

Novel **Opportunities** and Emerging **Risks** of Social VR for Online Interactions

Guo Freeman | guof@clemson.edu
Associate Professor
Human-Centered Computing
Clemson University, USA

CUGAME



Agenda

**What is social
VR?**

**Novel
opportunities for
social VR users**

**Emerging risks
in social VR**

**New solutions to
mitigate risks in
social VR**

**Future directions
for designing safer
and inclusive
social VR**

A person wearing a VR headset is shown from the chest up. The image is partially covered by a semi-transparent purple overlay on the left side. On this overlay, there is a white padlock icon. The text 'Trigger Warning' is written in orange on the purple background.

Trigger Warning

This talk involves descriptions and examples of risks and harassment in social VR.



What is Social VR?



What is Social VR?

3D virtual spaces where multiple users can interact with one another through VR head-mounted displays (HMDs)



Popular Social VR Platforms



Social VR and the “Metaverse”



Fully or Partially Body Tracked Avatars



One's avatar's movements will correspond to the real time movements of their physical body



Synchronous Voice Communication

Simulated Physical Touch



Social VR for Diverse Populations and Communities



Our Foci

- How does social VR benefit diverse users by providing novel **interaction** dynamics and **embodied** experiences?
- How might the existing social VR paradigm also introduce **emerging risks** to various communities' online social lives?
- How can we develop technologies to mitigate said risks in social VR in a **proactive** rather than reactive way?

Our Work Since 2020: Empirical Evidence

- **100+ interviews**
- **Participatory observation sessions**
 - 100+ hours (ongoing)
- **Two large scale online surveys** (ongoing)
- **Social media content analysis** (ongoing)
- **Highly diverse sample**



Our Work Since 2020: Technology Design and Development

- Innovating **consent mechanics** in social VR interactions
- Human-AI Collaboration for **moderating** social VR interactions
- **AI companions** for mitigating harassment in social VR
- ...



How does social VR benefit diverse users by providing novel **interaction** dynamics and **embodied** experiences?



The image is a composite. On the left, a person with blonde hair is wearing a VR headset and holding a white controller, standing in a room with a wooden door. On the right, a virtual avatar of a person with brown hair is shown in a virtual environment with a chain-link fence and a digital scoreboard in the background. A large purple rectangle is overlaid in the center, containing text.

Embodiment

centers around the key question
regarding how we can
experience a **virtual body**
representation as our **own body**
within a virtual environment

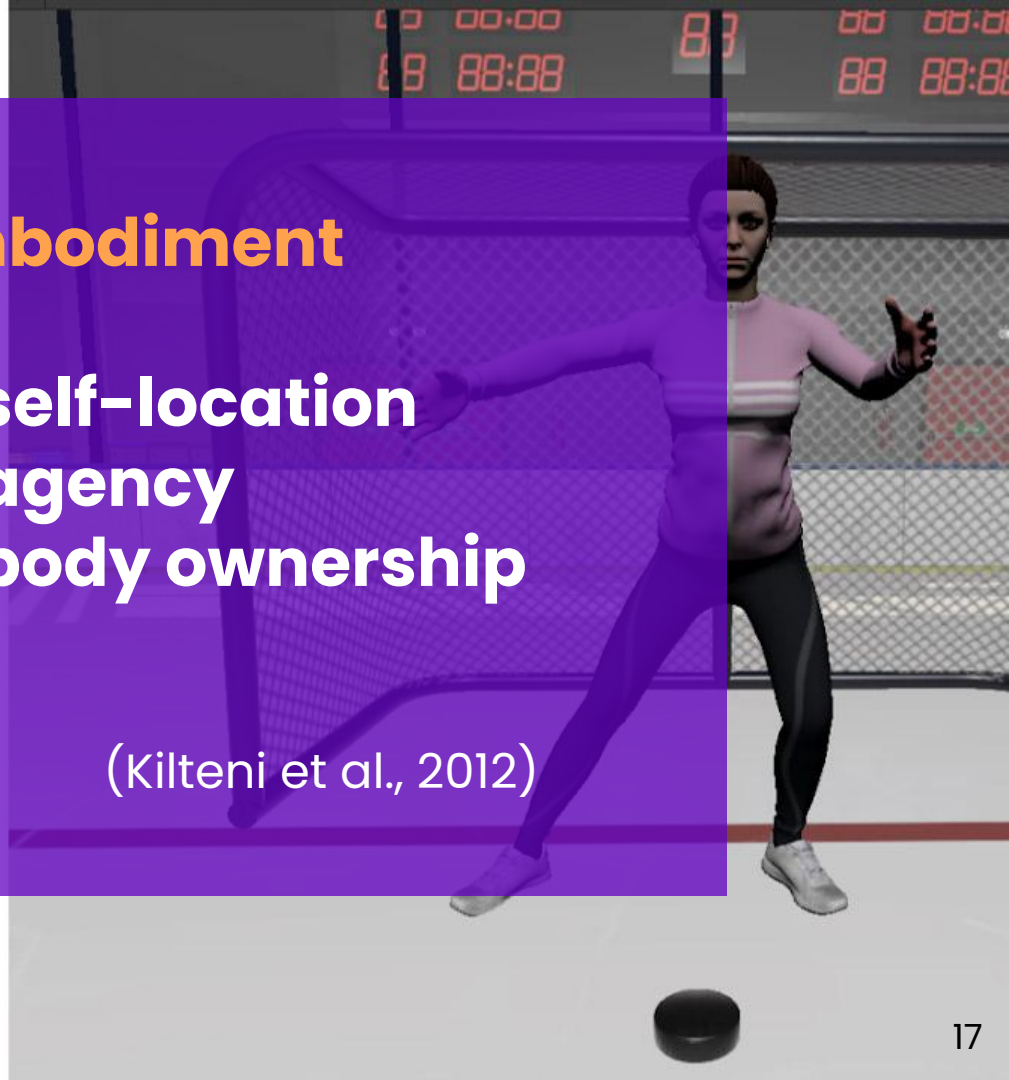
(Slater et al., 2009)



