

GNG 2101

**Design Project User and Product Manual**

# Library Wayfinder

Submitted by:

Library Wayfinding - A16

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**Table 1. Glossary**

<b>Term</b>	<b>Acronym</b>	<b>Definition</b>
Bluetooth Low Energy	BLE	The technology our bluetooth beacons use. BLE has a lower range but uses very low amounts of energy, enabling it to work for several months and longer.
Web Content Accessibility Guidelines	WCAG	The official guidelines for maintaining a standard of accessibility. The Government of Canada is required to follow WCAG 2.1 AA.

# 1 Introduction

Navigation is an issue that is faced by many people, even without any disabilities it can feel like you're in a maze when looking for a book or finding someone to assist you. Our goal with this project is to make library navigation easier for people who have accessibility needs, specifically people with visual and hearing impairments. The way we have done this is by creating a library wayfinding app that uses bluetooth connectivity for navigating the library. Our app has key points of the library outlined and also has a help button that an individual can call to get assistance in the library, along with these audio and visual instructions to help. The assumptions that we have made is that the client already has preferred accessibility settings on their device (as they would not otherwise be able to access the web in any meaningful way), and that they're accessing the site via a mobile device (i.e. the desktop view is not of critical importance). As a result, compliance with WCAG would allow for the client to be able to use the web app.

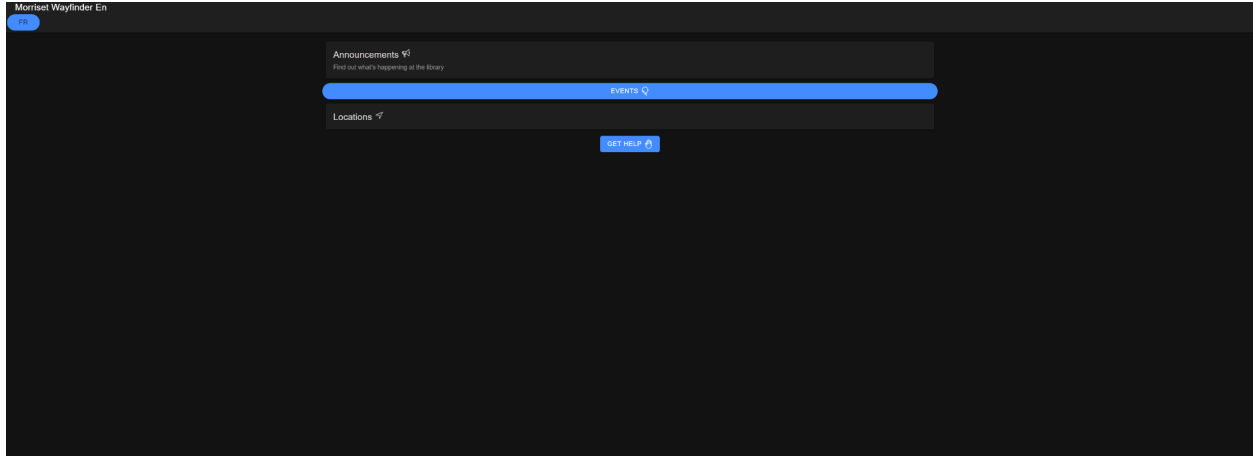
The purpose of this User and Product Manual is to provide the necessary information needed for a user to effectively use the Library Wayfinder system and for prototype documentation. Also there isn't any privacy concern with our library wayfinding system as we do not ask for any information from the user as it is an app that anyone can use without the need of logging in.

## 2 Overview

The world is designed around those without disabilities. This leads to some people with disabilities feeling excluded and reliant on others. We want to eliminate that feeling as much as possible by bringing the control back to the user.

Essentially we want our service to be easy to use, accessible and adaptable. It should communicate to the user easily. As well it should conform to all WCAG and supports the user's built in mobile phone accessibility options.

