Point2Point

Project Group Members: Ginsu Eddy, Christopher Yin, Phuong Vu, Anna Fair, Yiping Li
INFO 200 | BB | JoJo Saunders

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Solutions Considered

Solution 1

For our first solution, we considered another type of mobile app that utilized many of the mapping solutions similar to that of Google Maps or Waze. The app would open up with a map view of the user's current location and the buildings nearby to it, and there would be warning icons and thumb up icons scattered across the map view to provide some sort of guide to the user to where they should walk. If the user searched for a building or pressed on any building on the map, the app would take you to another screen where information about the building would be presented to the user. There would be a button to get directions through different transportation methods, a button to look and write reviews, and a button to display an augmented reality based map. If the user pressed that button, they would be taken to another screen where there the camera would be used to display pointers to accessible routes and utilities like elevators in augmented reality.

Solution 2

Our second solution was an outdoor map of the user's surrounding area. A user could search for a building which would prompt a new screen which entailed a lot of information about that building and specifically its accessibility. In addition to information on this screen, there are a series of buttons for reporting an issue with the building's accessibility, saving the building and writing and reading reviews. At the bottom of this information screen, there is a button for getting directions through public transportation with the accessibility settings turned on, and another button which will take the user to another screen which has an indoor map of the building they selected. In this indoor map accessibility and important points will be highlighted making it easy for the user to use this as a guide throughout the building. In addition, when the user swiped up from the bottom of the screen, then that would start the AR Mode. The AR mode uses the user's camera to show pointers on where the accessibility points are.

Solution 3

The third solution we came up with is another map based solution where by default it shows an outdoor map based on the user's current location. On the bottom of the screen there is a search bar where the user can search for a building or directions to a building. On the bottom there is also a toggle for an outdoor map mode

vs an indoor map mode, where if the user were located inside a building they could see a layout of the building with all the accessible points. On the right side of the screen there would be a handful of settings and tools such as get my current position, my favorite buildings, and other personal settings. If the user searched for a building, they would be taken to another screen which gave more information about that building, specifically with its accessibility. In addition, there would be features on this screen like to call ahead, write a review, get directions with a variety of direction options (uber, public transportation, and fastest with friends), and look at an indoor layout map ahead of time.

Solution 4

For our fourth solution we came up with another map based navigation system app. It has every type of transportation system that supports wheelchairs and even a Yelp type recommendation option that provides restaurants or events that are wheelchair accessible. It has an outdoor option for navigating on the streets and an indoor option when navigating indoors. When navigating, the screen is split up into two sections, one for the 360 degree "street view" and another for the map of the street or floor plan of the building. This uses the screen efficiently and provides a lot of navigation information that is easy to follow. This also would be voice guided to ensure the clearest guidance possible. Also if the user is lost, the user can call someone to help guide them to their destination. Lastly if the user is in trouble and can't unlock their phone, they can hold down all the side buttons and the power button to call emergency services.

	Solution 1	Solution 2	Solution 3	Solution 4
Description	Accessibility map where if a user presses or searchs a building they get information about accessibility and can user AR to see pointers of the accessible routes inside.	Map where user can search for buildings. When user does that they see more information, and they can get accessible directions or view an indoor map with AR camera features.	App with indoor and outdoor map capabilities. Indoor maps show the user the layout of buildings and their accessible routes. Can search for buildings and see information	App that uses a map and picture view while navigating to outdoor/indoor destinations. Also provides restaurants and transportation services.

			about accessibility.	
Advantages	Able to show virtual pointers to accessible points that are poorly marked or hard to find.	Utilizes both an indoor and outdoor map which highlights key things, and AR mode (virtual pointers), and a decent amount of settings.	Lots of settings for users to make it customizable to them, and get a general sense of the layout.	Allows easy to use/very informative navigation
Disadvantages	Information screen can be overwhelming with too many features	Limited accessibility direction options for the user to choose from.	Indoor map could be hard to read and figure out where user is.	Can be overwhelming with too much on the screen

Selected Solution

Select the most appropriate solution for your stakeholders.

- State why you selected that solution.
- What were the advantages of it over the rest?
- What made it stand out as the best solution?

For our selected solution we decide to base our final solution most heavily on our second considered solution. The reason we chose to go with this solution is because we felt that this solution felt like it took the best parts of the first, third and fourth considered solutions and had included all of them to create the ultimate solution. In addition, we also felt that for the most part this solution's advantages checked off the most problems from our problem list we synthesized from our research. (Refer to appendix for this problem list.) For example, the virtual pointers from the AR mode in combination with the indoor map helps check the problems of accessible routes being poorly marked, the problem of an easy way to navigate inside of buildings, and getting lost, and knowing if accessible points are guaranteed.

The other solutions we considered but did not end up selecting really focused on one single problem from our problem list and that became the focus for that solution. We felt that with the solution we selected however, instead of focusing on one problem entirely and working to fix it completely, this solution focused on a bunch of problems and made some effort to just improve the problem from what we currently have in our world. This way instead of only checking off one, maybe two problems from our problem list this solution was able to check almost all of the problems, which really made it stand out as the best solution we have. Even though, we selected solution two as our current solution, we still plan to make some changes and additions to it from things we liked better in our other considered solution to make this solution even better.

Description of Your Solution

Our solution starts out with an outdoor map of the user's general area, very similar to something like Google Maps. On the right middle of the screen, there is a small list which houses four buttons with different purposes: Settings, Current Position, Favorite Buildings, and a calling feature. From there the user can either search for a building or tap on a building they see on the map view. Once a user has selected a building through either method, a new screen gets shown with information about that specific building and its accessibility. There is general information like name, picture and address. Furthermore, there is also an accessibility rating, buttons for sharing the building, reporting an issue with an accessible route, saving the building as a favorite, or writing a review. A user can also view other users reviews about the building's accessibility. At the bottom there are two buttons: one for indoor mode and one accessibility directions.

The directions button is a floating action button which means if a user presses it, three more buttons will pop-up on top of it, and these three buttons all have different navigation options: Uber, public transportation, and fastest for when a user is with someone who can help them. All of these buttons will link them to Google Maps or Uber respectively with all the accessible functions already turned on. If the user presses the indoor mode, then a new screen is prompted. This new screen has an indoor layout map where accessibility points are highlighted; however, if the user swipes up from the bottom of the screen they can begin the AR mode where AR pointers will be shown on the user's camera of the building's nearby accessible points.

