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Research Article

ANARKI: A Technology-Driven Framework for Enhancing Women's Safety Through Real-Time Security and Privacy

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ABSTRACT

Women's safety continues to be a serious concern especially with the national crime rate against women increasing from 57.0 to 67.0 per 100,000 women between 2020 and 2022. In 2024, the National Commission for Women (NCW) reported 25,743 cases showing the urgent need for better safety solutions. Many challenges remain such as delayed responses from law enforcement due to poor location tracking and weak communication systems. Existing safety apps often don't meet the needs of users from different backgrounds, lacking essential features and easy usability. This research introduces ANARKI (Application for Navigating Assistance & Response for Keeping Immediate Support), a mobile app created to improve women's safety by offering real-time emergency support and privacy protection. With smartphone usage in India at 7.0% in 2024 and expected to rise to 8.3% by 2029, ANARKI is designed with a simple interface and key features like: Easy navigation and clean UI for all age groups, Spy camera detector to protect privacy, SOS alert system for quick help during emergencies, Fake siren to scare or distract potential threats. To build and improve ANARKI, the study used a mixed research method. A Google Form survey was conducted with 170 participants of different age groups to gather feedback on design, usability, and feature preferences. The results helped identify what users expect from a safety app. Additionally, a review of seven existing research papers helped understand the strengths and gaps in current women's safety apps. Combining user feedback with research insights helped make ANARKI more user-friendly, inclusive and effective. The app not only improves emergency response but also empowers users with preventive tools and health monitoring features. This study highlights the role of innovation, government policies and public awareness in building strong and long-lasting safety solutions. In the future, technologies like AI-based threat detection and smart city integration could make digital safety even stronger making tech a key part of protecting women's well-being.
Keywords: women's safety, mobile application, emergency response, user experience, privacy protection, sos alert, spy camera detector, digital security.

INTRODUCTION

Approximately one-third of women worldwide reported experiencing intimate partner violence or physical injury at some point in their lives according to a 2020 UNODC survey [1]. Unfortunately, delays and a lack of data frequently make it difficult for regulatory enforcement to respond effectively. In India, 4,45,256 instances were formally recorded as "crimes against women" in 2022. According to the National Crime Records Bureau, this corresponds to about 1,220 reported cases every day.

Today's women face significant safety obstacles, especially in urban and rural areas where harassment, assault and kidnapping are prevalent. Even with advancements in women's rights and more employment, many still feel vulnerable particularly when taking public transit or traveling late at night. Even if there are safety precautions like emergency helplines, they frequently fall short of offering prompt and efficient support, depriving women of instant aid during dire situations. Their susceptibility is further increased by a lack of knowledge about the services that are available or by the difficulty in obtaining them.

According to India's most recent crime data for 2024, the country's total crime rate decreased by 0.56% from the last year.

- The number of rape cases increased by 1.1% underscoring the ongoing danger to women's safety.
- Even while total crime has decreased, some crimes have increased which is indicative of growing safety concerns.
- A 5.1% rise in kidnapping and abduction cases suggests that the risk is rising.

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- There is a concerning discrepancy between the crime rates reported in rural and urban areas.
- With a crime rate of 7.4 per person, Uttar Pradesh continues to be the nation's most dangerous state.
- In India, the WEI reports a 48% empowerment deficit while the GGPI reports a 44% gender disparity.
- India's position on the 'Women, Peace And Security Index 2021' is 148th out of 170 countries.

Engineering solutions are obviously desperately needed to ameliorate the situation, especially in light of the startling rise in crimes against women [2]

By offering a discreet and quick and effective way to call the police in an emergency, ANARKI is one such effort to improve women's safety [3]. The functionality of the program is divided into three steps: setting up an emergency contact, setting off an alarm, sending an emergency message and contacting local law enforcement. The user's current location and emergency contact details are included in the message. ANARKI is intended to provide a dependable lifeline for women who are vulnerable [4].

In order to handle emergency calls and messages, the ANARKI system interfaces with local law enforcement and instantly shows the risk zone on the Google Maps interface. This makes it possible for police officers to be sent from the local station more quickly and makes it easier to communicate with the provider's immediate consumers. ***Android dominated the Indian mobile operating system market in 2023, accounting for 95.17% of the market while iOS came in second with 3.98%, according to a research by Shangliao Sun released on August 2, 2024.***

The development, deployment and technological uses of ANARKI as well as potential future advancements and designs, are thoroughly examined in this study.

LITERATURE SURVEY

TABLE 1: LITERATURE SURVEY

Paper	***Key Findings***	***Methodology***	***Limitations***
Banerjee, S., Maiti, P., & Biswas, S. (2024). Empowering Personal Safety Through Mobile Apps. In S. Ponnusamy, V. Bora, P. Daigavane, & S. Wazalwar (Eds.), *AI Tools and Applications for Women's Safety* (pp. 91-120). IGI Global Scientific Publishing.	Although applications speed up reaction times, smartphone-based safety apps have trouble becoming adopted.	Case Studies, App Testing and Survey	Restricted to cities and rural areas have minimal awareness.
Kumar, S. S., Aishwarya, T., & Ansong, E. D. (2024). *Android Based Women Safety Application Using Accelerometer Sensor. In Disruptive Technologies for Sustainable Development (pp. 121-126). CRC Press.*	For detection and alerting accelerometer sensor is used.	Detects odd motions and sounds a warning using an accelerometer sensor.	Dependability of the sensor because of potential false positives.
Tejas Tathe, Harshal Wadne, Pranav Patil, Dheeraj Waydande (2024) *"SafeSteps" A Flutter -Based Application to Provide Security to Women's,* International Journal of Scientific Research in Engineering and Management (IJSREM), *Volume. 8 Issue. 11,*	Through SIM tracking, a better mobile app increases women's safety.	Emergency alert system for sending SOS signals to authorities and position monitoring based on SIM cards for dependable tracking.	More innovation is required beyond current apps.