We use the latest technology to guide the user to their requested destination using the most optimal route. Also, we want to provide as many accessibility options as possible to allow everyone to use our service. We have longer lasting beacons with larger ranges.



**Figure 1: Homepage of the web-app's User interface**

The user can view announcements made by the library staff, events that are being hosted at the library, call the service desk for help, and click on the destination they want to go to to get directions. They also can use their mobile phone's built-in accessibility options with our web app.

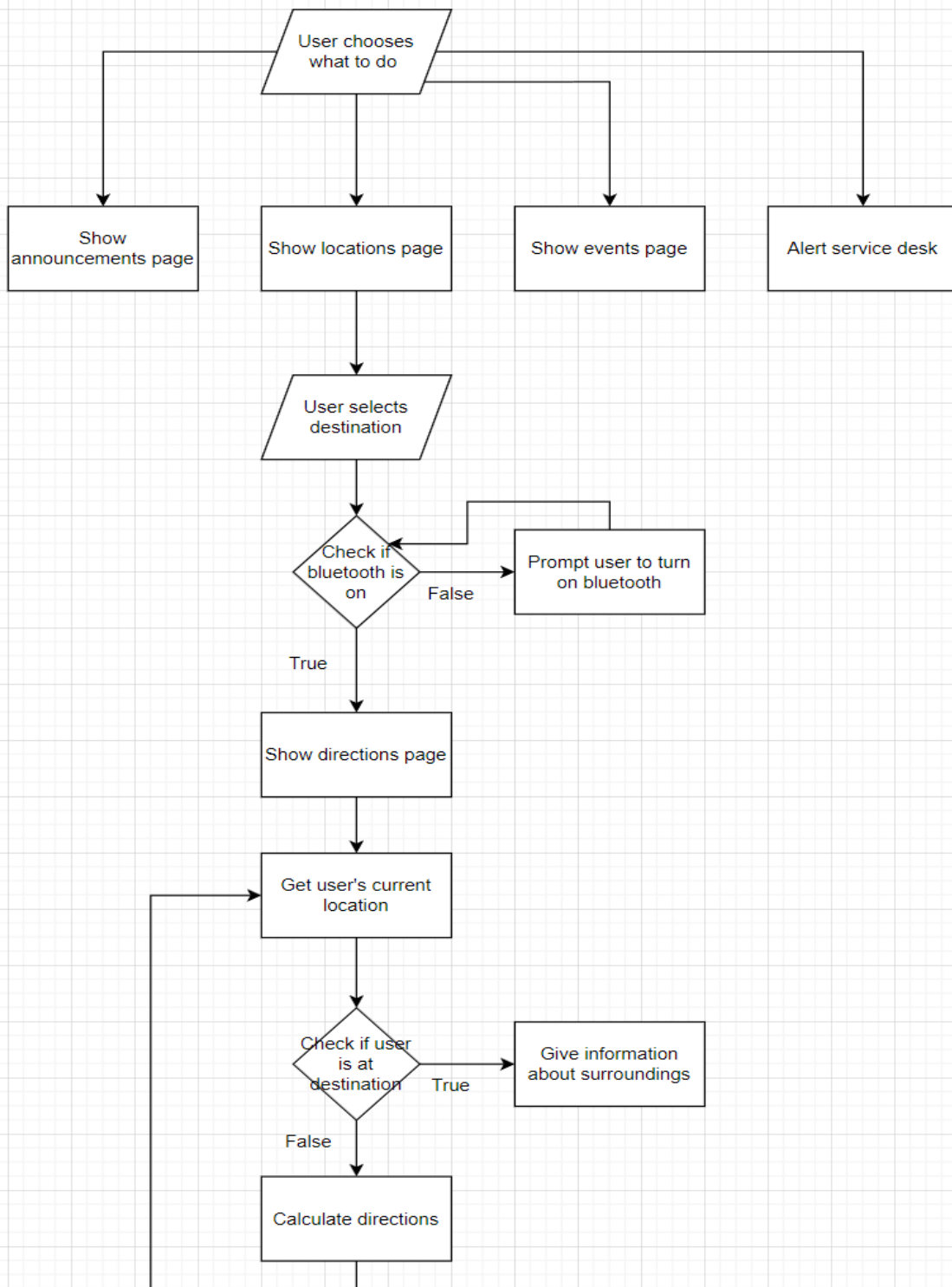


Figure 2: Design flowchart

## 2.1 Conventions

Links will be colored blue and underlined.

