XENOFON KARAKONSTANTIS

Machine learning & signal processing engineer
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SELECTED SKILLS

- **Signal Processing:** Beamforming algorithms, adaptive filtering for noise/echo cancellation, single-channel denoising
- **Machine Learning:** Neural networks (discriminative/generative models), Bayesian models (VAEs, HMC, analytic methods, Gaussian Processes), kernel methods, graph neural networks, physics-informed machine learning
- **Software engineering:** Programming and simulations in Python, Matlab and C++, C#, MLOps, DevOps, unit testing, code reviewing and careful documentation
- **Audio:** Time-frequency signal analysis, speech, music, compressive sensing, signal enhancement, noise reduction, dereverberation, spatial audio and psychoacoustics
- **Acoustic measurements:** Microphone-loudspeaker-interface signal chains, amplifiers/preamplifiers, sampling, signal generation (sweep and noise signals), transducers, inverse-kinematics for robot arm sensor arrays
- **Computational:** Most machine Learning API's (Tensorflow, Pytorch, JAX, ONNX), probabilistic programming (Numpyro, Pyro, Tensorflow probability, PySTAN) and embedded machine learning for audio and radar (ONNX-runtime, TFLite)

EXPERIENCE

Audiological Solutions — **Oticon (Demant)**
Senior DSP Engineer — *March 2025 to Present*
- Developing single-channel speech denoising/separation deep learning models
- Designing real-time streaming pipelines for on-device inference and evaluation
- Leading model optimization for memory, latency, and power constraints on embedded hardware

Radar tracking - signal processing — **Trackman**
Machine learning developer — *September 2024 to February 2025*
- DSP development in C++ and Python for sports tracking algorithms.
- Developed multipath tracking algorithms of projectiles using state-space models
- Undertook deep learning model quantization and optimization for embedded devices

Audio-Visual Computing Group — **IT University of Copenhagen**
Postdoctoral researcher — *May 2024 to Sept 2024*
- End-to-end binaural rendering of ambisonics signals for extended reality (XR) applications
- Direction of arrival estimation using multiple microphone arrays
- C#, C++ development for XR headsets

Acoustic Technology Group — **Technical University of Denmark (DTU)**
PhD researcher — *December 2020 to April 2024*
- Investigating neural generative models for sound field reconstruction
- Research of cross-modalities in machine learning and physical models for sound field processing
- Validated methods by comparing real and simulated data of sound fields with classic regression methods
- Investigating graph neural networks and inductive (spatial) biases for sound source localisation
- Acoustic measurements for spatial audio and sensor arrays in enclosures and programming of robot arm for room impulse response measurements

Image and Sound Processing Lab — **Politecnico di Milano**
Visiting researcher — *August 2023 to December 2023*
- Visited the Image and Sound Processing Lab of the Polytechnic University of Milan (Politecnico di Milano) collaborating on data-driven methods for microphone array processing

Audio Research — **GN Audio**
Student worker — *September 2019 to August 2020*
- Python DSP applications for audio related tasks (sensor array processing, room acoustics)
- Deep learning framework (Tensorflow-Pytorch-ONNX) migration tasks for audio product-related applications
- Higher order ambisonics recording-processing, sensor calibration and beamforming

EDUCATION

- PhD, Data Driven Acoustic Holography, Technical University of Denmark, Present
- MSc, Engineering Acoustics, Techical University of Denmark, 2020
- MEng, Electrical and Computer Engineering, National Technical University of Athens, 2018

TEACHING AND MENTORING EXPERIENCE

- 2019 - 2024 Teaching assistant and lecturer in the classes of "Advanced Acoustics" and "Acoustic Signal Processing" at DTU
- Supervised MSc projects on spatial audio rendering, noise control, and source localization using deep learning

