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Shohayota: An Intelligent Response System for Safety

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***Abstract*: Smartphones are used by a great number of individuals nowadays. Using smart phones with GPS navigation systems has increased considerably in the previous five years from 3% to more than 20%. As a consequence, a smart phone may be used efficiently for personal safety or other forms of protection, especially in the case of women's safety. Shohayota is an application that may be activated automatically or manually with a single button push when the user feels threatened and needs help. The focus of the proposed work are its unique features, such as automatic speech recognition, SMS, Chat-bot, and real-time location detection. This software sends message to the user's registered contacts in every couple of seconds, notifying them of their whereabouts, hence acting as a sentinel, following the user until safe. When users cry 'HELP,' this app has a unique function that allows it to broadcast messages with live GPS to their registered contacts. If the victim yells 'CALL' it will immediately dial the emergency contact person in the victims' contact-list. Constant location tracking can be done through SMS to assist in speedy rescue of the victim. The main purpose of this application is to protect and keep people safe. In today's environment, the Shohayota app employs cutting-edge technology to ensure people's safety. This software ensures user's safety by informing about their situation immediately to their near ones.**

***Keywords*:** Intelligent Chatbot, Natural Language Processing, Chatbot, Artificial Intelligence, Machine learning, Smart Home, Android Application.

I. Introduction

Even in today's technologically advanced society, it is still unsafe to travel alone at night, particularly for women. A wise strategy to reduce the likelihood of being a victim of violent crime (for example: robbery, domestic abuse, rape, sexual assault) is to recognize dangerous situations and seek assistance from smart applications or agencies [1]. Thus, in this paper, authors have discussed about the proposed an android-based application named 'SOHAYOTA' app that can assist and help in reducing risk and danger and provide aid when required, i.e., during emergency situations or late-night hurdles [2].

In accordance to the National Crime Records Bureau of India, there is a confirmed increase of 6.4 percent in crimes against women in 2012. According to statistics, a crime against a woman occurs once every three minutes [3-4]. The main objective of the proposed work is to create an application that would provide a safe atmosphere for women with the help of smartphone. Of course, the Nirbhaya case in Delhi has prompted the government to toughen legislation, but the rate of sexual crime in India has not diminished. As a result, it is preferable to take self-precautions rather than being a victim of such crimes.

The various incidents that have shocked the entire country has once again made the society aware of the need of their safety, specially women, which has led to the creation of a sequence of new programs that provide security systems to women via their phones.

With only one click, the Sohayota app with the help of GPS detects the location, send messages to the emergency contacts with the location URL, and calls the first contact to help the person in need.

Section – 2 provides a literature survey on initiatives taken towards women security and health through chatbot models. Section – 3 gives the description of the methodology we adapted for implementing our application. Section 4 - methodically explains the proposed model, and also gets a detailed idea of the results and performance analysis. Section – 5 concludes the paper and provides a specific future scope of this research work.

II. Literature Survey

In this section, authors have examined few of the existing apps for women's safety present in the market as part of the literature analysis. The idea is to figure out how these applications function and how they differ so that they may be improved. There are various Android apps for women's security till date that have been deemed to be reliable and provide a comparable function.

WOMEN'S SECURITY [5]: This software was developed by AppSoftIndia. One of the app's key features includes storing specific information. The information provided includes the user's email address, password, the recipient's email address, telephone number, and text message. When the user touches the app, it is loaded as a "widget," which alerts the recipient. Another useful aspect of the application is that it captures the environment's voice for 45 seconds before sending a text message to the recipient's phone with the user's location coordinates.

POLICE NEARBY [6]: Big Systems developed this programmed in 2013. With the use of the police nearby scanner Android app, individuals may easily contact with the police stations closest to them anywhere in the city, increasing community engagement right from their Android phones. This scanner Android App can be used by police department or other law enforcement agencies to enhance services and communications. The Police Nearby app may be downloaded without having to register for free.

SCREAM ALARM [7]: Scream Alarm, an android application, was launched in November 2013 by Go Pal AppMaker. This application produces a scream that is extremely loud when a person's lungs are unable to scream in pain. The fictitious scream, which is spoken in a woman's voice, works well in deterring prospective troublemakers. When the user presses or touches the phone, the software causes it to scream loudly and in a female voice.

