



Social XR Collaboration Platforms

Features and Considerations for Teaching & Learning

UC Berkeley XR Community of Practice

May 23, 2022

Anni Chai
Bernard Wong
Chris Hoffman
Owen McGrath

Agenda

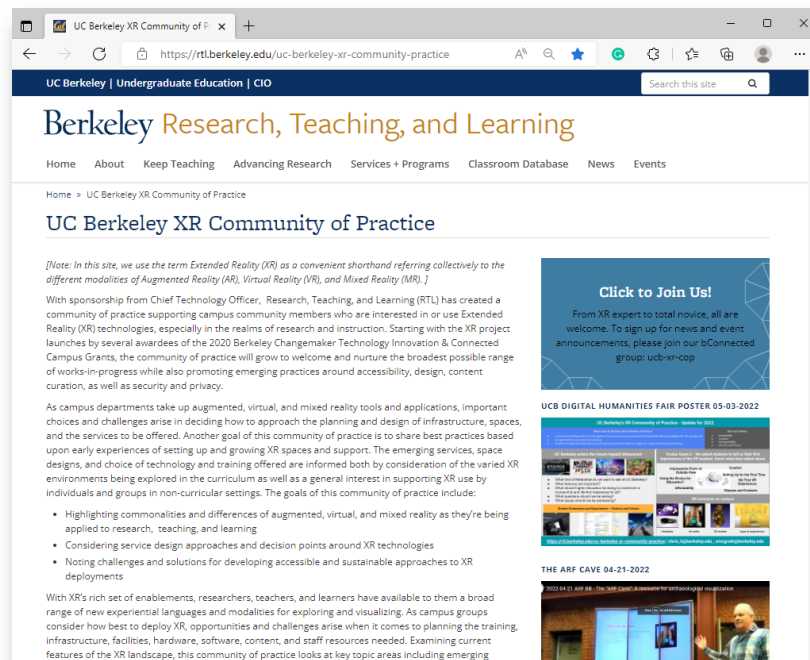
- Introduction and background
- Social XR through our themes: Accessibility, Content curation, Interoperability, Security and privacy
- Student design thinking
 - Basic features for teaching & learning
 - Capabilities & features rubric
- Q&A 15 minutes
 - At 1:00, some attendees will drop off
- Virtual Bauer Wurster
- Discussion and next steps
- Adjourn 1:30

Please put questions in Zoom chat.



UCB XR Community of Practice

- History
- Events
- Resources
- Other work this year
 - Last May: Return to the Tomb event
 - Oculus Quest 2 first impressions
 - Towards a litter-free metaverse
 - ARF Cave and CITRIS Cave
 - Research in XR



Social XR Background

- AltspaceVR
- Spatial
- Horizon workrooms
- Engage
- Mozilla Hubs
- Virbela
- Wonda
- etc.



Social XR Features

- Multi-user
- Immersive 3D w/Avatars
- Alternative 2D (Screen-based) Access
- Group & Individual Spaces
- Presentation Tools
- Event Hosting
- Invitation-Based Access Control
- Some degree of customization
- etc.



Accessibility

Our focus today is on **captioning** for users w/auditory challenges, but there are other disability areas to be considered in XR:

- Auditory ✓
- Eyesight
- Color Perception
- Voice
- Motor
- Cognitive

XR Accessibility | Universal Design

https://udl.berkeley.edu/accessibility/xr-accessibility

UC Berkeley XR Accessibility

Berkeley Universal Design for Learning

Home Universal Design Accessibility

Home > Accessibility > XR Accessibility

XR Accessibility

Please to this site, we use the term Extended Reality (XR) as a convenient shorthand referring collectively to the different modalities of Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR).

How might XR modalities be deployed for teaching and learning in ways that furnish multiple means for representation, action & expression, and engagement while also aligning with our commitment to making user-facing IT environments accessible?

This site covers some of the potential barriers to using XR faced by people with disabilities or, better put, diverse users across a truly representative range of visual, auditory, motor, and cognitive capacities. We also showcase some of the research and emerging best practices for overcoming these barriers particularly through the support and development of assistive technologies. Along the way, we consider important process dimensions for organizing analysis of accessibility: content development, assistive technology support, hardware and content selection/acquisition, instructional deployment with accommodation, evaluation cycles and iterative improvements. The UDL framework has something to offer across all these dimensions.

XR from a UDL Perspective

From a UDL perspective, XR-based experiences potentially offer promise across all three of the key principle domains: representation, action & expression, and engagement. From augmented reality chemical models to immersive virtual reality architectural walkthroughs, many wonderful...

Accessing Virtual, Augmented, and Mixed Realities

Precise definitions are elusive when it comes to the terms virtual reality (VR), augmented reality (AR), and mixed reality (MR). In common usage, VR tends to be associated with immersive head-mounted displays that fully supplant what the user can see, hear, and interact with. In...

Devices, Spaces, & Deployment Considerations

For the deployment of XR content in instructional modes, courses usually have their needs met from a service perspective in one of three kinds of prepared settings: 1) portable XR kits that can be deployed within traditional classrooms, 2) XR-enabled labs, where existing computer...

Spotlight: Emerging Solutions

Virtual Assistive Technology for Immersive Environments

Emerging Solution: Microsoft Research [Ability Group](#) / [SenseVR](#) / [Toolbox](#)

Available at: <https://github.com/microsoft/SenseVRToolbox>

Video presentation: [SenseVR: A Set of Tools to Make Virtual Reality](#)

More Accessibility Research and Learning Resources

Related Resources

- [XR Access Initiative](#)
- [A11yVR: Accessibility Virtual Reality Group](#)
- [Accessibility at Visual Reality Environments](#)
- [Immersive Accessibility - EU](#)
- [Accessibility Fundamentals Overview \(PDF\)](#)
- [XR Accessibility User Requirements \(PDF\)](#)
- [Accessible Platform Architecture \(W3C\)](#)
- [The Geeky Google](#)
- [PACT's Accessibility Handbook](#)
- [Bureau of Internet Accessibility \(BIA\)](#)
- [Virtual World Society](#)
- [The A11y Power On](#)

The CIL's Power On Review: Microsoft Seeing AI vs. Be My Eyes | Low Vision Apps

Microsoft Seeing AI vs. Be My Eyes | Low Vision Apps

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How it's possible to interact with objectives and...
[A11yVR: Accessibility Virtual Reality Group](#)

udl.berkeley.edu/accessibility/xr-accessibility



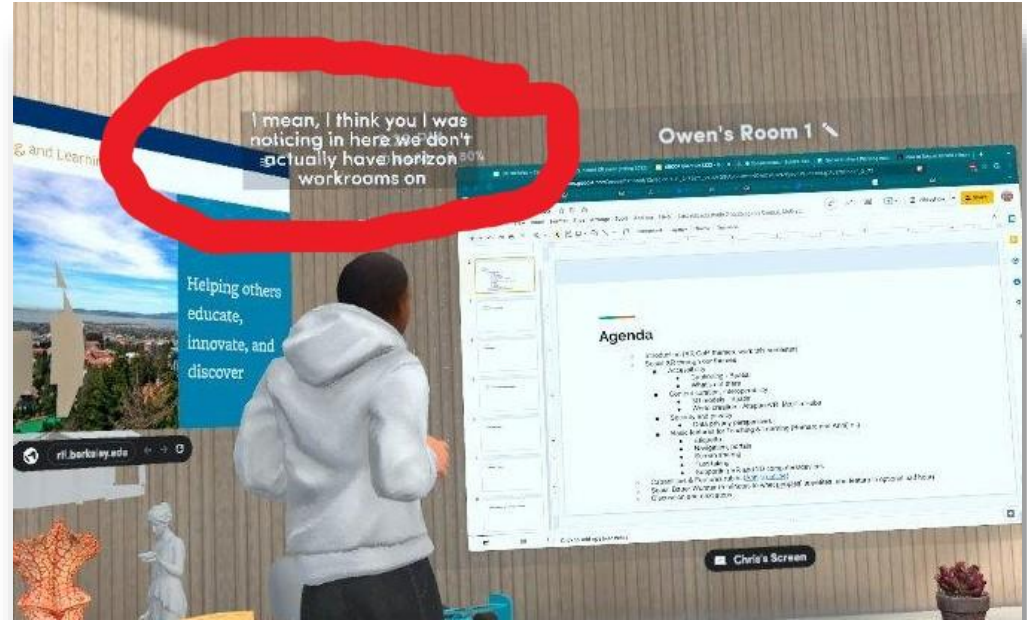
XR Access
Virtual, Augmented, & Mixed Reality for People with Disabilities



