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Swaraksha: Comprehensive Safety Application for Community Protection

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Abstract: - By combining real-time geolocation intelligence with AI-driven image analytics, Swaraksha ia an innovative emergency response and community safety application. Its goal is to improve personal security, especially for women and children. K-Nearest Neighbours (KNN) algorithms and geospacial APIs provide optimal navigation to the nearest police station. Convolutional Neural Networks (CNNs) assess threat levels in real time by looking at crowd density and gender distribution. Some key features include continuous GPS tracking, immediate SOS notification, direct communication with guardians, notifications about geofenced crime zones, location-based reviews and a secure community chat with picture sharing. The backend uses Python frameworks like Flask or Django with MongoDB. This setup ensures scalability, low latency and secure data management. Firebase Cloud Messaging enables real-time notifications. Swaraksha is a connected safety ecosystem that enables users to report incidents, share verified safety updates and receive prompt assistance from authorities and the community. It is designed with modularity for future IoT and law wnforcement dashboard integration, going beyond traditional safety apps.

Keywords*: Women protection, real-time GPS tracking, AI-based image analysis, convolutional neural networks (CNNs), community safety, crime zone alerts, K-nearest neighbors (KNN).*

1. Introduction

There is not a single nation or city in the world where women can genuinely travel around in total freedom and security. Women still face daily threats to their safety despite tremendous advancements in education, careers, and leadership positions in industries like sports, politics, business, and the arts. Safety is now a constant concern, not only for working women but also for those at home, due to an increase in cases of sexual violence, harassment, abuse, and kidnapping. Women who work in corporate and IT sectors, particularly those who work late shifts, are frequently more at risk for threats while traveling or even at work. [1]

Although there are many safety applications available today, they tend to react to incidents in real time rather than preventing them, and they frequently lack the tools necessary to collect legally sound evidence following an attack. Violence and harassment can take many different forms, making it hard to predict and stop them without taking lessons from the past. [6] [13]

This demonstrates the critical need for a mobile-based, intelligent safety system that not only anticipates dangerous scenarios and dangerous routes but also gives women the tools they need to know their rights, share their location in real time, and safely record and send evidence in an emergency. Such a platform could act as a proactive shield by combining technologies like artificial intelligence, machine learning, and expert systems. This would warn users before danger arises and guarantee that, even in the worst-case situation, justice and assistance are accessible. [3] [6]

2. Background

The problem of women's safety has endured for centuries and still poses difficulties for society at large, law enforcement, and policymakers. Approximately one in three women worldwide have been victims of physical or sexual violence at some point in their lives, according to the World Health Organization. Data from India's National Crime Records Bureau (NCRB) continuously shows an increase in crimes against women, such as rape, assault, harassment, and stalking. Although there are legal frameworks and preventive measures in place, their execution frequently fails because of issues with delayed reporting, inadmissible evidence, and real-time intervention limitations.

Women are increasingly working late hours due to the IT and corporate sectors' explosive growth, which makes them even more vulnerable at work and during commutes. Numerous safety applications for mobile devices have been created, providing location sharing, SOS alerts, and emergency contact access. Most, however, are unable to identify dangerous areas, adjust to new harassment trends, or inform users of their legal rights.

One promising way to close these gaps is through the integration of cutting-edge technologies like expert systems, machine learning, and artificial intelligence. Such systems can transition from reactive to proactive safety solutions by utilizing real-time location tracking, automated evidence collection, and historical crime data. This will empower women to make well-informed decisions and improve the effectiveness of authorities' responses. [7]

3. Literature Review

This section reviews the current research papers and articles to present the existing knowledge and findings both theoretically and methodologically on the particular topic. The following papers discuss issues regarding women safety, security, awareness and women safety systems, applications and models.

The authors [1] suggest an Internet of Things (IoT)-based safety solution that employs Bluetooth Low Energy (BLE) iBeacon technology to give women and children in designated safe zones proximity alerts and real-time location monitoring. The system is intended to be scalable, reasonably priced, and especially appropriate for indoor settings where GPS is unreliable. Although the idea is novel and extremely pertinent to establishments like public areas and schools, the abstract omits performance metrics like accuracy, latency, and reliability. Therefore, additional validation through comprehensive performance data, real-world testing, and improved security measures is required to fully assess the approach's practical effectiveness, even though it has a strong potential to improve personal safety.

