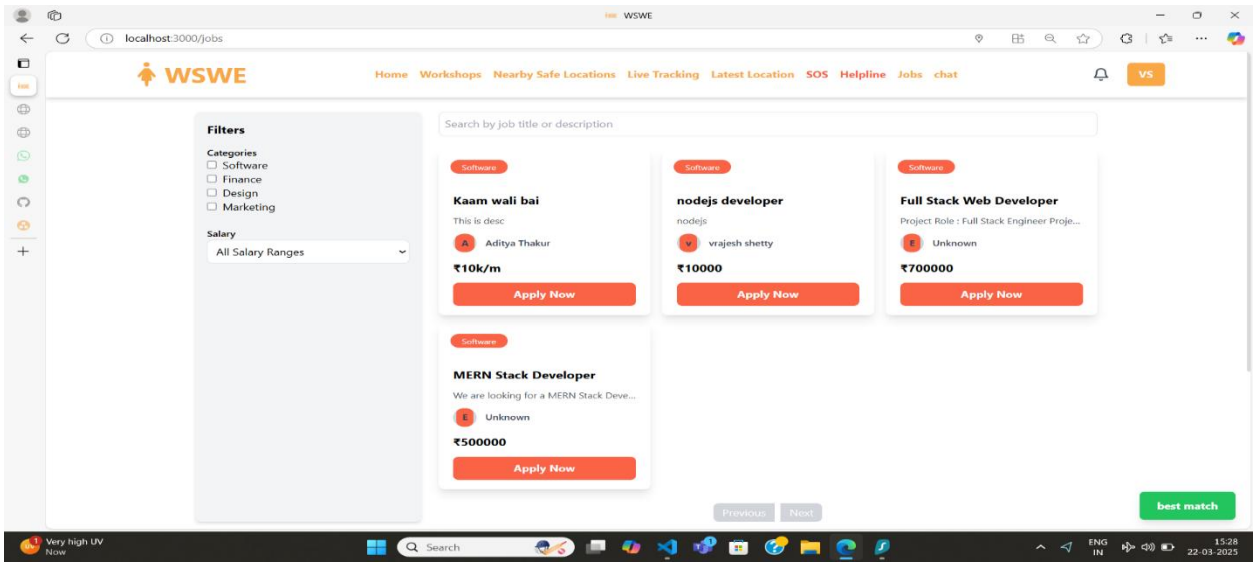


Figure 4.8 – GUI of Job Section

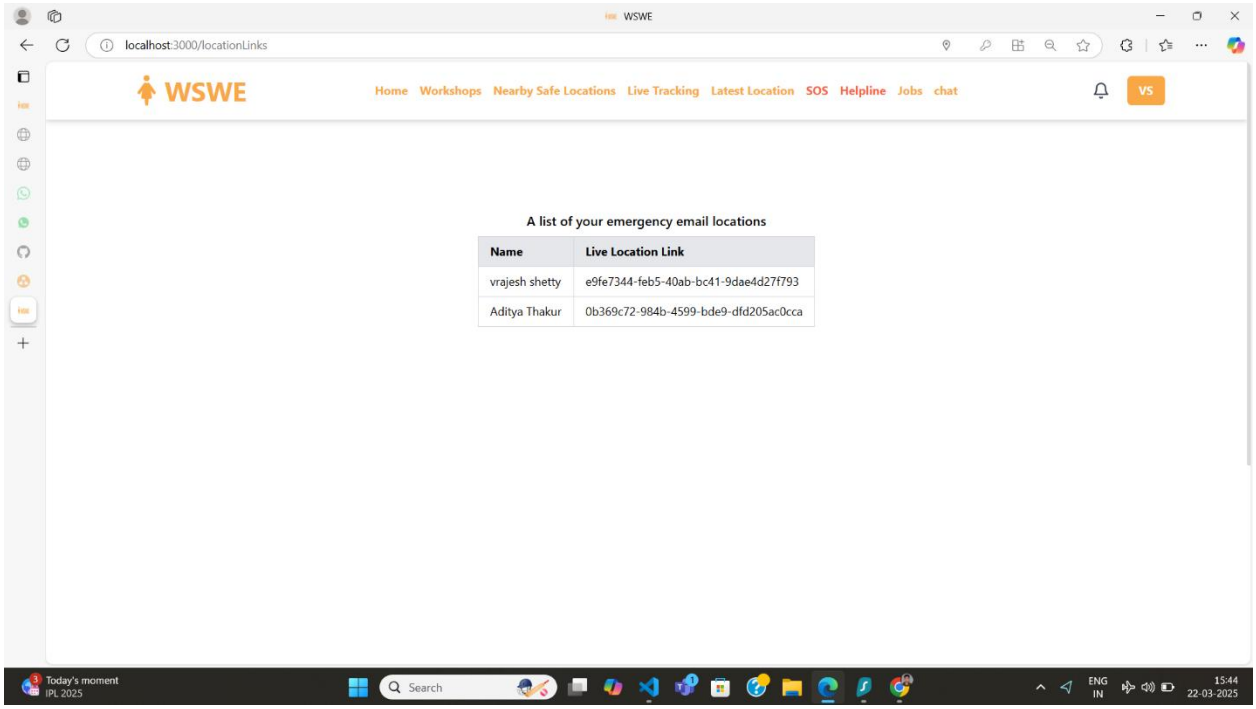


Figure 4.6 – GUI of Emergency Locations

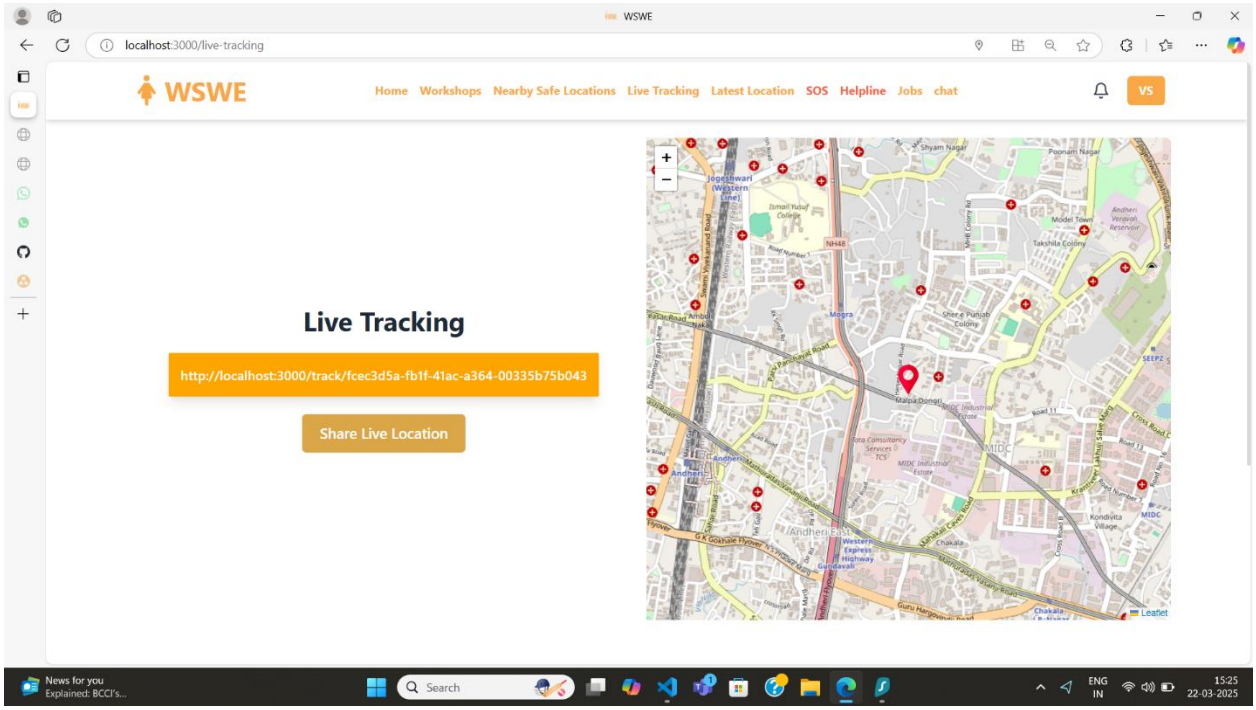


Figure 4.6 – GUI of Live Tracking

4.2 Proposed system versus existing system

The below table explains the key differences between the existing system and our proposed system, Women Security and Empowerment System. The parameters of differentiation include: Safety Assistance, Integration with Social Networks, Mobile Device Compatibility, Real-Time Location Tracking, Execution Speed, System Accuracy, Incident Report Generation, Notification and Alert System, SOS Agent Support, Reliability, and Performance. These factors highlight the improvements introduced in our innovative system, showcasing how the Women Security and Empowerment System brings enhanced security, real-time responsiveness, and better overall performance compared to existing systems. The comparison between the existing system and the proposed system is presented in Table 4.1.

Table 4.1 – Comparison between existing and proposed system.

Parameter	Existing System	Proposed System
Emergency Reporting	Limited options for women to repor incidents.	Mobile app with real- time inciden reporting, SOS buttons, and location sharing.
Community Participation	Citizens have minimal involvement in safety efforts.	Chat section where people from different areas can communicate and share issues.
Legal Support	Women need to visit police stations or legal advisors for assistance.	Provides in-app access to view nearby safe places like police stations, hospitals
Safety Wearables	No integrated solution for wearable devices.	No dependency on wearables; full software-based alert and tracking system.
Women Empowerment	scattered and inconsistent resource for women's education and empowerment.	Centralized platform offering job postings, remote work,etc
Self-Defense Training	Self-defense resources are not widely accessible.	Access to self- defence workshop and local training session information.
Access to Police, Helpline Numbers	Doesn't have any social media tracing facility	Contains all emergency contact information

