UNIVERSITY OF GENOA
DEPARTMENT OF INFORMATICS, BIOENGINEERING, ROBOTICS AND SYSTEMS ENGINEERING
MASTER'S PROGRAM IN BIOENGINEERING

Thesis Project Form

Title (tentative): Development of a closed-loop peristaltic pump prototype for in vitro neuromodulation

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Description

Motivation and application domain

The modulation of the electrophysiological activity of large-scale neuronal networks by means of external input is fundamental in the light of interacting with the neuronal system. In this sense, the delivery of ad hoc concentrations of neuromodulators would allow to finely control the firing and bursting features of in vitro neuronal networks. The goal of this thesis, performed in conjunction with the start-up ScreenNeuroPharm, is to design a low-cost peristaltic pump to control delivery of neuromodulators.

General objectives and main activities

- Design the features of the peristaltic pump
- Design the control circuit to allow a closed-loop stimulation
- Test the peristaltic pump prototype on in vitro neuronal networks coupled to Micro-Electrode Arrays (MEAs)
- Analyze the recorded data to compare the effect of the delivery of the neuromodulators

Training Objectives (technical/analytical tools, experimental methodologies)

- Acquiring knowledge in the design of peristaltic pump
- Acquiring knowledge in the control of peristaltic pump
- Design of experimental protocols
- Use of MEA-based electrophysiological set-up

Place(s) where the thesis work will be carried out: DIBRIS

Additional information

Pre-requisite abilities/skills: Neuroengineeering, Electrophysiology, MEA, Arduino programming, Computational Neuroscience

Curriculum: Neuroengineering

Maximum number of students: 1

Financial support/scholarship: -