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Select Case Studies

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Table of Contents

About Me

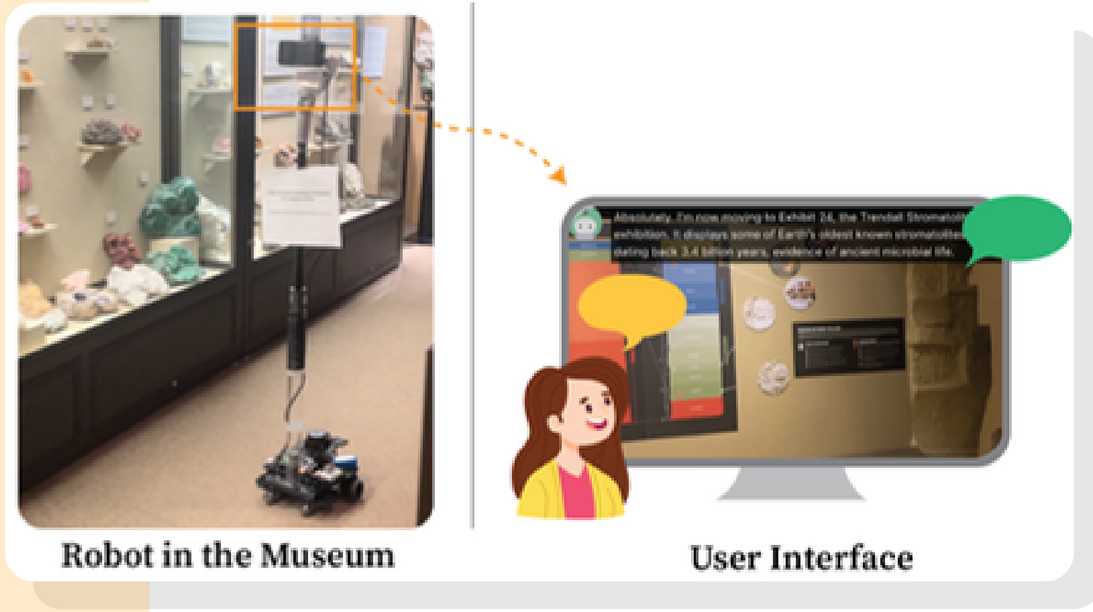
I’m a User Experience (UX) Researcher and Designer, specializing in systems that support group interaction, collaboration, and human-AI engagement. I work closely with cross-functional teams to translate complex social and workflow challenges into clear, actionable designs.

I’m also passionate about community building through mentoring students, developing and facilitating workshops, and creating experiences that empower others to design with intention.

Case Study 1:

Remotely Exploring a Museum through a Robot

Collaborators:
Yaxin Hu, Jingxin Du, Chenming Ye,
Anjun Zhu, Pragathi Praveena, Bilge Mutlu



Project Highlights

Problem: People who cannot physically visit a location lack access and knowledge to explore these spaces on their own

Methods Used: Observation Session, In-the-Wild Deployment, Dataset Annotation, Interviews, Surveys, Affinity Mapping

My Role: Co-Lead UX Researcher

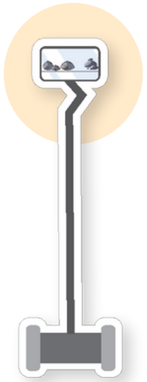
Responsibilities: User Study Design, Dataset Annotation, Interviewing, Thematic Analysis, Data Visualization, Community Partner Acquisition

Remotely Exploring a Museum through a Robot

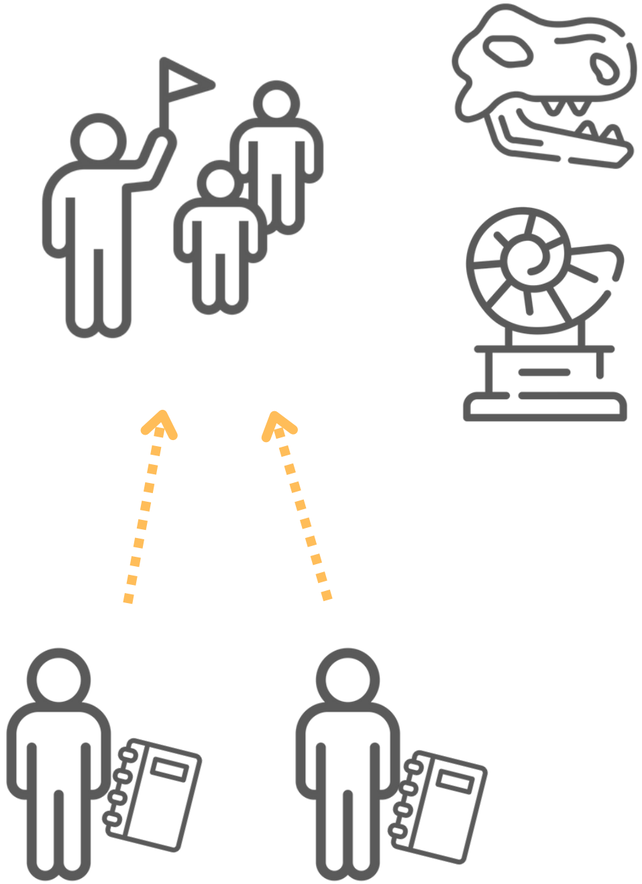
Overview: Remote visitors may not know the layout of a museum and lack knowledge about the exhibits to tour the museum alone. Thus, we designed a robot that allows remote visitors to navigate the museum and converse with an AI agent in real-time.

Process:

Observation Session → Dataset Preparation → Prototype Development → In-the-Wild Testing



Observation Session



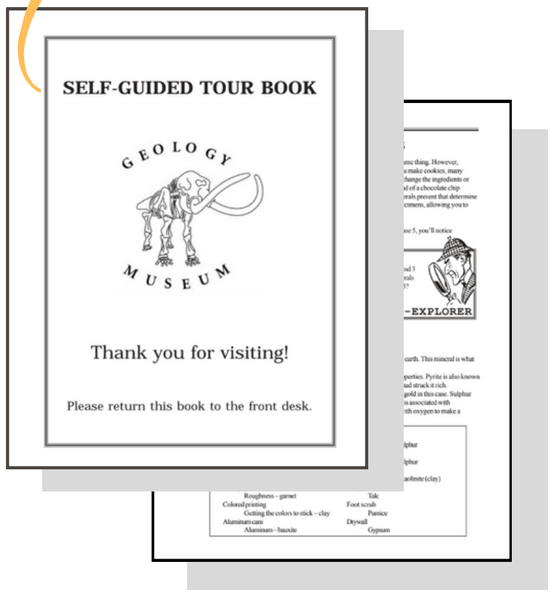
To design an authentic robot that provides a tour experience, we observed a tour session with 30 visitors and conducted informal interviews with the museum director (with 20+ years of experience). We identified the following key actions for a tourguide:

- **Answering** visitor questions
- **Asking** questions about the exhibits to the visitors
- **Directing** attention of visitors to exhibits
- **Allowing** for free exploration

