

# Safe Women: An Android App for Women's Safety

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**Abstract:-** The security of girls and women is a serious issue faced by society. Crimes against women such as sexual abuse, domestic violence, or eve teasing are growing in number day by day. In such a gloomy situation, a smartphone can be looked into as a great help. This project attempts to create an Android app that can help to protect women in any situation they might face in their everyday life. We have designed, implemented, and tested an Android application that comprises various security measures which can be explored by women in a few steps on the screen, and can get quick and easy access to help. It uses GPS location tracking to provide a simple and fast way for the registered contacts to know that the user is in trouble and for them to reach the user easily. It also provides safety features such as a GPS tracking of the user, sending help messages to the registered numbers of the app, and emergency contact numbers which can be used to directly contact via a voice call to trusted people of users whose numbers are saved in the application.

## I. INTRODUCTION

Women's safety is a major issue and has been treated as one of the most important matters to date. It is a matter of prime concern that women have to undergo some sort of security threat at home, outside, or even at the working place. Most women of various ages, to this day, are being subjected to violence, domestic abuse, and rape. As ladies have to travel late at night for various purposes, it's necessary to make their life safer especially in outdoor environments. Although the government is taking necessary measures for their safety, but, certain loops holes still remain. Some free security apps are available which can protect a woman in a distressed situation and help them to feel secure. Due to the enormous popularity of smartphones these days, most women carry smartphones with them. It is required to install at least one personal security app on their smartphones. Such a security app for ladies will definitely facilitate safety in one way or the other. In this project, we developed a user-friendly application that can be accessed by anyone who has installed it on their smartphone. Our intention is to offer the smartphone user the fastest and simplest way to contact the nearest help. In this system, the user needs to feed contact numbers, in case of an emergency by clicking the emergency button, the system sends a help SMS and GPS location of the user on all the numbers fed into the system with the location. The proposed SafeWomen app also can connect direct calls to one of the emergency contact numbers saved by the user in the application. This features both everyday safety and real emergencies, making it an ultimate tool for all.

## II. LITERATURE SURVEY

As part of our comprehensive literature survey, we conducted an investigation into various applications that provide comparable or similar services on Android platforms. Our objective was to explore the diversity of available options and assess the effectiveness and user satisfaction levels across different platforms. The following is a summary of our findings:

- **“bSecure”**: It is an Android application designed by Pasa et al. [1] to provide a safe environment for women through their smartphones. It allows users to share their location details with predefined contacts instantly, ensuring quick alerting in case of emergencies. Additional features include photo capture by shaking the mobile and automatically switching to general mode upon receiving an alert message. The application can locate the device by making a call and obtaining its latitude and longitude. It also offers authentication capabilities to ensure secure sharing of location details via SMS.
- **“Abhaya”**: The Abhaya Android app is designed by Yarrabothu et al. [2] for the safety of women, providing a one-click activation feature in times of need. When activated, the app uses GPS to identify the user's location and sends a message containing the location URL to registered contacts. It also initiates a call to the first registered contact for immediate assistance. The app has a unique functionality where it continuously sends location updates every five minutes until the user clicks the "stop" button. This continuous location tracking feature helps quickly locate the victim and ensures a safe rescue.
- **“Safe”**: The Safe Android app is a comprehensive security system developed by Lokesh et al. [3] consisting of three main components: an Android application, a Main Device (using Raspberry Pi with integrated GSM/GPS Shield and a manual pepper spray), and a Portable Camera module. The Main Device features a rechargeable battery to power its circuitry. The Camera module can be attached to a backpack or other suitable location and captures real-time events in time-lapse format, storing them on a micro SD card. The Android app offers two options for location capture: using the phone's GPS system or the GPS system of the Main Device, which can be activated using volume up or volume down buttons, respectively. Together, these devices form an effective security system.
- **“Intelligent safety system”**: This introduces a voice keyword recognizing app [4] that allows users to activate the app even when the mobile keypad is locked. The app utilizes a GPS module to track the user's longitude and latitude for precise location tracking. In case of emergencies, it sends a pre-stored emergency message, including the location, to registered contact numbers. The app also has an Audio Recording module that can record conversations for five minutes, serving as evidence.