Local Expert: Dylan Fox (UCB)

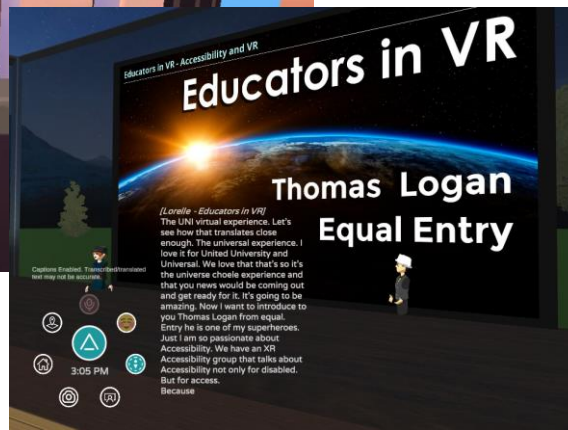
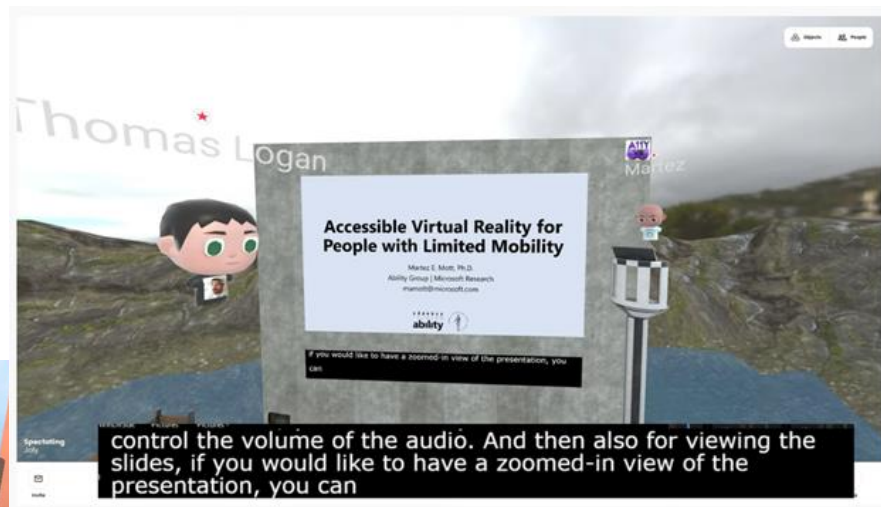
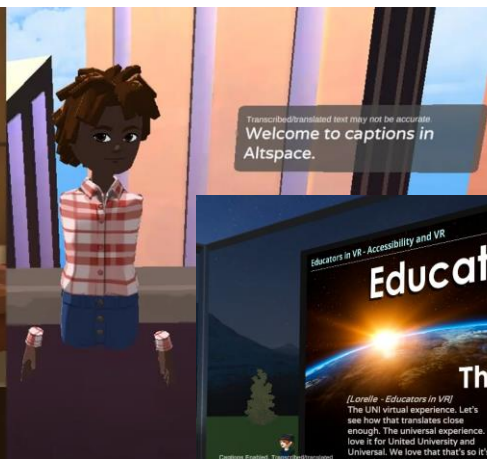
Accessibility - Spatial

Automated Speech Recognition (ASR)
Captions in Spatial



Accessibility – AltSpace & Hubs

AltSpaceVR & Mozilla Hubs



Content Management & Curation



- What kinds of content do we want to incorporate into Social XR environments?

And 3D models, 360 images and videos, 3D experiences

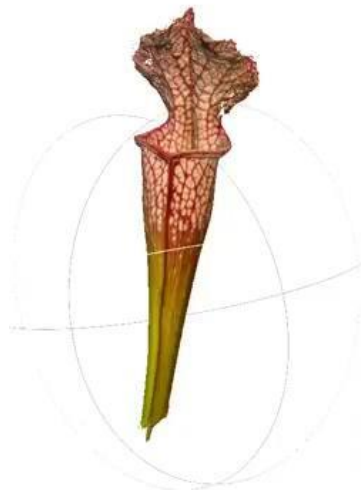
- What creation, management and curation issues will we encounter?

- Performance
- Design
- Pedagogically appropriate
- No harm done
- Reuse
- Versioning
- Compatibility
- Attribution

Content creation is still very hard



Photography

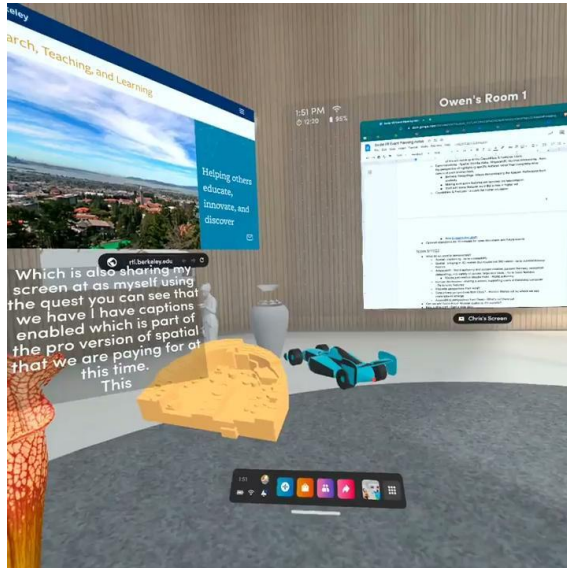
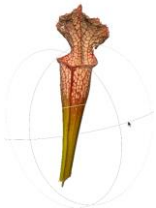


Photogrammetry



Decimation, reformatting

Content Management & Curation - Platforms



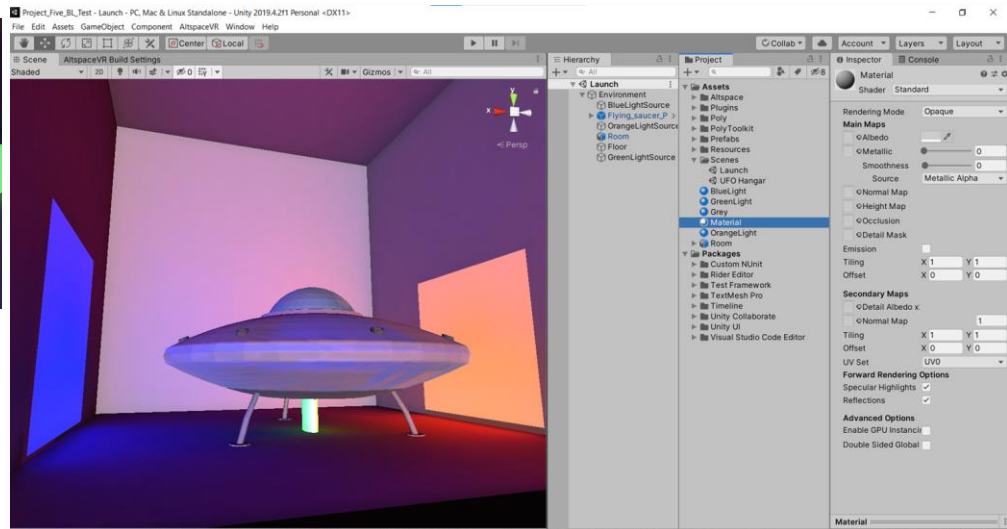
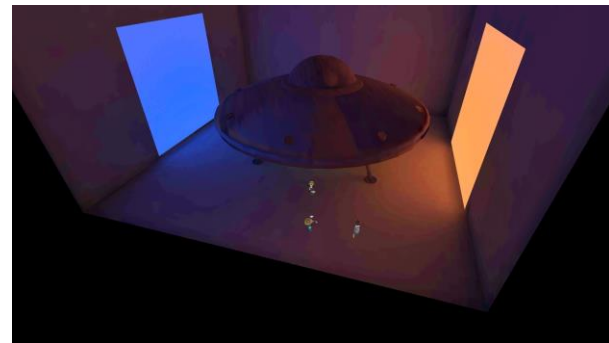
Spatial



Spoke (for Mozilla Hubs and Wonda)

