'Through science we may reach real friendship'

- Fernando Lopes da Silva

Fernando Lopes da Silva Neuroengineering Program

Exchange Program between the UMC Utrecht Brain Center and Instituto Superior Técnico

July 2021

Master Internship Abroad

Program description

The Fernando Lopes da Silva Neuroengineering Program ([website](#)) was initiated in 2021 to honor the outstanding accomplishments and dedication of Professor Lopes da Silva to the academic community in the field of Neuroscience and Biomedical Engineering.

The program selectively exchanges students of academic excellence between Lisbon-Portugal and Utrecht-Netherlands. More specifically, the program exchanges Biomedical Engineering master students enrolled at Instituto Superior Técnico (IST) Lisbon to the UMC Utrecht Brain Center, and Neuroscience and Cognition master students enrolled at the University of Utrecht (UU) to the Department of Bioengineering at IST.

To stimulate student exchange and international collaborations, the program aligns the interested of both institutions and elects yearly two exciting research topics. The program consists of a 9-month internship at the receiving institution. The best two candidates, one to Lisbon and one to Utrecht, are selected by a committee of researchers directly involved in the election and supervision of the topics.

Professor Fernando Lopes da Silva

Fernando Lopes da Silva (1935–2019) was one of the most influential neuroscientists of our time. For half a century he enriched the neuroscience community with his research on the mechanisms generating electrophysiological brain activity. He was born in Lisbon and graduated in medicine from the University of Lisbon in 1959. In 1965 he moved to the Netherlands and received his PhD degree in 1970 from the University of Utrecht.

In 2000, he became visiting Professor of the Faculty of Medicine of the University of Lisbon, and in 2005 was appointed Professor at the Instituto Superior Técnico with the task of coordinating teaching and research in Biomedical Engineering. He was an active researcher at the Institute for Systems and Robotics ([ISR](#)) and the Evolutionary Systems and Biomedical Engineering Lab ([LaSEEB](#)) and at Faculty of Science at the University of Amsterdam. In the last decades he often returned to Portugal to teach and was (proudly) involved in the supervision of many MSc and PhD students in both Portugal and the Netherlands.

PARTNER INSTITUTIONS

UMC Utrecht Brain Center, University of Utrecht

The UMC Utrecht Brain Center represents all research and (international) educational activities of the UMC Utrecht. Specifically, the Registration and Imaging of Brain Systems (RIBS) is a group of researchers from different departments (neurology, neurosurgery and radiology), who share the same facilities to register, process and manipulate the neural data. The group's vision is to unravel the mysteries of the brain on the areas of epilepsy, tumor and sensorimotor paralysis, using functional MRI (3T and 7T) and electrocorticography (ECoG) to measure brain function.

There are currently several fundamental and applied topics of active research in the group, namely:
     1) the development of Brain-Computer Interfaces (see website);
     2) the mapping of brain function in epilepsy and tumor patients;
     3) the relationship between functional MRI and the underlying neuronal activity;
     4) the development of tools for simulation of neuronal bioelectrical activity and for neurosurgical mapping.

Bioengineering department, Instituto Superior Técnico, Universidade de Lisboa

The **Bioengineering Department** is the most recent department at Instituto Superior Técnico (IST), the engineering school of the University of Lisbon. The department is strongly multidisciplinary and covers the most relevant areas of Biomedical Engineering, including biomedical imaging, biosignals and instrumentation, as well as biomaterials, nanotechnology and regenerative medicine.

The topics of neuroengineering, neuroimaging and brain-computer interfaces are of special importance for this program. The faculty associated with these topics develop their research activities in the research institutes affiliated with IST: Institute of Systems and Robotics - Lisboa (ISR-Lisboa), Telecommunications Institute (IT), and INESC-ID. Important partnerships with national and international research institutes in neurosciences in close connection with public and private hospital infrastructures are established in the scope of this research activity.