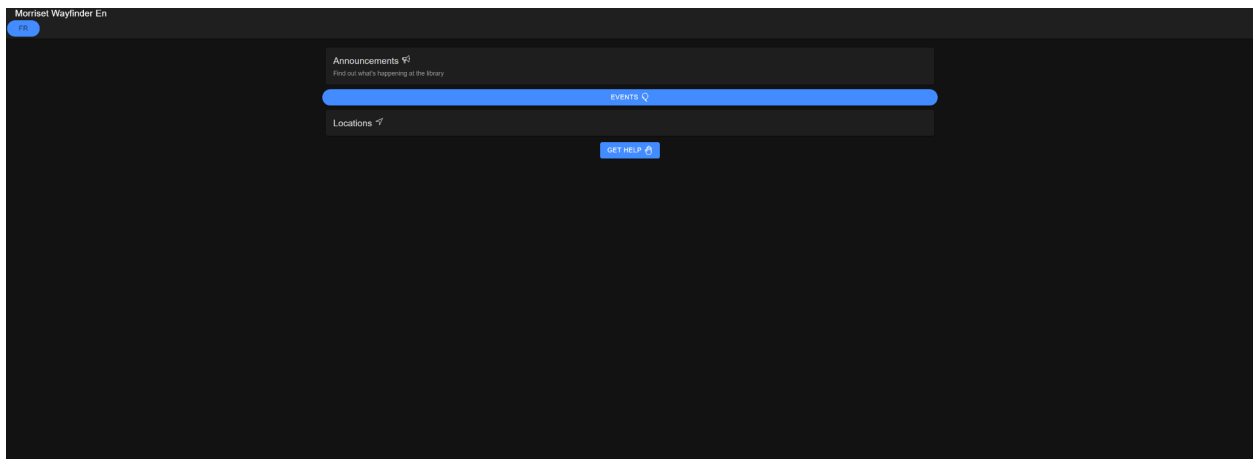
## 2.2 Cautions & Warnings

Our product, due to its digital nature, makes use of bluetooth and wifi technology.

## 3 Getting started

The user will access the application through this URL (<https://focused-lalande-e762c2.netlify.app/>).

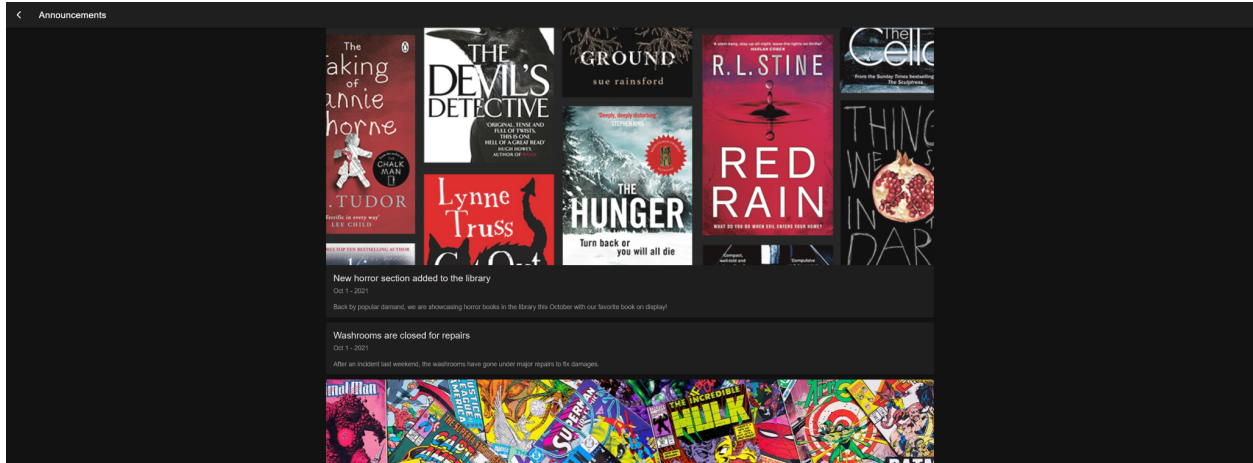
They will start on the homepage of the app which provides them with a choice of actions and also pick their language of preference.



