Alejandro Luis **Callara**

BIOMEDICAL ENGINEER · POSTDOCTORAL RESEARCHER

Via Castello 50, 56028 San Miniato, PI, Italy

☐ (+39) 3478557368 | ✉ alejandrocallara@gmail.com | ⌨ AlejandroCallara | ⊞ AlejandroCallara

Summary

Alejandro Luis Callara is a postdoctoral researcher at the Research Center "E. Piaggio" at the University of Pisa. He received his bachelor's Degree in Biomedical Engineering in 2012 and his master's Degree in Biomedical Engineering in 2015 from the University of Pisa, Italy. He received his PhD in Information Engineering in 2019 from the Dipartimento di Ingegneria dell'Informazione, University of Pisa. His main research activity is related to models, methods and pipelines for biomedical signal and image processing. He is particularly skilled with electroencephalography (EEG) and functional magnetic resonance imaging (fMRI), and with methods for inferring brain connectivity from these kind of data. He also collaborates, as part of the Brain matters team, in the development of tools, algorithms and models for the segmentation of single neurons from clarified confocal microscopy data.

Work Experience

Research Center "E. Piaggio", School of Engineering, University of Pisa *Pisa, Italy*

POSTDOCTORAL RESEARCH ASSOCIATE *February 2019 - PRESENT*

- Biomedical signal and image analyst within the fet-proactive project: 824153 - POTION - Promoting social interaction through emotional body odours.

IRCCS - Fondazione Stella Maris *Calambrone, Pisa (PI), Italy*

ENGINEERING CONSULTANT, EEG-DATA ANALYST *May 2018 - August 2018*

- Design of a pipeline of open source analytic tools for EEG-based connectivity analysis from acquisitions of pediatric patients affected by autism spectrum disorders (ASD).
- Pre-processing of high-density EEG acquisitions and extraction of functional connectivity measures.

Education

Dipartimento di Ingegneria dell'Informazione, University of Pisa *Pisa, Italy*

PH. D. IN INFORMATION ENGINEERING *November 2015 - May 2019*

- THESIS TITLE: *Brain connectivity of the central control of breathing in humans using EEG and fMRI: integration of hypothesis and data driven approaches*
- TUTORS: *Prof. Nicola Vanello, Prof. Luigi Landini, Prof. Arti Ahluwalia*

Faculty of Engineering, University of Pisa *Pisa, Italy*

MASTER DEGREE IN BIOMEDICAL ENGINEERING *September 2012 - July 2015*

- THESIS TITLE: *3D reconstruction of single Purkinje Neurons from clarified cerebellar tissue for the study of sexual dimorphism in animal models of autism*
- FINAL MARK: *110/110*
- TUTORS: *Prof. Arti Ahluwalia, Dr. Chiara Magliaro*

Faculty of Engineering, University of Pisa *Pisa, Italy*

BACHELOR DEGREE IN BIOMEDICAL ENGINEERING *September 2009 - December 2012*

- THESIS TITLE: *Progettazione del Sistema di fabbricazione SpHyGa: nuovo design e layout.*
- FINAL MARK: *104/110*
- TUTORS: *Prof. Arti Ahluwalia, Eng. Annalisa Tirella*

Language Skills

Italian, Spanish

NATIVE SPEAKER

English

PROFESSIONAL KNOWLEDGE

- Certificate of knowledge - University of Pisa (CLI), 26/06/2016, European Level: C1
- Self Assessment, European Level: C2

Technical Skills & Competences

Excellent knowledge of Windows and Linux operating systems
Excellent knowledge of Microsoft Office package
Excellent knowledge in biomedical signal and image processing
Excellent experience of fMRI data analysis
Excellent experience in statistical analysis
Expertise in EEG data analysis
Excellent knowledge of MATLAB, bash script, git(hub), latex
Excellent knowledge of AFNI, ANTS, EEGLAB

Software development

https://github.com/CentroEPiaggio/ManSegTool

https://github.com/AlejandroCallara/

Participation in international research projects

Fet-proactive project: 824153 - POTION - Promoting social interaction through emotional body odours

Collaborator

FLAG-ERA JTC2019: SENSEI - Segmentation of Neurons using Standard and Super-Resolution Microscopy, HBP Partering project

Collaborator

Teaching Experience

Department of Information Engineering, DII, University of Pisa, Via G. Caruso 16, 56122 - Pisa, Italy

Pisa, Italy

Graduate teaching assistant @ Biomedical Engineering Bachelor Program

October 2018 - December 2018
October 2019 - December 2019

- Assistant for the course of Biomedical signal analysis held by Prof. Maria Sabrina Greco

Department of Information Engineering, DII, University of Pisa, Via G. Caruso 16, 56122 - Pisa, Italy

Pisa, Italy

Graduate teaching assistant @ Biomedical Engineering M. Sc. Program

October 2017 - December 2017

- Image processing with MATLAB for the course of Mechanobiology held by Prof. Arti Ahluwalia

Department of Information Engineering, DII, University of Pisa, Via G. Caruso 16, 56122 - Pisa, Italy

Pisa, Italy

Graduate teaching assistant @ Biomedical Engineering M. Sc. Program

October 2016 - December 2016

- Image processing with MATLAB for the course of Transport Phenomena held by Prof. Arti Ahluwalia

Peer reviews

PlosONE, IEEE Journal of Biomedical and Health Informatics, Frontiers in Bioengineering and Biotechnology - Bionics and Biomimetics

Publications

International Journals

Callara, A.L., Morelli, M.S., Hartwig, V., Landini, L., Giannoni, A., Passino, C., Emdin, M., Vanello, N. *Ld-EEG Effective Brain Connectivity in Patients with Cheyne-Stokes Respiration* (2020) IEEE Transactions on Neural Systems and Rehabilitation Engineering, 28 (5), art. no. 9042228, pp. 1216-1225.