Messages are queued in case of network problems and sent when the network becomes available, with a notification generated for successful delivery. Additionally, the user can use voice commands to select contacts from a voice-based contact list and make calls. The spoken keyword is converted into text for comparison with the registered keyword.

- **“Women and child security”:** This paper surveys a security system designed to provide immediate responses to harassment situations for women and children in public places and societies [5]. The project introduces a portable device with a pressure switch. When women or children sense danger or an assailant is about to attack, they can activate the device by squeezing or compressing it. The pressure sensor detects this activation and sends an SMS with the victim's location to their parents/guardians' cell phone numbers. A call is also made to the registered contacts. If the call goes unanswered for an extended period, it is redirected to the police, and the same message is sent. The system's main feature is its quick response time, ensuring prompt assistance for the victim.

### III. PROPOSED SYSTEM

The proposed system for the women's safety app aims to create a powerful and reliable platform dedicated to enhancing the safety and security of a woman. The app is equipped with a wide range of features, including real-time location tracking, an emergency contact list and direct call during emergencies to the saved contact allowing users to quickly seek assistance in threatening situations. The system can be divided into two module:

- **Victim's phone / User's phone :** This is the root device that uses 4G/5G connections for tracking the location of victim and sending an alert message along with a direct call to the saved / registered contacts in the app by the user.
- **Saved / Registered contact's phone:** This refers to the saved contact's phone that may be either friends or family members who receives the alert message containing URL along with direct call facility that is sent from the root device.

#### A. Block Diagram of the Proposed System:

The top level view of the proposed system for women security is represented by Fig. 1. The working principle of each of the blocks are as follows.

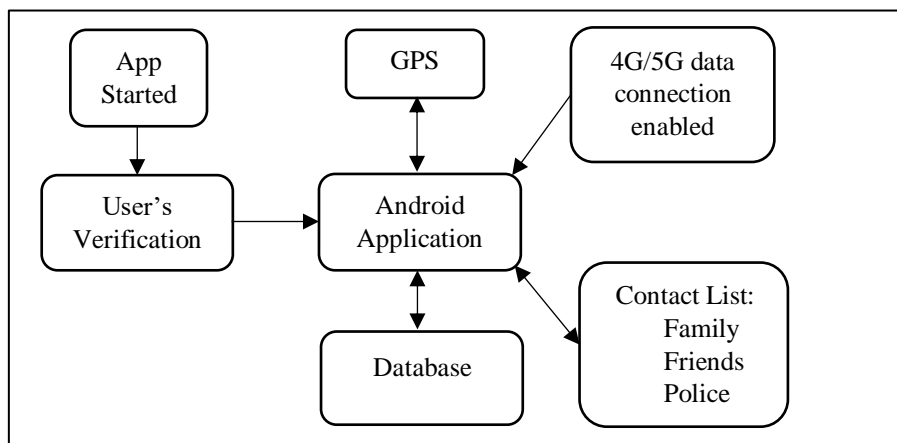


Fig. 1: Block diagram of SafeWomen application

- **App Started:** This block represents the starting point of the SafeWomen app when a user opens it on their android smartphone.
- **User's Verification:** Upon app startup, the user's verification process takes place. This step ensures that only authorized users can access the app's features.
- **Android Application:** This block represents the core functionality and user interface of the SafeWomen app, which is designed for Android devices. It includes all the screens and features accessible to the user, such as the home screen, emergency button, settings, and more.
- **GPS (Global Positioning System):** The GPS block allows the app to access the device's location information. It enables real-time tracking of the user's location, which is essential for providing location-based services and emergency assistance.
- **Database:** The database block represents a secure storage system that stores important app data, such as user profiles, emergency contacts. It ensures that user information and preferences are saved and can be accessed as needed.
- **Contact List:** This block stores the user's list of emergency contacts, which they have set up in the app. It includes the names and phone numbers of trusted individuals to be notified in case of an emergency.

