Empowering Women: Innovative Solutions for Women's Safety and Empowerment

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Abstract: Women's safety remains a critical issue that demands urgent attention. A 2018 study by the Delhi Commission for Women (DCW) revealed that over 70% of women feel unsafe in public spaces, especially after dark. The situation has only worsened with incidents of street harassment, violence, and the recent 2024 Kolkata rape case, which sparked national and international outrage. Such incidents highlight the growing need for effective safety measures to protect women in vulnerable situations. To address this pressing issue, the Sanrakshan360 Women Safety App emerges as a vital solution. Designed for working women, teenage girls, and anyone who feels the need for security, the app offers essential features like emergency alerts, live location tracking, and quick access to emergency contacts. By leveraging technology, Sanrakshan360 aims to create a safer environment for women, empowering them with the confidence to navigate public spaces securely.

1. INTRODUCTION

Many countries are currently facing an alarming issue which is women safety but India, being a country which is at the forefront in developing countries with ever growing infrastructure and GDP, is at the centre of attention and therefore the national issues of this country would be concerning to other developing countries too.

The Kolkata Rape-Murder Case on 9th August, 2024 caught worldwide attention of global media leading to a strike by doctors nationwide. Some precautions can be of great help in these intolerable cases.

While this problem cannot be totally uprooted, there can be several measures to mitigate this serious issue to an extent. According to a **World Economic Forum** research, one in 10 women who are concerned about their personal safety say they have been harassed while commuting or travelling for work; 16% deal with customers or clients who have harassed them or behaved in a way that has made them feel uncomfortable [3]. Nearly one in 10 have been harassed by a colleague, and a quarter of women say that people in senior positions have made inappropriate comments or actions towards them.

Despite policy reforms and growing awareness, women still encounter innumerable challenges that threaten their sense of security and well-being at work. Policies alone haven't been enough to ensure women's safety at the workplace.

2. LITERATURE REVIEWS AND SURVEYS

This section reviews the current research papers and articles to bring forth the existing findings and researches on the particular topic. The following papers present issues regarding women safety systems, awareness, applications and models surrounding them:

Ansari et. al, 2017[6] discuss how after the Kopardi violence shook the nation and how many people tried to find various technologies regarding women safety. Their paper proposed a technology which harnesses Raspberry PI, GSM and force sensors to generate a SOS message which is sent directly through the application to the saved contacts and the nearby police stations. While this technology is reliable and easy to carry, it fails in cost effectiveness. Also, it is difficult to carry this device all along to the work and back.

Another paper by Vaghela and Shih, 2018[8] proposes an application WalkSafe which is based on the user location. The application sends an emergency notification to the user based on the past records or incidents in the nearby areas or localities. This application performed well as it was praised by many users due to its simplistic approach.

Authors (Likhitha and Hemlatha, 2019 and Latha et. al, 2020) [12,13] proposed a wearable device system with which the user can flash LED light having great intensity and blinds the attacker for approx 7 to 8 seconds. It brings Arduino, LED, GPS etc to use along with a SOS button which sends the location of the victim to the saved contacts.

With the recent advancements in technology, not only smartphones but other wearable devices such as wristbands, rings and necklaces have been designed keeping in mind the portability and ease of use. Smart rings using force or pressure sensors automatically detect clenching of fist and rings alarm to the saved devices also notifying the present location of the user.

Author A. Shaji George (PUII Journal, 2024) mentions several applications launched by various states which demonstrates how several state governments are also stepping forward for women safety and threat prevention initiatives. One of the southern states in India, Telangana was praised for the initiative "Suraksha" app which bridges the gap between police stations and women with the use of features such as online report lodging and online case updates which were solved with utmost priority.

Similarly, Chhattisgarh which is one of the central states in

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India also emphasised upon E-FIR lodging through an online portal as more than 80 percent of the cases go unreported. The portal also provides aid through legal advisors who have especially studied about this domain.