Product Features

Primary Features

Feature 1: **Augmented Reality Navigation/Indoor Map**

      When the user is navigating indoors, the user will be able to navigate with their camera and a floor plan map. So what this means is that about 90 percent of the screen will have a floor plan map with their location in the building and the bottom will be an area where the user can swipe up on. If the user swipes up, the user will have the full view of augmented reality navigation mode where the camera will be turned on and will display navigation arrows based in augmented reality. This allows for a very informative and immersive navigation experience.

Feature 2: **Accessible Route Directions**

      When the user is trying to navigate to a building or is outside they will have three navigation options to help get from point a to point b. All of the navigation options will be housed in a floating action button which will be toggled when the user taps the direction button. The first navigation option will be an Uber Accessible option, the second option will utilize public transportation again, with accessibility features all turned on, and finally the fastest navigation option. The fastest navigation option will be for users who are currently with other people who can help them get around.

Secondary Features

Feature Name: **Report**

      The report feature will help users report any routes, buildings or roads that are not accessible for them so it will keep users informed of accessibility issues in areas. At the same time if there is a high number of reports of the specific accessibility issue, the report feature will automatically send the issues to the government or whoever is in charge of the area.
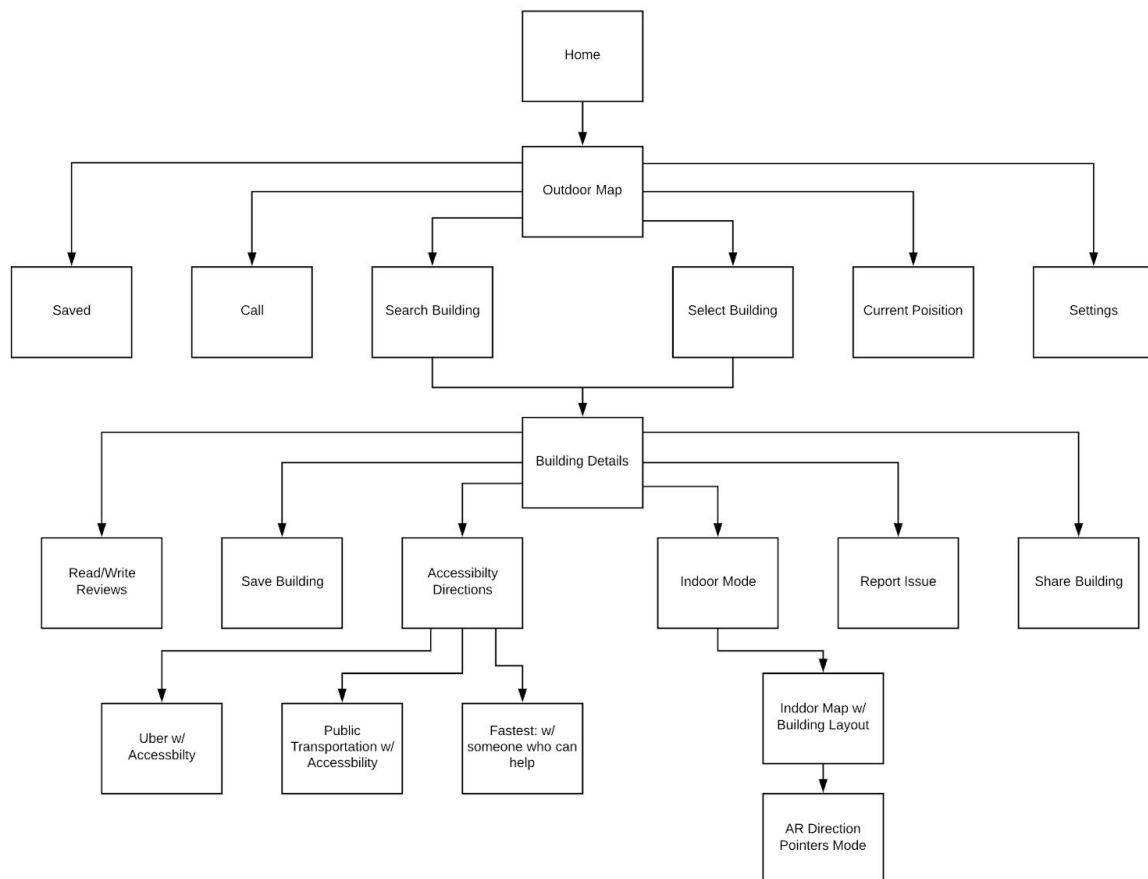
Feature Name: **Reviews**

      For the review feature, users will be able to learn a lot of useful information about the specific place they are looking at. The review feature will help users to see what other Point2Point users have to say about the place in terms of accessibility or satisfaction if it's food or entertainment.

Feature Name: **Save**

The save feature will allow users to save certain places that they like or usually visit often to a list. This way, whenever they want to go to the place, they can just pick that place directly from the list, instead of searching for the place's name every time.