*B. Proposed Algorithm:*

The proposed algorithm is presented in the form of a flowchart in Fig 2.

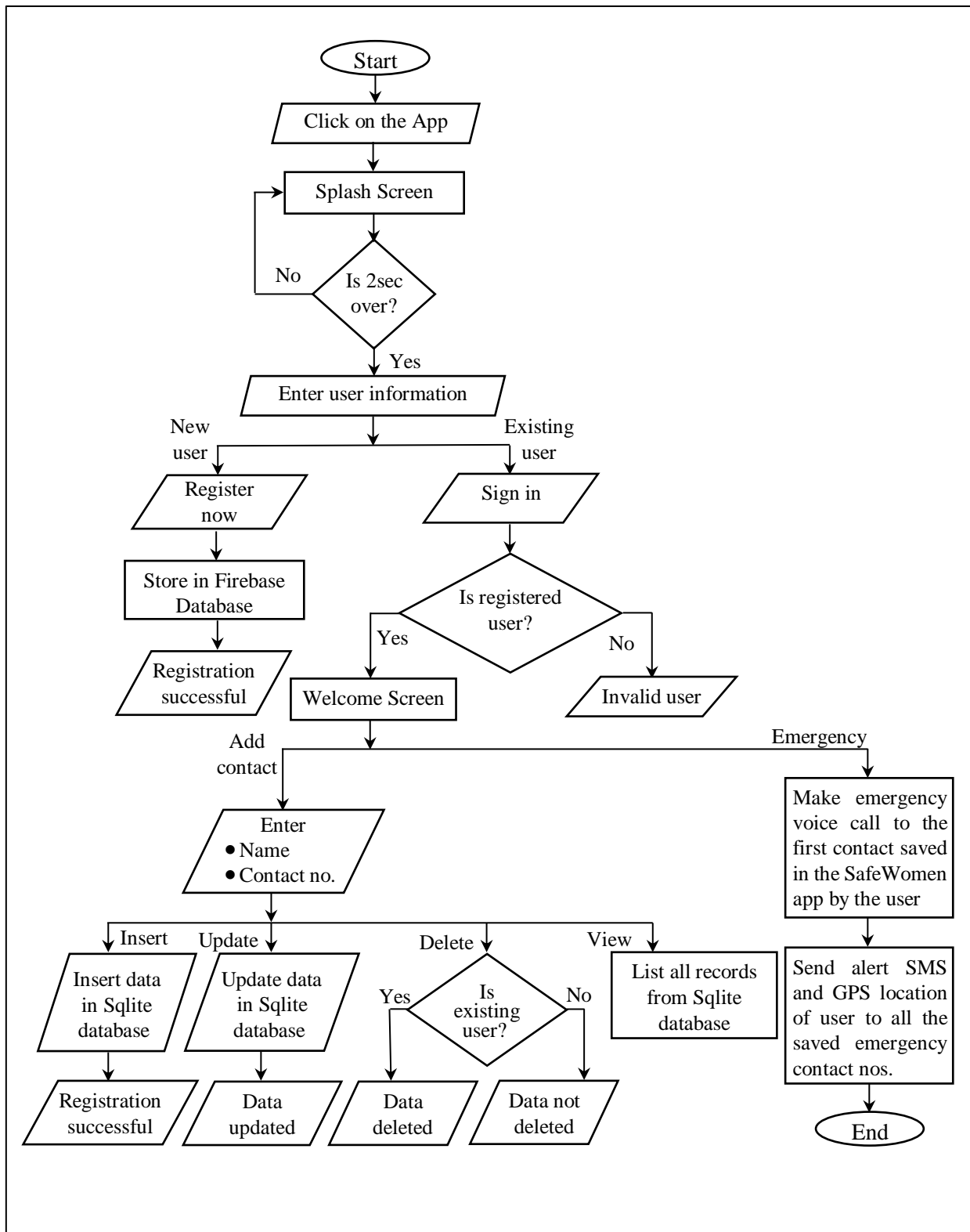


Fig. 2: Flowchart representation of the algorithm of proposed Safe Women App

### C. *Software and Hardware used:*

This section describes the software and hardware platform used during the design and testing of the proposed app.

