CHRISTOPHER R. LANDSCHOOT

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SUMMARY

Audio and acoustics machine learning engineer possessing a unique breadth of expertise across diverse disciplines. A background in audio, acoustics, engineering, research & development, and AI/ML with a passion for music, sound, and technology provides insight into emerging technologies and innovative practices.

SKILLS

Programming	Python, C++, MATLAB, Max/MSP/RNBO, R, SQL, Git, PyTorch, TensorFlow, Scikit-learn, Jupyter/Google Colab, Neptune, W&B, Docker, Modal, AWS, GCP, Spat (IRCAM), JUCE
Technical	Machine Learning and Deep Learning, Digital Signal Processing, Real-Time Spatial Audio Processing, Audio Algorithm Development, Audio Data Engineering, Rapid Prototyping, Project Management, Time-Frequency Analysis, Acoustics & Psychoacoustics, Technical Writing
Music & Audio	Pro Tools, Composing, Performing, Recording, Producing, Mixing, Mastering, Electric & Acoustic Guitar, Bass Guitar, Piano, Percussion, Vocals, Banjo

EXPERIENCE

Whitebalance *August 2023 – Present*

Machine Learning Engineer

- Leading the development of deep learning algorithms for audio source separation and audio enhancement.
- Advancing core product technology through the implementation of cutting-edge audio source separation frameworks, model refinements, and audio dataset curation.
- Creating custom audio datasets, ensuring high-quality annotations, and leveraging data augmentation techniques to improve model generalization.

Virtuel Works *August 2022 – Present*

Collaborating Audio Research Developer

- Collaborating on the development and implementation of a real-time binaural externalization algorithm for object-based spatial audio in Max, addressing the unsolved immersive audio problem of improper frontal source elevation perception while minimizing spectral coloration via an all-pass framework.
- Created an interactive website with explanations and demonstrations of the externalizer to promote the technology.
- Utilize rapid prototyping within Max/MSP and RNBO, improving the build, test, iterate cycle to real-time.

Threshold Acoustics *March 2020 – January 2023*

Acoustics Consultant

- Developed proprietary software collaboratively with a research team in MATLAB to model wave behavior via the finite-difference time-domain method, producing a new company tool for precise acoustic diffusion analysis.
- Built a suite of software tools in MATLAB for impulse response acquisition and general acoustics utilities, increasing company-wide efficiency, accuracy, and capabilities of acoustics measurements and analysis.
- Delivered a wide range of successful projects, including performing arts, education, civic, worship, experimental, corporate, residential, and environmental, by managing project teams, timelines, and budgets effectively.

Kirkegaard Associates *August 2018 – March 2020*

Audio and Acoustics Specialist

- Launched a new product offering by developing a room acoustics auralization system in Max/MSP that can encode, convolve, and decode higher-order ambisonic signals in real-time.
- Reduced acoustic design time on projects by updating company protocols to standardized acoustic analysis and testing methods as well as designing bespoke analysis tools in MATLAB.

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Rensselaer Polytechnic Institute *August 2017 – August 2018*
Research Assistant

- Researched new technology that contributed to a pending patent, by creating a novel machine learning algorithm in MATLAB that estimates the directions of arrival and relative levels of an arbitrary number of sound sources through a multi-level Bayesian framework, using spherical beamforming with a spherical microphone array.
- Published and presented novel research, contributing to the audio and acoustics community and increasing visibility of the new technology, resulting in over 40 citations in other research publications.

OPEN-SOURCE PROJECTS

Tiny Audio Diffusion

- Implemented a lightweight waveform-based diffusion system to generate high-resolution 44.1kHz short audio samples capable of being trained and run on a single low-level consumer GPU with less than 2GB VRAM.

Music "Demixing" with Band-Split Recurrent Neural Network

- Built an audio source separation system in Python using a band-split recurrent neural network framework that was trained via a GCP pipeline with W&B tracking, to compete in the Sound Demixing Challenge 2023, resulting in an improvement over the baseline model by 42%. Separated sources: voice, bass, drums, other.

EDUCATION

Data Science Immersive *January 2023 – April 2023*
General Assembly

Master of Science, Acoustics *August 2017 – August 2018*
Rensselaer Polytechnic Institute GPA: 4.00/4.00
Graduate Researcher

Bachelor of Science, Mechanical Engineering *August 2012 – May 2016*
University at Buffalo, The State University of New York GPA: 3.50/4.00
Minor: Music Performance, Guitar

PUBLICATIONS

Jot, J.; Landschoot, C.; Lukin, A. Binaural Externalization Processing - from Stereo to Object-Based Audio. The Journal of the Audio Engineering Society. 2022; Express Paper 56.

Landschoot, C.; Xiang, N. Model-based Bayesian Direction of Arrival Analysis for Sound Sources Using a Spherical Microphone Array. The Journal of the Acoustical Society of America. 2019; 146, 4936. DOI: 10.1121/1.5138126.

Xiang, N.; Landschoot, C. Bayesian Inference for Acoustic Direction of Arrival Analysis Using Spherical Harmonics. Entropy 2019, 21, 579. DOI: 10.3390/e21060579.

PATENTS

Xiang, N.; Bush, D. 2020.; Landschoot, C. Sound Source Enumeration And Direction Of Arrival Estimation Using A Bayesian Framework. PCT/US2020/040046, filed June 29, 2020. Patent Pending.

LEADERSHIP

Acoustical Society of America *May 2019 – Present*
Vice Chair, Chicago Regional Chapter

Acoustical Society of America *August 2017 – August 2018*
Vice President, Rensselaer Polytechnic Institute Chapter
Award: Commendation for ASA Student Design Competition