SiteMap

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                                    ┌──────────┐
                                    │   Home   │
                                    └────┬─────┘
                                         │
                                    ┌────▼────────┐
                                    │ Outdoor Map │
                                    └─────────────┘
   ┌───────┐   ┌──────┐   ┌─────────────────┐   ┌─────────────────┐   ┌──────────────────┐   ┌──────────┐
   │ Saved │   │ Call │   │ Search Building │   │ Select Building │   │ Current Poisition│   │ Settings │
   └───────┘   └──────┘   └─────────────────┘   └─────────────────┘   └──────────────────┘   └──────────┘
                                    ┌──────────────────┐
                                    │ Building Details │
                                    └──────────────────┘
```

| Read/Write Reviews | Save Building | Accessibilty Directions | Indoor Mode | Report Issue | Share Building |

| Uber w/ Accessbilty | Public Transportation w/ Accessbility | Fastest: w/ someone who can help |

Inddor Map w/ Building Layout

AR Direction Pointers Mode

Low Fidelity Wireframes

Brainstorming Stage

For the brainstorming stage, we first all sat together and synthesized all the issues we discovered in our user research. Doing this allowed us to clearly see what were the main problems we needed to tackle. After coming up with a list we came up with another list with possible solutions/feature we could add to the designs. We came up with about 15 ideas ranging from obvious to almost science fiction but we wrote them all down in case one of these 15 ideas could possibly trigger another idea. We gave descriptions for these ideas and afterwards we took 30 minutes to split up and come up with some ideas by ourselves using the ideas and problems we listed. The reason we split off after 30 minutes was because we wanted everyone to participate and come up with ideas. We felt if we worked together from square one there might be people who are soft spoken who might not be able to share their ideas. After the 30 minutes, we came together to discuss what we came up with. After discussing all of this we considered some of the solutions and from our considered solutions we came up with a selected solution. We made some modification to our selected solution, mainly taking some things we liked from the other considered solution and adding it to our final solution.