Dataset Annotation

Museum Exhibits

Museum Tour Books

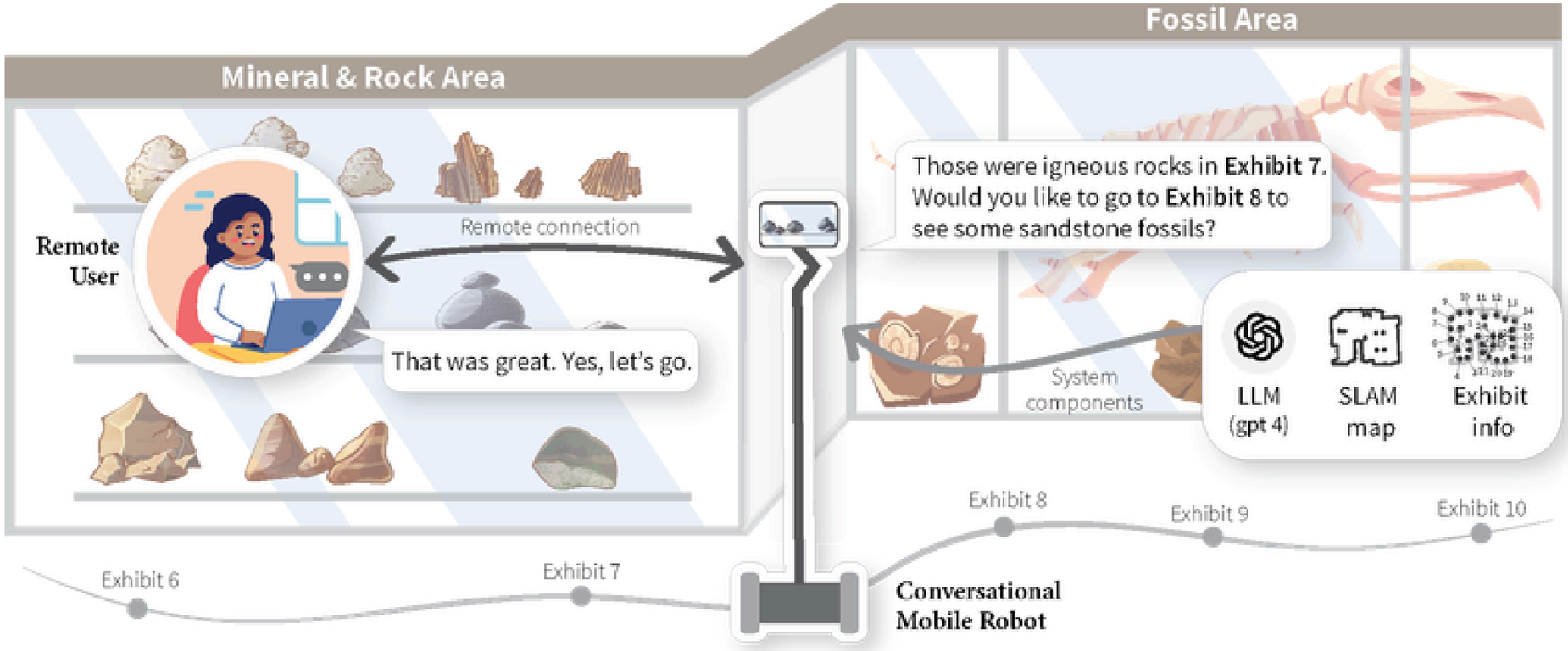


Along with the tour observations, we annotated **museum exhibits** and coded **tour books** to create a database of exhibit information, classifying information into museum-specific facts or general knowledge. We chose to distinguish these facts to create variations of conversations from informative descriptions to fun facts for conversational pleasure.

This database was used to create a **robust and knowledgeable conversational agent**.

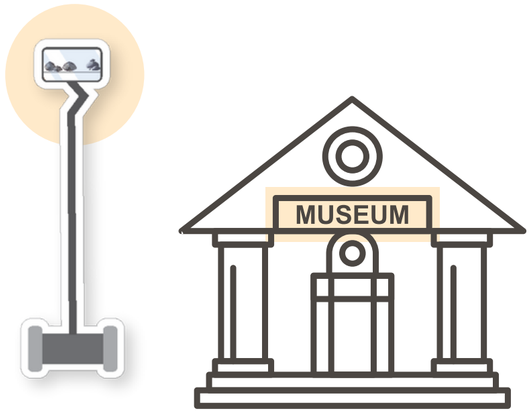
Interaction Paradigm in Context

Remote visitors experience the museum through the robot, commanding the robot to move (e.g., “Let’s move to the next exhibit”) or having a conversation (e.g., “Where are sandstone fossils found?”).



User Study Format

To understand how visitors remotely experience a museum via a robot with conversational abilities, we conducted an exploratory session and sought feedback through post-task surveys and in-depth interviews.



