Chapter 5: Social Interaction

5.1 Introduction 🌍🤝📱

Key Points & Attributions:

- **Human Social Nature**: 🌐👥 People are inherently social—living, working, playing, and learning together.
- **Technologies for Social Connection** 📱💻🎮:
  - Technologies like smartphones, social media, videoconferencing, messaging, and gaming help us stay social even when we are physically apart.
  - These tools are now embedded in our daily lives, supporting different ways of connecting.
- **Focus on Communication & Collaboration** 💬🤝:
  - This chapter explores how people communicate and collaborate both face-to-face and remotely.
  - Aim: To provide insights that help design better social technologies to support everyday interactions.
- **Impact of Communication Technologies** 📞👫:
  - Technologies have changed how we live, make friends, stay in touch, and manage social and work relationships.
- **Adaptation of Conversation Mechanisms** 🗣️➡️💬:
  - Face-to-face conversation methods have been adapted for remote, technology-based interactions.
- **Social Games** 🎮👾:
  - Social games are highlighted as a popular genre for promoting social interaction.

Quotes & Attributions:

- **Authors of Section 5.1**: "A diversity of technologies has been developed specifically to enable us to persist in being social when physically apart from one another."

5.2 Being Social 👥🌐📱

Key Points & Attributions:

- **Importance of Social Interaction** 🤝:
  - Socializing is a fundamental part of life, including sharing news, updates, and events—whether it's at work, home, or with friends and family.
- **Shift to Online Communication** 💬📲:
  - Social media usage has dramatically increased, with many hours spent messaging, tweeting, and videoconferencing.
  - Workplace communication tools like WhatsApp, Slack, and Teams have become standard.
- **Impact of Social Media on Connections** 🌍🔗:
  - Before COVID-19, the rise of social media saw people having large online networks (e.g., 300+ Facebook friends or 1,000+ LinkedIn connections).
  - Social computing tools like shared calendars (e.g., Google Docs, Miro) have also transformed how we connect.
- **COVID-19 and Social Distancing** 🦠🏠:
  - The pandemic led to a huge increase in the use of videoconferencing tools like Zoom and Teams for work, study, and socializing.
  - Social bubbles were introduced, with schools, universities, and households adapting to limit physical contact.
- **Hybrid Working After the Pandemic** 💻🏙️:
  - Hybrid models became more common, but remote participants often had a less immersive experience compared to those in person.
  - Issues included tech setup problems, and challenges in making hybrid meetings as engaging as in-person ones.
- **Zoom Parties and Social Adaptations** 🎉💻:
  - During the pandemic, "Zoom parties" became a social phenomenon—people would chat, play games, and celebrate together online.
  - **Yvonne Rogers (2020)**: Shared personal experiences of Zoom birthday celebrations and the challenges of missing in-person connections.
- **Concerns About Screen Time** 📱⏳:

    - Growing concerns around the impact of screen time on well-being. Surveys show people spend 5-6 hours a day on their phones (Ceci, 2022).
    - **Sherry Turkle (2015)**: Warns of the negative impact on conversations and empathy due to increased online communication—urging people to "reclaim conversation."

- **Technologies Promoting Social Interaction** 🗣️📢:
    - Voice assistants like Amazon Echo provide interactive experiences for families (e.g., "Open the Magic Door"), encouraging joint use in shared spaces.

- **Changing Social Norms** 🔴🙋:
    - Social etiquette adapted during videoconferencing, like muting oneself or using emoji reactions (e.g., raising a virtual hand or clicking emoji like hearts ❤️).

- **Social Activity Planning** 📅🤔:
    - A shift from phone calls to WhatsApp groups for planning events, but often leads to delays and miscommunication. Teens particularly wait till the last moment for better social offers, making pre-planning challenging.

Quotes & Attributions:

- **Sherry Turkle (2015)**: "It is time to reclaim conversation... to put down our phones more often and (re)learn the art of talking to each other."
- **Yvonne Rogers (2020)**: Documented the emergence of Zoom parties and the longing for physical connection during the pandemic.

5.3 Face-to-Face Conversations 🗣️👥🎶

Key Points & Attributions:

- **Conversations as Collaborative Achievement** 🤝🎵:
    - Holding a conversation is a skilled collaboration, like a musical ensemble. Understanding how conversations progress helps in designing better chatbot dialogues and voice assistants.

- **Conversation Starters & Enders** 📞👋:
    - Conversations often begin with mutual greetings ("Hi!" 👋) and end with farewell rituals ("Goodbye!" 👋). Implicit cues like checking the time also signal the end of a conversation.

