Niccolò Antonello · **niccolo.antonello@gmail.com** · webpage: nantonel.github.io

Niccolò Antonello | Curriculum Vitae

- Status: Postdoc at Idiap Research Institute, Switzerland
- Fields: Acoustics, Machine Learning, Numerical Algorithms, Optimization, Signal Processing, Speech Recognition

Experience

April 2019 - Present **Postdoc** Idiap Research Institute (CH)

- Supervisors: Philip N. Garner, Hervé Bourlard
- Focusing on out-of-distribution in Neural Networks (SHAPED in collaboration with Logitech). Research on automatic speech Recognition (ASR) acoustic model training exploiting sparsity (SHISSM).

September 2018 - April 2019 **Postdoc** KU Leuven (BE)

- Supervisor: Toon van Waterschoot
- Continuing PhD research on dereverberation & speech enhancement under the European Union's Horizon 2020 research and innovation program / ERC Consolidator Grant: SONORA (no. 773268).

May 2013-August 2018 **PhD** KU Leuven (BE)

- Supervisor: Toon van Waterschoot - Co-supervisors: Marc Moonen, Patrick A. Naylor
- The research focused on developing algorithms for solving *inverse problems* for *dereverberation* and *room identification* using *numerical room acoustics models* and *compressed sensing* (DREAMS Initial Training Network (ITN) FP7-PEOPLE Marie Curie ITN consortium).

May - Sept. 2015 **Visiting Researcher** Imperial College London (UK)

- Supervisor: Patrick A. Naylor
- Research collaboration with Prof. Patrick A. Naylor. Help in organising the "Royal Society Summer Science Exhibition 2015 - Sound Interactions" event.

Oct. 2012 -Feb. 2013 **Research Assistant** Technical University of Denmark (DK)

- Supervisor: Finn T. Agerkvist
- Project: "Compensation of flux modulation distortion using an additional coil in a loudspeaker unit" which resulted in a patent application.

Education

2013 - 2018 **PhD, KU Leuven** Various institutions

- Relevant coursework: Numerical Optimization (Prof. M. Diehl, KU Leuven), DREAMS Machine Learning School at Imperial London College (Prof. S. Theodorides et al.), DREAMS Advanced Psychoacoustic School at Aalborg Univeristy (Prof. T. Lokki et al.), TEMPO Nonlinear Model Predictive Control School at University of Freiburg (Prof.J.B. Rawlings et al.), DISC Summer School 2018 Machine Learning for Control.
- Thesis title: " Solving inverse problems in room acoustics using physical models, sparse regularization and numerical optimization ".

2010 - 2012 **M.Sc, Engineering Acoustics** Technical University of Denmark (DK)

- Relevant coursework: Advanced Acoustics, Acoustic Communication, Electroacoustic Transducers and Systems, Architectural Acoustics, Sound and Vibration, Partial Differential Equations
- Thesis title: "Balanced Armature Transducers for Hi-fi Systems".

2007 - 2010 **B.Sc, Electrical Engineering** Universitá degli Studi di Padova (IT)

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Publications

Journal Papers

- N. Antonello, P. N. Garner, "A t-distribution based operator for enhancing out of distribution robustness of neural network classifiers," *IEEE Signal Process. Letters*, vol. 27, pp.1070-1074, 2020.
- N. Antonello, E. De Sena, M. Moonen, P. A. Naylor, and T. van Waterschoot, "Joint acoustic localization and dereverberation through plane wave decomposition and sparse regularization," *IEEE/ACM Trans. Audio, Speech Lang. Process.*, vol. 27, no. 12, pp. 1893-1905, Dec. 2019.
- N. Antonello, E. De Sena, M. Moonen, P. A. Naylor and T. van Waterschoot, "Room impulse response interpolation using a sparse spatio-temporal representation of a reverberant sound field", *IEEE/ACM Trans. Audio, Speech Lang. Process.*, vol. 25, no. 10, pp. 1929-1941, Oct. 2017.
- E. De Sena, N. Antonello, M. Moonen, and T. van Waterschoot, "On the modeling of rectangular geometries in room acoustic simulations", *IEEE/ACM Trans. Audio, Speech Lang. Process.*, vol. 23, no.6, pp. 774-768, Apr. 2015.

