Engineering Problem

There are many people in the world who cannot access help in emergency situations even if they possess a cell phone.

Engineering Goal

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

Target Features

Functionalities of this application:

- Allow user to asynchronously send their information to a database
- Allow 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 help and find route to their location
- Application can be accessed with phone in standby mode

Background

- **EMS Services**
  - 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 had bought some variation of a telehealth service

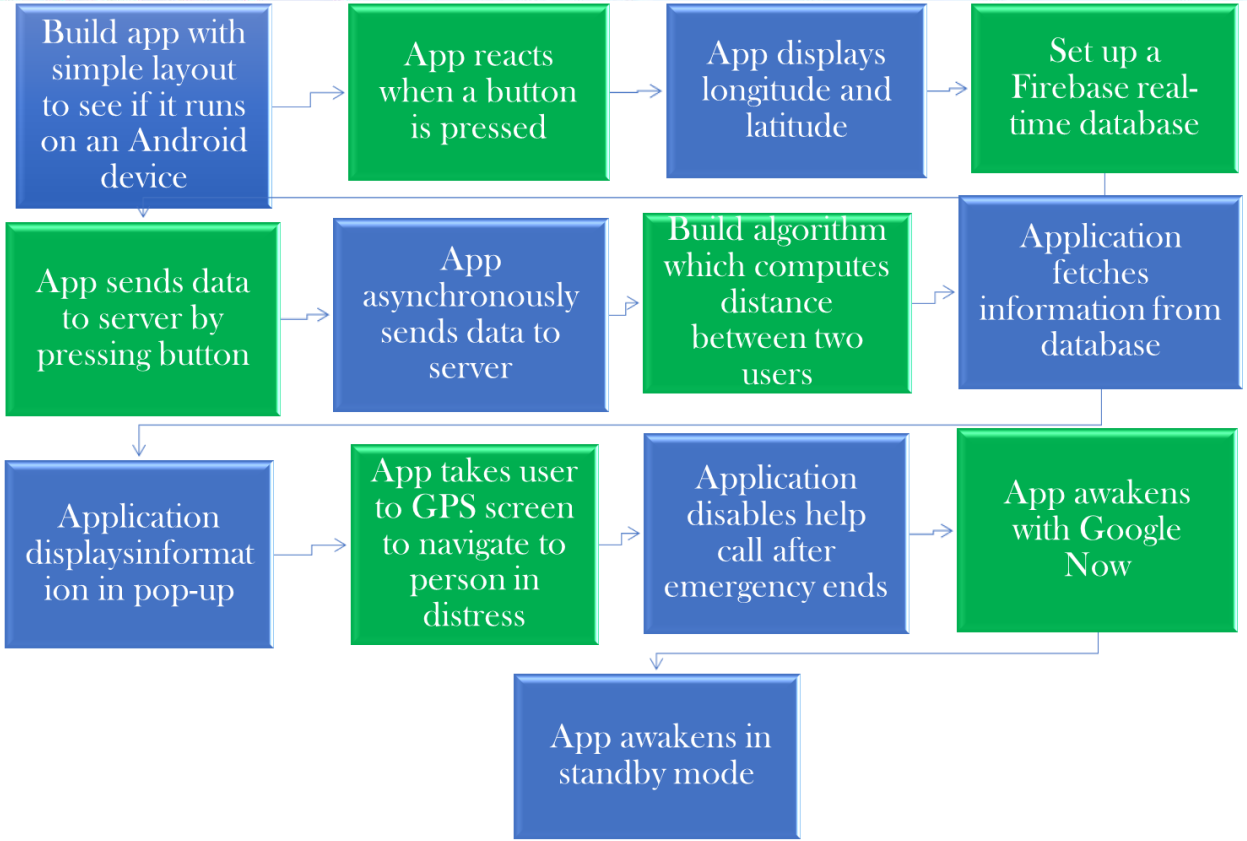
        - 3.84 million people had invested in PERS as of 2017; this is expected to double in 2018
    - Need for Device
        - In a survey recently conducted by the Center for Disease Control (CDC) of 835,200 individuals in 2014, 21% of people living in residential care had fallen in the previous ninety days
        - If not aided in time, elderly can get further health complications

- Associated Technologies
    - Voice recognition can allow user to call for help without crucial wasting; Google's voice recognition software can analyze over 90% of over 5 million words
    - GPS technology is contingent on a network of satellites and provides access to accurate longitude and latitude positions
    - 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