Embodiment

- Sense of self-location
- Sense of agency
- Sense of body ownership

(Kilteni et al., 2012)



Three Dimensions

Individual

Novel **Identity practices** by
(re)discovering the
physical body online
(CHI'22*, CSCW'20,
CHI'20 LBW)

*Best Paper Honorable Mention Award

Three Dimensions

Individual

Novel **Identity practices** by (re)discovering the physical body online (CHI'22*, CSCW'20, CHI'20 LBW)

Interpersonal

- Collaboration and relationship building through **embodiment** (IDC'21, GROUP'22*, IMX'20)
- Seamlessly simulating the physicalized, offline **social support** (CHI'23*, CHI'21 LBW)

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Community

Embodied visibility (CSCW'22)

Novel Identity Practices by (Re)discovering the Physical Body Online



- Embodying **full-body tracked avatars** to experience gender identity in a realistic way
- Leveraging voice chat to train and validate a gender appropriate **voice**

"In real life, you're stuck with what you were born with. But in VR, you can be what you truly feel like you are inside. This experience actually gave me confidence to start my [transgender] procedure in the real life." (P3, trans woman, 30, white)

Conducting Embodied Collaborative Activities



- Collaborative **creative** activities
- Simulating **physical** collaborative gameplay
- **Professional** development events
- Replicating **mundane** daily tasks

"Building stuff in social VR requires so much work and effort. So I like to invite my friends into my realm and build stuff together there. It's fun to collaborate that way because you can really feel you are making something with others face to face since you are physically doing things together. This also helps you build trust." (trans woman, White, 32)

Innovating Online Social Support for Marginalized Users



- Creating a sense of **co-presence** similar to face-to-face Interaction
- Simulating **physical behaviors** to demonstrate support
- Imitating **offline LGBTQ+ centered events** in a natural and immersive way

*"Social VR allowed us as a long distance relationship to have **physical interaction** to an extent, which really helped when they were sad I could go up to them and give them a hug and they would feel better."* (Cis Man, Gay, Indigenous Australian, 17)

“Embodied Visibility”



- E.g., queer users' conscious choices on presenting and/or disclosing non-hetero or non-cisnormative identity expressions to others through a sense of **embodiment** about wearing and acting upon one's **virtual body**

*“I do believe that the strength of social VR is cultivating the LGBTQ community and help them gain confidence. With the confidence about themselves, they can then have the power to **advocate** their rights on other platforms such as social media.”* (Genderfluid, bi-curious, mixed race, 25)

How might the existing social
VR paradigm also introduce
emerging risks to various
communities' online social
lives?



