Curriculum Vitae - Dr. Silvestro Micera

Name Silvestro Micera
Place of birth [redacted]
Date of birth [redacted]
Current position Bertarelli Foundation Chair in Translaitonal Neuroengineering and Associate Professor at the Ecole Polytechnique Federale de Lausanne, Professor of Biomedical Engineering, Scuola Superiore Sant'Anna

Education

1996	University degree (Laurea) in Electrical Engineering (magna cum laude) from the University of Pisa, Italy
2000	Ph.D. degree in Biomedical Engineering (magna cum laude) from Scuola Superiore Sant'Anna, Pisa, Italy

Positions and Employment

2000-2008	Assistant Professor, Scuola Superiore Sant'Anna, Pisa, Italy
2006-2007	Visiting Scientist, Massachusetts Institute of Technology, Boston, USA
2008-2011	Group leader, Swiss Federal Institute of Technology Zurich, Zurich, Switzerland
2011-2018	Associate Professor, Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland
2012-2014	Associate Professor, Scuola Superiore Sant'Anna, Pisa, Italy
2014-	Professor, Scuola Superiore Sant'Anna, Pisa, Italy
2018-	Professor, Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland

Teaching activities

2009-now	Fundamental of Neuroengineering, SSSA
2011-now	Fundamental of Neuroengineering, EPFL
2011-now	Sensory-motor Neuroprosthetics, EPFL
2016-now	Neural Interfaces and Bioelectronic Medicine, SSSA-UniPisa

Honours and Awards

2005-	Senior Member of the IEEE Engineering in Medicine and Biology Society.
2007-	Fullbright Scholarship to spend six months at the McGovern Institute for Brain Research at the Massachusetts Institute of Technology.
2009	"Early Career Achievement Award" of the IEEE Engineering in Medicine and Biology Society.

Other Main Experience and Professional Memberships

1998-	Member of the IEEE Engineering in Medicine and Biology Society
2000-	Member of the IEEE Robotics and Automation Society
2004-2016	Associate Editor for IEEE Trans on Biomedical Engineering
2005-	Reviewer for various journals (Nature, Science, Nature Biotechnology, Neuron, Nature Medicine, Nature Biotechnology, Science Translational Medicine, Neurorehab Neural Repair, J Neural Engineering, IEEE Trans Neural System and Rehab Eng, etc.)
2005-	Guest-editor of several special issues in neural and rehabilitation engineering journals
2008-	Associate Editor of the IEEE Trans on Neural Systems and Rehab Eng
2008-	Member of the Editorial Board of J Neuroeng Rehabilitation
2009-	Member of the Editorial Board of J Neural Engineering
2010-	Evaluation of candidates for professorships for several universities
2010-	Grant evaluator for the European Commission, the Canadian Science Foundation, the Swiss National Science Foundation, several public agencies and private Foundations
2011	Program Chair of the IEEE EMBS Neural Engineering Conference
2012-2017	Associate Editor of the IEEE Journal Translational Engineering on Health and Medicine
2012-	Member of the American Society for Neuroscience
2019-	Associate Editor of the IEEE Transactions on Medical Robotics and Bionics

2020- Associate Editor of the IEEE Open J Engineering Medicine and Biology
2021 General Chair of the IEEE EMBS Neural Engineering Conference

Ongoing Funding ID

2013- Swiss National Competence Center for Reaserch (NCCR) in Robotics funded by the Swiss National Science Foundation.

2014- INCOGNITO/INCOGNITO2 projects funded by CARIPLO and Carigest Foundations to develop a novel technique for cognitive and motor neurorehabilitation.

2015- ENABLE, A-STIM, NEUROPROBES Projects funded by the Wyss Center for Bio and Neuro-engineering on bionic limbs, and novel approaches to restore motor function.

2018- TIMEs project funded by the "Personalized Health and Related Technology" scheme of the Swiss government

2019- NeuTouch project (ITN Marie Curie) to understand the basic mechanisms of tactile percection and artificial sensory feedback.

2019- CHRONOS Project funded by the SNF to develop a fully implanted bidirectional hand.

2020- CATALYST Project funded by the Bertarelli Foundation to develop and test non-invasive and invasive sensory feedback approaches.

Previous Funding ID

2010-13 ICT MUNDUS (Multimodal Neuroprosthesis for Daily Upper limb Support) EU Project whose aim is to develop novel assistive technology by combining robotics and electrical stimulation.

2010-14 ICT NEUWALK (Neuroprosthetic interface systems for restoring motor functions) EU Project whose aim is to develop a novel neuroprosthesis to restore functions in SCI patients.
Role: Co-PI for EPFL. Funding (after the moving from ETHZ): 254795 CHF.