Content Management & Curation - Scenes

AltSpace World Creation



Interoperability - USD

De Facto & Official Standards - USD

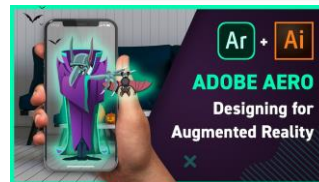


ARKit

+



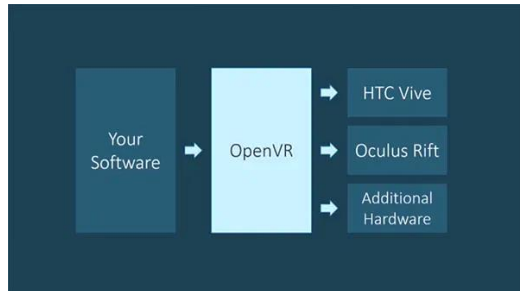
SceneKit



Interoperability – OpenXR

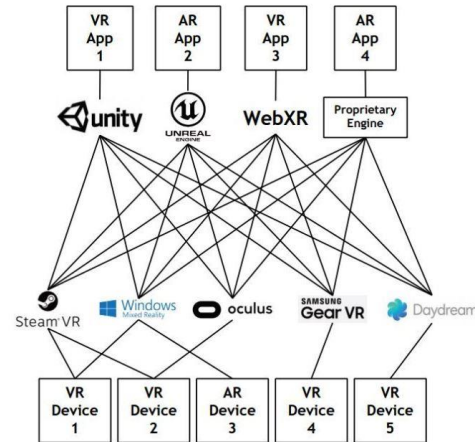
De Facto & Official Standards - OpenXR

2014

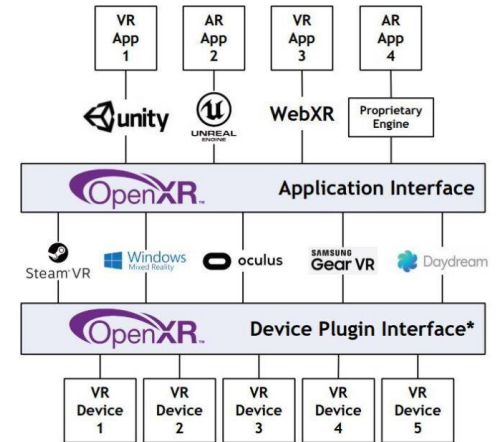


2019

OpenXR - Solving XR Fragmentation



Before OpenXR
XR Market Fragmentation



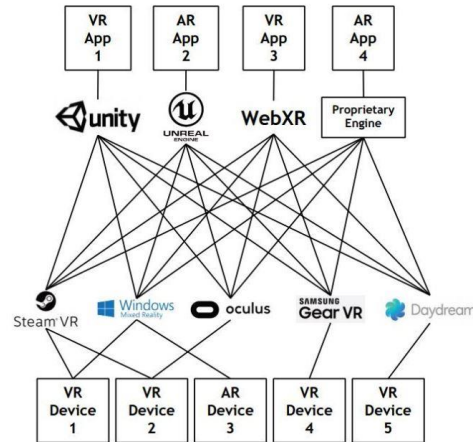
After OpenXR
Wide interoperability of XR apps and devices

Interoperability – OpenXR Adoption

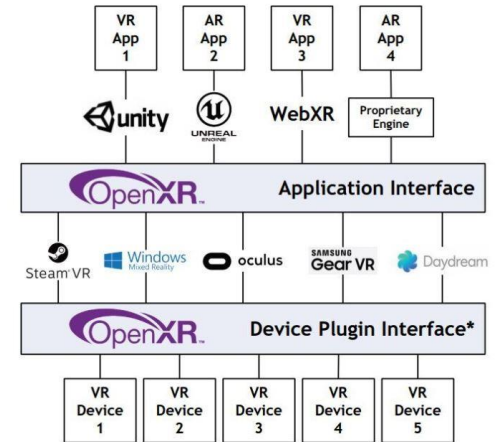
De Facto & Official Standards - OpenXR



OpenXR - Solving XR Fragmentation



Before OpenXR
XR Market Fragmentation



After OpenXR
Wide interoperability of XR apps and devices



Interoperability

Social VR Platform Device Support (Immersive VR)

AltSpaceVR - Oculus Rift, Oculus Quest, Windows, HTC Vive, Windows Mixed Reality

Spatial - Valve Index, HTC Vive, Oculus Quest, Oculus Rift, HP Reverb, Varjo, Windows Mixed Reality, Hololens**

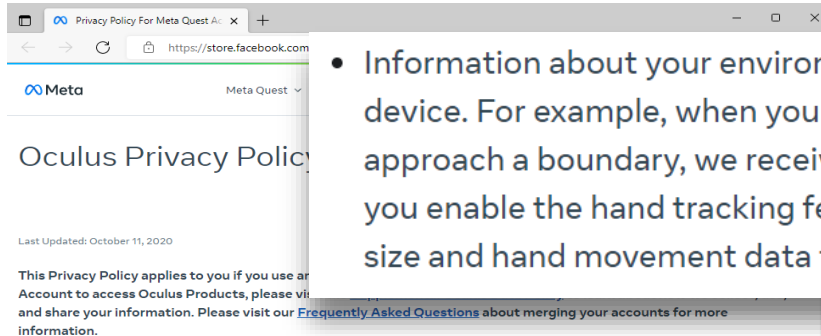
Horizon Workrooms - Oculus Quest

Mozilla Hubs - (WebVR Browser) Valve Index, HTC Vive, Oculus Quest, Oculus Rift, HP Reverb, Varjo, Pico, Windows Mixed Reality

Engage - Valve Index, HTC Vive, Oculus Quest, Oculus Rift, HP Reverb, Varjo, Pico, Windows Mixed Reality

Security & Privacy - Meta

So What Kind of Information Do They Collect?

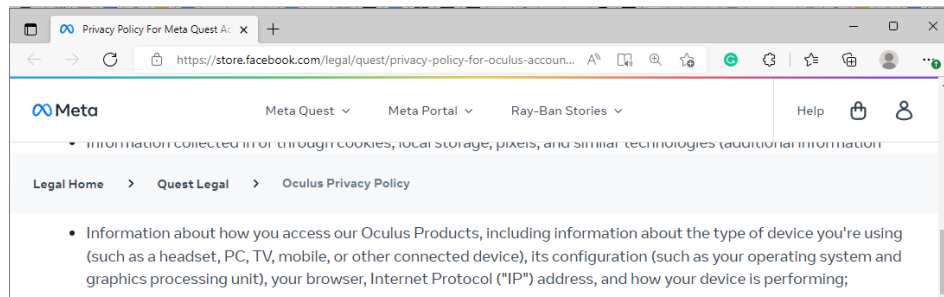


Facebook offers virtual, mixed, and augmented reality ("XR") hardware and software products and operates a platform under the Oculus brand where users can download, interact with, and submit content and obtain services related to or in connection with our XR products (collectively, the "Oculus Products"). We describe our Oculus Products including our websites, mobile apps, platform, content, hardware, services, and any product or service that links to this Oculus Privacy Policy—in our [Oculus Terms of Service](#). This Privacy Policy explains how we treat information from or about you, including how we collect, use, and share information on our Oculus Products.

1. What kind of information do we collect?

Depending on which Oculus Products you use, we must process different kinds of information from or about you. Here's how:

- Information about your environment, physical movements, and dimensions when you use an XR device. For example, when you set up the Oculus Guardian System to alert you when you approach a boundary, we receive information about the play area that you have defined; and when you enable the hand tracking feature, we collect technical information like your estimated hand size and hand movement data to enable this feature.

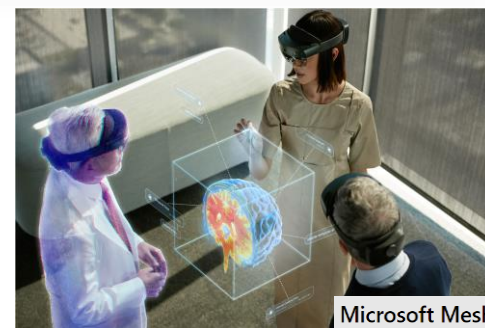
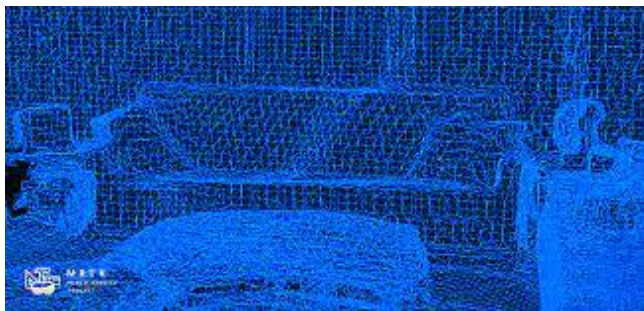
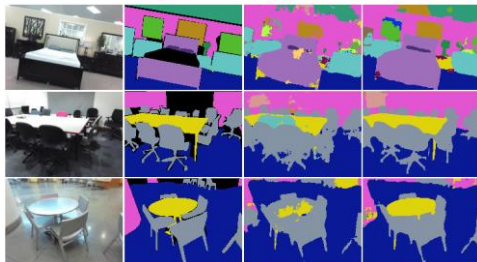


Products, including from third parties;

- Location-related information, which can be derived from information such as your device's IP address. If you're using a mobile device, some of our Oculus Products collect information about the device's precise location, which is derived from sources such as the device's GPS signal and information about nearby Wi-Fi networks and cell towers;
- Information about your environment, physical movements, and dimensions when you use an XR device. For example, when you set up the Oculus Guardian System to alert you when you approach a boundary, we receive information about the play area that you have defined; and when you enable the hand tracking feature, we collect technical information like your estimated hand size and hand movement data to enable this feature.
- Information we receive through device settings you choose, such as your photos or audio content.

