

POSTDOCTORAL RESEARCH FELLOW AT THE DEPARTMENT OF CLINICAL AND EXPERIMENTAL SCIENCES, UNIVERSITY OF BRESCIA, ITALY

The **Department of Clinical and Experimental Sciences** at the **University of Brescia** has an opening for a 1-year Postdoctoral Research Fellowship funded by the **ERC CoG project INCEPTION**. The position is expected to start on **March 2025**.

Project Title:

Development of an innovative neural closed-loop control paradigm for the rehabilitation of individuals with upper limb disability.

Project Overview:

Non-invasive high-density surface EMG (HDsEMG) technology has advanced the recording of muscle activity during voluntary contractions. Using blind source separation, HDsEMG enables identification of motor unit discharge patterns and measures common oscillatory inputs to motor neuron pools from spinal and supraspinal pathways. Modulating correlated activity between motor neuron pools is key to coordinating muscles and adapting or restoring motor function after neuromuscular damage. Techniques like transcranial magnetic stimulation (TMS) and sensory electrical stimulation can effectively modulate excitatory and inhibitory synaptic projections, promoting plasticity in motor neuron connectivity. These advances offer promising opportunities for interfacing with the central nervous system in motor disorders. This project will develop a framework for real-time estimation and modulation of neural activity in arm and shoulder muscles of individuals with upper limb disabilities, focusing on a closed-loop system to optimize stimulation and enhance rehabilitation outcomes.

Required qualifications:

- We are seeking a highly motivated researcher with a PhD in **biomedical engineering, computer engineering**, or a related field.
- Applicants should have a strong research background with expertise in **biomedical signal processing** and **data analysis** using **MATLAB** or **Python**. Preferably, candidates should also have experience in **control system engineering** and **matrix analysis**.
- Proficiency in **written and spoken English** is required.

Desirable qualification:

- Experience with **stimulation techniques** (electrical and/or magnetic).
- Expertise in **data collection involving human participants**.

Expression of interest:

If you wish to express your interest, please contact Prof. Francesco Negro at francesco.negro@unibs.it.