Women Safety App To Detect Danger And Prevent Automatically Using Machine Learning

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Abstract. This work follows the Software Development Life Cycle (SDLC) to develop a women's safety application using Java within the Android Studio environment. The application integrates audio sensing, machine learning, cloud storage, and geolocation to address women's safety concerns. It utilizes audio sensors to monitor the surroundings, employing a TensorFlow Lite model trained on audio samples to detect potential threats. The Java-based Android app responds to triggers by issuing alerts and initiating audio-video recording if unacknowledged. Geolocation determines the user's location, shared with nearby police along with cloud-stored data. Emergency contacts aid communication during crises. The app displays nearby safe places, and rigorous testing ensures accuracy, reliability, and security. In conclusion, this application enhances women's security by autonomously detecting threats, recording evidence, and notifying authorities. The integration of safe locations and systematic SDLC approach ensures reliability.

Keywords: women's safety, threat detection, machine learning.

1. Introduction

Our work addresses the paramount concern of women's safety in today's society by developing a Java-based women's safety application within the Android Studio environment. Leveraging advanced technologies like audio sensing, machine learning, cloud storage, and geolocation, our application offers a comprehensive solution to enhance personal security.

In a world where mobile phones are ubiquitous; our app harnesses this technology to empower women and provide an added layer of security. With the majority of individuals owning a mobile phone, our app becomes an essential and accessible tool for women to feel secure in their daily lives.

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The core functionality of our application centres on audio sensing using machine learning. It continuously monitors the surrounding soundscape, detecting potential threats by recognizing specific audio patterns associated with danger. This enables prompt notifications to alert users to potential risks. In cases of unacknowledged notifications, the app automatically initiates audio and video recording, securely storing files in the cloud for future reference.[6]

Furthermore, our application utilizes mobile device geolocation to determine the user's location, which is shared with nearby police stations for quick response and assistance. Users can also add emergency contacts, facilitating effective communication during emergencies.

To enhance user safety, our app offers a list of nearby safe places,[5] such as police stations, hospitals, and secure locations. This feature enables women to easily access information about safe locations in their vicinity and navigate to these places in distressing situations.[7]

In summary, our paper presents a women's safety application that leverages contemporary technology to address the vital issue of women's security. This application aims to provide women with a powerful tool to bolster their personal security and peace of mind.

2. Related work:

It is deeply concerning to note a significant rise in crimes against women, exemplified by the alarming 731 reported rape cases within the first six months of 2019 in Bangladesh. This disturbing trend underscores the urgent need for immediate action to mitigate such incidents. To address this issue, we have diligently acquired knowledge and extensively studied relevant research papers.One noteworthy application in this context is "Raksha - Women Safety Alert." This app is expressly designed to ensure women's safety, providing them with a constant sense of security. It functions by sending alert messages, including the user's location, to predefined contacts.

"I Go Safely" presents a noteworthy functionality, wherein it dispatches a 30-second audio recording and video clip to designated contacts during emergency situations. The activation is initiated by the user shaking or dropping their phone. Nonetheless, it's crucial to be aware that inadvertent movements may activate the app, leading to potential unwarranted interruptions.Similarly, there's an app called "Shake to Alert" that operates on a similar premise.The "Safety Pin" app is a valuable tool designed to enhance personal safety. With features such as real-time location sharing, emergency alerts, and a virtual companion system, the app aims to provide users with a sense of security. Users can easily notify their trusted contacts in case of an emergency, and the app utilizes innovative technologies to offer a robust safety solution. The "Abhaya" app is a mobile application with a primary focus on personal safety and security. Designed to empower individuals, especially women, the app incorporates features like real-time location tracking, distress signal alerts, and a quick response mechanism. In times of emergency, users can swiftly alert predefined contacts, and the app provides a seamless interface for seeking assistance. "Abhaya" serves as a valuable tool for enhancing personal safety.Having thoroughly reviewed existing applications, including those mentioned above, it becomes evident that while several serve a similar purpose, they often lack certain essential features. For instance, some apps provide location URLs but do not offer information on safe places, while others offer live streaming but lack the capability to record evidence. These observations have led us to consider the development of a new application that incorporates all these essential features to ensure a comprehensive and effective approach to enhancing women's safety and well-being.

3. Proposed system

Our system stands out from existing apps by integrating all their features into one unique platform. To get started, users must register. Afterward, they can log in using their registered email and password. Users are also required to manually input four contact numbers during registration. User registration will be stored in the Firebase Database for record-keeping.The application even sends URI/URL of Users location to selected contacts through what's app and SMS [12] and also having shake phone gesture calls Emergency functions and share users' location to selected contacts [13].