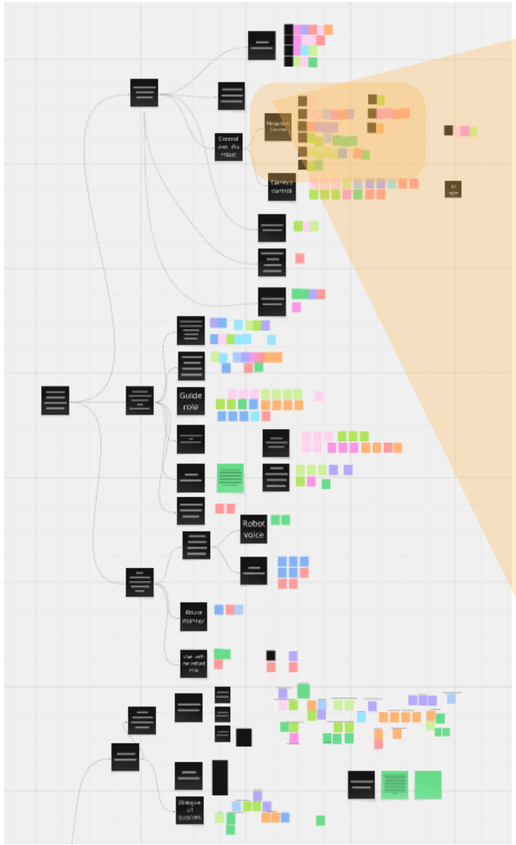
Exploratory Session

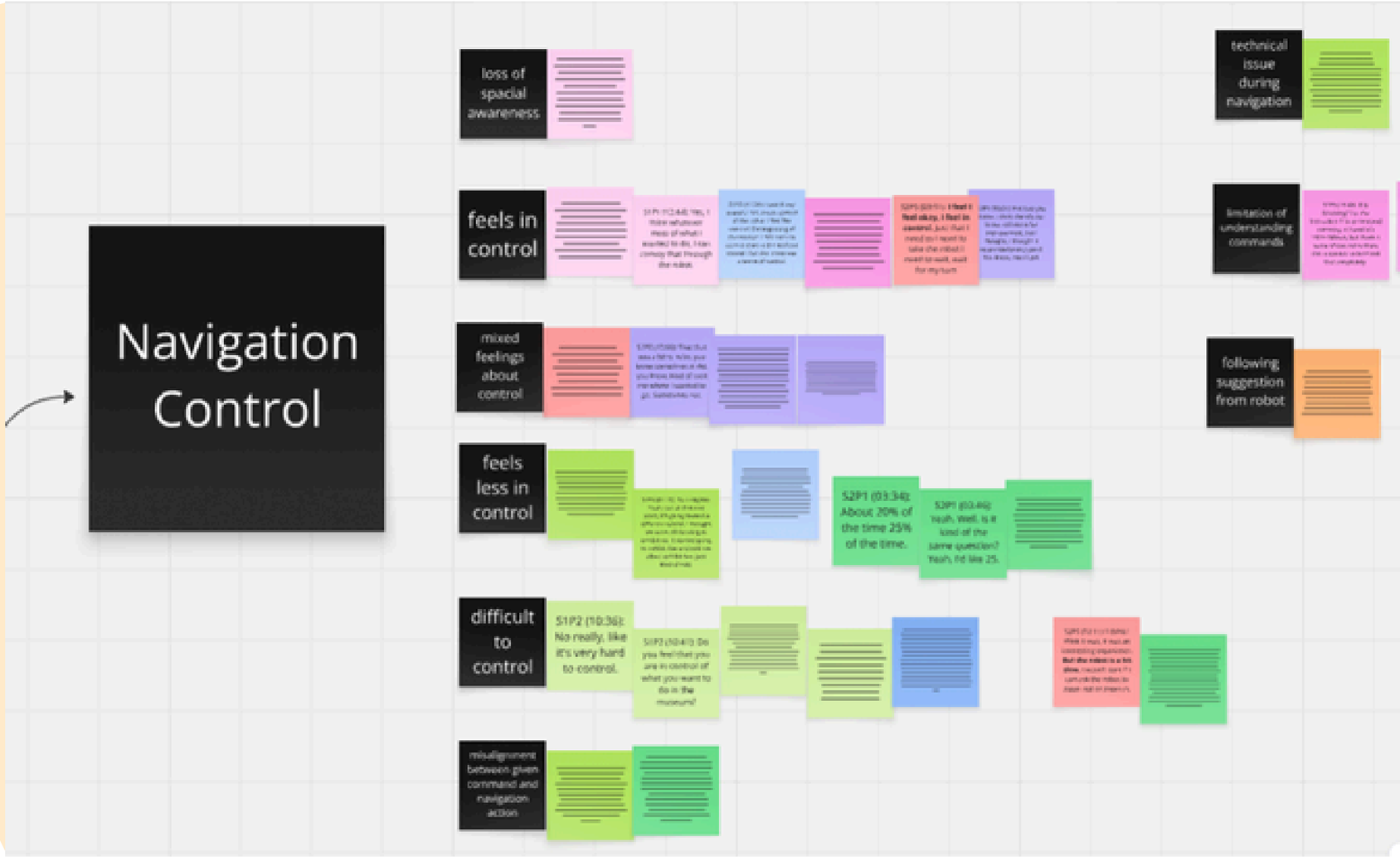
Post-task Survey

Interview

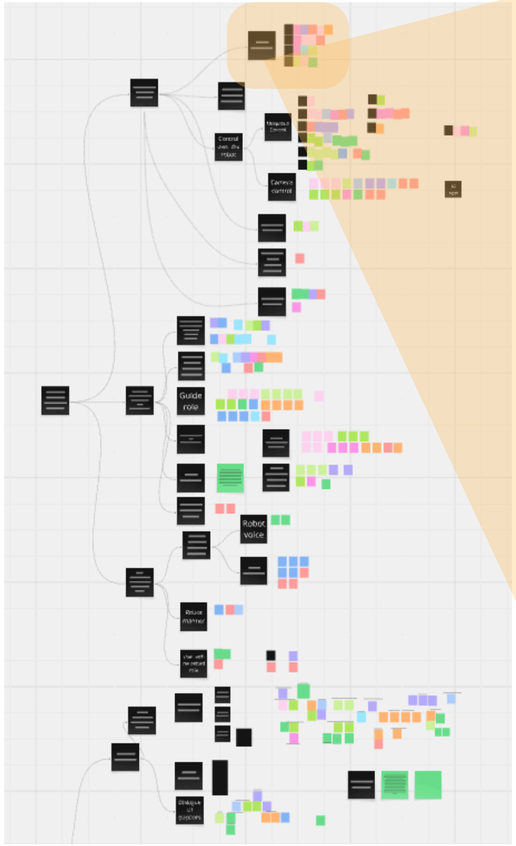
Affinity Diagramming

After coding the inteviews, we created an affinity diagram to identify salient themes from the participants' museum experience.





Affinity Diagramming (cont.)



Visual experience

visualization of object focus

expected visual capabilities

augmenting visual component of the interface

S1PS (10:59): I think, because we are visiting a museum, **I would prefer at least an image.** Also, it can understand image stuff.

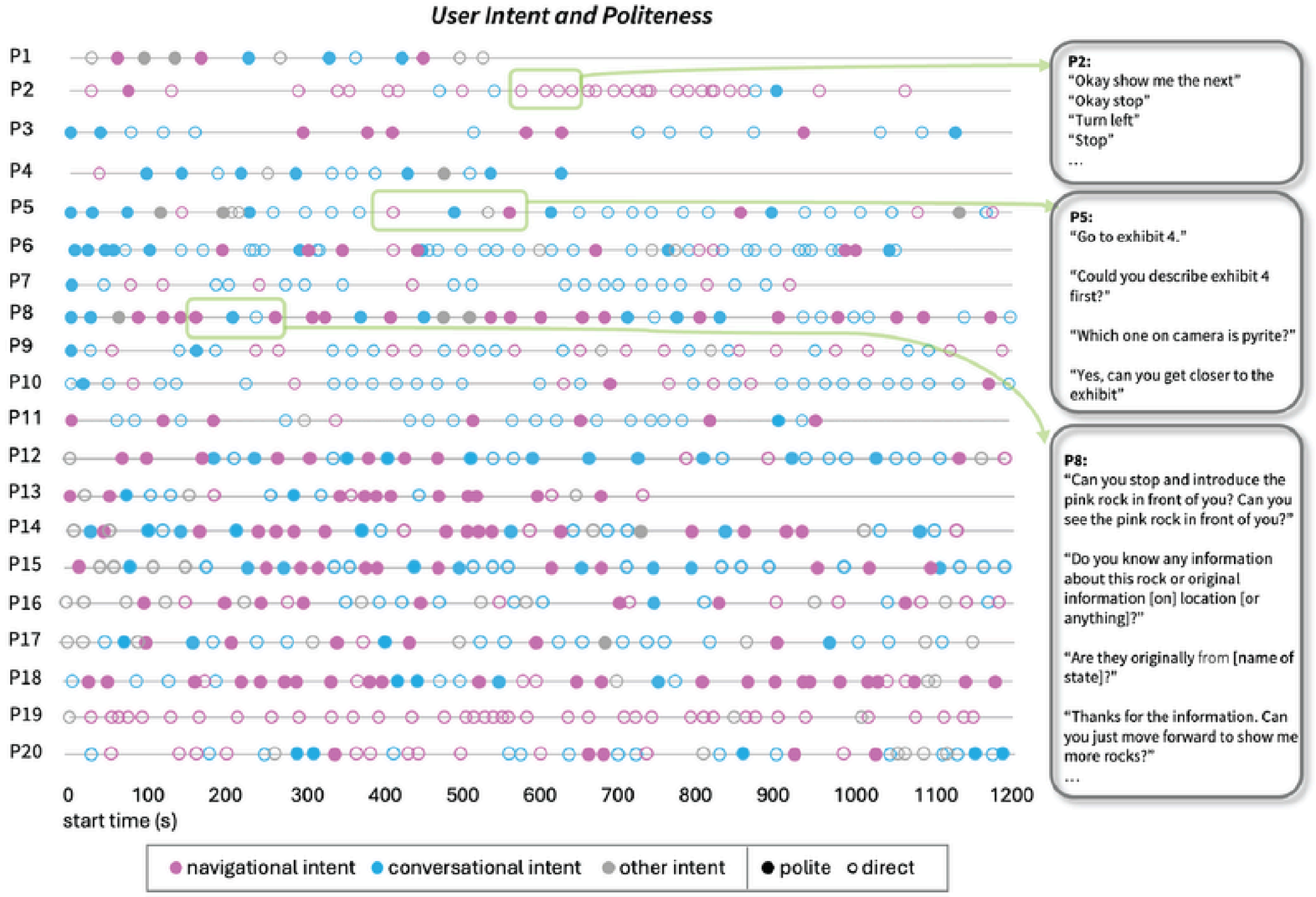
miscellaneous (stabilization)

S1P1 (11:38): Yeah, I think maybe the mechanical system can be improved a little bit. It's, it seems like it's shaking when it's moving. But then yeah, the other other things.

Data Visualization of Conversations

We analyzed and visualized the types of conversation and level of formality from each participant.

We identified different **usage patterns** (e.g., primarily using the robot to navigate vs. chatting with the robot as a companion). We also uncovered diverse **levels of formality** a participant had with the robot (e.g., “Turn left” vs. “Could you please turn left”).