- **Phone vs. Online Conversations** ☎️💻:
    - Phone calls often start with a greeting ("Hello, John!") and end with formal farewells, while online chats often skip these and go straight to the point.

- **Email Study on Replies** ✉️💬:
    - **Brendan (2017)**: Analyzed 300,000 emails. Casual openings like "Hey" and endings with "Thanks"

received higher reply rates compared to formal phrases.

- **Turn-Taking Rules** 🔄🗣️:
  - **Sacks et al. (1978)**: Defined three turn-taking rules:
    a. Speaker chooses next person.
    b. Someone else decides to speak.
    c. Speaker continues if no one else speaks.
- **Cues for Turn-Taking** ✋👀:
  - Signals include lowering/raising voice, body language, back-channeling (e.g., "uh-huh"), and gestures like raising hands.
- **Adjacency Pairs for Coherence** 💬➡️💬:
  - **Schegloff and Sacks (1973)**: Conversations often occur in pairs (e.g., Question ➡️ Response) to maintain coherence.
- **Conversation Breakdowns & Repairs** 🛠️🤦:
  - Breakdowns happen when misunderstandings arise. Repair mechanisms like repeating louder or using gestures help correct these misunderstandings.
- **Nonverbal Communication** 🖐️👀:
  - Nonverbal cues (gestures, facial expressions, voice intonation) are key in face-to-face interactions to signal meaning beyond words.
- **Chatbots and Turn-Taking** 🤖🔄:
  - Conversational interfaces like **Replika** mimic human conversation by encouraging turn-taking. Chatbots are evolving to mediate work meetings and steer conversations effectively (Reicherts et al., 2022).

Quotes & Attributions:

- **Brendan (2017)**: Casual greetings like "Hey" and ending with "Thanks" led to higher reply rates in email conversations.
- **Sacks et al. (1978)**: Defined key rules for managing turn-taking in conversations.
- **Schegloff and Sacks (1973)**: Discussed the use of adjacency pairs to maintain conversation flow.

5.4 Remote Collaboration and Communication

5.4.1 Videoconferencing 📹💻🤝

Key Points & Attributions:

- **Early Videoconferencing Research** 📽️🕰️:
  - **Fish et al. (1990)**: Created the **VideoWindow**, a system that connected two distant lounges with large video projections, making conversations feel almost face-to-face.

    - Users spoke a bit louder and discussed the video system often during these early tests (Kraut et al., 1990).

- **Characteristics of Videoconferencing Behavior** 📞🗣️:
    - **Connaill et al. (1993)**: Found that during video calls, people projected themselves more, took longer turns, and interrupted each other less compared to in-person talks.
- **Modern Videoconferencing Tools** 💻🛠️:
    - Videoconferencing evolved significantly—Skype, FaceTime, Zoom, and Teams became popular, providing additional features like screen sharing, breakout rooms, custom backgrounds, and emoji reactions.
- **Zoom Fatigue** 😩💤:
    - **Bailenson (2021)**: Highlighted reasons for "Zoom fatigue," such as prolonged close-up eye contact, cognitive overload, self-evaluation from seeing oneself, and sitting in one place for too long.
- **New Virtual Spaces for Engagement** 🕹️👾:
    - During the pandemic, 2D virtual spaces like **Gather** allowed students to socialize more informally, creating avatars and moving in retro-style virtual areas to engage with others.
    - **Sococo** provided a similar experience, helping remote teams feel connected throughout the day (Kate Jones, UCL).
- **Concept of Social Translucence** 🌫️👥:
    - **Erickson and Kellogg (2000)**: Emphasized the importance of making participants and their activities visible to each other in virtual spaces, a principle integrated into tools like **Babble** and **Sococo**.
- **360 Cameras for Hybrid Meetings** 📸🔄:
    - Tools like **Meeting Owl** provided 360-degree views of meeting rooms, automatically zooming in on speakers to improve inclusivity for remote participants.
- **Hybrid Working** 🏠🏢⚖️:
    - After the pandemic, hybrid working became popular due to its flexibility—people saved time on commutes and worked more comfortably. However, remote participants often felt disconnected from office life.
    - **Microsoft (2022)**: Conducted research to make hybrid meetings more inclusive, experimenting with video feed placements to improve eye contact and shared document interactions.

