Title (tentative): A neuromorphic neural network for the egocentric representation of the peripersonal visual space

Thesis advisor(s): Sabatini Silvio P., Mike Spratling (King’s College London)

E-mail: silvio.sabatini@unige.it

Address: Via All'Opera Pia, 13 - 16145 Genova Via Opera Pia 13 (III piano)

Phone: (+39) 010353 - 2092

Description

Motivation and application domain
Developing biologically-inspired algorithms for visual perception to either model the biological visual system or to develop methods for computer vision or robot control.

General objectives and main activities
The thesis will concern, in general, bio-inspired computational algorithms for visual perception. Algorithms will be based on neural network models inspired by theories of cortical visual information processing.
In particular, the goal is to develop neuromorphic models of sensory-motor mapping to gain a stable visual representation of space around the body independently of eye and head movements.
The proposed activity will be concerned with deriving egocentric 3D visual receptive fields. The resulting receptive fields will be fixed with respect to a body-centred reference frame and therefore capable to localize visual stimuli in space with increasing invariance to body movements.
The performance of the developed algorithm will be quantitatively assessed to validate the approach.

Training Objectives (technical/analytical tools, experimental methodologies)
To gain practical experience in developing and using neural network models, to gain MATLAB programming experience; experience applying benchmark assessment methods and of performing quantitative analysis of results; experience using a robot simulator (such as the iCub simulator).

Place(s) where the thesis work will be carried out: Department of Informatics, King’s College London and DIBRIS, University of Genoa

Additional information

Pre-requisite abilities/skills: (MATLAB) programming skills.

Maximum number of students: 1

Financial support/scholarship: ERASMUS+ placement