Reflections

From the user studies and interviews, I found the following points impact my design and research perspective:

- **Visualizing system transitions bridges the gap between expectations and reality.** Clear status cues (e.g., loading a response) encourage users to be patient with a system.

- **People approach new technology with curiosity and skepticism.** When users “stress-test” a system, their behaviors can highlight underlying priority and trust-related values.

- **Design for both functionality and emotional shifts.** User may be warm and affectionate one moment and highly utilitarian in another; systems should adapt to these nuances.

Case Study 2:

Designing a Collaborative System for Grandparents and Grandchildren

Collaborators:
Callie Y. Kim, Nathan T. White,
Hui-Ru Ho, Christine P. Lee,
Yuna Hwang, Bilge Mutlu

Project Highlights

Problem: Grandparents and grandchildren may struggle when collaborating due to differing levels of familiarity with technology

Methods Used: Workshop Deployment, Group Interviews, Surveys, Affinity Mapping

My Role: UX Researcher & Workshop Facilitator

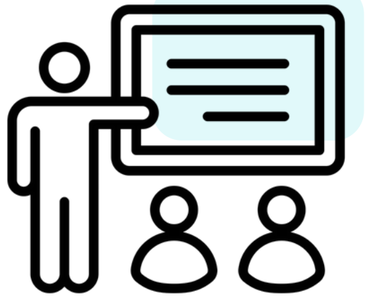
Responsibilities: User Study Design, System Design, Workshop Design, Interview, Video Analysis, Workshop Facilitation, Thematic Analysis

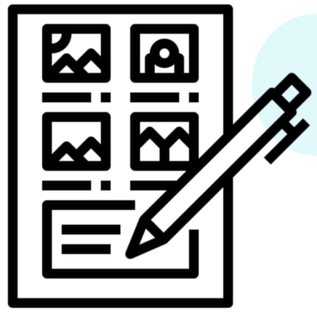
Designing a Collaborative System for Grandparents and Grandchildren

Overview: Differing familiarity with technology can hinder grandparents and grandchildren when working on computer tasks together. Thus, we designed a workshop and robot programming interface that leverages AI to bridge communication and facilitate collaboration.

Process:

Lesson on Robotics → Storyboarding Session → Programming Activity → Group Interview

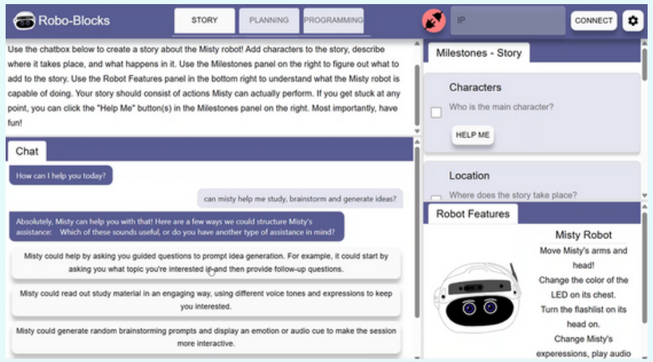




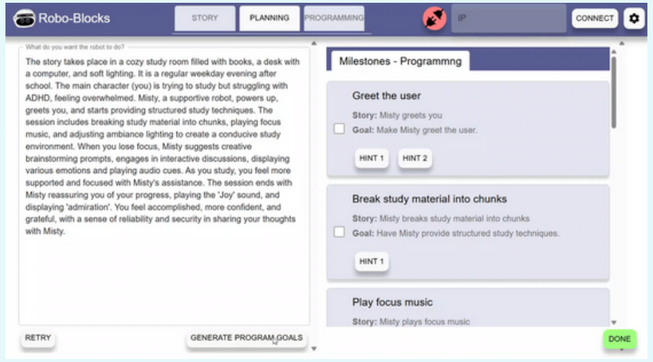
Overview of Robo-Blocks

We designed Robo-Blocks, an AI-powered robot programming system. Users can work with an LLM agent to create a story narrative, plan goals to program a robot, and finally program the robot.

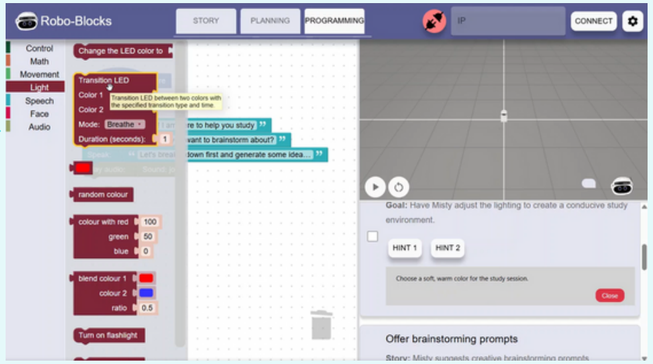
story creation



planning goals



robot programming



Flow of Robo-Blocks

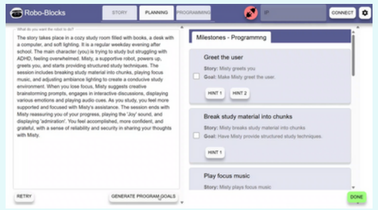
1

story creation

Grounded in the Self-Regulated Strategy Development (SRSD) approach, users work with an AI chat agent to create a narrative.

2

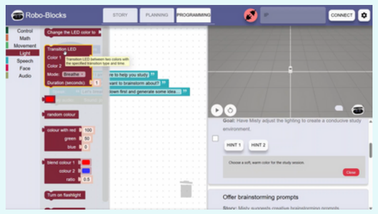
planning goals



The system then translates and breaks down the narrative into robot-programmable tasks for the users.

3

robot programming



The user then programs a robot, using AI-generated hints as necessary to complete programming tasks.

Workshop Setup

We hosted a workshop where **29 groups of grandparents and grandchildren** learned about social robotics and used Robo-Blocks to program a robot, Misty.

Select Reflections after Using Robo-Blocks

Through group interviews, we uncovered the following experiences and opinions:

Robo-Blocks enabled users to interweave complementary strengths

"Well [my grandchild] knew more about it than I did. So I kind of let him take the lead. And he had an idea and just work[ed] with it. And I suggested a few things."

-Grandparent A

Robo-Blocks highlighted AI in a different light

"I don't have such a bad thought about AI anymore... in a way, it's... two of us (grandparent and grandchild), and then the AI is a third entity. So we're all helping each other."

- Grandparent B

How Users Interact while using Robo-Blocks

We observed and identified categories of how grandparents (GP) and grandchildren (GC) interacted with one another while using Robo-Blocks.

Interaction Category	Observed Behavior	Interaction Direction
Collaborative Ideation	Soliciting ideas for the story	GC ⟺ GC or GP
Praise/Compliment	Praising or complimenting the other person's idea or skill	GC ⟺ GP
Encouragement	Encouraging the other to contribute or share ideas	GP ⟹ GC
Shared Laughter	Laughing together while discussing ideas	GC ⟺ GP
Language Assistance	Requesting help with spelling or grammar	GC ⟹ GP
Clarification Requests	Clarifying AI responses or intentions	GP ⟺ GC
Technical Assistance	Seeking help with typing tasks or using the computer mouse	GC ⟹ GC or GP

Reflections

From the workshop sessions and group interviews, I found the following points impact my design and research perspective:

- **A person's familiarity with technology may be shaped by family values and upbringing,** highlighting the need to identify a person's prior exposure and experiences.