In order to gauge public opinion regarding women's safety, Parveen et al. [2] concentrate on using machine learning algorithms on Twitter data. Following text cleaning and preprocessing, the study classifies tweets into positive, negative, and neutral sentiments using algorithms like SVM, Random Forest, Naïve Bayes, and Logistic Regression. According to the findings, sentiment classification successfully recognized societal trends and patterns, emphasizing incidents of harassment and support for programs aimed at ensuring the safety of women. The analysis showed how machine learning can transform vast amounts of unstructured tweet data into insightful knowledge that could lead to policy changes and increased awareness. The study comes to the conclusion that by integrating with other platforms, such as Facebook and Instagram, the strategy can be further improved to increase data coverage and accuracy for a more thorough safety monitoring solution.

By combining cutting-edge technologies like machine learning, artificial intelligence, and data science, Priyanka Gupta et al. [3] offer a comprehensive solution to women's safety concerns. Features like live location sharing, SOS alerts, safe route prediction, audio-video evidence recording, and legal rights guidance are all part of the proposed Real-Time Intelligent System (RTIS). Key features such as live tracking, emergency SOS generation, WhatsApp messaging, and automatic image capture from both front and rear cameras to provide evidence were successfully demonstrated by the prototype, which was created using Android Studio and tested with Firebase for

real-time data storage. These results demonstrate that the system can improve women's safety by guaranteeing prompt alerts and evidence gathering, which facilitates prompt assistance from emergency services, law enforcement, and family members. The study concludes by pointing out that this clever and intuitive mobile application can greatly speed up reaction times in emergency situations and provide women with useful resources for legal assistance and self-defense.

To improve women's safety at night, Varsha Gorakh et al. [4] present an Internet of Things-enabled autonomous robot with an ESP32-CAM microcontroller, adaptive obstacle-aware navigation algorithm (AOANA), and real-time video streaming. Smooth autonomous patrolling, real-time video monitoring, and operator control over speed and light intensity via a web-based interface were just a few of the system's impressive outcomes. These features allowed the system to adjust to different environmental conditions. The prototype ensured dependable surveillance for both urban and rural areas by successfully integrating live streaming, remote navigation, and obstacle avoidance. These findings demonstrate the robot's capacity to offer timely threat detection, proactive security, and a scalable solution that can be improved in subsequent iterations with AI-based threat detection. All things considered, this technology is a big step toward using robotics and the Internet of Things to protect women in public places, particularly at risky hours of the night.

An IoT-enabled safety device with a built-in taser for emergency defense, GPS, GSM, a panic button, and heartbeat and EEG sensors is presented by Kruthika N M et al. [5]. With nearly 95% accuracy in vital sign monitoring, automatic alerts to pre-programmed contacts, and real-time location tracking in emergency situations, the system proved to be effective. The gadget also successfully updated data to a centralized IoT platform for real-time monitoring in the event of an abnormal heart rate, abnormal EEG readings, or manual panic button activation. By providing instant self-defense, the taser mechanism further improves personal security. These findings demonstrate the device's ability to provide prompt emergency response, seamless connectivity, and preventative safety measures, making it a workable and creative way to enhance women's security in everyday situations.

An intelligent mobile application created especially to improve women's safety in educational settings is presented in a study by P. Kohli and K. Singh [6]. By including features like real-time location tracking, geo-fencing capabilities, verified authentication for both users and campus guards, and a dedicated SOS function, the suggested app prioritizes both user and campus security. By guaranteeing a responsive and safe campus environment, these systems work together to increase the confidence of students and their parents, encouraging educational participation with peace of mind.

In order to improve women's safety, Sai Satya Navya et al. [7] investigate the developments in AI-enabled surveillance technologies. It offers a hybrid detection and alert system that uses real-time monitoring, GPS tracking, and mobile applications to provide timely location-based warning and response services. The authors highlight how AI and IoT integration have significantly improved user notification and rapid threat detection. The study also emphasizes how apps like Circle of 6 and Be Safe, which give users instant access to emergency contacts and location-based notifications, show how intelligent, proactive safety systems can improve women's overall security ecosystem.

Ramya E. and others [8] Their study sought to improve child safety by implementing alerting and real-time tracking systems. The system incorporates technologies like GPS for ongoing location tracking and automated alerts, most likely intended to alert guardians or caregivers in case of an emergency. A promising framework for enhancing child safety in both public and private settings is provided by this proactive approach.

Innovative AI-driven and mobile application-based solutions for women's safety are presented in the studies by Navaneetha krishnan et al. [9]. (WoExP) Artificial intelligence is used by Women Express to facilitate quick response and intelligent threat detection. Mishra Nitish et al. [10] Myguard provides an easy-to-use mobile platform that combines emergency contact information, SOS alerts, and location tracking. Collectively, these

pieces demonstrate how AI and mobile technologies are increasingly being used to provide proactive, real-time safety measures that empower and protect women in commonplace circumstances.