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Gehani, H. & Ponnusamy, S. (2024). Mobile Application-Based Women's Safety and Security System Using AI. In S. Ponnusamy, V. Bora, P. Daigavane, & S. Wazalwar (Eds.), *Impact of AI on Advancing Women's Safety* (pp. 200-215). IGI Global Scientific Publishing.	Real-time monitoring security system powered by AI.	Uses AI algorithms to monitor and notify in real time.	Implementing AI is complicated since it requires a lot of processing power.
Jefry, A. N. I., Ismail, S. R., Munira, I., Ibrahim, Najmuddin, A. F., Shaffie, S. S., Anisah, & Rahman, A. (2023). *Women Safety Application Using Geolocation*. *International Journal of Academic Research in Business and Social Sciences, 13(9)*	Geolocation tracking for safety.	Tracks the user's position and sends notifications using GPS technology.	Geolocation tracking accuracy may be impacted by signal loss.
Choudhary, A. K., & Pagar, S. (2023). *Design and implementation of women's safety system*. International Journal for Research in Applied Science & Engineering Technology.	System design that works well for women's safety.	Creates a useful safety system and puts it into action.	Difficulties in real-world implementation because to limitations.
Aarthi, E., Ramya, K., Srilekha, M., & Mageshwari, R. (2023). *Women safety enhancement application*. International Journal for Research in Applied Science and Engineering Technology, 11(5), 674-677.	Resolving safety issues that jeopardize women's social security.	In an emergency, registered contacts receive ongoing location updates via SMS with the help of one-click activation.	Lacks locators for local police stations and hospitals and the current systems require improvement in terms of use and accessibility.

A. Rationale

B. Methodology

C. C. Evaluation of Safety Apps

Notable have been earlier initiatives to improve women's safety especially with regard to mobile applications.

On the streets of the city, women face harassment, assaults, and violations on a daily basis. Globally, gender-based violence is prevalent particularly in underdeveloped nations [5]. This violence includes intimate, physical and psychological abuse.

The use of force to injure or jeopardize the health of women is known as physical aggression. Rape, human trafficking, genital mutilation, child marriage and domestic abuse are all examples of sexual exploitation. Depression brought on by psychological abuse frequently results in acute stress disorder, anxiety or protracted depressive states. The physical and mental health of women is significantly impacted by these types of assault. [6]

More than 33% of women globally are victims of physical or sexual violence according to a 2021 UN report that compiled earlier studies [7]. Ninety-eight percent of the 4.5 million victims of forced sexual abuse are women [8]. Women in urban areas, especially in developing countries are more than twice as likely as men to experience various types of assault, according to the report [9].

In India, a research conducted by the National Crime Records Bureau of the Home Ministry found that 33,500 children and over 44,500 women were raped in 2012. [10]. The women's safety software industry is expected to grow from its 2024 projection of $1.9 billion to $3.9 billion by 2031 [11]. This expansion corresponds to a compound annual

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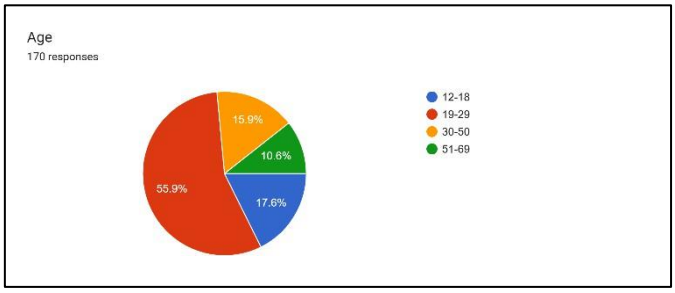
growth rate (CAGR) of 9% throughout the 2024–2031 projected period. With 69 million devices shipped overall, the first half of 2024 witnessed a 7.2% rise in India's smartphone market over the same time previous yearly. Forecasts indicate that by 2025, there may be approximately 1.14 billion smartphone users in the nation.

B. Identification of the Problem and Choice of Solution

Establishing strong infrastructure in connection to empowering women and children in our society is the aim of this Android application. In order to achieve this, we created a mobile application that::

1. Its user interface is straightforward making it simple to use and quick.
2. The police are assured of receiving a warning message right away.
3. Users can utilize it to covertly send out alerts.
4. The app shares real-time location details with emergency contacts helping them reach the user quickly.
5. A built-in tool helps users identify hidden cameras in unfamiliar environments enhancing privacy and security.



Since mobile phones are so common and are less likely to be misplaced than separate hardware devices, the decision to develop an Android app for trouble reporting was motivated by the fact that they provide a useful alternative to open communication with a companion.

We go over three such implementations with goals similar to ANARKI below..

1) SafeTrek[12]

When users feel uncomfortable, they can discreetly alert law enforcement using this app. Users can inform authorities by holding down a button on the app if they are unable to provide a PIN, emergency personnel are contacted.

2) Circleof6[13]

The app which was created with college students in mind, lets users select six reliable individuals. They can covertly communicate pre-programmed messages to their team, such distress signals or help requests.

3) bSafe[14]

With features like a false call option, SOS alert and live GPS tracking, bSafe enables users to stay in contact with their loved ones and make sure they're safe. In addition to providing a "Follow Me" option for trip tracking it facilitates family communication.

ANARKI stands out from the many other existing applications that concentrate on women's safety because it integrates directly with local law enforcement organizations. This feature may be enhanced by application extensions and it is free and open source, allowing for quick deployment and smooth research development. Additionally from a research standpoint, the usage of ANARKI Application based technology offers a chance to investigate how well smartphone applications solve significant societal concerns like women's safety.

D. User Survey

A comprehensive survey involving 170 individuals from various age groups was conducted to gain deeper insights into user preferences, expectations and desired functionalities for the application. This study aimed to explore perspectives on key aspects such as user interface (UI), user experience (UX) and advanced features that would enhance usability. By engaging participants from diverse technological backgrounds and generations, the survey provided valuable feedback to guide the development of a user-centered application. The findings played a crucial