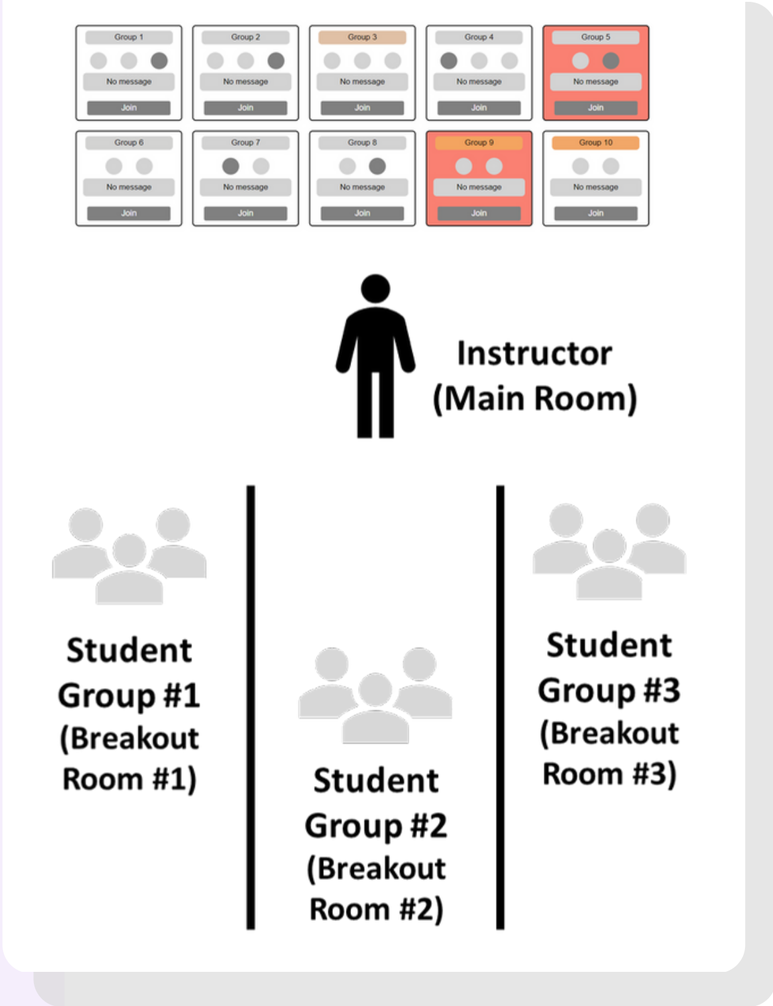
- **Interfaces can highlight people using them,** influencing how users see themselves and their collaborators, and bringing forth individual thought processes and solutions.

- **Diverse attitudes toward technology help reveal opportunities for better design.** Even when we disagree, exploring these perspectives can strengthen technology development.

Case Study 3:

Developing a System for Instructors to Manage Online Group Discussions

Collaborators:
Zefan Sramek, Koji Yatani



Project Highlights

Problem: Instructors face a “void” due to a lack of context when overviewing parallel groups of students during online classes

Methods Used: Participatory Design, Feedback Session, Interviews, Surveys

My Role: Lead UX Researcher

Responsibilities: Sketch and Prototype Creation, Interview, Design User Study, Thematic Analysis, Data Visualization Design, Usability Testing

Developing a System for Instructors to Manage Online Group Discussions

Overview: With the move to online classes, instructors faced a “void” in awareness when managing groups of students. Via Zoom, instructors could be immersed with a group, but lose context of other groups. To address this, we investigated how their classroom practices shifted and designed an interface to visualize student group activity.

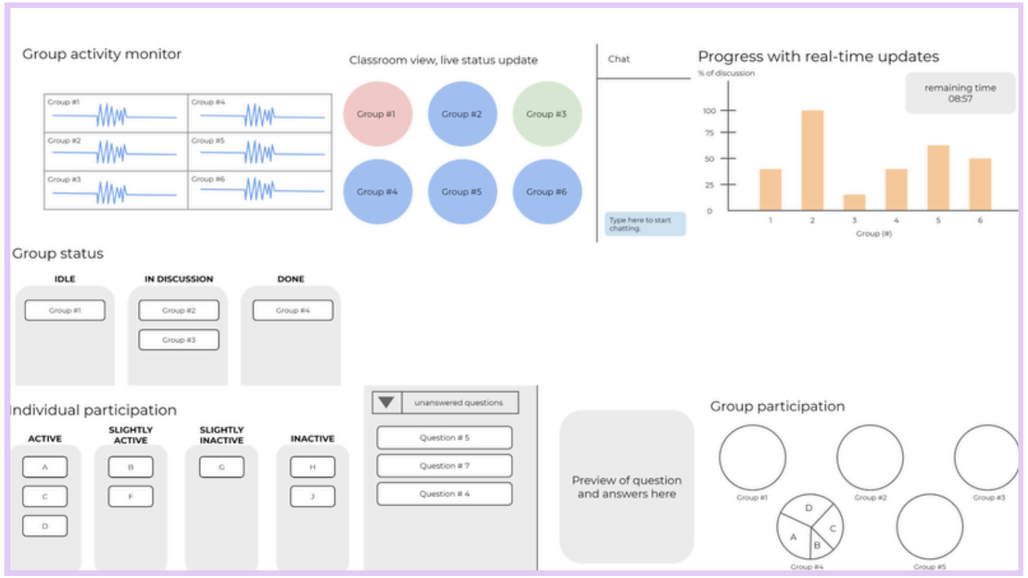
Process:

Participatory Design  Sketch and Prototype Development → Usability Testing

Participatory Design Sessions

We worked with **4 experienced instructors** experienced a shift to fully online classes. We conducted 4 sessions where we collaboratively **brainstormed and reviewed sketches and low-fidelity prototypes.**