Decision Matrix

Criteria	Weight	Hardware Device	Software Application
Low Cost	4	3	4
High Durability	3	3	5
Easy to Update	2	2	5
Audience Range	4	3	4
Easy to Use for Target Audience	4	4	4
Independence of Product	4	5	3
	Total	73	85

Design Procedure



Testing Procedure

1. Download application onto two android phones of the same version
2. Keep Tester 1 in a stationary location with phone and record position
3. Keep Tester 2 with phone 0.5 miles south of stationary person
4. Tester 1 sends distress message
5. Tester 2 records if message was received
6. Tester 2 records whether successful Google Maps opening or not
7. Repeat Steps 3-6 for North, West, and East of Tester 1
8. Repeat Steps 3-7 for distances of 0.75, 1, 1.25, and 1.5 miles from Tester 1

Materials: Development

Criteria	Weight	MIT App Inventor	Android Studio
Low Cost	4	5	5
Multiplatform	4	3	5
Size of Application	2	2	4
More offered tools	3	3	4
Easier development tool	4	5	3
Inter-app communication	5	3	5
	Total	80	97

Materials: Technique

Criteria	Weight	Geofencing	Distance Computing
Low Cost	4	2	5
More Accuracy	5	3	4
Larger size of Audience	3	3	5
Location Identification	5	3	4
Ease of Use	4	3	3
Ease of Development	4	4	3
	Total	75	99

Competitor Analysis

Features	SoS Emergency "GPS Bodyguard	SoS Emergency App	5Star 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
Overall Review	Yes	Yes	Yes	Yes	Yes
Server	Yes	Yes	No	Yes	Yes

Application Versions

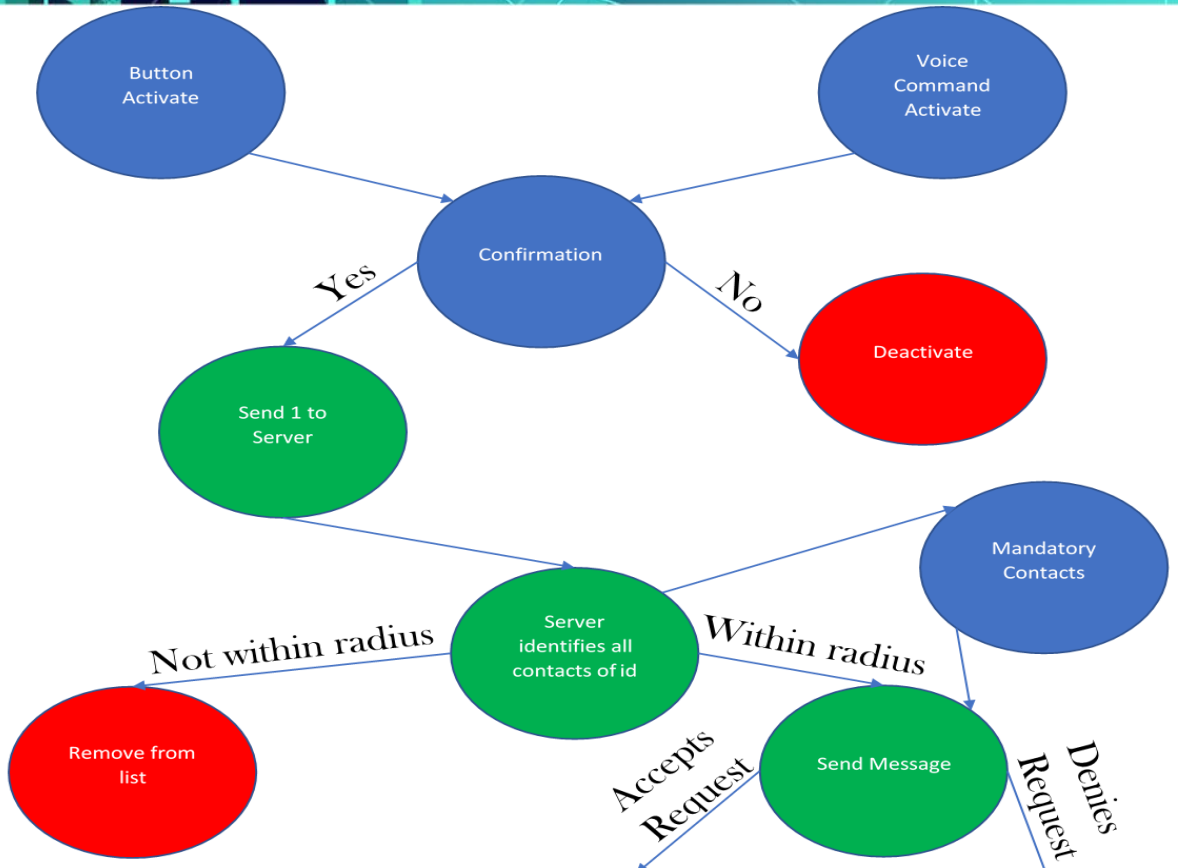
Features	Version 1	Version 2	Version 3	Version 4
Message Sending	No	No	Yes	Yes
Messaging to Contacts	No	No	No	No
GPS Directions	No	No	No	Yes
Specified Radius	No	No	No	No
Overall Review	N/A	N/A	N/A	N/A
Server	No	No	Yes	Yes