Some of the applications described above are available for Android, Windows, and iOS, while others are exclusively available for Android or Windows. Security Alert, on the other hand, is currently only featured for Android, although it may be made available for Windows and iOS platforms in the future. The platform is free and open source, and it was built on top of the open Linux Kernel to allow developers to create unique mobile apps that take full advantage of the handset's capabilities. To improve the memory and hardware resources of the mobile environment, Android constructed and employs a Virtual Machine. As new cutting-edge technologies become available, Android may be able to accommodate them. As a result, the Android platform's developer community will continue to grow in order to make new mobile applications.

In today's world, the number of people who are using smart phones is increasing rapidly, therefore a smart phone may be used efficiently for personal security or other sorts of protection. The shocking incident has reawakened our awareness of the need of women's safety, inspiring the development of a plethora of new apps that provide security systems to women via their phones. A single click on the Sohayota app identifies the location with the help of GPS and connects with the person whose number has been first registered to assist the person in need and message the contacts that have been registered with the location URL.

According to alarming statistics, a woman is raped every 16 minutes in India, whereas a woman is abused by her in-laws every four minutes. In 2016, 88 rape cases were recorded per day across the country. The Dalit minority was responsible for 8% of the 32,033 rape occurrences reported throughout the year [8].

Figure 1. Country by country analysis of women's criminality

Figure 1. reveals that the most prevalent IPC offence against women was 'Cruelty by Husband or His Relatives' (30.9%), followed by 'Assault on Women with Intent to Outrage her Modesty' (21.8 %), 'Kidnapping and Abduction of Women' (17.9%), and 'Rape' (16.9%)."The crime rate reported per lakh women population in 2019 is 62.4, up from 58.8 in 2018," according to NCRB data [9].

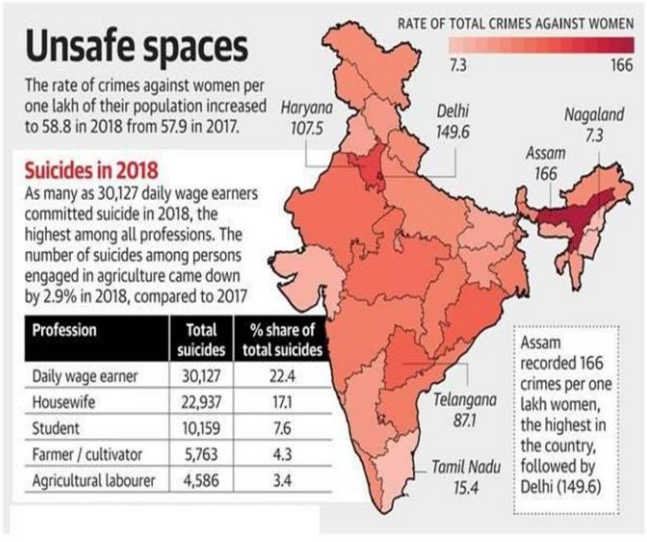

Figure 2. Total number of crimes committed against women

Kai-Hui L. et al (2021) [10] presented an evaluation based on a dataset prepared by authors on the basis of conversation intervening the physical activities of women in order to lay the foundation on building physical activity intervention chatbot. Intervening chatbots have been developed for understanding strategies of conversation with the help of Natural Language Processing. Annotation schemes of four dimensions of strategy, domain, task-focused exchange and social exchange have been adapted. On that basis a strategy classifier has been built by them for detecting strategies from both participants and trainers. Pearson's correlation analysis was conducted. The research found a correlation between the barrier and support techniques utilized in the intervention and the changes in the associated score, and the effects varied depending on the baseline score and socio-demographic characteristics of the participants.

S. P. et al (2021) [11] proposed a chatbot on Women's mental health where the authors used Seq2seq with attention-based learning. It aimed at improving mental prosperity of women. The work proposes a conversational framework based on age that produces answers based on whatever questions is asked by the client. The results showed the availability of little danger of damage in conversational specialist use. The aftereffects of these examinations show that there is potential for compelling, agreeable psychological wellness care utilizing chatbots [12].