Project description for 2022

Utrecht Research Topic

Identification and classification of awake-sleep states in implanted Brain Computer Interfaces

Summary: A Brain-Computer Interface (BCI) allows its user to control a computer with brain activity. As part of the Utrecht NeuroProsthesis (UNP) study, people with locked-in syndrome have been implanted with an electrocorticography-based BCI that allows them to communicate at home. Our users should be able to use the system during the day and at night, but the latter has proven to be a challenge. The goal of the project is to improve classification of the BCI at night. Any insights from this project might be implemented in the home-system of our UNP participants for real-time testing.

Supervising team: Sacha Leinders, Mariana Branco, Zachary Freudenburg, João Sanches and Agostinho Rosa

Lisbon Research Topic

EEG-based motor Imagery-BCIs with robotics feedback for stroke rehabilitation

Summary: EEG-based Motor Imagery Brain-Computer Interfaces (BCIs) have been shown to be effective in restoring motor function after stroke, by promoting neuroplasticity and improving neurorehabilitation results when compared with traditional approaches. In this line of research, neuroscientists, biomedical engineers and robotic engineers get together in a multi-disciplinary team to address this problem by developing an EEG-based Motor Imagery BCI for controlling a robotic arm, with the objective of further improving neuroplasticity.

Supervising team: João Sanches, Patrícia Figueiredo, José Santos-Victor, Athanasios Vourvopoulos, Mariana Branco and Mathijs Raemaekers.

PROCEDURE

WHO CAN APPLY?

Students in the 2nd year of the Master (Biomedical Engineering at Instituto Superior Técnico Lisbon or Neuroscience and Cognition at University of Utrecht) who are interested in performing research in the selected topic.

HOW TO APPLY?

Students must submit

      1) a letter of motivation, indicating the research topic, and the sending and receiving institutions,

      2) a transcript of records (BSc and MSc)

      3) a CV

To info@lopesdasilva-program.nl.

The selection committee will award two students (one for Lisbon and one for Utrecht) based on academic performance and motivation.

WHEN TO APPLY?

For the latest information about deadlines check the website.

DURATION OF INTERNSHIP

Students will be selected for a 9-month exchange program (e.g., P2-P4 of the academic year, December to July)[1].

ASSESSMENT

The project will be supervised by faculty researchers at the receiving institution and at the home institution. The research output generated by the student[2] will be presented during the **Annual Meeting**

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[1] Equivalent to 45ECTS (3 academic periods) for students enrolled in the Master of Biomedical Engineering at IST. Equivalent to a minor research internship (33 ECTS) plus educational credits for students enrolled at Master Neuroscience and Cognition at UU.

[2] During this period **Biomedical Engineering students** will do a literature review (12 ECTs), a technical internship (3 ECTs) and the master thesis (30 ECTs). The output of each component is a report that is graded. The Master thesis must be presented for the RIBS group (pre-defense), the examiner committee (defense). The output reports will be jointly assessed by the examiner committee (as designated by the program coordinator at the home-institution) and supervisor(s) at receiving institution. The student will be graded on a scale from 0 to 20. **UU students** must submit a report in the end of the internship and present the results to the group. The report will be jointly assessed by the examiner and assessor appointed during the internship. The student will be graded on a scale from 0 to 10.

of Biomedical Engineering in Lisbon. The supervisor(s) and examiners will attend the defense in person or online.

FUNDING

The program is covered by an ERASMUS+ funding and is arranged by the IST/UU mobility office. The UMC Utrecht provides access to housing and work facilities. Information about housing in Lisbon can be found here.

Program Coordinators:

Prof. João Sanches (IST) and Dr. Mariana Branco (UMC Utrecht)

Selection committee 2022:

Prof. João Sanches   IST
Prof. Patrícia Figueiredo   IST
Prof. Nick Ramsey   UMC Utrecht
Dr. Mariana Branco   UMC Utrecht

Partners:

Bioengineering Department (DBE), Instituto Superior Técnico.
Website

Institute for Systems and Robotics
Website

Instituto de Medicina Molecular
Website

UMC Utrecht Brain Center
Website

Registration and Imaging of Brain Systems
Website