examples of early sketches

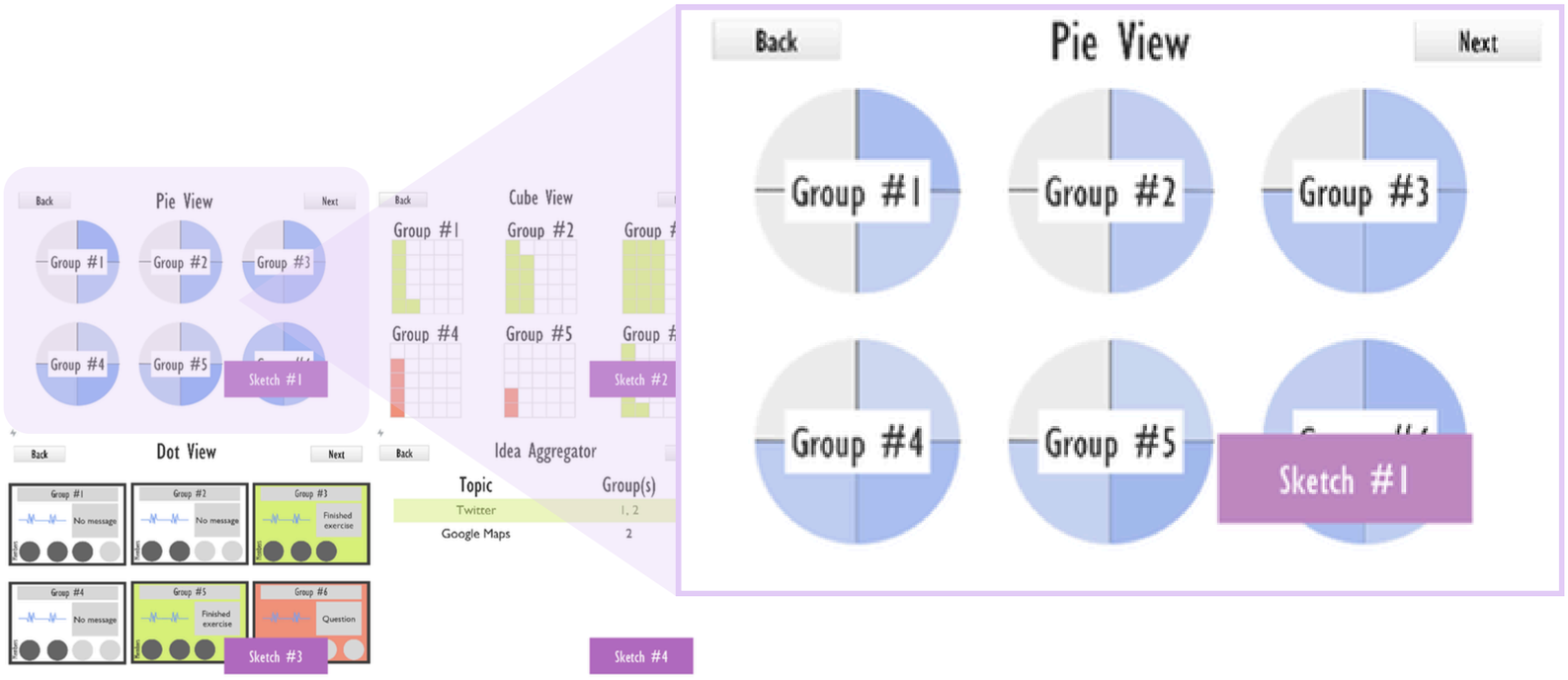


examples of later designs

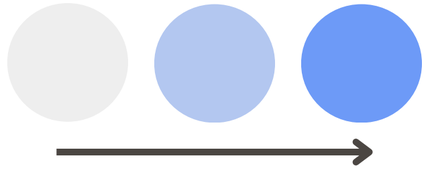
Closer look into select designs →

Examining Prototype Designs

Early design concepts, including sketches and low-fidelity prototypes, were created using slide decks and Justinmind, a prototyping tool, to explore and capture the instructor's preferences.

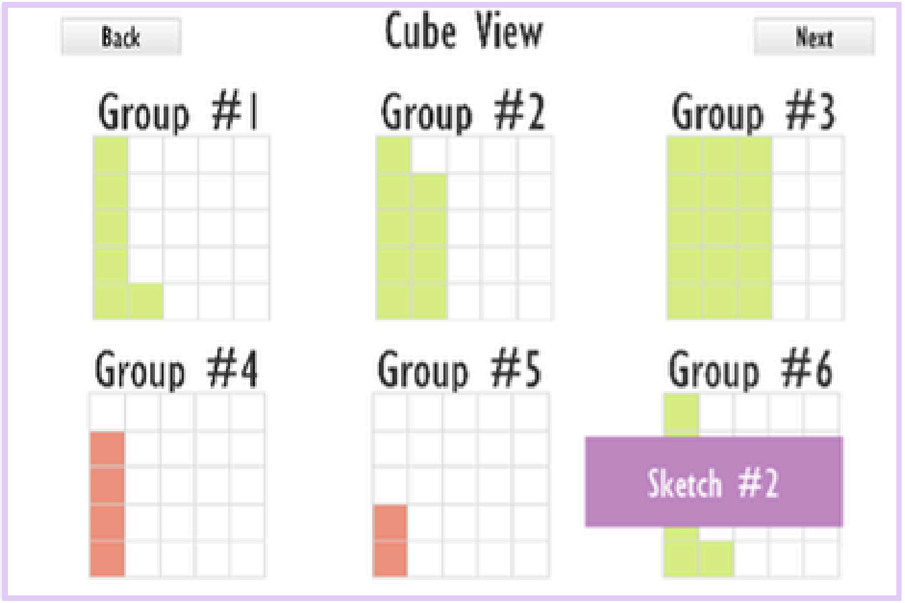


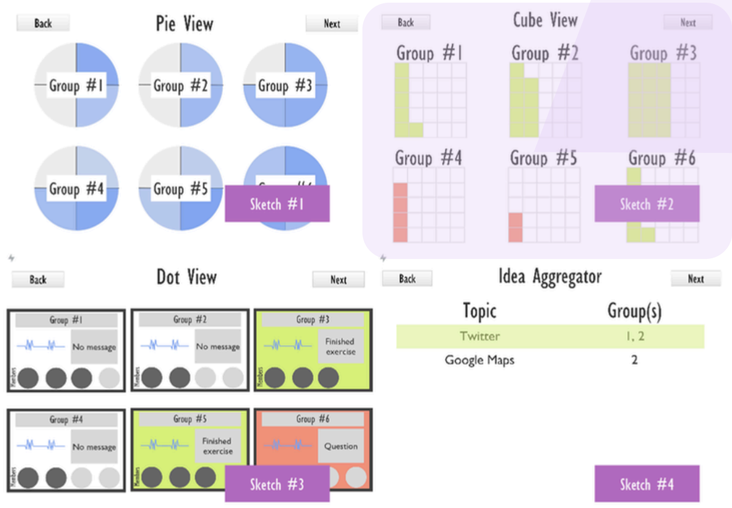
We explored how to visualize silences in conversations. To prevent information overload, we co-designed color-changing components to give glanceable information to instructors.



color changes
as silence continues

Examining Prototype Designs (cont.)





We also explored quantifying student productivity. However, instructors shared their reluctance as the visualization allows them to compare students.

> “I feel like the [detailed view] almost gives the sense that it’s like a race between the [students] and I don’t want to view it that way. And I don’t want one implicit bias to emerge that this [student] is ahead and that [student] is not...”
>
> - Instructor A

Participatory Design Sessions

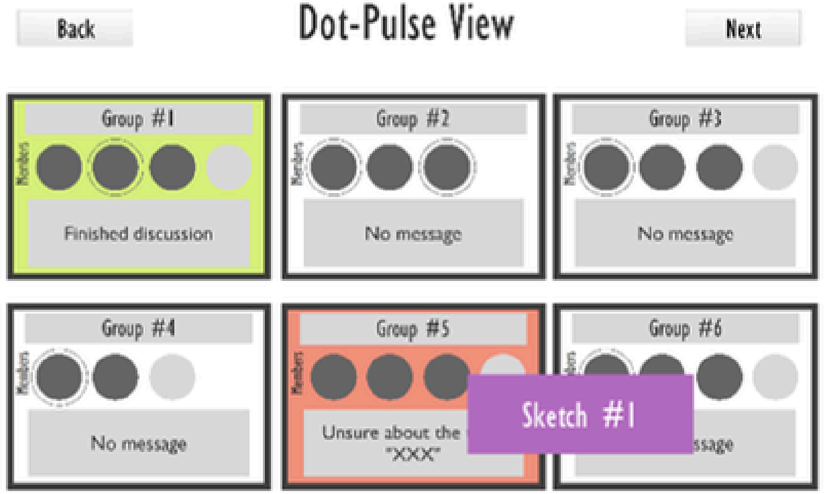
Takeaways

What information should be presented?

- Vocal data, Direct messages, and Status indicators

How should this information be displayed?

- **Aggregate view** of all groups in a single interface
- Visualize **individual-level participation** in a group
- Visualize **recent vocal activity**
- **Avoid overly detailed** visualizations about individuals
- Allow students to **convey their status**