The author also emphasises that these apps focus solely on the post abuse occurrence rather than preventing the user from those threats. Although, recently there have been many breakthrough approaches towards this problem and many of them seem to be promising.

Machine learning algorithms are being incorporated into devices to study the previous data from the places near the user and triggering a warning for safety precautions hence safeguarding the user. Also, balancing the interface aesthetics along with cost effectiveness and reliability of the user can prove to be a challenging tasks, and many challenges are being overcome with the use of latest methodologies which focuses on avoiding vulnerabilities instead of emergency approaches [11].

3. AIMS AND OBJECTIVES

3.1 Aim

Keeping in mind all the previous researches and findings till date, this project aims to present an application named "Sanrakshan 360" which is developed to overcome the shortcomings of some recent women safety apps. The following details emphasise on its working, uniqueness and how it can help in minimising threats to women safety.

3.2 Problem Statements

- There are a lot of women safety systems and technologies but still there is a need for an integrated and refined system which has a more intuitive interface and is cost effective.
- The devices or systems using shock systems can also harm the user so there is a risk of injury to the user itself.
- There is a need for a well programmed SOS system which sends the live location along with an alert to the saved or selected contacts.
- Only a few of the existing systems are using the latest machine learning models and most of them lack an alternate route analysis which can pre-determine the specific areas where the user needs to be more alert.
- There should be a custom feed which keeps the user updated on the recent news and findings regarding women safety.
- Most of the embedded systems don't prove to be cost effective so there is a narrow market for targeting users.

4. METHODOLOGY

This paper focuses on an android application **"Sanrakshan 360"** which is designed to tackle these issues that were found in the above mentioned section.

4.1 Android Application

Figure 1.1 represents the flow diagram or the general methodology of the Sanrakshan 360 app. Upon opening the app, the home page (Fig. 1.2) is displayed which has a bottom navigation bar having 5 icons leading to different pages in the respective order[1] (Home, SOS, Location, Ask, Profile).

- The Home Page consists of general information along with emergency services and nearby police stations/ hospitals etc[10].
- The SOS Page consists of an emergency alarm button which when pressed, sends a SOS message to all the saved contacts through messages.
- The Location Page shows the live location of the user and uploads it to the cloud in a regular interval of time.
- The ChatBot Page consists of a chatbot which leverages the Gemini API to provide users with any kind of help or assistance[4].
- The Profile Page consists of the user's basic data such as favourite contacts, saved locations, user's details, settings and logout section[7].
- The user receives timely notifications while using this app which if ignored more than three times, would immediately send SOS to the saved contacts[9].