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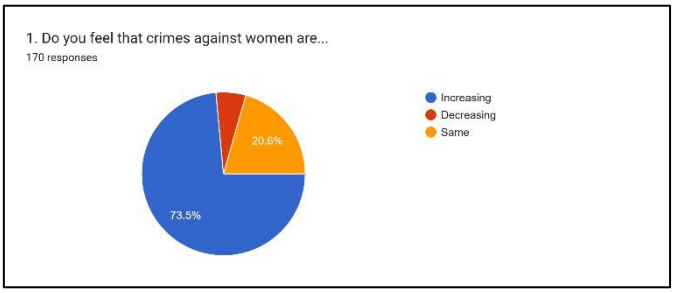
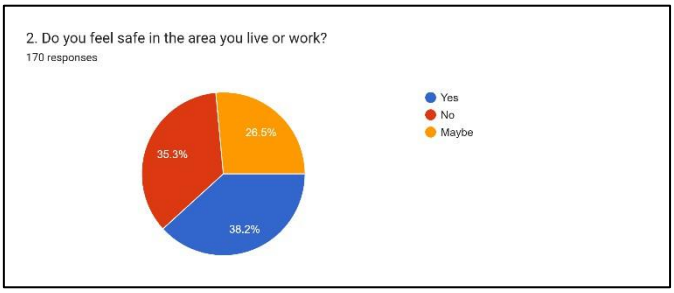
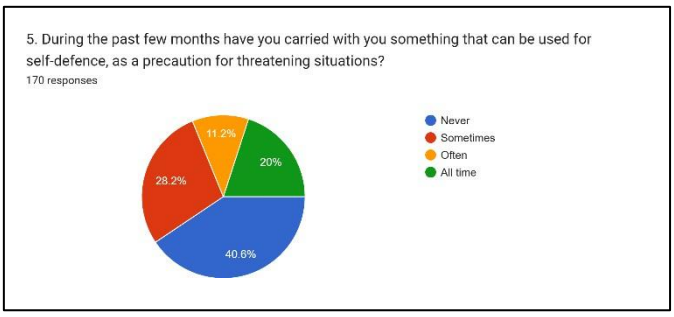
role in ensuring that the app is intuitive, inclusive and adaptable to the needs of a wide-ranging audience.

Our survey highlights a diverse age distribution among respondents with the majority falling within the 19-29 age group, reflecting a strong interest in women's safety among young adults. However, significant participation from the 12-18 and 30-50 age brackets underscores the broader relevance of this issue. The engagement of teenagers emphasizes the need for early safety awareness while the active involvement of individuals in their 30s and 40s many of whom may be working professionals or mothers demonstrates that safety concerns extend across different life stages. This broad demographic interest reinforces the importance of developing an inclusive and widely accessible safety application.



The survey results reveal a strong public perception that crimes against women are on the rise with a significant 73.5% of respondents expressing concern over increasing incidents. In contrast, only 5.9% believe there has been a decline, possibly indicating localized improvements or varying safety perceptions. Meanwhile, 20.6% feel that the situation has remained unchanged underscoring the persistent nature of this issue. These findings highlight the urgent need for proactive strategies including stronger policies and community-driven initiatives to enhance women's safety and address growing concerns effectively.





The survey provides valuable insights into respondents perceptions of safety in their living and working environments. Notably, 35.3% of participants reported feeling unsafe highlighting a significant concern. Conversely, 38.2% expressed a sense of security which is an encouraging indicator of positive environmental conditions for many individuals. Meanwhile, 26.5% remained uncertain falling into the "Maybe" category suggesting that feelings of safety can be fluid and influenced by factors such as recent events, location and personal experiences. Given these varied perspectives, a deeper analysis of the survey data could help identify the specific factors shaping these perceptions. This, in turn, could inform the development of targeted strategies to enhance safety and address existing concerns effectively.

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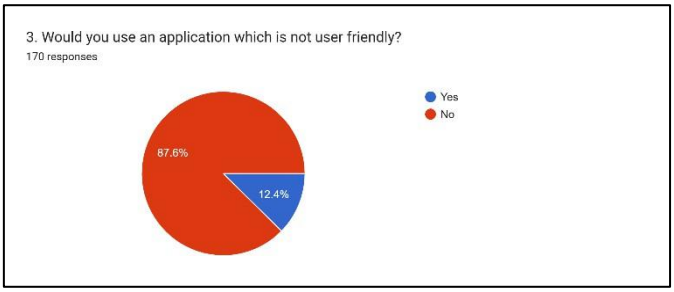
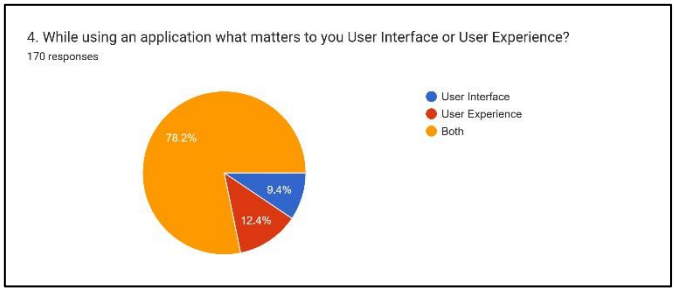
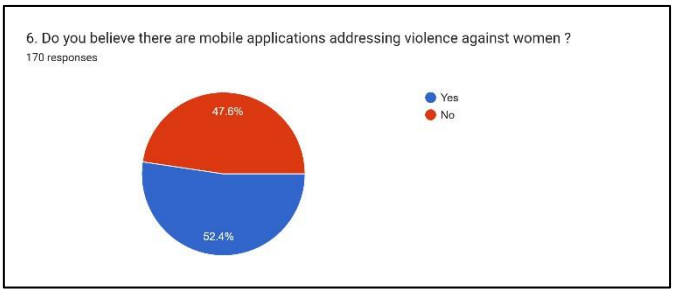


The survey results make it clear that user-friendliness is a critical factor in application adoption. An overwhelming 87.6% of respondents stated that they would not use an application that is not user-friendly highlighting the necessity of an intuitive and accessible design especially for a women's safety app where ease of use is essential. Conversely, only 12.4% expressed a willingness to use an application with usability challenges suggesting a higher tolerance for complexity among a small minority. However, the dominant preference for a seamless user experience underscores the need for ANARKI to prioritize accessibility and simplicity. These insights reinforce the app's role in addressing rising concerns about women's safety emphasizing that its effectiveness depends on ensuring a user-friendly interface that meets the expectations of the majority.



The survey results highlight the crucial role of both User Interface (UI) and User Experience (UX) in application design. A significant 78.2% of respondents believe that an ideal application should balance both a visually appealing interface and a smooth, intuitive user experience. Meanwhile, 9.4% place greater importance on UI indicating that design and aesthetics heavily influence their decision-making. In contrast, 12.4% prioritize UX focusing on functionality, ease of use and the overall interaction with the application. These insights emphasize the need for a well-rounded approach that seamlessly integrates UI and UX particularly in a women's safety application. A thoughtfully designed platform that effectively combines both elements can enhance user trust, engagement and overall effectiveness in addressing safety concerns.

