

Constance Douwes

<https://constancedws.github.io/>

Resume - I am an associate professor in computer science at Centrale Méditerranée in Marseille (France). I'm specialized in the environmental footprint of modern AI. I did my Ph.D. at IRCAM in Paris, where I studied the energy consumption of neural networks applied to music generation. After that, I worked as a postdoctoral researcher at INRIA in Nancy where I focused on the energy footprint of AI systems for sound event detection. I am now a member of the QARMA team at the LIS laboratory, continuing to explore the environmental footprint of AI systems.

Keywords - Artificial intelligence, deep learning, energy consumption, environmental impacts.

Formation and professional experiences

- Sept. 2025 **Associate professor in computer science, Marseille, FRANCE**
École Centrale Méditerranée, Laboratoire d'Informatique et Systèmes, CNRS, Université d'Aix-Marseille.
- **Teaching:**
 - Fundamentals of programming and algorithms
 - Environmental impacts of digital devices and AI systems
 - Deep learning fundamentals
 - **Research:**
 - Automatic extraction of environmental data from scientific publications.
 - Energy prediction and normalization of neural network.
 - Frugal and sufficient AI
 - **Other responsibilities:**
 - Chargée de mission "enjeux environnementaux" in the GdR IASIS.
 - Animatrice de la fresque du numérique et du climat.
- 2023 – 2025 **Postdoc researcher at LORIA, Nancy, FRANCE**
Laboratoire Lorrain de Recherche en Informatique et ses Applications (Inria, CNRS, Université de Lorraine).
- **Supervisor:** Romain Serizel
 - **Topic:** Analysis of the energy footprint of deep learning systems.
 - Analysis of existing metrics, comparison, and identification of potential biases.
 - Proposal of methods for normalizing energy consumption to provide fair comparisons.
 - Quantifying the energy consumption of development costs within LORIA and multispeech team.
- 2019–2023 **PhD student at IRCAM, Sorbonne Université**
Laboratoire UMR 9912 Sciences et Technologies de la Musique et du Son (STMS), Ircam/Sorbonne Université/CNRS/Ministère de la Culture, École Doctorale Informatique, Télécommunications et Électronique (EDITE).
- **Supervisors:** Jean-Pierre Briot (director), Philippe Esling (co-director)
 - **Topic:** On the environmental impact of deep generative models for audio.
 - Study of the environmental impact of training deep learning models specialized in audio synthesis.
 - Proposal of a methodology based on Pareto to evaluate models in terms of cost/quality trade-offs.
 - Quantization of deep audio models to reduce the energy costs of inference.
- 2018–2019 **Master 2 ATIAM, Ircam, Sorbonne Université, Telecom Paris, France**
Acoustics, Signal Processing, and Computer Science Applied to Music
- 2015–2018 **Engineering school, ENSEA**
École Nationale Supérieure de l'Électronique et de ses Applications (ENSEA)

Organization and scientific committee

- March 2028 **GreenDays 2028**, *Marseille*, LIS
Member of the local organization committee, planning the 2028 edition in conjunction with the Undone Computer Science Conference, to be held during the same week. <https://greendays.sciencesconf.org/> and <https://www.undonecs.org/>
- November 10, 2026 **Journée Sobriété et Résilience en TSI**, *Paris*, IRCAM
Co-organizer and member of the scientific reviewing committee for the GdR IASIS for the "Resilience and Sobriety" day in Signal and Image Processing Community. <https://gdr-iasis.cnrs.fr/reunions/sobriete-et-resilience-en-tsi/>

Supervision

Research interns

- 2026 **Lucia MEYRAND**, *Engineering student - M1 equivalent*, 2 months
supervision 100%. **Topic:** Life cycle analysis of an embedded GPU powered by solar panels.
- 2026 **Sami ALBAOUI**, *AMU M2 Data Science*, 6 months
50% co-supervision. **Topic:** Energy estimations of deep neural network inference using per-layer predictions.
- 2025 **Victoria DUCROS**, *AMU L2 MPCI*, 2 months
50% co-supervision with a collaboration with the Laboratoire d'Études en Sciences des Arts. **Topic:** Carbon footprint assessment of the environmental impacts of the art-science project "Karaoké Animal".
- 2024 **Mayank Mishra**, *IDMC M2 TAL*, 6 mois
50% co-supervision. **Topic:** Source separation neural network comparisons of in terms of performance and energy consumption.

Research engineers

- 2025 **Thibault SCHNEEBERGER**, 3 months
50% co-supervision. **Topic:** Automatic extraction for carbon footprint estimation based on scientific publications.