Conference Papers

- N. Antonello, E. De Sena, M. Moonen, P. Naylor, T. van Waterschoot, "Joint source localization and dereverberation by sound field interpolation using sparse regularizations," in *Proc. IEEE Int. Conf. Acoust. Speech Signal Process. (ICASSP-18)*, Calgary, Canada, Apr. 2018.
- N. Antonello, E. De Sena, M. Moonen, P. Naylor, T. van Waterschoot, "Sound field control in a reverberant room using the Finite Difference Time Domain method," in *Proc. AES 60th Int. Conf.*, Leuven, Belgium, Feb. 2016.
- N. Antonello, T. van Waterschoot, M. Moonen, and P. A. Naylor, "Evaluation of a Numerical Method for Identifying Surface Acoustic Impedances in a Reverberant Room," in *Proc. 10th European Congress Expo. Noise Control Eng. (EURONOISE '15)*, Maastricht, the Netherlands, June 2015.
- N. Antonello, F. T. Agerkvist, "Compensation of the Flux Modulation Distortion Using an Additional Coil in a Loudspeaker Unit", in Proc. AES 137th Int. Conv., Los Angeles, USA, Oct. 2014.
- N. Antonello, T. van Waterschoot, M. Moonen, and P. A. Naylor, "Identification of Surface Acoustic Impedances in a Reverberant Room Using the FDTD Method," in *Proc. 2014 Int. Workshop Acoustic Signal Enhancement (IWAENC 2014)*, Antibes, France, Sep. 2014 (candidate for best student paper award).
- N. Antonello, T. van Waterschoot, M. Moonen, and P. A. Naylor, "Source localization and signal reconstruction in a reverberant field using the FDTD method," , in *Proc. 22nd European Signal Process. Conf. (EUSIPCO 2014)*, Lisbon, Portugal, Sep. 2014.

arXiv

- N. Antonello, L. Stella, P. Patrinos and T. van Waterschoot, "Proximal gradient algorithms: applications in signal processing", *arXiv:1803.01621*, Mar. 2018.

Patents

- F. T. Agerkvist, N. Antonello, and A. Christensen,"Loudspeaker assembly with suppression of magnetic flux modulation distortion," WO Patent App. PCT/EP2014/073 655, May 2015.

Software Projects

- **HMMGradients.jl** Enables computing the gradient of the parameters of Hidden Markov Models (HMMs).
https://github.com/idiap/HMMGradients.jl
- **tsoftmax** Reproducible code for the paper "A t-distribution based operator for enhancing out of distribution robustness of neural network classifiers" (pytorch)
https://github.com/idiap/tsoftmax
- **StructuredOptimization.jl** Structured optimization in Julia.
https://github.com/kul-forbes/StructuredOptimization.jl
- **AbstractOperators.jl** Abstract operators for large scale optimization in Julia.
https://github.com/kul-forbes/AbstractOperators.jl
- **ProximalAlgorithms.jl** Proximal algorithms for nonsmooth optimization in Julia.
https://github.com/kul-forbes/ProximalAlgorithms.jl
- **ProximalOperators.jl**
Julia package to compute the proximal operator of several functions commonly used in optimization algorithms like ADMM and (fast) proximal gradient methods.
https://github.com/kul-forbes/ProximalOperators.jl
- **ImageMethodReverb.jl** Julia package for generating room acoustics impulse responses using the Randomized Image Method (RIM). https://github.com/nantonel/ImageMethodReverb.jl

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Skills

Software

- **Programming Languages:** *Proficient*: Julia, Python, MATLAB. *Familiar*: C, C++
- **Libraries:** pytorch, kaldi **Others:** git, bash, LaTeX, CI & CD, Linux, SGE, vim

Technical Skills

- **Measurements**: experience with Brüel & Kjær PULSE system analyzer, Klippel R&D System and measuring room impulse responses/reverberation time.
- **Others**: soldering simple analog circuits, oscilloscope usage, (non)technical drawing.

Languages

- *Proficient*: Italian (Native), English
- *Elementary*: French