Conclusion

Empowering women and ensuring their safety is not just a necessity but a fundamental step toward a more equitable society. The Women Safety and Empowerment Project serves as a crucial solution, combining technology and community support to provide real-time protection and long-term empowerment. Features such as an SOS button with live location sharing ensure immediate assistance in emergencies, while access to resources, skill-building opportunities, and support networks fosters independence and confidence. Additionally, safe route tracking enhances mobility, reducing risks in uncertain environments. This initiative goes beyond security—it nurtures strength, resilience, and self-sufficiency. By leveraging innovation and collective effort, we can create a world where women feel safe, empowered, and free to pursue their aspirations without fear.Appendix

1. MongoDB

MongoDB is used as the database to store user information, incident reports, and real-time location data, providing a scalable and flexible back-end solution for handling large datasets.

2. ReactJS

React is employed for building the user interface, offering a dynamic and responsive front-end for the mobile and web applications.

3. ExpressJS

Express is the back-end framework used to build the server and manage API routes, handling the communication between the front-end and the database.

4. NodeJS

Node.js serves as the runtime environment for building and running the server-side code, ensuring the app is fast and efficient.

5. Twilio API

Twilio API is integrated to handle SMS, voice calls, and notifications, particularly for sending emergency alerts and location information to contacts and authorities.

6. Socket.io

Socket.io is integrated to enable real-time, bidirectional communication between the client and server, particularly for instant messaging, live notifications, and collaborative features in the application.

This tech stack ensures a powerful, real-time, and responsive system for both user interface and back-end processes.

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