***Please reference our index for our synthesized lists and all the wireframe sketches we came up with.

Final Low-Fidelity Wireframes

Home Screen / Screen 1

This is the home screen of our solutions. It is like any online map however has features built specifically for the physically disabled. For the outdoor map, the buildings and facilities on the map will be displayed with 3 different colors. The green buildings indicates high accessibility, yellow indicates limited accessibility, and the red indicates low accessibility. This follows the color conventions of signs such as stop lights so this design will be very intuitive. This design will be helpful because users can directly know whether a building or facility is accessible very quickly.

Another feature in our homescreen are the labels on the road. This map will show inaccessible areas like stairs and hills on the map. Since the physically disabled require accessible routes, these labels that point out inaccessible areas will be able to save the

trouble and time of those with mobility limitations. This is something that other map based navigation apps like Google Maps don't have.

Not only is our map an outdoor map, the user can switch it to an indoor map with the building's floor plan and where they are in the building.

Home Screen/Screen 1:

Obstacle:
Roads, which are currently closed or blocked, are highlighted.

Color:
We use color to indicate whether a facility is accessible, including stairs. The higher the accessibility rate it has, the green its color will be.

Search:
Search for an address or other key words like name of the place and the description of the place. The search bar is located at bottom, which makes it easy to click with only one hand.
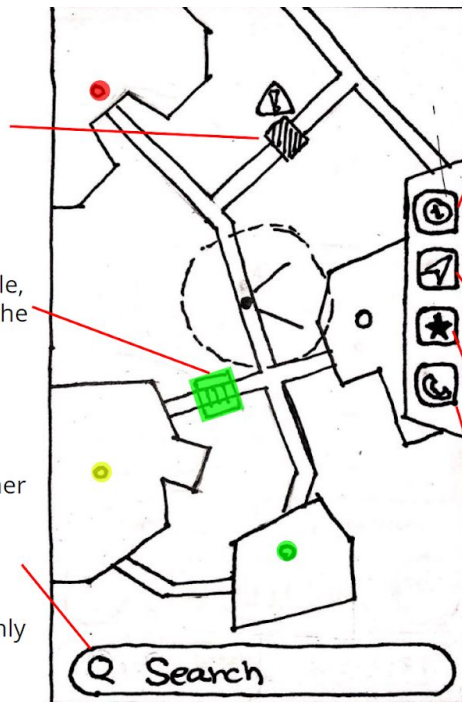
Settings:
Allows users to change their preferences and map displays, including handedness, 2D/3D/Satellite display, and road-only/building-only mode.

Current Position:
Gets the current position and recenters the map

Saved:
Shows the list of saved places

Contact us:
Reports any issues or calls us for emergency

Detailed Information Screen / Screen 2