The survey results on carrying self-defense items in potentially threatening situations reveal varying levels of precaution among respondents. A significant 40.6% stated that they never carry such items which may indicate a sense of security or a lack of awareness regarding self-defense measures. Meanwhile, 20% reported always carrying self-defense tools reflecting a heightened level of vigilance and proactive approach to personal safety. Additionally, 28.2% carry these items occasionally suggesting that their decision is situational and influenced by specific environments or perceived risks. Furthermore, 11.2% frequently carry self-defense items demonstrating a consistent commitment to personal security. These insights highlight the diverse attitudes toward self-defense emphasizing the need for greater awareness and preparedness to enhance safety measures for individuals in vulnerable situations.



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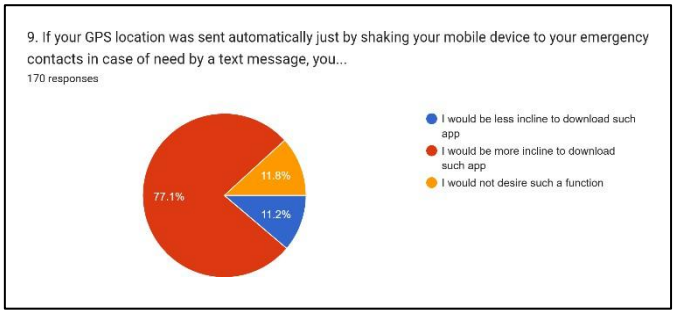
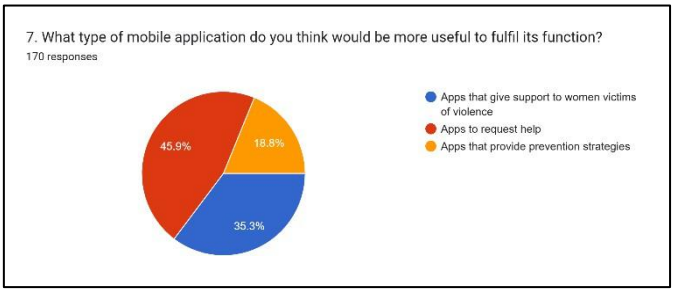
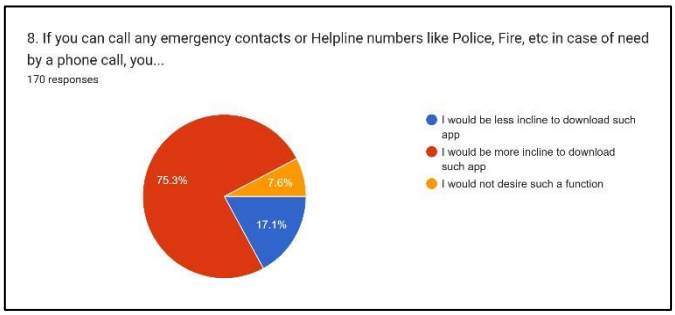


The survey results regarding the existence of mobile applications addressing violence against women show a relatively even split where 52.4% of respondents believe there are mobile applications addressing this issue, indicating awareness and recognition of such solutions. On the other hand, the 47.6% of respondents who express a belief that there aren't mobile applications specifically addressing violence against women present a different perspective. This group may not be aware of the existence of such apps, which could indicate a need for improved awareness campaigns or educational efforts. Alternatively, they might believe that the existing solutions are insufficient in addressing the problem adequately.



The survey results provide valuable insights into the ideal mobile application features for addressing violence against women. A significant 45.9% of respondents prioritize apps designed for requesting immediate help emphasizing the critical need for swift emergency assistance. This indicates that a large portion of respondents view rapid access to support as a key factor in combating violence. Additionally, 35.3% believe that applications offering resources and guidance for victims of violence are essential highlighting the importance of post-incident support and recovery. While a smaller percentage, 18.8% value apps focused on prevention strategies recognizing the role of proactive measures such as educational content, safety tips and risk awareness in reducing violence. These findings underscore the necessity of diverse mobile solutions that integrate emergency response, victim support and prevention strategies to effectively address this complex issue.



The survey responses regarding the inclusion of direct emergency contacts or helpline numbers in a mobile application indicate strong support for this feature. A notable 75.3% of respondents expressed a willingness to download an app that provides immediate access to emergency contacts highlighting the critical importance of quick assistance in urgent situations. This overwhelming preference suggests that safety and accessibility are top priorities for the majority of users. Meanwhile, 17.1% were less inclined to download such an app possibly because they already have alternative ways to access emergency contacts or prefer different safety measures. The remaining 9.6% showed no interest in this feature likely due to personal preferences or circumstances that make it less relevant to their needs. These findings reinforce the significance of integrating direct emergency contact options into mobile safety applications to enhance accessibility and responsiveness in critical moments.

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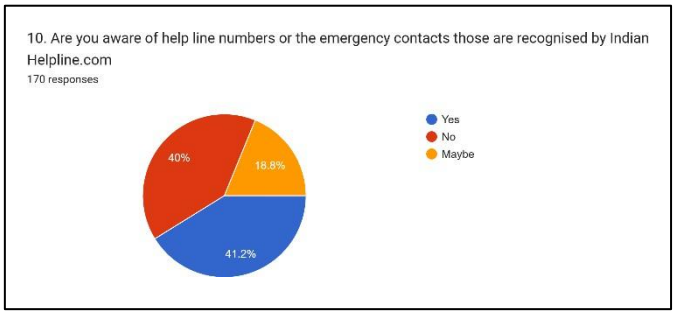
The survey findings on the automatic GPS location-sharing feature activated by shaking the mobile device during emergencies reveal a strong positive response from participants. A significant 77.1% indicated a greater willingness to download an app incorporating this functionality, recognizing its potential to enhance security and provide quick access to help. Conversely, 14.2% were less inclined to use such a feature possibly due to concerns about accidental activation or privacy risks. Additionally, 13.6% of respondents expressed no interest in this capability suggesting that individual preferences and varying comfort levels with location-sharing technology play a role in adoption. These insights can help guide the design and promotion of mobile safety applications ensuring they address user concerns while maximizing effectiveness.



