Project Deliverable D: Conceptual Design

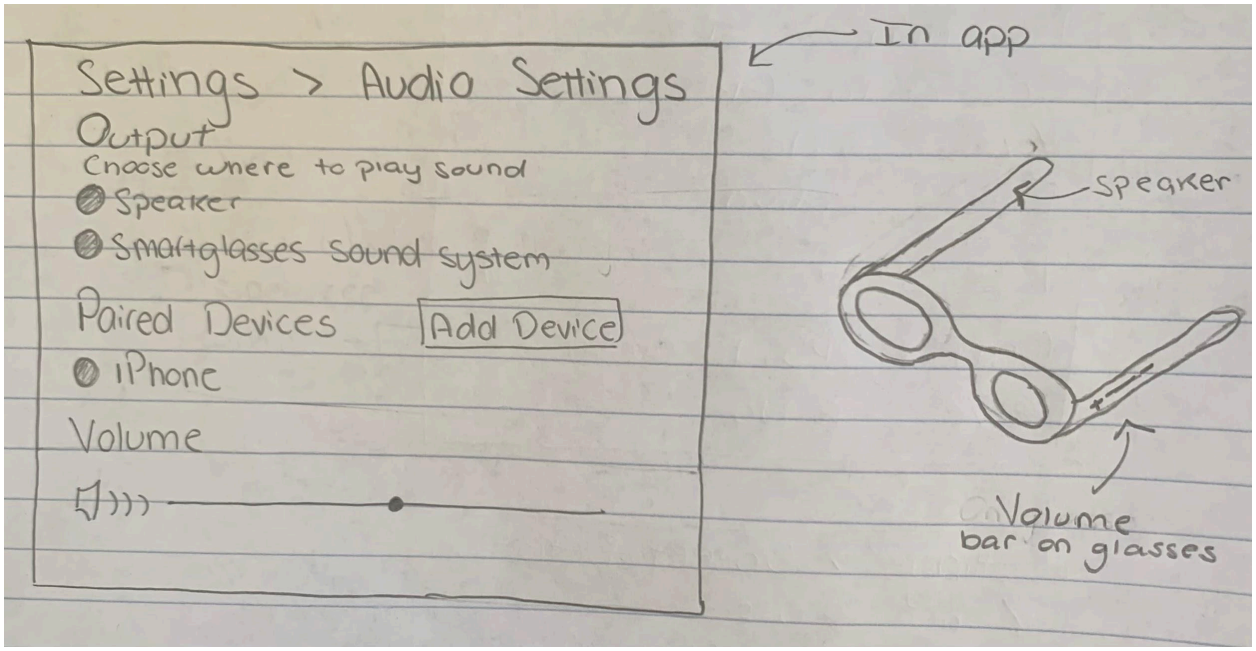
Mariyam Sheikh, Amélie Chénier, Michael Braimah,
Margaret Kravchenko, Luke Meintjes

October 13, 2024

1.

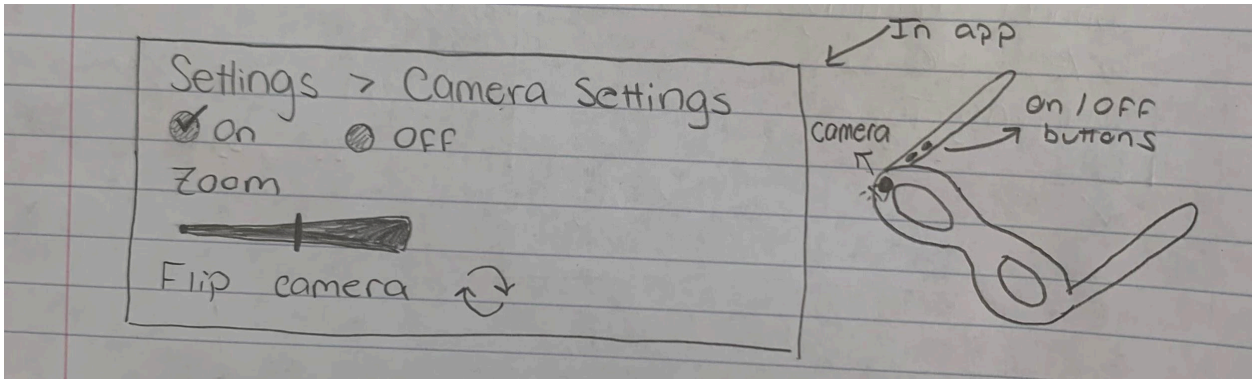
Amelie's concepts:

Subsystem 1 - Audio Settings



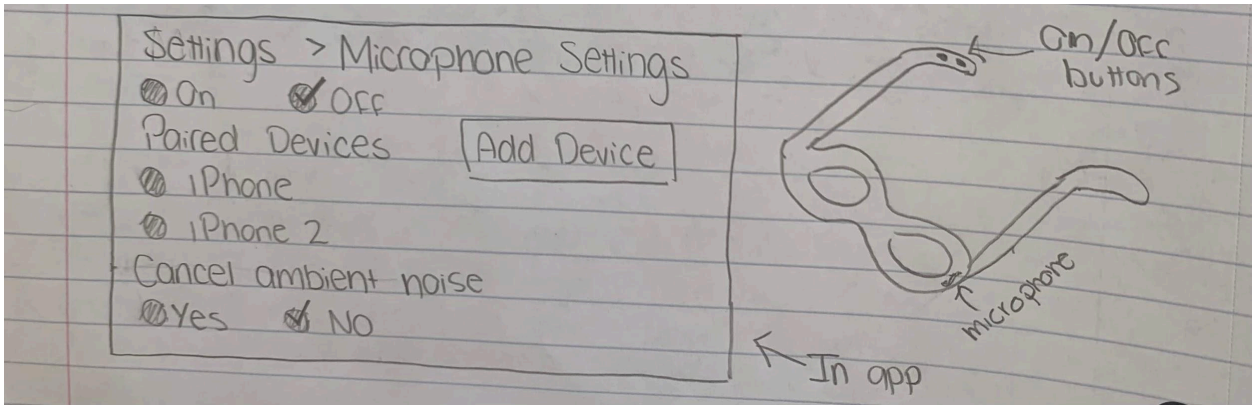
A volume bar is on the left side of the glasses on its exterior which would allow it to increase or decrease the volume. In the app, different sections would allow users to select different outputs for the sound and audio and to pair different devices to connect audios. The volume could also be changed through the app.

