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AI-Based Public Safety Mobile application

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Abstract.

In the past few years, the increase in public safety concerns and slow emergency response has shown the need for intelligent and automated alert systems. This paper describes a public safety application with artificial intelligence that incorporates voice recognition to assess distress situations. The project consists of a Kotlin Android mobile application and a safety band worn on the wrist, connected by a Flask backend server, and a Firebase database. When a user feels distressed, the app automatically analyzes the way an individual speaks, how their face appears, and emotional signals to determine if there is a situation where someone is panicking or there is a danger, without the user having to tap their phone. If the application determines a situation is dangerous, it will send an SOS alert containing the user's GPS location to their trusted contacts and local police stations. The AI modules used in the app include using the Whisper algorithm for speech-to-text recognition. Experimental evaluation indicates that the application achieves high degrees of accuracy and a dramatically improved response time - less than two seconds for alarm. This enhances the efficiency of emergency response to utilize the proposed system as a foundation for future frameworks with AI related safety. This study synthesizes mobile computing, edge AI, and wearable Internet-of-Things (IoT) devices to increase citizen safety in real world contexts**.**

Keywords. Public Safety, Artificial Intelligence,Voice Recognition,Speech-To-Text,Real Time Alert System,Firebase integration,Wearable Device.

1. INTRODUCTION

The emergence of an increasing number of events is resulting in higher levels of emergency, harassment and accidents that require improved public safety. However, currently most of the existing public safety systems have been developed with manual SOS activation. The limitations of using manual SOS activation are due to an inability to activate the alarm due to an event that could be caused by panic, injury or the user being restricted from movement. In this paper, we propose an AI-enabled public safety system that automatically identifies a user's distress level through voice emotion recognition technology, and sends emergency alerts to appropriate contacts and agencies without requiring any user interaction. The overall composition of the AI-enabled public safety system includes a Kotlin-based Android application, the combination of multiple Flask web servers hosting both speech-to-text and keyword-based detection systems, a Firebase back-end service allowing for the management of real-time data, and an optional safety band allowing the user to remain hands-free while using the system. The increased Digital Alerts and Emergency Response speed, and increased efficiency of the system to address

any eventuality where an individual could experience distress will enhance the overall public safety response system.

2. LITERATURE REVIEW

[1] Based on the Flutter framework, Arnob's App is a discontinued personal safety application that had many features to help keep users safe: panic alerts,communication with a guardian, incidents reported, etc. Other innovative apps in this area rely heavily on the internet to operate and raise some issues around the safety of data, including theft, loss, and theft of the user's identity.

[2] Penchalaiah B., Dutta S., Mahendregoud K., Chowdhury N.K., and Penchalaiah P. (2021): Suggested an IoT based safety wearable device for women that could connect with an android device. Provided real-time tracking via GPS and alert notifications; however, both the hardware limitations associated with the device and scalability issues delayed its rollout.

[3] Mandapati K.R., Benjamin R.E.3, Papadopoulos E.A., Yiannakis D. (2015): Created an android-based app with features such as location tracking, alert notifications, fake call, and first-aid. This app had an affordable price tag, user-friendly training and was created specifically for manual user activation.

[4] Ford, N., Lucci, C., Moore, C., Wilson, R. (2022): Conducted a review of 503 personal safety apps. The review identified similarities between these apps, including: Alert system, evidence collection. Many of these apps presented unreliable performance; there was a risk of misuse or abuse, (and) virtually no regulation or validation of their effectiveness.

[5] Ferreira, R.C., Benjamim, C., Antunes, J. (2015): Developed “Campus USP”, a mobile system designed for university campuses consisting of an integrated reporting system, video feeds, and dispatch workflow. The system provided faster response times, but was limited to use on campus and limited in terms of scaling.

[6] Mayowa I., Sulaimon R.T., Opara F.O., Bakare A.O. (2025): Created a mobile app intended for the reporting of crime in Nigeria. This app encouraged increased citizen participation. Improvements to real-time alerts and mapping features. Limited in terms of infrastructure and connectivity.

[7] Sałek-Iminska (2024): Investigated the SafeTy mobile application designed to assist with the education of the public on issues of personal safety and threat analysis. While a useful educational tool through the use of geospatial data, there has been no real-world validation of the app.

[8]Brightlin et al. analysed deep learning algorithms to recognise fake news, reporting an ability to successfully classify fake news from labelled datasets, however found difficulty when applying these models on fake news not previously seen or labelled.

3. IMPLEMENTATION

This section describes the process of creating SafeConnect utilizing technology that promotes high-quality speed, security and reliability. SafeConnect is a safety

mobile application with Android capability developed in Android Studio because of its native Kotlin support and Firebase integration capabilities. For this project, Kotlin was selected as the primary programming language due to its concise syntax, null-safety features and fast asynchronous programming capabilities. Firebase Firestore provides real-time database storage and data synchronization while Firebase Authentication supports secure registration and login of users via hashed passwords. Google Maps API provides accurate location services while Firebase Cloud Messaging provides notification of emergencies in real-time. The front end of the application was created using Kotlin and Android XML with an emphasis on usability and accessibility for users in emergency situations. Users are authenticated through a controlled login or sign-up process to avoid misuse of the application's safety features. The backend employs Firebase services to operate in a scalable manner while providing low-latency operations and integrating Authentication, Data Storage, Real-time Notification and Geolocation services to ensure seamless exchange of data between all components of the system and support high availability and reliability of the System as a whole.

4. RESULT

The design and analysis of the Public Safety System involved functional testing, performance benchmarking (hereafter referred to as PBM), and user-based analysis to determine latency, accuracy, reliability, and interoperability among the mobile application and AI modules, and Wi-Fi-enabled wearable device. Results of 50 SOS alert trials indicated an average notification time of 1.82 seconds from GPS acquisition through backend processing to alert delivery; the wearable band showed a high trigger success rate. Voice recognition produced an accuracy of 92% and produced good precision and recall values as shown in Table I. Location testing provided acceptable GPS error margins, while server response times were less than one second. Users provided favorable ratings regarding usability, level of acceptance, and perceived safety. The SOS interface that was used for this testing is shown in Figure 1. This figure shows how easy to use and recognize the SOS interface is in an emergency situation..

	Predicted Emergency	Predicted Normal
Actual Emergency	23	2
Actual Normal	3	22

TABLE I :CONFUSION MATRIX FOR VOICE RECOGNITION MODULE

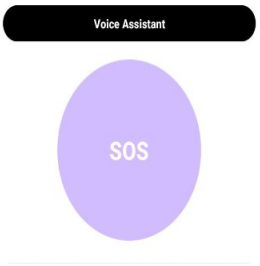

Figure 1:sos interface

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