Deliverable D
Group 14

Introduction: Bring together all of the collective subsystems to weigh out the pros and cons to provide a general overview of our solution to the problem at hand. Please consult individual subsystem documents for a more extensive overview.

Objective: The smart glasses should provide functional and clear audio to the user through an API, This system must offer a seamless audio and video connection, ensuring both clarity and reliability, especially in potentially noisy and disruptive environments.

Design Criteria:

1. Clear audio and video connection between the junior employees and the senior mentors.

   The feed between the video source and the receiving end must be seamless to ensure real-time communication and avoid timing-based errors. For precision, the display should be clear with

2. Must be battery efficient.

   The design must be able to support a longer battery-life, so the glasses can be used on a long workday and are reliable in times of emergency.

3. Visual cues and annotations

   Alongside audio help, the glasses will allow the mentor to give the junior employee visual aids, such as annotations, gestures, or pertinent data/images.

4. Lightweight

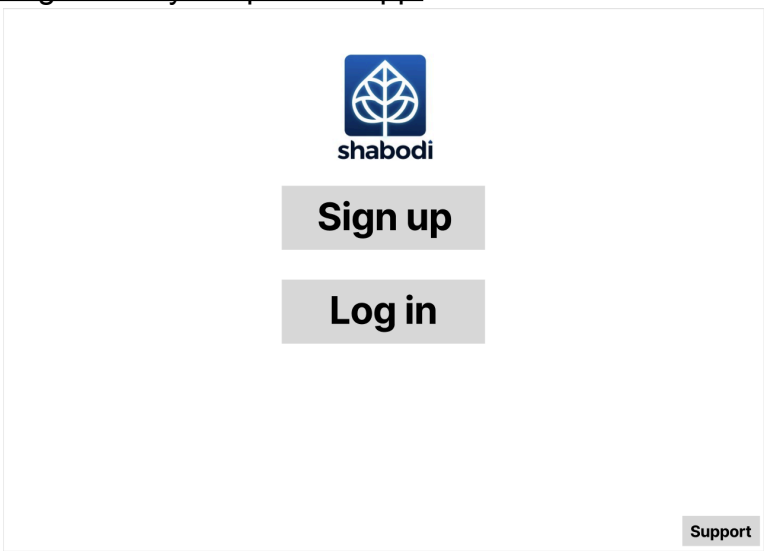
   Hardware should not exceed a certain weight which will end up making lots of discomfort on the nasal and aural region. The glasses are going to be worn for multiple hours during work so comfort is necessary.

5. User friendly application.

   The app should be user friendly and offer connection to the glasses with as few clicks as possible.

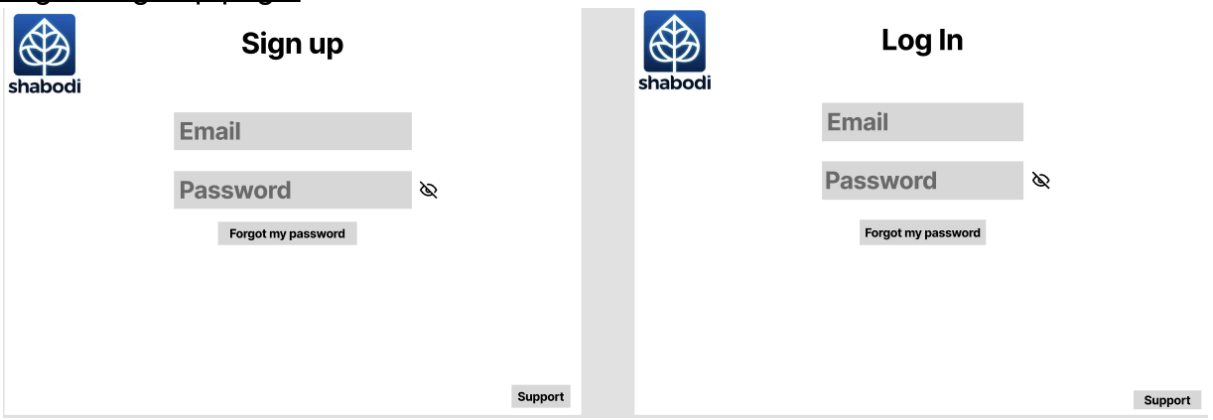
Conceptual design for the application:

Page when you open the app:



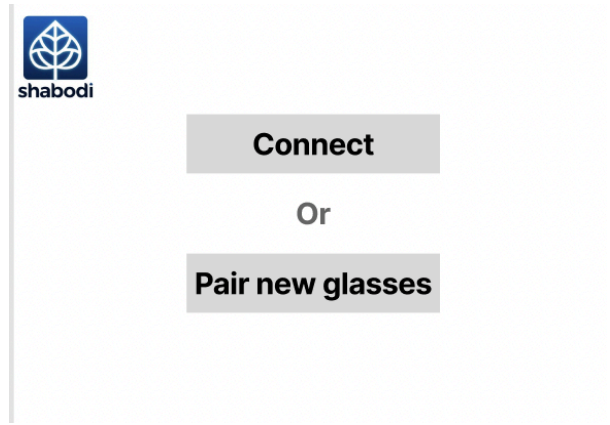
This first page offers three options, all of which are very straightforward and self-explanatory. The goal in mind here is to allow the user to hopefully connect to the glasses with as few clicks as possible.