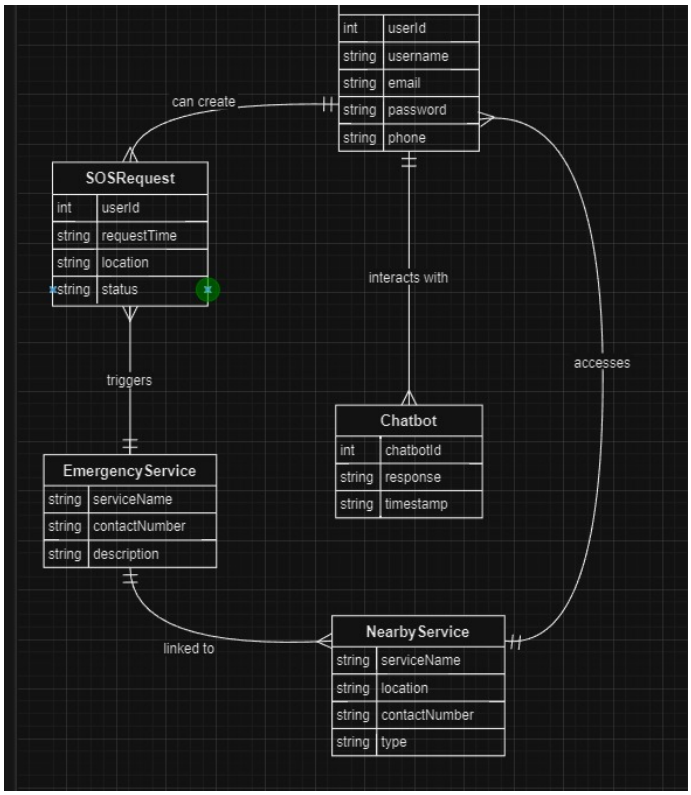

Fig 1.1 Methodology of the Sanrakshan 360 app

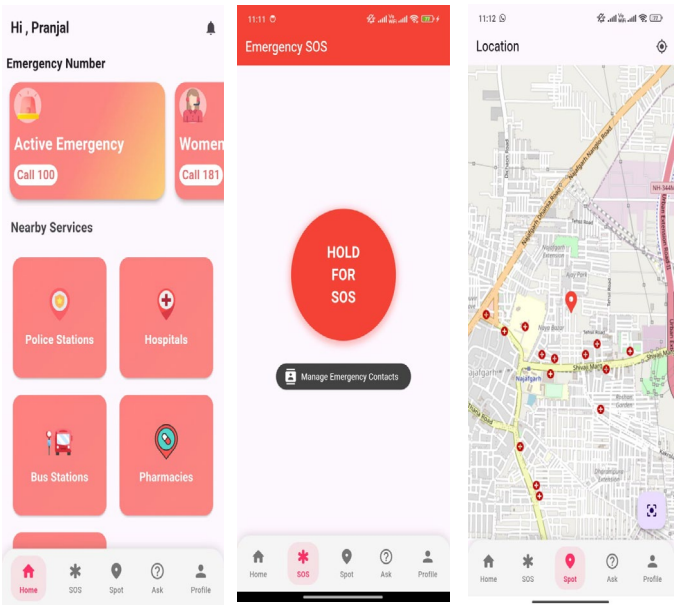

Fig 1.2 : Different Functionality of Women Security App

4.2 Internal working

The basic working of the app is explained in the following points in brief:

- **Frontend -** This application is developed in Flutter [2] which is a cross platform, easy to implement language. Application development requires effortless API handling, simple data flow and many other things which are easier to achieve in Flutter.
- **OpenStreet Maps API -** This application uses the OpenStreet Maps API which is a free-of-cost alternative to Google Maps and comes along with many features that can be modified as per the user's needs.
- **Flutter Message Package -** The flutter_messages is a lightweight package which can be imported into any project for messaging functionalities. The SOS feature leverages this package which functions beneath the hood of the code and can be used to message any selected contact[5].
- **Backend:** Firebase is used as the main backend or the foundation of the application. The data as well as the location of the user is uploaded to the database in a regular interval.
- **Flutter Notifications -** For sending timely notifications to ensure the user's safety, this application uses flutter notifications which is inbuilt in the default flutter package.

5. CONCLUSION AND FUTURE SCOPE

The app "Sanrakshan 360" has the potential to enhance women's safety by providing a list of useful features and a clean & simple interface. It empowers it's users with timely notification alerts, live location tracking feature, SOS button for selected contacts.

Future Directions

- **Accessibility:** Providing the users with a clean intuitive interface which also helps the people with disabilities or anyone with a diverse background.
- **More Advanced Features:** Integration with high end technologies like facial recognition, biometric triggers and voice commands can be utilised for the further development of this project.
- **Optimised routing:** With the help of routing mechanisms and various machine learning algorithms, the user will be able to access the best and the safest routes to the desired location. Also, predicting the chances of risk in accordance with the time and place to choose can help the user to avoid risks.
- **Community Engagement:** Spreading awareness by fostering a strong community of users who can form information sharing groups and organise safety campaigns to emphasise the use of such methodologies.
- **User privacy and security:** Usage of more secure and robust ways to safeguard user's information and introducing new security measures to minimise the rate of communication failures.

By continuously evolving and adapting to emerging technologies and user needs, Sanrakshan 360 may become one of the leading solutions in ensuring not only women security but anyone who feels the need of this app and empowering them to live fearlessly.

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