

# RAKSHAK: WHERE SAFETY MEETS TECHNOLOGY

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**Abstract** - The proposed app aims to enhance safety in India, particularly in remote areas, by leveraging the widespread network of petrol pumps. Users can activate the app in emergencies, prompting trained petrol pump staff to provide rapid assistance. The app ensures discreet help for women by automatically sharing their precise location with trusted contacts, even without internet connectivity. Additionally, the app acts as a guardian for anyone feeling unsafe, allowing communication through various means, including audio, pictures, or live video. The innovation utilizes existing infrastructure, making it accessible across diverse geographies without relying on traditional emergency numbers or constant internet access. This inclusive and forward-thinking solution strives to create a safer society for everyone, emphasizing the transformative impact in rural areas and showcasing the positive influence of pragmatic inventions.

**Key Words:** Emergency Response, Safety App, Petrol Pump Infrastructure, Remote Areas, Accessibility, Gender-Inclusive, Innovation, Technology.

## 1. INTRODUCTION

Our solution for enhancing safety in India revolves around a strategic use of the widespread network of petrol pumps, strategically located everywhere within few kilometres. Through an intelligent app, we empower users to activate prompt assistance during emergencies with a simple press of a button. Trained petrol pump staff, positioned nearby, respond swiftly, addressing critical situations, especially in remote areas where reaching a hospital quickly can be challenging.

However, our app's utility extends beyond emergencies. It ensures discreet assistance for individuals facing trouble but unable to communicate effectively by automatically sharing their precise location with trusted contacts, even in the absence of an internet connection. This feature, derived from focus group discussions, emphasizes our commitment to providing efficient and discreet help.

Furthermore, the app acts as a watchful guardian, particularly attentive to anyone feeling unsafe. In situations where communication is hindered, the app automatically sends messages to trusted contacts and facilitates communication through audio, pictures, or live video. This inclusive approach underscores our commitment to the safety of all individuals.

In rural areas, where immediate assistance is often limited, our integrated solution becomes transformative. By capitalizing on existing petrol pump infrastructure and incorporating cutting-edge technology, we establish a safety net that spans vast geographies. The app's accessibility, independent of traditional emergency numbers or constant internet connectivity, extends its benefits to even the most remote corners of the nation.

This fusion of resources and innovation reflects our dedication to empowering individuals, fostering secure surroundings, and setting a precedent for the positive impact of pragmatic inventions. It's not just a safety app; it's a comprehensive solution that utilizes existing infrastructure and smart technology to create a safer society. Its reliability and accessibility, regardless of location or connectivity, showcase the potential of pragmatic inventions in making a positive difference in people's lives.

## 2. RELATED WORK

The project introduces a GPS-based women's security system with an Android app. The device triggers alerts and SMS to emergency contacts, activated by a distress button. The app complements the device, enabling users to make calls, share locations, and play a siren sound for self-defense. It addresses women's security concerns, providing a cost-effective solution for enhanced safety during night shifts or solo travel.[1]

Addressing global crime and women's safety concerns, particularly in countries like India, remains challenging despite existing efforts and technologies. To enhance women's security, we propose a system that ensures a safe path for solo travel and provides a distress notification feature for immediate assistance from family or nearby police stations.[5]

While other safety apps focus on women, "Rakshak" stands out by prioritizing the safety of all genders and addressing various emergencies in remote areas. Distinguishing itself from other apps, Rakshak collaborates directly with local petrol pumps, extending this feature to cover wider geographical areas. The app utilizes the nearby petrol pump network, where dedicated staff can provide immediate assistance to users in need.

### 3. PROBLEM AND SOLUTION DESCRIPTION

#### 3.1 Motivation

The motivation behind this innovative app stems from a deep-seated commitment to fostering a secure environment for every individual in India, particularly those in remote areas facing potential dangers. The recognition of the widespread network of petrol pumps as strategic points for assistance inspired the development of a solution that transcends gender and focuses on the safety of all.

The vision is to empower individuals in emergency situations, allowing them to swiftly access help with a simple press of a button. The app's features, such as automatic location sharing without internet connectivity and a watchful guardian mode, have been carefully designed based on insights from focus group discussions, ensuring discreet and efficient assistance for anyone in need.

