Nebias

Objectives

The NEBIAS ("NEurocontrolled BIdirectional Artificial upper limb and hand prosthesiS") proposal aims at developing and clinically evaluating (in selected amputees) a neuro-controlled upper limb prosthesis intuitively controlled and felt by the amputee as the natural one.

This will be possible by means of a novel neural interface able to provide a stable and very selective connection with the nervous system.

This goal will be achieved by combining microtechnology and material science and will allow, on one side, recording of the motor-related signals governing the actions of the amputated hand/arm for the motion control of a mechanical prosthesis, and on the other providing sensory feedback from tactile and kinesthetic sensors through neuromorphic stimulation of the adequate afferent pathway within the residual limb.

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Consortium

- Scuola Superiore Sant'Anna Pisa (IT)
- Albert-Ludwigs-Universitaet Freiburg (DE)
- Universitat Autonoma de Barcelona (ES)
- Università degli Studi di Cagliari (IT)
- Università Cattolica Sacro Cuore Roma (IT)
- Deutsches Primatenzentrum Göttingen (DE)

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Project duration: 4 years
EC contribution: 3.464 M€

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NEurocontrolled BIdirectional Artificial upper limb and hand prosthesiS

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ICT-2013.9.6
FET Proactive: Evolving Living
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European Commission

SEVENTH FRAMEWORK PROGRAMME

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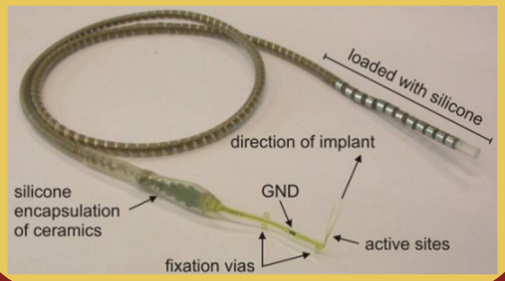
SELECTIVE AND BIOCOMPATIBLE INTRANEURAL ELECTRODES

able to selectively enable two-way exchange of information (recording and electrical stimulation) with the peripheral nervous system.
The novel electrodes will be preliminary tested in rats and non human primates, and then in human amputees.



EMBEDDED ELECTRONICS

A novel implanted electronic transmitter/receiver, powered wirelessly by an extra-corporal unit that amplifies motor nerve signals and permits selective electrical stimulation of sensory fibres.

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NEBIAS will be composed of the following modules:

HUMAN-LIKE DEXTEROUS PROSTHESIS

A novel generation of hand and upper limb artificial prostheses characterized by an increased dexterity as well as sensorization, reduced weight, and biomimetic characteristics.

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DECODING AND ENCODING ALGORITHMS

to develop the bi-directional link between the nervous system and the artificial device.
Novel decoding procedures to process ENG signals and increase the controllability of the artificial device.
Novel encoding procedures to increase the richness of the sensory feedback delivered.

PROCESSING OF MULTI-MODAL NEURAL INFORMATION

Project outcomes will allow the achievement of increased neuroscientific, clinical, and technological knowledge, guidelines for the development of other bidirectional interfaces and neural prostheses, as well as roadmaps for future development of bio-hybrid systems.

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