Martin H. et al (2021) [13] presented a study on chatbots and security issues related to chatbots in order to generate security awareness among users. The paper focusses on discussing situations upon which personal information is dealt with which is extracted from conversations and these conversations are sources from which natural language and machine learning techniques learn. The main aspect is the security issue of the chat bots as most of them operates on third-party networks/interfaces and therefore, this study results in proposing some standardized methods that can be used in order of protecting the user along with the enlistment of concerns of chatbot security.

III. Methodology

A. Level 2 Dataflow Diagram

To develop and design any system first authors have to divide the system for modular development which works in an efficient manner. The data flow diagram of Sohayota App explains the flow of information in the app. The flow diagram explains various app modes present in the application. It includes- Voice Mode, Manual Mode, Chat Bot, and App Settings. Step by step the flow has been explained in the flowchart. The functionalities under different modes are explained through the flowchart.

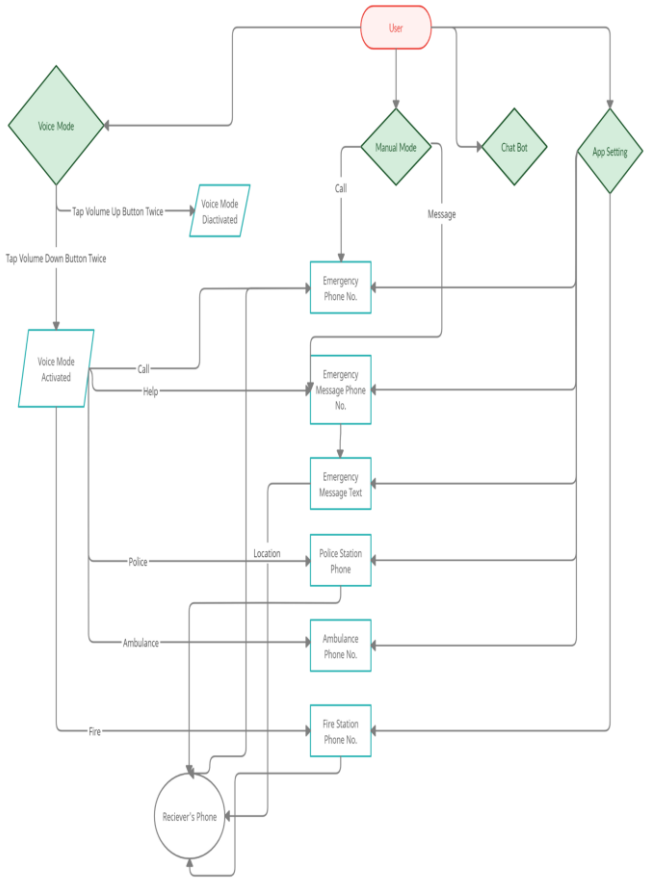

Figure 3. Level 2 Dataflow Diagram of Sohayota App

B. Use Case Diagram of Sohayota App

The use case diagram gives a block representation for giving people a holistic view of the app. It depicts how various actors interact between them. The diagram demonstrates two actors one is the victim and another is the receiver, and they interact through some specified relationships between them established by voice recognition, chatbot and receiver's phone.