Three Dimensions

Individual

Challenges for
presenting **diverse**
genders and
sexualities (CHI'22*,
CSCW'20)

*Best Paper Honorable Mention Award

Three Dimensions

Individual

Challenges for presenting **diverse genders** and **sexualities** (CHI'22*, CSCW'20)

Interpersonal

- Growing **harassment** risks (CSCW'22, 23*)
- **Privacy** and **safety** risks (VRST'20, CHI'22, CSCW'23)
- Tensions in **children-adults** interactions (IDC'21, CHIPLAY'20)

Three Dimensions

Individual

Challenges for presenting **diverse genders** and **sexualities** (CHI'22*, CSCW'20)

Interpersonal

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- **Privacy** and **safety** risks (VRST'20, CHI'22, CSCW'23)
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Community

“Embodied visibility” as a **privilege** (CSCW'22)

Challenges for Presenting Diverse Genders and Sexualities



- Limited **avatar design and customization** for diverse identities
- **Anti non-cisgender** rhetoric in cishnormative public spaces
- The common behaviors of **misgendering**

“The social norm for most people is that ‘**everyone is a guy until proven otherwise**’.”
(P5, Trans Woman, NH/PI, 15)

“Embodied Harassment”



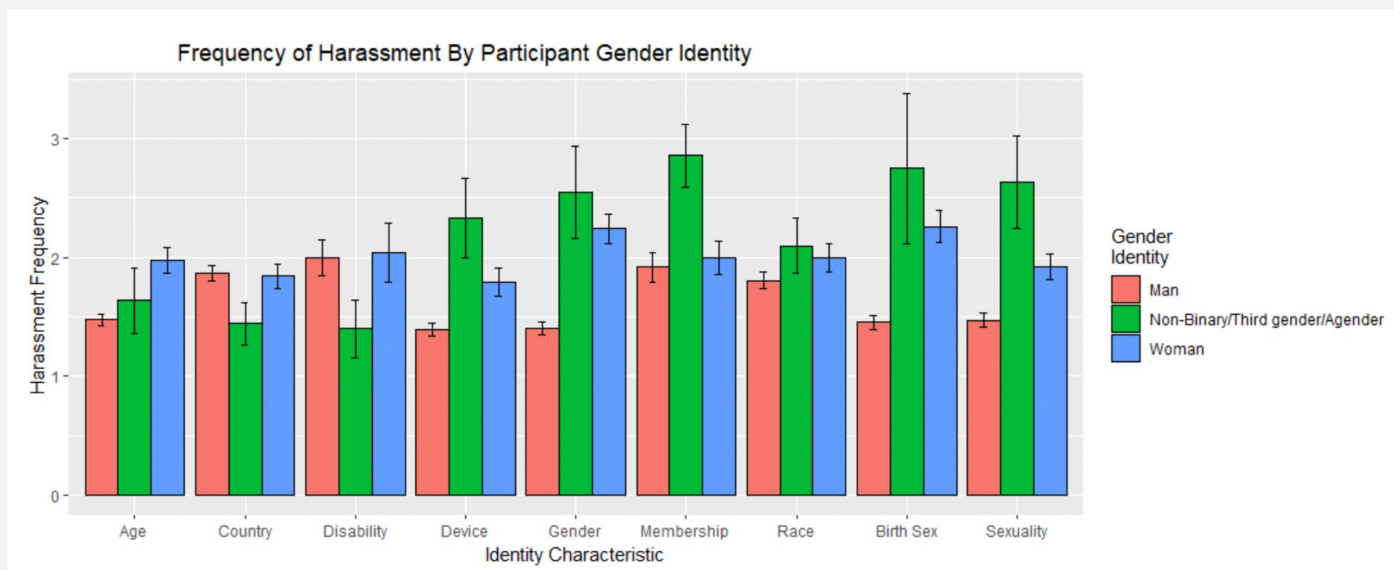
- Harassing behaviors are both conducted and experienced through **a sense of embodiment about one's virtual body** with a higher awareness of body ownership and more **physical** and transformative interactive experiences.

Who You Are or Appear to Be Does Matter

Variables	Total (N=223)	Percentage (%)	Variables	Total (N=223)	Percentage (%)
Gender			Race/Ethnicity		
Cis Man	146	65.47	Asian	6	2.69
Cis Woman	69	30.94	Black/African American or African	50	22.42
Trans Woman	1	0.45	Hispanic or Latino/a	28	12.56
Non-Binary/Third Gender/Agender	6	2.69	White	129	57.85
Not Provided	1	0.45	Mixed	7	3.14
Age			Not Provided	3	1.34
18 - 24	116	52.02	Country of Origin by Region		
25 - 34	78	34.98	Africa (except South Africa)	3	1.34
35 - 44	17	7.62	Asia	2	0.90
45 - 54	6	2.69	Australia	2	0.90
55 - 64	4	1.79	Central America (e.g., Mexico)	36	16.14
65 - 74	2	0.90	Europe	117	52.47
Sexuality			North America	11	4.93
Asexual	3	1.35	South Africa	44	19.73
Bisexual	10	4.48	South America	8	3.59
Gay	7	3.14	Country of Residence by Region		
Lesbian	8	3.59	Australia	2	0.90
Pansexual	11	4.93	Central America (e.g., Mexico)	37	16.59
Straight	178	79.82	Europe	121	54.26
Not Provided	6	2.69	North America	12	5.38
Disability			South Africa	43	19.28
Yes, identified as having a disability	16	7.17	South America	8	3.59
No, not identified as having a disability	205	91.93			
Not Provided	2	0.90			

