

Problem & Goal

➤ Engineering Problem

- Many people in the world cannot access help in emergency situations, even if they have access to a cell phone.

➤ Engineering Goal

- The goal of this project is to engineer an application which can deliver timely and low-cost help in emergency situations using location-based services.

Background

➤ EMS

- In the early 1970s, 70% of EMS callers needed paramedic support, while today, only 35% of EMS callers request paramedic support
- EMS struggles to meet the demands of all its callers in rural areas, urban areas, and areas in which a natural disaster is occurring
- EMS finds it difficult to help the elderly and individuals who are physically impaired

➤ Elderly

- Demand for application
 - In 2013, 350,000 people in the United States bought some variation of a telehealth service (IHS, n.d.)
 - As of 2017, 3.84 million people had invested in PERS; this value is expected to double in 2018 (IHS, n.d.)
- Need for Device
 - In a survey recently conducted by the Center for Disease Control (CDC) of 835,200 individuals in 2014, 21% of people living in residential care had fallen in the previous ninety days
 - Elderly can develop further health complications if not aided in time

➤ Associated Technologies

- Google's voice recognition software can analyze over 90% of over 5 million words
- GPS technology is contingent upon a network of satellites and provides access to accurate longitude and latitude positioning
- Android Studio is a mobile development platform that allows for easy integration into Google products
- Firebase is a real-time database which stores information of multiple app users in JSON format

Target Features

➤ Functionalities of this Application

- Allows user to asynchronously send their information to a database
- Allows user to call for help through voice-activated command to specified contacts
- Database sends help request to all contacts in a specified radius
- Allows user to get coordinates of individuals in need and find a route to their location
- Application can be accessed with phone in standby mode or locked

Competitor Analysis

Features	SoS Emergency "GPS Bodyguard"	SoS Emergency App	5 Star Urgent Response with GPS	mySOS SA	Emergency Response App
Message Sending	Yes	Yes	Yes	Yes	Yes
Messaging to Contacts	Yes	Yes	No	Yes	No
GPS Directions	Yes	No	No	Yes	No
Specified Radius	No	No	No	No	No
Hands-Free	No	No	No	No	No
Overall Review	Yes	Yes	Yes	Yes	Yes
Server	Yes	Yes	No	Yes	Yes
Access While Locked	No	No	No	No	No