B. Software Engineering Framework

The creation of ANARKI ensued James Martin's rapid application development (RAD) paradigm The RAD framework is characterized by three key principles: [16]

The survey findings on the automatic GPS location-sharing feature, activated by shaking the mobile device during emergencies reveal a strong positive response from participants. A significant 77.1% indicated a greater willingness to download an app incorporating this functionality recognizing its potential to enhance security and provide quick access to help. Conversely, 14.2% were less inclined to use such a feature possibly due to concerns about accidental activation or privacy risks. Additionally, 13.6% of respondents expressed no interest in this capability, suggesting that individual preferences and varying comfort levels with location-sharing technology play a role in adoption. These insights can help guide the design and promotion of mobile safety applications ensuring they address user concerns while maximizing effectiveness. Developers can consider implementing customizable settings such as sensitivity adjustments or manual overrides to address concerns while maintaining the feature's core functionality in enhancing women's safety.

I. Accelerated Development and Deployment.

II. Cost-Effective Development.

III. Delivering a High-Quality Final Product.

The framework follows an incremental and progressive model, designed to adapt to evolving conditions seamlessly. Its rapid development cycle and frequent updates enable efficient synchronization with the victim's smartphone, ensuring timely and effective responses. ANARKI's development is rooted in the Agile methodology, fostering a dynamic and iterative process that emphasizes flexibility, continuous user feedback and gradual improvements to align with the ever-changing safety needs of its users.17]

The ANARKI application is fundamentally structured on a robust Java framework which serves as the foundation for its functionality and responsiveness. At its core, the application utilizes native Java code to seamlessly facilitate user interactions with the alert system. This component has been carefully engineered to operate with precision and efficiency ensuring that user engagement triggers an immediate and reliable response particularly in emergency situations.

IMPLEMENTATION

C. Development of UI

The app's user interface was designed with simplicity in mind, recognizing the need to be quick to use, especially in

A. Block Diagram

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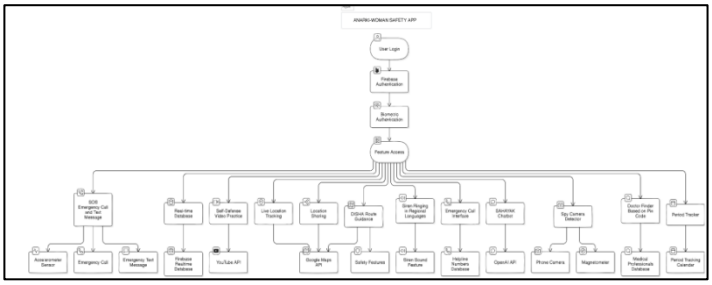

Fig 1: Block Diagram of the Proposed System

ANARKI is an innovative initiative dedicated to enhancing women's safety across India. This pioneering project integrates a comprehensive set of advanced features aimed at addressing diverse security concerns while enabling users to access immediate support and emergency response services. By leveraging state-of-the-art technology, ANARKI offers a reliable and user-friendly platform designed to create a safer environment and instill confidence among users. The application's foundational structure is depicted in the accompanying block diagram outlining the key functionalities intended for implementation. As a next-generation mobile safety solution, ANARKI delivers real-time assistance, swift emergency response and intuitive features tailored to mitigate potential threats effectively.

times of crisis and the idea was to make the app easier to use, especially over time taking into account its primary use in emergency situations, except for emergency communications of the primary system concerned [18].

The ANARKI application's homepage features three primary buttons: Distress, Set-Up Configuration and Overview. Selecting the Set-Up Configuration tab directs users to a settings form where they can input essential details such as their name and phone number. This intuitive form simplifies the process of entering personal information ensuring a seamless user experience. [19]

The homepage is designed with clearly labeled and visually distinct buttons, facilitating quick and effortless navigation. Notably, under typical circumstances, users are not expected to manually press the Distress button through the interface. Instead, the distress alert is discreetly activated by shaking the phone allowing for a more covert emergency response.

Additionally, a Google Map is integrated into the system, positioned between police stations with a Zoom function to precisely locate individuals in distress. The system maintains a comprehensive record that includes phone numbers, location data and emergency response contacts for every user who has triggered an alert. The platform prioritizes active case records, granting law enforcement officers the ability to modify or remove records as necessary. Furthermore, data entries can be updated and dispatched ensuring real-time responsiveness to emergency situations.

C. Tools Used

The following technologies were involved in the creation of ANARKI:

1. **XML for Front-End User Interface Development**:

- Utilized for defining user interface layouts in a structured, hierarchical manner.
- Provides a standardized format for describing UI elements, ensuring consistency across different screens.

2. **Java for Native Platform Code**:

- Widely adopted programming language for mobile application development ensuring robust performance.
- Known for its platform independence and flexibility

3. **Gradle Setup for Backend Processing and Database Connectivity:**

- Create an automation mechanism to deploy projects and manage dependencies.
- Effective management of server-side processing duties.
- Integration with databases for data management.

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4. **Firebase for Management of the Database**:

- A comprehensive cloud-based platform tailored for mobile and web application development.
- Provides a NoSQL database solution that ensures scalability, high availability and reliability.
- Enables real-time data synchronization across multiple devices
- Offers seamless integration with Firebase services

5. **JSON payload for Front-End and Back-End Integration:**

- Compact data format optimized for data transmission.
- Enables organized and efficient data exchange.
- Readable syntax for clear representation of data objects.
- Frequently utilized in web-based server-client interactions

D. Implementation and Technical Deployment

The application's interface is structured using XML ensuring an organized and responsive layout. A plug-in from the PhoneGap API, powered by Apache Cordova has been seamlessly integrated to detect vibrations and automatically send emergency messages to authorities without requiring user intervention. While Java handles the core alert system, Cordova could have been utilized for managing the emergency call feature enhancing cross-platform compatibility. This could involve directly interacting with the device's telephony features to initiate a call to a predefined emergency number. The shake detection plugin by A. Gibson, likely integrated into your app via Cordova would be responsible for detecting when the user shakes their device [20]. This functionality is often used for triggering specific actions or events in response to a physical movement. The Red-Folder plugin for Cordova would have been used to enable the application to run in the background as a service. This is important for applications that need to perform tasks or respond to events even when the app is not in the foreground. For example, it's often used for applications like location tracking, monitoring, or services that need to run continuously.

