0) URL to Figma Prototype

https://www.figma.com/proto/oiD2u1FB8INUUCGCxhkZxe/Smart-Glasses-HUD%2FUI?page-id=1%3A2&node-id=10-26&viewport=-10766%2C-215%2C0.19&t=s5qDYdnva0aauh2v-1&scaling=scale-down&starting-point-node-id=10%3A26

1) Method for Conducting Usability Testing (Cami Lacy)

- Summarize the research method you used, and the persona(s) and scenarios you researched.
- Describe the research participants (number of people in your study, the team member who conducted each session; demographics of participants).
- Describe how you collected the research data (e.g., observing the user participant do a task; taking notes during the study)
- Describe how you analyzed the data (e.g., affinity diagramming, group discussion on main themes, quantitative analysis)
- Feel free to include screen captures, images, etc. if it helps.

The InnovateNow team determined that we would incorporate a Wizard-of-Oz prototyping into the final project for our smart glasses HCI technique. While the technology for this product does exist for voice command tasks, it was within the scope and feasibility of this class quarter to further use this type of study. This observational research paired with initial exploration of different types of human-computer interactions was extremely useful for further examination of techniques. Particularly, our project concentrated on specific use cases including students and office workers who wanted the ease with hands-free technology while they were working in a communication and collaborative environment. This meant that the product was usable for multiple tasks, and we focused on video calls, messaging, calendar event management, and settings preferences.

These tasks were investigated thoroughly with a total of eight user studies for our team. Each member conducted two separate interviews which included one being a classmate from CSS 480 while the other was a friend, family member, etc. Consequently, half of our study group is composed primarily of college students who are in related fields to computer science and general design frameworks. We conducted our interviews separately and each followed the outlined tasks located at the bottom of this document that were pre-determined as agreed upon by everyone. The participant would speak to the host, and the host would act as a voice assistant replying to their voice commands and navigating through the Figma prototype for them. Afterward, the participant was asked the relevant feedback questions also located at the bottom of the document that provided insight to how the experience went and what improvements could potentially be made. As a group, InnovateNow hosted a group Discord call to review the data that was collected and make changes to the Figma prototype accordingly. This group discussion and analysis further established our foundation for improving the accessibility and usability of our product.

2) Findings of Conducting Usability Testing (Sovannara Tav)

- Identify the high priority observations based on your research.
- Identify how these research insights influence your understanding of your personas, scenarios, and product enhancements relating to affective computing.

In reference to the feedback questions section located at the bottom of this document:

a) For part A of the section, observations we found from our user studies were that users agreed that the use of white and making text, images, and icons semi-transparent was a good design standard. However, important observations they made were that the design standard wouldn't be well suited in environments where it is too bright and where the user would be looking at a white surface to which white text on the smart glasses on a white background in real life isn't a good contrast.

b) For part B of the section, observations we found from our user studies were that users agreed that the interaction and navigation for our video meeting application with voice commands were good when it came to selecting a person to have a video meeting with, turning on and off the user's camera, and ending the video meeting. However, important observation they made were the limited demonstration meaning that they expected additional functionalities such as adding additional people to ongoing video meetings, the ability to turn on and off the user's microphone, and many more.

c) For part C of the section, observations we found from our user studies were that users agreed that the interaction and navigation for our messages application with voice commands were good when it came to viewing the messages for each person, replying to each person with a different message, and sending the message to each person. However, important observations they made were seeing what a group message functionality would be like and the process for it, having the ability to select which media files and documents to send rather than having them preselected, and how long messages would be managed and displayed.

d) For part D of the section, observations we found from our user studies were that users agreed that the interaction and navigation for our calendar application with voice commands were good when it came to viewing all calendar events, viewing more details for a single calendar event, creating a new calendar event, deleting an existing calendar event, and revising an existing calendar with new information. However, important observations they made were the process of adding a new calendar event and deleting an existing calendar event was confusing at first but was handled successfully afterward. In addition, when adding a new event, if the user didn't provide details beforehand with their voice command, the smart glasses should display a prompt to fill in each input field.

e) For part E of the section, observations we found from our user studies were that users mostly agreed, but not all, that the interaction and navigation for our settings application were good when it came to navigating to each option in the settings application, going back, and then navigating towards another option. However, important observations they

made for some options, the layout of text and icons was cluttered while for other options, the text was too small to read.