Security & Privacy - Mapping

Space Mapping & Object Recognition

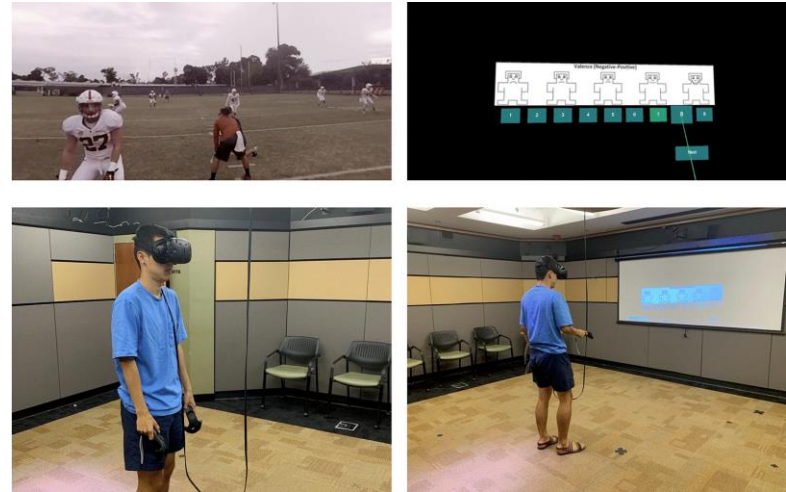


Research into XR and privacy

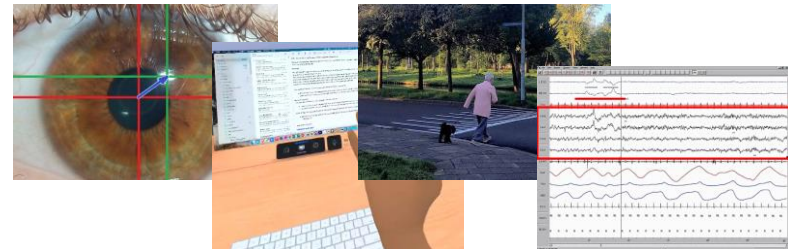
Miller, M.R., Herrera, F., Jun, H. et al. Personal identifiability of user tracking data during observation of 360-degree VR video. Sci Rep 10, 17404 (2020). <https://doi.org/10.1038/s41598-020-74486-y>

"Out of a pool of 511 participants, the system identifies 95% of users correctly when trained on less than 5 min of tracking data per person. We argue these results show nonverbal data should be understood by the public and by researchers as personally identifying data."

Miller et al. used headset and controller data



But what if we include ...



Security and Privacy challenges in the future

What happens when bad actors realize the real value of XR data?

What happens when our avatars become really important to us, and begin to carry value with them (e.g., digital wallets)?

What happens when we really want to know who it is we're talking to and interacting with?

What happens if we want to opt out?

The truth is: We're there now, and these issues will only become more serious and impactful.



Security & Privacy - Types of XR Data

Type	Examples
Observable	Avatars; immersive gestures, interactions, and communications
Observed	Spatial data, HMDs and controllers, biometric sensors, user data, linked profiles
Computed	User profile, biometric identity
Associated	Credentials, contacts, payment info

From: Ellyse Dick, 2021. [Balancing User Privacy and Innovation in Augmented and Virtual Reality](#). Information Technology & Innovation Foundation.

Risks to privacy

- User anonymity and autonomy
- Security of sensitive provided information
- Discriminatory use by third parties
- Fraud or malicious misuse
- Harms from combining with other forms of user data



Oculus Quest 2 and Spatial - a data privacy example



Facebook/Meta has data from

- Headset and controller
- Cameras
- Play area
- Oculus Store
- Experiences I play
- Facebook account, friends, likes, etc.

Spatial has data from

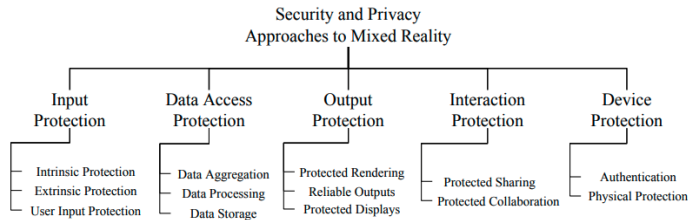
- Spatial.io account
- Quest-based and website logins and experiences
- Movement and navigation
- My avatar choices
- Screens I share
- Objects and models I add
- Interactions with other Spatial avatars

- What agreements did I sign with these companies in the click-through agreement?
- What agreements have those companies signed with each other?
- How do we know that these companies are honoring these agreements and protecting our data?
- What responsibilities do we in higher education have as students and instructors start using these platforms?

Social XR Security & Privacy - Recommendations

Higher ed needs to work actively in these areas:

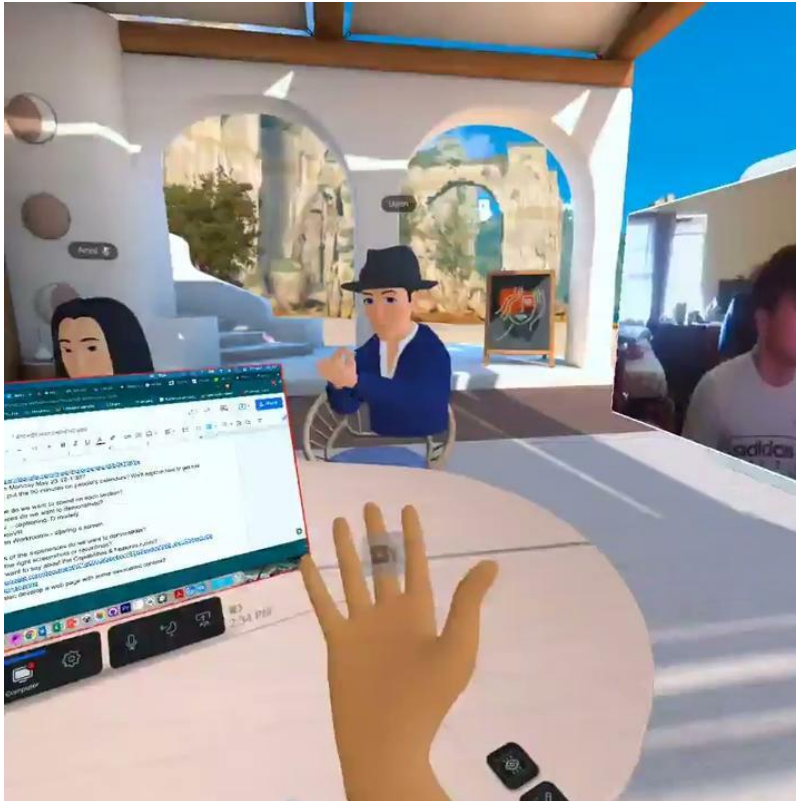
- Education
- Awareness
- Research
- Policy
- Tools and Services



J De Guzman, K Thilakarathna, A Seneviratne. 2020. Security and Privacy Approaches in Mixed Reality: A Literature Survey. Retrieved May 21, 2022 from <https://arxiv.org/pdf/1802.05797v3.pdf>



Basic Features for Teaching & Learning



UXD and Design Thinking - the student perspective

Bernard Wong

- Social VR design critiques using “I like / I wish / What if”