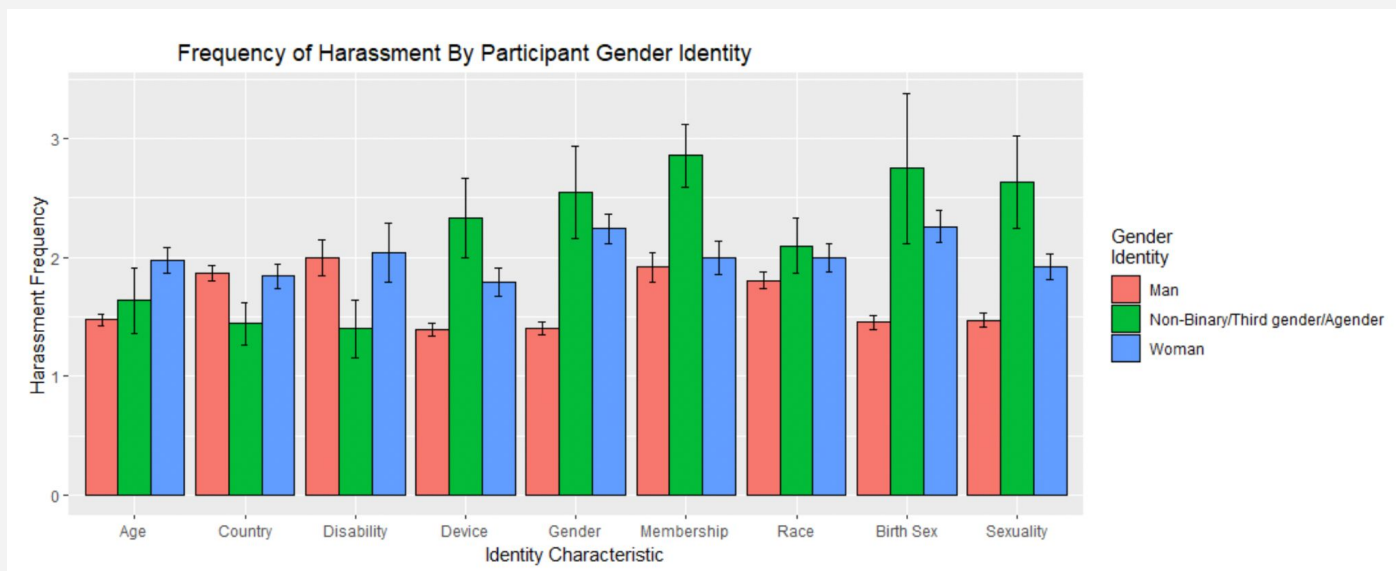
Table 1. Demographic information of 223 valid respondents

Who You Are or Appear to Be Does Matter



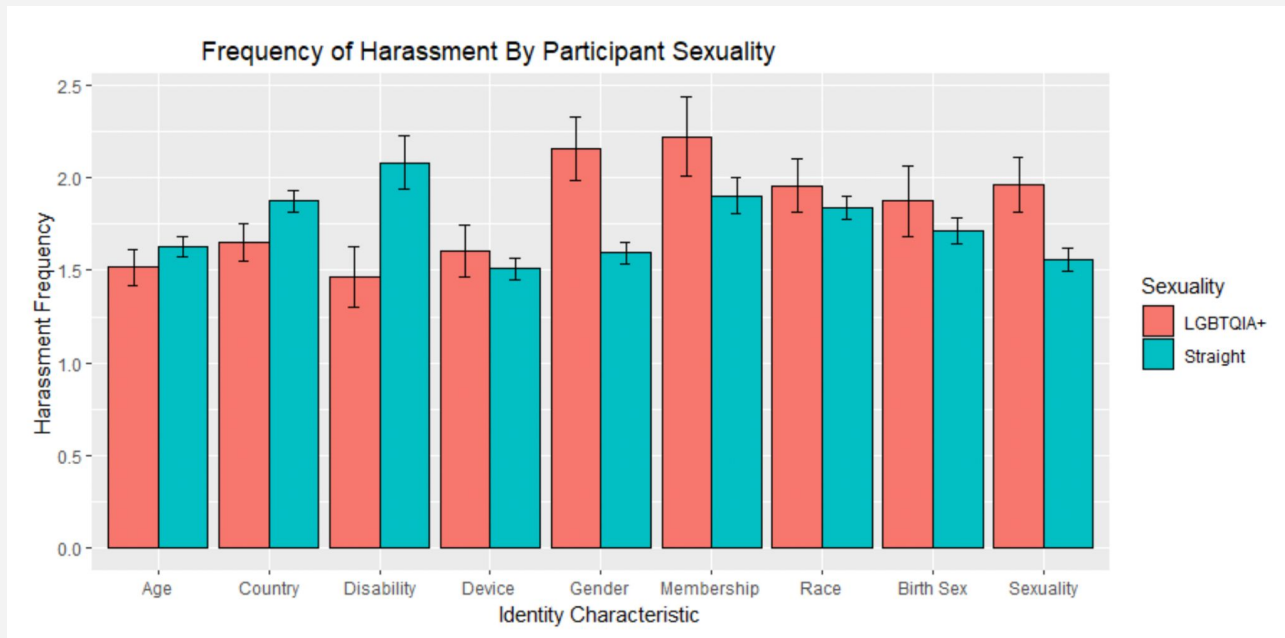
Women are harassed more frequently than men for Age, Device Used, Gender Identity, Sex Assigned at Birth, and Sexuality.

