

## **Deliverable C - Design Criteria**

### **List of Interpreted Needs:**

1. Smart glasses have easy accessibility to networks
2. Smart glass is quick and responsive
3. Smart glass adapts to different network conditions
4. Smart glass warns user of surrounding hazards and detect obstacles
5. Smart glasses help people who are blind safely navigate streets
6. Smart glasses have clear communication between the user and operator/AI

Number	Need	Design Criteria
1	Smart glasses have easy accessibility to networks	-Network connection (5G connection) -Bandwidth (bits per second (bps)) and time (ms)
2	Smart glass is quick and responsive	-Response Time (ms) -Latency(ms)
3	Smart glass adapts to different network conditions	-Network connection (5G connection) -Dynamic Bandwidth Adjustment (bps)
4	Smart glass warns user of surrounding hazards and detect obstacles	- Obstacle Detection - Voice Warnings - Heads-up display (Hz)
5	Smart glasses help people who are blind safely navigate streets	-GPS (longitude, latitude)
6	Smart glasses have clear communication between the user and operator/AI	-Latency(ms)

## Design Criteria and Constraints:

5 is high priority and 1 is low priority

### Functional Requirements

- Obstacle Detection
- GPS (longitude, latitude)
- Heads-up display (hz)
- Response Time (ms)

### Non-functional Requirements

- Design of Smart Glasses (aesthetic)
- Bluetooth ( connect to other products)
- Product life (years)

### Constraints (and measurements)

1. Network connection (5G connection)
2. Bandwidth (bits per second (bps)) and time (ms)
3. Resolution (ppi)
4. Voice Warning (Yes / No)
5. Battery life (hours)
6. Weight (g)
7. Processing time under 200ms
8. Cost (\$)
9. Latency(ms)
10. Dynamic Bandwidth Adjustment (bps)

## Technical Benchmarking:

- On a scale of 1-3, which specs are better?

○ 1=green

○ 2=yellow

○ 3=red

○ neutral = no color

Specs \ Smart glass devices	Importance	Ray Ban Meta Skyler	Envision Glasses: Home edition	Lenovo Think Reality A3
<b>Brand</b>	<b>1</b>	Ray Ban	Envision	Lenovo
<b>Cost</b>	<b>3</b>	369.99\$	3,461.00\$	1499\$
<b>Wifi/Bluetooth</b>	<b>5</b>	Wifi 6, Bluetooth 5.2	Wifi 802.11ac, dual-band, single	5G, Wifi 6

			antenna Bluetooth 5.x AoA	
Battery	3	4 hours	4 to 6 hours	3 to 5 hours, including an extended battery pack
Charging	2	Charging case	USB Type C	USB Type C
Lightweight	2	50g	46g	130g
Mic / voice command	4	Yes Custom 5 Mic Array	3 beam-forming microphones	3 integrated mics
Camera	5	12MP	8Mp, 80 DFOV	8MP and Dual fish-eye cameras for 6DoF tracking
Object detection	5	No	Yes	Yes
Object recognition	5	No	Yes	Voice, object and image recognition
Face recognition		No	Yes	Yes
Audio	4	Yes - music - 2 Custom-Built Speaker Open Ear	Yes - AI or Hands-free	Integrated speakers
Calls and texting	3	Yes Meta AI or assistant	Yes Handsfree AI or assistant	N/A
Heads-up display	3	N/A	AR display	Dual 1080p AR display
Quality of Recording / photos	3	1440x1920 Px @30 Fps 3024x4032px	N/A	N/A
Memory	2	32GB Flash Storage 500+ Photos, 100+ 30s Videos	3GB LPDDR4 / 32GB eMMC Flash	8GB, dual channel
Touch control	2	Yes	Multi-touch gesture touchpad	Yes - toggle volume
Total		34	38	33

## User Benchmarking:

### Drawbacks to using smart glasses

- Short battery life
- Slow upload times
- Inferior camera quality
- Spotty voice control
- Low level voice recognition abilities
- System mishears words
- Difficulty understanding over loud background noise

### Benefits to using smart glasses

- Audibly give instructions and guidance
- Communication with friends, family or an assistant at any point in time
- Discreetly listen to audio
- Cool AR display
- Capturing moments with camera

## Target Specification :

	Design specifications	Relation	Value	Units	Verification methods
	Functional requirements				
1	GPS	=	Yes	N/A	Test
2	Response time	>	200	ms	Analysis
3	Heads-up display	=	Yes	N/A	Analysis
4	Obstacle detection	=	Yes	N/A	Analysis

	Design specifications	Relation	Value	Units	Verification methods
	Constraints				
1	Network connection	=	Yes	N/A	Test
2	Bandwidth	> =	50	mbps	Analysis
3	Resolution	> =	14	MP	Analysis
4	Voice warning	=	Yes	N/A	Test

5	Processing time	>	200	ms	Analysis
6	Cost	< =	500	\$	Estimate, final check
7	Weight	<	45	g	Analysis
8	Battery life	> =	24	hr(s)	Analysis

	Design specifications	Relation	Value	Units	Verification methods
	Non-functional requirements				
1	Aesthetic	=	Yes	N/A	Test
2	Bluetooth (capability to connect to other devices)	=	Yes	N/A	Test
3	Product life	>	5	Years	Test

## Reflection :

The client meeting was one of the most crucial stages of the design criteria, which helped us gain a brief understanding of the client's raw needs in the project we are focusing on. During the client meeting, several key features were brought up for the smart glasses assistance. Citing straight from the meeting, the client specified the terms 'cloud-ready', 'demonstrable', 'uses a couple Net-Aware APIs'. The integration of cloud-ready infrastructures would allow us to speed up the process of object detection and make it more responsive. By implementing APIs, the system would be able to continuously scan the user's surroundings and update its knowledge on the surroundings which would in turn enhance user experience.

Certain client needs such as warning users of surroundings and helping them navigate were crucial in the development of possible solutions, as well as prioritizing them. These priorities helped us focus on key aspects of the project. Initially in Deliverable B, we started with treating these needs as of equal importance, but overtime analyzing the meeting helped us identify our top priorities. For example, features which were responsible for the safety of the user such as vice warnings were put higher up in the priority list whereas the ones such as a heads-up-display has been deprioritized to make sure that the primary focus is on the safety of the user.

## Sources

- What is an AEP and IoT platform  
[https://www.iot83.com/in-depth-analysis-aep-vs-traditional-iot-platforms/#Key\\_Differences\\_between\\_AEPs\\_and\\_Traditional\\_IoT\\_Platforms-Use\\_Cases](https://www.iot83.com/in-depth-analysis-aep-vs-traditional-iot-platforms/#Key_Differences_between_AEPs_and_Traditional_IoT_Platforms-Use_Cases)
- Our project: [https://makerepo.com/project\\_proposals/472.advanced-network-applications](https://makerepo.com/project_proposals/472.advanced-network-applications)
- Envision Glasses (benchmarking) <https://youtu.be/oGWinKD0dc>
- ThinkReality A3- [https://techtoday.lenovo.com/sites/default/files/2022-11/ThinkReality\\_A3\\_PC\\_Edition\\_Datasheet.pdf](https://techtoday.lenovo.com/sites/default/files/2022-11/ThinkReality_A3_PC_Edition_Datasheet.pdf)