4. Problem Statement

Women are still regularly threatened in both public and private settings, even with the development of communication technologies and the proliferation of mobile applications focused on safety. The majority of current solutions are reactive in nature, providing location sharing or emergency alerts only after an incident has started. Despite their value, these measures lack predictive intelligence, automated evidence collection, and integrated legal awareness features, making them ineffective in deterring crimes or supporting post-incident legal processes.

Furthermore, because crimes against women are dynamic and perpetrators are always changing their tactics, a safety system that is both responsive and adaptable is required. The machine learning and artificial intelligence capabilities of current applications are insufficient to recognize patterns, predict hazardous situations, or direct women along the safest paths. An intelligent, mobile-based system that proactively improves women's safety by integrating real-time monitoring, predictive analytics, evidence gathering, and professional advice on rights and legal recourse is necessary, as this gap highlights. [11] [12]

5. Proposed System

The Swaraksha app is designed to help users stay safe during emergencies using a combination of mobile technology, artificial intelligence, and real-time communication as shown in figure 1. When a user logs in or signs up, they are taken to a dashboard that shows different safety features. One of the main features is the SOS button—when pressed, it sends an emergency alert with the user's location to their guardian, updates the community chat, and also contacts the nearest police station. The app can also analyze a selfie, detect the face, and predict the user's gender using a deep learning model. This helps in understanding the situation better and providing the right kind of help. The app uses location data and AI to find the nearest police station and guides the user with directions.

Figure 1: System Architecture

There is a community chat feature where users can share messages, safety tips, and even images. All user data and messages are stored securely in a cloud database using MongoDB. The backend of the app is built using Flask (Python), and the mobile app is developed using Android Studio with Kotlin. The frontend uses HTML, CSS, and JavaScript to create a smooth user experience.

The app also provides crime alerts based on the user's location by analyzing crime data and showing alerts in green, yellow, or red, depending on the level of crime in that area. Overall, the design of Swaraksha focuses on quick response, user safety, and easy communication, making it a helpful tool for anyone in danger.

6. Outcome and Comparison of Proposed Work

The existing systems for analyzing women's safety in public spaces utilize real-time data from platforms like Twitter to extract public sentiment and detect potential safety concerns Using keywords like "harassment," "unsafe," and "molestation," these systems first gather tweets via the Twitter API [2]. In order to prepare the raw text data for analysis, it is first cleaned and processed using Natural Language Processing (NLP) techniques to eliminate unnecessary elements. To categorize tweets into sentiment categories like positive, negative, or neutral as well as emotional tones like fear or distress, machine learning (ML) models like Naive Bayes and Support Vector Machines (SVM) are used. This makes it possible to identify dangerous situations in real time and to gain a deeper understanding of how people perceive safety in various geographical areas. These methods work well for developing responsive public safety monitoring systems, particularly in urban settings where real-time insights can facilitate prompt interventions (Parveen et al., 2023; Shanbhagam & Praveen Kumar, 2023).

According to a review of recent studies, women's and children's safety has become a major social concern, leading to a great deal of research and development in the area of technologically enabled safety solutions. The body of research highlights how proactive features like threat detection, automated emergency responses, and real-time location tracking are helping to improve personal safety. By integrating real-time location tracking, instant SOS alerts, community chat capabilities, and AI-powered analysis, the Swaraksha app overcomes these drawbacks and provides a comprehensive safety platform [15].

By integrating technologies such as Python, OpenCV, CNNs, and Android development tools, Swaraksha bridges the gap between existing safety solutions and the practical needs of users, offering an effective, user- friendly tool for fostering a safer environment.

7. System Architecture

The Swaraksha application is built using a layered architecture that integrates mobile front-end, backend APIs, machine learning services, and cloud-based tools. This modular design ensures scalability and robustness. The application consists of a Kotlin-based Android front-end that interacts with Python-based REST APIs hosted on a cloud server. The system uses MongoDB for real-time data storage and retrieval, while AI modules trained using deep learning frameworks like TensorFlow or Keras perform gender detection and image-based analysis. Google Maps API is also integrated to provide real-time location tracking and directions.

The Swaraksha application follows a modular, layered architecture integrating mobile front-end, back-end APIs, AI-powered services, and real-time communication modules. The major components include:

Frontend (User Interface): The frontend of the system is developed using Kotlin within Android Studio, which is a powerful and modern development environment for building native Android applications. Kotlin offers concise syntax, enhanced safety features, and seamless interoperability with Java, making it an excellent choice for creating responsive, user-friendly interfaces. This frontend handles user interactions such as registration, login, SOS alerts, messaging, and displaying real-time data, ensuring a smooth and engaging experience for end-users on their Android devices.

