

Pingkang Chen

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RESEARCH FOCUS

Spatial Audio · Room Acoustics · Neural RIR Modeling · Binaural Rendering · Real-Time Audio DSP · Spatial Audio Evaluation

EDUCATION

University of California, Santa Barbara

Ph.D., Media Arts and Technology | Aug 2026 - Jun 2029 (expected)

M.S., Media Arts and Technology | Aug 2024 - Jun 2026

American University

M.A., Audio Technology | Sep 2022 - May 2024

Xi'an Conservatory of Music

B.A., Electronic Music Production | Sep 2017 - Jun 2021

RESEARCH EXPERIENCE

AlloSphere, University of California, Santa Barbara

Graduate Student Researcher | Advisor: Prof. JoAnn Kuchera-Morin | Jan 2025 - Present

- Independently developed AlloLib-AmbisonicsToBinaural, a real-time C++ application supporting multiple loudspeaker layouts, head tracking, selectable acoustic spaces, and headphone compensation for immersive headphone mixing.
- Co-developed AlloLive, an AlloLib-based C++ framework integrating object-based spatialization, modular effects, graphical control, and networked parameter synchronization; demonstrated in a live concert using the AlloSphere's 54.1 loudspeaker array.
- Conducted a 3DoF/6DoF sound-localization study in a VR replica of the AlloSphere, comparing participant responses with stimulus directions associated with its loudspeaker array.

American University - Head-Track Digital Piano Research

Independent Research | Advisor: Prof. Braxton Boren | Mar - Jun 2024; Mar - Jun 2025

- Captured first-order Ambisonic samples of a Yamaha grand piano using a Zoom H3-VR (24-bit/48 kHz), including eight velocity layers with sustain pedal on/off, key-release sounds, and pedal noises.
- Built a real-time 3DoF playback system integrating Ambisonic samples in Kontakt, MIDI input, REAPER, IEM scene rotation and binaural decoding, and OSC head tracking; evaluated three playback systems with 12 experienced pianists.
- Developed a C++/JUCE 6DoF binaural rendering plugin using SOFA HRTFs, libmysofa interpolation, partitioned convolution, image-source early reflections, and Schroeder late reverberation.
- Integrated face tracking and Max/MSP OSC routing with per-key spatial processing. A counterbalanced within-subject study with 12 pianists found significant improvements over 3DoF in dynamic spatial realism, source stability, envelopment, and preference.

Neural Room Impulse Response Modeling

Independent Project | Ongoing

- Developing a neural RIR prediction workflow using pyroomacoustics for simulated training data and PyTorch for learning relationships between room geometry, source-receiver configurations, and impulse responses.
- Exploring learned acoustic modeling as an alternative to repeated room simulations, with the goal of supporting efficient room-response generation for spatial audio applications.

University of California, Santa Barbara - Auditory Distance Perception

Independent Research | Feb - Jun 2025

- Designed and conducted a 12-participant study comparing head-fixed and head-tracked binaural rendering in simulated free-field and reverberant environments using a custom C++/JUICE renderer.
- Built an Unreal Engine 5 / Meta Quest 3 experimental environment with OSC head tracking, trial alignment, controller-based spatial responses, and automatic response logging.
- Tested 49 source positions in free-field and 25 in reverberant conditions; analyzed how rendering mode, azimuth, and source distance affected perceived distance using multifactor ANOVA.

Qualcomm Institute, University of California, San Diego

Sonic Arts Research & Development - Research Intern | Advisor: Prof. Shahrokh Yadegari | Jun - Sep 2025

- Conducted a comparative room-acoustics study of Meta XR Audio, Steam Audio, and Space3D in Unreal Engine against ODEON, evaluating T30, EDT, and C50 across room models using ISO 3382-1 parameters.

PUBLICATIONS

Chen, P., & Boren, B. (2025). Extending Realism for Digital Piano Players: A Perceptual Comparison of 3DoF and 6DoF Head-Trackable Binaural Audio. AES 159th Convention, Paper 10243. Long Beach, CA.

Chen, P. (2025). Auditory Distance Perception in HRTF-Based Binaural Rendering: Effects of Head Tracking and Reverberation. AES 159th Convention, Paper 10246. Long Beach, CA.

Chen, P., Jaffe, J., & Parisi, L. (2025). A Framework & Toolkit for Live Music Performance in the AlloSphere. AES 159th Convention, Express Paper 398. Long Beach, CA.

Ranade, S., **Chen, P.**, & Tsuaye, J. (2025). A Primer Review of Head-Related Transfer Function Interpolation Methods. AES 159th Convention. Long Beach, CA.

Chen, P., & Boren, B. (2024). Enhancing Realism for Digital Piano Players: A Perceptual Evaluation of Head-Trackable Binaural Audio. AES 157th Convention, Paper 10199. New York, NY.

SELECTED AWARDS & TRAINING

Best Student Paper Award - AES 159th Convention, 2025; AES 157th Convention, 2024.

Virtual Acoustics for Immersive Audio Workshop - Stanford CCRMA, Jul - Aug 2025.

TECHNICAL SKILLS

Programming: C++, Python, MATLAB, Max/MSP, Pure Data

Machine Learning & Simulation: PyTorch, pyroomacoustics (ongoing neural RIR project)

Spatial Audio & DSP: JUCE, AlloLib, SOFA/libmysofa, HRTF rendering, Ambisonics, OSC, convolution, room-acoustic modeling, perceptual evaluation

VR & Production: Unreal Engine, Meta Quest 3, REAPER, Kontakt, Pro Tools, Logic, Wwise, Blender, SketchUp

Languages: Mandarin (native), English