This is the screen the user will see after a building is selected. This screen will show general information like photos and reviews of the accessibility in the building and can provide very valuable information to the user ahead of time.
Also this page has a share feature that can share the building to social media and personal messages.

Detailed Information Screen/Screen 2:

Overview:
Provides all kinds informations for users. Anything involves accessibility will be listed at top. It is clear for users to see whether this building has elevator or accessible bathroom, ATM, and coffee shop.

Report issues:
Allows users to report any issues they found in map or in the building.

Write review:
Encourages users to write review for this places and remind the next visiter.

In-Door Mode:
Provides a indoor map of the building.
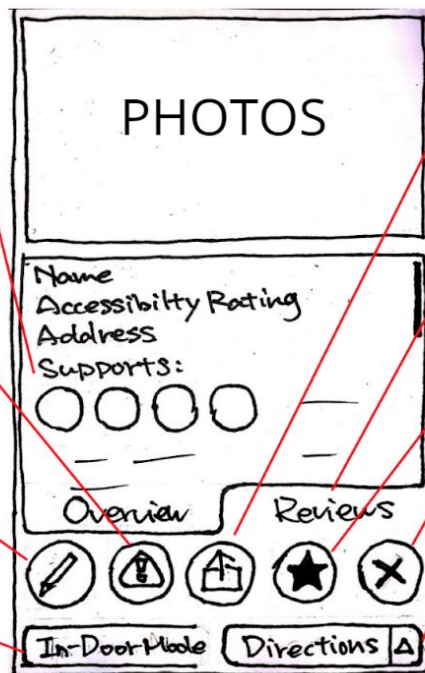
Share:
Share this place to other apps like message and facebook.

Reviews:
Allows users to check feedback, reminders, and photos from pervious visiter.
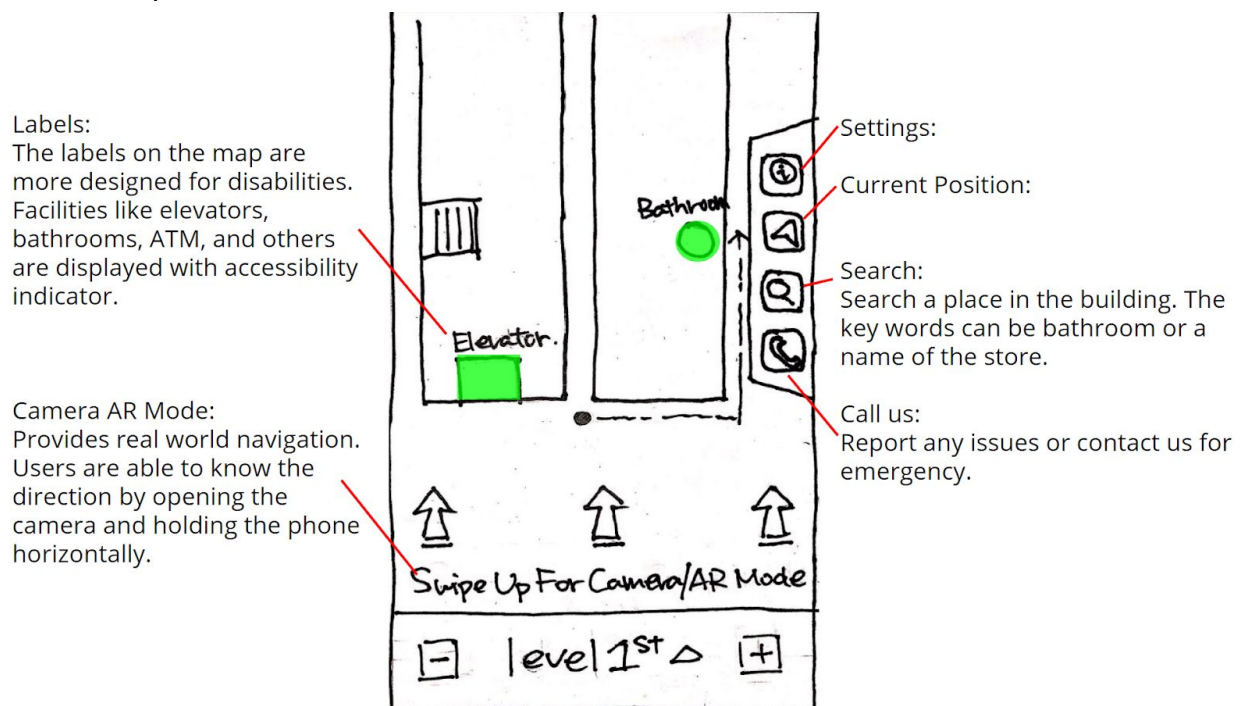
Save:
Save this place

Cancel:
Go back to the out-door map.

Direction:
It is a floating button which allows users to find different routes to get there based on their choices.

Indoor Map Screen / Screen 3

This is the indoor floor plan map that shows once Indoor Mode is selected or when the user is inside of a building. It would provide the user with exact locations of where specific locations are in
the building, such as bathrooms, elevators, emergency exits, or rooms. This will become crucial when the building does not have good wayfinding. Just like Outdoor Map, the places are labeled with different colors to indicate its accessibility. Green indicates high accessibility, yellow indicates medium accessibility, while red indicates little to no accessibility.

The top of the screen will show the indoor floor plan map (about 80% of the screen) and below that will give an option to swipe up to use the Augmented Reality navigation mode. The very bottom of the screen will give the option to see the floorplan maps of each floor. The Settings option gives the user the option to set the app to their preferences. The Current Position will show the user their exact location in the selected building. The Search button will allow the user to locate specific services in the building. The Call Us button will call Point2Point services for personal guidance if the user is ever lost or in trouble.