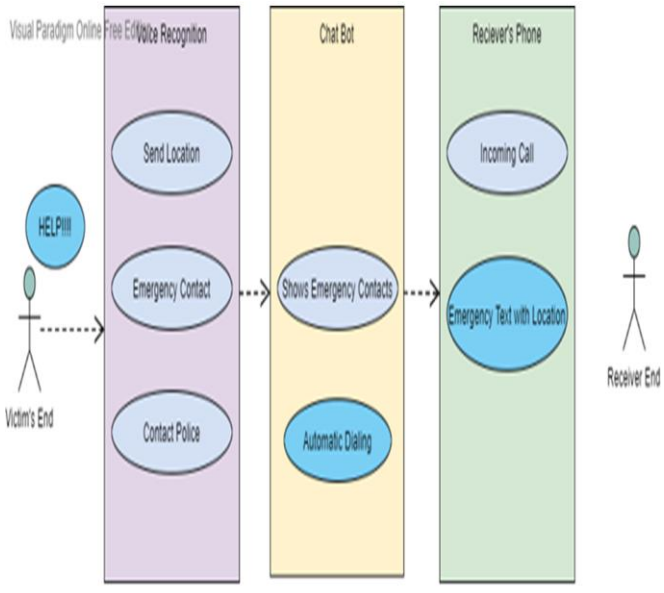

Figure 4. Use Case Diagram of Sohayota App

IV. Proposed Model

There are a lot of applications which are deployed in various businesses, for commercial uses but the need for an application that can be used by women at the time of their insecurity and unsafe situations is still unfulfilled. So, in order to address this problem, we have come up with our application which aims at solving these issues and provide mental and urgent help to women at the time of serious situations.

The proposed model of Shohayota app is discussed below in figure 5. The diagrams 5 below show the working of Shohayota App. Victim here, is the user who is using the app on encountering some unsafe situations. The app upon installation can be used upon a single click. The app demands live location update of the user for tracking. The user sends key word voice callouts which are recognized by the speech recognition model of the app which then leads to the generation of text messages for help along with the location of victim with coordinates. This message is then sent to the saved contact numbers on the phone, to the police station, fire station, ambulance services based on the keywords provided by the user regarding their situation.

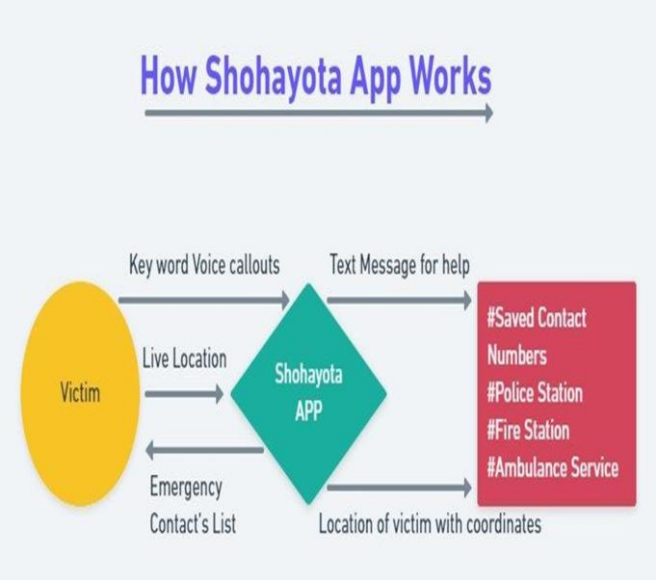

Figure 5. Level 1 Dataflow Diagram of Sohayota App

For a more detailed discussion on the model on Figure 6, we can look over the next diagram. Here, the working has been explained along with the keyword. User using the app generates a message “Help!” by speaking or we can say through voice callouts which goes into the system of Shohayota app along with the GPS updates, the keyword help is then recognized by voice recognition, then, the app tracks down user’s locations. The app demands the selection of some emergency contacts by the user at the time of installation process and these contacts are then used for sending them emergency message in order to help and protect the user. The app sends a message to the emergency contacts along with location co-ordinates for tracking the user’s exact location. It also fascinates automatic dialing. Based on the messages received the emergency contacts of the user are accepted to take actions and arrive at the required location as soon as possible for helping out them from any kind of harassment and unsafe situations.