Quotes & Attributions:

- **Bailenson (2021)**: Explained causes of "Zoom fatigue," including cognitive overload and prolonged eye contact.
- **Erickson and Kellogg (2000)**: Developed the principle of "social translucence" to ensure participants in virtual spaces were visible and their engagement apparent.

Here's a summarized and emojified version of Section 5.4.2 in list format:

5.4.2 Telepresence 🤖🌍👥

Key Points & Attributions:

- **Telepresence Definition** 🌐👀:
  - Telepresence refers to the perception of being physically present in another location while controlling a remote device, like a robot.
- **Telepresence Robots** 🤖👧:
  - Robots are used for remote events, enabling users to see and move around a distant space, enhancing their feeling of presence.
  - **Natalie Friedman and Alex Cabral (2018)**: Found that telepresence robots helped children with developmental difficulties feel more socially and physically confident.
- **AI-Enabled Telepresence** 🤖🧠:
  - **Ava the Robot**: Uses AI for autonomous navigation, moving to specified locations independently. However, this automation reduces user control, which impacts the sense of embodiment.
- **Social Presence vs. Telepresence** 👥💬:
  - **Short et al. (1976)**: Described "social presence" as the feeling of being with a real person virtually. It's different from telepresence, which involves a virtual person in a physical space.
- **3D Virtual Worlds for Socializing** 🌍💃:
  - Virtual spaces, like the **2020 ISMAR Conference**, used 3D environments to connect attendees. Avatars could perform actions like dancing and clapping, enhancing the feeling of social presence, but still fell short of true realism.
- **The Metaverse** 🕶️🌌:
  - The Metaverse aims to create a richer, immersive experience where digital avatars interact in 3D worlds.
  - **Mark Zuckerberg (Meta)**: Envisioned a more embodied experience using VR controllers to enhance the sense of presence. Current limitations include the absence of legs in avatars due to tracking challenges.

Quotes & Attributions:

- **Natalie Friedman and Alex Cabral (2018)**: Telepresence robots increased self-efficacy in children with developmental difficulties.
- **Short et al. (1976)**: Conceptualized "social presence" in telecommunication, emphasizing the realness of others in a virtual context.

5.4.3 Collaborative Tools 🤝🛠️📅

Key Points & Attributions:

- **Common Collaborative Tools** 📋💻:

    - Tools like shared calendars, word processors, and project management apps have become essential for both work and everyday life.
    - **Slack**: Used widely for work, social communication, team management, code sharing, and deployments—especially by software development teams (**Lin et al., 2016**). Developers often keep Slack open to chat and check on each other's availability.

- **Shared Calendars** 🗓️📆:
    - Tools like Google and Outlook calendars help people manage meetings and events. They are used both at work and at home to coordinate schedules, especially for family activities (birthdays, playdates, etc.).

- **Miro for Online Learning** 🎨📚:
    - **Nic Marquardt (UCL)**: Uses Miro for teaching interaction design. Students upload their design posters on the digital canvas, where others can zoom in, comment, and give feedback using digital sticky notes (yellow for students, orange for instructors).

- **Live Sessions with Miro** 🖱️✨:
    - During live classes, students move their cursors around the Miro board, which helps create a sense of shared space. Students enjoyed the visibility of activities and the collaborative nature of feedback.

- **People-in-a-Box** 📦👤:
    - **Proto (David Nussbaum, 2020)**: Developed a 3D box to display lifelike digital images of people. The 3D "people-in-a-box" provide an almost real-time interaction experience using embedded LEDs that create volumetric depth.

Quotes & Attributions:

- **Lin et al. (2016)**: Noted Slack's versatility in supporting work and social interactions.
- **Nic Marquardt (UCL)**: Demonstrated how Miro helps foster a sense of collaboration and awareness in online classes.

Here's a summarized and emojified version of Section 5.5 in list format:

5.5 Co-Presence 👥🤝✨

Key Points & Attributions:

- **Definition of Co-Presence** 📌👫:
    - Co-presence involves designing social technologies that support people interacting in the **same physical space**, enhancing activities like collaboration, learning, and socializing.

- **Goal of Co-Presence Technologies** 🛠️🎯:
    - These technologies aim to **augment co-located group interactions** to make collaboration more

effective.

- **Technologies Supporting Co-Presence** 💻🖐️:
  - Examples include **multitouch screens**, **mid-air gestures**, and **object recognition**—all designed to support parallel and interactive group activities.
- **Coordination and Awareness** 👀🤲:
  - To evaluate their effectiveness, we need to consider how people coordinate and maintain awareness during **face-to-face interactions** and how technology adapts or replaces these natural behaviors.