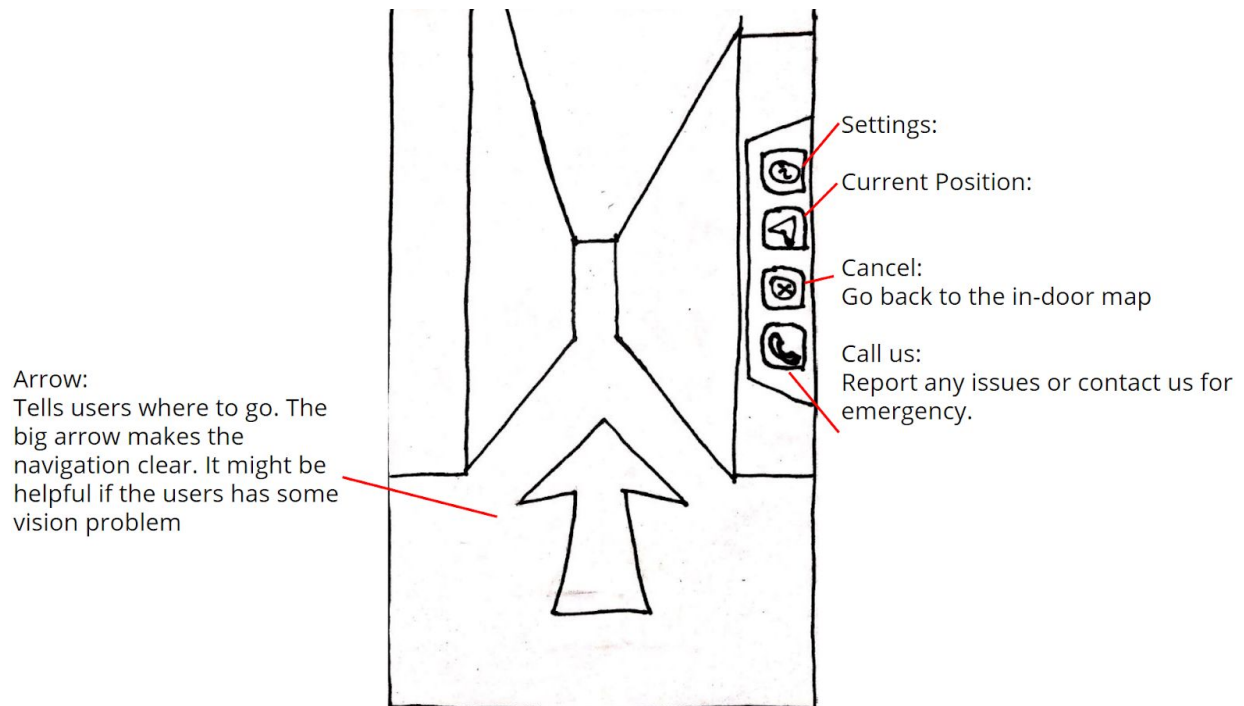
Indoor Map Screen/ Screen 3:

Labels:
The labels on the map are more designed for disabilities. Facilities like elevators, bathrooms, ATM, and others are displayed with accessibility indicator.

Camera AR Mode:
Provides real world navigation. Users are able to know the direction by opening the camera and holding the phone horizontally.

Settings:

Current Position:

Search:
Search a place in the building. The key words can be bathroom or a name of the store.

Call us:
Report any issues or contact us for emergency.

Augmented Reality Navigation Mode Screen / Screen 4

This is the Augmented Reality navigation mode. This navigation mode allows the user to navigate their indoor surroundings using Augmented Reality. Instead of just reading the map and figuring out where the user needs to go next, the Augmented Reality mode where to go using large 3D arrows that point toward the destination. The user can simply point the device's camera in a certain direction and the arrows will adjust and point to the direction the user should follow.

Augmented Reality Navigation Mode Screen/Screen 4:

Settings:

Current Position:

Cancel:
Go back to the in-door map

Call us:
Report any issues or contact us for emergency.

Arrow:
Tells users where to go. The big arrow makes the navigation clear. It might be helpful if the users has some vision problem

Usage Scenarios

Usage Scenario 1: Knowledge of Accessibility of Buildings

After Nathan fractured his foot, he had to use a wheelchair while recovering. Accessibility routes around his school and other buildings were not obvious for him. This was inconvenient for Nathan who had to spend a lot of time searching for these points. At the time, Nathan could have benefitted from Point2Point. Point2Point would have allowed Nathan to view a map of buildings in his general surrounding on the home page/ 1st page. For example, on his first day back to school after his injury, Nathan would select his school building. This would take him to a second page giving him information about the building selected, in this case his school. The second page would show pictures at the top of the screen and also include the name, address, and