Who You Are or Appear to Be Does Matter



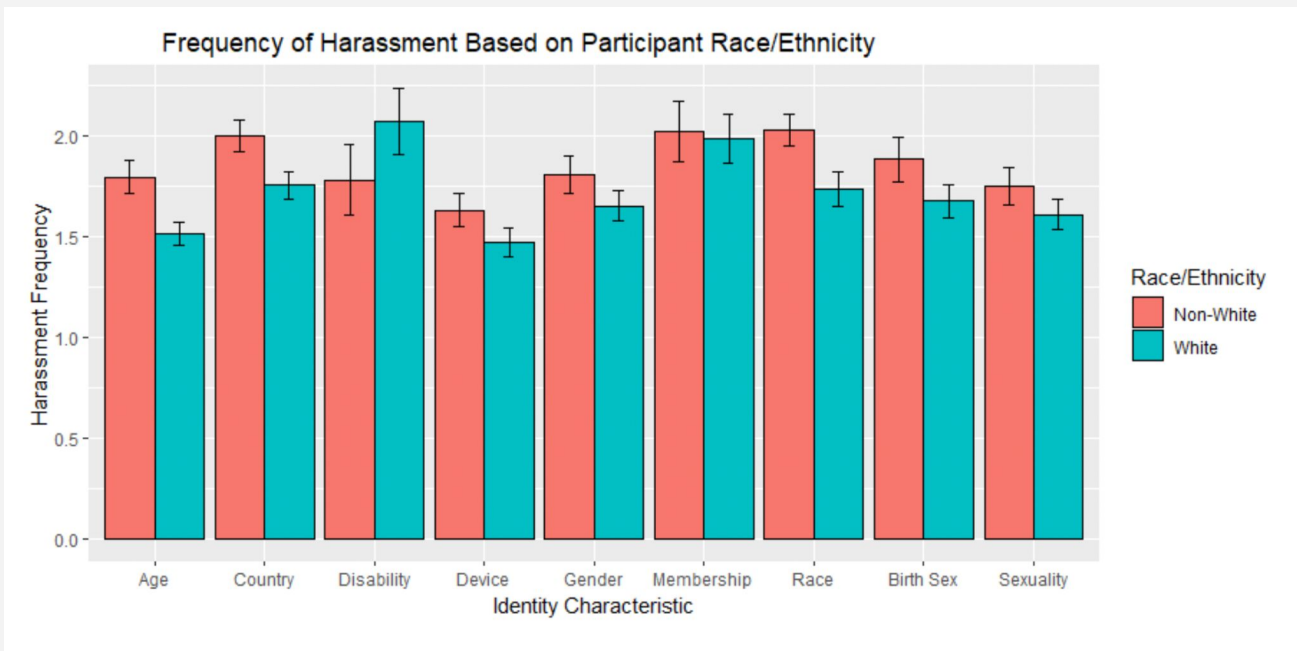
Nonbinary/third gender/agender individuals are harassed more frequently than men or Gender Identity, Sub-community Membership, Sex Assigned at Birth, and Sexuality, and more frequently than women for Sub-community Membership and Sexuality.