**Figure 1: Homepage of the web-app's User interface**

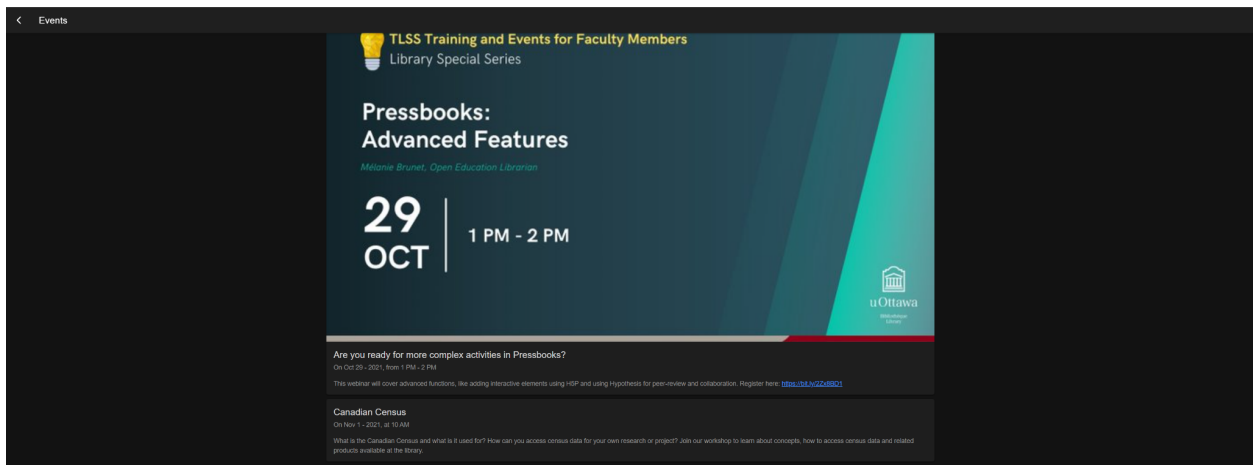
If the user clicks on announcements, they will be brought to the announcements page where they can view all recent announcements made by the library staff. The user can return to the homepage by clicking the back arrow located on the top left corner.





**Figure 3: Announcements page of the web-app**

If the user clicks on events, they will be brought to the events page where they can view all upcoming events being hosted at the library. Similarly, the back arrow can be used to return to the homepage.



**Figure 4: Events page of the web-app**

If the user clicks on locations, they will be brought to the locations page where they can pick their destination. Once the user clicks on their destination, they will be brought to the directions page where they will be provided with directions to get to their destination.

If the user clicks on get help, a pop up appears that shows the service desk's phone number. Upon clicking the phone number, the user's phone app will automatically open with the number pre-filled.