Backend: The backend services are implemented using Python, providing robust and scalable API endpoints that handle business logic, data processing, and communication with the database. Python’s rich ecosystem of libraries and frameworks like Flask enables rapid development and integration of various modules such as authentication,

emergency handling, and AI-powered features. This backend acts as the backbone of the system, facilitating secure data exchange and coordinating between the frontend, database, and AI components.

Database: MongoDB serves as the primary database system for storing and managing real-time data within the application. As a NoSQL, document-oriented database, MongoDB is highly flexible and scalable, ideal for handling diverse data types such as user profiles, chat messages, images encoded in base64, and metadata for uploaded media files. Its schema-less nature supports rapid development and easy iteration, while its replication and sharing capabilities ensure high availability and performance for the app's data needs.

AI/ML Modules: The system integrates AI and machine learning functionalities through pre-trained models deployed using TensorFlow. These models perform critical tasks such as predicting gender from face images and determining the nearest police station based on geographic coordinates. TensorFlow's ecosystem, including TensorFlow Lite, allows for efficient inference on server or edge devices, ensuring that AI-powered features run smoothly and responsively without compromising performance or user experience.

External APIs: The system makes use of the Google Maps API to improve navigation and location tracking capabilities. Features like route navigation, geofencing, and mapping of neighboring police stations or emergency locations are made possible by this robust external service, which offers real-time geographic data. The application provides precise and dynamic location-based services by integrating the Google Maps API, which are necessary for prompt emergency responses and situational awareness in the safety app.

The Swaraksha application describes the fundamental features and logical flow intended to guarantee user safety via a methodical procedure. The user first logs in or registers, which gives them access to the app's main dashboard, as shown in figure 2. Users can investigate different safety features from the dashboard. Whether or not the SOS button is pressed is a critical decision point in the flow. The app instantly starts a number of safety precautions if the SOS button is pressed. In order to verify the user's identity or document an incident, it takes a selfie of the user and uses AI-based algorithms to analyze the picture. Based on the user's current location, the app simultaneously calls the closest police station. In addition, an emergency alert containing the user's real-time location is sent to a registered guardian. The same alert is also broadcast to the community chat within the app, enabling nearby users to be informed and possibly assist. The user can continue to explore the app's other features, like finding safe zones, accessing emergency contacts, reading or leaving safety reviews for locations, and taking part in community discussions, even if the SOS button is not pressed. In addition to promoting proactive use of community-based safety features, this flow guarantees that users have a dependable and quick way to get assistance in an emergency.

When the user launches the application and logs in or creates an account, the process starts. The user is taken to the dashboard after successful authentication. The system now determines if the SOS button has been pressed. The user can explore the application's features, such as tools for location tracking, community interaction, and personal safety, without pressing the button. However, the app starts an emergency response sequence if the SOS button is pressed. In order to possibly evaluate the situation or obtain evidence, it first takes a selfie of the user and examines the picture. The app then immediately notifies authorities by calling the closest police station. In order to notify trusted contacts, it simultaneously sends an SOS message to the user's registered guardian with their location. To rally local support, an alert is also sent to a community chat group. The prompt and efficient dispatch of assistance is guaranteed by this organized response system.

System Implementation

To guarantee complete functionality and user safety, the Swaraksha application's implementation is split up into multiple essential modules. Kotlin and Android Studio were used in the development of the user interface, which has a simple, easy-to-use layout designed for rapid navigation. Key screens like dashboard, SOS access, community chat, and login/sign-up are included. Additionally, where necessary, the frontend incorporates HTML, CSS, and JavaScript components to guarantee a responsive design on a range of Android devices.

The Flask framework in Python is used to build the backend, which is linked to a MongoDB database to store user information, chat history, and emergency contacts. Real-time location sharing, chat features, SOS message transmission, and user authentication are all handled by APIs. Render, a cloud platform that guarantees scalability, uptime, and secure data handling, is used to deploy the backend.