The motivation extends to addressing the challenges faced in rural areas, where immediate assistance is often limited. By utilizing existing infrastructure and cutting-edge technology, the integrated solution aims to create a transformative safety net across vast geographies. The commitment to accessibility, irrespective of conventional emergency numbers or constant internet connectivity, reflects a dedication to reaching even the most remote corners of the nation.

The overarching motivation lies in the harmonious fusion of resources and innovation, with the goal of empowering individuals, cultivating secure surroundings, and setting a precedent for the positive impact of pragmatic inventions. This forward-thinking approach acknowledges the potential of simple yet smart ideas to make a substantial and positive difference in people's lives, emphasizing resilience, safety, and the collective strength of communities.

#### 3.2 Problem Statement and Proposed Solution

The prevailing issue lies in the insufficiency of access to emergency services in remote and rural areas of India. Individuals in these regions encounter challenges when seeking immediate assistance during emergencies, including medical crises or situations where personal safety is compromised. The existing emergency services are often limited or take a significant amount of time to reach such remote areas, exacerbating the urgency of the problem.

Another critical facet of the problem is the difficulty in effective communication during emergencies. Traditional means of seeking help may be impractical in situations where individuals are injured, feel unsafe, or are unable to make a conventional emergency call. This communication challenge further hampers the timely deployment of assistance in critical situations.

Safety concerns in remote areas compound the problem, leaving residents and travellers without access to reliable safety measures. This vulnerability exposes them to various risks, such as health-related emergencies, accidents, or personal safety threats. The lack of a robust safety infrastructure in these regions intensifies the need for a solution that can bridge the gap in emergency response.

The proposed solution involves the development of an intelligent app that capitalizes on the widespread network of petrol pumps across the country. These petrol pumps, strategically located within few kilometres, are identified as crucial points for prompt assistance during emergencies. The choice of leveraging existing infrastructure is based on comprehensive surveys that reveal the well-distributed nature of these petrol pumps, making them reliable rescue points.

The app's functionality includes a simple activation process in emergencies, connecting users with nearby petrol pump staff trained to respond swiftly. This approach ensures rapid assistance, particularly in remote areas. To address communication challenges, the app automatically shares the precise location of individuals in trouble with trusted contacts, even without an internet connection, ensuring discreet and efficient help.

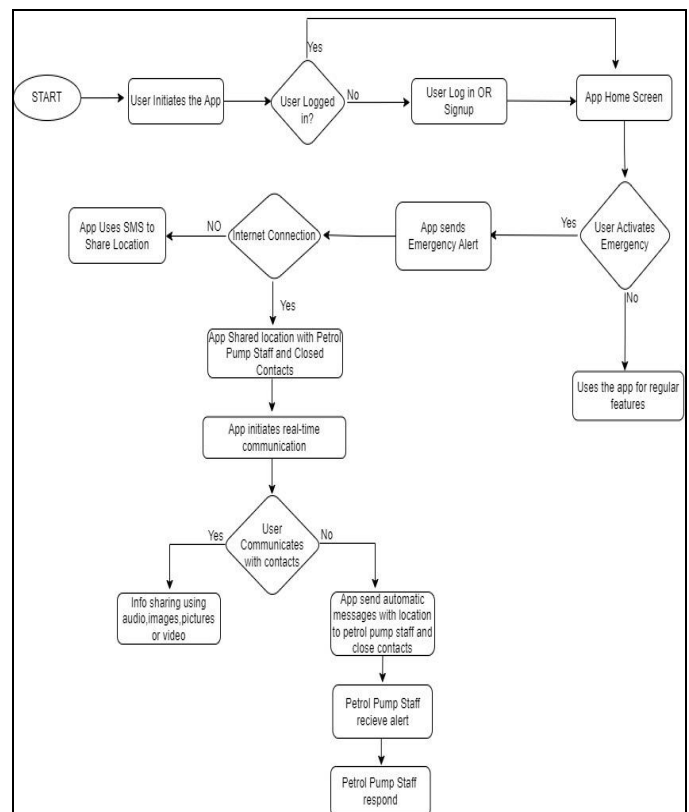


chart1: flowchart of the system

## 4. APPLICATION DEVELOPMENT

### 4.1 Software Development Process Model

The development of our “Rakshak” App follows a hybrid model, combining aspects of Rapid Application Development (RAD) principles with Agile methodologies for iterative and quick development cycles. Three main properties guiding this model include