Figure 1: A table detailing whether competitors met design criteria

Design Procedure

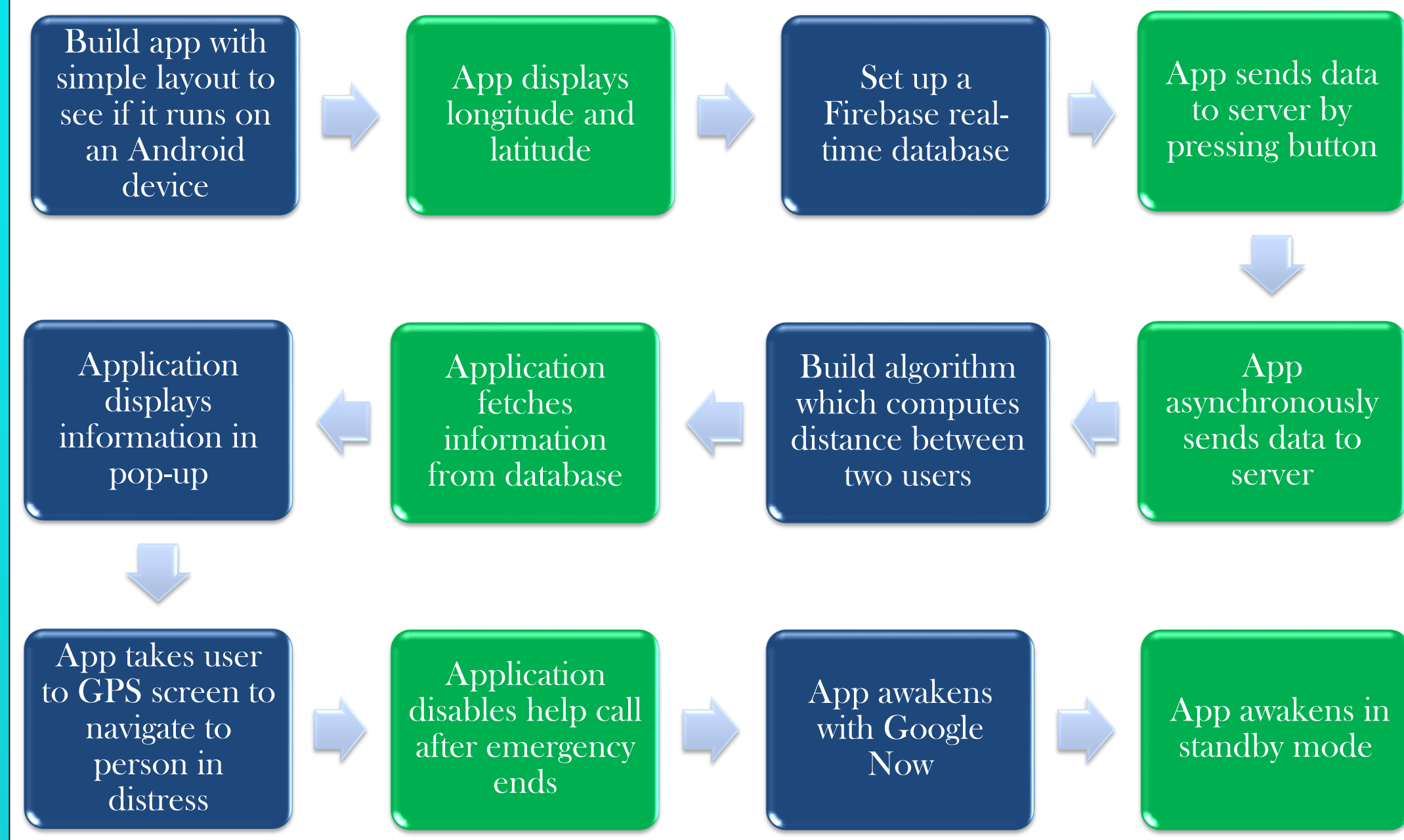


Figure 2: The design procedure in which the application was developed

Testing Procedure

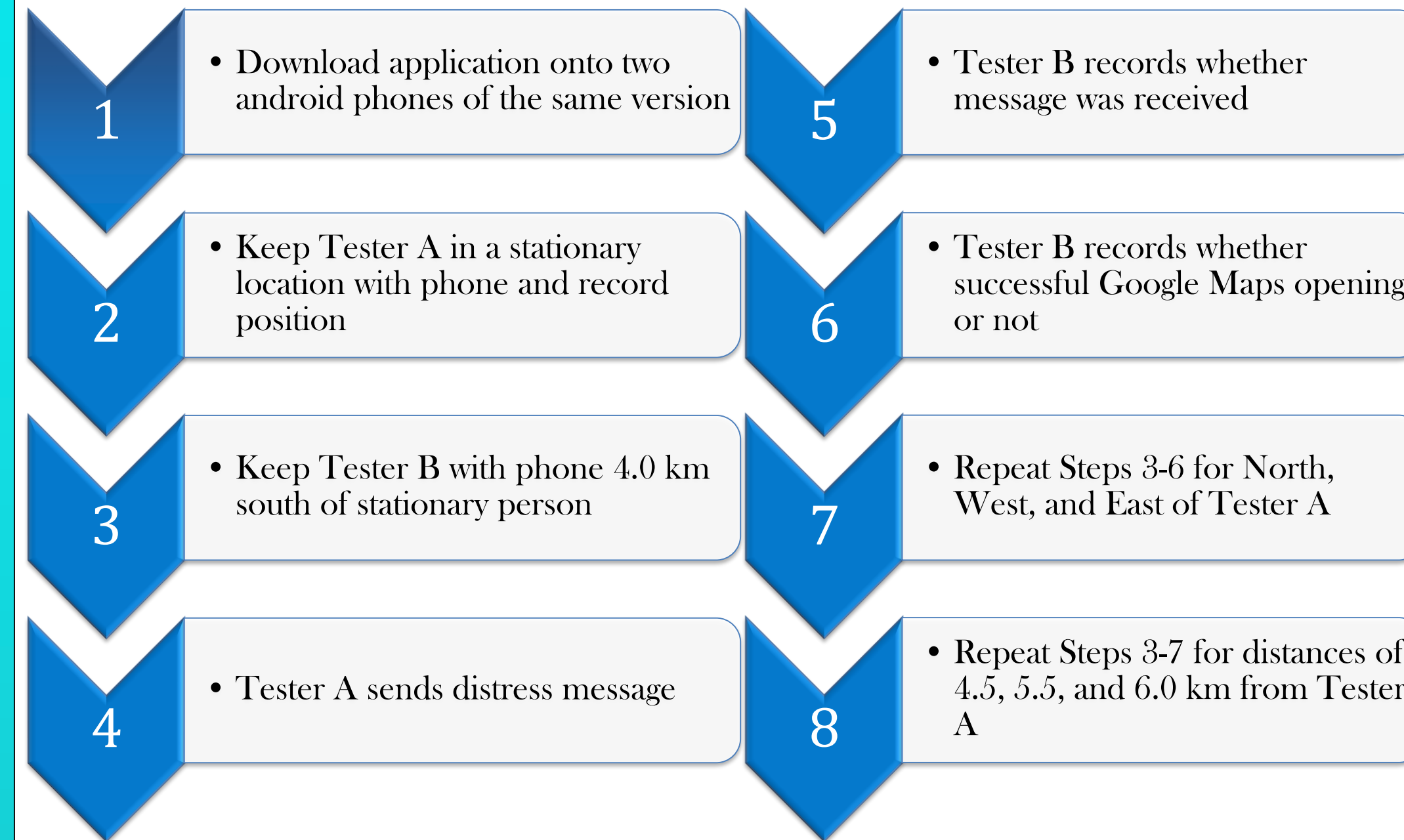


Figure 3: The procedure in which the application was tested

Application Versions

Features	Version 1	Version 2	Version 3	Version 4	Version 5	Version 6	Version 7	Version 8	Version 9
Message Sending	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Messaging to Contacts	No	No	No	No	No	Yes	Yes	Yes	Yes
GPS Directions	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Specified Radius	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Hands-Free	No	No	No	No	No	No	Yes	Yes	Yes
Server	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Access while Locked	No	No	No	No	No	No	No	No	Yes