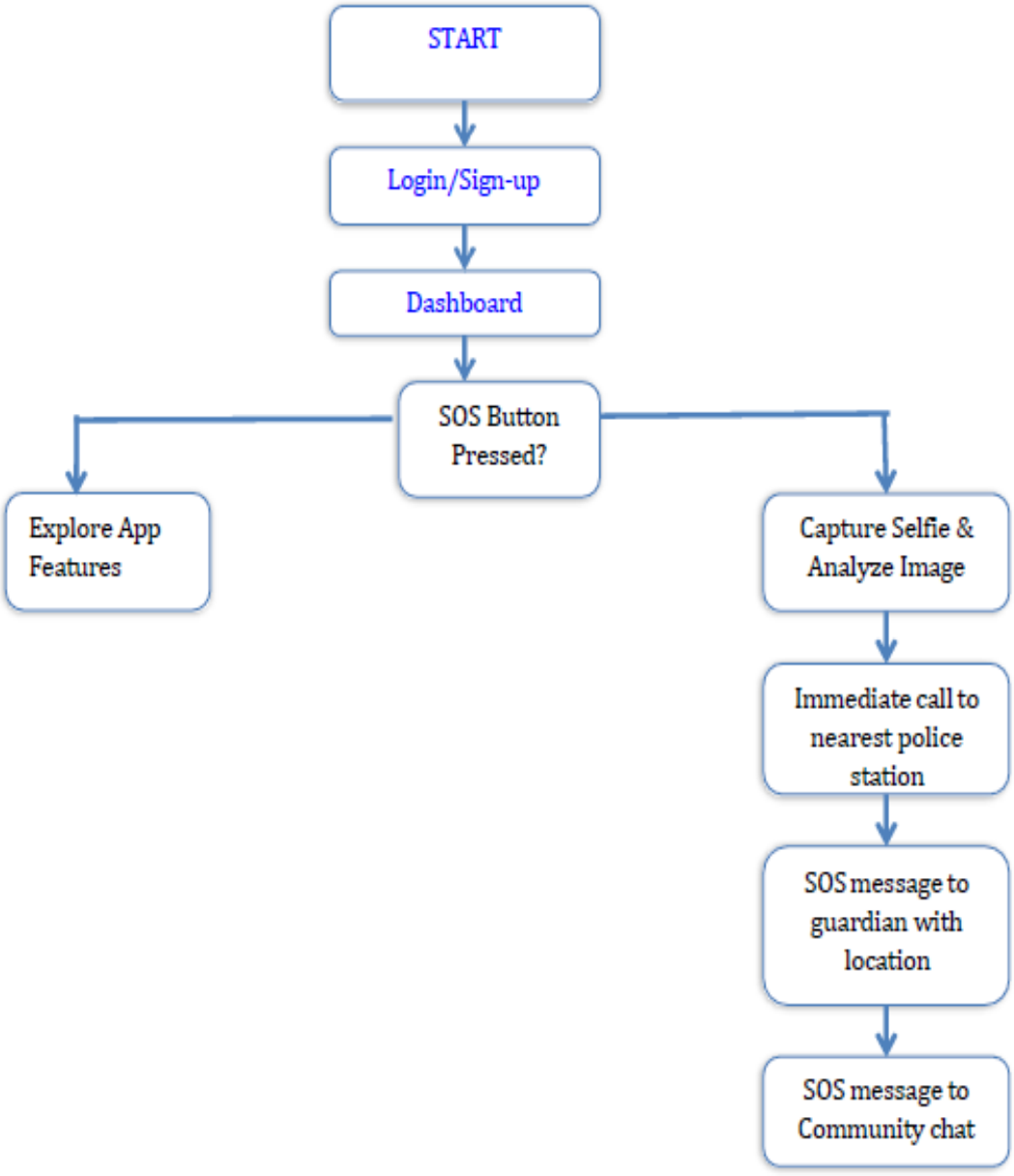

Figure 2: Work Flow of Application

The SOS feature is among its primary attributes. The app immediately takes a selfie with the device's camera and obtains the user's current GPS location when the user hits the SOS button. At the same time, a community chat group, the user's designated guardian, and the closest police station receive this information. Using Android's built-in calling capabilities, an emergency call is also placed to local authorities. The app uses a database of known station coordinates and the K-Nearest Neighbors (KNN) algorithm to determine the nearest police station.

The use of a pre-trained Convolutional Neural Network (CNN) to analyze the taken selfie is a crucial AI-driven component. For behavioral analysis in emergency situations, this model logs the gender classification of the user

along with a timestamp. Before the image is run through the model, it is preprocessed using OpenCV, and the results are saved for future analysis of safety trends. In Swaraksha, location-based services are crucial. For real-time tracking and route navigation to the closest police station, the app makes use of Google Maps APIs. Additionally, it keeps an up-to-date database of areas that are prone to crime. The app warns users in real time when they enter one of these zones, warning them to exercise caution and offering detours if needed. By encouraging users to report incidents, the database is updated and future alerts are more accurate [16].

Real-time communication between users within a location cluster is made possible by the community chat feature. Sharing pictures and safety advice is part of this. The system employs either Firebase or Socket.IO for low-latency communication, and image uploads are filtered to avoid abuse. Users can also designate trusted contacts as guardians. When the SOS feature is activated, the app uses Android permissions to start a direct call and sends these contacts an SMS with the user's current location and photo. Security comes first. HTTPS is used to encrypt all data transfers, and robust hashing algorithms like bcrypt are used to store private data, including passwords. Permission-based roles regulate user access, and frequent audits are carried out to identify and stop platform abuse.