accessibility rating of his school. Resources such as an overview, reviews, and a call button are available on this screen. A feature called Indoor Mode is also available on this screen. This unique feature would show a map of the school and an augmented reality mode ready to be swiped up for the full experience. After swiping up, Nathan would gain full access to AR navigation mode using his phone's camera and he would be able to easily navigate the school's accessible routes. Not only would he be able to get to where he needs to go safely but he would stand out as the coolest kid in the school with the newest technology.

Usage Scenario 2: Knowledge of Accessibility of Roads & Transportation

Ever since being diagnosed with rheumatoid arthritis, Bill could simply not get around to run errands and visit his grandchildren like he could before. With Point2Point, Bill could save time on his trips and stress in his planning. When Bill first opens up the app, it would bring him to the homepage which is a map of his general surroundings. From there, Bill would type his desired destination, let's say his grandson's middle school baseball field. This would bring him to the second page that has all the information about the selected location. On this page Bill could find pictures of the field as well as the address, accessibility rating, an overview, reviews and more. This page includes an additional information section as well as the Indoor Mode and Directions. Bill then would select the directions button and be brought to a third page giving him the options of "Uber", "Public Transportation", and "Fastest". Selecting

Uber would bring him to the Uber application. Selecting Public Transportation would bring Bill to the Metro services. If Bill were to be travelling with another person who owned a car, the Fastest route would be mapped for time conveniences. Overall, the app would cater to meet Bill's transportation needs and give him the satisfaction he's been longing for.

Bibliography

I/O 2019: Our Definitive Guide to Design - Library. (n.d.). Retrieved from

https://design.google/library/io-2019-our-definitive-guide-design/

Appendix

List of problems from our research:

Main Problems:
1. Accessible points are inconveniently placed
2. There is no guarantee of accessible points
