Mateo Cámara

Madrid, Spain / 🌐 Website / 🔗 Linkedin / 🐙 GitHub / 🎓 Scholar / macamlar@gmail.com / +34 625985159

I am deeply passionate about **technology, sound, and music**, which have captivated me since childhood. I find the complexities of sound especially fascinating, often overshadowed by visuals, yet holding immense potential. Music has always been an integral part of my life, leading me to the inevitable **pursuit of a Ph.D** to delve deeper into this captivating world. The true revolution in AI will not be realized until we can perfectly generate sound. **I'm committed to being at the forefront of this revolution**, actively contributing to its advancement.

EXPERIENCE

Reasercher & Teaching Assistant
Sep 2020 - Present

Universidad Politécnica de Madrid
Madrid, Spain

- **Research projects**:
  - **Artificial intelligence and generative models (in collaboration with Amazon)**: Led a team of six to develop an image-conditioned Audio Generator, implementing Scrum for efficiency. We used AudioLDM, based on CLAP, and initially created a CLIP to CLAP translator for image conditioning. Our second strategy involved CoCA for image-to-text conversion, further refining audio input. All work was done in PyTorch. Additionally, we developed a novel quality metric using ImageBIND's latent space to validate our results. 2023
  - **Design of AI Audio Effects for a Short Film**: Developed AI Audio Effects using RAVE, a model based on Variational Autoencoders (VAE), for the first-ever Spanish short film employing AI techniques for sound production. Implemented specific fine-tuning to tailor sound effects. Additionally, designed a user-friendly interface in MAX8 for general use, garnering media attention and interviews for its innovative approach. 2023
  - **Innovative Digital Sustainable Aggregates Systems (European H2020)**: Analyzed the acoustic signals emitted by machines used in a quarry and developed a system to predict machinery health status. Utilized custom-designed VAEs to analyze the latent space of quarry sounds, enabling the generation of new sounds indicative of machinery condition. This approach allowed for the identification of potential malfunctions, as faulty machinery would occupy distinct regions of the latent space. 2022
  - **Internet for All (in collaboration with Telefónica)**: Analyzed data from the position of antennas in developing countries and implemented an optimization algorithm to place new access points. Employed machine learning techniques, including regression and classification, for predicting optimal placements. Implemented a PSO algorithm to strategically place new access points, enhancing network coverage and efficiency. 2021

- **Lectures**: Proficient in artificial intelligence, the underlying mathematics, and communication skills, I have been entrusted with delivering masterclasses and seminars on subjects such as Deep Learning for Acoustic Signal Processing (Variational Autoencoders), Predictive and Descriptive Learning (Data visualization), and Machine Learning Techniques (Geospatial data science). I have packaged and shared all my educational materials on YouTube and GitHub. Actively contributing to AI-relevant repositories, I am engaged in the GitHub and HuggingFace communities, where I collaborate and share advancements in the field.

Visitor Researcher (supervisor: Prof. Joshua Reiss)
Aug 2022 - dec 2022

Queen Mary University of London
London, UK

- **Research**: Collaborated with a team of four international students to research the morphology of the vocal tract and optimize parameters of a speech synthesizer to emulate human speech. Utilized a comprehensive array of optimization algorithms, including genetic algorithms, Particle Swarm Optimization (PSO), least squares, and neural network-based predictors. I developed a Node.js version of a computerized model of the tract. This involved an in-depth study of the vocal tract morphology and speech production mechanisms.

Co-Founder; Head of AI
jul 2020 - dec 2023

Pickgeo - Location Intelligence (startup)
Madrid, Spain

- **Technical**: Led the development of a web application, employing Django for the backend and Vue.js for the frontend. Self-educated in GeoData Science, I applied this knowledge to ad-hoc projects. I defined and coded complex Machine Learning algorithms, contributing to key developments within the company. This work culminated in a product that attracted dozens of recurring clients.

- **Leadership**: I built the first company's business plan, laying the foundational strategy for growth and development. My involvement extended to the hiring process, where I played a crucial role in selecting new software engineering talent. Participating in meetings with stakeholders, I was instrumental in securing public funding of €300,000. This collective effort and leadership culminated in winning the best startup award by ActúaUPM.