These research insights influenced our understanding of our personas, scenarios, and product enhancements relating to affective computing in terms of: 1) how the designers' and developers' interaction of a product will differ from the user, 2) how our focus on college students and office workers valued the ability to multitask when interacting and navigating through the smart glasses, and 3) how a more qualitative approach can provide more insights and feedback than a qualitative approach. To provide more elaboration on the first and second points, for our Figma prototype, each application in our smart glasses was designed in a way in which the user would need to carry out all the steps for a task before moving on to the next step to which us, the designers and developers, thought was fine. However, during our user studies, another important observation users made was wanting the ability to go back and freely interact and navigate their own way which better reflects the user experience in the real world and also illustrates how the users' experience will always differ from the designers and developers. Lastly, for the third point, in the feedback questions sections, some of us had questions that asked the users to give a number of their experiences on a scale from 1 to 10. In some cases, it can be difficult to quantify what each number means, and how to take that number to identify on what are the strengths, weaknesses, and improvements needed for a product. With that being the case, having open-ended responses can in other cases better identify what you need to continue doing, focus more on, and many more for a product.

3) Reflection on Conducting a Usability Study (Grace Setiawan)

- What did you find were the key benefits of conducting a usability study?
- What did you find were some drawbacks?
- What were some lessons you learned about using this method?

Conducting a usability study for our smart glasses HCI technique provided several key benefits. First, it allowed us to gather genuine feedback directly from our target users, students, and office workers helping us understand their real needs and interactions with the product. Observing users perform tasks helped us to spot issues early and fix them, making the smart glasses more user-friendly. The study also tested our design ideas in practice, revealing which features were intuitive and which needed adjustment. This feedback guided us in improving our design step by step, with team discussions on Discord and meetings helping to brainstorm and refine our Figma prototype.

However, there were some drawbacks. Conducting a usability study can be time-consuming, from setting up interviews to analyzing feedback, which was challenging to manage alongside other project tasks within the class quarter. Our small sample size of 8 participants, primarily college students, family, friends, etc, might not represent the broader audience. The presence of the host during the study could have influenced participant behavior, affecting the accuracy of our findings. Also, since the host navigated the Figma prototype for participants to act as the

voice assistant, it didn't fully replicate the actual hands-free user experience of just the user only interacting and navigating through the smart glasses, possibly limiting the feedback.

Several lessons from the study include making sure it's clear, standardized steps for conducting interviews, and collecting feedback to ensure reliable and comparable data. Regular team meetings and using collaboration tools like Discord helped efficiently gather and act on user feedback. Being open to change and flexible with user insights led to a more user-friendly design. Despite some challenges, the usability study significantly improved our design, making the smart glasses more intuitive and effective.

4) Group Roles for Conducting a Usability Study (Tushar Thonupunoori)

- Describe what roles and responsibilities your group had to complete this assignment.
- Identify which team members fulfilled which roles.
- Identify what went well in your team work for this study.
- Identify area(s) that could be improved regarding team work and agreed-upon steps to improve that area going forward.

In this assignment, our team had roles to make sure everything went smoothly. Each member conducted two user studies, giving us a total of eight. Each member would serve as the host for the user or in other words, the voice assistant to replying to the user's commands and navigating through the Figma prototype for them. We also divided this assignment into four sections, with each member taking one section. Cami handled the method section, Sovannara managed the findings section, Grace worked on the reflection section, and Tushar completed the group roles section.

Something that went well in our team was our communication. We used Discord messages to stay connected and to stay up to date on our tasks. We regularly discussed our progress, asked questions, and helped each other with any issues we encountered. The workload was equally divided and everyone knew their responsibilities.

While our remote communication worked well, we realized that occasional in-person meetings could have sped up our progress. Face-to-face discussions can sometimes solve problems faster than online messages. Scheduling meetings that fit everyone's timetable was sometimes difficult, so having a regular meeting time could help keep us on track and address issues promptly. To improve our teamwork, we plan to mix remote and in-person meetings, continue using collaborative tools to keep everyone updated, and set clear deadlines for each task.

5) Tasks given to the users when conducting usability study

a) Hosting and displaying a live video meeting with other people through the smart glasses (Tushar Thonupunoori's task). Hey Google:

- Host a live video meeting with Sarah Johnson.
- Add John Smith to the live video meeting.
- Add Chris Doe to the live video meeting.
- Return to the live video meeting.
- Turn on my camera.
- Turn on my mic.
- End the live video meeting and return to the home page screen.

b) Sending messages to other people as well as viewing their replies through the smart glasses (Sovannara Tav's task).

