



Alex Gaudio

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ACADEMIC APPOINTMENTS

The Johns Hopkins University

Postdoctoral Fellow in Electrical Computer Engineering

Sep 2023 – Current

- Advisor: Professor Mounya Elhilali
- In: Laboratory for Computational Auditory Perception

EDUCATION

Carnegie Mellon University

Ph.D. in Electrical Computer Engineering

Aug 2018 – Aug 2023

- Advisors: Professor Asim Smailagic and Professor Aurélio Campilho
- Thesis: Explainable Deep and Machine Learning for Medical Image Analysis

University of Porto, Faculdade de Engenharia

Ph.D. in Electrical Computer Engineering

Aug 2018 – Aug 2023

- Advisors: Professor Aurélio Campilho and Professor Asim Smailagic
- Fellowship awarded through the CMU Portugal Program for Dual Ph.D. Degrees

Carnegie Mellon University

Master of Science in Electrical Computer Engineering

Aug 2018 – May 2023

- Advisors: Professor Asim Smailagic and Professor Aurélio Campilho

Bard College

Bachelor of Arts in Music

Aug 2006 – May 2010

- Award: Recipient of the Larry McLeod Award in Jazz.
- Thesis: Connecting With Others Through Jazz: Performances and All-Original Composition

JOURNAL PUBLICATIONS (PEER-REVIEWED)

* indicates equal contributions † indicates corresponding author(s)

- [1] **A. Gaudio**^{*†}, N. Giordano, M. Elhilali, S. Schmidt, and F. Renna. “Pulmonary Hypertension Detection from Heart Sound Analysis”. In: *IEEE Transactions on Biomedical Engineering* (2025), pp. 1–13. DOI: [10.1109/TBME.2025.3555549](https://doi.org/10.1109/TBME.2025.3555549). URL: <https://doi.org/10.1109/tbme.2025.3555549>.
- [2] **A. Gaudio**^{*†}, H. Hahn^{*}, J. West, and M. Elhilali. “Diaphragm Design for an Electret Microphone Stethoscope”. In: *IEEE Sensors* (2025). DOI: [ACCEPTED\(May2025\)](https://doi.org/10.1109/sens.2025.4555549).
- [3] F. Renna^{*}, **A. Gaudio**^{*†}, S. Mattos, M. D. Plumbley, and M. T. Coimbra. “Separation of the aortic and pulmonary components of the second heart sound via alternating optimization”. In: *IEEE Access* 12 (2024), pp. 34632–34643. DOI: [10.1109/ACCESS.2024.3371510](https://doi.org/10.1109/ACCESS.2024.3371510). URL: <https://doi.org/10.1109/ACCESS.2024.3371510>.
- [4] **A. Gaudio**^{*†}, C. Faloutsos, A. Smailagic, P. Costa, and A. Campilho. “ExplainFix: Explainable Spatially Fixed Deep Networks”. In: *Wiley WIREs Data Mining and Knowledge Discovery* 13.2 (2023), e1483. DOI: [10.1002/widm.1483](https://doi.org/10.1002/widm.1483). URL: <https://doi.org/10.1002/widm.1483>.
- [5] **A. Gaudio**^{*}, A. Smailagic, C. Faloutsos, S. Mohan, E. Johnson, Y. Liu, P. Costa, and A. Campilho. “DeepFixCX: Explainable privacy-preserving image compression for medical image analysis”. In: *Wiley WIREs Data Mining and Knowledge Discovery* 13.4 (2023), e1495. DOI: <https://doi.org/10.1002/widm.1495>. eprint: <https://wires.onlinelibrary.wiley.com/doi/pdf/10.1002/widm.1495>. URL: <https://wires.onlinelibrary.wiley.com/doi/abs/10.1002/widm.1495>.

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- [6] H. Montenegro^{*†}, W. Silva^{*}, **A. Gaudio^{*}**, M. Fredrikson, A. Smailagic, and J. S. Cardoso. “Privacy-Preserving Case-Based Explanations: Enabling Visual Interpretability by Protecting Privacy”. In: *IEEE Access* 10 (2022), pp. 28333–28347. URL: <https://doi.org/10.1109/ACCESS.2022.3157589>.
 - [7] A. Smailagic^{*†}, P. Costa^{*}, **A. Gaudio^{*}**, K. Khandelwal, M. Mirshekari, J. Fagert, D. Walawalkar, S. Xu, A. Galdran, P. Zhang, A. Campilho, and H. Y. Noh. “O-MedAL: Online active deep learning for medical image analysis”. In: *Wiley WIREs Data Mining and Knowledge Discovery* 10.4 (Jan. 2020). DOI: 10.1002/widm.1353. URL: <https://doi.org/10.1002/widm.1353>.