Education (Universidad Politécnica de Madrid)

Ph.D in Neural Audio Synthesis   Oct 2020 - Jan 10th 2025

- **Thesis**: My thesis delves into **generative models and their application to sound**. I developed VAE-based models for enhanced audio phase reconstruction and make such technology accessible to a broader audience. Simultaneously, I conducted a thorough study of the vocal tract's mechanics and speech production. A **core ambition is to embed the vocal tract model within current generative systems**, moving beyond solely acoustic data to include vocal tract configurations as critical prior information. This integration aims to improve speech synthesis models significantly and diminish the need for vocoders in converting spectral data back into sound signals.

MSc Telecommunications Engineering (ABET accredited)   *18% Global Percentile* 2017 - 2019

Machine Learning and Multimedia Data Science specialization

- **Final project**: I was **honored with a Cum Laude distinction**, I developed strategies for subjective video quality estimation utilizing neural networks. This innovative approach earned me an **Extraordinary Award from the National Telecommunication Engineering School**.

BSc Telecommunications Engineering   *21% Global Percentile* 2012 - 2017

- **Knowledge**: I focused on Digital Signal Processing, Statistical Analysis, and Stochastic Processes, employing tools like Matlab to deepen my understanding and application of these complex subjects.

Honors & Awards

- **Andrés Lara Award, TECNIACUSTICA 2022**: Best development and application of science developed by young researchers at the 53rd Spanish Congress of Acoustics.
- **First Prize at ActuaUPM**: Pickgeo was awarded with the Best Startup of the Year Award.
- **XL Edition 2019 Telecommunication Engineers Awards**: Official College of Telecommunication Engineers (COIT) and Spanish Association of Telecommunication Engineers (AEIT)
- **First Prize at National Organization of Spanish Blind People**: Challenge to improve their life quality.
- **First Prize at Data Analytics Hackathon**: Organized by McKinsey & Co.

Publications & Patents

[1] **Mateo Cámara** Fernando Marcos José Luis Blanco. "Decoding Vocal Articulations from Acoustic Latent Representations". In: *AES Europe Conference* (2024).

[2] **Mateo Cámara** José Luis Blanco. "FOLEY-VAE: Generación de efectos de audio para cine con inteligencia artificial". In: *Tecniacústica* (2023).

[3] **Mateo Cámara** Zhiyuan Xu Yisu Zong José Luis Blanco Joshua D Reiss. "Optimization Techniques for a Physical Model of Human Vocalisation". In: *DAFx (CORE-A)* (2023).

[4] David Südholt **Mateo Cámara** Zhiyuan Xu Joshua D Reiss. "Vocal tract area estimation by gradient descent". In: *DAFx (CORE-A)* (2023).

[5] **Mateo Cámara** José Luis Blanco. "Acercando los autocodificadores variacionales al gran público". In: *Tecniacústica* 53 (2022).

[6] **Mateo Cámara** José Luis Blanco. "Expanding the Frontiers of Web Audio With Autoencoders and JavaScript". In: *Journal of the Audio Engineering Society (Q1 in Music, Q2 in technology)* 70.11 (2022).

[7] **Mateo Cámara** José Luis Blanco. "Phase-Aware Transformations in Variational Autoencoders for Audio Effects". In: *Journal of the Audio Engineering Society (Q1 in Music, Q2 in technology)* 70.9 (2022).

[8] Marcelo Bertalmío Itziar Zabaleta **Mateo Cámara** César Díaz Trevor Canham Narciso García. "Computer-Implemented Method for Adding Texture to a Digital Image". In: *European Patent, EP3866116* (2020).

[9] Itziar Zabaleta **Mateo Cámara** César Díaz Trevor Canham Narciso García Marcelo Bertalmío. "Retinal noise emulation: A novel artistic tool for cinema that also improves compression efficiency". In: *IEEE Access (Q1)* 8 (2020).

[10] **Mateo Cámara** César Díaz Juan Casal Jorge Ruano Narciso García. "Perceptually equivalent resolution in handheld devices for streaming bandwidth saving". In: *IEEE Signal Processing Letters (Q1)* 26.6 (2019).