Our application incorporates a time-triggered alarm function, allowing users to set timers that are synchronized with their mobile devices and managed through app-specific logic and sensor detection mechanisms. In the event that a user fails to acknowledge the alert notification, our system initiates a series of automated actions. Firstly, it dispatches a notification to the user, providing their current location. Simultaneously, the system notifies designated emergency contacts with the same location data. Additionally, the app records video footage [1,15] and securely stores it in a cloud-based repository, facilitating

its access and retrieval. In the event of non-response from the user, this recorded video is automatically transmitted to the nearest police station, aiding in immediate response and assistance.

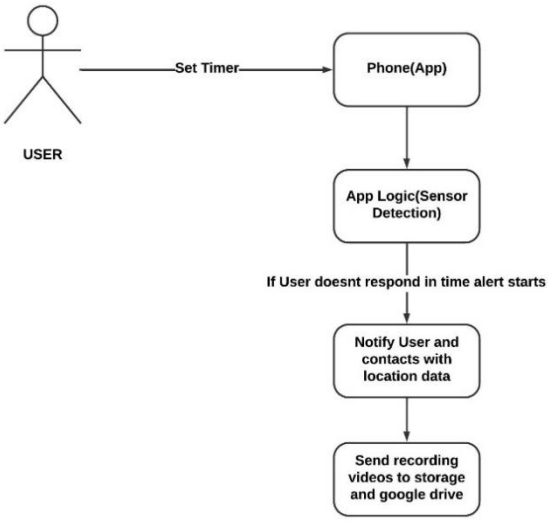

Fig. 1. Time based alarm

Our application incorporates an Automatic Detection Using Sensor feature that operates by monitoring ambient sound levels. When a user emits a loud sound exceeding 40 decibels [3], indicating a potential danger or distress situation, the app, in conjunction with its advanced sensor detection and logic algorithms [10], springs into action. In response to this audio signal, the application swiftly notifies both the user and their designated emergency contacts [9], providing them with the user's real-time location information. If the user fails to acknowledge or respond to these alerts [2], the application proceeds to capture periodic snapshots and videos, preserving a visual record of the situation [14,15]. This robust functionality enhances user safety by ensuring that critical information is readily available to the user's contacts while also providing visual documentation of the event, it should be necessary for subsequent review or reporting.[3]

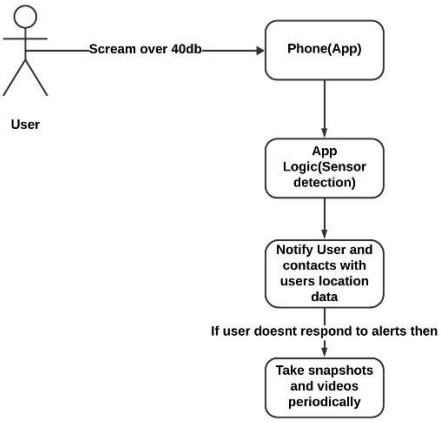

Fig. 2. Automatic detection using sensor.

Location tracking Using geo mapping:

Our application incorporates an automatic location checking after the user gives location permission to the app it will run down two major checks whether user in safe zone by geo mapping and fencing or not [5,11]. Whether user is in crowd or not depending on type of sound we can classify and detect the danger and start taking few recording samples and then send a timed notification to the user if the user does not respond to notification app will share the samples to police and the safety numbers given by the user. [1,2,7]

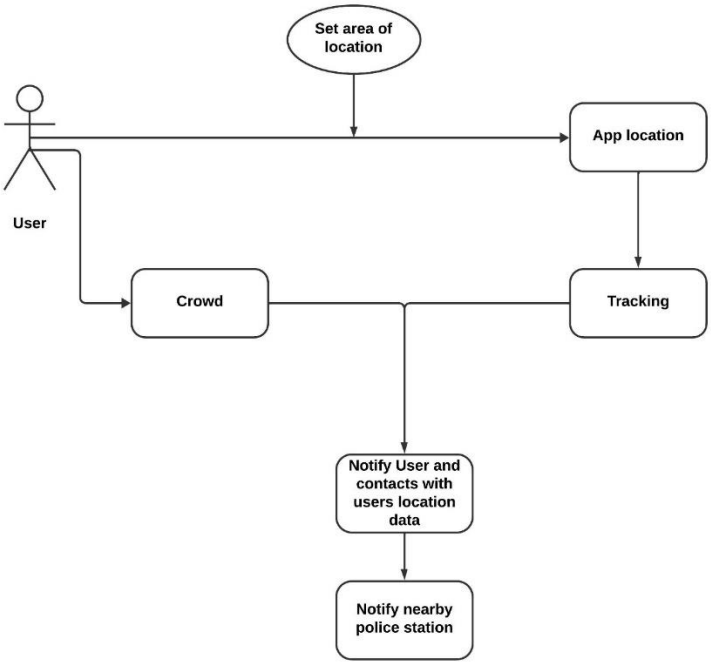

Fig. 3. Location tracking using geo-mapping.

