

The first iteration of our development:

1. We plan on creating a simplistic device as to inform the wearer of the intended direction that they must head towards.
2. The device will be mounted onto a glove and will be in contact with the back of the wearer's hand, it operates by utilizing an Arduino with two servos that control the heading of a pointer in the x and y direction (one servo controls x and the other the y)
3. We will then start development on a swift application using Xcode to publish a mobile application to the app store on iPhone.
4. In our first iteration we will focus on simply keeping the wearer going on a straight-line avoiding obstacle placed in front.
5. The iPhone will obtain a 3d depth map using the ARKit library and will forward the data to the app, which will then be sent to our personal desktop.
6. Our personal desktop will handle the computations which will mainly be programmed in python, and will then relay a set of instructions back to the app.
7. The app will then send the instructions to the Arduino using Bluetooth
8. The commands that the Arduino could possibly receive are an arc circle towards the right and an arc circle towards the left, indicating the intended direction the user must temporarily head towards to avoid the obstacle to remain at his current heading.
9. To maintain current heading, we will extract the compass data from the CoreLocation library and measure deviation from the path.
10. As the user proceeds around the object the pointer will recede back from its endpoint of the arc (meaning when it creates the arc, it then starts to trace back as the user until the user has fully avoided the obstacle and returned onto his original path)

The second iteration of our development:

1. We will then begin implementation of the navigation system
2. The user will be provided the ability to enter in a desired location
3. After sending the desired location, and the user's current location to the app, which will then be sent to our desktop
4. We will map out the intended route of the user to follow (this will serve as our new compass heading)
5. The user will proceed to following this path, and in the event of any obstacles the device will proceed with the function prev developed, then center the user back onto the appropriate heading required to remain on the path.

The third iteration of our development:

1. We will then apply accessibility settings onto our app to enable visually impaired users ease of access
2. The model of the glove will also be updated to create a more compact design, initial thoughts are to use magnetism to manipulate a steel ball to indicate heading rather than utilizing servos.

The fourth iteration of our development:

1. We have concerns about the transfer speed of the information from the phone to the app to our desktop and back to the phone, so we have devised two potential solutions, and will be testing both solutions for a better fit
2. The first involves utilizing aws as our “desktop” to handle all interactions to the phone and application, it would also enable us to setup a database for any potential information we may want stored.
3. The second solution involves having the entire app as independent, and having all the computation done on the phone’s hardware itself, we have concerns of processing capabilities due to having to handle complicated 3d depth maps, however the iphone’s architecture was designed to incorporate 3d depth maps and allow the user to access it, so it is likely that it may very well be possible, however further research and testing is required.