Quotes & Attributions:

- **Human-Computer Interaction Research**: Emphasizes designing technologies that adapt face-to-face coordination and awareness for group settings to make co-presence effective.

5.5.1 Physical Coordination 🤝🔄

Key Points & Attributions:

- **Verbal & Nonverbal Coordination** 🗣️🤫:
  - During close collaboration (e.g., moving a piano 🎹), people coordinate actions using **commands** ("Down a bit") and **nonverbal cues** like nods, winks, and gestures.
- **Gestures for Time-Critical Tasks** ⏱️✋:
  - For fast-paced or loud environments, gestures often replace spoken words. Examples include:
    - **Conductors** using batons to lead orchestras 🎼.
    - **Airport ground staff** signaling pilots with orange batons ✈️.
- **Universal & Cultural Gestures** 🌍✋:
  - **Common gestures** like beckoning, waving, and halting are used universally, though cultural differences affect their interpretation.
- **Using Physical Objects for Coordination** 🪄📊:
  - **Wands, batons, and other props** are used to support communication in groups. They serve as **external thinking aids**, helping people visualize and share ideas effectively (**Brereton & McGarry, 2000**).
  - **Holding or waving objects** helps grab attention and fosters **better group awareness** and understanding of the shared activity (**Fernaeus & Tholander, 2006**).

Quotes & Attributions:

- **Brereton & McGarry (2000)**: Physical props help explain principles or plans in group settings.
- **Fernaeus & Tholander (2006)**: Physical artifacts enhance awareness and exploration in collaborative activities.

5.5.2 Awareness 👀🗣️🔄

Key Points & Attributions:

- **Definition of Awareness** 🔍👫:
  - **Awareness** means knowing who is around, what's happening, and who's interacting with whom (**Dourish & Bly, 1992**). It's like observing a party—seeing who's chatting, who's entering or leaving, and keeping track of the vibe.
- **Peripheral Awareness** 👁️👂:
  - This involves keeping tabs on the surroundings while focused on something else. For example, noticing someone's mood or who's just arrived, all while in a conversation.
- **Situational Awareness** ⚠️💡:
  - This is about understanding what's happening around you and predicting how it affects ongoing events. It's crucial in dynamic environments like **air traffic control** or an **operating theater**, where constant awareness of complex information is needed.
- **Close-Knit Team Dynamics** 🤝🍇:
  - In **interdependent tasks**, awareness helps people collaborate efficiently—like performers monitoring each other to stay in sync. Teams develop a strong sense of what others are doing and adapt accordingly.
- **Classic Study: London Underground Controllers** 🚇🎙️:
  - **Heath & Luff (1992)**: Studied two controllers in the London Underground. Controller B would overhear Controller A talking to a train driver and take action, like making announcements, without needing explicit instructions. They showed how awareness enabled seamless coordination.

Quotes & Attributions:

- **Dourish & Bly (1992)**: Awareness includes knowing who's around and what's happening to maintain social context.
- **Heath & Luff (1992)**: Demonstrated how shared awareness helps controllers work in sync without direct communication.

5.5.3 Shareable Interfaces 🤝💻✨

Key Points & Attributions:

- **Shareable Technologies for Collaboration** 🖼️🙌:
  - **Whiteboards**, **large touchscreens**, and **multitouch tables** are designed to support group interactions by allowing multiple users to interact with the same content at the same time.
  - These technologies make use of **natural gestures** (fingers, pens) to improve awareness and comfort in group settings (**Müller-Tomfelde, 2010**).
- **Comfort in Group Interactions** 🤗🛋️:
  - Shareable surfaces like **tabletops** were found to be more comfortable for group collaboration

compared to working at a PC or standing in front of a vertical display (**Rogers & Lindley, 2004**).
    - This natural interaction encourages users to join in without feeling intimidated.

- **Augmented Reality Sandboxes** 🏞️🖌️:
    - **AR sandboxes** allow visitors, like children, to create collaborative landscapes using real sand combined with virtual effects, fostering creativity and communication among participants (Yvonne Rogers).

- **Equitable Participation with Shared Tables** ⚖️✋:
    - Research shows that **physical tokens** on tables lead to more equitable participation, encouraging those who are typically shy to contribute more without needing to speak up (**Rogers et al., 2009**).
    - People who spoke less verbally often contributed more through the tabletop, showing that the **form of interaction affects group dynamics**.