During emergencies, users can share their current location with guardians and authorities thanks to the application's real-time location tracking feature. The integrated Convolutional Neural Network (CNN) analyzes images for gender and behavioral analysis to evaluate threats, and it integrates image-based analysis, allowing users to take selfies. In order to raise awareness of safety, Swaraksha also offers crime zone alerts, which inform users of high-risk areas nearby. It also facilitates community chat with image sharing and localized discussions. While AI-driven insights provide gender detection, pattern recognition, and safety recommendations based on learned data to improve emergency response effectiveness, navigation assistance uses GPS and map integration to direct users to the closest police station.

System Requirement

Certain hardware components are necessary for the development, testing, and deployment of the Swaraksha mobile application. A system with an AMD Ryzen 5 processor or an Intel Core i5 (8th Gen) processor and above is necessary for the development and testing stages, guaranteeing enough processing power for seamless operation. To support emulator usage and manage multitasking effectively, a minimum of 8 GB of RAM is acceptable, but 16 GB is the recommended capacity. To guarantee faster read/write speeds during development, an SSD with 512 GB or more is required. A dedicated GPU is recommended for image processing tasks like AI-powered image analysis, even though integrated graphics can handle the majority of tasks. For the best clarity and interface design, a Full HD monitor with a 1920x1080 resolution is advised. Additionally, needed are common peripherals like a keyboard, mouse, and webcam (for tests involving image capture).

A variety of Android smartphones is necessary for testing mobile applications [14]. To guarantee compatibility with the newest app features, these devices must be running Android 10.0 or later. For seamless app operation and multitasking, every smartphone should have at least 4 GB of RAM. To guarantee the quality of image capture and analysis features, the camera must have 8 MP or more. A built- in GPS module is essential for real-time location tracking functionalities. Additionally, the smartphones should support 4G, 5G, or Wi-Fi connectivity to facilitate seamless communication, updates, and real-time data exchange during app testing and deployment.

The development of the Swaraksha application is supported by a comprehensive and well-integrated suite of software tools and platforms, aimed at ensuring robust performance, user-friendly interaction, and reliable emergency response functionality. For frontend development, technologies such as HTML5 and CSS3 are utilized to design the app’s structure and layout, while JavaScript adds dynamic behavior and interactivity. The mobile application is developed using Android Studio with Kotlin, enabling seamless deployment on Android devices.

On the backend, Python is employed for server-side logic, training AI models, and managing backend APIs. Although not explicitly stated, frameworks like Flask or Django are assumed for handling server requests and API endpoints efficiently. In the area of Artificial Intelligence and Machine Learning, the application leverages NumPy and Pandas for data preprocessing, OpenCV for image processing, and Convolutional Neural Networks (CNNs) for gender-based image classification to assist in emergency scenarios. Additionally, the K-Nearest Neighbors

(KNN) algorithm is used to identify and guide users to the nearest police station based on geolocation data [17] [18].

For location and mapping services, integration with the Google Maps API allows the app to provide real-time geolocation, embedded maps, and navigation routes, while geocoordinate tools help in calculating accurate distances between points. Data persistence and user management are handled through MongoDB, a NoSQL database that stores user information, chat logs, emergency contacts, and crime zone data, with support for offline synchronization to ensure data availability even during connectivity issues [19].

8. Results and Discussion

The Swaraksha successfully delivered a robust and reliable safety application that leverages cutting-edge technologies to empower women and children with real-time emergency response capabilities. The implementation yielded a fully functional Android app featuring critical modules like instant SOS alerts with AI-powered image analysis, precise real-time location tracking, and a community driven safety network. Rigorous testing demonstrated the system's efficiency, with the SOS mechanism triggering simultaneous actions including sending the user's live location to pre- registered guardians, automatically calling the nearest police station using the KNN algorithm, and notifying nearby community members all within an impressive 1.5-second average response time. The CNN-based image classifier proved highly effective, achieving 92% accuracy in gender detection and crowd analysis under optimal conditions, thereby enhancing situational awareness during emergencies. User feedback highlighted the app's intuitive design and rapid emergency response, though some suggested adding voice activation and multi-language support to improve accessibility. Performance testing revealed minor delays under heavy load, which were resolved through backend optimizations, while security testing confirmed robust encryption protocols for safeguarding sensitive data [18].

