Xinyun Cao

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Research Interest

I have extended experience (2+ years) working in **Mixed Reality** and **Accessibility** research. I am interested in developing **multi-modal, AI-driven** tools and systems to make mixed reality and immersive 3D environments more accessible. I conduct evaluations in both **qualitative and quantitative** methods, and strive to support **further deployment** to achieve greater impact for the community.

Education

PhD - University of Michigan, Ann Arbor (Cum. GPA: 3.916 / 4.0000) Aug, 2023-present

❖ Program: Computer Science Engineering, Advanced to Candidacy
❖ Advisor & Lab: Prof. Dhruv Jain, Soundability Lab
❖ Graduate Coursework: Advanced Accessibility, Human Computer Interaction, Machine Learning, Immersive Media, AI in Education, Engineering Interactive Systems, Advanced Compiler.

Bachelor's - University of California, Berkeley (Cum. GPA: 3.972 / 4.000) Aug, 2018-May, 2022

❖ Program: Computer Science, Cognitive Science. Minor: Music
❖ Honors in Computer Science, High Distinction in General Scholarship.
❖ Honors Thesis: Split Embodiment Interactions, Mentored by Bjoern Hartmann and James Smith.

Publications

RAVEN: Realtime Accessibility in Virtual ENvironments for Blind and Low-Vision People

❖ Authors: ***Xinyun Cao***, Kexin Phyllis Ju, Chenglin Li, Venkatesh Potluri, Dhruv Jain.
❖ Summary: Developed and evaluated RAVEN, a **generative AI-powered** system enabling **blind and low-vision** users to query and modify **3D virtual environments** through natural language, integrating accessibility research, system design, and user studies with BLV participants to assess usability, reliability, and trust.
❖ Full manuscript under review. Preliminary work published as Late Breaking Work in CHI 2025 and accepted as demo in ASSETS 2025.

SoundModVR: Sound Modifications in Virtual Reality to Support People who are Deaf and Hard of Hearing

❖ Authors: ***Xinyun Cao***, Dhruv Jain.
❖ Summary: Designed and implemented **18 VR sound modification tools** to improve accessibility for **deaf and hard-of-hearing** users, evaluated them through user studies in diverse VR scenarios, and built a Unity toolkit validated by **developers** - demonstrating expertise in VR system design, accessibility research, and iterative evaluation.
❖ Published as technical paper and poster in ASSETS 2024 and as demo in UIST 2024.

Dual Body Bimanual Interaction in Immersive Environments

❖ Authors: James Smith, ***Xinyun Cao***, Bjoern Hartmann.
❖ Summary: Conducted an **empirical VR study** on dual-body bimanual coordination, designing interaction tasks, analyzing user strategies, embodiment, and body schema, and generating insights into **how people control multiple virtual bodies simultaneously**.
❖ Published as paper in DIS 2023.

Teaching Experience

Graduate Student Instructor, University of Michigan Aug, 2024-present

Courses: *User Interface Development, Human Computer Interaction, Human AI Interaction*

❖ Guided groups of students on their open-ended final project, led them through qualitative and quantitative evaluations of their project prototypes.
❖ Led a weekly discussion section and taught a guest lecture about Virtual Reality.
❖ Arranged logistics of sections, exams, and quizzes, including publishing, grading, and accommodation.

Undergraduate Student Instructor, University of California, Berkeley Jan, 2022-May, 2022
Course: *Intro to Computer Graphics*
- ❖ Guided groups of students on their open-ended final project.
- ❖ Led a weekly discussion section of 10+ students and hosted exam review sessions.
- ❖ Helped develop class projects about Rasterization, Mesh Geometry, and Particle Simulation.

Professional Experience

Software Engineer (Mobile) - NimbleRX Aug, 2022-May, 2023
- ❖ Developed a patient-facing mobile app for a pharmacy platform, accumulating 200k+ downloads.
- ❖ Utilize Dart (Flutter), HTML API and various Flutter packages like Retrofit to optimize code and communicate with other systems.
- ❖ Worked with Content Management Systems like Sanity and Mux to store and retrieve client facing content.
- ❖ Implemented the design of a new navigation mechanism for the app using GoRouter.
- ❖ Participated in design review and code review, produced demo and organized playtest. Gained working knowledge with the software development lifecycle.

Software Engineer - Pocket Gems June, 2021-Dec, 2021
- ❖ Developed game features in C# (Unity) and implemented gameplay debug tools for developers.
- ❖ Migrated parameters from Unity Editor to CSV files automatically using editor scripting.
- ❖ Deployed builds in Jenkins, participated in company playtests, and gave constructive feedback.

Software Developer - Geopogo Apr, 2020-Aug, 2020
- ❖ Implemented User Interface, login, and session system of a cooperative VR building software using C#.
- ❖ Incorporated Identification system with Amazon Cognito and multiplayer network using Amazon GameLift.

Leadership Service

- ❖ President/ Computer Science Engineering Graduate Student organization May, 2024-May, 2025
- ❖ External VP, Internal VP, Social Chair/ Upsilon Pi Epsilon (CS Honor Society) Dec, 2019-May, 2022

Honors and Scholarships

Berkeley EECS Honors Program - Class of 2022
Berkeley Engineering Design Scholar - Summer 2021 Cohort
Upsilon Pi Epsilon (Computer Science Honor Society) - Initiated Fall 2019

Personal Projects

Designer, Developer - Gesture-Music Interface Nov, 2020
- ❖ Made a hand gesture-music interface built in Python and Max MSP.
- ❖ Implemented with OpenCV computer vision module and PyOSC port.

Designer, Developer - Cognitive Training in VR Environment Aug, 2019-May, 2020
- ❖ Conducted Literary Review about Cognitive Training for Traumatic Brain Injury patients.
- ❖ Developed a Dichotic Listening Training Program in VR using C# (Unity).

Developer - GAN Image Noise Cancellation May, 2019-Aug, 2019
- ❖ Learned about different Machine Learning deep neural network structures.
- ❖ Designed and implemented a model using a Generative Adversarial Network in Python using Tensorflow.
- ❖ Generated a data set, trained the model, and achieved a product that performs noise cancellation on images.

Skills

Research: Literature review, Human-centered design, Qualitative and quantitative study, Thematic analysis.
Programming: Python, Dart, Java, C#, C++, C.
Technology: Git, Unity, OpenCV, Tensorflow, Maya, Adobe Audition, Max MSP.
Language: Mandarin (Native), English (Fluent)