- **Reflect Table for Real-Time Feedback** 🗣️🔄:
    - **Reflect Table** used **LED lights** to show how much each person was speaking during a group discussion (**Bachour et al., 2008**).
    - Findings were mixed: those who spoke too much often reduced their speaking level, while those who spoke too little did not increase much.

- **Design Challenges for Shareable Interfaces** 🚧👩‍🦰:
    - Providing real-time feedback can be intimidating for some, especially those who already speak less.
    - Designing **discreet ways** for people to contribute can help those who find it hard to speak up, such as people on the **autistic spectrum** or those who are **shy**.

- **PeopleLens for the Visually Impaired** 👓🔊:
    - **PeopleLens** is a head-mounted device that uses **computer vision and audio cues** to help blind individuals engage socially by identifying who is nearby and their gaze direction (**Cecily Morrison et al., 2021**).
    - It helps the user remember positions and names, creating a richer sense of spatial awareness and interaction.

Quotes & Attributions:

- **Müller-Tomfelde (2010)**: Investigated shared technologies for improved co-located collaboration.
- **Rogers & Lindley (2004)**: Found shareable surfaces to be more comfortable for group work.
- **Rogers et al. (2009)**: Physical tokens improve group participation at shared tables.
- **Bachour et al. (2008, 2010)**: Used Reflect Table to analyze group talk dynamics and the impact of real-time feedback.
- **Cecily Morrison et al. (2021, 2022)**: Developed PeopleLens to enhance social awareness for visually impaired users.

5.6 Social Games 🎮👫✨

Key Points & Attributions:

- **Social Games Defined** 🎲🤝:
  - Social games are designed for **interaction**, played indoors or outdoors, with or without technology. These include board games, video games, and augmented games where players cooperate or compete while staying aware of each other's actions.
- **Popular Video Games for Social Interaction** 🕹️🗣️:
  - Games like **Fortnite, Roblox, and Minecraft** support social play where players communicate in real time, often using **Discord** for voice or text chats. Some games even offer a **whisper** function for private chats.
- **Augmented Social Games** ✋🤖:
  - Classic games like **Rock Paper Scissors** have been adapted into augmented versions using **Alexa skills**, enhancing social bonding with laughter and fun for co-located families (**Beirl et al., 2019**).
- **Community in Social Games** 🌐👥:
  - Social games can create communities where emotions like **competition, collaboration, and peer pressure** come into play.
  - **Matt Richetti (2022)**: Proposed three heuristics to assess social games—type of interaction (synchronous or asynchronous), relationship symmetry, and strength of social ties.
- **Minimalist Social Game - Journey** 🏜️🎵:
  - **Journey by Jenova Chen**: A unique game where players control a robed figure traveling through a desert. Communication is done through musical chimes instead of words, emphasizing exploration and connection rather than competition.
- **Live Streaming and Social Interaction** 📺📣:
  - Watching others play, also called **live streaming**, is a popular form of social media. Platforms like **Twitch and YouTube** allow streamers to connect with audiences in real time, creating a sense of community. **Ninja** is a famous example, with millions of followers on both platforms.
- **Small-Scale Social Streaming** 👥🌳:
  - The best community experiences often happen with **smaller streamers**, where fewer viewers create a more intimate and connected environment, similar to families watching children play soccer in a park.

Citizen Science & Community Engagement 🌱🔬:

- **Citizen Science** 📊🌍:
  - Citizen science involves everyday people collaborating with scientists to collect and analyze data, made easier by the **Internet and mobile devices**. Projects range from monitoring rain gardens to identifying galaxies.
  - Portals like **Zooniverse** and **Scistarter** connect people with science projects, encouraging collaboration on important topics like environmental conservation.

    - **iNaturalist** leverages **crowdsourcing** and **machine learning** to help participants identify species in nature.

Quotes & Attributions:

- **Beirl et al. (2019)**: Highlighted augmented reality adaptations of classic games for increased social cohesion.
- **Matt Richetti (2022)**: Proposed heuristics for understanding community dynamics in social games.
- **Taylor (2018)**: Discussed the rise of live streaming as a form of entertainment and social interaction.