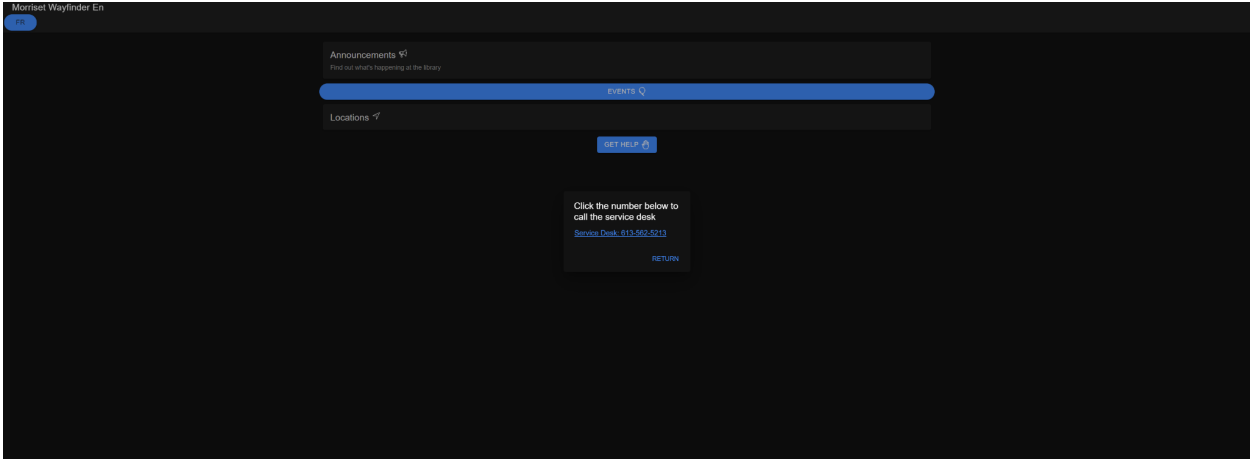


Figure 5: Pop-up of the call Service desk

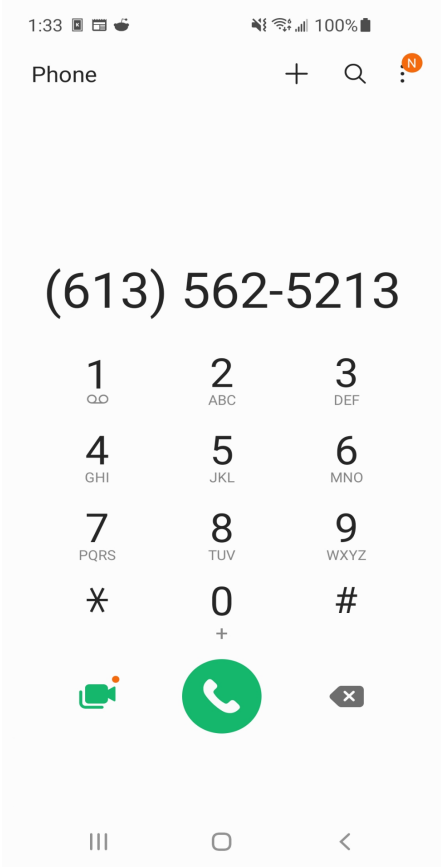


Figure 6: Interface of the Phone application with the listed phone number of the service desk

### **3.1 Set-up Considerations**

The user must turn on the bluetooth functionality on their mobile device in order for the web app to connect to the BLE beacons.

### **3.2 User Access Considerations**

The two main user groups will be visitors of the library and library staff. The library visitors will only be able to view the contents of the application while the library staff will be able to update the events and announcements that are shown in the app.

### **3.3 Accessing the System**

Users will be able to visit this website <https://bit.ly/3w5scpS> and begin navigating. There is no need for login or user ID.

### **3.4 System Organization & Navigation**

The application has 5 main pages. The homepage lists all the actions that a user can perform. Clicking each action will redirect the user to the corresponding result pages.

### **3.5 Exiting the System**

The user can exit the system either by closing the tab in their browser or by closing their browser.

## **4 Using the System**

The following subsections provide detailed, step-by-step instructions on how to use the various functions or features of the Web-application.

### **4.1 Navigation**

The user will choose the locations button on the website and be prompted to choose a desired location to be guided to. Once selected the user will see their position on the map and then will be prompted to head to their desired location. Once arrived at the location the website will end the navigation.

## **4.2 Announcements/Events**

After opening the web app the user will choose the announcements or events tabs, this will display announcements / events occurring at the library.