Subsystem 2 - Camera Settings:



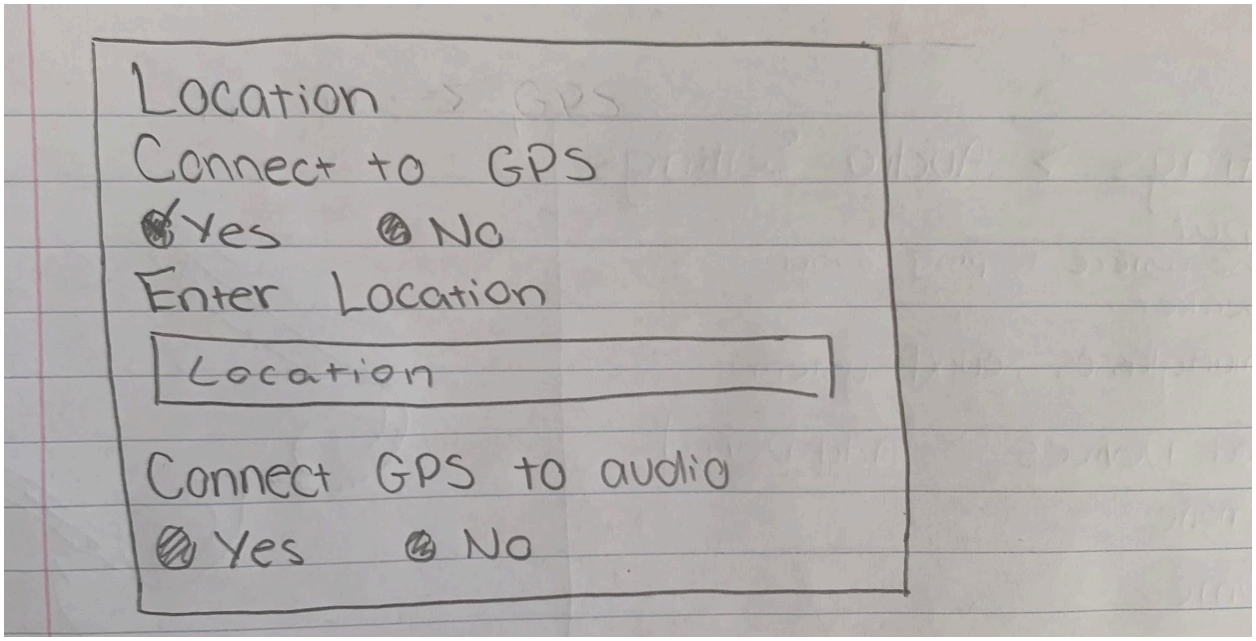
A small and discreet camera would be found on the right front side of the glasses with on/off buttons on the right side. In the app, in the camera settings, the camera could be turned off or on, the zoom could be adjusted and the camera flipped.

Subsystem 3 - Microphone Settings:



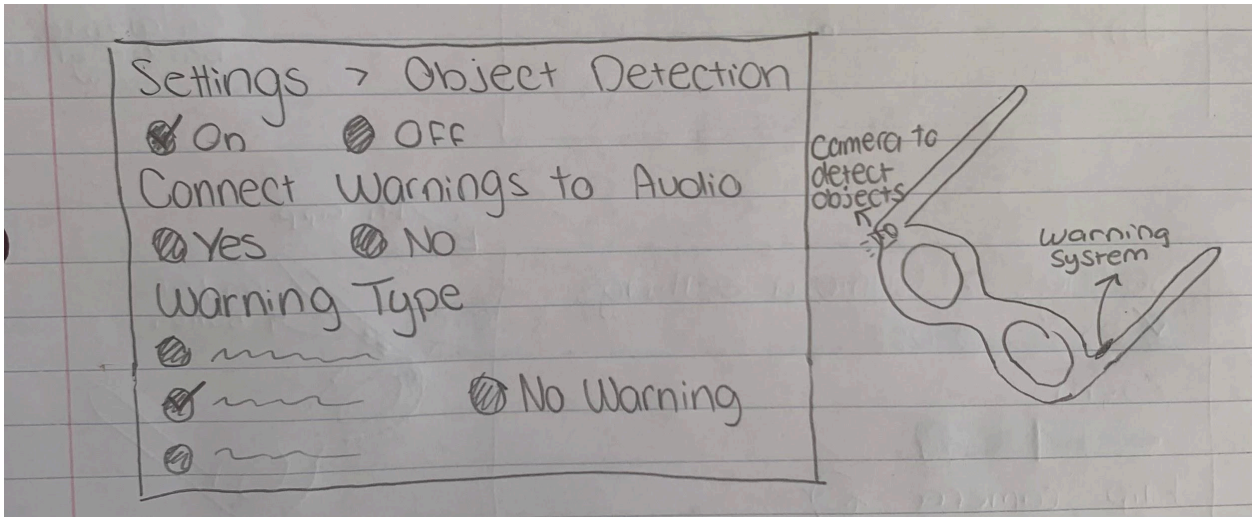
On the glasses, there is a small microphone on the left front side with on/off buttons on the far right side. In the app, the microphone could also be turned on or off, different devices could be paired to communicate with different contacts. A special feature to the microphone could also be turned on or off which could cancel ambient noise.

Subsystem 4 - Location



On the application, locations could be entered which would then through the glasses audio inform the user on the location if the user wishes.

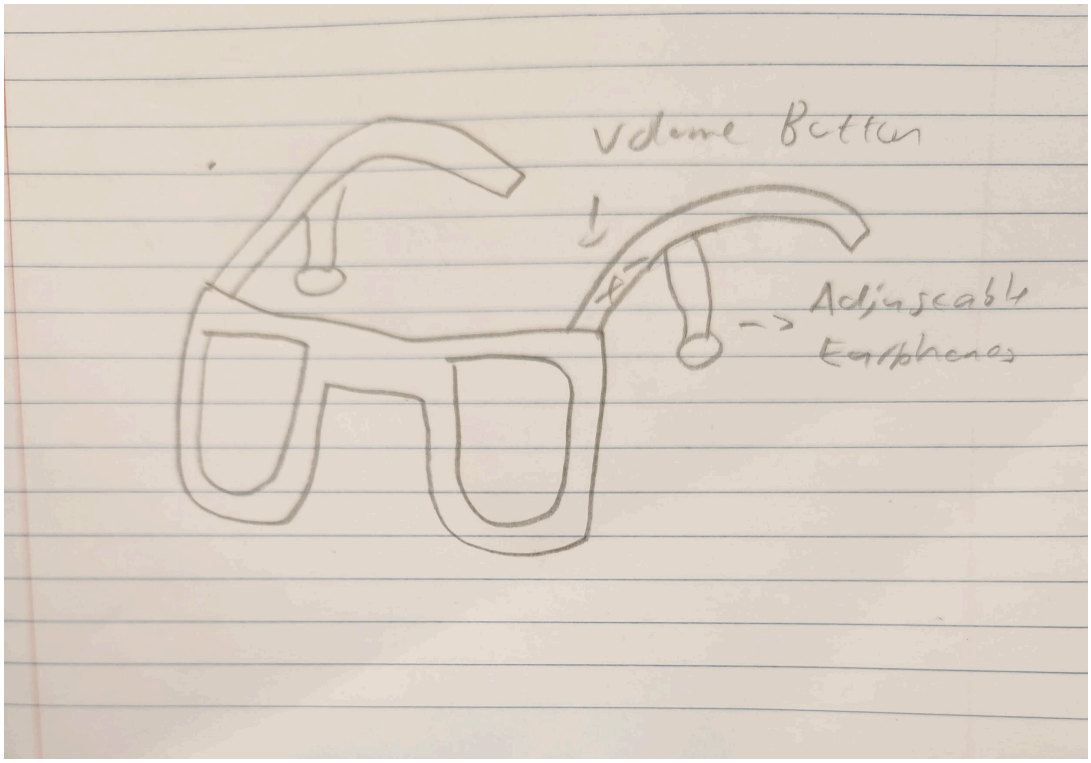
Subsystem 5 - Object Detection:



The glasses would have an obstacle detection system in its camera to warn the user of approaching obstacles. On the app, the object detection feature could be turned on or off and the warning type could be changed or no warning could be made.