#### ➤ *Android Studio:*

Android Studio [6] is the official integrated development environment (IDE) for Android app. It is a powerful and comprehensive tool provided by Google to create, test, and deploy Android applications. Some important features are as follows:

- **Code Editor:** Android Studio provides a sophisticated code editor with intelligent code completion, syntax highlighting, and code analysis to help developers write clean and error-free code.
- **Layout Editor:** The IDE includes a visual layout editor that allows developers to design app interfaces using a drag-and-drop interface. This feature simplifies the process of creating UI components and adjusting their properties.
- **Virtual Devices:** Android Studio comes with an Android Emulator, which enables developers to test their apps on virtual devices with different Android versions and screen sizes.
- **Gradle Build System:** The build system in Android Studio, based on Gradle, automates the build process, making it easier to manage dependencies and create different build variants of the app.
- **Instant Run:** Android Studio's Instant Run feature speeds up the development process by quickly applying code changes to the running app without requiring a full reinstallation.

#### ➤ *JAVA language:*

The code for the SafeWomen is developed in Java language [7] which is a widely used programming language in Android app development. Here's a brief overview of Java's significance in building such apps:

- **Android Development Language:** Java is the official programming language for Android app development. It is the primary language supported by Android Studio, the official IDE for creating Android applications. As a result, a significant portion of Android apps, including our SafeWomen app is written in Java.
- **Android API Integration:** Java provides native support for the Android API (Application Programming Interface). This means that Java can directly interact with Android's built-in functions and features, allowing developers to access various device functionalities, such as GPS, camera, sensors, and more. In our SafeWomen app, Java can be used to access the device's GPS for location tracking, calling facility during emergency situation, or send SMS alerts to emergency contacts.
- **Platform Compatibility:** Java is platform-independent, meaning code written in Java can run on various platforms with minimal modifications. This characteristic is especially useful for developers targeting multiple devices and Android versions.

#### ➤ *XML language:*

XML (Extensible Markup Language) [8] is a markup language commonly used in Android app development and used in this work for the front-end design. Here's a brief overview of XML's significance in building such apps:

- **User Interface (UI) Design:** XML is extensively used in Android for designing the user interface of apps. The UI layout of an Android app is defined using XML files, which describe the arrangement and appearance of various elements such as buttons, text views, images, and more. XML's hierarchical structure allows developers to create visually appealing and responsive user interfaces.
- **Separation of UI and Logic:** XML allows a clear separation between the UI design and the app's logic, which is typically written in Java or Kotlin. This separation follows the Model-View-Controller (MVC) pattern, making it easier for developers to modify UI elements without affecting the app's underlying functionality.
- **Resource Management:** In Android development, XML files are used for resource management. Developers can define various resources, such as strings, colors, dimensions, styles, and layouts, in XML format. This approach enables easy localization, theming, and maintainability of the app's resources.

#### ➤ *Databases used:*

During the design of SafeWomen app following two types of databases are used for storing the data.