Utilizing the device's built-in accelerometer sensor, the app enables users to trigger an emergency alert by simply shaking their phone. This action automatically sends an SOS message along with the user's real-time location to pre-selected emergency contacts ensuring immediate response in critical situations [21]. Firebase Authentication and Realtime Database facilitate secure user login and maintain dynamic data updates. Biometric security, implemented via the Android BiometricPrompt API enhances access control through fingerprint or facial recognition. A Doctor Finder powered by the Google Places API helps users locate medical professionals based on their pin code for immediate healthcare needs. Additionally, an AI-driven period tracker employs machine learning algorithms to monitor menstrual cycles, symptoms, and reminders. This robust implementation ensures that our application delivers a comprehensive, reliable and secure safety solution for users. The integration of this feature enhances personal safety by offering a quick and efficient way to call for help without needing to manually navigate through the app.

The application's backend was built using Java with Firebase handling database queries. In the background, an encrypted gateway securely transmits messages beyond the user's device storing them in a dedicated repository for later retrieval [22]. This message is then accessed. Additionally, the Positioning Data are visualized in the Google Maps UI. Additionally, an audio alarm system has been incorporated into the customer portal to notify operators.

This application was developed using an open-source framework allowing for rapid deployment and easy adaptation to different environments without requiring a complete system overhaul [23]. By leveraging open-source tools and libraries, development efficiency is significantly improved, enabling developers to focus on customization and integration rather than building functionalities from scratch.

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RESULTS & ANALYSIS

Fig 2. Welcome Screen

When users open the application they are greeted with an aesthetically pleasing splash screen that provides a smooth and engaging introduction. This design choice not only enhances the app's visual appeal but also reinforces its core identity creating a welcoming first impression.

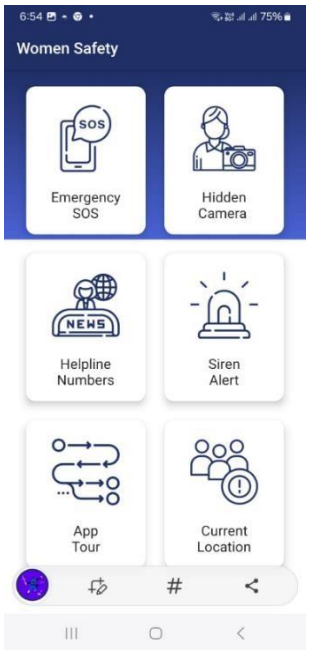

Fig 3. Main Screen

Following the splash screen, the home screen seamlessly loads, presenting all key features in a well-structured and user-friendly layout. With just a single tap, users can effortlessly access essential functions such as the SOS button, Hidden Camera Detector, Helpline Numbers, Siren Alert, App Tour and Current Location. The thoughtfully designed interface ensures easy navigation allowing users to respond quickly in critical situations while maximizing convenience and efficiency.

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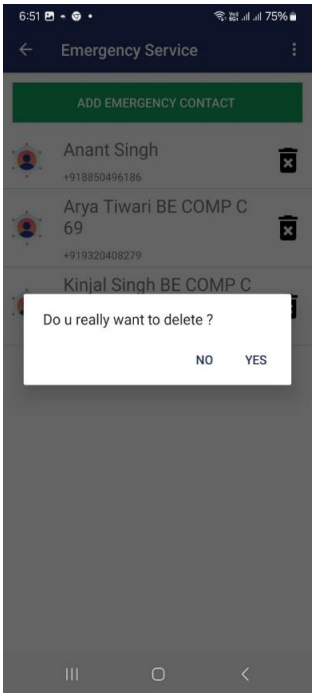

Fig 4. SOS Contact Addition

When users access the SOS feature, they can add emergency contacts who will receive distress alerts in case of an emergency. The app operates in the background, automatically sending alerts when it detects a shake or a voice command. Additionally, it functions offline ensuring that users can seek help even without an active internet connection.

Fig 5. Manage Emergency Contacts

To enhance flexibility, users can easily manage their emergency contacts with a built-in option to update or delete them as needed. This feature allows individuals to keep their contact list current ensuring that the right people are notified during emergencies.

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Fig 6. Distress Alert to Emergency Contacts

Once Once users have added their emergency contacts, a simple shake of the device activates an alert instantly sending a distress message along with real-time location details. The designated contacts receive this information immediately, enabling them to track the user's location and respond swiftly. This feature significantly enhances safety by ensuring timely assistance in critical situations.

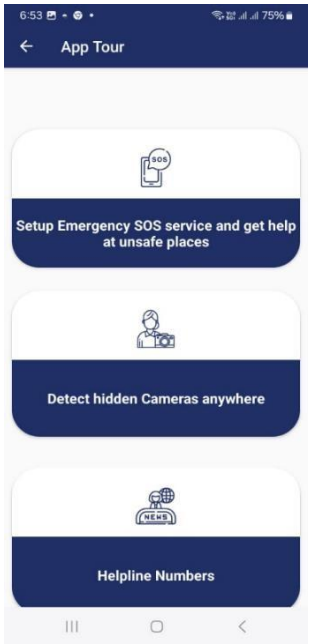

Fig 7. Emergency Contacts

The Helpline Numbers feature provides users with a well-researched list of essential emergency contacts carefully sourced from Incredible India. This functionality was integrated based on insights gathered from survey respondents and secondary research ensuring easy access to crucial support services. By allowing users to quickly reach out to relevant authorities during emergencies this feature strengthens overall safety and ensures timely intervention when needed.

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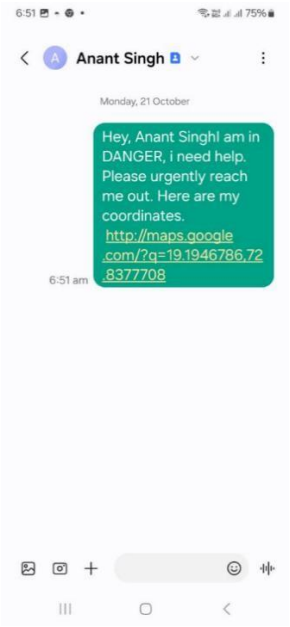

Fig 8. ANARKI App Walkthrough

The ANARKI App Tour provides users with a step-by-step walkthrough of its features offering a clear and intuitive guide to its functionality. With a user-friendly design, it acts as an in-app manual making navigation effortless. This ensures a smooth onboarding experience helping users quickly understand and make the most of the app's capabilities.