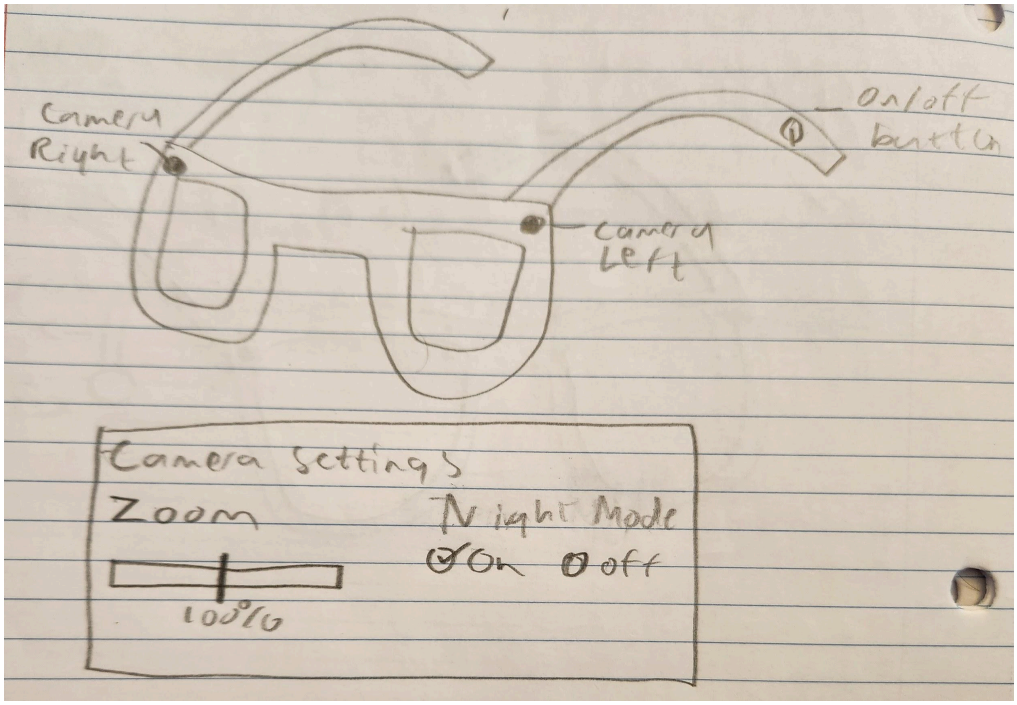
Luke's concepts:

Subsystem 1 - Audio Settings:



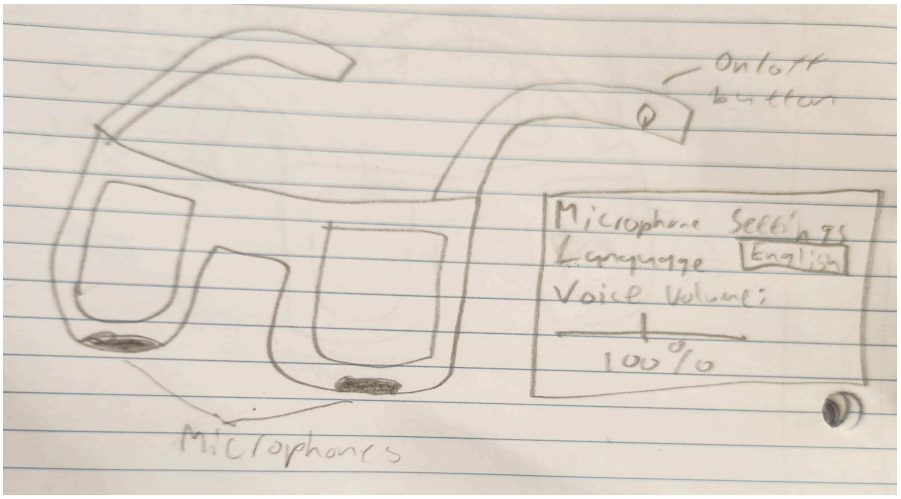
In this subsystem there is a volume bar on the side of the glasses which can be used to adjust the volume of the system. For the audio output there are adjustable earphones which the person can wear, because speakers sometimes can't be heard in loud and crowded spaces so the earphones will help with hearing the instructions clearly.

Subsystem 2 - Camera Settings:



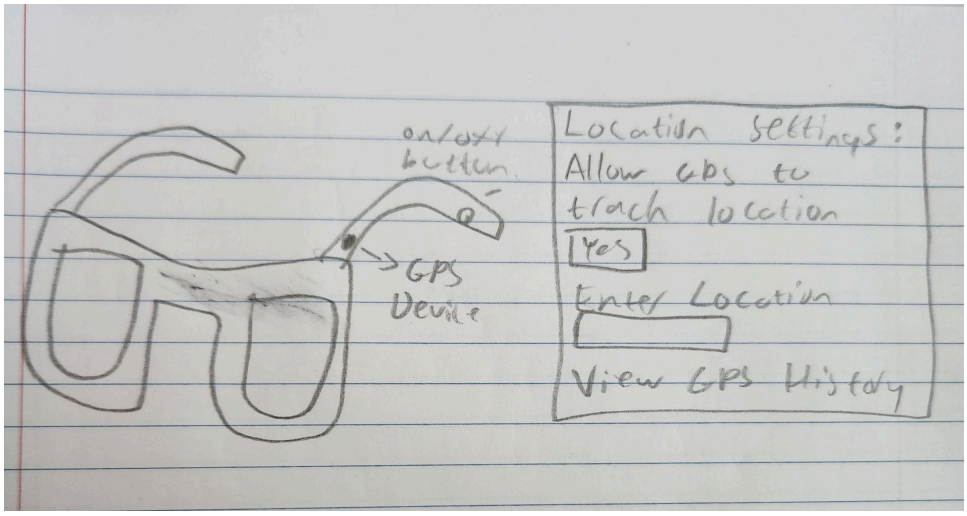
Here there is an on/off button for the camera with two cameras on the front right and front left of the glasses. In the app there is an option to change the zoom of the cameras and an option of turning on night mode for when it is dark.

Subsystem 3 - Microphone Settings:



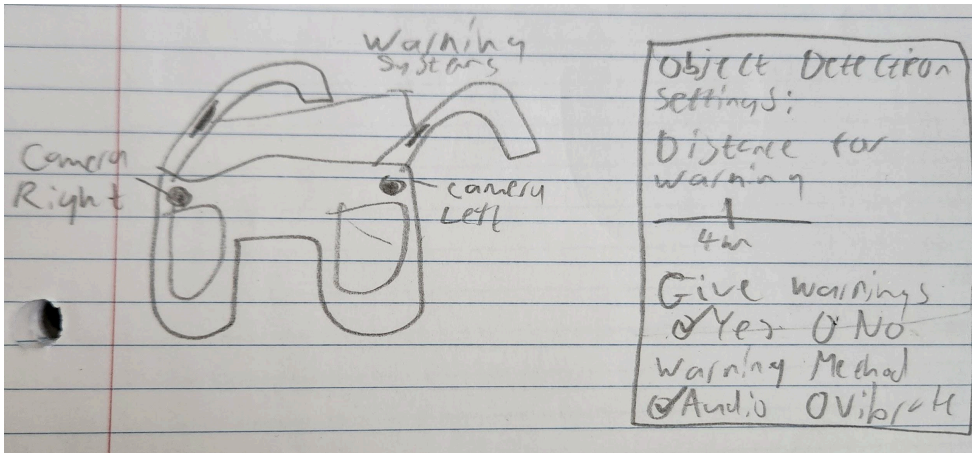
Here there is an on/off button for the microphones with two built in microphones on the bottom of the glass frames that are in sync with one another. In the app there are options to change the language and a setting to change the volume input.

Subsystem 4 - Location:



This device has an on/off button for the GPS device that is built in inside the frame of the glasses. In the app there is an option to give the app permission to track your location through the GPS, there is a setting to enter your default location and a setting to view the tracking data of the device.