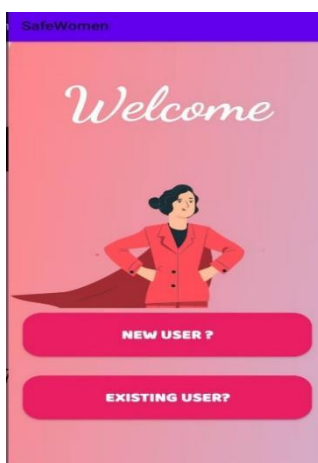
- **Firestore database:** Firestore [9] Realtime Database, a cloud-based NoSQL database, is utilized in women's safety apps to securely store user login credentials. When a user registers, their login information (username/phone no.) is collected and saved in the Firestore database. During login, Firestore Authentication validates the credentials by comparing them with the stored data. The database ensures data security through encrypted connections and provides error handling for login validation. This approach simplifies data management, offers real-time synchronization, and contributing to a reliable and secure user authentication process in our SafeWomen app.
- **SQLite database:** SQLite database [10] is a lightweight, embedded database used in our SafeWomen app to store contact numbers of the user's family or friends. In this app, users can save emergency contacts, and the database securely holds this information. When an emergency occurs, the app can send alert SMS messages to the saved contacts, along with the user's GPS location. Additionally, the app initiates a direct call to the first contact on the list, facilitating immediate communication for help and safety. SQLite's efficiency and simplicity make it an ideal choice for managing emergency contact information, ensuring a swift and reliable response during critical situations in the women's safety app.

**IV. RESULT AND ANALYSIS**

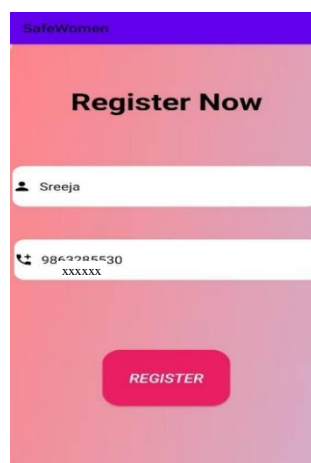
This section presents the results as screenshots depicting the various stages of SafeWomen App implementation.



(a) Splash Screen



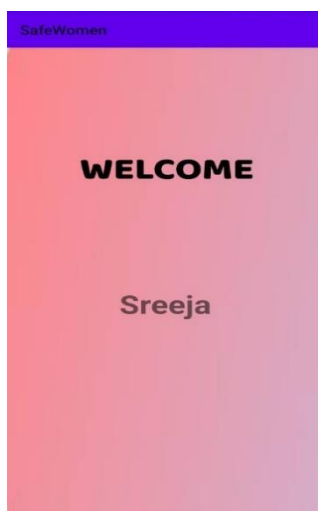
(b) Welcome Screen



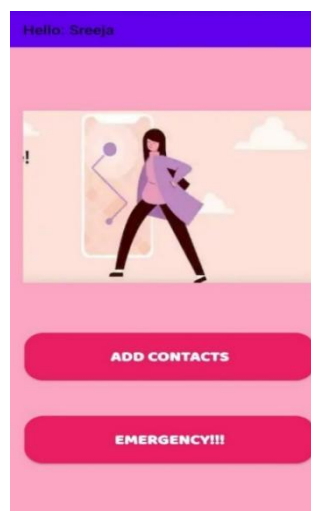
(c) Registration screen



(d) Sign in Screen



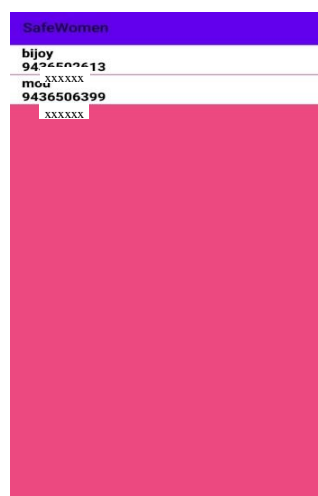
(e) Welcoming the verified user



(f) Registration of contacts



(g) Screen to add the emergency contacts



(h) Viewing the emergency contacts saved

Fig. 3:(a)-(h): Screen shots of various stages of implementation of SafeWomen App using Android Studio



