Xinyun Cao

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Research Interest

My most recent work focused on Sound Accessibility in Virtual Reality. More generally, I am interested in using multi-modal tools to make mixed reality and immersive 3D environments more accessible.

Education

PhD - University of Michigan, Ann Arbor, 2023/8-now
❖ Program: Computer Science Engineering
❖ Advisor & Lab: Prof. Dhruv Jain, Soundability Lab

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

SoundModVR: Sound Modifications in Virtual Reality to Support People who are Deaf and Hard of Hearing
❖ Authors: Xinyun Cao, Dhruv Jain.
❖ Published as paper and demo in ASSETS 2024 and as demo in UIST 2024.

Dual Body Bimanual Interaction in Immersive Environments
❖ Authors: James Smith, Xinyun Cao, Bjoern Hartmann.
❖ Published as paper in DIS 2023.

Teaching Experience

Graduate Student Instructor - User Interface Development, University of Michigan, 2024/8-now
❖ Taught discussion, hosted office hours, and answered questions on the class forum.
❖ Guided eight groups of students on their open-ended final project.
❖ 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.
- ❖ Explored different topics in the intersection of sound accessibility and mixed reality.
- ❖ Made tools in Unity, built scenarios to evaluate them, and open-sourced the tools on GitHub.
- ❖ Conducted user studies, and performed interviews and thematic analysis.
- ❖ Produced paper SoundModVR and published in ASSETS 24.

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)