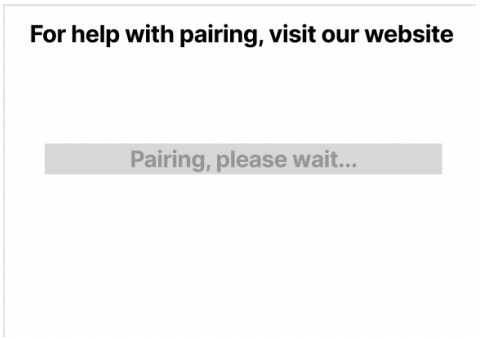
Log in/ Sign up page:



Generic login/sign up page that provides a simple way to login without overwhelming the user.

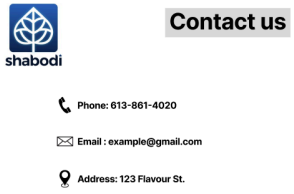
Connection pages:





These pages show the user what is happening in the connectivity process while keeping it very barebones and simple.

Support page:



Simple contact page that provides all necessary information to a user that might require assistance.

Pros:
- Simple UI
- Minimal Clicks

Cons:
- Very barebones
- not very appealing to look at

Auditory subsystem evaluation chart:

Specifications	Importance of specifications	In-Ear Wireless Speakers	Bone Conduction Audio	Directional Speakers Built into Frames
Audio Clarity	3	3	2	1
Comfort	2	2	2	3
Battery Efficiency	2	2	3	1
Weight	2	2	2	3
Situational Awareness	1	1	2	3
Results:		22	22	19

3 = good, 2 = okay, 1 = bad

Visual component evaluation chart:

Rating in terms of compliance with criteria, 3 being most and 1 being least.

Design criteria	**Smart glasses with extensive visual aid**	**Smart goggles that utilize AR**	**Simple smart glasses with layered information display**
Visual aids	**2**	**3**	**1**

Reduced battery consumption	**2**	**1**	**3**
Size	**3**	**1**	**3**
Unique experience	**2**	**3**	**1**
View of work field	**3**	**2**	**3**
Results:	12	10	11

Based on the results of the evaluation chart, the smart glasses with extensive visual aid are the most ideal design option.

<u>Three full concepts</u>

Solution 1: Glasses add-ons edition

- Separate Camera
- External Earphone
- App that connects the glasses to a desktop

Solution 2: Technical edition

- Augmented reality goggles
- Bone conduction speaker
- App that connects the glasses to a desktop

Solution 3: Feasible edition

- Smart glasses with layered information display
- Basic Speaker at the arm of the glasses
- App that connects the glasses to a desktop

Evaluation for Each Solutions

	Glasses add-ons	Technical	Feasible
Price	2	1	3
Weight	2	1	3
Accessibility	2	3	2
Aesthetics	1	1	3
Flexibility	3	3	3
Unique Experience	3	3	1
Operating Conditions (Temperature)	2	3	1
Total	15	15	16

3 = good, 2 = okay, 1 = bad

According to the evaluation from design criteria, we choose option 3 (feasible edition) to be the best global concept. To improve the precision of our evaluation, we must talk to Shabodi and to the users of the product to determine which criteria are most important.

Comparing with Solutions Derived from Technical Benchmarking

Benchmarking Table

Specification	Meta Ray Bans	XReal Air	Blade 2's
Price	$459 CAD	$380 USD	$1,765 USD
Weight	48.6g	79g	90g
Lens size	50.22mm	50x60mm	80mm
Arms length	150mm	148.5mm	160mm
Connectivity	WIFI 6 9.6 Gbps	USB C DisplayPort 40 Gbps	USB 2.0 MICRO-B, 2.4GHz Wifi and bluetooth 600 Mbps

Benefits and Drawbacks for Each Solutions

Glasses add-ons

Benefits:

Since the components of this design are removable, this design is adjustable based on the user's current needs.

Drawbacks:

Heavy, clunky and lots of different parts, which makes the design a lot easier to lose or break. It is inconvenient to have to assemble separate parts rather than put on one singular design.

Technical

Benefits:

Augmented reality allows the junior employee to receive extensive aid on a work site. The bone conduction speaker is ideal for a good sound system so that communication between the junior and the senior employee is most efficient.

Drawbacks:

Not very cost efficient, very bulky on workers faces

Feasible

Benefits:

Subsystems contained in the feasible edition are easy to obtain and control. Most of the parts are cost-efficient and user-friendly. The visuals contain only the necessities, keeping the view simple and clear.

Drawbacks:

The simplicity of the visual component does not offer the most support that the junior employee could receive, only the necessities. Should a situation occur where the junior employee needs extensive guidance, visual rather than only auditorial, this could be an issue.

Reason why we chose this as the best option:

Product is very cost effective and will be easy to maintain if something breaks down, the application is very user friendly making it easily acceptable.

Suggested Further Developments for Chosen Option

Our future prototypes may include full diagrams of the entire system instead of just each subsystem. As well as a software overview and how the API and code are going to integrate into our physical product. One of the biggest drawbacks for the solution we got is that cost-efficient basic speakers do not prevent disturbances by the work environment noises. Our future development should focus on finding the solution against those work environment noises such as noise canceling.

Sources:

The following links provide insight into existing products similar to our project
In-Ear Wireless Speakers
Bone Conduction Audio
Directional Speakers Built into Frames

The following links provide insight into existing products similar to our project
Televu Smart Glasses
OHANAONE Technologies
Vuzix smart glasses