Fig 9. Spy Camera Detector

The Spy Camera Detector utilizes two detection methods: the built-in magnetometer and the device's camera. Users can either scan for hidden cameras by detecting magnetic fields or visually inspect their surroundings for suspicious devices. Designed for ease of use, this feature allows seamless switching between modes ensuring effective and accessible surveillance detection.

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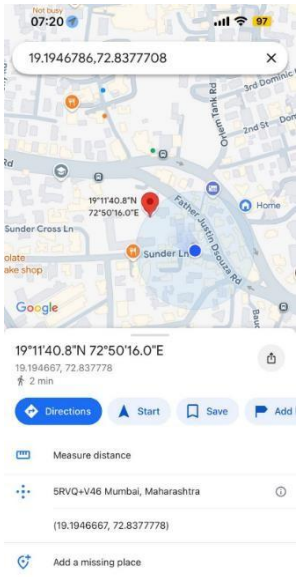

Fig 10. Spy Camera Location Highlighted with Red Circle Based on Sound Intensity.

The Spy Camera Detector highlights potential hidden cameras with a red circle based on sound intensity making detection straightforward and effective. This visual cue helps users identify suspicious devices with ease enhancing their security and awareness. When a distress signal is sent, the recipient can tap on the message to open a Google Maps link enabling real-time tracking of the sender's location. Designed for simplicity and clarity, this feature ensures that help can reach the person in distress as quickly as possible. The seamless integration with Google Maps enhances usability providing effortless navigation and immediate response options.

DISCUSSIONS & USAGE SCENARIO

A. Operational Workflow of ANARKI

The The application functions through four essential phases: configuring emergency contacts, activating the SOS feature, instantly sending distress messages and calls and detecting hidden cameras by receiving location coordinates from suspicious areas. Each phase is carefully designed to prioritize user safety and ease of use ensuring a seamless and reliable experience for individuals in urgent situations.

1) Entering Contingency Numbers

The initial launch of the app allows the user to enter their emergency contacts for storage [24]. These connections can be selected from a list of existing connections or entered manually. Then, the application runs as a background project, ready to be used in an emergency. This preliminary framework provides valuable analytical data on user preferences. If the user prefers, they can manually enter contact information for emergency contacts. This option allows for more flexibility in selecting individuals who may not be in the participant's phone contacts. The software solution should request permission to access the user's contact list. If granted, the user can select individuals from their existing contacts as contingency numbers. The specified contacts might comprise reliable allies.

2) Service Activation

The ANARKI Android operating system prioritizes simplicity and efficiency for rapid emergency response. They are activated by vigorously swaying the mobile phone or tapping the dedicated DISTRESS button. When used, the app launches immediately with its emergency response system. It enables background processing and provides a dedicated system for passing emergency messages, ensuring a seamless process with no delays in between. This streamlined process ensures that users are responsive by quickly calling for help. By properly classifying tasks, ANARKI Android optimizes its emergency alerting system without disrupting users communication, providing a reliable backup option in situations where in the strong situation takes place [25].

The choice of triggering actions—shaking the phone or pressing the PANIC button—is deliberate, offering users multiple intuitive options to activate the service. Shaking the phone vigorously provides a physical action-based trigger, while the PANIC button serves as a readily accessible virtual option. This dual approach caters to diverse user

preferences and ensures accessibility for individuals in different situations.

Furthermore, the specific parameters set for activation 40 consecutive shakes within 8 seconds optimize the balance between responsiveness and accidental triggering. By requiring a significant but achievable threshold of movement within a short timeframe, our application minimizes the risk of false alarms while ensuring a swift response to genuine emergencies.

3) Dispatching Critical Notification and Dial

Upon usage, the app instantly delivers an SMS to the authorities, with the victims's present positioning data and pre-determined numbers. Officers then send messages to identified emergency contacts. Its reliability, especially in regions with poor cell phone coverage, makes SMS the choice of communication channel over mobile data. This seamless integration of SMS call features increases emergency response efficiency and improves user safety in critical situations.

Subsequent to correspondence is transmitted, the application proceeds to call customized support service and then by local testers when the app's access was expanded For potential evidentiary purposes this call is strategically postmessaged to ensure seamless communication. This coordinated approach greatly improves the effectiveness of emergency response efforts and facilitates rapid assistance to users in crisis.

4) Live Coordinate Mapping for Hidden Camera Detection

When the app identifies a potential hidden camera, it pinpoints the exact coordinates of the suspicious location. These coordinates are displayed on the user's screen assisting them in navigating to the precise area of concern. As the user moves, the app continuously updates the coordinates in real time offering dynamic guidance. This feature enhances accuracy in tracking hidden cameras, strengthening privacy and security.

B. Key Performance Indicators (KPI)

- Analyze the frequency of user engagement with essential safety features such as SOS alerts and real-time location sharing.
- Measure the average response time taken by emergency contacts to act on distress signals.
- Evaluate the precision of location tracking during emergencies to ensure dependable and accurate results.
- Monitor the usage patterns of additional features like the spy camera detector and AI-powered chatbots.
- Gather user feedback to assess overall satisfaction and identify potential areas for enhancement

C. Performance Evaluation Parameters

To evaluate the app's effectiveness, several key performance metrics will be analyzed, including:

Response Time: Measures the speed at which the app processes user inputs and executes commands.

Location Tracking Accuracy: Assessing how precisely the app detects and shares the user's real-time location.

Reliability: Ensuring the app remains stable and functions seamlessly even under heavy usage without crashes or interruptions.

Battery Usage: Monitoring the app’s impact on battery life during normal operation and when safety features are actively in use.

D. Ethical Implications

The development of the ANARKI for women's safety necessitates a comprehensive examination of the legal and ethical considerations that underpin its operation. Ensuring that the app complies with relevant laws and adheres to ethical principles is of paramount importance. User data privacy is a critical ethical concern. ANARKI should prioritize obtaining clear consent and knowledge from users on data collection and use. Compliance with privacy safeguarding regulations and relevant national legislation, is essential. Transparent privacy policies and robust security measures should be in place to safeguard user information.