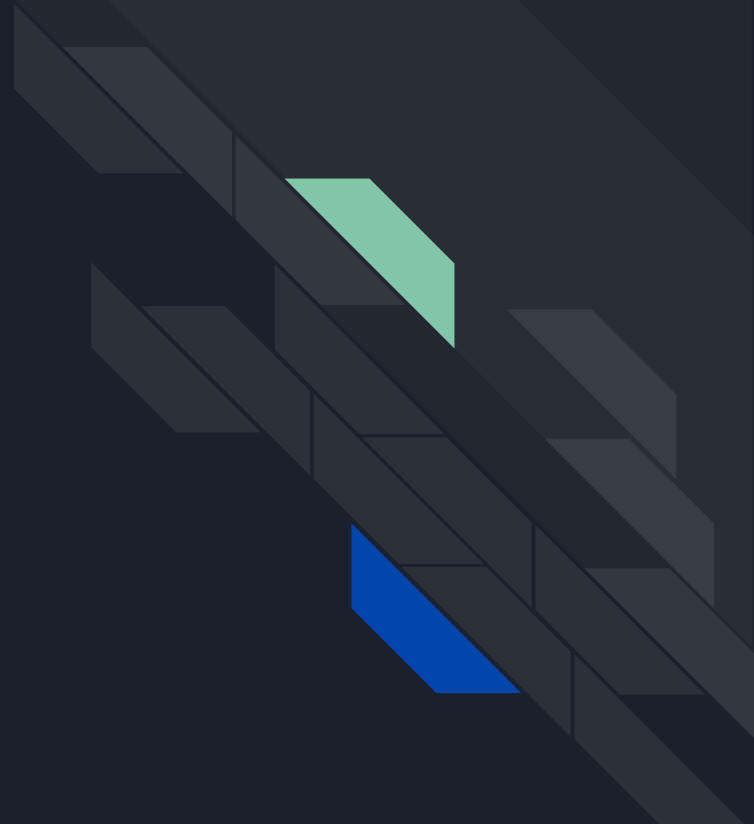
Anni Chai

- Capabilities & Features Rubric and scenarios



OCULUS QUEST 2 **SOCIAL VR**

INTRODUCTION





Social VR

- Not knowing a whole lot about social VR content, I thought this was a fantastic opportunity to venture into various social VR applications and explore each of them to find what I liked or disliked about each of them
- With the rise of the metaverse and VR applications/technology getting better and better everyday, interacting with others in a virtual environment may become common very near in the future



Social VR cont.

Here are some of the social VR apps that I experimented with:

- Engage
- Mozilla Hubs
- Wonda VR
- AltSpace VR
- Spatial.io
- Virbela
- Horizon Worlds

ENGAGE

According to Engage.com: “We are a spatial network solution for enterprise clients to build their own unique virtual world “MetaWorld” which can be used for employee on-boarding, training, product demos, wellbeing, customer outreach and professional events.”





First Impressions with Engage - Overview

- For my very first application I decided to start off with Engage. Since I have no friends to connect with, I decided to start my own virtual environment.
- Engage has a wide selection of different hub spaces that can be used to connect with others.
- From Martian surfaces to Sky Hotels, to homey campfires and lecture halls, if you can think of a space Engage will probably have it.

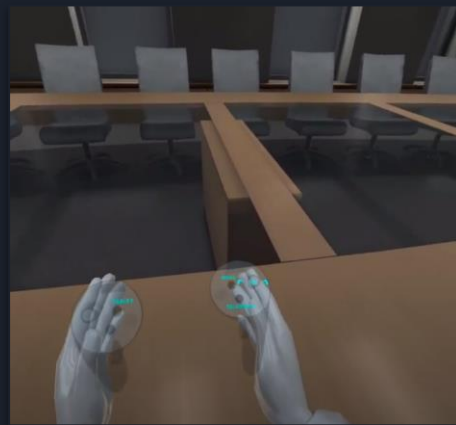
First Impressions with Engage

- As soon as you launch the app and finish entering all of your personal information, you are introduced to the avatar screen
- There are a wide variety of options to choose from and you can edit your clothes, facial features, hairstyle, etc
- It's so detailed that you can adjust the curvature, the angle of your eyes, and how big you want your lips to be



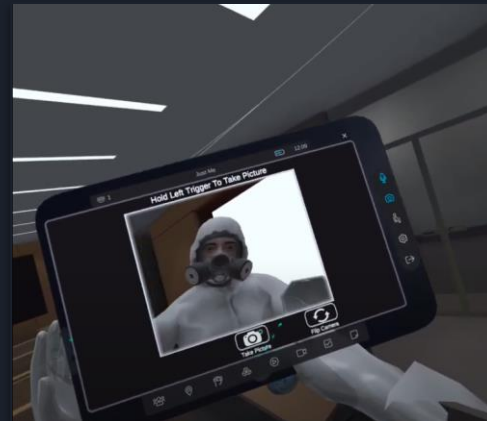
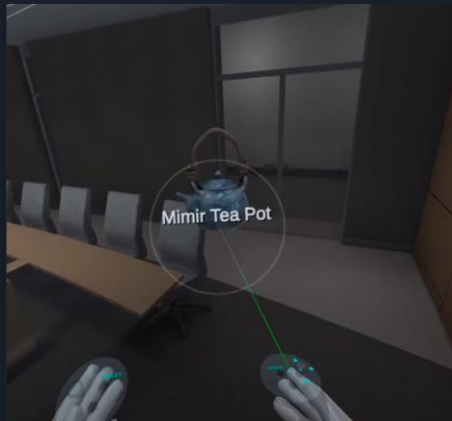
Location 1: Standard Meeting Room

- For the first location, I loaded into a Standard meeting conference room
- I think one of the coolest things is seeing you own hands. If you hold your left hand up you're able to see the time as well as many small functions



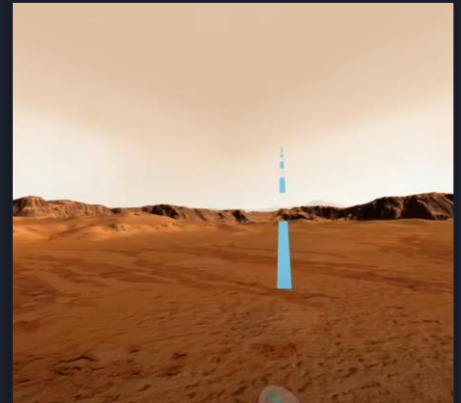
Location 1: Meeting Room Devices

- One of the things I love most about Engage is the tablet that you can pull up
- While there is an option to just pull up a standard 2d menu, I think being able to hold the menu in your hand and actually “touch” the options is absolutely fantastic
- There is a lot of content in the menus. You can pull in real life 3d objects—I ended up pulling a Mimir Tea Pot into my room and it looked absolutely stunning
- You’re also able to load up youtube videos which you can play on the board and even take a selfie!
- The amount of stuff you can do is endless.



Location 2: Martian Surface

- For my next location, I was transported into another planet. I just love how as soon as you load in you can hear desolate winds and martian surface panning for miles and miles. There are mountains and cliffs in the background and surprisingly you can travel pretty far. The barren landscape really hits the mark.
- You're spawned right next to a Mars Rover and when you prompt the Rover is proceeds to conduct an experiment. Watching in Virtual Reality is amazing. The Rover even shoots a laser at a rock and collects samples!



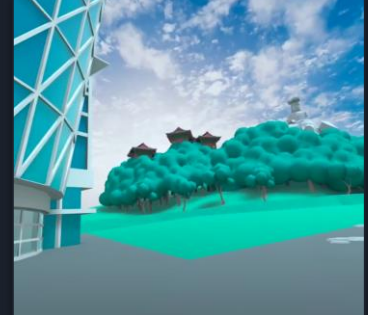
Location 3: Woodland Campfire

- As you spawn in, it really feels as though you're in a forest. Owls sing and crickets chirp. You can hear the sound of the wind flowing as a simple fire crackles in front of you
- Overall the Woodland Campfire was a lot smaller compared to the Martian Surface but I could see how meeting up with some friends over the fire could be a good time



Location 4: DAEGU Virtual MICE Town

- It seems that MICE Town is some sort of Amusement Park
- Everything is bright and blue and super colorful
- There's a hotel, a music hall, and a beautiful Lake with a giant rubber duck. I love the massive map that you can travel and the lake in the middle of the park is beautiful
- The mountains in the distance host traditional Korean style architecture as well as a giant Buddha statue. I think the sky looks impressive as well