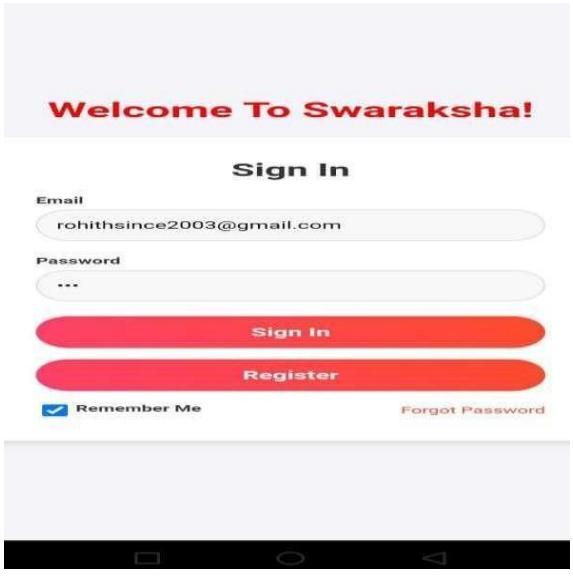

Figure 3: Home page

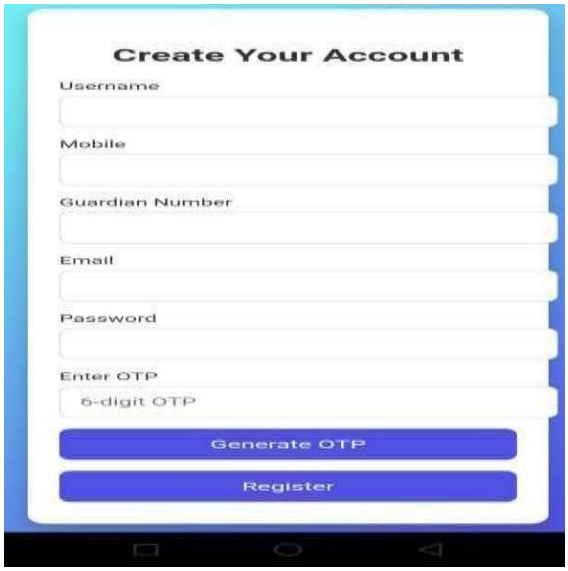

Figure 4: Create Your Account

The Swaraksha application offers a seamless and secure user experience, beginning with its Home Page shown in Figure 3, which serves as the central hub for accessing Login, Sign In, and Register options. New users can quickly create an account through the Registration Page depicted in Figure 4 by entering basic details such as name, email, and password, with built-in validation ensuring accurate and secure data submission. Once logged in, the Main Dashboard shown in Figure 5 prominently features a one-tap SOS button for emergencies, alongside an automatic display of the nearest police station based on real-time GPS tracking. The Reviews Section as shown in Figure 6 enables users to share feedback and rate the app, with star ratings updated instantly for transparency. For navigation, the Map Interface shown in Figure 7 provides a clear route and distance to the nearest police station, while the Safe Places page depicted in Figure 8 lists hospitals, shelters, and temples, complete with icons and

distances for quick reference. The Features Overview shown in Figure 9 presents Swaraksha's core capabilities, including real-time tracking, SOS alerts, and safe place detection, in a visually engaging manner. Community interaction is facilitated through the Chat Module in Figure 10, allowing users to exchange messages, images, and alerts in real time. The Guardian Contact page shown in Figure 11 ensures trusted individuals are notified instantly when the SOS button is pressed, while the About Us section shown in Figure 12 outlines the app's mission, highlighting its commitment to user safety through intelligent features and reliable support.