Summary 🌍🤝💬

Key Points & Attributions:

- **Humans Are Inherently Social** 👫💛:
    - Collaboration, coordination, and communication are core human needs, and new technologies help us do these in **more diverse and extensive ways**.
- **Social Mechanisms in Communication** 🗣️🌐:
    - Different **social mechanisms** help people interact effectively in **face-to-face** and **remote** settings, supporting **conversation, coordination, and awareness**.
- **The Role of Talk in Social Coordination** 💬🔄:
    - **Talk** and how it's managed are integral for social interaction, helping people navigate complex communication situations.
- **Technologies for Remote Communication** 📱💻:
    - Many technologies have been developed to support **remote communication**, expanding how we connect over distances.
- **Importance of Awareness** 👀🔄:
    - Staying aware of others' activities and letting others know what you're doing are crucial aspects of effective collaboration and socializing.
- **Impact of Social Technologies** 📲🌟:
    - Social technologies like **Teams** and **Zoom** have significantly changed how people maintain connections, socialize, and work, especially during critical times like the **COVID-19 pandemic**.

Quotes & Attributions:

- **Chapter Summary**: Discussed core aspects of sociality—communication and collaboration—and the technologies that support them in both physical and remote spaces.

Chapter 5 Glossary 🌍🤝💬

1. **Social Interaction** 🤝:
   - The process of people communicating, coordinating, and collaborating in social, work, and everyday contexts. It is essential for human relationships and is supported by various technologies.
2. **Face-to-Face Conversations** 🗣️:
   - Direct verbal interactions involving physical presence, gestures, body language, and other non-verbal cues that are essential for natural and effective communication.
3. **Remote Collaboration** 🌐👥:
   - Collaboration that occurs when people work together using technology across different locations, such as videoconferencing tools (e.g., Zoom, Teams).
4. **Co-Presence** 👥💻:
   - The concept of being physically present together and using technology to enhance interaction and coordination among co-located groups.
5. **Videoconferencing** 📹💻:
   - A technology that allows people in different locations to have real-time video and audio communication over the internet, widely used for remote meetings and social gatherings.
6. **Hybrid Working** 🏠🏢:
   - A work model combining remote and office-based work, offering flexibility but also challenges in maintaining collaboration quality between in-person and remote participants.
7. **Social Media** 📱💬:
   - Platforms that enable people to stay connected, socialize, and share updates over long distances, such as Facebook, LinkedIn, WhatsApp, and Instagram.
8. **Social Games** 🎮🤝:
   - Games that are played by multiple people, either cooperatively or competitively, facilitating social interaction. Examples include Fortnite, Roblox, and Minecraft.
9. **Peripheral Awareness** 👀🗣️:
   - The ability to stay aware of what is happening in the physical and social context around oneself, even when focused on other activities, such as noticing conversations or mood changes.
10. **Situational Awareness** ⚠️👥:
    - The ability to understand what is happening around oneself to predict how events may unfold. This is crucial in high-stress, technology-rich environments like air traffic control.

11. **Shareable Interfaces** 💻🤝:
    - Technologies that allow multiple users to interact simultaneously, such as multitouch tables and large shared displays, promoting collaborative work and coordination.
12. **Social Presence** 👤💬:
    - The sense of being "present" with someone in a virtual environment, aiming to replicate the feeling of face-to-face interaction in remote settings.
13. **Telepresence** 🤖👥:
    - The feeling of being physically present at a distant location, often facilitated by robots or immersive technologies, allowing remote participants to interact more naturally with physical environments.
14. **Augmented Reality (AR) Sandboxes** 🏞️🤝:
    - Interactive installations where users manipulate real sand, while the virtual landscape is projected over it, facilitating collaborative creativity.
15. **Reflect Table** 💡🗣️:
    - An ambient technology that provides feedback on group communication, using colored LEDs to represent participants' speaking levels, encouraging equitable contribution.
16. **Live Streaming** 📺👥:
    - Broadcasting one's activity in real time to an audience, often used by gamers to share their gameplay on platforms like Twitch and YouTube, facilitating social engagement between the streamer and viewers.
17. **Gather** 🛏️💻:
    - A virtual 2D space allowing people to meet and socialize online using avatars, used to foster community and engagement during events like classes or social gatherings.
18. **Social Translucence** 🔍👥:
    - A design principle that emphasizes making participants and their activities visible to one another in a shared digital environment, thus fostering awareness and collaboration.
19. **PeopleLens** 👓🔊:
    - A wearable AR technology designed for people with low vision, helping them sense their surroundings and recognize others by using spatialized audio cues.
20. **Citizen Science** 🌍🔬:
    - The involvement of the general public in scientific research, using technology to contribute data and insights to various projects. Examples include monitoring ecosystems via platforms like iNaturalist.