

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

2023/8-now

- ❖ Program: Computer Science Engineering, Advanced to Candidacy
- ❖ Cum. GPA: 3.916 / 4.0000
- ❖ 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

2018/8-2022/5

- ❖ Majors: Computer Science, Cognitive Science. Minor: Music
- ❖ Cum. GPA: 3.972 / 4.000.
- ❖ Honors in Computer Science, High Distinction in General Scholarship.
- ❖ Honors Thesis: Split Embodiment Interactions, Mentored by Bjoern Hartmann and James Smith.
- ❖ Honors to Date in 7 out of 7 semesters, Dean's List in 4 out of 7 semesters.

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 interact with 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 - User Interface Development, Human Computer Interaction, Human AI Interaction, University of Michigan

2024/8-now

❖ Guided groups of students on their open-ended final project, led them through qualitative and quantitative evaluations of their project prototypes.

❖ Teach guest lecture about Virtual Reality.

❖ Taught discussion, hosted office hours, and answered questions on the class forum.

❖ Arranged logistics of sections, exams, and quizzes, including publishing, grading, and accommodation.

Undergraduate Student Instructor - Intro to Computer Graphics, UC Berkeley

2022/1-2022/5

❖ Taught discussion sessions of 10+ students and hosted exam review sessions.

❖ Answered questions during office hours and on the class forum.

❖ Helped develop class projects about Rasterization, Mesh Geometry, and Particle Simulation.

❖ Reviewed and scored open-ended final projects.

Research Experience

PhD Student - University of Michigan, Soundability Lab

2023/8-now

❖ Mentored by Prof. Dhruv Jain.

❖ Conducted Related Work searches on different topics regarding sound and visual accessibility and mixed reality.

❖ Made tools in Unity, built scenarios in Meta Quest to evaluate them, and open-sourced the tools on GitHub.

❖ Conducted user studies, and performed interviews and thematic analysis.

❖ Produced work that was published in top HCI and Accessibility conferences like ASSETS, CHI, UIST, DIS.

Undergraduate Researcher - Berkeley Institute of Design

2021/1-2022/5

- ❖ Mentored by Prof. Bjoern Hartmann and Ph.D. Student James Smith.
- ❖ Explored how VR can improve the prototyping process by reading related papers.
- ❖ Participated in the Engineering Design Scholar program and implemented VR programs to explore how modifying VR avatars can lead to design insight.
- ❖ Help proposed Dual Body Bimanual Interaction in VR, wrote a VR program in Unity 3D as an artifact, and conducted user studies. Finished an Honors Thesis and a research paper submitted to DIS.

Undergraduate Researcher - Tetrachromacy

2021/8-2021/12

- ❖ Mentored by Ren Ng for the Computational Color graduate-level course.
- ❖ Worked on a project analyzing the mathematical and biological model of tetrachromacy to study its color space.
- ❖ Proposed a new color-matching pipeline and used PCA and hyperspectral dataset to find the basis for a Four Color Opponency system.

Undergraduate Researcher - ROAR VR

2020/9-2020/12

- ❖ Mentored by Allen Yang for the Immersive Computing and Virtual Reality graduate-level course.
- ❖ Worked on the ROAR (Robot Open Autonomous Racing) VR project.
- ❖ Implemented and tested localization functionalities for a small car with an intel Realsense camera using OpenCV and Python.
- ❖ Built a virtual city using C# (Unity) to overlap images collected by car mount cameras, and export them into VR.

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

Professional Experience

Software Engineer (Mobile) - NimbleRX

2022/8-2023/5

- ❖ 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 (Adventure Chef)

2021/6-2021/12

- ❖ Developed game features in C# (Unity) and implemented gameplay debug tools for developers.
- ❖ Migrated a large number of parameters from Unity Editor to CSV files automatically using editor scripting.
- ❖ Made builds in Jenkins, participated in company playtests, and gave constructive feedback.

Software Developer - Geopogo

2020/4-2020/8

- ❖ Implemented User Interface, login, and session system of a cooperative VR building software using C# (Unity).
- ❖ Incorporated Identification system with Amazon Cognito and multiplayer network using Amazon GameLift.

Personal Projects

Designer, Developer - Gesture-Music Interface

2020/11

- ❖ 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

2019/8-2020/5

- ❖ Researched by reading paper about Cognitive Training for Traumatic Brain Injury patients.
- ❖ Developed a Dichotic Listening Training Program in VR using C# (Unity).

Developer - GAN Image Noise Cancellation

2019/5-2019/8

- ❖ 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.

Activities

President/ Computer Science Engineering Graduate Student organization

2024/7-now

- ❖ Work as a connection between the CSE department, officer board, and CSE graduate students.
- ❖ Represent the CSE graduate student body in events like the CSE national advisory board meeting.
- ❖ Host events with industry, the CSE department, and other departments and organizations.

External VP, Internal VP, Social Chair/ Upsilon Pi Epsilon (CS Honor Society)

2019/12-2022/5

- ❖ Planned and organized social events to foster the CS community. Trained new members.

❖ Held academic office hours, academic advising sessions, resume critiques, and mock interviews.

Skills

Programming: Python, Dart, Java, C#, C++, C.

Technology: Git, Unity, OpenCV, Tensorflow, Maya, Adobe Audition, Max MSP.

Language: Chinese (Native), English (Fluent)