Who You Are or Appear to Be Does Matter



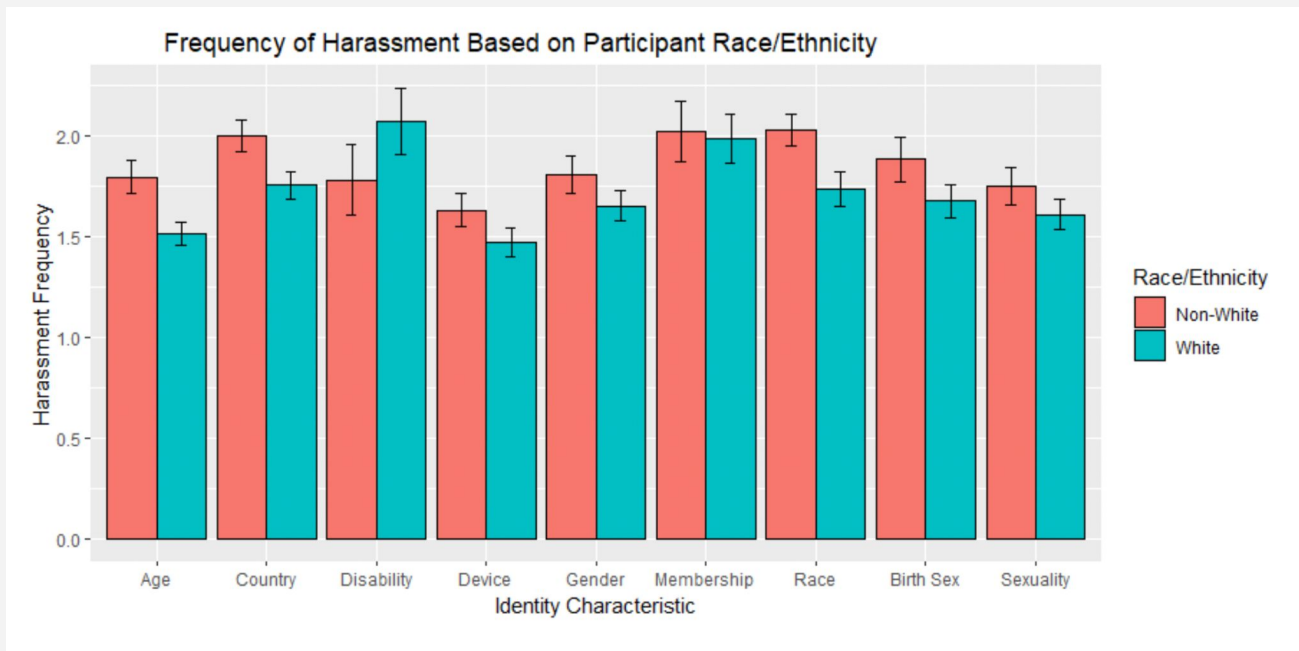
LGBTQIA+ individuals are harassed more frequently than straight individuals for Gender Identity, Sub-community Membership, and Sexuality.

Who You Are or Appear to Be Does Matter



Non-White individuals are harassed more frequently than White individuals for **Age, Device Used, and Race/Ethnicity**, and almost significantly more for Country of Origin and Sex Assigned at Birth.

Who You Are or Appear to Be Does Matter



However, **White individuals** are harassed more frequently than non-White individuals for **Disability**.

Tensions between Different Age Groups



- The **coexistence** of children and adults in social VR, but:
 - The absence of appropriate guidance
 - The mismatch between children's and adults' understandings of play

"Harassment happens quite a lot and most when there are kids. **These kids would try to break the game and get super tall or super short or screaming and doing silly stuff.** That's not the thing and I'm here for. So I will even go away from the room and go to another room." (cis man, Hispanic, 32)

“Embodied Visibility” as “Privilege”



- Which community gets to be visible and/or more visible than others in embodied ways
- Who gets to build and engage in such communities safely

“When I was exploring, I didn’t personally see a lot of LGBTQ. [...] I think one challenge is the price of those things [the VR headset]. I’m lucky that I was able to get a good discount but I don’t know a lot of black people even myself can afford it.” (Non-binary, sexuality unknown, Black, 28)

How can we develop technologies to mitigate said risks in social VR in a **proactive** rather than reactive way?



Main Challenges to Build Inclusive and Safe Social VR Spaces



- **Challenge 1:**
- **No consensus** on what social behaviors are deemed to be harassment and risky rather than just inappropriate or "fun/play."

Main Challenges to Build Inclusive and Safe Social VR Spaces



- **Challenge 2:**
- Existing techniques to prevent and mitigate harassment and risks are mainly “**reactive.**”

Main Challenges to Build Inclusive and Safe Social VR Spaces



- **Challenge 3:**
- How **moderation**, a common method for online safety, can be used to protect social VR users is unclear.



