# FILIPPO CASTELLANI

MSc Student

Birth date: 5th Feb 1999


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## SUMMARY


Biomedical Engineering student driven by a profound interest in Neuroscience, Brain-Computer Interfaces (BCI), and AI-driven solutions for rehabilitation.
I have a solid engineering background, reinforced by hands-on experience acquired in clinical settings and conducting experiments with technical instruments and biological tissues. With my work, I aim to make significant contributions to the field of biomedical solutions, enhancing the well-being of patients affected by neural disabilities.


## TECHNICAL EXPERTISE

**Coding Languages:** Python, Matlab, C++, JavaScript, SQL, HTML, CSS.

**Electro-Physiology:** EEG acquisition, EMG acquisition, FES stimulation, Neural population recording using Multi-Electrode Arrays.

## EXPERIENCE

10/2023 – 04/2024 **Research internship (Master Thesis)** — **Institut de La Vision (Sorbonne Université), Paris, FR**

- Research visual information encoding in biological neural networks, in particular, in the retina.
- Study Retinal Ganglion Cells response through Multi-Electrode Array recording on ex-vivo mouse retina.
- Devise and carry out experiments to probe and explore visual information encoding mechanisms during biomimetic stimulation.
- Analyse the electrophysiological response of neurons to uncover the mechanisms behind poorly understood color encoding.

11/2021 – 09/2023 **Neurotechnology Researcher**

**RECOMMENCER Project:** ***Currently undergoing clinical trial - NCT05511207*** — **S.Lucia Foundation IRCCS, Rome, IT**

- Implementation of a bidirectional Brain Computer Interface (BCI) for upper limb rehabilitation in post-stroke subjects.
- Develop real-time algorithm to perform electroencephalographic (EEG), electromyographic (EMG) signals analysis and eventually extracting Corticomuscular Coherence features.
- Code and test the features classification logic that relays neurofeedback through Functional Electrical Stimulation (FES).
- Design and integrate information processing modules in a cohesive data pipeline, from acquisition to sensorial neurofeedback.
- Create the therapist interface for rehabilitation session management. Write documentation and software version management.

## PUBLICATIONS

2022 **Cortico-Muscular Coupling to Control a Hybrid Brain-Computer Interface for Upper Limb Motor Rehabilitation: A Pseudo-Online Study on Stroke Patients.** **Front. Human Neuroscience 2022, 16, 1016862.**
de Seta, V.; Toppi, J.; Colamarino, E.; Molle, R.; Castellani, F.; Cincotti, F.; Mattia, D.; Pichiorri, F.

## PROJECTS

Up-to-Date **My projects** — **Portfolio**

Collection of recent, past and ongoing projects.

## EDUCATION

9/2021 - today, scholarship holder — **MSc Biomedical Engineering - Technologies for Electronics** — **Politecnico di Milano, Milan, IT**
Thesis: currently under development

9/2018 - 10/2021, scholarship holder — **BSc Clinical Engineering** — **Sapienza Università di Roma, Rome, IT**
Thesis: Coherence-Based BCI for Rehabilitation: Feature Extraction and Experimental Assessment

- Perform research on state of-the-art use of coherence-based BCI.
- Implementing via Python, a feature extraction algorithm executable within the OpenVibe Software framework.
- Conduct laboratory test of features extraction from non-pathological subjects.

9/2011 - 9/2019 **Jazz Drum [2011-2015] and Electronic Music [2018-2019]** — **Conservatory of Music Santa Cecilia, Rome, IT**

- Completed coursework in composition, music theory, application of signal theory to sound design.
- Proficient in solfége, pianoforte, Jazz drumming techniques, as well as orchestral performance.

## LANGUAGES

**English**: B2 (Cambridge), **French**: C1 (Alliance Française), **Spanish**: B1 (Istituto Cervantes), **Italian**: native.