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## Abstract

As digital technology continues to advance, new opportunities arise for enhancing emergency response and health management. The Be Safe mobile application focuses on identifying these opportunities and leveraging today's AI capabilities to improve the efficiency and effectiveness of emergency services. By utilizing Dart, FlutterFlow, Firebase, and OpenAI's ChatGPT, the app enables users to store and monitor vital health data, record and upload emergency videos, and receive real-time AI-driven guidance. The primary goal of the project is to optimize emergency response in Puerto Rico by providing accurate information to first responders, ultimately saving time and resources. With the integration of advanced AI-driven communication features and personalized content generation, Be Safe aims to be a powerful tool for both individuals and first responders in managing health and ensuring safety during emergencies.

## Introduction

The high volume of emergency calls in Puerto Rico, totaling over 1.3 million in 2019, poses challenges in terms of response times and resource allocation (EMDACPR, 2019) [1]. To address this problem, the Be Safe mobile application is introduced as a comprehensive solution that leverages advanced AI capabilities and digital tools. By utilizing technologies such as Dart, FlutterFlow, Firebase, and OpenAI's ChatGPT, the app aims to streamline the emergency call process, provide real-time guidance, and optimize emergency response services. This innovative solution revolutionizes emergency management by enhancing communication, enabling users to store vital health data, record emergency videos, and receive personalized AI-driven guidance. By addressing the challenges faced in Puerto Rico's emergency response system, the Be Safe app ensures the safety and well-being of individuals in critical situations.

## Background

The emergency response systems in Puerto Rico face unique challenges, including geographical factors and extended response times (PRIS, 2018) [2]. These challenges have created a need for technological advancements to improve efficiency and accuracy. The Be Safe mobile application addresses these challenges by leveraging AI-driven features and digital tools. It allows users to store health data, record emergency videos, and receive real-time AI-driven guidance. The integration of Dart, FlutterFlow, Firebase, and OpenAI's ChatGPT ensures a user-friendly platform for enhanced emergency response and health management.

## Problem

Emergency response systems in Puerto Rico face challenges related to resource allocation inefficiencies and a lack of accurate information (Rivera-Santana et al., 2016) [3]. These issues lead to delays in assistance and the deployment of unnecessary resources. The Be Safe mobile application serves as a comprehensive solution to address these challenges by empowering individuals to manage their health and optimize emergency response services. By enabling users to record and upload emergency videos, the app provides valuable information to first responders, improving assessment accuracy and dispatching appropriate teams. Additionally, the app offers AI-driven guidance and personalized content, empowering users to effectively manage their health. The Be Safe app aims to save time, resources, and potentially lives during emergency situations in Puerto Rico.

## Methodology

To develop the Be Safe mobile application and optimize its features, we will follow a multi-step process:

1. Assess the current emergency response system in Puerto Rico
2. Identify opportunities for improvement
3. Develop the AI-driven platform
4. Conduct user testing
5. Refine the app based on feedback

## Analysis

During our investigation into the emergency response system in Puerto Rico, we conducted an interview with a seasoned expert who provided valuable insights based on their 12 years of experience as a first responder. The interview highlighted the need to reduce response and assignment times, as well as the potential benefits of utilizing real-time video footage in emergency situations. Building upon these insights, we proceeded to analyze real emergency response data to assess the current system and explore how the Be Safe app could enhance response times and overall efficiency. The subsequent Data Analysis and Results section presents our findings and discusses the potential impact of the Be Safe app on Puerto Rico's emergency response system.



**Figure 1:** Example of SkyCAD, a computer-aided dispatch system. As part of our research, we were granted supervised access to SkyCAD, a computer-aided dispatch system utilized in Puerto Rico for emergency call management. With guidance from our expert interviewee, we explored the functionalities of SkyCAD to assess its strengths and weaknesses and draw comparisons to our proposed solution, the Be Safe app.

As depicted in **Figure 1**, SkyCAD provides a comprehensive set of tools for receiving, dispatching, tracking, and reporting emergency calls. Developed by SkyTec, this computer-aided dispatch system enables emergency service providers to efficiently manage incoming calls, allocate resources, and monitor real-time response statuses. Our analysis of SkyCAD's functionalities allowed us to assess its strengths and weaknesses and draw meaningful comparisons to our proposed solution, the Be Safe app.