Our Effort to Address Challenge 1:

Preventing Interpersonal Harm in Social VR through the Lens of Consent



Our Work



- Conceptualizing **Consent & Consent Practices** in social VR
- Identifying existing **Consent Mechanics** in Social VR Interactions
- Designing future **Consent Mechanics** in Social VR

(CSCW'23, Best Paper Honorable
Mention Award)

Conceptualizing Consent & Consent Practices in Social VR



- **Boundaries** as a Foundational Lens to Conceptualize Consent in Social VR
- Consent Practices in Social VR Revolve around the **Negotiation of Boundaries**

Designing Future Consent Mechanics in Social VR

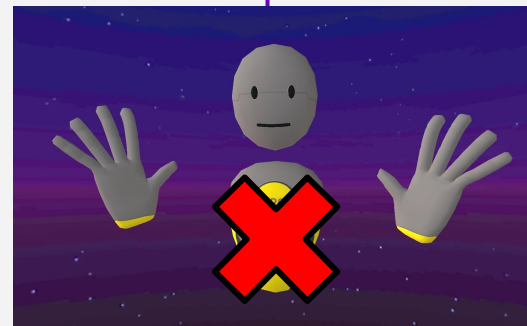
The importance of maintaining natural social experiences while interacting with others



The importance of customization: Relationship to requester; Nature of action; When and where of interaction



The importance of revoking consent once given





Our Effort to Address Challenge 2:

AI Companions as a New
Harassment Mitigation
Approach in Social
VR



Limitations of Existing Safety Mechanisms for Protecting People in Social VR

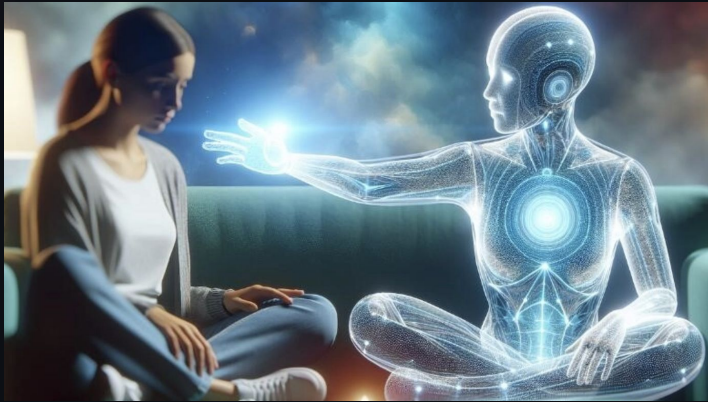
Mute Others

Press the button below to mute or unmute all other players. Other players will still be able to hear you.

Mute Players



AI Companion as a New Lens?



Companionship is crucial for people's everyday psychological wellbeing



AI companions such as NPCs have long been used to fulfill players' social and emotional needs



AI companions have potential to support under-addressed harassment mitigation needs

Our Work

- Understanding women's envisionings for leveraging AI as **Accessible Companions, Informational Companions, Emotional Support Companions, and Protective Companions** to better protect them in social VR compared to their existing safety mechanisms and strategies
- Also unpacking various **sociotechnical** complexities for designing and implementing such AI companions in social VR spaces

(CHI'25, in press)

Designing Future AI Companions to Protect Social VR Users

The importance of fostering **mutual support, emotional bonding, and trust** among social VR users rather than replacing their human connections



The importance of enhancing **a sense of comfort** rather than **alienation**



The importance of careful considerations of unintended use to **prevent personal abuses**





Our Effort to Address Challenge 3:

Leveraging **Human-AI
Collaboration** to
moderate Harassment
Risks in Social VR



Why?

I've been
upgraded to
admin status



- **Content moderation mechanisms** have become crucial approaches to mitigate and prevent online harassment

Human-Based and Community-Driven Moderation



Vote



r/VRchat · Posted by u/Garanorn7 47 minutes ago

Hand tracking in VRchat?

Help

As I wanted to chill in VRchat yesterday I saw an pop up that hand tracking is in the beta for VRchat anyone know how I can enter ?