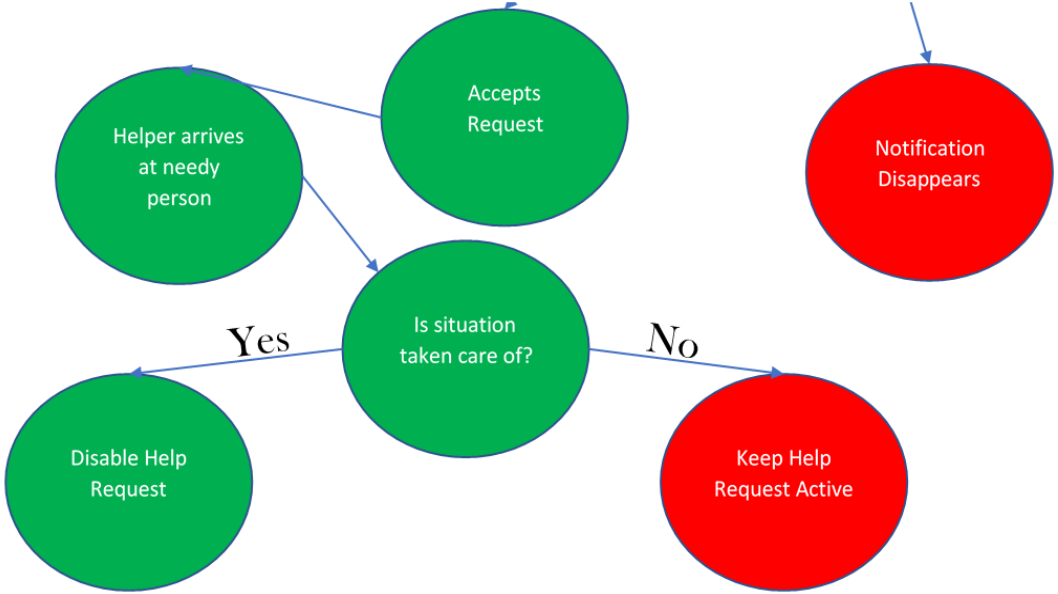
Scoring Matrix

Features	Weight	SoS Emergency "GPS Bodyguard	SoS Emergency App	5Star Urgent Response with GPS	mySOS SA	Emergency Response App	Version 4
Message Sending	5	Yes	Yes	Yes	Yes	Yes	Yes
Messaging to Contacts	3	Yes	Yes	No	Yes	No	No
GPS Directions	3	Yes	No	No	Yes	No	Yes

Specified Radius	5	No	No	No	No	No	No
Overall Review	4	Yes	Yes	Yes	Yes	Yes	N/A
Server	3	Yes	Yes	No	Yes	Yes	Yes
Access while locked	3	No	No	No	No	No	No
	Totals	18	15	9	18	12	11

How it Works


Button Activate
Voice Command Activate
Confirmation
Yes
No
Deactivate
Send 1 to Server
Mandatory Contacts
Server identifies all contacts of id
Not within radius
Within radius
Remove from list
Accepts Request
Send Message
Denies Request


Accepts Request
Notification Disappears
Helper arrives at needy person
Is situation taken care of?
Yes
No
Disable Help Request
Keep Help Request Active

Future Work

Future Work for February Fair

- Build the navigation feature of the Google Maps portion of application
- Clean up look of user interface
- Build voice recognition part of application
- Test application and voice recognition accuracy

Future Extensions

- Deploy app on the Google Play Store
- Make necessary changes to deploy app on the App Store
- Analyze the demographics that are the most interested with the application and see how to better tailor app to them

Timeline

December

- Build navigation features of application
- Clean up user interface of application to make it user-friendly

January

- Build voice recognition portion of application
- Test accuracy of voice recognition and radius-bound messaging

February

- Get application onto two android devices for February fair
- Start process to publish application on Google Play Store