Callara, A.L., Magliaro, C., Ahluwalia, A., Vanello, N. *A Smart Region-Growing Algorithm for Single-Neuron Segmentation From Confocal and 2-Photon Datasets* (2020) Frontiers in Neuroinformatics, 14, art. no. 9, .

Magliaro, C., Callara, A.L., Vanello, N., Ahluwalia, A. *Gotta trace 'em all: A mini-review on tools and procedures for segmenting single neurons toward deciphering the structural connectome* (2019) Frontiers in Bioengineering and Biotechnology, 7 (AUG), art. no. 202, .

Magliaro, C., Callara, A.L., Vanello, N., Ahluwalia, A. *A manual segmentation tool for three-dimensional neuron datasets* (2017) Frontiers in Neuroinformatics, 11, art. no. 36, .

Magliaro, C., Callara, A.L., Mattei, G., Morcinelli, M., Viaggi, C., Vaglini, F., Ahluwalia, A. *Clarifying CLARITY: Quantitative optimization of the diffusion based delipidation protocol for genetically labeled tissue* (2016) Frontiers in Neuroscience, 10 (APR), art. no. 179, .

International Proceedings

Cauzzo, S., Callara, A.L., Sole Morelli, M., Hartwig, V., Montanaro, D., Passino, C., Emdin, M., Giannoni, A., Vanello, N. *On the Use of Linear-Modelling-based Algorithms for Physiological Noise Correction in fMRI Studies of the Central Breathing Control* (2019) Proceedings of the Annual International Conference of the IEEE Engineering in Medicine and Biology Society, EMBS, art. no. 8856397, pp. 808-811.

Callara, A.L., Sole Morelli, M., Cauzzo, S., Giannoni, A., Hartwig, V., Montanaro, D., Landini, L., Passino, C., Emdin, M., Vanello, N. *Exploring the supra linear relationship between PetCO2 and fMRI signal change with ICA* (2019) Proceedings of the Annual International Conference of the IEEE Engineering in Medicine and Biology Society, EMBS, art. no. 8856513, pp. 4795-4798.

Magliaro, C., Callara, A.L., Arami, N., De Maria, C., Ferrari, V., Vanello, N., Tognetti, A., Mangione, M., Viaggi, M.C., Vaglini, F., Castagna, M., De Rossi, D., Landini, L., Ahluwalia, A. *Databrain: A web-accessible database for three-dimensional reconstructions and quantitative morphometrics of neurons* (2017) IFMBE Proceedings, 65, pp. 767-770.

Callara, A. L., Morelli, M. S., Hartwig, V., Giannoni, A., Landini, L., Passino, C., Emdin M., and Vanello N. *Effective connectivity in Cheyne-Stokes respiration from low-density EEG: a methodological framework*, OHBM, June 2019, Rome, Italy.

Cauzzo, S., Callara, A.L., Sole Morelli, M., Hartwig, V., Montanaro, D., Passino, C., Emdin, M., Giannoni, A., Vanello, N. *Breath hold challenges in fMRI: Methodological issues in modelling BOLD signal changes*, OHBM, June 2019, Rome, Italy.

Vanello, N., Callara, A.L., Sole Morelli, M., Cauzzo, S., Giannoni, A., Hartwig, V., Montanaro, D.,Passino, C., Landini, L., and Emdin, M. *An analysis of fMRI signal during voluntary breath hold and carbon dioxide challenge: physiological correction and modeling issues*, IOP, September 2018, Lucca, Italy.

Callara, A. L., Morelli, M. S., Giannoni, A., Landini, L., Emdin M., and Vanello N. *EEG functional brain connectivity in patients with Cheyne-Stokes Respiration*, GNB, June 2018, Milan, Italy.

Callara, A. L., Magliaro, C., Ahluwalia, A., and Vanello, N. *Smart Region growing: a novel algorithm for the segmentation of 3D clarified confocal image stacks*, GNB, June 2018, Milan, Italy.

Callara, A. L., Morelli, M. S., Giannoni, A., Landini, L., Emdin M., and Vanello N. *EEG functional brain connectivity in different respiration phases in Cheyne-Stokes Respiration*, OHBM, June 2017, Vancouver, Canada.

Callara, A. L., Magliaro, C., Positano, V., Ahluwalia, A., and Vanello, N. *Tracing single neurons from mice cerebellum clarified tissue*, GNB, June 2016, Naples, Italy.