Our focus was on analyzing how SkyCAD calculates response times, as our primary objective with the Be Safe app is to reduce these times and enhance the efficiency of emergency responses. We identified potential areas of delay in the process, such as call transmission from 911 to local offices and provider assignment. To visually illustrate the contrast between the SkyCAD interface and processes and our Be Safe app, we captured screenshots of the SkyCAD interface and its response time calculation, as shown in **Figure 2**.

Horas		Tiempos	
Creado 9-1-1:	2023-05-08 01:17:32	9-1-1:	0:01:54
Recibido 9-1-1:	2023-05-08 01:19:25	Activacion:	0:03:09
Recibido en Despacho:	2023-05-08 01:19:26	Reaccion:	0:03:09
Activado:	2023-05-08 01:20:45	Ruta:	0:09:26
Escena:	2023-05-08 01:35:11	En Escena:	0:21:41
Completado:	2023-05-08 02:52:37	Ruta Hospital:	0:21:41
Archivado:		En Hospital:	0:30:01
		Total Agencia:	1:33:10
		Total Llamada:	1:35:05

**Figure 2:** SkyCAD Part of generated real case PDF

## Results and Discussion

Our analysis of five real emergency cases in Puerto Rico, as shown in **Table 1**, revealed areas where the current emergency response system could be improved, particularly in the time it takes for a 911 call to be transmitted to the nearest local office and the time it takes for the office to assign a provider. These findings highlight opportunities for enhancing the system and optimizing emergency response efficiency.

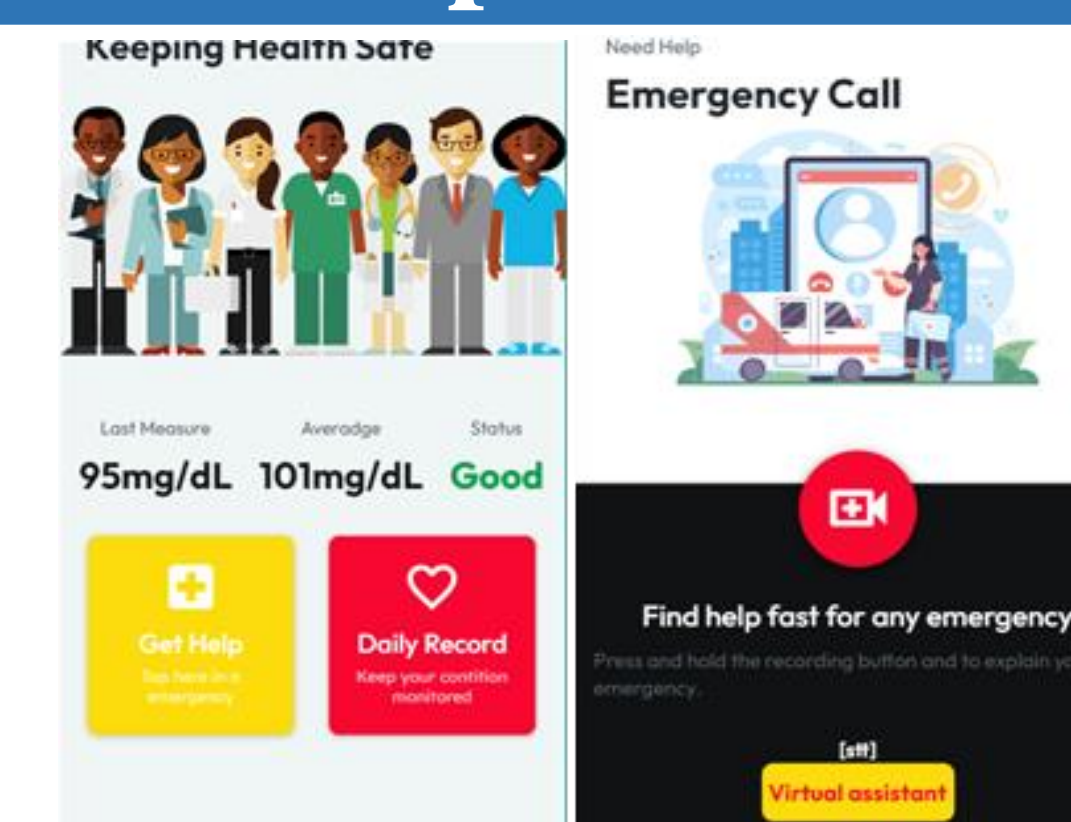
The Be Safe app offers potential solutions to address these areas of improvement. By automatically determining the user's location and uploading relevant information to the nearest local emergency office, the app can streamline the transmission process from 911. Additionally, providing emergency agents with a video of the emergency scenario enables faster assessment and assignment of an appropriate provider, resulting in optimized resource allocation. By facilitating better communication between users, emergency service providers, and local emergency offices, the Be Safe app can contribute to overall improvements in response efficiency. While comparing the current system, SkyCAD, with the Be Safe app, it is important to note that our intention is not to criticize the effectiveness of SkyCAD, but rather to demonstrate how technology can evolve and enhance emergency response management.

