Xinyun Cao

Website: xinyun-cao.github.io/; LinkedIn: linkedin.com/in/xinyun-c; Google Scholar; Email: xinyunc@umich.edu; Phone: (510)-693-2655

Research Interest

I have extensive experience working in **Extended Reality** and **Accessibility** research. I am interested in developing **multi-modal, AI-driven** tools and systems to make extended 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 relevant communities.

Education

PhD - University of Michigan, Ann Arbor (Cum. GPA: 3.916 / 4.0000) Aug, 2023-May 2028 (expected)

- 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. The system is developed in **C# (Unity 3D)** using **GPT-4o**.
- Full manuscript conditionally accepted at CHI 26. Preliminary work published as late breaking work in CHI 2025, and a demo in ASSETS 2025, which won the **Best Demo Award (1st of 22)**.

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 open sourced a **Unity** toolkit evaluated 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***, Adolfo G. Ramirez-Aristizabal, Bjoern Hartmann.
- Summary: Conducted an **empirical VR study** on **dual-body bimanual coordination**, designing interaction tasks, analyzing user strategies, embodiment, and body schema. The interaction methods are developed in **C# (Unity 3D)**.
- Published as paper in DIS 2023.

Employment Experience

Graduate Researcher - University of Michigan, Soundability Lab May 2023 - present

- Led research agenda designing, developing, and studying systems for **virtual 3D accessibility**. Collaborated with a multi-disciplinary team of students and mentors.
- Published and presented research papers, demos and posters in top HCI and Accessibility conferences, including CHI, UIST, and ASSETS, and open-sourced systems.

Software Engineer (Mobile) - NimbleRX Aug, 2022-May, 2023

❖ Developed a patient-facing mobile app for a pharmacy platform, accumulating 200k+ downloads.
❖ Utilized 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.

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

❖ 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.

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.

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

ASSETS 2025 Audience Choice Best Demo Award
Berkeley EECS Honors Program - Class of 2022
Berkeley Engineering Design Scholar - Summer 2021 Cohort
Upsilon Pi Epsilon (Computer Science Honor Society) - Initiated Fall 2019

Skills

Programming: C#, Python, Dart, Java, C++, C, SQL.
Technology: Git, Unity, OpenCV, Tensorflow, Pytorch, ASR, Maya, Adobe Audition, Max MSP.
Language: Mandarin (Native), English (Fluent)