CONFERENCE PUBLICATIONS (PEER-REVIEWED)

- [8] **A. Gaudio^{*}**, N. Giordano^{*}, M. Coimbra, B. Kjaergaard, S. Schmidt, and F. Renna. “Cross-Domain Detection of Pulmonary Hypertension in Human and Porcine Heart Sounds”. In: *Computing in Cardiology Conference*. Vol. 50. IEEE. 2023, pp. 1–4. DOI: 10.22489/CinC.2023.071. URL: <https://cinc.org/2023/Program/accepted/71.pdf>.
- [9] P. Madeira, A. Carreiro, **A. Gaudio**, L. í. Rosado, F. Soares, and A. Smailagic. “ZEBRA: Explaining Rare Cases Through Outlying Interpretable Concepts”. In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops*. June 2023, pp. 3782–3788.
- [10] S. C. Pereira, J. Rocha, **A. Gaudio**, A. Smailagic, A. Campilho, and A. M. Mendonça. “Addressing Chest Radiograph Projection Bias in Deep Classification Models”. In: *Medical Imaging with Deep Learning*. 2023.
- [11] P. Costa^{*†}, **A. Gaudio^{*}**, A. Campilho, and J. S. Cardoso. “Explainable Weakly-Supervised Cell Segmentation by Canonical Shape Learning and Transformation”. In: *Medical Imaging with Deep Learning*. 2022. URL: <https://openreview.net/forum?id=k7JurYN0hQA>.
- [12] **A. Gaudio^{*}**, M. Coimbra, A. Campilho, A. Smailagic, S. Schmidt^{*}, and F. Renna^{*†}. “Explainable Deep Learning for Non-Invasive Detection of Pulmonary Artery Hypertension from Heart Sounds”. In: *Computing in Cardiology Conference*. IEEE. 2022. URL: <https://ieeexplore.ieee.org/document/10081725>.
- [13] E. Johnson^{*}, S. Mohan^{*}, **A. Gaudio^{*†}**, A. Smailagic, C. Faloutsos, and A. l. Campilho. “HeartSpot: Privatized and Explainable Data Compression for Cardiomegaly Detection”. In: *IEEE-EMBS International Conference on Biomedical and Health Informatics (BHI)*. IEEE. Oct. 2022, pp. 01–04. URL: <https://doi.org/10.1109/BHI56158.2022.9926777>.
- [14] **A. Gaudio^{*†}**, A. Smailagic, and A. Campilho. “Enhancement of Retinal Fundus Images via Pixel Color Amplification”. In: *International Conference on Image Analysis and Recognition*. Springer International Publishing, 2020, pp. 299–312. DOI: 10.1007/978-3-030-50516-5_26. URL: https://doi.org/10.1007/978-3-030-50516-5_26.
- [15] A. Smailagic^{*}, A. Sharan^{*}, P. Costa[†], A. Galdran, **A. Gaudio**, and A. Campilho. “Learned Pre-processing for Automatic Diabetic Retinopathy Detection on Eye Fundus Images”. In: *International Conference on Image Analysis and Recognition*. Springer International Publishing, 2019, pp. 362–368. DOI: 10.1007/978-3-030-27272-2_32. URL: https://doi.org/10.1007/978-3-030-27272-2_32.
- [16] Q. Xiao^{*}, J. Zou^{*}, M. Yang, **A. Gaudio**, K. Kitani, A. Smailagic[†], P. Costa, and M. Xu. “Improving Lesion Segmentation for Diabetic Retinopathy Using Adversarial Learning”. In: *International Conference on Image Analysis and Recognition*. Springer International Publishing, 2019, pp. 333–344. DOI: 10.1007/978-3-030-27272-2_29. URL: https://doi.org/10.1007/978-3-030-27272-2_29.

PATENTS

- [17] **A. Gaudio^{*}**, F. Renna^{*}, S. Schmidt, and M. T. Coimbra. *Explainable deep learning method for non-invasive detection of pulmonary hypertension from heart sounds*. WO 2024047610A1. Mar. 2024.
- [18] G. I. Kestenbaum^{*} and **A. Gaudio^{*}**. *Physical asset recognition platform*. U.S. Patent No. 10803542. Oct. 2020.

INVITED TALKS

- [19] **A. Gaudio**. *Addressing Private and Explainable AI via Compression*. Invited Speaker. Yale School of Medicine VAMOS Lab Seminar Series, Oct. 2022. URL: <https://docs.google.com/presentation/d/1ahgpzV6QEhmemYSt9zPAdl9It-U7t5-LIIRUyjkhDYE/edit?usp=sharing>.