- Open my text messages with John Smith.
- Reply to John Smith with "Yep! In-person meeting in Bellevue."
- Send the message to John Smith.
- Go back and open my text messages with Sarah Johnson.
- Display my saved media files.
- Attach the first and second media files for Sarah Johnson.
- Send the attached media files to Sarah Johnson.
- Go back and open my text messages with Chris Doe.
- Display my saved documents.
- Attach the first and second documents for Chris Doe.
- Send the attached documents to Chris Doe.
- Return to the messages home screen.
- Return to the home page screen.

c) Displaying calendar schedule information as well as making new calendar events and managing existing calendar events through smart glasses (Cami Lacy).

- Display upcoming events in my calendar.
- Display further information for this Friday's event (Tennis 2 vs 2 Practice).
- Close the details of this Friday's event (Tennis 2 vs 2 Practice).
- Create a new calendar event and label it as "CSS 422 Hardware".
    - Set the date to "Thursday, May 23, 2024".
    - Set the time to "1:15 PM to 3:15 PM".
    - Set the frequency to "Every week".
    - Set the location to "UW1 - Room 230".
    - Set the details to "Office hours afterwards".
- Display further information of the new calendar event (CSS 422 Hardware).
- Close the details for the new calendar event (CSS 422 Hardware) and delete this Friday's event (Tennis 2 vs 2 Practice).
- Confirm the deletion of this Friday's event (Tennis 2 vs 2 Practice).
- Open the edit page for Saturday's event (Fred Meyer Grocery)
    - Change the time to "3 PM to 4 PM".
    - Change the details to "Get potatoes".
- Save my new changes for this event (Fred Meyer Grocery).
- Display the updated details for Saturday's event (Fred Meyer Grocery).

- Close the details and return to the home page screen.

d) Displaying the available options in settings and making adjustments to the user's preferences through the smart glasses (Grace Setiawan).

- Open settings.
- Open Accessibility preferences.
- Return to the settings home page.
- Open Manage Account preferences.
- Return to the settings home page.
- Open Power Settings preferences.
- Return to the settings home page.
- Open Bluetooth preferences.
- Return to the settings home page.
- Open Network Manage preferences.
- Return to the settings home page.
- Open Voice Settings preferences.
- Return to the settings home page.
- Open Video Settings preferences.
- Return to the home page.

6) Feedback questions for the users after conducting usability study

a) Look-and-feel of the prototype (Group)

a) Is the use of white color and making the text, images, and icons semi-transparent a good design standard for the HUD/UI of the smart glasses? Note that this design standard is to allow users to interact and navigate the smart glasses while also seeing what is occurring in the real world.

b) Tushar Thonupunoori's feedback questions:

a) On a scale from 0 to 10, how was the process for turning off and on the video call?
b) How was the interaction from selecting the person to hosting a live video chat with that person?
c) What additional features should be added when talking to the person through a live video chat? Are three options enough or should more be added?

c) Sovannara Tav's feedback questions:

a) What are the strengths when interacting and navigating through the provided prototype example of the messages app for smart glasses?
b) What are the weaknesses that can be improved when interacting and navigating through the provided prototype example of the messages app for the smart glasses?
c) Are there any existing components in the provided prototype example of the messages app that should be removed? Are there new components that should be implemented?
d) Does the provided prototype example of the messages app for the smart glasses clearly show how this task fits in the theme of communication and collaboration?

d) Cami Lacy's feedback questions:

a) Visually, how does the "Add New Event" page seem overwhelming at all? Are there any design features that should be simplified to avoid any clutter?
b) On a scale from 0 to 10, how intuitive was the flow for adding an event? Was there any part that the flow went off path than expected?
c) Is the confirmation process and final deletion clear? If yes, what parts of the design were most clear? If not, what was confusing?

e) Grace Setiawan's feedback questions:

a) On a scale from 0 to 10, what was the experience like when interacting with the prototype for managing the user account?
b) Are there any features that are unclear? If yes, which one and why?
c) When the user is selecting the "manage accounts" feature, other features' colors fade away. Is this clear to see?
d) Are there any features that I should have added in the settings option?