Thanks for the help in advance :)



7 Comments



Share



Save



Hide

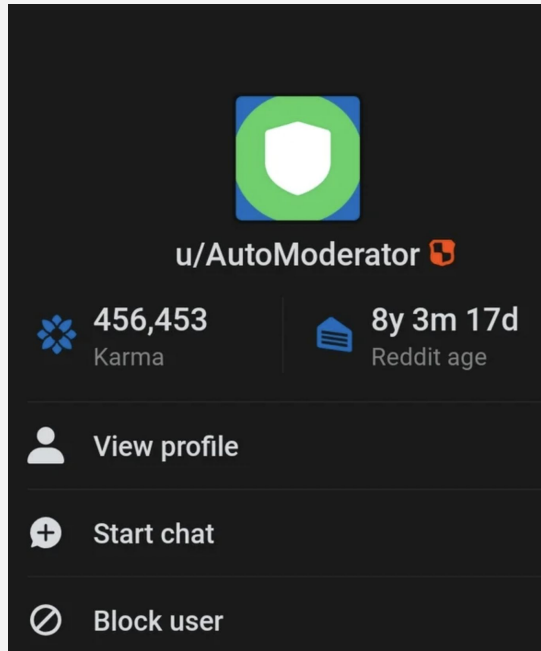


Report

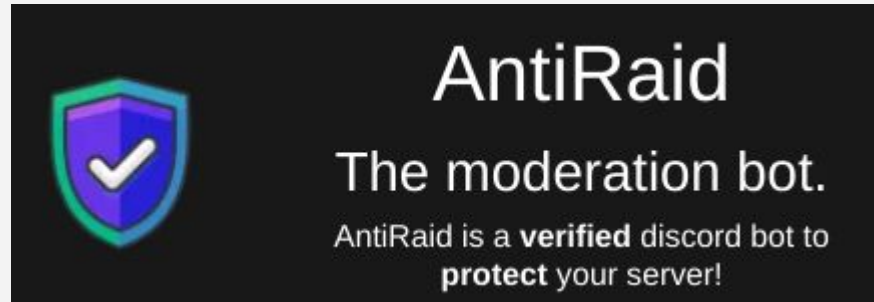
50% Upvoted



AI-Based Moderation



- Refers to **the use of machine learning and decision making to monitor online spaces for violations and incidents of harassment**



**AI-based moderation has
yet to be implemented in
social VR, so ...**



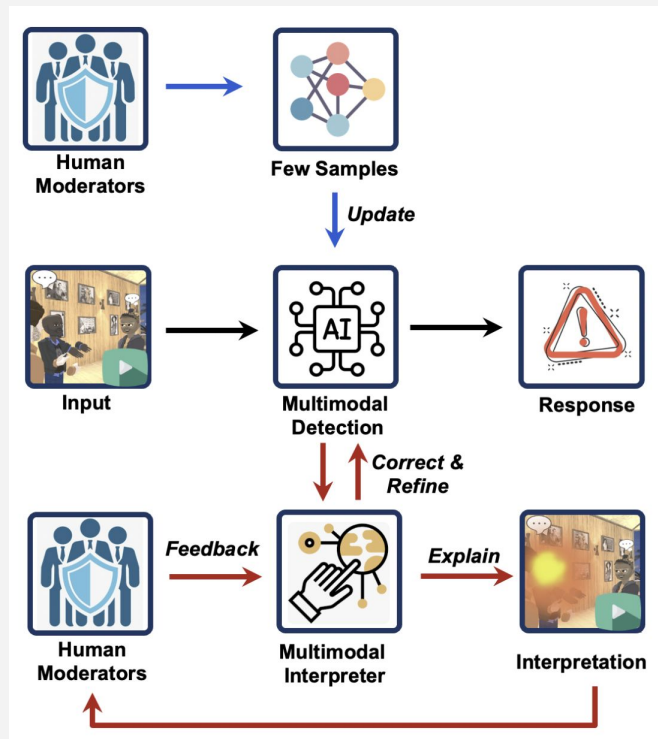


Our Work

- **Perceived opportunities and limitations** for AI-based moderation to address emergent harassment in social VR, especially vs. traditional human-based moderation
- Social VR users' own **design recommendations** to enhance these opportunities and remedy risks to implement AI moderators for social VR

(CHI'23)

A New Moderation System (Collaboration with U of Buffalo)



A Bigger Picture ...

A stylized illustration of a globe with various geometric shapes (cubes, triangles, hexagons) floating around it. The background is a dark purple space with stars and a grid floor.



A Bigger Picture

- **How can we create safe, inclusive, and supportive social VR spaces to empower diverse communities?**
 - How can AI be leveraged to go beyond a moderator or a punisher in social VR to provide for under-addressed harassment mitigation needs?



Kelsea Schulenberg
HCC PhD candidate



Lingyuan Li
PhD in HCC



Catherine Barwulor
HCC PhD student



Douglas Zytke
UM-Flint



Hongxin Hu
SUNY Buffalo



Caitlin Lancaster
PhD in HCC



Divine Maloney
PhD in HCC



Dane Acena
MS in CS



School of
COMPUTING
Clemson University

Thank you!

Questions?



Guo Freeman

Clemson University, USA

guof@clemson.edu