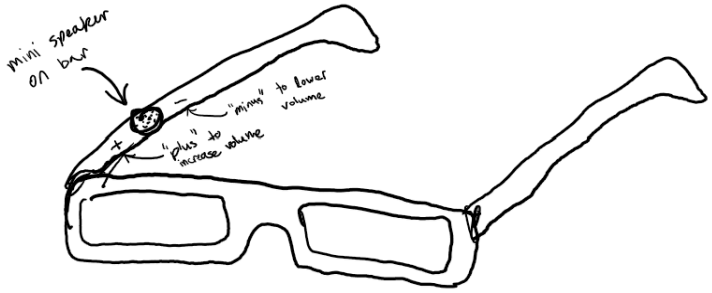
Subsystem 5 - Object Detection:



This device has a warning system built on each side of the glasses with two cameras at the front of the glasses to detect the distance of the objects. In the app settings there is a slider to select how close an object needs to be before giving a warning, the next setting gives the option to keep the warnings on or off, and the last setting is the warning method which is either audio or vibration.

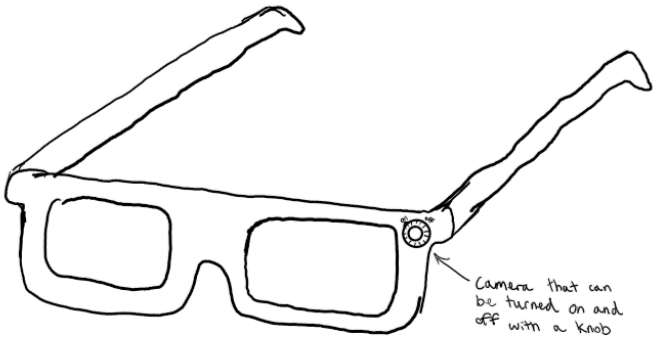
Mariyam's Concepts:

Subsystem 1 - Audio Settings:



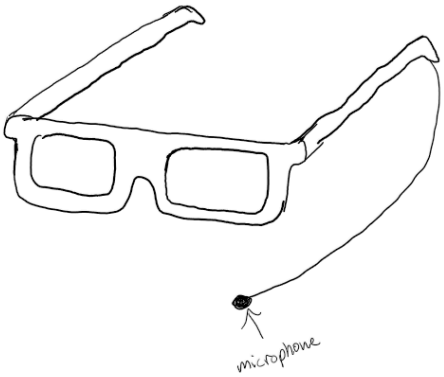
For this subsystem, a speaker is installed on the right arm of the glasses closer to where ones ear would be. On either side of the speaker is a touch system for increasing and decreasing the volume - it will be on the outer part of the glasses. In the app, one can control the volume as well as pair the glasses with a device using bluetooth.

Subsystem 2 - Camera Settings:



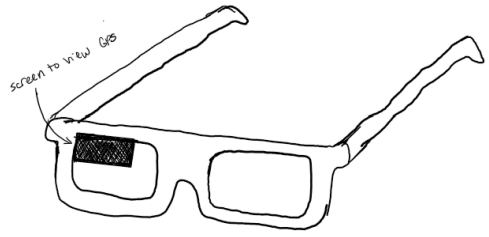
This subsystem has a camera placed on the top left corner of the glasses. It is sitting on a knob that turns the camera on and off. The app can control brightness, zoom features and has a night mode too.

Subsystem 3 - Microphone settings:



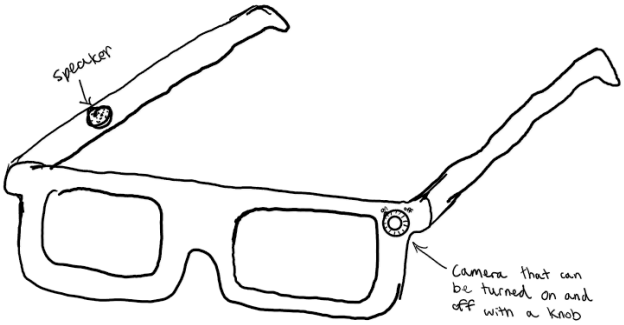
This system has a microphone attached to the end of the glasses and curves in towards the face. The microphone can be pushed back or pulled closer to the front. The app can control the volume of the microphone and it can turn it on and off.

Subsystem 4 - Location:



For this system, locations can be inputted into the app and the directions will be shown on the screen in the right lens. Directions will be read out though the speaker as well.

Subsystem 5 - Object detection:



For this subsystem, the camera has a detection system built-in to it that can detect when obstacles are approaching. It has a fixed distance of 5 meters. When an obstacle is approaching a warning will be given. In the app, one can decide the method of the warnings (through speakers or through vibration) and can also turn them on and off.

<u>Michael's concepts:</u>
Subsystem 1 - Audio Settings:

This subsystem controls the audio functions of the Smart Glasses. When the glasses are being used by visually impaired/disabled people It allows the wearer to set preferences for the audio prompts from the smart glasses. When they are being used by inexperienced workers it allows the wearer to set preferences for the audio received from his/her mentor.

It has features like;

Noise Cancellations: This feature helps to cancel out the background so that the wearer only hears audio from the glasses. It can be toggled on or off,

Volume Controls: This feature controls the volume of the audio from the glasses.

Subsystem 2 - Camera Settings:
This subsystem controls the orientation and workings of the camera in the smart glasses.

It has features like;

Orientation: This can be either Landscape or Portrait/

Flashlight: This can be toggled on/off and used to aid vision in areas with dim lighting.

Video Quality: This determines how “clear” the video is going to be. Higher video qualites are sharper but they require more data to be sent.

Subsystem 3 - Microphone Settings:

This subsystem has to do with the audio being received from the user.

It has features like

Voice Isolation: this feature makes it so that the only audio being transmitted is the voice of the user and not background noise. It can be toggled on or off.

