Bruno Aristimunha
Biosignal Engineer

b.aristimunha@gmail.com +33749000745
https://www.linkedin.com/in/bruaristimunha/
portfolio: https://github.com/bruAristimunha

I am a PhD Student experienced in **machine learning** and **electrophysiological signal processing**. I am the main open-source **maintainer** of the **Braindecode** and **MOABB**, Pytorch library for Biosignal Decoding, and EEG decoding Benchmark. I have five years of experience with bio-signals in research.

EDUCATION

09/2020 – 08/2026, Ph.D. IN COMPUTER SCIENCE at the UNIVERSITÉ PARIS-SACLAY and UFABC. Provisional Title: **LEARNING REPRESENTATIONS OF ELECTROENCEPHALOGRAM USING DEEP LEARNING**. Supervisors: Dr Sylvain Chevallier, and Dr Raphael Y. de Camargo.

• Developed a machine learning application using Python for neurophysiological data (EEG, ECG) collection, annotation, visualisation, and experimentation.
• Created and normalised physiological datasets to BIDs formats with data structuring, pre-processing with ICA, and creating epochs for the experiment to machine learning algorithm usage.
• Implemented Pytorch and Scikit-Learn compatible algorithms from papers including ShallowNet, Deep4Net, and EEGNet. Trained deep models using Pytorch, Keras and fine-tuned hyperparameters.
• Managed the projects using Git and open-sourced the code in GitHub with documentation and tutorials generated by Sphinx. Conducted a literature review of decoding brain signal methods for EEG signals.
• Supervising four neuroscience and computer science undergraduate/master students during their one year and a half of research, with weekly meetings.

2016-2020, Double **BSc COMPUTER SCIENCE** and Science and Technology, at the Center for Mathematics, Computing and Cognition, Federal University of ABC (CMCC, UFABC), Brazil.

SELECTED PEER-REVIEWED PUBLICATIONS

1. **Aristimunha, Bruno**, Raphael Yokoingawa de Camargo, Sylvain Chevallier, Oeslle Lucena, Adam Thomas, M. Jorge Cardoso, Walter Lopez Pinaya, and Jessica Dafflon. "Synthetic Sleep EEG Signal Generation using Latent Diffusion Models." In ***Deep Generative Models for Health Workshop NeurIPS***. 2023. **SPOTLIGHT**
2. Moraes, C.P., **Aristimunha, B.**, Dos Santos, L.H., Pinaya, W.H.L., de Camargo, R.Y., Fantinato, D.G. and Neves, A., 2023, June. Applying Independent Vector Analysis on EEG-Based Motor Imagery Classification. In *ICASSP 2023-2023 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)* (pp. 1-5). IEEE.
3. **Bruno Aristimunha**, R. Y. De Camargo, W. H. L. Pinaya, Marie-Constance Corsi, Sylvain Chevallier, Holographic CONCERTO: Coherence & Functional Connectivity Graph Network. *Journée CORTICO 2023*, May 2023, Paris, France.
4. Igor Carrara***, Bruno Aristimunha*,** Sylvain Chevallier, Marie-Constance Corsi, Théodore Papadopoulo. Holographic EEG: multi-view deep learning for BCI. Journée CORTICO 2023, May 2023, Paris, France.
5. **B. Aristimunha,** A. J. Bayerlein, M. J. Cardoso, W. H. L. Pinaya and R. Y. De Camargo, "Sleep-Energy: An Energy Optimization Method to Sleep Stage Scoring," in *IEEE Access*, vol. 11, pp. 34595-34602, 2023, doi: 10.1109/ACCESS.2023.3263477.

Publications Under Review

1. **B Aristimunha,** WHL Pinaya, RY de Camargo, Sylvain Chevallier, Alexandre Gramfort, Cédric Rommel. Evaluating the structure of cognitive tasks with transfer learning. Manuscript under review in Neural Network Journal.

2. B Junqueira, **B Aristimunha**, Sylvain Chevallier, RY de Camargo. A Systematic Evaluation of Euclidean Alignment with Deep Learning for EEG Decoding. Manuscript under review in Journal of Neural Engineering
3. **B Aristimunha*,** Carrara I*, Marie-Constance Corsi, Raphael Y. de Camargo. Sylvain Chevallier, Théodore Papadopoulo. Geometric Neural Network based on Phase Space for BCI decoding. Manuscript under review in Journal of Neural Engineering
4. G Rodrigues, **B Aristimunha**, Sylvain Chevallier, RY de Camargo. Combining Euclidean Alignment and Data Augmentation for BCI decoding. Manuscript under review in EUSIPCO 2024
5. S Chevallier, I Carrara, **B Aristimunha**, et al. The largest EEG-based BCI reproducibility study for open science: the MOABB benchmark. Manuscript under review in Journal of Neural Engineering

Publications Under Preparation

1. **B Aristimunha**, et al. Latent Diffusion models and Biosignal generation.

EXPERIENCE

PhD Student/Research Assistant, at **Université Paris-Saclay** (Mar/2023 –2026)

- Working on my thesis =)

Visiting PhD Research at **King's College London** (Jul – December 2022)

- My interest during this visiting period was in machine learning projects, studying deep generative models to get a latent representation of medical data (EEG).

PhD Intern in Data Scientist, at **University of Glasgow/FGV** (Mar – Jun 2022)

- I worked on a project to automatically crawl tweets from the largest city in Brazil and associate them with official flood indices. Building and structuring a SQL database with flood-related tweets. This work is inside the interdisciplinary project Waterproofing Data (Outstanding Societal Impact Award by the ESRC: Economic and Social Research Council), the project coordinated by Prof Dr Joao Albuquerque.

PhD internship in Data Scientist, at Getúlio Vargas Foundation - FGV (Mar – Aug 2021)

- Designed experimental protocol to integrate data source with unbalanced dimensional, to build a label, and to associate the Waze Data with the vehicle accident database with terabytes per day.
- Implemented and used machine learning algorithms including **CatBoost**, **XGBoost**, **LightGBM**, **Random Forest,** and other decision trees to establish a relationship with Waze data and the city accident official database.
- Achieved real-time and offline classification of the Waze alerts in a massive volume of data to determine accident severity by plugging in pre-trained AI models such as the **scikit-learn** and CatBoost models.

Research Intern in Computer Vision, at Dom Bosco Catholic University (Jul 2014 – Dec 2015)

- I worked for one year and a half in a research group. In conjunction with two undergraduate researchers, I developed two papers: Bamboo Weevil Counting Using Threshold Techniques, presented at the Conference on Graphics, Patterns and Images - Sibgrapi (2015), and Bamboo Borer Tracking using optical flow at Computer on the Beach (2015), supervised by Prof Hemerson Pistori.

LANGUAGES AND SKILLS

I have experience working with many different programming languages and frameworks, most notably: **Python**, **Bash Script, Kotlin**, **Java**, and Haskell. I build software products on **Amazon Web Services (AWS)**, **Google Cloud Platform (GCP)** and **Azure**, with **docker** and **docker-compose** modules.

I have a solid background in Python packages, such as Request, **Beautiful Soup**, **Numpy**, **Scipy**, **Pandas**, **Scikit-Learn**, **Pytorch**, **Tensorflow**, **Keras**, **Dash**, and **Dask**. Also, the brain signal ecosystem includes MNE-Python, Braindecode, and **Moabb**. Statistical software, RStudio.