## **4.3 Call the help Desk**

After opening the web app, the user will choose the get help button. This will open up a notification allowing the user to call the Morisset library help desk.

# **5 Troubleshooting & Support**

If you run into any issues using the web-app, please close your web browser and re-open it. If the problem persists, please contact the help desk and let them know of the error. You could also contact us on Github and submit an issue request.

## **5.1 Error Messages or Behaviors**

If the website is acting slow or having issues navigating you to your location be sure to check your bluetooth settings. Make sure it is turned on and functioning. Also check your internet connectivity, if it is weak or unstable it may be the cause.

## **5.2 Special Considerations**

Be sure to check your internet connection, a weak or unstable internet connection may cause issues. Also be sure to enable your bluetooth connectivity on your device.

## **5.3 Maintenance**

Be sure to keep your mobile device up to date. As well check the git Hub for any new updates. The code should also be updated when methods get deprecated.

## **5.4 Support**

Contact us on github: <https://github.com/LibraryWayfinderGroup16>. Also you could contact the help desk to see if any of the issues you may be experiencing are known. They will be able to assist you with any navigation issues.

## 6 Product Documentation

### 6.1 User interface

#### 6.1.1 BOM (Bill of Materials)

Table 2. Bill of Materials

Product	Cost	
Bluetooth beacon	\$23.66 x 3	
<a href="https://www.amazon.com/gp/product/B085XN9B7N/ref=ox_sc_act_title_1?smid=A3LUSRMOBZQLMS&amp;psc=1">https://www.amazon.com/gp/product/B085XN9B7N/ref=ox_sc_act_title_1?smid=A3LUSRMOBZQLMS&amp;psc=1</a>	Subtotal	\$70.98
	Taxes	\$9.23
	Shipping	\$10.32
	Total	\$90.53

#### 6.1.2 Equipment list

Visual Studio Code (for editing source code)

Ionic with Angular v5.5 (Web framework)

Git/Github

Netlify

#### 6.1.3 Instructions

First thing, create an Ionic starter project. Then make sure to configure all necessary features using ionic documentation. Create the required web pages (you can use `npm run start` to preview your changes). Save and document your build and upload it to Github. Input build commands (for us, this is `ng build`) into Netlify and specify other build configuration details. Once you push new code to Github, it should automatically update those changes on the deployed site.

## 6.1.4 Testing & Validation of UI

Testing for WCAG conformity was done using a Google Chrome extension called “axe DevTools”. The tool was used to identify accessibility issues for every page. Below is an example of what the tool outputs.

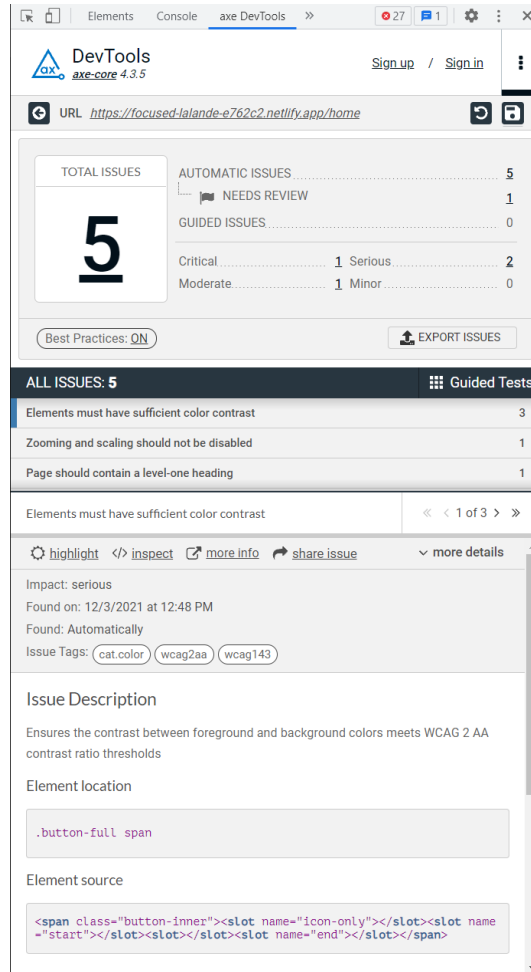


Figure 7: Automated WCAG testing performed by DeQue’s Axe DevTools.