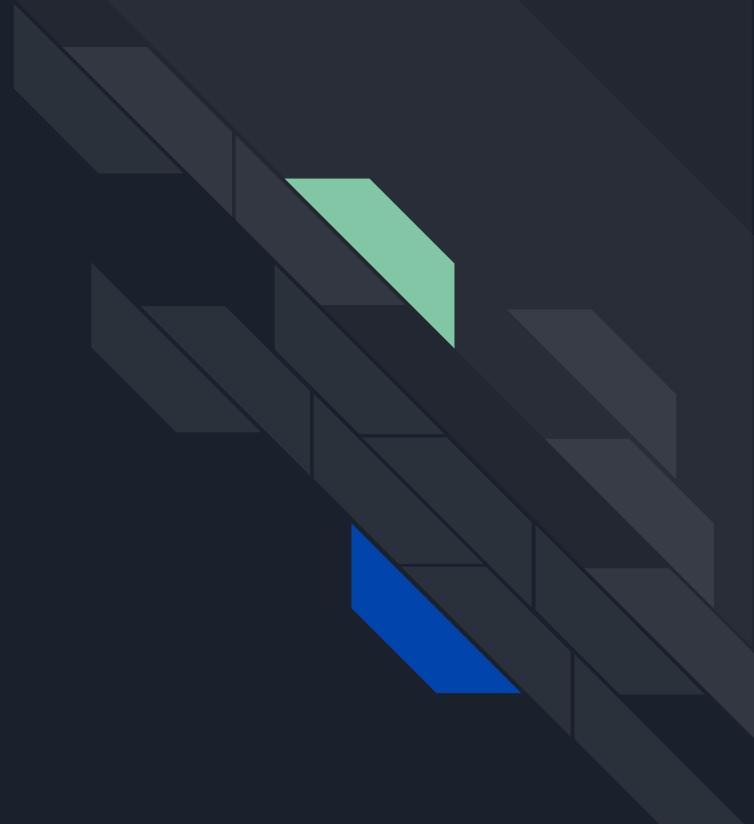


Location 5: Lecture Hall

- Really gives perspective into the potential of research teaching and learning in a virtual world



I Like/I Wish/What If



I Like	I Wish	What If
<ul style="list-style-type: none">● Really loved being able to pull the virtual tablet out and play with the settings instead of just being forced into a generic menu● Loved all the different atmospheres and highly detailed variety of environments● Ease of use, settings are very straightforward and easy to setup	<ul style="list-style-type: none">● I wish there was more user to user interface where you could join other people's rooms and interact with them● I think having a more modern movement option instead of only a teleport option would be hugely beneficial and would greatly help the immersion● Some of the environments could be more detailed and while still beautiful, could probably use higher quality textures	<ul style="list-style-type: none">● What if we could be able to "walk" in the environments instead of simply teleporting● What if we could make Engage more of a social environment and encourage the joining of public rooms● What if we could upgrade all of the textures in all of the environments

ALTSPACE VR

“the leading platform for live, virtual events, empowering artists, brands, and businesses to easily design meaningful experiences that foster community and connection.”





First Impressions with AltSpace VR

- Compared to Engage, AltSpace was much more detailed. While the spaces were a lot smaller and a lot less imaginative, I really enjoyed how everything looked. AltSpace had a coherent theme through all the environments and menus and it really showed when I played through it.
- The social environment was a lot better compared to Engage and they had plenty of events to join and meet other people as well.
- I really like the menus and the UI. It seemed a lot more Modern compared to Engage. Logging in and creating an account was quite easy as well. You need a Microsoft account but luckily I already had one so it streamlined the process.



First Impressions - AltSpace VR Browser

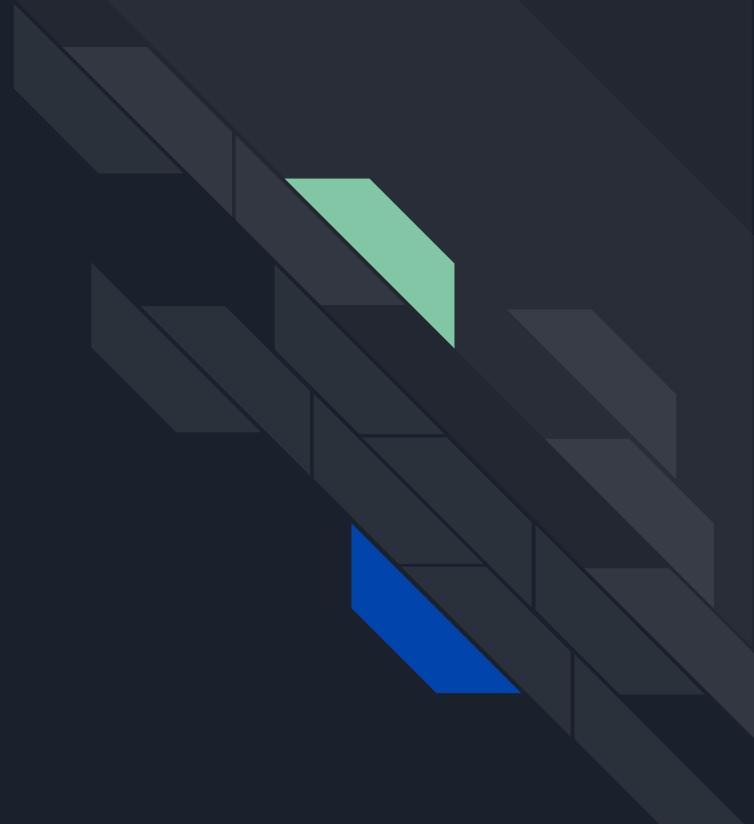
- You're able to do a lot in AltSpace. You can present slides and pull in materials and objects into your space.
- You can even open up a browser window in the space and just start browsing as you would on any smart device. And of course, the default browser forces you to use Bing.

First Impressions - AltSpace VR cont.

- As you get into the loading screen, you're given a choice to get a tutorial to get started. You're allowed to create a fully customizable avatar as well. The tutorial teaches you all the different actions you can take. You can even launch a firework and shoot basketballs into hoops!



Events





EVENTS in Engage

- One of the complaints I had about Engage was that there just didn't feel like there was enough community involvement.
- While the player base at Altspace wasn't huge persay, there were most definitely events that were being hosted that I could join.
- It seems that everyday there are different events being hosted that you can join. Some of them are just casual meetups while others are for work. Some even feature meditation classes!

Campfire Chaos

- First off, I just want to say that I love the color palette in ALTspace. Everything is so colorful and vibrant
- I had a really great time in the first event and met countless people in the meantime. One of the more memorable moments was when I saw a group of people smoking a joint together in a circle
- I also met a great many people from the UK and there was actually a class from the University of Toronto being hosted in Altspace
- In the campfire, you could even roast marshmallows and shoot a basketball
- Compared to Engage, the social atmosphere was much much better.

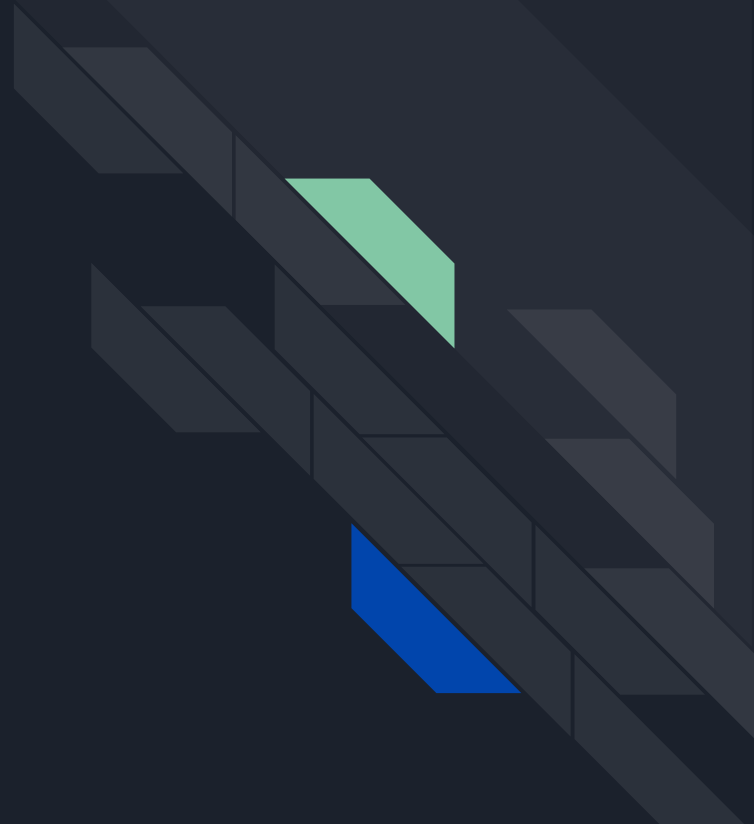


Daisy's Plank

- I was met with a insanely cool obstacle course surrounded by high mountains and cliffs and a large city down below
- The obstacle course gets very very high so I definitely not recommend it if you have a fear of heights
- One thing I hated was that everytime you moved you got surrounded by this black circle on your screen which dramatically reduced your vision and it was just plain annoying
- Also, turning in Altspace is not smooth at all and it's very static. Trying to turn on the obstacle course without falling to your death proves to be quite difficult

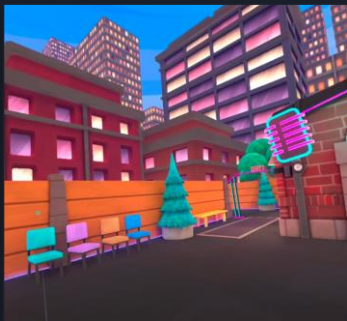


Now that I had been to two different events, here's a quick rundown of the various event locations you can create.