- **Splash Screen:** This screen refers to the splash screen of our Safe Women application. The splash screen of the women's safety app serves as the initial screen displayed when the app is launched. It typically features a visually captivating image or logo related to women's safety, with a brief tagline or message emphasizing the app's purpose.
- **Welcome Screen:** This screen contains two buttons they are:
  - ✓ **"New User" button:** When clicked, this button takes new users to a registration form where they can create a new account by providing their username and phone number. After completing the registration process, they gain access to the app's features and functionalities.
  - ✓ **"Existing User" button:** This button is for users who have already registered and created an account on the app. When clicked, it prompts them to enter their login credentials, such as their registered username and phone number, to access their existing account and resume using the app.
- **Registration Screen:** This screen emerges when a user click the "new user" button in the previous screen. This screen contains the following buttons:
  - ✓ **Name field:** Users can enter their full name into the designated text field.
  - ✓ **Phone number field:** There is a separate text field where users can input their phone number.
  - ✓ **Register:** After entering their name and phone number, users can click the "Register" button to complete the registration process.
- **Sign in Screen:** This screen emerges in our screen when a user click the "existing user" button in the previous screen. This screen contains the following buttons:
  - ✓ **Name/Username field:** Users enter their registered name or username into the provided text field. This could be the name they used during the initial registration process.
  - ✓ **Phone number field:** Users enter the phone number associated with their registered account. This is used to verify their identity and provide an added layer of security.
- ✓ **Sign In button:** After entering their name/username and phone number, users click the "Sign In" button to authenticate their account and access the app's features.
- **Welcoming verified user:** After the completion of the verification process of the user this screen welcomes the user.
- **Registration of contacts:** After completion of the verification process of users this screen emerges that contains two buttons they are:
  - ✓ **"Add Contacts" button:** When clicked, this button takes users to a page where they can insert, update, delete and view contact numbers of people they want to alert during an emergency. Users can save trusted contacts like family members or friends who will receive the emergency SMS when the "Emergency" button is activated.
  - ✓ **"Emergency" button:** When the user clicks this button, the app immediately sends an alert SMS along with victim's GPS location to all the contact numbers saved by the user on the "Add contacts" screen. Additionally, the app initiates a direct call to the first saved contact on the list, ensuring that immediate help can be reached.
- **Screen to add the emergency contacts:** After clicking on the add contact button this screen emerges in which the user can insert, update, delete and view the contact numbers of user's trusted people that may be either family or friends during the emergency scenario.
- **Viewing the emergency contacts saved:** This screen helps the user to view the contact numbers saved by them in the Safe Women application.

The screenshot of the text alert message with the GPS location of the victim sent to one of the registered emergency contact numbers is presented in Fig. 4.

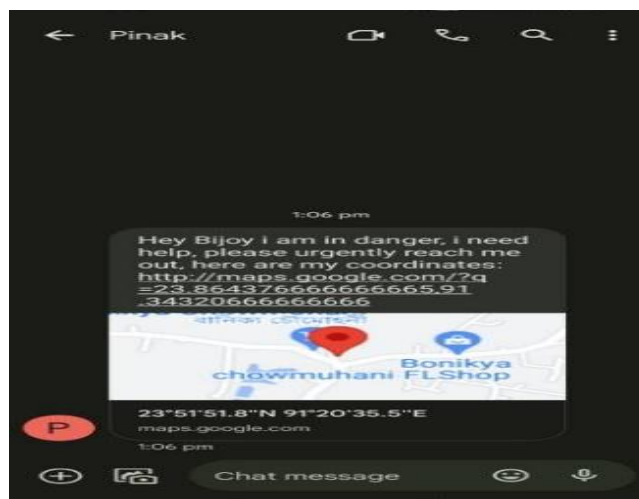


Fig. 4: Screenshot of the alert message received by one of the emergency contact numbers

Fig. 5 demonstrates the circumstance when an emergency voice call is initiated from the victim's smartphone upon pressing the "EMERGENCY" button to the first contact number saved in the app.

