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++, SQL, MATLAB, Max/MSP/RNBO, 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, Audacity, Composing, Performing, Recording, Producing, Mixing, Mastering, Electric & Acoustic Guitar, Bass Guitar, Piano, Percussion, Vocals, Banjo

EXPERIENCE

Whitebalance

Machine Learning Engineer — *August 2023 – Present*

- Leading the research and development of state-of-the-art deep learning systems, including audio source separation, sound event detection, zero-shot classification, audio fingerprinting, and audio enhancement.
- Advancing core product technology through the design and innovation of cutting-edge machine learning frameworks, novel model architectures, scalable system designs, and optimized end-to-end pipelines.
- Creating and curating custom audio datasets, ensuring high-quality annotations, and leveraging advanced data augmentation techniques to improve model generalization.

Virtuel Works

Advisor — *August 2023 – Present*

Audio Research Collaborator — *August 2022 – August 2023*

- 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

Acoustics Consultant — *March 2020 – January 2023*

- 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

Audio and Acoustics Specialist — *August 2018 – March 2020*

- 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
Research Assistant *August 2017 – August 2018*

- 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.

LogWMSE (PyTorch)
- Developed a PyTorch implementation of logWMSE, an audio quality metric and loss function that addresses issues in common metrics, like digital silence targets, making it ideal for training and evaluating audio separation models.

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 approved, issuance pending.

LEADERSHIP

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