Stakeholders:

- Blind person who navigates indoors
- Caretaker who sets the configuration of the smartphone app and come to aid the blind person in case the blind person is injured or lost
- UTD police in emergency situations
- Software Developers of the app

Functional Objectives:

- Navigating indoors in the same building or from one building to another

Non Functional Objectives:

- Safe Navigation
- Fast Navigation
- Comfortable Navigation
- Usability
- User-Friendliness
- Customizable Interface
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Features:

1. Accepting the next action of user based on user's decision and his or her schedule
    a. Examples are having the user select out of different options and if the user needs repeating, then the AI will repeat the options again
2. Figuring out and suggesting which routes can reach the destination location and accepting user preference on the routes based on his or her comfortability
    a. Suggesting best path selection based on features like distance and time of day for safest and fastest time to get to destination (A Machine Learning approach)
3. Google Maps-like navigation (Using GPS… telling how many steps to take and how long till destination is reached … "2 minutes to turning point" and "3 steps forward")
4. Telling user to stop at a turn
5. Detecting obstacles and telling the user what to do to avoid a collision
    a. Having the user adjust their speed based on how fast the object is moving and its direction
6. Placing emergency calls and messages during a fall or other circumstances
7. Guiding the blind person when the environment is dark (During a power outage)
8. Customizable interface that includes adjusting volume, increasing or decreasing interval speed, picking the language, and automatically updating internal software
9. Guide to the nearest braille if the user prefers to walk in that manner

Issues:

1. Gps isn't accurate
2. Detection in the dark? (During power outage or other emergencies)
3. Obstacles?
    a. Will we have the blind person stop or move based on the rate of that object moving?
4. No battery / too much battery drainage
5. Detecting and navigating up or down stairs (How will we notify blind person where the stairs end?)
6. What happens when there are too many people in the hallway? Where will we have the blind person walk to avoid any collisions if we have him move based on the rate of object moving?
7. How will we detect the falls properly? Suppose the phone drops out of the person's hand and then the person falls? Or the phone drops, then the headphones drop… how will the person notify emergency services that they have not fallen?
8. How will the blind person hear the voice from the app if it is too loud?
9. Assuming he wears headphones, what if one or even both headphones fall out of that person's ear?
10. What if the person falls in a manner that the phone app does not detect the fall? In a case where the blind person is unable to do anything and no one is nearby, what will we do?
11. Phone gets damaged

How to navigate around issues and some assumptions:

- How will the blind person hear the voice from the app if it is too loud?
    - He will be wearing bluetooth headphones
- What if the connecting headphone wire comes out of the phone?
    - Wireless bluetooth headphones is an option
- Wireless bluetooth headphones run out of charge
    - Assumption: That the phone and the headphones are fully charged every time before a navigation and there is a backup power system for these technologies
- How will we detect the fall of the phone and what kind of action is needed in this case?
    - Assumption: User has the phone around his neck. Phone is likely not to fall out.
- How will we detect the fall of an individual?
    - Based on the orientation and level of the phone, it will trigger an emergency response and if it is not needed, the user can say "No" in the situation to stop the call. If no response, call and location details will be forwarded to the UTD police
- What if the person falls in a manner that the phone app does not detect the fall? In a case where the blind person is unable to do anything and no one is nearby, what will we do?

        - Not likely to happen given the assumption that the phone will likely stick to the user at all times.
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Assumptions: the app is already running

1. User knows where the app is present -> (accessibility features dictate what the user clicks on)
2. Mobile has all the required sensors.
3. User has the phone around his neck
4. Back side shall face the front (ambient light sensors would detect this)
5. The phone is always connected to wifi and bluetooth
6. The phone is likely not to fall out

Facts:

- Blind people do not count their steps
- Guide Dogs usually help blind people
- Blind people have white-cane walking sticks to watch for obstacles