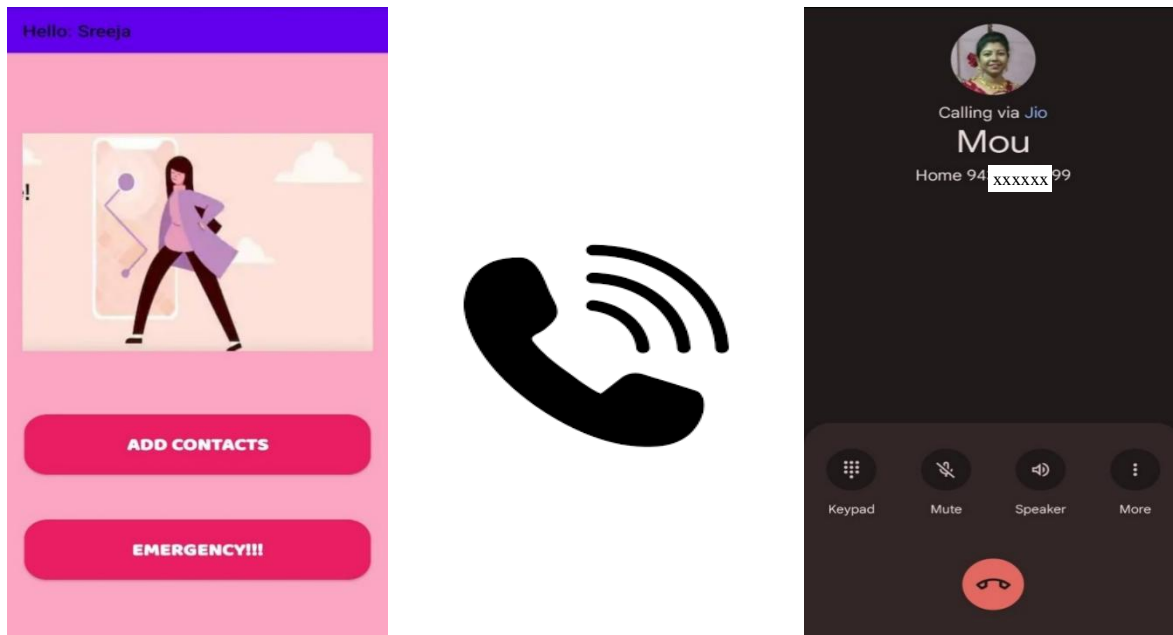


Fig. 5: Screenshot of the emergency voice call received by the first saved emergency contact number

## V. CONCLUSIONS

The Safe Women app stands as a pioneering Android application dedicated to enhancing women's safety and empowerment. With its comprehensive set of features and user-friendly interface, SafeWomen has is expected to be a reliable companion for women, instilling a greater sense of security and confidence. The app's real-time GPS tracking, emergency alert message along with direct voice call to the first contact saved by the user in the app provide users with an instant lifeline to trusted contacts and authorities during times of distress. By quickly sharing the user's location and situation, SafeWomen ensures prompt assistance and intervention, potentially preventing dangerous situations from escalating.

## VI. FUTURE SCOPES

In terms of future scope, there are several potential enhancements that can elevate the impact and effectiveness of this application in aiding women's safety. One significant improvement could involve integrating the application with law enforcement databases, encompassing a comprehensive list of regional police phone numbers. This integration would enable women to directly connect with local law enforcement in emergency situations, expediting response times and ensuring immediate assistance. Moreover, expanding the application's compatibility to include iOS and Windows platforms can significantly broaden its user base. By reaching a wider audience, the app can extend its support and safety measures to even more women, strengthening the collective effort to combat unsafe conditions. By combining these advancements, the application has the potential to revolutionize women's safety by providing them with a powerful and accessible tool to navigate unsafe situations.

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