In conclusion, our analysis suggests that the Be Safe app offers ways to improve the efficiency of the emergency response system in Puerto Rico. Further research and user testing will be conducted to validate these findings and refine the app's features to ensure maximum impact on the emergency response system.

**Table 1:** Time to transmit an emergency on real cases

Case	Date	Emergency	Time to transmit to Local Office	Time to Assign a Provider
1	5/8/23	Respiratory Distress	1:04	0:04
2	5/8/23	Car Crash	3:09	1:20
3	5/7/23	Bleeding from a leg	2:02	0:46
4	5/5/23	Urinal bleeding	3:07	8:42
5	5/3/23	Nervous breakdown	1:33	3:00

## Main Implementations

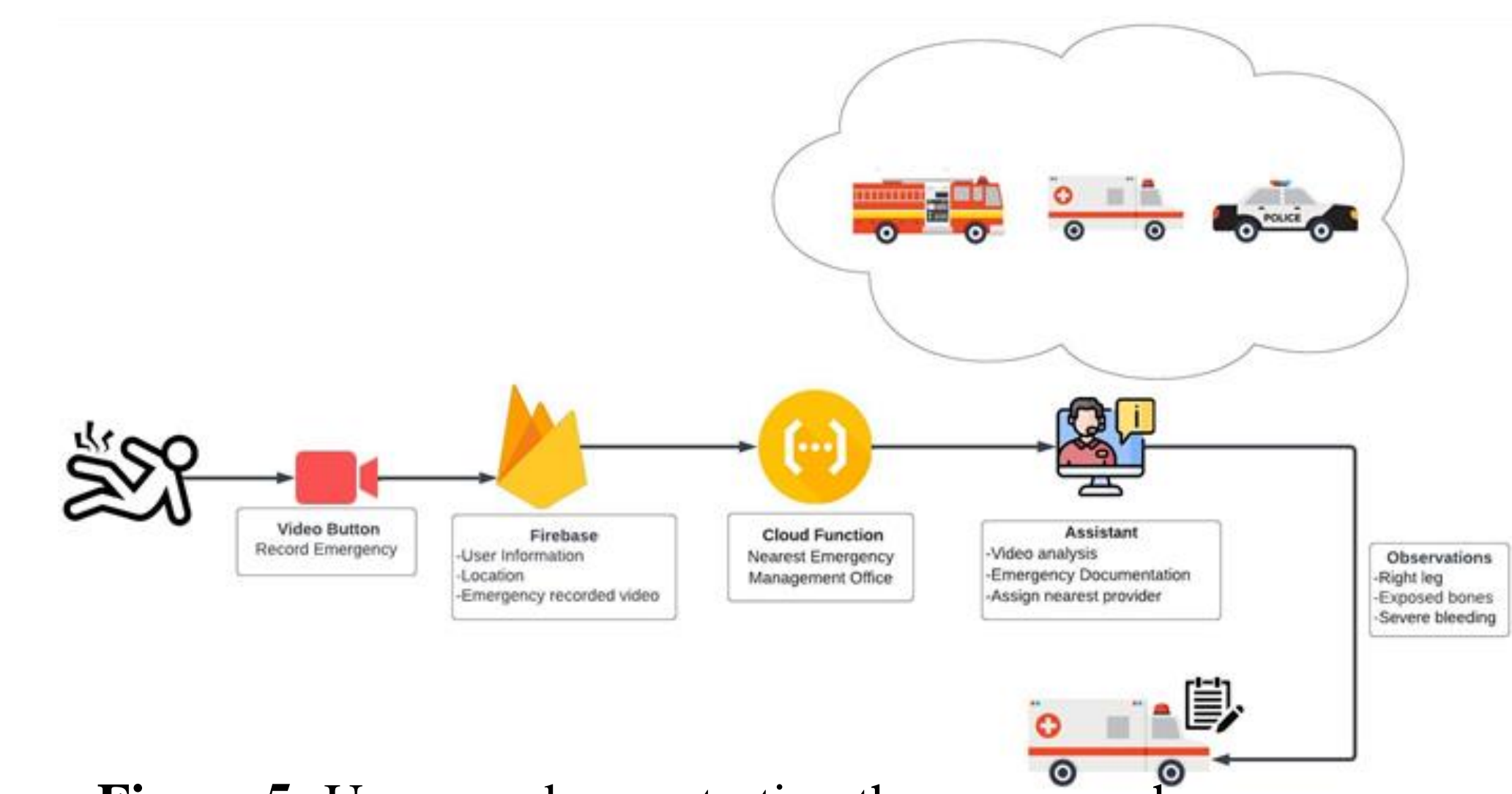


**Figure 3 and 4:** examples of the Be Safe UI

The Be Safe mobile application offers a user-friendly experience with multiple pages, including the Home Screen, as shown in **Figure 3**, Patient Record, and Profile pages. However, the core focus of the project lies in the development of the Emergency Call User Interface (UI), shown in **Figure 4**. This UI plays a crucial role in reporting emergencies, capturing visual evidence, and communicating with emergency service providers. The following sections will explore the details of the Emergency Call UI, its functionalities, and its integration with technologies like Firebase and ChatGPT. The report will also discuss the methodologies used, challenges faced, and how the app aims to transform emergency response management in Puerto Rico. While the Emergency Call UI is the main focus, it's important to acknowledge that the other app features contribute to its overall functionality, creating a comprehensive emergency response solution.

## Main Components

The Be Safe mobile application includes the Recording Button, which enables users to record and upload real-time videos during emergencies. When the user long-presses the button, as shown in **Figure 5**, the app captures the user's location, starts recording the video, and uploads it to a remote server. The app also updates the user interface and stores the emergency call information for future reference. This feature provides emergency responders with up-to-date visual evidence, improving response times