Club Stage

- Club stage seems like it would be an amazing hub to meet people
- While the locations are much much smaller, they're filled with a great amount of detail
- There's plants everywhere, chairs to sit in, places where you can eat and much more
- I think it would be amazing if someone could actually give a live performance onstage or something while I could watch from the top story
- Sitting on the second floor while looking down on the stage actually gave me club vibes and I love the little detail of a little bar where you can sit and eat in.



Street Hoops


- As an avid basketball player, I play street basketball quite often so I felt right at home with this one. I love the idea of being able to meet and play with basketball in VR
- I think as the movement options improve and the physics as well, being able to see and play basketball with your friends in VR could be quite the amazing experience.
- One of the things that I noticed were that everything was not very textured, especially the basketball. My guess is that there are more physics working with it so it's less textured





I Like/I Wish/What If - AltSpace

I Like/I Wish/What If – AltSpace Rubric



I Like	I Wish	What If
<ul style="list-style-type: none">• I love the colors of altspace and all the different environments it provides• I just love the overall vibe it presents and it just makes you feel happy entering the different environments and really wants to make you stay there forever• The social atmosphere is unmatched with multiple events that are filled• While small, has a lot of details that you can tell had a lot of work put into it	<ul style="list-style-type: none">• I wish that some of the environments were a bit bigger. All the environments were quite small and you could see the entire event from spawn• While you can walk around the event, I hate the black circle that envelops your screen when you do• I also dislike the turning options where it just flicks you right or left instead of smoothly turning	<ul style="list-style-type: none">• What if we could incorporate smooth turning instead of static turning• What if we could get rid of the giant black circle that envelops your screen whenever you walk• What if we could make more massive environments to explore and make more hallways and cut off points of vision to make it seem bigger than it actually is

Horizon Worlds





First Impressions with Horizon Worlds

- Horizon Worlds was one of the few ones I was really excited to try. I had heard many people talking about it for a while now and it was supposedly super popular especially in 2022.
- Overall, I had an amazing time and I honestly think it's definitely one of my favorites. There are lots and lots of games to play and try and it's so easy to meet other people.
- I love the worlds concept as you can hop in and out of different worlds and explore at your own pace. With so many different worlds developed professionally and by the community, there's a whole lot of variety out there.

The Plaza

- The Plaza is the initial meeting place for Horizon Worlds. One thing I really enjoy about Horizon Worlds is that Meta is really pushing the boundaries of what you can do in VR
- I also enjoy the fact that they want to really make sure that everyone is in a safe place. One of the modes is “safe zone” in which you can create your own personal bubble and make sure that you are safe. Horizon Worlds is always pushing a motto for safety, reporting people, and anti-bullying which I really like
- I love the little mode where you can tap in your wrist like a watch and open up the settings, take selfies, and much more. Overall the plaza is beautiful and is a great starting point to enter other worlds.



Club Sol

- I love hitting the clubs on the weekend and it was especially amusing that I could hit the club in VR of all things
- There's music, a dance floor, plenty of drinks and tables, and a drink bar that you can go to
- I like the color palette and it really does make me feel like I'm in a club. I love that you can take selfies and do little emotes and dances when you do certain poses
- For example, if you stick a thumbs up a little thumbs up emoji pops up and when you stick two hands up a bunch of confetti pops out.



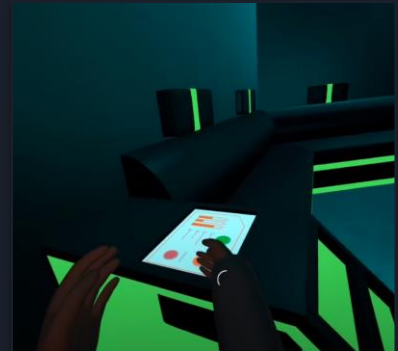
Solaris30 Hub World

- One of the things I discovered were these things called “hub worlds”
- It seems that it’s just a simple place where you can meet people in the hub and discover multiple different worlds together
- It’s a super cool and chill place and gives you access to many different worlds
- I really like this casual concept in which you can hop to different worlds at ease and just explore so many different environments



Afterlife Club

- This club was much simpler than club sol. There wasn't a whole lot to do and was unfortunately empty at the time I headed in.
- However, it seemed that there was live music every Saturday. There's a little bar with a bartender robot lady. On the stage you got a DJ as well as a dance floor and plenty of seats.
- I like the futuristic green color palette and it was really cool to checkout



Arena Clash


- I got bored so I decided to tryout some of the games that Horizon Worlds provides. Arena Clash is one of them.
- Arena clash is the main game that Horizon Worlds supports. It was super super cool to try out and it seems like a great deal of people play it. There's a global leaderboard.
- I think it's really fun that you have to manually reload your gun when you run out of bullets and I love the idea of dodging and weaving behind cover and shooting people.



I Like/I Wish/What If – Horizon Worlds

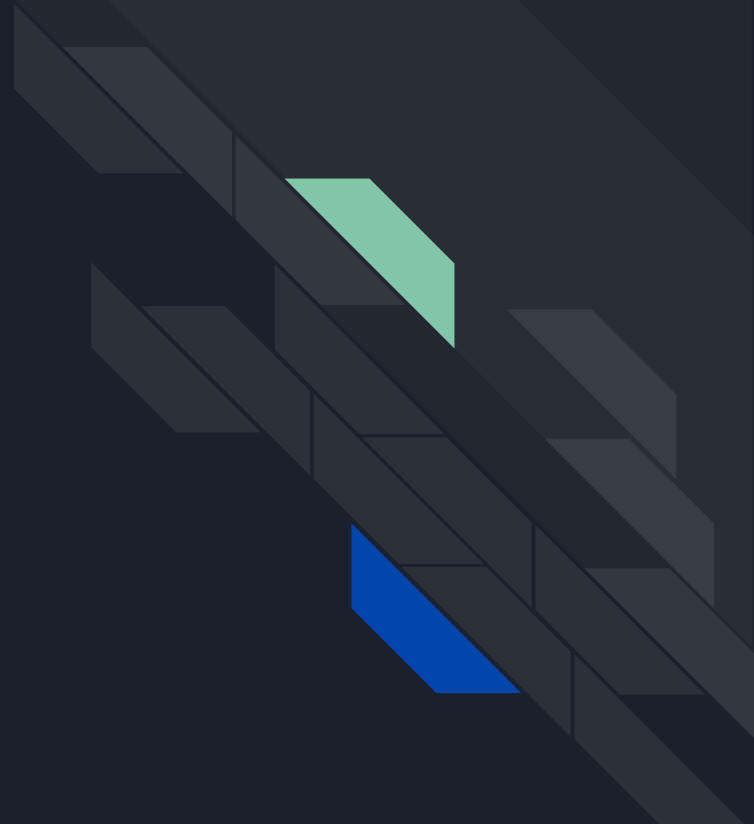
The background features a series of overlapping, three-dimensional geometric shapes in shades of dark blue, green, and blue, creating a sense of depth and movement. The shapes are arranged in a way that suggests a staircase or a series of steps leading upwards and to the right.