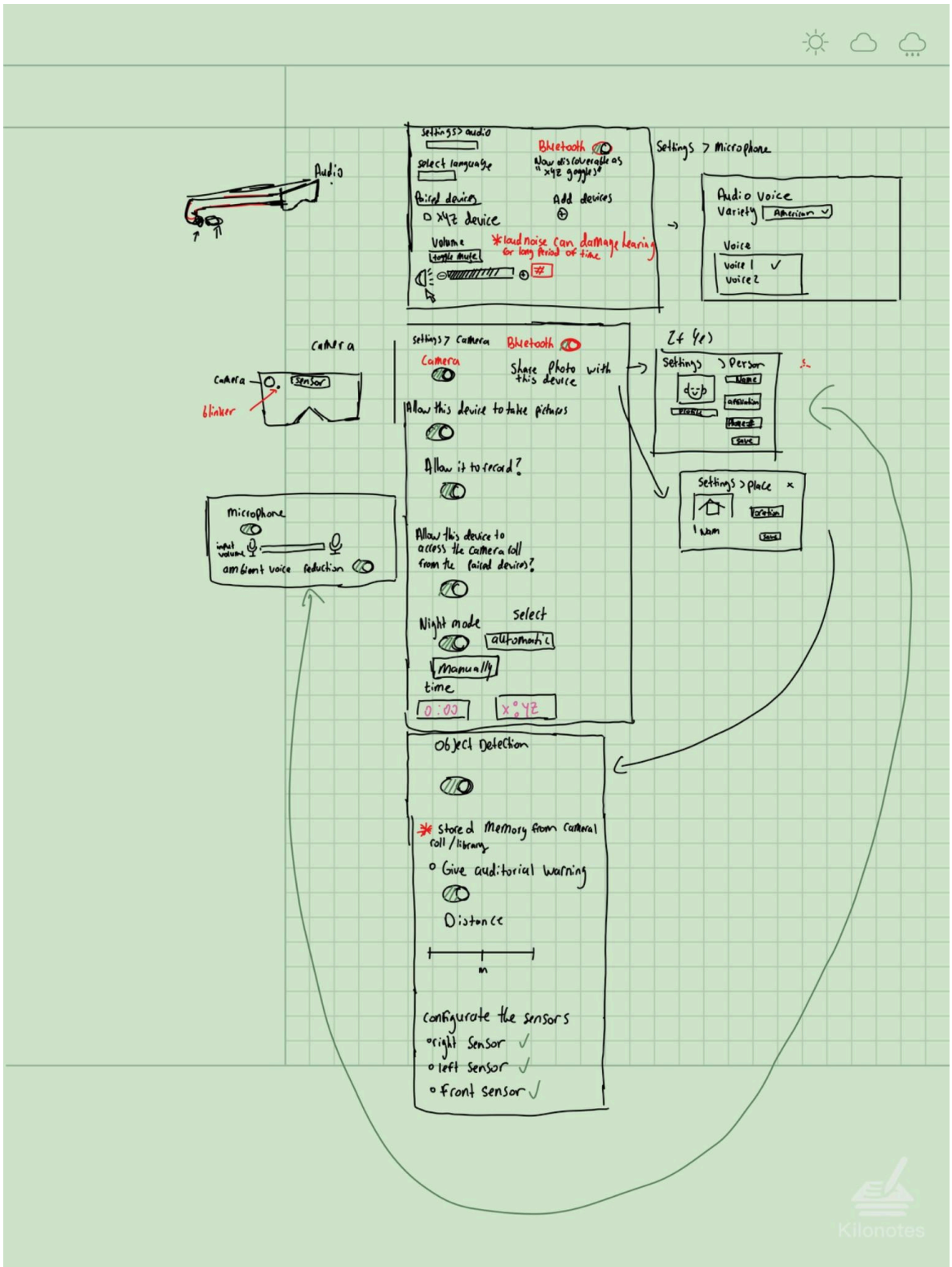
Subsystem 4 - Location:

This feature allows for the use of GPS to track the location of the wearer of the smart glasses. This comes in handy when the glasses are being used by the visually impaired and they find themselves lost. It can also be used for giving directions. it can be toggled on or off.

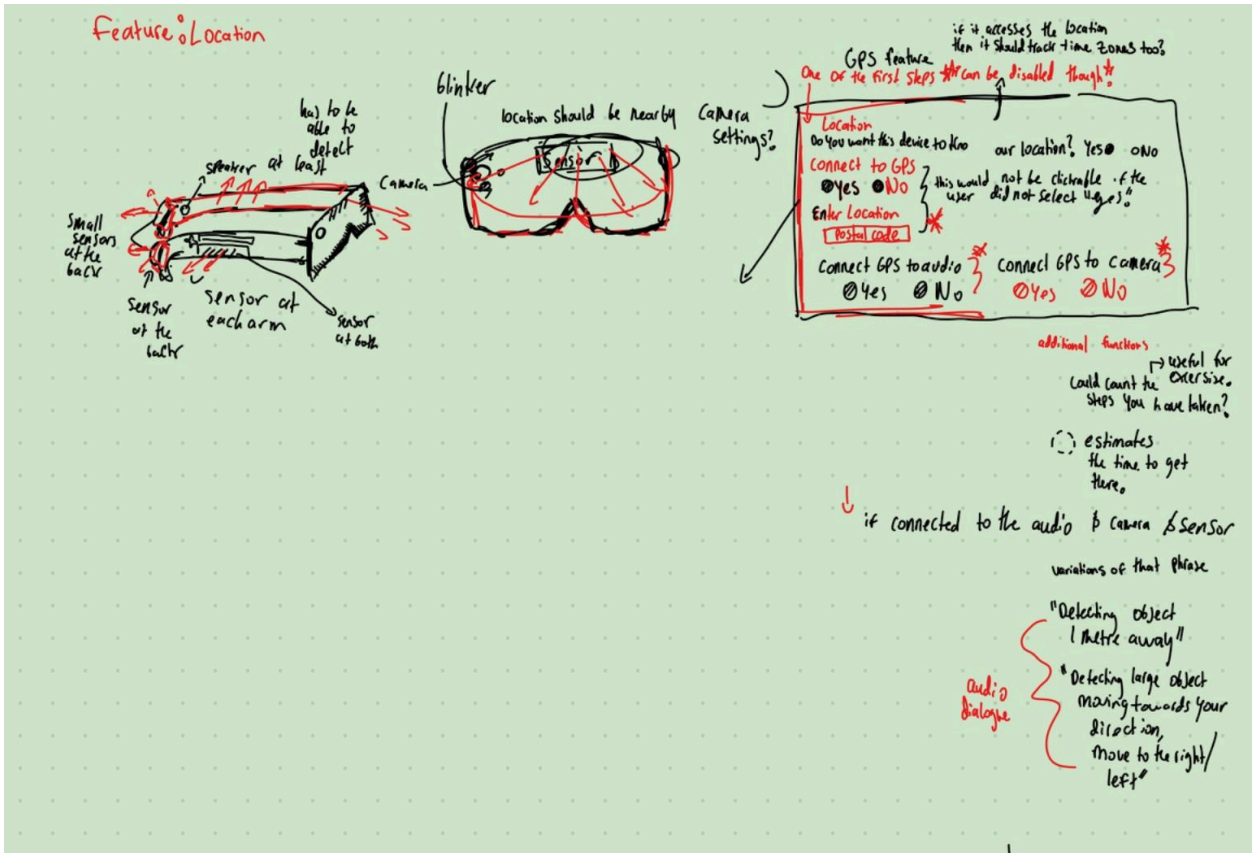
Subsystem 5 - Object detection:

This feature also helps the visually impaired especially. It uses the cameras in the glasses to detect objects in someone’s path, estimate the distance from the object to the user and warn them about the possible danger.

Margaret's concepts:



Subsystem - Location:



Subsystem - Camera Settings:

The glasses will have functions such as taking pictures and recording, which could be utilized for the location feature as to help them walk back to their places. This could be taken by the camera on the device or by the paired device the person is using for the person and the place feature. There would be a blinker next to it, allowing the user and other people around them to know that the camera is on as it is blinking. Could always disable the camera and readjust the settings for the important place or people. For recognizing people, it will require a 360-degree angle of the person's face and feature for the system to recognize it, which can then be inputted to the object recognition. Has facial recognition and can focus on it automatically. When the camera is on, it is blinking.Night mode allows the camera to readjust the lighting and to function more ideally during nighttime. Including both manually and automatically for the user's convenience.

Subsystem - Audio:

The user can change the accent of the voice as well as the type of voices for better accessibility and for preference. The glasses can connect to Bluetooth to other devices and allow to toggle the volume while also showing the warning. Allows users to select their preferred language.

Subsystem - Object recognition:

Object recognition only gives auditory warnings as well as a section for calibrating the sensors to see how far the range can be and allows the user to know if recalibration is required. Can adjust the distance for the object before the system will give a warning.