and outcomes. The Virtual Assistant Button utilizes speech-to-text and text-to-speech functionality. When the user presses the button, their speech is transcribed into text, which is then sent to the Chat GPT API for a response. The app checks for a successful response and converts the assistant's response into speech, playing it back to the user. This allows users to communicate with a virtual assistant using voice commands, enhancing communication efficiency during emergencies.



**Figure 5:** Use case demonstrating the process when a user has an emergency and presses the "Record Video" button

## Future Work

The future updates of the Be Safe app could include a deeper integration of ChatGPT using Firebase Functions, enabling personalized user experiences based on individual medical conditions. By leveraging Firebase Functions, the app can connect with ChatGPT to provide tailored content and recommendations, improving the app's usefulness during emergencies. This enhancement would involve implementing a user profile system where users can input their medical history, allowing the app to access contextually relevant information and offer personalized guidance. For example, users with diabetes could receive customized advice on managing blood sugar levels during emergencies. These enhancements showcase the potential of AI-driven services in revolutionizing emergency response and personal safety applications.

## Conclusions

The Be Safe mobile application is a groundbreaking solution for emergency response management, utilizing advanced technologies like FlutterFlow, Firebase, and OpenAI's ChatGPT. It offers unique features such as real-time video recording, speech-to-text and text-to-speech functionality, and a virtual assistant, improving user experience and providing responders with vital information. The app is continuously improving through rigorous testing, partnerships with emergency services, and expansion into new regions. Future enhancements include the integration of AI-driven personal health data analysis, providing tailored advice during emergencies. The Be Safe app exemplifies the transformative power of technology in improving emergency response outcomes and enhancing lives.