I Like/I Wish/What If – Horizon Worlds Rubric



I Like	I Wish	What If
<ul style="list-style-type: none">● Horizon Worlds offers so many different possibilities I can't even begin to describe them all● I love the world hopping feature as it offers so much variety everytime you visit● It's really easy to meetup with people and explore with them in the metaverse● I love the colors, atmosphere, and different environments that Worlds has to offer	<ul style="list-style-type: none">● I wish there was more people● I wish there was more detailed worlds with more content. Some of the worlds can feel a little bit empty at times and some of them are quite lacking when it comes to features and stuff to do● I wish there was a faster movement option like a sprint that can really propel you forward instead of the default slow walking pace	<ul style="list-style-type: none">● What if we could more easily congregate a group of people into fewer worlds instead of having hundreds of empty ones● What if we could increase the speed of the default walk options or add a sprint function to allow you to run● What if we could create higher quality worlds with more features and content so that users can stay on the app for much longer

Etiquette

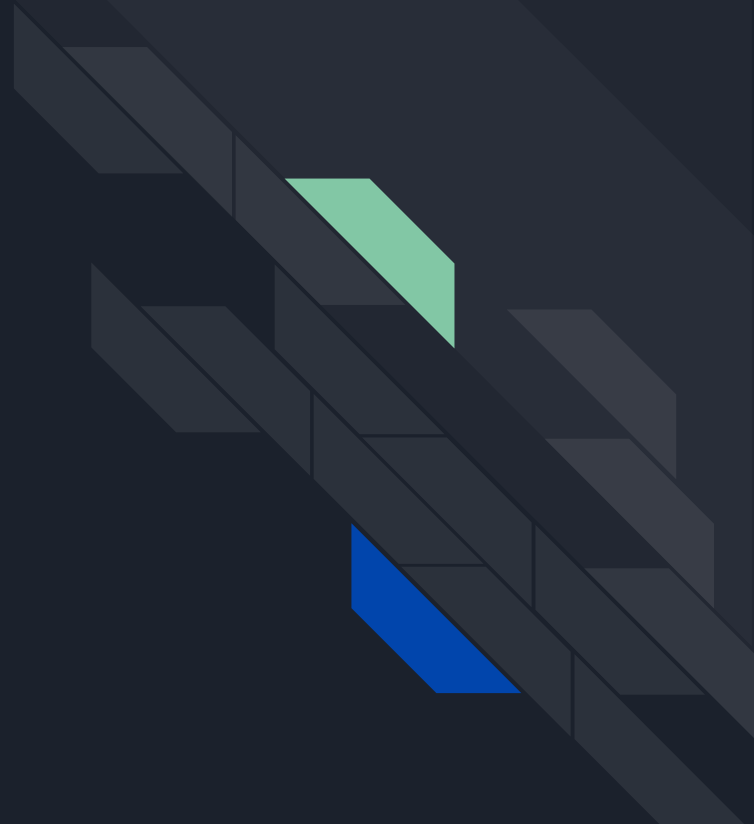




Etiquette

- Many safety and privacy features that were included in the many various VR applications.
- Many of the apps include several safety features such as being able to mute individuals and even providing a personal bubble of space so that no one gets into your “personal bubble”.
- I recently had an experience in Horizon Worlds where an individual was harassing another individual and there was a vote held to kick that user from the world and it actually passed. In every single app, there is always give a strict tutorial on how to defend yourself or how to report someone for a wrongdoing. They make sure to educate you about the rules and to make sure to respect every person you meet.
- I think this education factor is a very important part of the experience and made me feel a bit more relieved about the whole situation.
- While most of the people I met during this experience were generally very kind, there are certain individuals who may push the rules a bit and I think having these safety features are a great way to regulate these worlds.

Navigation



Navigation in Metaverse

- Movement options
- Portals
- How to navigate world
- Community
- People
- Immersion, Movement



Supporting VR and 2D computers/devices

Supporting VR & 2D computers/devices



Capabilities & Features Rubric

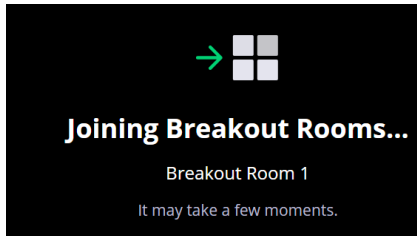
		AltSpaceVR	Horizon Workrooms	Spatial.io
Teaching/Learning	Breakout rooms	✓ teleporter	X	X
	Public message to breakout rooms	✓ go-on-air	X	X
	Close breakout rooms/send everyone to main room	X	X	X
	Private message	✓		X
	Public message	✓		X
	Non-verbal feedback (reactions)	✓	X	X
	Share screen	✓ stream browser	✓ remote desktop cont	✓ cast desktop
	Whiteboard		✓	X
	Annotation (on shared screen)	✓		✓
	Transcriptions	✓	X	✓
	Note Taking			✓
	Polling			X
	Recording	✓ record on PC		X
	Participate on PC	✓	✓ join on video call	✓ join on video call
	Stream meeting	✓ stream on Youtube		X
	Amplify voice to all	✓		X
Security	Mute a participant or all	✓	✓	✓
	Waiting Rooms		X	✓
	Require host to be present before meeting starts			
	Expel participant	✓		
	Lock a meeting			
	Passcode	✓		
	Join by Domain			
	Disable private chat			
	Personal Space	✓ space bubble	✓ transparent	
Others	Google Drive Integration	X	X	✓
	Hand Tracking		✓	
	File Sharing		✓	
	Import 3D models			✓
	Support for other ways to participate (non-HMD)			

Classroom Scenario Reimagined: Small Group Discussion

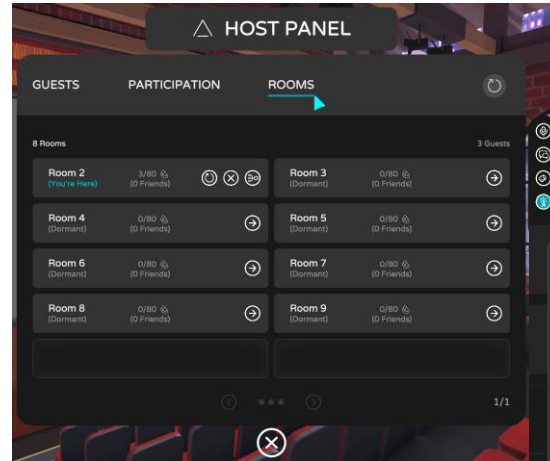
Traditional



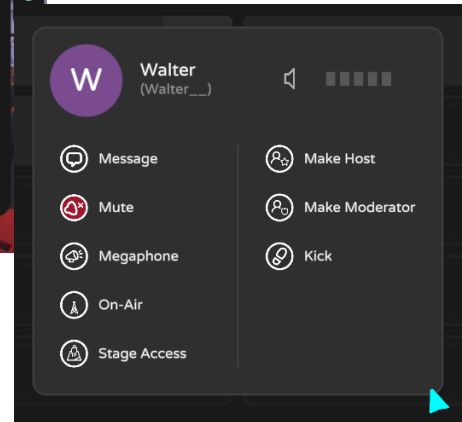
Zoom



VR



AltspaceVR

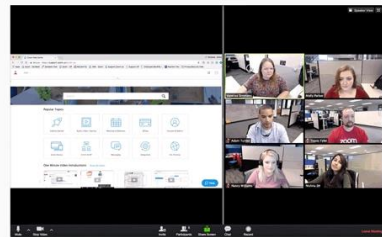


Classroom Scenario Reimagined: Presentation, Annotation, & White Board

Traditional



Zoom



VR



spatial.io



Horizon Workrooms

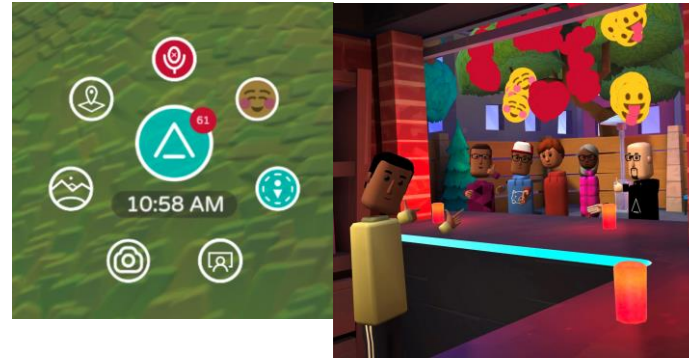


Classroom Scenario Reimagined: Non-verbal feedback

Traditional

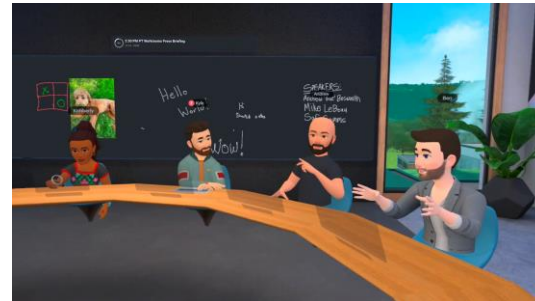


VR



AltspaceVR

Zoom



Horizon Workrooms

Social XR platforms - Discussion

15 minutes

If 1:00 comes along and you need to leave, thank you for attending!

Virtual Bauer Wurster

- Luisa Caldas and team

1:30 adjourn

Thank you for joining us!

Owen McGrath (omcgrath@berkeley.edu)

Chris Hoffman (chris_h@berkeley.edu)