3. Getting to destinations quickly while feeling independent.
4. Easy way to get inside of buildings using routes
5. Accessible routes are poorly marked (Vague signs/need to ask around)
6. Getting lost
7. A lot prep needed to go outside and explore

List of solutions we brainstormed:

Feature Ideas for Solution:
1. Augmented Reality pointers inside building
    a. AR arrows shown on phone camera: similar to the new Google maps update
2. Users can select which building they are in
    a. Possibility using a map view to show nearby building or a list view of all the buildings nearby.
3. Outdoor/Indoor mode for people to navigate to
4. Rating System
    a. Rate how accessible a building or a place is for disabled people
    b. Range from 1 to 5 with 5 is the most accessible
5. Ride hailing
    a. Possibility: Link to Uber/Lyft disability part of app
6. Public transportation
    a. Give user estimation of time and tracking for the nearest accessible bus
7. Show certain accessible route
8. Accessible reporting
    a. If something is wrong easy to tell person in charge what the issue is
    b. Update information if the route or building become inaccessible
9. Emergency button
    a. Kind of like the "life alert"
10. Motorized wheelchair: self driving feature
    a. Like tesla's autopilot
11. Reviews of the accessible routes or building
12. Suggested restaurants/buildings with high accessibility routes
    a. Recommendations based off the ratings
13. Explore feature
    a. Similar to google maps
14. Your Contributions
    a. Similar to google Map
    b. User can answer questions about how the building was
15. Your places and routes
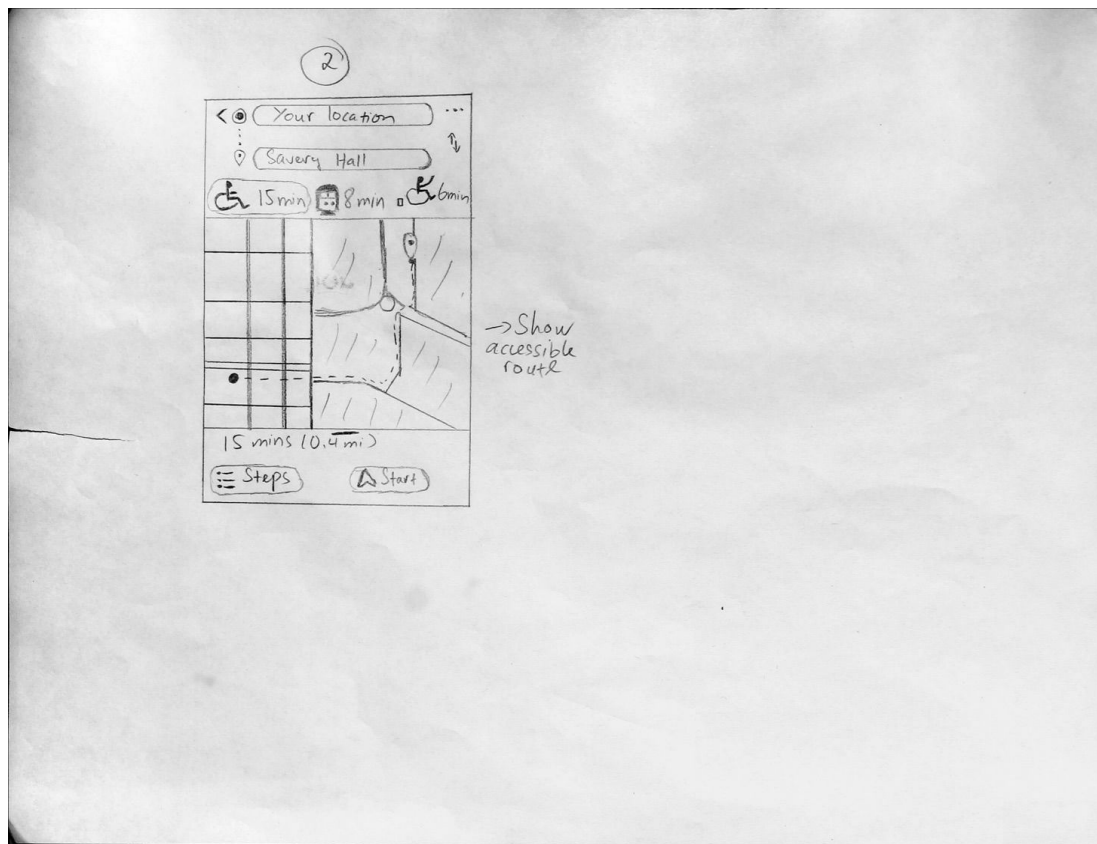   a. Saved routes and buildings
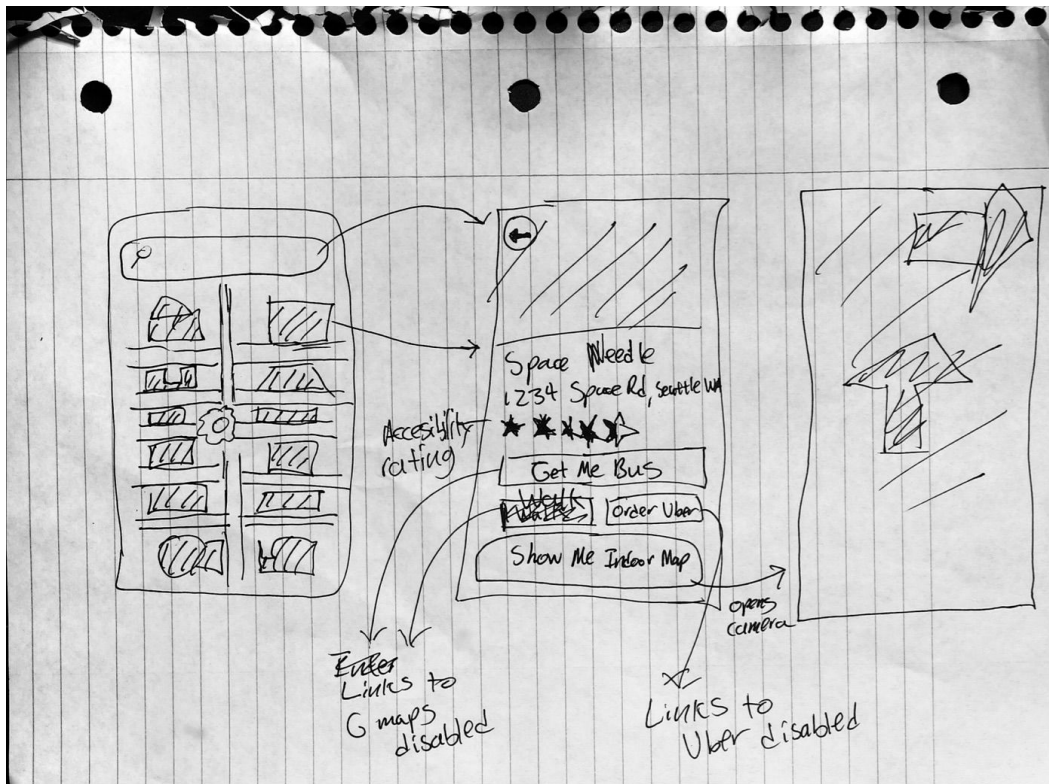16. Map View

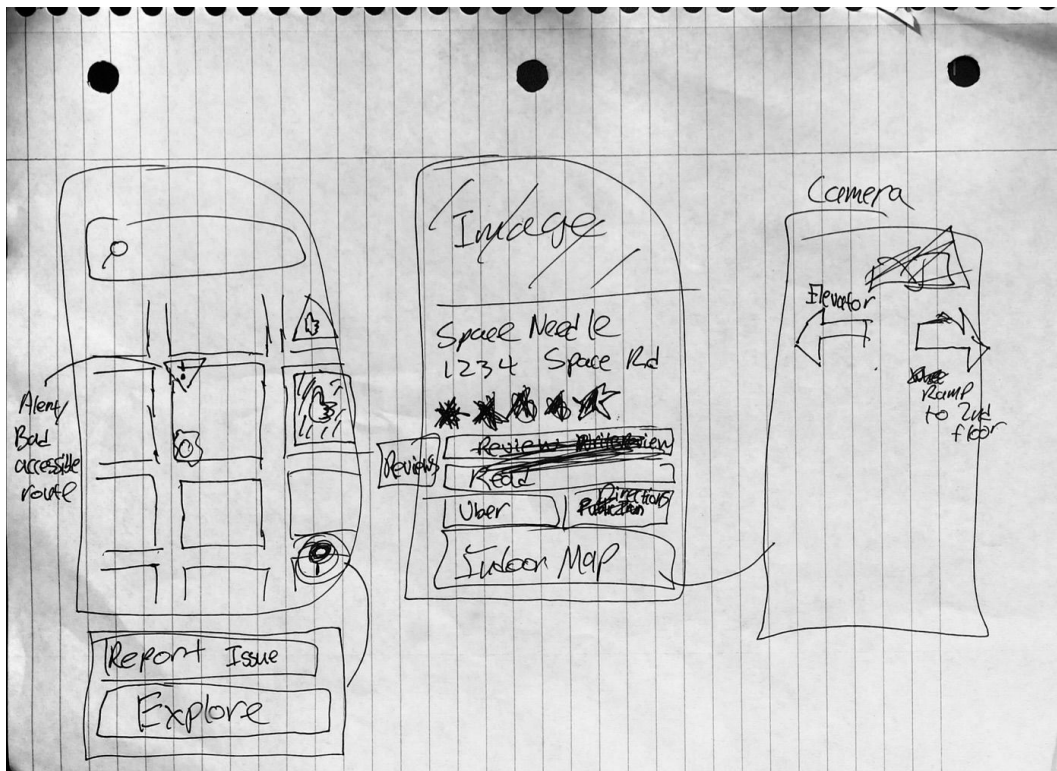Design from Brainstorm #1 (Considered Solution 2)
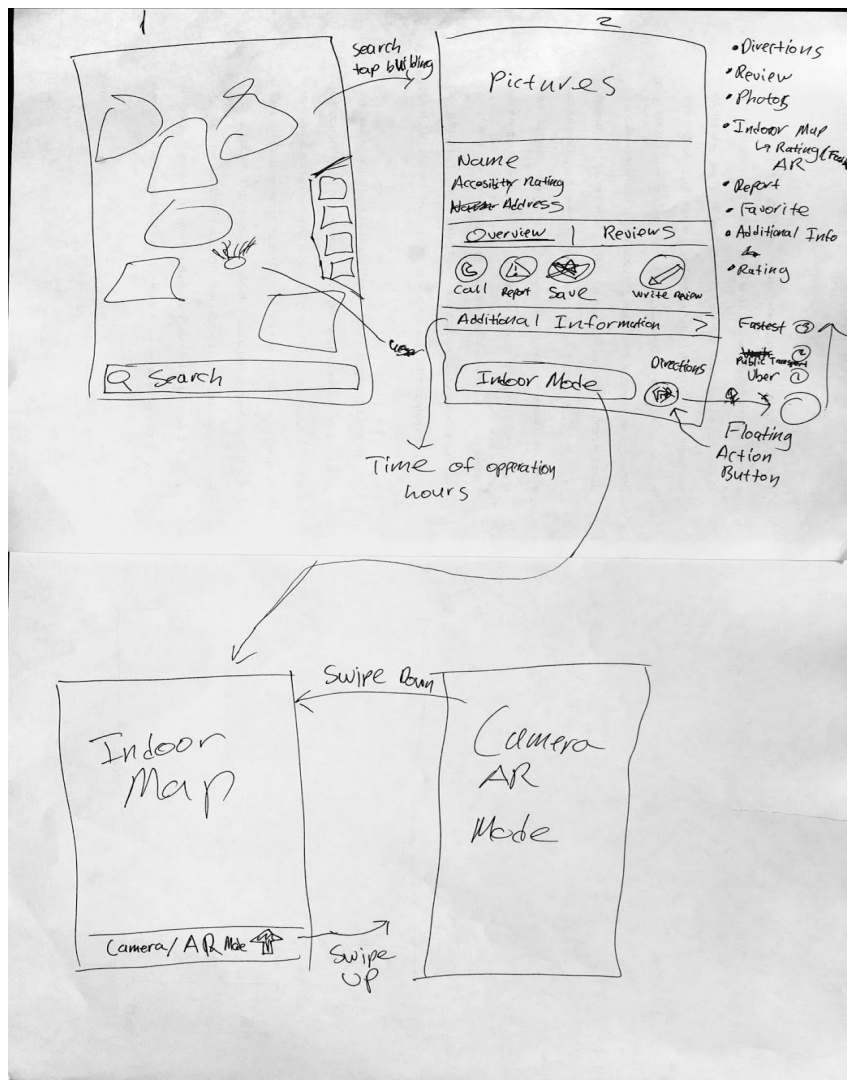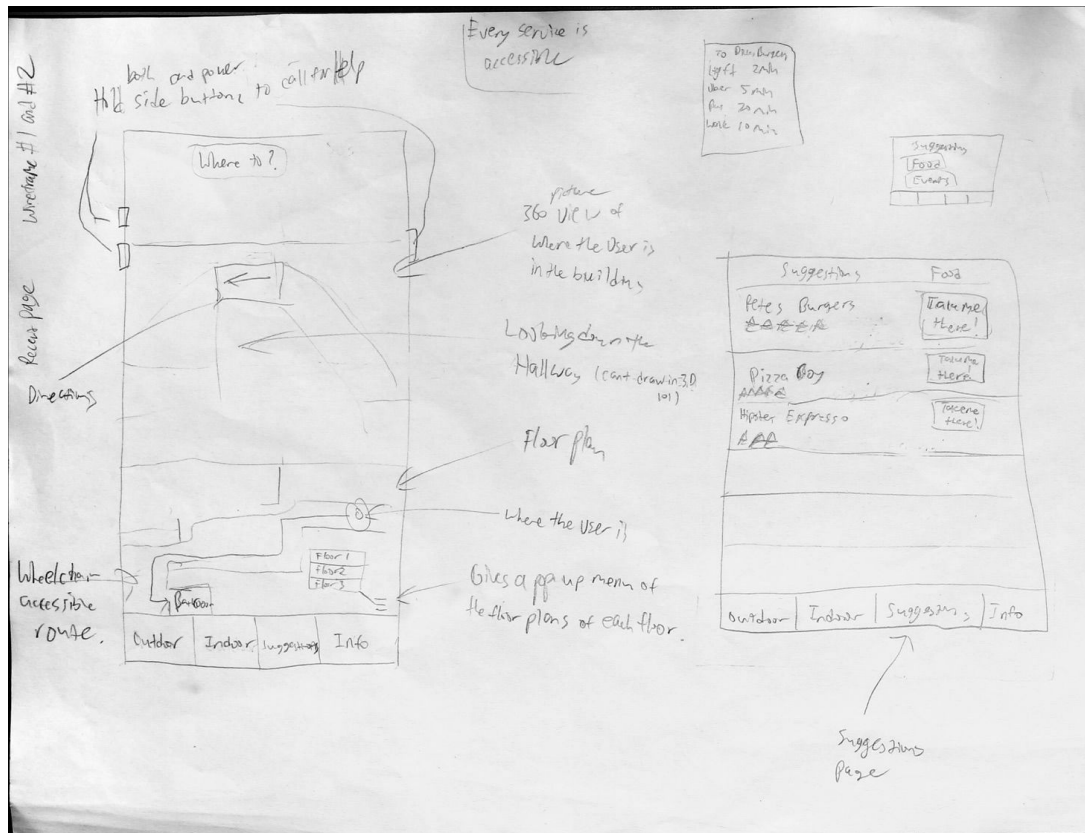
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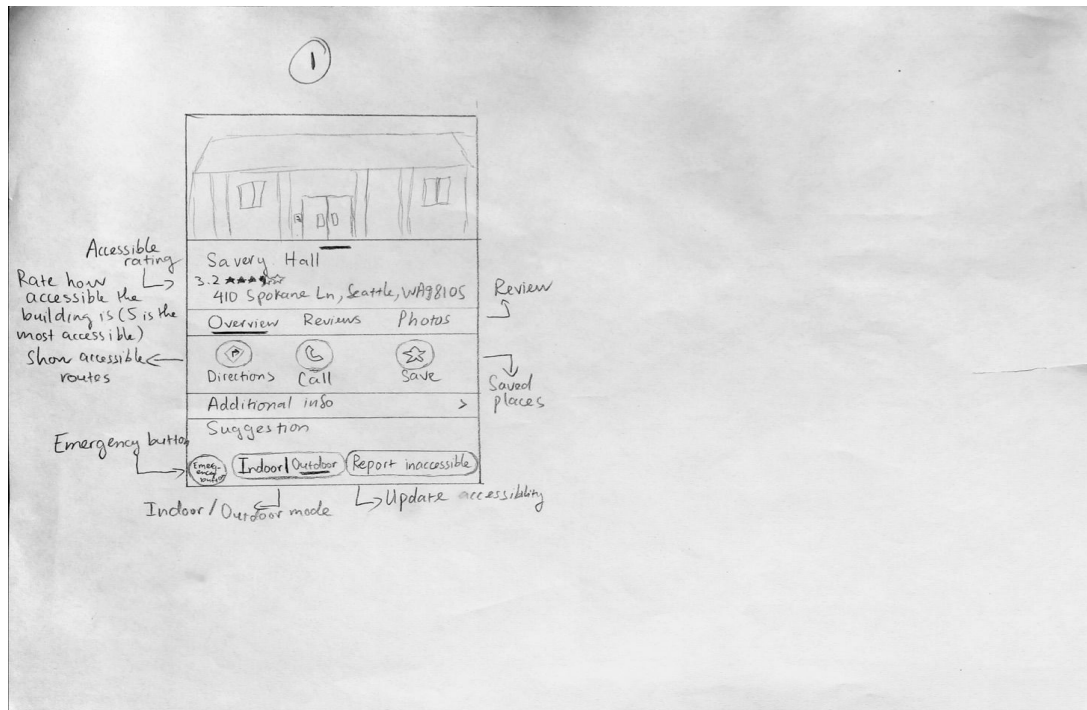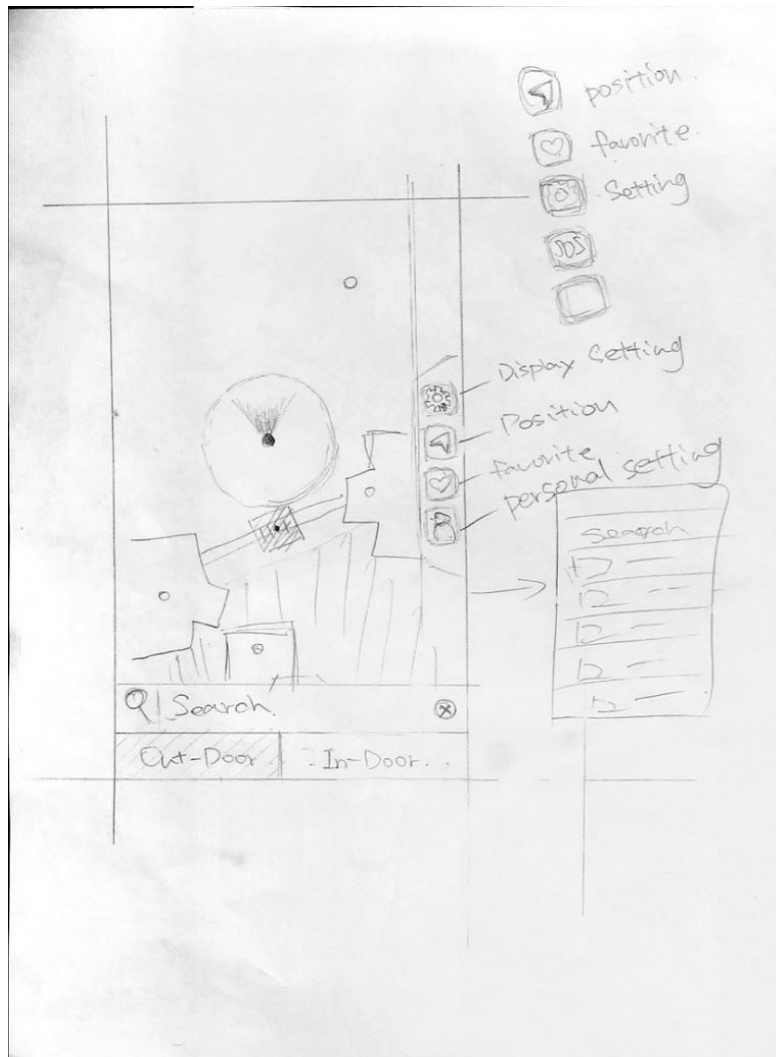

Design from Brainstorm #3
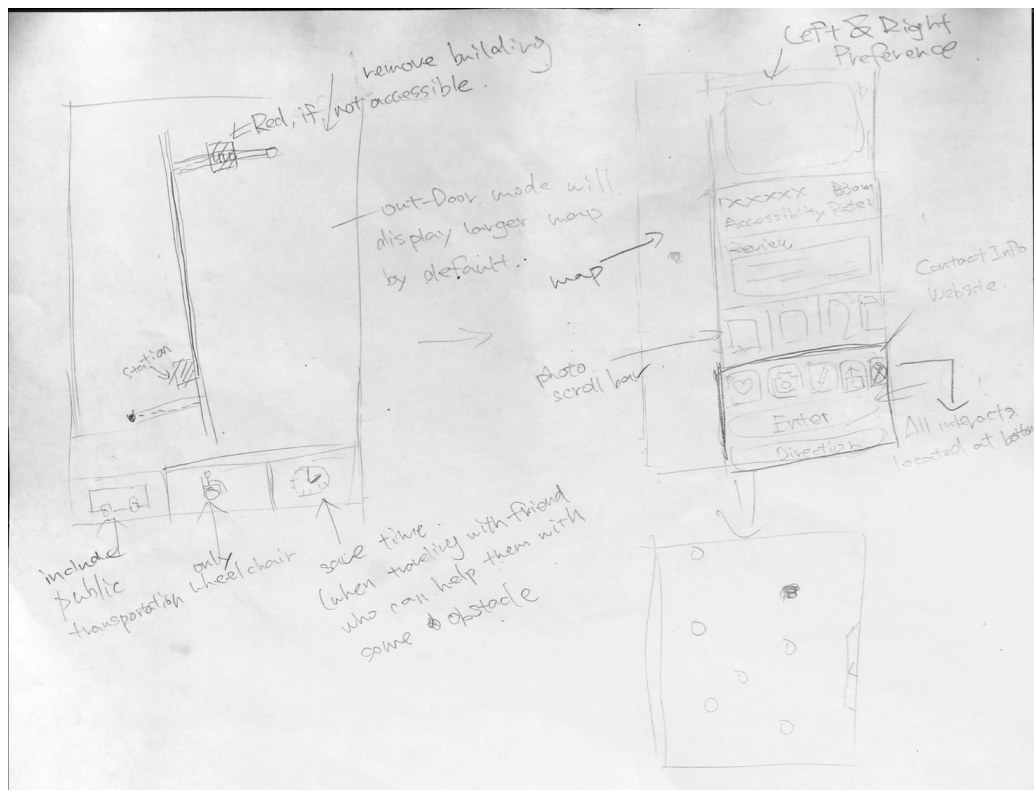
Design from Brainstorm #4

Design from Brainstorm #5 (Considered Solution 1)

Design from Brainstorm #6 (Considered Solution 4)

Design from Brainstorm #8 (Considered Solution 3)

Design from Brainstorm #9