- Swift development and deployment
- Cost-effective development
- Ensuring acceptable quality in the final product

The application architecture comprises two primary components: a front-end user interface and a back-end functional unit. The user interface is developed using Flutter, incorporating Dart programming language, while the native platform code is written in Dart. The back-end functionalities are implemented using Firebase services, including Firebase Authentication, Firebase Realtime Database, and Firebase Cloud Functions. These components communicate seamlessly via JSON for efficient data exchange

### 4.2 Technologies Used

The “Rakshak” App development leverages the following technologies:

- Flutter and Dart for front-end UI development
- Firebase services (Authentication, Realtime Database, Cloud Functions) for the back-end
- JSON for seamless communication between the front-end and back-end components
- Firebase APIs for essential functionalities and services
- Android SDK to support the Android platform

### 4.3 Technical Implementation

The app's user interface is developed using Flutter and Dart. Firebase APIs and plugins are employed for various functions such as background service implementation, emergency message transmission to authorities, and initiating emergency calls.

The back-end operations rely on Firebase services such as Firebase Realtime Database and Cloud Functions, using JavaScript for necessary processing. Incoming encoded text messages are received, processed, and stored in the database. GPS coordinates are extracted and plotted on a Google Maps interface. An audio alert system notifies operators of incoming distress signals.

This development approach embraces an open-source model, allowing for rapid implementation and deployment across various platforms without the need for extensive system reconfiguration.

## 5. System Architecture

### 5.1 Input of Emergency Contacts

When the user opens the application for the first time, she is asked to enter her emergency contacts so the same can be stored. The emergency contacts can be chosen from the existing contact list or can be entered anew. Thereafter, the application will run as a background service which can be triggered in case of an emergency.

### 5.2 Activation of Service

The triggering of the application is simple and swift. On pressing the SOS alert button on the app by the user which will be the responder, the emergency message and alert on the app with the location of the sender will be sent to the responder i.e. nearest petrol pump staff and to the emergency contacts.

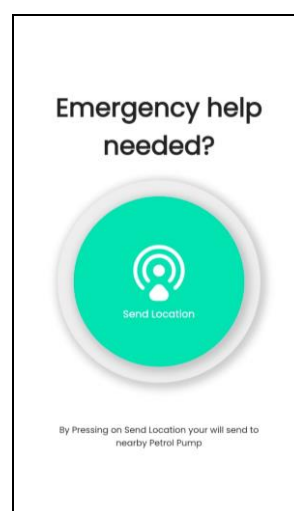


Fig 1: Send alert

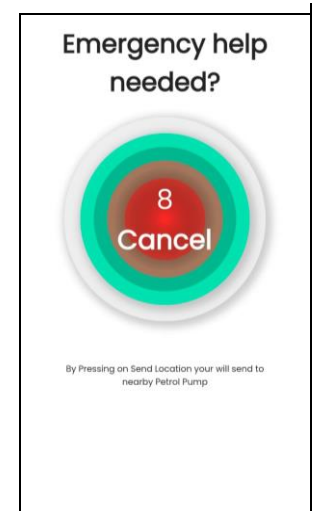


Fig 2: Cancel alert

### 5.3 Responder and Informer Interface

The informer interface within the app empowers users to seek assistance by choosing specific help options or directly activating the accident or emergency button. Upon pressing this button, a help request SMS and alert in the app is automatically dispatched to the designated responders, which include petrol pump staff of nearest petrol pump and to the pre-selected emergency contacts, complete with the sender's location. On the responder side, the interface is designed for efficiency, featuring a Google Maps interface that precisely pinpoints each emergency location in real-time. Additionally, a list view is provided for a comprehensive overview. This dual-interface system enables

rapid response times, crucial for ensuring the safety of users in emergency situations, and allows authorities to take swift and targeted actions based on the precise location information received.

