Project Deliverable C

Design Criteria:

Need	Design Criteria	Prioritization & Justification
Needs to showcase the unique capabilities of Shabodi's NetAware network.	Use APIs (Minimum 2) Efficiency (response time, resource utilization) Compatible with all APIs	1 "Use bandwidth, jitter, latency, location and insights APIs to conform network conditions to meet application needs."
Needs to have a unique user experience – A unique way that the use can **interact** with the software.	Easy to use Clear signals to user Clear inputs from the user	1 Helps perform tasks such as "getting money from an ATM, counting money, paying for bills/meals."
Glasses software needs to be **robust.**	Easy to use Simple logic (Maintainability index) Fail safe measures Minimal network demands	2 "Navigating city streets and completing daily tasks."
Needs to effectively help the user.	Communicates clearly Storage space (Bytes)	3 "User experience can take a very long time and has to go through multiple iterations."
Needs to be cloud ready and accessible.	Connects to 5G network Needs to have a two-way connection with the internet.	1 "Consumer Public 5G." "We want it functional."
Needs to be improvable (whether by microservices or not). Could be by developers or by the app itself.	Simple logic Accessible code / information Opportunities for improvement	1 "Software is never complete. Coming up with [snippets] of [solutions] for solving real world problems, allows it to be expandable and adaptable."
Needs to be geared toward the enterprise.	Autonomous Simple logic	4 This specific case focusses more on user experience than enterprise experience, but it should still be marketable to enterprises considering the versatile requirements we have noted.
Needs to function on the network provided (private, public, restrictions, etc), and have a smooth integration between the two networks.	Function on local network Smooth transition between networks.	2 As previously mentioned, must function on the 5G public network ideally. Shabodi said this may be difficult, but it is the goal.

Needs to have a way for the user to connect to a network - not just use its API's. Find ways to encourage a 'connected' experience.	Clear communication Easy for users inputting data	2 "Provide visual and audio guides/feedback." "Uses Shabodi's NetAware platform change network conditions allowing for navigation and task assistance in a busy environment – if smart glasses unavailable use smart phone." Encouraging connection beyond Shabodi's APIs and using an app.
Needs to allow the user to function independent of other people if needed.	Adequate response time(s) Strong communication	4 Meeting bandwidth, jitter and latency requirements for response time. Not much mentioned regarding independence.
Needs to use proper safety warning systems.	Clear warning Adequate response time (s)	1 "Provide visual and audio guides/feedback."
Needs to behave professionally	Professional graphics if there are Clear application use Simple	2 "Enhanced video display through glasses."

Prioritized 1 – 4, 1 highest priority and 4 being lowest priority. Prioritization based on Shabodi presentation requirements and Client Meeting #1 Notes.

Target Specifications:

- **Object Detection and Recognition**:
  - Real-time detection of objects in the user's surroundings (e.g., obstacles, walls).
  - Recognize common objects like doors, chairs, vehicles, etc.
- **Text Recognition (OCR)**:
  - Extract and read aloud printed text from documents, signs, labels, etc.
  - Support for multiple languages.
- **Energy Efficiency:**
  - Reduce the amount of energy so user can use the glasses for a long period of time.
- **Device Compatibility:**
  - Make it able to connect to different platforms such as; iPhone, android, Nokia for device integration (if we pursue with this idea).
- Should have a relatively high API rate usage:
  - This is so that we can define the usage limit of each smart glass so that performance speed doesn't reduce due to high load of information.
- Color identification:
  - Identify the colours of different objects like when wanting to pick out a new pair of clothes.
- Response distance:
  - API response message should be 6 feet away from the user. E.g. If the user is walking and a trash bin is in front of them, the glasses give them an alert and tells then which direction to go.
- **Navigation assistance:**
  - In case user is walking through a flight of stairs, glasses give user step by step instructions.