## 6.2 Navigation algorithm

### 6.2.1 BOM (Bill of Materials)

Table 2. Bill of Materials

Product	Cost	
Bluetooth beacon	\$23.66 x 3	

<a href="https://www.amazon.com/gp/product/B085XN9B7N/ref=ox_sc_act_title_1?smid=A3LUSRM0BZQLMS&amp;psc=1">https://www.amazon.com/gp/product/B085XN9B7N/ref=ox_sc_act_title_1?smid=A3LUSRM0BZQLMS&amp;psc=1</a>	Subtotal	\$70.98
	Taxes	\$9.23
	Shipping	\$10.32
	Total	\$90.53

## 6.2.2 Equipment list

Visual Studio Code (for editing source code)  
Git/Github

## 6.2.3 Instructions

You want to take the user's inputted location and find the coordinates of the location. Then you will want to get the user's location using all 3 beacons to ping their distance and calculate their exact coordinates using trilateration. Constantly pinging and calculating the distance you can then display the user's location over a map of the library. Constantly updating as the user moves.

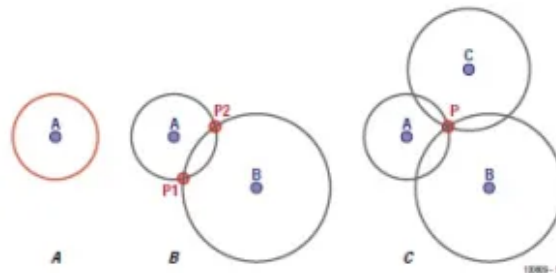


Figure 8: Display of how the navigation function works

## 6.2.4 Testing & Validation of Navigation

Testing will be done by standing in different parts of the library to see if the web-app will be able to navigate them to their final destination. We also will test to see if the web app will still function after disconnecting from the internet/bluetooth.

## 7 Conclusions and Recommendations for Future Work.

We learned the importance of time management, communication, and proper planning will go a long way in reducing stress and improving workflow. At the start we were all lost and confused, it wasn't until we sat down and went over everything that we came up with a proper plan. This plan went a long way in helping efficiency and productivity. If anything, we'd recommend at the start to build a plan and continuously update it as you work on improving the project. It helps keep goals and software organized.

We would try to implement the bluetooth functionality, unfortunately we were unable to get it working properly. We evidently would like to have added more functionality and adaptability to the service. Also implement user input for locations to give users more freedom. As well, implementing/changing features based on user feedback would be a big priority.

## 8 Bibliography

Ionic documentation : <https://ionicframework.com/docs/developing/starting>

Bluetooth beacon Documentation :  
<https://bluecharmbeacons.com/bc011-ibeacon-multibeacon-quick-start-guide/>

WCAG : <https://www.w3.org/WAI/WCAG21/quickref/>

Source of our wayfinding/trilateration method:  
<http://isyou.info/jowua/papers/jowua-v11n3-3.pdf>

Source of our WCAG testing tool: <https://www.deque.com/axe/devtools/>



# APPENDICES

## 9 APPENDIX I: Design Files

Table 3. Referenced Documents

Document Name	Document Location and/or URL	Issuance Date
GitHub repository  (contains all of our source code)	<a href="https://github.com/LibraryWayfinderGroup16/Prototype1">https://github.com/LibraryWayfinderGroup16/Prototype1</a>	September 23rd, 2021
Deployed site (uses shortened URL)	<a href="https://bit.ly/3w5scpS">https://bit.ly/3w5scpS</a>	November 2nd, 2021

## 10 APPENDIX II: Other Appendices