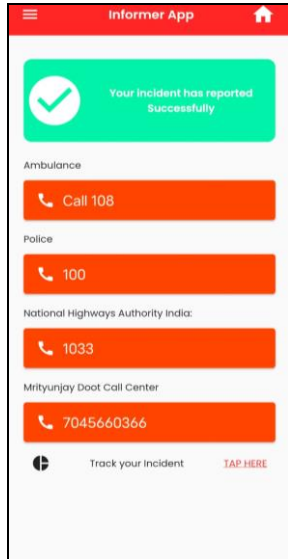


Fig 3: Informer Interface

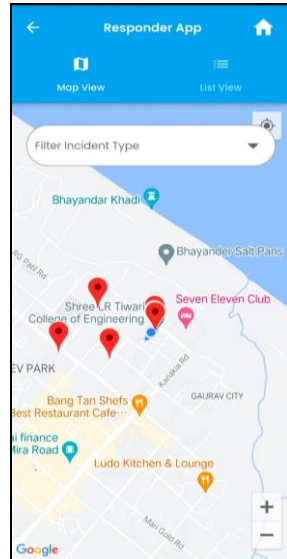


Fig 4: Responder Interface

### 5.4 Transmission of Emergency Alert and Notification

Upon activation, the application initiates the transmission of an SOS alert to the nearest petrol pump and the pre-selected emergency contacts. The alert, comprising the user's current geographical location and the list of emergency contacts, is primarily sent through mobile data for its efficiency. However, recognizing that network connectivity can be unpredictable, a fail-safe mechanism is integrated.

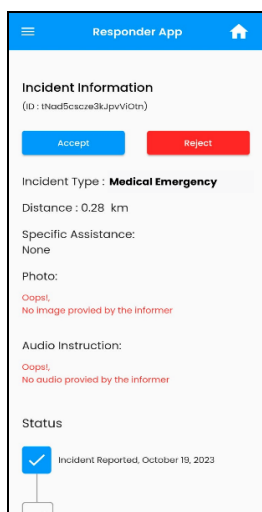


Fig 5: Alert Notification

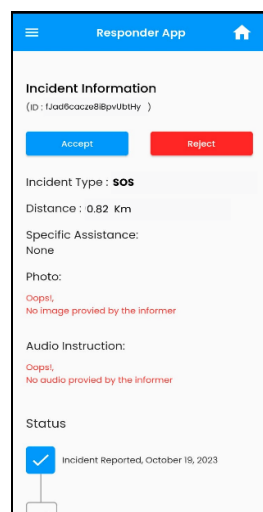


Fig 6: Alert Notification Other Petrol Pump Staff

In the event that the petrol pump staff, who is the designated responder, rejects the informer's request due to being occupied with other tasks or for any other reason, the help request is automatically forwarded to another available petrol pump staff. Additionally, if the designated responder does not respond to the request within a particular time limit of a few seconds, the informer's help request is promptly redirected to another petrol pump staff. In the absence of a stable internet connection, the application automatically sends an SMS to the emergency contacts, ensuring the delivery of crucial information even in areas with limited mobile connectivity. Importantly, instead of a traditional call, the alert is efficiently and swiftly delivered to the designated responder in the app, streamlining the communication process.

This dual-mode transmission, utilizing mobile data as the primary channel and seamlessly switching to SMS when needed, maximizes the reliability and reach of the emergency alert system. The offline transmission of location information further enhances the system's robustness, guaranteeing that emergency contacts receive vital details regardless of the prevailing network conditions.

### 6. CONCLUSION

In conclusion, the safety app is an essential tool for every individual in today's world. With its various features such as SOS alerts(emergency alert), chat with loved ones, petrol pump network, and alert to nearby petrol pump, the app provides users with a sense of security and confidence in their daily lives.

By using the safety app, users can take control of their safety and well-being, knowing that they have a powerful tool at their fingertips. The app empowers individuals to go about their daily lives without fear or hesitation, knowing that they are protected by cutting-edge technology and a supportive community

### 7. FUTURE WORK

The app's future plans include strategic integration with public services, fostering collaborations with law enforcement, healthcare, and various agencies to create a seamless emergency response network. Simultaneously, it aims to empower users by allowing offline sharing of their precise location with nearby petrol pumps, ensuring swift assistance in areas with limited connectivity. This innovative feature utilizes a local network or alternative communication protocol, prioritizing user safety and reinforcing the app's reliability across diverse geographical settings. This comprehensive approach aligns with our commitment to creating a safer environment through efficient emergency management and user-focused solutions.

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