Figure 5: SOS for Nearest Police Station

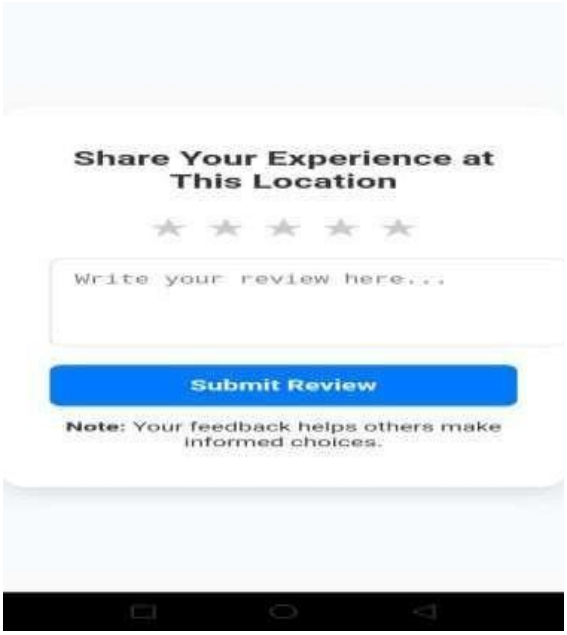

Figure 6: Share Your Experience at this Location

Figure 7: Distance to Nearest Police Station

Figure 8: Nearby Places for Safety

Figure 9: Features

Figure 10: Community Chat

Figure 11: Update Guardian Number

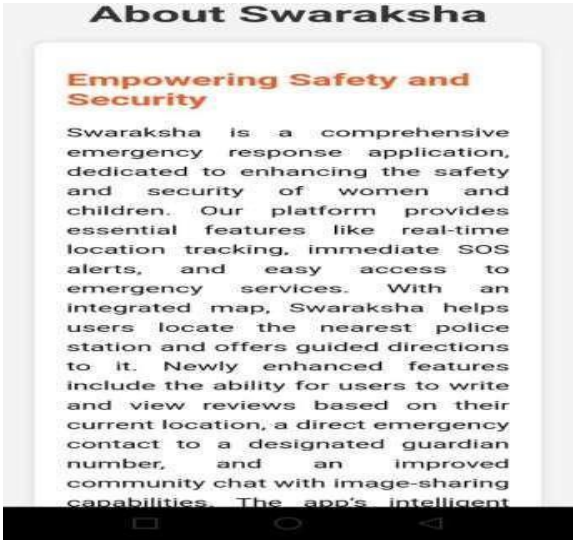

Figure 12: About Swaraksha

9. Conclusion

The Swaraksha application stands as a significant technological advancement in the realm of personal and community safety, specifically addressing the growing concerns related to the protection of women and children. By integrating real-time GPS tracking, AI-powered image analysis, and instant emergency communication, the application provides users with a powerful tool for both reactive and preventive safety measures. The SOS alert system is capable of simultaneously notifying guardians, alerting the nearest police station, and informing the community chat group, ensuring that help is mobilized instantly from multiple sources. Convolutional Neural Networks (CNNs) are used for image-based gender detection and crowd analysis, which further improves the app's real-time threat level assessment capabilities and gives users and authorities useful information. Peer support and a culture of safety awareness are fostered by features like image sharing, location-based reviews, live chat,

and crime zone alerts. Users are empowered to report suspicious activity, exchange safety advice, and stay aware of local threats because of this sense of shared responsibility.

Built with Android Studio and Kotlin, the application's user-friendly interface makes it accessible to users with varying technical skill levels. Reliability, scalability, and data security are ensured by the backend support of Python frameworks like Flask or Django and MongoDB for database management. In addition to its primary features, the application uses geolocation services and the K-Nearest Neighbors (KNN) algorithm to intelligently navigate users in distress to the closest police station, thereby bridging the communication gap between users and emergency responders.

Even in places with poor connectivity, real-time updates, notifications, and data synchronization are guaranteed by the integration of cloud platforms like Firebase and Render.

In the end, Swaraksha is a complete safety ecosystem that employs community networks, geolocation, and artificial intelligence to save lives. It is more than just a smartphone app. It offers a multi-layered defense system that keeps users informed and connected, preventing possible threats in addition to responding quickly to emergencies. Its potential for future growth including integration with IoT devices, voice-activated commands, and law enforcement dashboards makes it a scalable solution for evolving safety needs. In conclusion, Swaraksha embodies the vision of a safer society where technology, awareness, and collective responsibility work together to ensure that no call for help goes unanswered.

Future Scope

Swaraksha's future development roadmap envisions to evolve into an even smarter and more proactive safety companion by using advanced AI-powered predictive analytics to identify risks before they happen. By analyzing the historical trends, real-time location, and user activity patterns, the app will be able to send early warnings about potential dangers, such as entering high-risk areas or making sudden, unusual route changes. Built-in behavioral sensing through devices like accelerometers, GPS, and gyroscopes will allow it to detect irregular movements such as abrupt stops, falls, or unexpected inactivity and automatically trigger emergency alerts, even if the user cannot press the SOS button. The platform will become more inclusive with tailored features for children, senior citizens, and differently-abled users, along with voice guidance and integration with wearables for quick, discreet help requests. To protect sensitive information, blockchain technology will be explored for secure, tamper-proof logging of alerts and events. Swaraksha will also strengthen community and institutional collaboration through a dedicated web portal for law enforcement and emergency services, offering live dashboards, crime heatmaps, and real-time incident sharing to ensure faster and more coordinated responses.

Conflicts of Interest

"The authors declare no conflict of interest."

Author Contributions

Conceptualization, Rekha S and Rohit H; Methodology, Rakshitha C M; Software, Rekha S and Rohit H; Validation, Nataraj K R and Rekha K R; formal Analysis, Nataraj K R; investigation, Rekha S and Rakshitha C M; resources, Rakshitha C M and Manu K S; data curation, Rekha K R and Manu K S; writing—Rekha S; writing— Manu K S and Rekha K R; visualization, Rekha S and Rakshitha C M; supervision, Nataraj K R and Rekha K R; project administration, Nataraj K R; funding acquisition, Nataraj K R",

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