# Bernardo Torres

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https://bernardo-torres.github.io | github.com/bernardo-torres | linkedin | Google Scholar

Researcher in machine learning for audio and music. My current research focuses on the intersection between signal processing and deep learning for music information retrieval, source separation and synthesis, with a focus on unsupervised and self-supervised methods.

## Education

### Telecom Paris, Institut Polytechnique de Paris
Paris, France

Ph.D. Student in Machine Learning and Signal Processing for Audio and Music — 2023 - May. 2026 (expected)

- Data-driven analysis-by-synthesis for music source separation and transformation.
- Advisors: Prof. Geoffroy Peeters, Prof. Gaël Richard

### École Normale Supérieure Paris-Saclay
Gif-sur-Yvette, France

M.S. in Computer Science and Applied Mathematics, MVA. **Highest honors**. — 2021-2022

- MVA stands for Mathematics, Vision and Learning (Apprentissage). Top AI Research Master in France.
- Deep Learning, Artificial Intelligence, Time Series, Audio and Speech processing, Computer Vision

### Telecom Paris, Institut Polytechnique de Paris
Paris, France

B.S. in Computer Science / Engineering Diploma, **GPA: 4.0/4.0**. — 2020-2022

- Machine Learning, Signal Processing and Embedded Systems majors.

### Federal University of Minas Gerais
Belo Horizonte, Brazil

B.S. in Electrical Engineering — 2016-2022

- Electrical, Electronics and Computer Engineering

## Work Experience

### Deezer
Paris, France

Research Scientist Intern — Apr. 2025- Jul. 2025

- Research in diffusion and consistency models for audio compression.
- Advisor: Gabriel Meseguer-Brocal

### Sony Computer Science Laboratories
Paris, France

Research Scientist Intern — Apr. 2022-Sep. 2022

- Developed a self-supervised foundation model for singing voice.
- Advisor: Stefan Lattner

### Radix Engineering and Software
Belo Horizonte, Brazil

Data Science Intern — Jul. 2019 - May 2020

- Developed and deployed LSTM networks for time series analysis and anomaly detection.

## Publications

**Journal Publications**

- *Under review:* **Torres, B.**, Peeters, G. and Richard, G., The Inverse Drum Machine: Source Separation Through Joint Transcription and Analysis-by-Synthesis, 2025.
- Riou, A., **Torres, B.**, Hayes, B., Lattner, S., Hadjeres, G., Richard, G., and Peeters, G., PESTO: Real-Time Pitch Estimation with Self-supervised Transposition-equivariant Objective, *TISMIR*, 2025.

**Conference Publications**

- *Under review:* **Torres, B.**, Moussallam, M, and Meseguer-Brocal, G., Leaning Lineariry in Audio Consistency Autoencoders via Implicit Regularization, 2025.
- **Torres, B.**, Peeters, G. and Richard, G., Unsupervised Harmonic Parameter Estimation Using Differentiable DSP and Spectral Optimal Transport. *ICASSP 2024*.
- Richard, G., Chouteau, P. and **Torres, B.**, A Fully Differentiable Model for Unsupervised Singing Voice Separation. *ICASSP 2024*.
- **Torres, B.**, Lattner, S. and Richard, G., Singer Identity Representation Learning using Self-Supervised Techniques. *ISMIR 2023*.

## Teaching Experience

### Telecom Paris, Institut Polytechnique de Paris
Paris, France

Teaching Assistant
2023–Present

*Deep Learning I*, from IP Paris' Data Science M.S. program
*TSIA 201 Signal Processing*
*TSIA 206 Speech and Audio Processing*
*TSIA 203 Introduction to Deep Learning*

## Awards and Scholarships

### BRAFITEC excellence double degree scholarship
Two-year scholarship granted by CAPES foundation
2020-2022

## Skills

**Deep Learning**: PyTorch, TensorFlow
**Programming Languages**: Python, C, C++
**Other**: Docker, Git, Slurm, Hydra
**Spoken Languages**: Portuguese (native), English (fluent, C2), French (fluent), Spanish (B2)
**Interests**: Music, Sound synthesis, Electronic Music Production/Mixing, Meditation, Philosophy, Cognitive Science

## Projects

### Formula SAE UFMG
Belo Horizonte, Brazil

Head of Electronics
2018-2019

- Lead a group of 8 people in the design, manufacturing and testing of the electrical subsystems of a racecar prototype.
- Designed, developed and deployed an embedded data acquisition system.

Team Member
2017-2019

- Designed the team's first telemetry system, from embedded board design to user interface development.