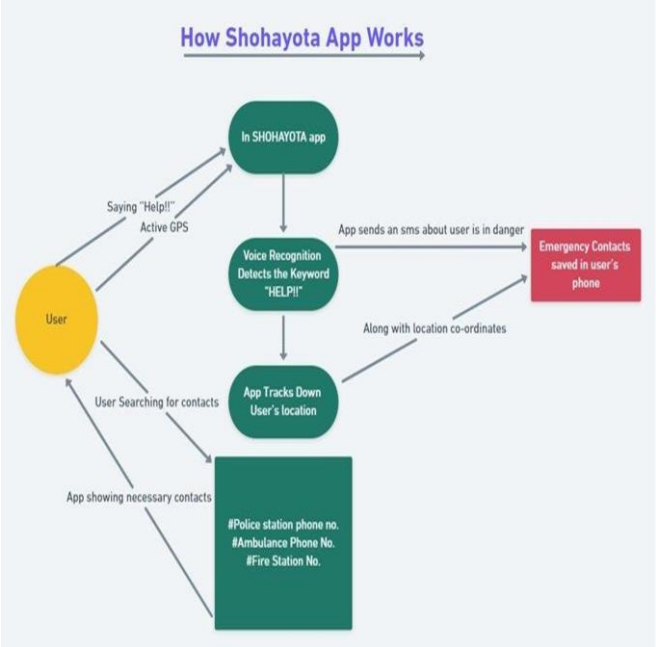

Figure 6. Working of Sohayota App details

A) Technologies used in the application

The following segment discusses about the various technologies that have been used in the proposed model.

1) Android Studio
Android Studio officially serves as the Integrated Development Environment (IDE) for Android. For the creation of Android apps, IntelliJ IDEA is utilized. While creating Android apps, Android Studio's extra features, in addition to IntelliJ's powerful code editor and developer tools, increase your productivity.

2) Dialog Flow
It is simple to create and incorporate a conversational user interface into any mobile app, IVR system, web app, bot, and more using Dialog Flow, a platform for natural language comprehension. There are many creative methods to engage with the product using Dialog Flow. It can evaluate different client inputs, such as text and audio inputs (i.e., from phone or voice recording). Moreover, it could converse with the users through text and artificial speech.

B) Hardware Requirements
Following are the hardware requirement for developing the application: (a) Processor: intel core i3 or any higher processor (b) Memory: 8 GB RAM (c) Hard Disk Drive: 64GB

C)Software Requirements

1) Programming Language: Java
Nowadays, Android is a widely used smartphone operating system. Today, there are millions of programmers accessible that run on various types, models, and brands of mobile phones. Java, a popular programming language, is used to

create Android applications for various reasons. Android development's main objective is to create a platform-agnostic application environment that could run on any device. The Dalvik VM is a modified virtual machine based on the Java virtual machine known as the JVM that runs Android apps. Any device with the Dalvik virtual machine installed may execute the Android application. In this way, Android applications are developed and operated in a high-performance environment with platform independence. The object-oriented method of software development is a fantastic method. The oops concept lies at the heart of Java. Android is heavily reliant on Java concepts such as classes and objects, as well as other flaws. A huge number of libraries are included with Java. Making use of these libraries is straightforward. The Android SDK includes a number of standard Java libraries. These contain, among other things, data structure, math operations, graphics implementation, and networking functions. All of our other jobs are made easier by these Java libraries. Java assists with the speedy and inefficient creation of Android applications in this method. Android is built to run on a wide range of hardware platforms. As a result, architectural neutrality is desired as well as necessary. Once Android code has been written, it must be built and optimized for use on a range of devices. Java is often used in Android programming since it is platform agnostic.

2) Android Studio 4.2.1

Tablets and other Android-powered devices are popular among techies. Because of its open-source infrastructure, it makes mobile app creation simple. App makers may also publish their apps right away without any fuss. A big number of developers are becoming active in mobile app development for the Android platform as a result of its remarkable growth. Eclipse and Android Studio are always at the top of the list when it comes to Android. Why would we want to work using Android Studio rather than Eclipse? It's easy to understand. The studio was established with the purpose of accelerating the development of Android apps. Android Studio is the way to go if you're looking for a dependable IDE. Eclipse has gotten increasingly outdated as time has passed. Furthermore, Eclipse is sometimes referred to as a "Student-Project IDE" since it cannot compete with Studio. Here are a few examples of why Android Studio is a better option for making things easy to understand.

3) Java Code Auto-Completion

Java code auto-completion is available in both Android Studio as well as Eclipse. Even though Studio's code completion function is superior than Eclipse, Code completion in Eclipse may sometimes fail to deliver accurate answers. Since a developer's code completion is critical, Android Studio was created to provide accurate solutions.