Figure 5: A table detailing the progression of the application

How it Works

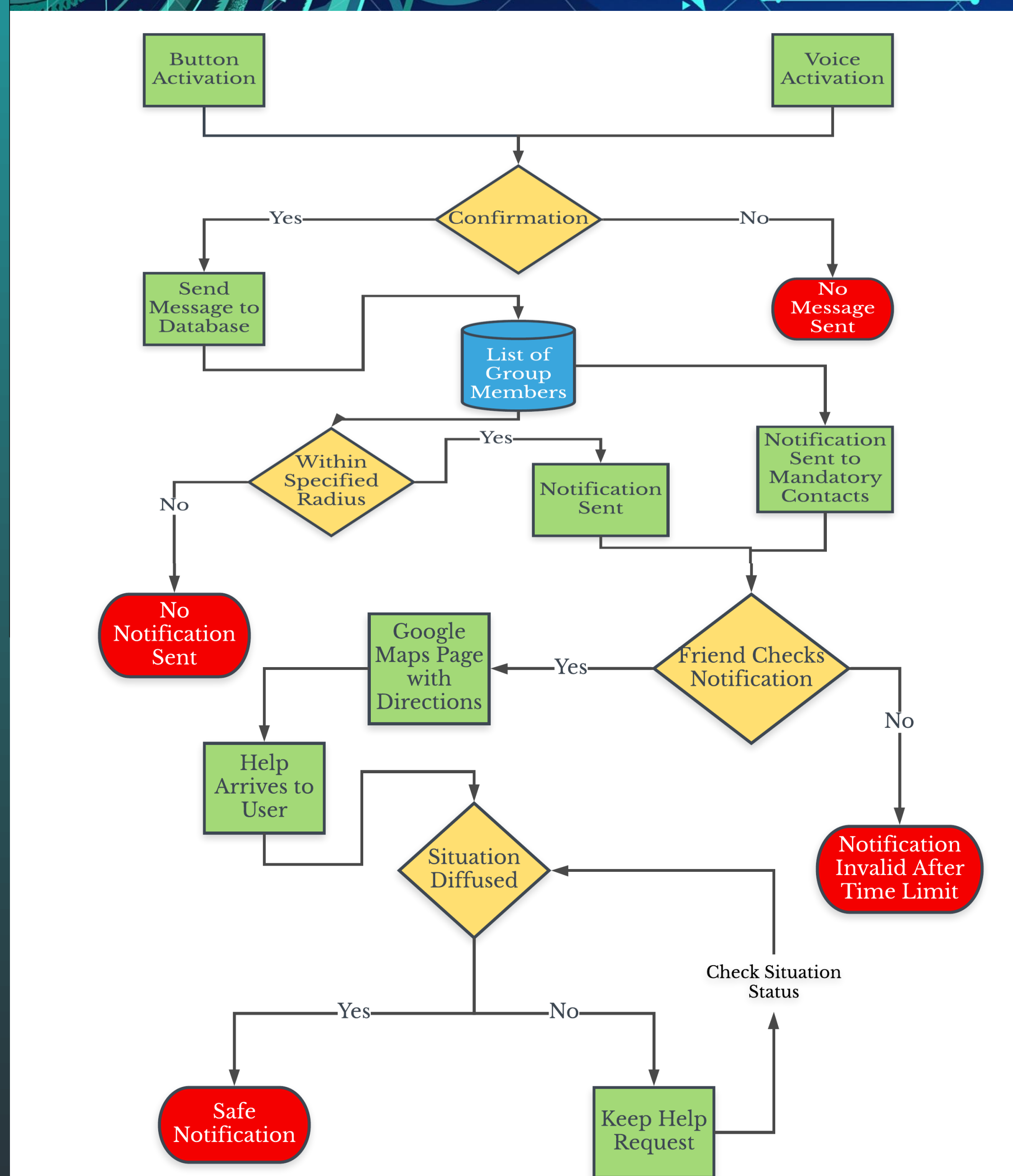


Figure 6: A flowchart detailing the user experience of the application

Feature Matrix

Features	Weighting	SoS Emergency "GPS Bodyguard"	SoS Emergency App	5Star Urgent Response with GPS	mySOS SA	Emergency Response App	Version 9
Message Sending	5	Yes	Yes	Yes	Yes	Yes	Yes
Messaging to Contacts	3	Yes	Yes	No	Yes	No	Yes
GPS Directions	3	Yes	No	No	Yes	No	Yes
Specified Radius	5	No	No	No	No	No	Yes
Hands-Free	4	No	No	No	No	No	Yes
Server	3	Yes	Yes	No	Yes	Yes	Yes
Access while Locked	3	No	No	No	No	No	Yes
Totals		14	11	5	14	8	26

Figure 7: A matrix evaluating the performance of EmerSave versus competitors

Notification Accuracy

Distance from Tester 1 (km)	Direction Relative to Tester 1	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
4.0	South	✓	✓	✓	✓	✓
4.0	North	✓	✓	✓	✓	✓
4.0	West	✓	✓	✓	✓	✓
4.0	East	✓	✓	✓	✓	✓
4.5	South	✓	✓	✓	✓	✓
4.5	North	✓	✓	✓	✓	✓
4.5	West	✓	✓	✓	✓	✓
4.5	East	✓	✓	✓	✓	✓
5.5	South	✓	✓	✓	✓	✓
5.5	North	✓	✗	✓	✓	✓
5.5	West	✓	✓	✓	✓	✓
5.5	East	✓	✓	✓	✗	✓
6.0	South	✓	✓	✓	✓	✓
6.0	North	✓	✓	✓	✓	✓
6.0	West	✓	✓	✓	✓	✓
6.0	East	✓	✓	✓	✓	✓

Figure 8: A table indicating the success of the radius-based notification system where green indicates success and red indicates failure

Conclusions

➤ Conclusions

- Application has intuitive and easy-to-use user interface
- Application evaluated much better than its competitors overall
- Notification system at desired accuracy levels for different ranges

➤ Future Extensions

- Deploy app on the Google Play Store
- Make necessary changes to deploy app on iOS App Store
- Analyze the demographics that are the most interested with the application and see how to better tailor app to them
- Make database functions seamless for heavy user traffic
- Refine the radius-based notification system