Students projects

- 2025–2026 **Students from AMU M2 IAAA**, 1 month (2h/week)
50% co-supervision, **Topics:**
– Extracting information from environmental data in PDF documents
– Estimating the energy footprint of linear and convolution layers.
- 2023–2024 **Students from IDMC M2 TAL**, 4 months (1h/week)
50% co-supervision. **Topic:** Energy monitoring of AI models for speech processing

Publications

Conferences

- 2027 **Douwes et al. (2026)**, Exposing the cost of deep learning audio model development
IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), *Toronto, CANADA*
(1st author) - under review
- 2027 **Magron et al. (2026)**, Investigating the Performance and Energy Costs of Replicating Band-Split RNN for Music Source Separation
IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), *Toronto, CANADA*
(2nd author) - under review
- 2025 **Douwes and Serizel (2025)**, Energy consumption trends in sound event detection systems
IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), *Hyderabad, INDIA*
(1st author). Poster presentation
- 2023 **Douwes et al. (2023)**, Is quality enough? Integrating energy consumption in a large-scale evaluation of neural audio synthesis models
IEEE International Conference on Acoustics, Speech and Signal Processing, *Rhodes, GREECE*
(1st author). Poster presentation
- 2020 **Esling et al. (2020)**, "Diet Deep Generative Audio Models with Structured Lottery"
International Conference on Digital Audio Effects (DAFx), *Vienne, AUTRICHE*
(2nd author, equal contributions) Oral presentation by Philippe ESLING

Journals

- 2026 **Douwes (2026)**, Défis énergétiques et écologiques de l'IA pour la création musicale
Revue Francophone d'Informatique et Musique [En ligne], Numéros, n° 11 - Frugalité, pérennité et création
(1st author)

Workshops

- 2024 **(Douwes and Serizel, 2024a)**, From Computation to Consumption: Exploring the Compute-Energy Link for Training and Testing Neural Networks for SED Systems
Detection and Classification of Acoustic Scenes and Events (DCASE) Workshop, *Tokyo, JAPAN*
(1st author). Oral presentation by SERIZEL.
- 2024 **Cornell et al. (2024)**, DCASE 2024 Task 4: Sound Event Detection with Heterogeneous Data and Missing Labels
Detection and Classification of Acoustic Scenes and Events (DCASE) Workshop, *Tokyo, JAPON*.
(3ème auteure). Oral presentation by Samuel CORNELL.
- 2024 **Douwes and Serizel (2024b)**, Normalizing energy consumption for hardware-independent evaluation
IEEE 34th International Workshop on Machine Learning for Signal Processing (MLSP)
(1st author). Oral presentation.

Scientific communication

Mediation

April 2026 **Treize Minutes**, *Marseille*, FRANCE
<https://vimeo.com/1192196495>

Keynotes

Oct. 2026 **Workshop on Frugality and Explainability**, *Toulouse*, FRANCE
<https://indico.math.cnrs.fr/event/16954/contributions/16434/>

April 2026 **Statlearn**, *Grenoble*, FRANCE
<https://statlearn.sciencesconf.org/resource/page/id/11>

Jan. 2026 **From Bio-Inspired AI to Frugal AI**, *Dijon*, FRANCE
<https://lead.ube.fr/jeudi-22-janvier-2026-de-lia-bio-inspiree-a-lia-frugale-journee-detude-lead/>

June 2025 **Music Computing Conference (JIM)**, *Lyon*, FRANCE
<https://jim25.sciencesconf.org/>

March 2025 **GreenDays 2025**, *Rennes*, FRANCE, 15min
<https://greendays.sciencesconf.org/resource/page/id/3>

Feb. 2025 **Roundtable Discussion at the “Fast Forward” Event – Imagining the Future of Sound**, *Paris*, FRANCE
<https://pepr-icare.fr/events/fast-forward-imaginer-le-futur-du-son/>

Tutorials

2026 **Constance Douwes**, Eco-friendly AI: measure and efficiency
Eco-ICT autumn school, *Sète*, FRANCE
<https://eco-ict.sciencesconf.org>

2023 **Constance Douwes et al.**, Monitoring environmental impact of DCASE systems: Why and how ? <https://dcase.community/workshop2023/tutorials>
Detection and Classification of Acoustic Scene and Events (DCASE) Workshop, *Tampere*, FINLANDE

Colloquium and seminars

Oct. 2026 **TALEP team seminar at LIS**, *Marseille*, FRANCE

Sept. 2026 **I2M colloquium**, *Marseille*, FRANCE

Jan. 2026 **SPEC team seminar at CEA**, *Paris*, FRANCE

June 2025 **GDR IASIS annual general meeting**, *La Grande-Motte*, FRANCE

March 2025 **SIMS team seminar at LS2N**, *Nantes*, FRANCE

References

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- Douwes, C. (2026). Défis énergétiques et écologiques de l’ia pour la création musicale. In *Revue Francophone d’Informatique et Musique [En ligne], Numéros, n° 11 - Frugalité, pérennité et création*.
- Douwes, C., Bindi, G., Caillon, A., Esling, P., and Briot, J.-P. (2023). Is quality enough? integrating energy consumption in a large-scale evaluation of neural audio synthesis models. In *ICASSP 2023-2023 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 1–5. IEEE.
- Douwes, C., Magron, P., and Serizel, R. (2026). Exposing the cost of deep learning audio development. *arXiv preprint arXiv:2610.01619*.
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- Douwes, C. and Serizel, R. (2024b). Normalizing energy consumption for hardware-independent evaluation. In *2024 IEEE 34th International Workshop on Machine Learning for Signal Processing (MLSP)*, pages 1–6. IEEE.
- Douwes, C. and Serizel, R. (2025). Energy consumption trends in sound event detection systems. In *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, pages 1–5. IEEE.
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- Magron, P., Douwes, C., and Serizel, R. (2026). Investigating the performance and energy costs of replicating band-split RNN for music source separation. *arXiv preprint arXiv:2609.21918*.