4) System Reliability

Eclipse is a larger IDE and a core Java-based application when compared to Android Studio. It requires a large boost in RAM space and CPU performance to function correctly. The software will crash and become unresponsive if the appropriate prerequisites are not satisfied in Eclipse, whereas Android Studio has less bugs. It has a more constant performance as compared to Eclipse. In comparison to Eclipse, Android Studio has less system requirements. Android Studio is easy to use.

V. Result

In this section, authors have provided screenshot and figures of the output of the chatbot.

Figure 7. Logo of Sohayota App

Figure 8. Main Menu of Sohayota App

In **Figure 8**. Main Menu of Sohayota App where users can navigate into Manual Mode, Chatbot, App Settings.

Here users can also see the current status of voice mode i.e., if it is in on mode or off mode. Voice recognition mode can be turned-on through this screen too.

Figure 9. Manual Mode Options

In **Figure 9**. If the user opts to go with Manual Mode, they will be given the option to Call or SMS their emergency contact.

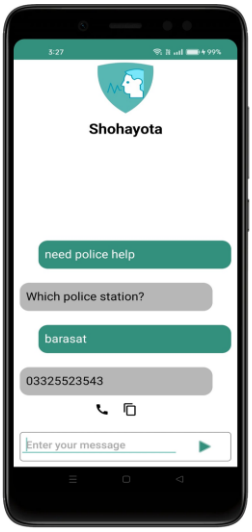

Figure 10. Help Options

In **Figure 10.** If the user needs to search the number of any nearby police station, ambulance service and fire station they can simply ask it to the chatbot. It will find the information from the database. It also provides the option to the user whether he wants to call or copy the number.

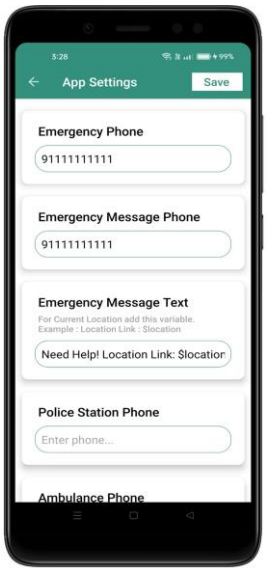

Figure 11. Emergency Services

In **Figure 11.** App settings users can save their emergency contact number, which will receive the calls and SMS from this app. Also, there are options to save the number of Police Station, Fire Brigade and Ambulance service.

Figure 12. SMS services

In **Figure 12**. this is the message that will be received by the contact number which is saved in the user's Sohayota App.

The SMS contains a short customizable text with the user's lastlocation coordinates with it.

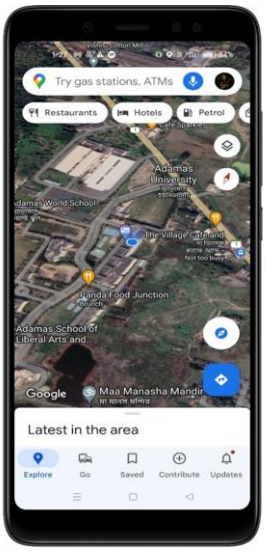

Figure 13. Location services

In **Figure 13.** After clicking the location coordinate the receiver will be able to see the exact location of the victim through Google Map.

Figure 14. Description about Sohayota App

In **Figure 14.** provides an idea about the Sohayota App to the user.

VI. Conclusion

Women's protection is becoming increasingly vital in India and other nations. The capacity of the police to respond quickly to distress calls are restricted that is the fundamental issue with their handling of these occurrences which includes not being able to locate the crime or the occurrence of the crime. It is difficult for the victim to contact the authorities in a safe and discrete manner. To assist women in overcoming these obstacles, authors have designed Shohayota (Safety App), a smartphone application that provides a safe way for women to contact the police in an emergency. With the help of current advancements in mobile technology, this article discusses about the application named ‘Sohayota’, which is built in the Android platform for the safety of women. It is used to assist the user when they encounter a difficulty or need assistance.

Instead of the experimental database utilized, this programme can be merged with a law enforcement database in the future. When the root device's network is unavailable, as well as when the root device is turned off, certain more upgrades can be performed. As a result, this software can play a significant role in rescuing people from dangerous situations.

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