2013-15 CAPITALIS project funded by the KTI Swiss Federal Agency to develop a novel software for FEM and biophysical models for the human body and its many components (in particular the nervous system).

2015-16 vCAP project funded by MEDEL (major player in the field of cochlear implants) to develop a novel vestibular neuroprothesis.

2013- 17 EPIONE (Natural sensory feedback for phantom limb pain modulation and therapy) project funded by EU Commission to develop and test novel methods to reduce phantom limb pain (Health project).

2013-17 REHAB_MECHANISMS project to develop advanced approaches for robot-based neurorehabilitaiton funded by a bank foundation (Fondazione Pisa).

2013-18 NEBIAS (NEurocontrolled BIdirectional Artificial upper limb and hand prosthesiS) project funded by the EU Commission.

2015-19 RETRAINER (REaching and grasping Training based on Robotic hybrid AssIstance for a novel generation of neuro-technologies to restore reaching and grasping functions) funded by the EU Commission.

2015-18 LINARM ++ project funded by the EU Commission to develop a novel generation of neuro-technologies to restore reaching functions.

2016-19 SINERGIA project funded by the Swiss National Science Foundation to restore locomotion after neurological problems in non-human primates

2016-19 NeuGrasp project funded by the Swiss National Science Foundation to develop novel methods to restore grasping using implantable neuroprostheses.

2016-18 Project funded by GSK to develop novel solutions for bioelectronic medicine.

2017-19 SYMBIOLEGs project funded by the Swiss National Science Foundation to develop new bionic legs.

2017-19 RONDA project funded by the Government of Tuscany to develop personalized neurotechnologies for motor function after stroke.

Invited presentations

In the past 5 years Dr. Micera gave more than 30 invited lectures in prestigious Universities and Conferences. Just as an example he was recently invited at the Max Planck Institute (twice), University of Cambridge, Scuola Normale Superiore, Harvard Medical School, Northwestern University, and he gave plenary talks in several Summer Schools and International Conferences.

Supervision of PhD students

Dr. Micera supervised or is currently supervised more than 30 PhD students over the past years. Some of them now hold academic positions in universities in Italy and UK and other hold important research positions in successful start-ups in USA and Europe.

Major scientific achievements

Dr. Micera's main goal has always been to develop implantable neural interfaces and robotic systems aimed at restoring sensorimotor function in people with different kind of disabilities, starting from basic scientific knowledge in the field of neuroscience, neurology and geriatrics, and investigating further to gain new information by using advanced technologies and protocols. In particular, the following research fields are currently investigated:

1. development of neural interfaces with the central nervous system (CNS) and the peripheral nervous system (PNS). In particular, several types of PNS neural interfaces have been developed in the past years, from less invasive such as cuff electrodes (Micera et al., 2001, Cavallaro et al., 2003, Raspopovic et al., 2009), to more invasive such as intraneural (Bossi et al., 2009, Cutrone et al., 2015) and regenerative electrodes (Musick et al., 2015, Santon et al., 2016, Delgado-Martínez et al., 2017). Moreover, the recorded signals have been processed using an innovative combination of different algorithms (Citi et al., 2008, Micera et al., 2010, Cracchiolo et al., 2020, Cracchiolo et al., 2021)
2. development of hybrid neuro-prosthetic (HNPs) systems. Several devices are currently under development. The first is a hand prosthesis bi-directionally controlled by using PNS intraneural interfaces. My group has been working on several decoding (extraction of motor commands) and encoding (stimulation of the afferent nerves) issues and the first implant in humans has been carried out some years ago (Micera et al., 2010, Micera et al., 2011) showing that (i) several hand functions can be controlled by the user also exploiting "shared-control" approaches (Zhuang et al., 2019); (ii) this kind of HNP is able to promote neural plasticity (Rossini et al., 2010, Granata et al., 2020). Our next implants showed the remarkable ability to restore advanced sensory information in the amputee, which can then be used in real-time (Raspopovic et al., 2014, Oddo et al., 2016, Valle et al., 2018, D'Anna et al., 2019, Petrini et al., 2019). We also recently showed that this approach can be extended to lower limb amputees (Petrini et al., 2019) and optic nerve stimulation (Gaillet et al., 2019, Romeni et al., 2021). The second system is a neuroprosthesis for the restoration of fine grasping functions in tetraplegic subjects. The results achieved in non-human primate show that intraneural electrodes can provide extremely interesting functional results (Badi-Dubois et al., under preparation). Finally, in collaboration with Prof. Courtine, Dr. Micera worked to restore locomotion after spinal cord injury using robotics and epidural electrical stimulation (Wenger et al., 2014. Martin et al., 2016, Wenger et al., 2016, Capogrosso et al., 2016, Formento et al., 2018, Bonizzato et al., 2021).