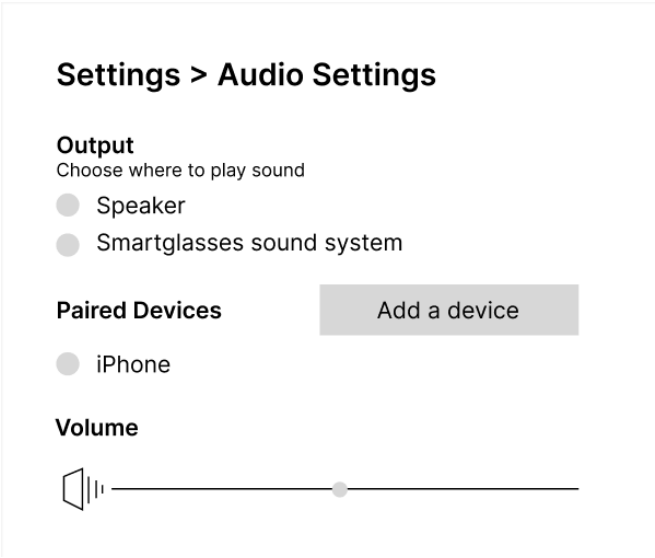
Uses GPS and auditory cues to aid people while also estimating the time. I can count the steps that people have taken throughout the day. While walking, it would use sensors and auditory warnings to warn the user about any obstacles. Also uses a camera to detect which side they're facing while it is connected for more accuracy, to help orient the user properly. The locations could be stored in the memory to make it more automatic and to make the function easier and faster to use. Features time zones too.

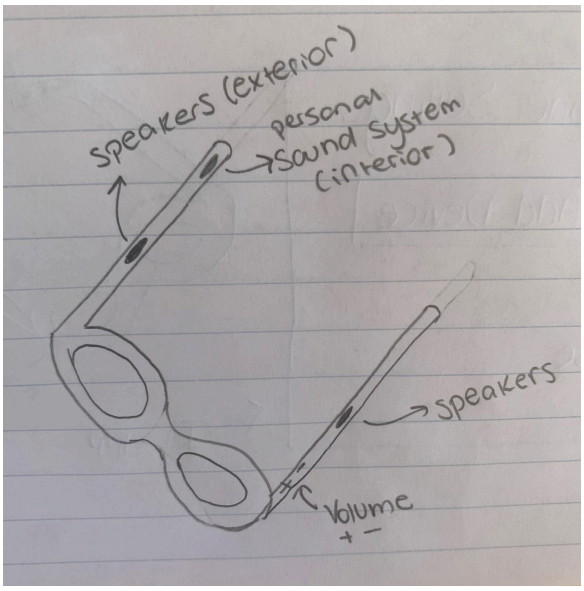
Subsystem - Microphone:

Could toggle the input volume. And it has an ambient voice function to easily filter voice from the background noise.

2.

Subsystem 1 - Audio Settings:





For this substem (audio), the glasses would include a volume tab which would allow the user to adjust the volume on the glasses. On each of its exterior sides, the glasses would also have speakers which were not present on all concepts. A small personal sound system would be present on the right side of the glasses. In the app, different sections would allow users to select different outputs for the sound and audio and to pair different devices to connect audios. The volume could also be changed through the app.

Subsystem 2 - Camera Settings:

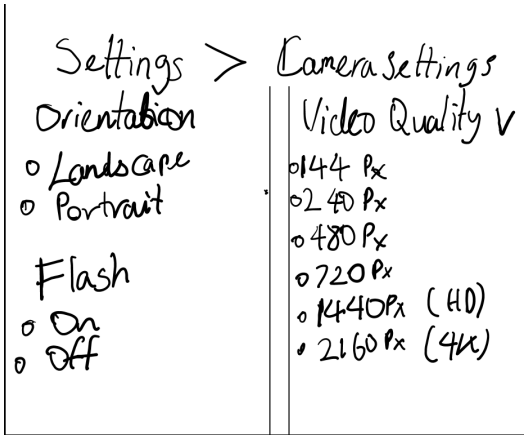
This subsystem controls the orientation and workings of the camera in the smart glasses.

It has features like;

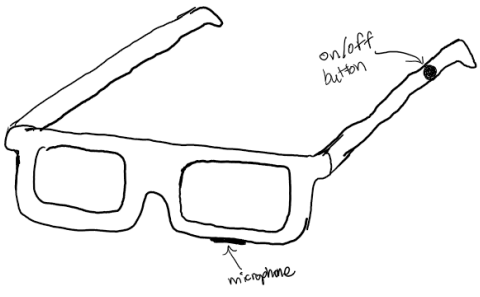
Orientation: This can be either Landscape or Portrait/

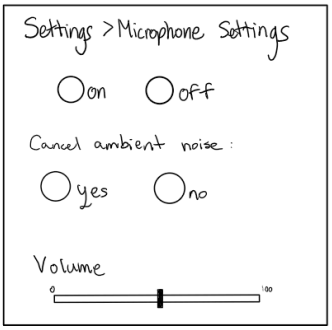
Flashlight: This can be toggled on/off and used to aid vision in areas with dim lighting.

Video Quality: This determines how "clear" the video is going to be. Higher video qualities are sharper but they require more data to be sent.



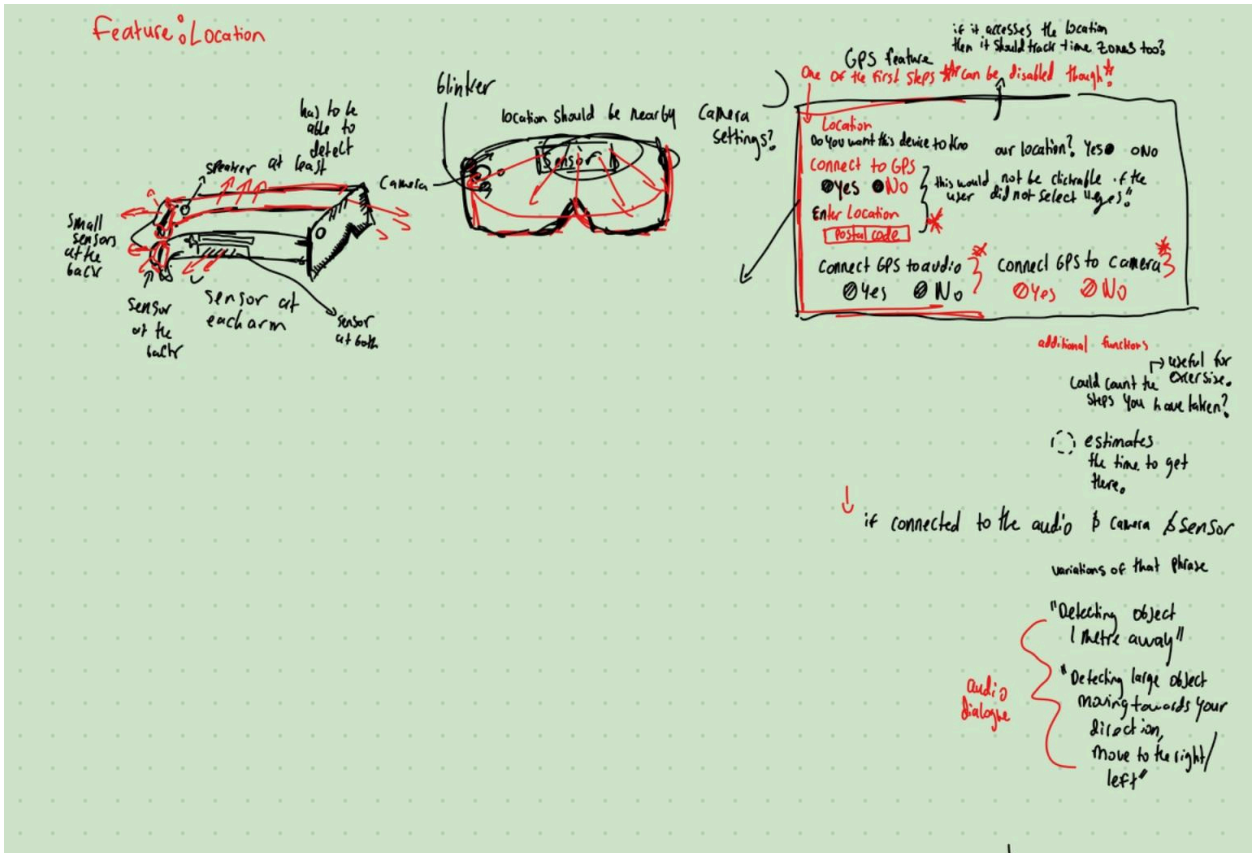
Subsystem 3 - Microphone Settings:





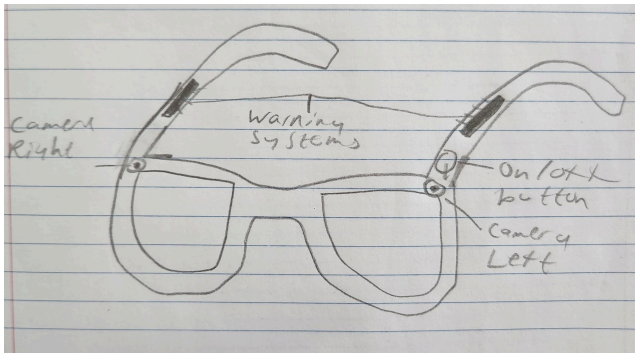
For this subsystem, the glasses have a microphone under the lens and an on/off button towards the back. In the app, the microphone can be turned on/off and the volume can also be controlled through the app. Also, the ambient noise can be turned on/off through the app as well. This design is a combination of the concepts from part 1. The design is compact, and has lots of features in the app as well.

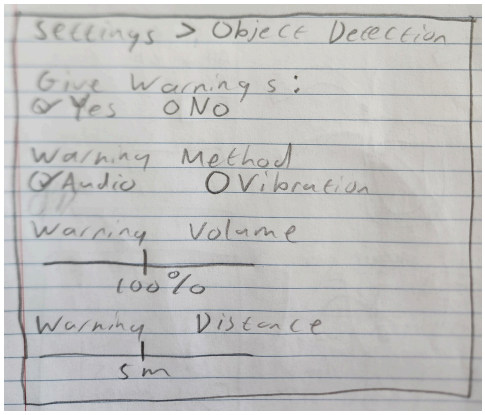
Subsystem 4 - Location:



For this subsystem, the user needs to access the settings and go to location. For location is an interconnected function that involves audio, camera, sensors, and GPS to aid people while also estimating the time to get there. It can count the steps that people have taken throughout the day. While walking, it would use sensors and auditory warnings to warn the user about any obstacles. Also uses a camera to detect which side they're facing while it is connected for more accuracy. The locations could be stored in the memory to make it more automatic and to make the function easier and faster to use. Features time zones too.

Subsystem 5 - Object Detection:

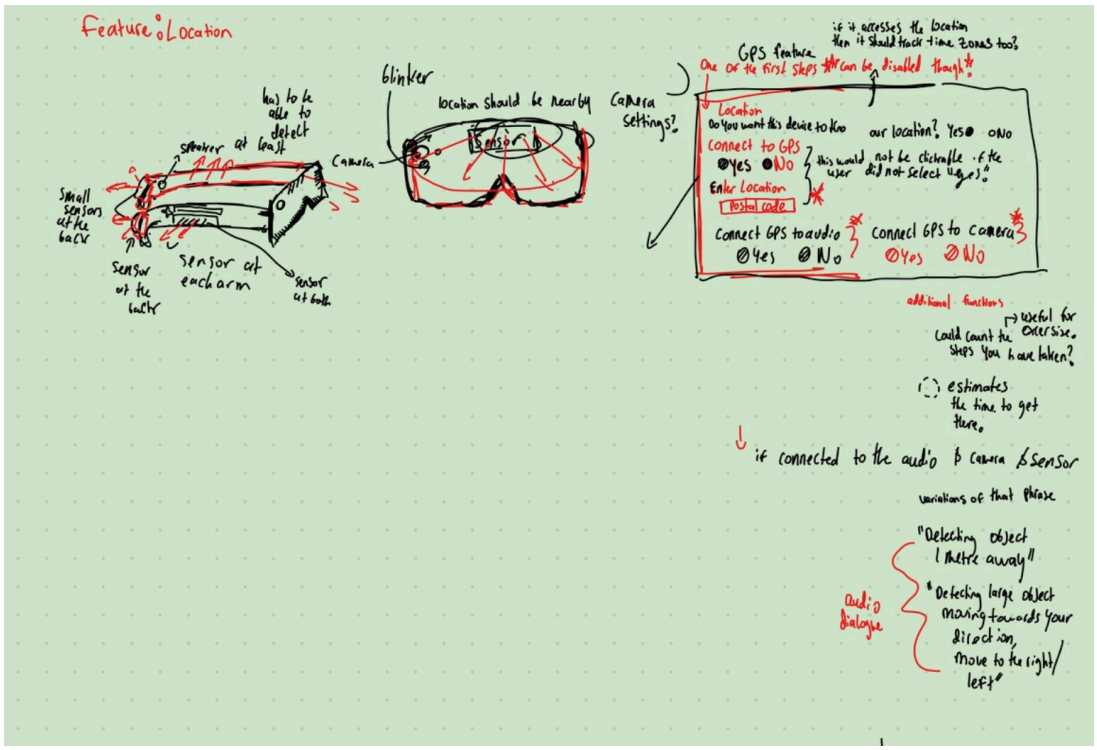


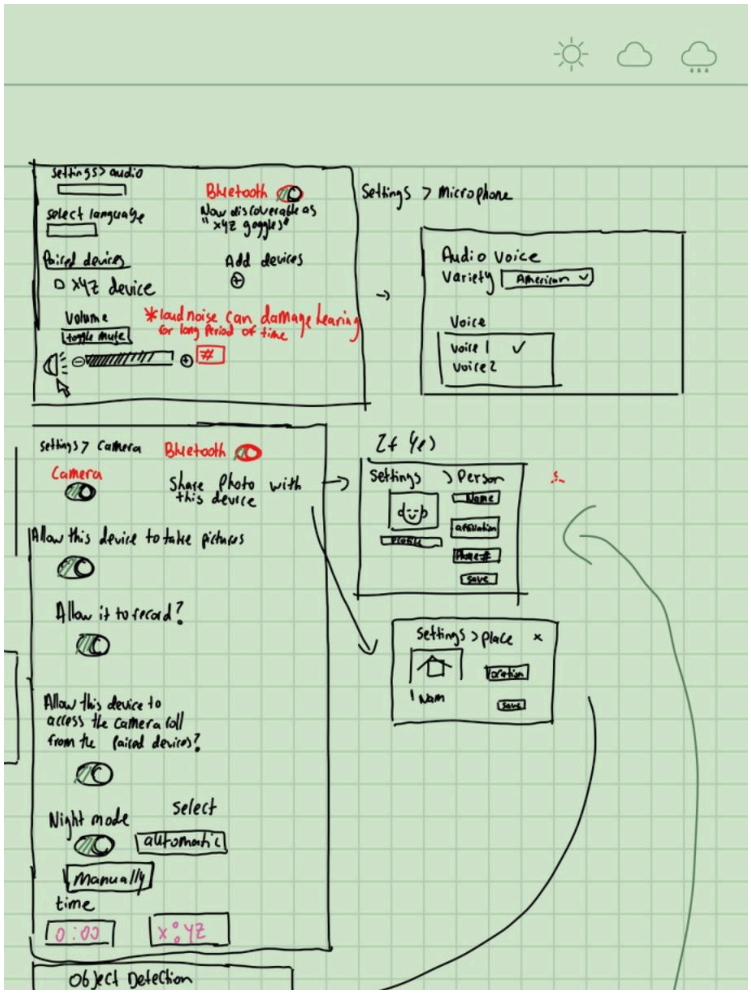


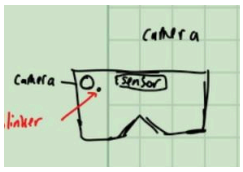
For this subsystem there are two warning devices with one on each side of the frame of the glasses, there is also an on/off button on the side of the glasses which can turn the warning system on or off and finally there are the two cameras at the front of the glasses for object detection. In the app settings, the settings are firstly if you want to be given warnings in the first place, the next setting is the method of warning the user which is audio or vibration, next is the volume for how loud the volume should be and lastly the distance an object should be before giving a warning.

3.

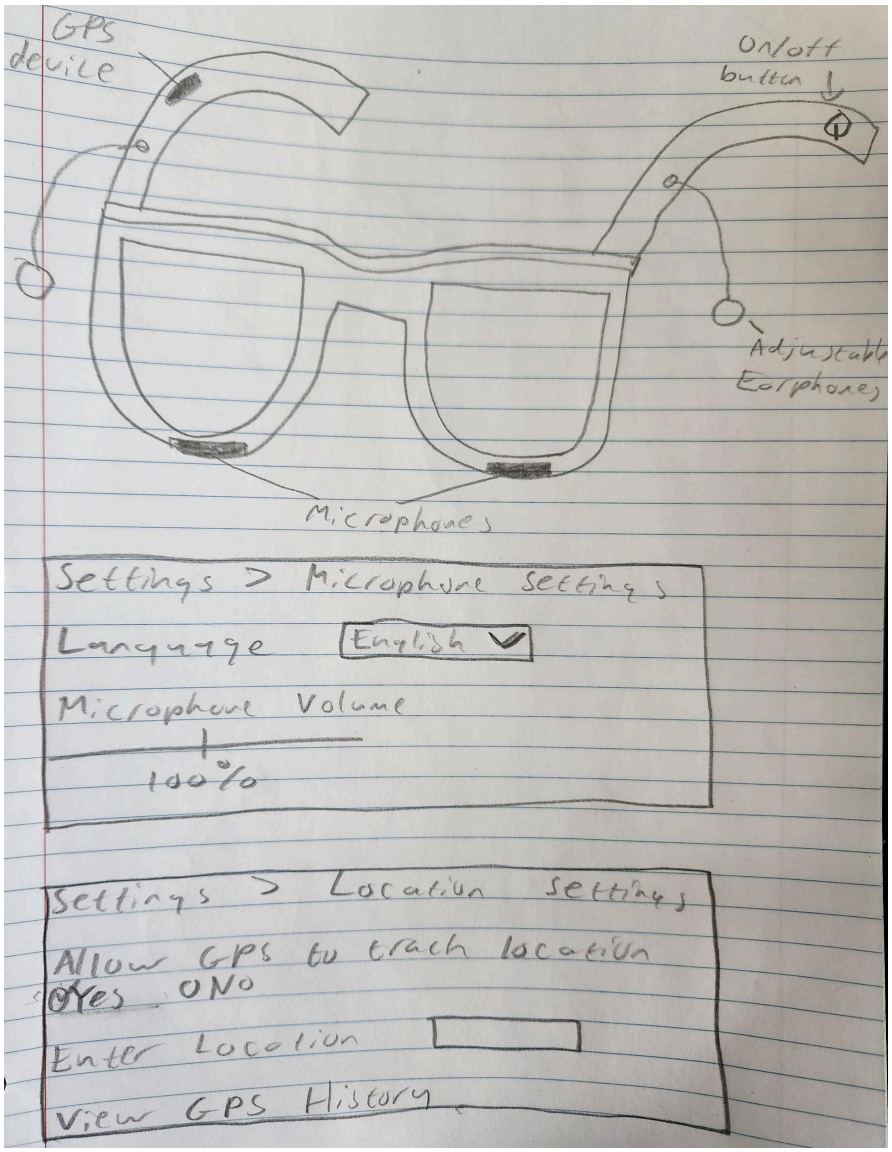
Solution 1: Camera settings, location and audio



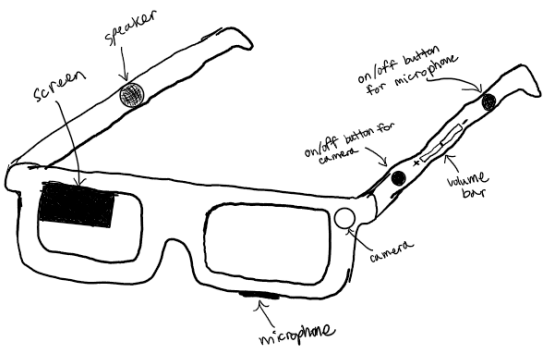

Settings> audio
Bluetooth
Now discoverable as "xyz goggles"
Select language
Paired devices
xyz device
Add devices
Volume
toggle mute
*loud noise can damage hearing for long period of time
Settings > Microphone
Audio Voice
Variety
American
Voice
voice 1
voice 2
Settings > Camera
Bluetooth
Camera
Share photo with this device
Allow this device to take pictures
Allow it to record?
Allow this device to access the camera roll from the paired devices?
Night mode
Select
automatic
Manually
time
0:00
x°yz
Object Detection
Zf (e)
Settings > Person
Name
Relation
Photo
Save
Settings > Place
Location
Name
Save


camera
camera
sensor
flicker

Solution 2: Audio, Microphone and Location



Solution 3: Camera, location, audio, microphone settings and object detection



Settings > Microphone Settings

◯ on ◯ off

Cancel ambient noise:

◯ yes ◯ no

Volume

0 100

Settings > Camera Settings

◯ on ◯ off

Zoom:

0 100

Night Mode: ◯ on ◯ off

Brightness:

0 100

Settings > Audio Settings

Volume

0 100

Location

Connect to GPS:

◯ yes ◯ no

Input location:

Connect to speakers: ◯ yes ◯ no

Connect to screen: ◯ yes ◯ no

View GPS history

Settings > Object Detection

◯ on ◯ off

Object distance:

4m

Give Warnings:

◯ yes ◯ no

Method(s) of Warning:

◯ screen ◯ speakers ◯ vibrate

Benchmarking:

Specifications	Solution 1	Solution 2	Solution 3
Functionality			
Adaptability			
Difficulty of use			Low difficulty
Understandability			
Cost			
Number of features		3	5
Weight/Size			
Aesthetics			

We believe that Solution 3 is the best global concept. It is less expensive and easier to use and understand. All solutions are functional and adaptable. Although, since Solution 2 and Solution 1 have less features, they are more aesthetically pleasing. But the aesthetics of the glasses were one of the less important needs and therefore, Solution 3 is the best concept.

<u>Trello Task Plan Update:</u>