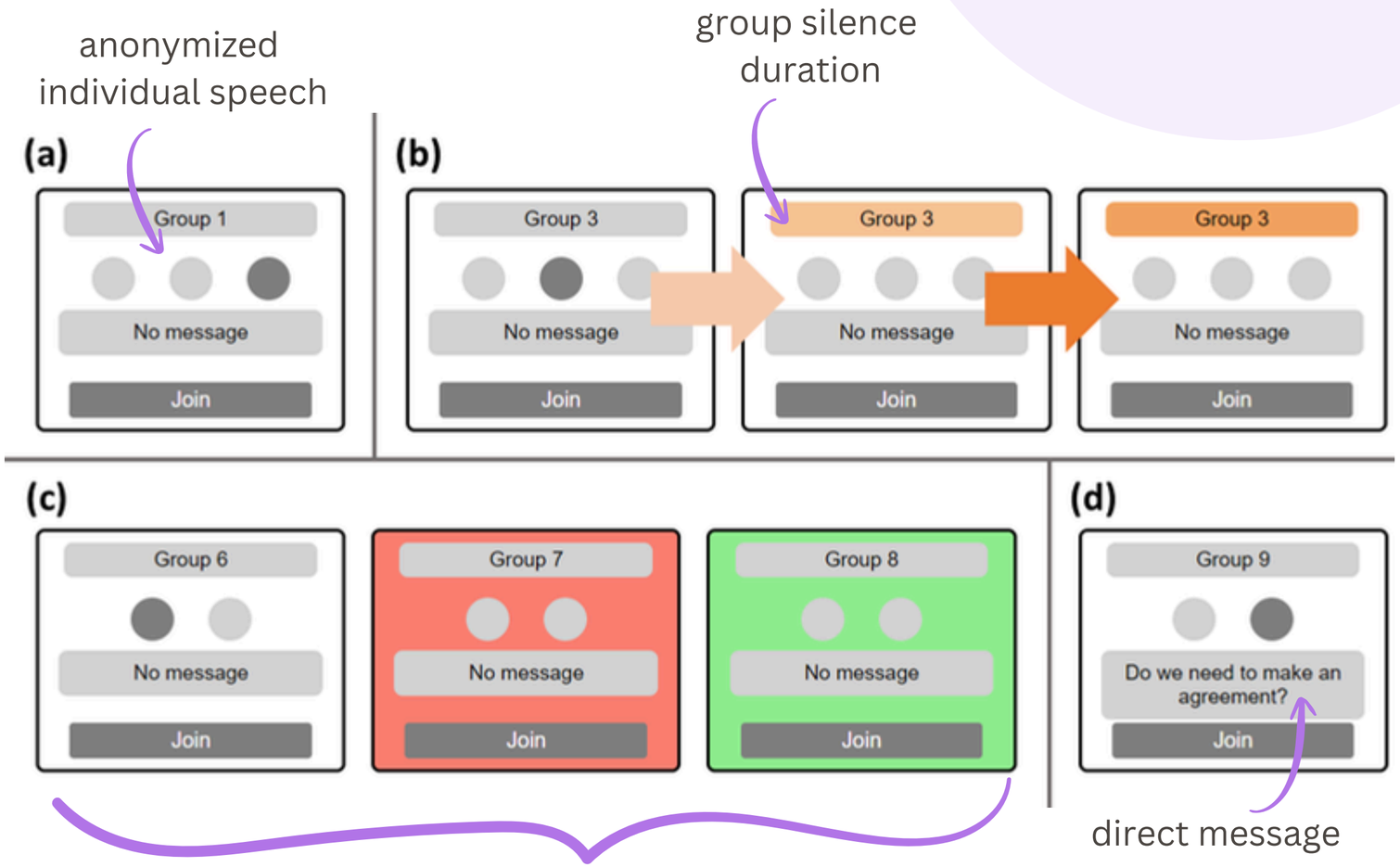
example design from final session

Overview of Groupnamics

Using insights from the participatory design, we implemented Groupnamics, an interface to overview group discussions with four core features:

a) anonymized individual speech,
b) group silence duration,
c) group status visualization, and
d) direct messages

Groupnamics was developed as a web application using Javascript, HTML, and CSS.



User Study Format

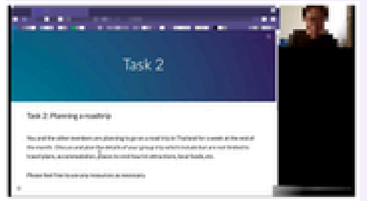
To understand how an instructor would use Groupnamics compared to a baseline interface, we conducted a within-participant design evaluation where instructors overviewed pre-recorded student discussions.

Interface #1 | Post-task Survey | Interface #2 | Post-task Survey | Interview

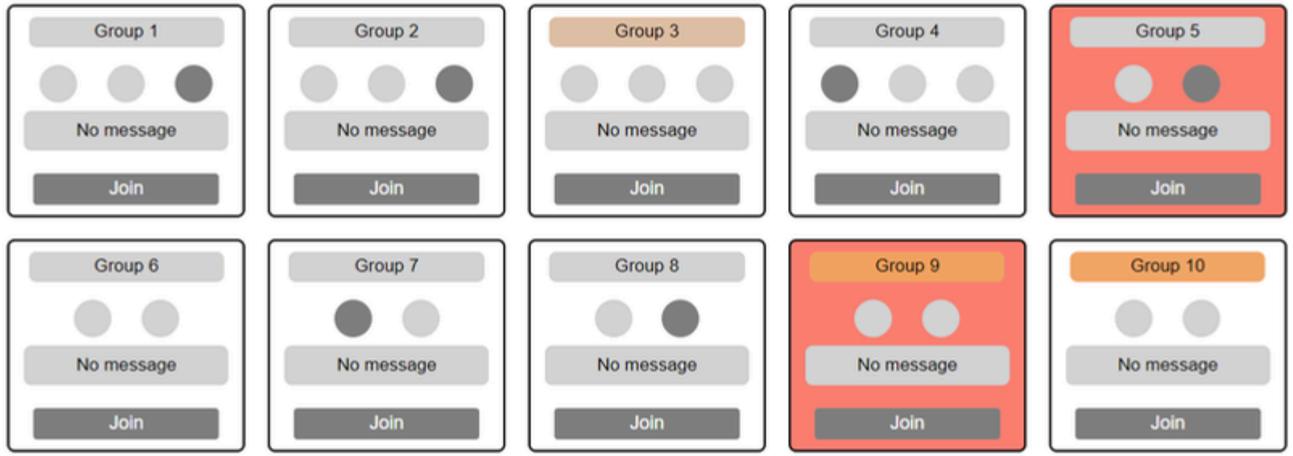
Student Discussion Dataset

To simulate an online classroom, we collected data and video recorded **10 groups of 2~3 students** who worked on tasks as a group. Each group complete two tasks and **extracted information from their conversations**, including timing of speech utterances per individual, and direct messages and status updates from inputted text.

These extracted details were stored in a database and visualized on an interface for later use in our user study to simulate an online class.