Low Battery Mode:

Our application incorporates an automatic Low Battery Mode feature that is activated by the app's intelligent logic. When the device's battery level reaches a critical threshold, this feature initiates a sequence of actions to enhance user safety and security.[4] Upon activation, the application promptly notifies both the user and their designated emergency contacts, providing them with the user's current location. Simultaneously, it begins capturing periodic snapshots and videos to document the situation. Additionally, it securely uploads data to cloud storage and forwards relevant information to the nearest police station, if required.

This comprehensive functionality ensures that users receive timely notifications, and that critical data is preserved and shared with the appropriate parties in the event of a low battery situation, further enhancing user safety and peace of mind.

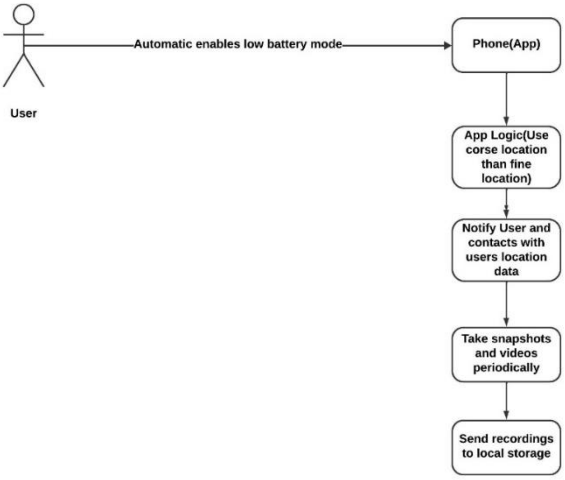

Fig. 4. Low battery mode

4. Output/result:

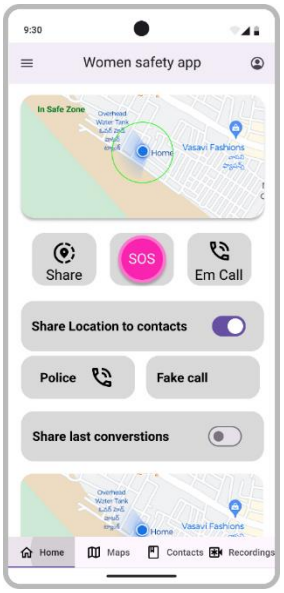

Fig. 5. HOME PAGE FOR "Women safety app to detect danger and prevent automatically using ML".

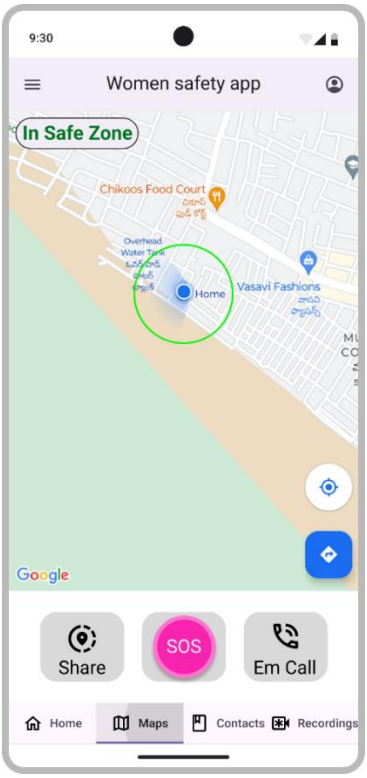

Fig. 6. NAVIGATION PAGE FOR "Women safety app to detect danger and prevent automatically using ML".

5. **Conclusion** and **Future scope**

In conclusion, the women's safety application is a powerful tool that leverages advanced technologies to enhance personal security. With features such as audio sensing, machine learning, cloud storage, geolocation, and emergency contacts, it empowers women to seek assistance promptly and record evidence in potential threat situations. The application's focus on leveraging the prevalence of mobile phones ensures easy access and usability for women in their daily lives. Through rigorous testing and user feedback, the application ensures reliability and continuous improvement. By providing a list of nearby safe places, it offers alternative locations for seeking refuge during distressing situations. Overall, the women's safety application provides a comprehensive solution that contributes to a safer environment for women, helping them feel secure and protected.

The future scope of the "Women's Safety Application to Detect Danger and Prevent Automatically Using ML" is poised for continuous innovation and expansion. Enhancements in machine learning models will be pivotal, with a focus on refining threat detection accuracy and recognizing a wider array of potential dangers. Real-time collaboration with law enforcement and emergency services will be pursued, enabling swift responses to distress situations. Integration with wearable technology, such as smartwatches, will offer users discreet and convenient access to safety features. The implementation of crowdsourced safety ratings will provide a community-driven approach, empowering users with real-time insights into the safety of specific locations.

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