Balancing the need for user safety with potential surveillance concerns is a delicate ethical matter. ANARKI's surveillance features, like location tracking and spy camera detection, should be designed with careful consideration of user rights and privacy. Clear policies on when and how surveillance features are activated and used must be established. ANARKI's integration with OpenAI for chatbot functionality introduces ethical considerations regarding chatbot interactions. The app should prioritize ethical communication, avoiding discrimination and misinformation.

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It is crucial to establish guidelines for chatbot responses that respect the sensitivities of users and adhere to ethical standards.

ANARKI like any application using biometric authentication, must obtain clear and informed user consent before collecting and using biometric data. Complete Knowledge endorsement guarantees that users are thoroughly briefed on the compilation, storage and utilization of their biometric information. This information should be presented in a clear and easily understandable manner, including potential risks and benefits. Users should explicitly agree to the terms before enabling biometric authentication. ANARKI should offer users the option to both opt in and opt out of biometric authentication features. Users who are uncomfortable with using biometrics should have the choice to use traditional password-based authentication instead. The opt-out process should be straightforward and users should not face any disadvantages or limitations for choosing this option.

The app's features and design should be culturally sensitive and consider the diverse backgrounds and needs of users. Cultural insensitivity can have ethical implications and impact user adoption. Ensuring inclusivity and avoiding stereotypes is both a legal and ethical responsibility. The app's design, features and content should not inadvertently reinforce harmful stereotypes or exclude certain cultural groups.

E. Impact

The ANARKI Women Safety App aims to significantly enhance personal safety for women particularly in environments where sexual violence is a concern. By utilizing mobile technology, the app provides crucial safety features designed to empower users and facilitate rapid response in emergency situations. The design and usability testing of the app have shown promising results, with a majority of participants successfully navigating its features and effectively sending emergency alerts during usability tests. This high level of usability suggests that the app can be an intuitive tool for users seeking to enhance their personal safety.

1) Role in Public Awareness and Prevention

The app's development is part of a broader movement to address sexual assault and the experiences of survivors. Milestones over the past two decades have shifted public consciousness regarding sexual violence, highlighting the need for accessible resources and support systems for those affected. Our application contributes to this shift by not only serving as a safety tool but also promoting awareness about the prevalence of sexual violence and the importance of preventative measures within communities.

2) Targeting Marginalized Populations

The app specifically aims to assist marginalized populations, including young women, working women, and other groups disproportionately affected by sexual violence. By focusing on the needs of these communities, our proposed application helps to fill a critical gap in existing safety solutions. This targeted approach ensures that resources are allocated effectively to support those most at risk, fostering a safer environment for all users.

3) Evaluating ANARKI's Impact and User Engagement

To measure the effectiveness of ANARKI, key performance metrics such as app downloads, user engagement levels and feedback will be continuously monitored. A high engagement rate and frequent utilization of safety features will indicate the app's success in not only attracting users but also enhancing their sense of security. Additionally, as awareness of the app spreads, it is expected to foster a strong community of users who can share their experiences and safety strategies. This collective exchange of knowledge will contribute to a broader understanding of personal security, empowering individuals to navigate potential threats more effectively.

4) Educational Resources

Recognizing the importance of knowledge in safety, future updates will aim to incorporate educational modules that provide users with information on resources available for various safety concerns, including self-defence strategies and mental health support. By expanding the educational offerings, the app seeks to not only alert users to dangers but also equip them with the knowledge necessary for effective self- management of their safety.

5) Comprehensive Research

In order to ensure that the app is relevant and helpful to a wide audience, future development of the app will also concentrate on incorporating insights from diverse communities. Research will be conducted to better understand the unique experiences and safety needs of women from various gender and ethno-racial backgrounds. With these plans, our Women Safety App aspires to be at the forefront of innovations in women's safety, providing a comprehensive, adaptive and supportive platform that empowers women worldwide.

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VIII. FUTURE ENHANCEMENTS

As ANARKI gathers more user activity, a real-time database will be developed to log reported incidents. This database will serve as a valuable resource for analyzing security levels across different locations enabling users to assess the safety of specific areas before visiting. A map-based interface within the app will provide users with access to this information, enhancing their ability to make informed decisions about their surroundings.

Currently, distress messages are sent exclusively to law enforcement who first verify the legitimacy of the alert before notifying emergency contacts. However, this verification step could be streamlined if local policies permit direct notification to emergency contacts ensuring a faster response in critical situations. This adjustment would align with regional emergency response protocols enhancing flexibility based on local regulations.

Future updates will introduce wearable device integration allowing ANARKI to sync with smartwatches or smart bracelets. This enhancement will enable automated distress signals to be sent when the device detects sudden movement or abnormal biometric data indicating potential danger. Additionally, AI-driven predictive security analysis will be implemented. By leveraging behavioral patterns, location data and historical incident reports, the app will provide real-time safety recommendations and personalized security plans to users, enhancing proactive protection against potential threats.

Beyond technological advancements, ANARKI will also focus on awareness and community engagement. Social media and online platforms will be leveraged to raise awareness about women's safety issues. Campaigns similar to #MeToo will be utilized to encourage community participation, share user experiences and drive collective action against harassment and violence.

CONCLUSION

This research paper introduces ANARKI (Application for Navigating Assistance and Response for Keeping Immediate Response), a smartphone application designed to enhance women's security by providing swift and efficient emergency support. ANARKI offers a seamless solution for women to seek immediate help during crises. With a simple shake of their phone, the app automatically triggers emergency messages, sharing real-time GPS coordinates with pre-selected emergency contacts and notifying law enforcement. Additionally, a dedicated police helpline is contacted without requiring any manual intervention from the user ensuring rapid response even in situations where taking direct action may not be possible.

Upon activation, law enforcement officers receive an audio alert allowing them to pinpoint the distress location on the Google Maps interface at their station. This system eliminates uncertainties regarding the victim's exact position and ensures clarity in law enforcement response, streamlining police dispatch and intervention. The ANARKI app is designed with a highly intuitive user interface, ensuring that all essential safety features are easily accessible

As students committed to social responsibility, we believe in leveraging technology to create a positive impact on society. The development of ANARKI reflects this commitment, aiming to extend abuse-prevention services to as many women and children as possible.

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