recorded group discussion



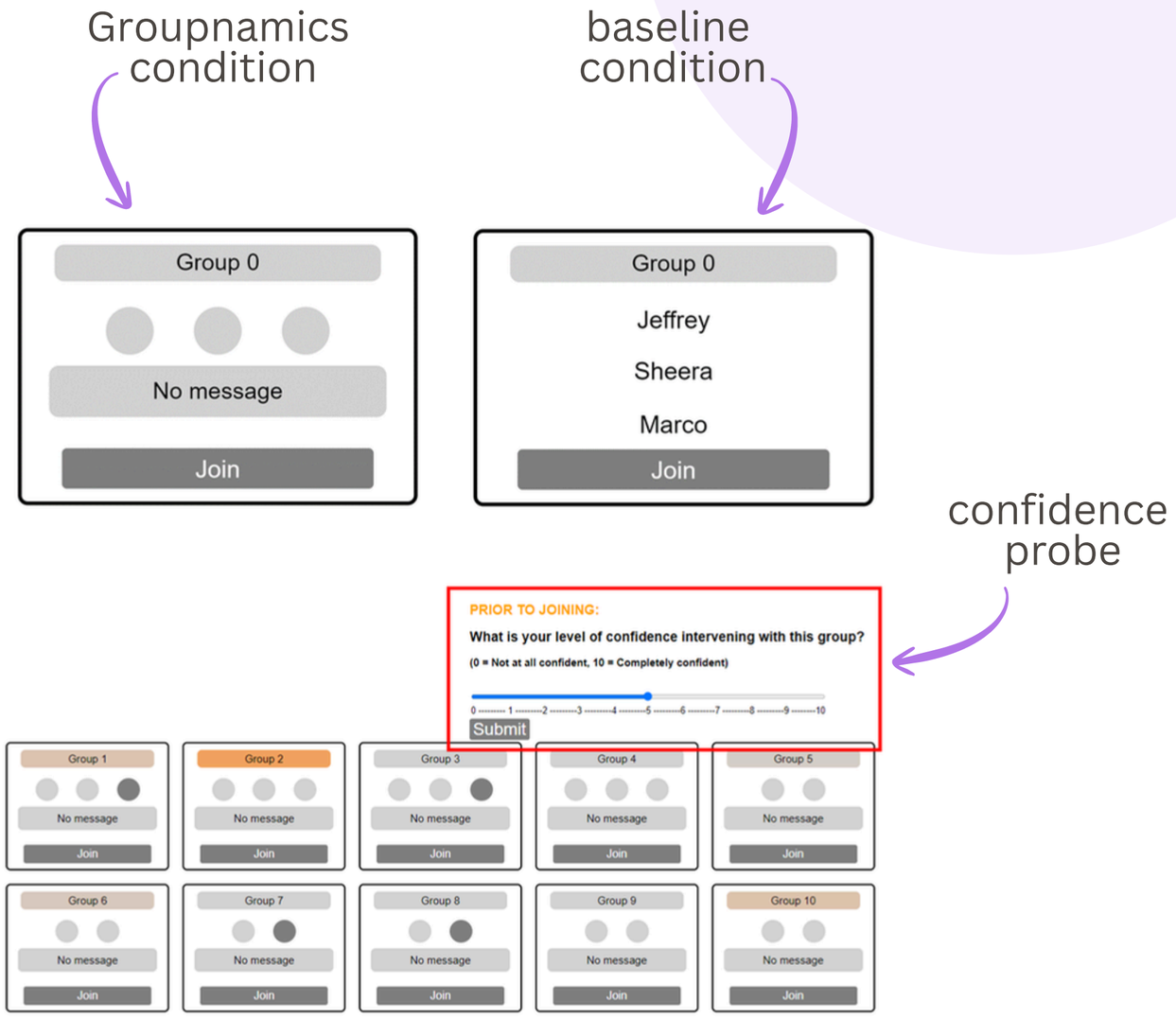
representation of 10 student groups working in parallel

User Study Design

We compared Groupnamics to a baseline condition, similar to commercially available interfaces that list the participants' names.

We augmented the system with a **confidence probe** to capture a participant's confidence before and after joining a group in situ to understand how the visualization affects a participant's decision to join a group.

We recruited **16 instructors** with experience facilitating online courses with groups to understand the usability of the system.

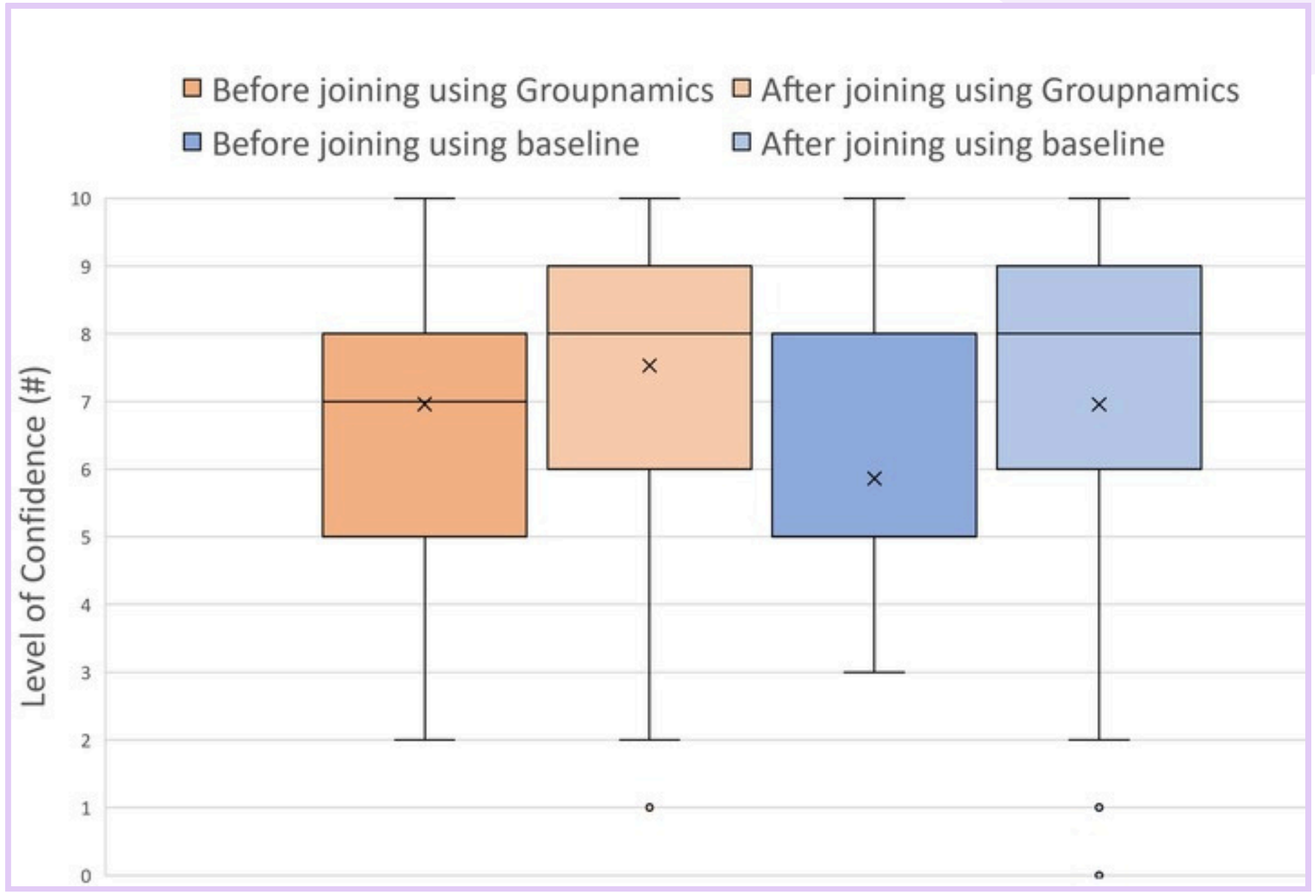


Outcomes: Perceived Confidence

Analyzing the confidence probe, we found the participants' average level of confidence using Groupnamics was significantly higher ($t(15)=2.54$, $p<.05$, Cohen's $d = 0.67$ [95%CI: -0.07, 1.42]) than the baseline condition: 6.67 (SD=1.19) and 5.79 (SD=1.43), respectively.

Participants shared three major reasons for positive effects of Groupnamics:

- confirming that students require help (14 instructors)
- visualizing the fluency of the conversation (10 instructors)
- providing confirmation that students completed their task (3 instructors)



Select Reflections after Using Groupnamics

Through interviews, we uncovered the following experiences and opinions:

Designs should balance information and empathy

"Too much information [about the students] in an interface [wouldn't] be a good thing... I don't think that would give students enough space to think... if the student [knows] that whether [they are] speaking or not will be shown [on an interface]... as a student, I [would] be very stress[ed]."

- Instructor B

Groupnamics can indicate both workload and next steps

"I think that visualizing discussion activity in that way... makes it very easy for the instructor to assess and understand in real time what's happening across 10 diferent breakout rooms... but at the same time, it could have a sensorial overload or cognitive overload on the instructor as well..."

- Instructor C

Overview of Findings

From the interviews, participatory design sessions, and user study, I found the following points impact my design and research perspective:

- **Privacy feels different in online contexts.** In physical spaces, overhearing conversations may feel natural, but online, it may feel like surveillance.
- **Transparency can be a double-edged sword.** While often prioritized in design, transparently visualizing data may introduce distractions without actionable next steps.
- **Visualize insights, not impositions.** Overviewing systems should highlight interaction patterns without pressuring users on how to act.

Arissa Sato, PhD

Thank you for your time! Please feel free to reach out to inquire further about ongoing work.

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