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- [20] **A. Gaudio**, I. Lynce, J. Magalhães, J. Mendonça, M. Casimiro, S. Brendão, and Z. Marinho. *Panel Discussion: Knowledge Creation and Talent Development under the CMU Portugal Program*. Invited Speaker. CMU Portugal Encontro Ciencia, May 2022. URL: <https://youtu.be/DMKc9t1I6VY?t=1374>.
- [21] **A. Gaudio**, B. Sanders, J. Magalhães, R. Santarromana, M. Andrada, S. Zejnilovic, and S. B. ão. *Panel Discussion: Roundtable on Talent Development*. Invited Speaker. CMU Portugal Summit 2022, Nov. 2022.
- [22] **A. Gaudio**. *ExplainFix: Explainable Spatially Fixed Deep Networks*. Invited Speaker. CMU Portugal Doctoral Symposium, 2021. URL: https://youtu.be/-_Zlkp82y_Y?t=10537.
- [23] **A. Gaudio**. *Balancing Infrastructure with Optimization and Problem Formulation*. Invited Speaker. Cornell Tech Data Science Hackathon, 2015. URL: https://www.youtube.com/watch?v=7FeKV46Us_0.
- [24] **A. Gaudio**. *Tmux + IPython = Awesome*. Invited Speaker. PyGotham, 2011. URL: <http://pyvideo.org/pygotham-2011/pygotham-2011--tmux---ipython---awesome.html>.

TEACHING

Fall 2023, Carnegie Mellon University, Mobile and Pervasive Computing (IoT), Mentor

- With Prof. Asim Smailagic
- Mentor two PhD students through a machine learning course project

Fall 2022, Carnegie Mellon University, Mobile and Pervasive Computing (IoT), Mentor

- With Prof. Asim Smailagic
- Mentor two PhD students through a machine learning course project

Spring 2022, University of Porto, Intro to Biomedical Engineering (Undergraduate Level), Teaching Assistant

- With Prof. Ana Maria Mendonça
- Two lectures, each one hour long. [slides](#)

Fall 2021, University of Porto, Intro to Machine Learning (PhD Level), Teaching Assistant

- With Prof. Jaime Cardoso
- Three lectures, each three hours long, and weekly office hours. [slides1](#) [slides2](#) [slides3](#)

INDUSTRY EXPERIENCE

Auscultation Lab, LLC: Founder Apr 2025 – Present

- View and annotate audio chest sound recordings, specifically designed for lung and heart sound analysis.
- Consulting services

NYC Makerspace: Co-Founder Feb 2017 – Oct 2020

- A non-profit establishing makerspaces throughout New York City. We provide advanced resources and education freely to the public, where learning and innovation is a form of recreation.
- Forged partnerships with Columbia University, Columbia Teacher's College and NYC Parks and Recreation.
- Taught three 12-week courses on robotics, programming, mathematics and 3D modeling to high school seniors.
- Established Harlem's first makerspace, and brought over \$17,000 to the space.
- Honored as a Champion of Social Justice by the Wilson Major Morris Community Center in Jan. 2018.

Columbia University, Creative Machines Lab (Prof. Hod Lipson)

- **Software Engineer: DARPA Transformative Design (TRADES) program** **Nov 2017 – Jun 2018**
– Mass-spring simulator for generative design of 3D models, an alternative to Finite Element Analysis.
- **Independent Research, advised by Prof. Hod Lipson** **Dec 2016 – Jul 2017**
– Multi-Agent Collaborative Learning simulator: [MACL](#).

BuildingLink: Data Scientist Nov 2016 – Jul 2018

- **ImageR**: Machine Learning and Vision to solve matching problems, such as to connect images of packages to building residents. I designed and implemented the production ready algorithms, then coordinated development and release of the mobile apps for iOS and Android. ImageR processes 50K packages a day, 18 million packages processed by Jan. 2021, launched May 2018. Awarded Patent: 10,803,542

Alluvium: Senior Data Scientist, 1st employee Dec 2015 – May 2016

- Machine learning and IoT business that deploys intelligent autonomous agents close to sources of streaming data.

Sailthru: Senior Data Scientist and Engineer Aug 2012 – Nov 2015

- Inc. 5000's 30th fastest-growing company in the US in 2013. Subsequently acquired in 2019.
- Founded data science team, hired my boss, VP of Data Science Jeremy Stanley and grew team from 1 to 4 full time employees. Promotion to "Senior" in 2014.
- Created and launched **Sightlines**TM to predict user behavior, and architected a robust, fault tolerant and distributed data science platform.

Adaptly: Developer Dec 2011 – Jul 2012

Flat World Knowledge: Software Engineer, Backend Feb 2011 – Dec 2011

Bard College: Systems Engineer Jul 2009 – Sep 2010

Lawrence and Memorial Hospital: Emergency Room Technician (Level I) Jun 2008 – Aug 2008

NDP Emergency Medical Services: Emergency Medical Technician (EMT-B) Nov 2007 – Mar 2008

AWARDS

- **Dual PhD Degree Fellowship** from Carnegie Mellon University, Portugal Program Aug 2018
- **Champion of Social Justice** from the Wilson Major Morris Community Center in Harlem, NY Jan 2018
- **Larry McLeod Award in Jazz** from Bard College May 2010