CONFERENCE PRESENTATIONS

- Experimental reconstruction of sound fields over large spatial domains - Acoustics 2023 4-8 Dec 2023 | Sydney, Australia
- Advancing sound field analysis with physics-informed neural networks - Acoustics 2023 4-8 Dec 2023 | Sydney, Australia
- Room impulse response reconstruction using physics-constrained neural networks - Forum Acusticum 2023 11-15 Sept 2023 | Torino, Italy
- Localising acoustic sources with a spherical graph neural network - 24th International Congress on Acoustics 24-28 Oct 2022 | Gyeongju, S. Korea
- Invertible neural networks for reconstructing acoustic fields - 182nd Meeting of the Acoustical Society of America 23-27 May 2022 | Denver, Colorado
- Sound field reconstruction in rooms with deep generative models - InterNoise 2021 1-5 August 2021 | Washington, DC
- Time lapse video sonification; watching and listening to events unfolding - 15th Sound and Music Computing Conference (SMC2018) | Limassol, Cyprus

PUBLICATIONS

- H-index: 7 (Google Scholar Profile)
- **Karakonstantis X.**, & Fernandez-Grande E. (2021, August). Sound field reconstruction in rooms with deep generative models. In *INTER-NOISE and NOISE-CON Congress and Conference Proceedings* (Vol. 263, No. 5, pp. 1527-1538). Institute of Noise Control Engineering.
- Fernandez-Grande E., Caviedes-Nozal C., Hahmann M., **Karakonstantis X.**, & Verburg S. (2021). Reconstruction of room impulse responses over extended domains for navigable sound field reproduction. In *International Conference on Immersive and 3D Audio*.
- Fernandez-Grande E., **Karakonstantis X.**, Caviedes-Nozal D. & Gerstoft P., (2023, February). Generative models for sound field reconstruction. In *The Journal of the Acoustical Society of America*.
- **Karakonstantis X.** & Fernandez-Grande E., (2022, August). Localising acoustic sources with a spherical graph neural network. In *24th International Congress on Acoustics. 2022*.
- **Karakonstantis X.**, Fernandez-Grande E., (2023, August). Generative adversarial networks with physical sound field priors. In *The Journal of the Acoustical Society of America*.
- **Karakonstantis X.**, Fernandez-Grande E., (2023, September). Room impulse response reconstruction using physics-constrained neural networks. In *Forum Acusticum 2023*.
- **Karakonstantis X.**, Caviedes-Nozal D., Richard A. & Fernandez-Grande E., (2024, January). Room impulse response reconstruction with physics-informed deep learning. In *The Journal of the Acoustical Society of America*.
- Olivieri M., **Karakonstantis X.**, Pezzoli M., Antonacci F., Sarti A., Fernandez-Grande E., (under review). Physics-Informed Neural Network for the Volumetric Sound field Reconstruction of Speech Signals. In *EURASIP Journal on Audio, Speech, and Music Processing*.
- Figueroa-Duran A., **Karakonstantis X.**, and Fernandez-Grande E., (2024, June). Bayesian Framework for Room Impulse Response Reconstruction using Explicit Frequency Regularisation. Accepted for publication in AES Europe 2024.
- **Karakonstantis X.**, Fernandez-Grande, E. and Gerstoft, P., (under review). Efficient Sound Field Reconstruction with Conditional Invertible Neural Networks. In *IEEE/ACM Transactions on Audio Speech and Language Processing*.

GRANTS AND AWARDS

- Recipient of Otto Monsteds foundation research stay grant 2023
- Danish sound cluster consortium grant for project “Physics-informed Neural Networks for Sound Field Reconstruction” 2023
- Recipient of Computational Acoustics Early Career Presenter award from the Acoustical Society of America to at Acoustics 2023 conference - Sydney, Australia
- European Acoustics Association - Best Paper and Presentation Award for Young Researchers - Forum Acusticum 2023

OTHER ACADEMIC MERITS

Reviewer

- Journal of the Acoustical Society of America (JASA)
- EURASIP Journal on Audio, Speech, and Music Processing (JASM)
- IEEE/ACM Transactions on Audio Speech and Language Processing (TASLP)
- IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)
- Engineering Applications of Artificial Intelligence (EAAI)

Organisation of scientific meetings

- Co-chair of session “Data-driven room acoustics” in International Congress on Acoustics 2025 (18-23 May, New Orleans, USA)

OTHER SKILLS

Music Multi-instrumentalist, trained in classical modern and jazz guitar, traditional balkan music (oud), toured as a musician
Music Electronics Part-time electronics enthusiast, occasionally collaborate with friends to make guitar pedals and synthesisers
Languages English: Native. Greek: Native. Danish: Professional proficiency.