Technical and User Benchmarking

Product	Specs	User perceptions
Guide dog	Range: Detects obstacles all around you, including moving obstacles like cars Signal: Effectively signals to others that the user is blind but can also bring unwanted attention/discrimination to the dog and user. Size and weight: 21”-25” tall, and 55 to 85lbs in weight. Cost: Typically, 10k-30k Maintenance: Dogs must be groomed, taken to the vet, exercised, taken to the bathroom, fed, watered, etc. In all, maintenance costs about $2,379/year. In terms of time, walking time for the dog is at least 1 hour per day. Required training: User must live and train in the training facility with the dog for 3 weeks. This training must happen for each dog a user has.	Typically, the preferred assistive technology for most visually impaired people due to the highest proficiency in detecting obstacles. Also, the fastest method of transport, since obstacles can be avoided entirely rather than found and navigated around. Also tends to be favourable since it feels the safest to the user. This is due to the emotional bond the user and dog have with each other and because of the reliability of the dog. However, the downsides of this option to the user is typically that it is much more expensive and requires much more maintenance (both in terms of cost and time) than any other assistive technology.
White long cane	Range: Detects obstacles 1.5 to 2 steps in front of you Signal: Effectively signals to others that the user is blind Size: length is between chest level to 4” below users' height. For a 5’4” person, this is typically 48” to 50”. Cost: Typically, $30-$50 Maintenance: Canes need to be cleaned occasionally, and tips need to be changed out when worn. This costs about $10 and can be done by the user. How often this needs to be changed can vary greatly depending on how much the user walks. At most, tips need to be changed approximately every 3-5 weeks. Required training: Users typically take a few months to get used to using a cane, but afterward, training does not need to be relearned even when switching canes. It is recommended that first-time users train with an orientation and mobility specialist. This is free with a referral in Ontario.	Another very common option preferred by the visually impaired. Has a high degree of effectiveness in both detecting obstacles and in alerting to the public that you are visually impaired and may need more space. Slower travel than a guide dog, and more difficult to use in snow and ice. However, proper training can enable a user to still travel effectively in these conditions when relying on a white long cane. One issue with long canes is difficulty in storing/transporting them when not in use. Collapsible canes solve this issue, but often transmit less tactile information than the non-collapsible counterparts

White guide cane	Range: Detects obstacles immediately in front of your feet Signal: Effectively signals to others that the user is blind Size: Typically, waist-height on the user. Cost: Typically, $30-$50 Maintenance: Canes need to be cleaned occasionally, and tips need to be changed out when worn. This costs about $10 and can be done by the user. How often this needs to be changed can vary greatly depending on how much the user walks. At most, tips need to be changed approximately every 3-5 weeks. Required training: Users typically take a few months to get used to using a cane, but afterward, training does not need to be relearned even when switching canes. It is recommended that first-time users train with an orientation and mobility specialist. This is free with a referral in Ontario.	Typically used by visually impaired people with a higher degree of sight. This is because it doesn't give as much tactile information as long canes or as much guidance as dogs, but alerts others of your disability and still provides the information needed in difficult scenarios like stairs or curbs. Due to their shorter length compared to long canes, these canes are typically much more convenient for the user.

Bibliography

[1] "Getting around," *CNIB*. https://www.cnib.ca/en/getting-around?region=on

[2] J. Loeppky, "Five Fascinating Facts About White Canes," *www.accessibility.com*, Jun. 29, 2020. https://www.accessibility.com/blog/five-fascinating-facts-about-white-canes (accessed Oct. 06, 2024).

[3] wikiHow, "How to Choose a White Cane if You Are Partially Sighted or Blind," *Wikihow.health*, Sep. 02, 2012. https://www.wikihow.health/Choose-a-White-Cane-if-You-Are-Partially-Sighted-or-Blind (accessed Oct. 07, 2024).

[4] "Reddit - Dive into anything," *Reddit.com*, 2023. https://www.reddit.com/r/Blind/comments/13wk42h/cane_sweepers_how_often_do_you_replace_the_tips/ (accessed Oct. 07, 2024).

[5] "Frequently Asked Questions," *Guide Dogs for the Blind*, 2024. https://www.guidedogs.com/resources/faqs (accessed Oct. 07, 2024).

[6] "FAQ – Canadian Guide Dogs for the Blind," *Guidedogs.ca*, 2020. https://www.guidedogs.ca/frequently-asked-questions/ (accessed Oct. 07, 2024).

[7] "White Canes," *blindlowvision.org.nz*. https://blindlowvision.org.nz/our-services/getting-around/white-canes/

[8] Wikipedia Contributors, "Guide dog," *Wikipedia*, Sep. 12, 2024. https://en.wikipedia.org/wiki/Guide_dog#cite_note-Fadl-44 (accessed Oct. 07, 2024).

[9] Alyssa Anderson, "What to Know About Canes for the Blind," *WebMD*, Jun. 16, 2022. https://www.webmd.com/eye-health/what-to-know-canes-for-the-blind