



Thesis Project Form

Title (tentative): Full perception of space through multisensory integration.

Thesis advisor(s): Canessa Andrea, Silvio P. Sabatini

E-mail: Andrea.Canessa@unige.it

Address: Via All'Opera Pia, 13 - 16145 Genova Pad E piano 1

Phone: (+39) 010 3532789

Description

Motivation and application domain

Vision, audition, and touch all code the space around us, or rather the things that are located in the space around us, in a different way. Yet, together our senses form a coherent spatial representation of our environment. Information from the different senses is then to be integrated in the central nervous system to build a unified perceptual representation of the world. This process of multisensory integration (MSI) has been shown to result in a panoply of behavioral benefits, such as faster and more sensitive perceptual discrimination, as well as more accurate and precise localization of stimuli in space. To date, most of the research on spatial attention and localization within the MSI framework has focused on probing people's responses to stimuli presented in frontal space and at fixed distance.

General objectives and main activities

The long-term goal of this project is to investigate how we create a full perception of space (at 360° and in depth) thanks of a space variant (3D) multisensory integration and how our senses differently interact one each other and how multisensory interactions between vision, audition, and touch are affected by the region of space in which information happens to be presented.

Main activities

- To design and prototype a multisensory stimulation setup (Vision + audition + touch) that could also include an eye tracker and IMU or a tracking system to characterize subjects' actions.
- To collect data (behavioral and physiological) from subjects while performing MSI tasks.
- To analyze psychophysical and physiological data and correlate with behavioural data

Training Objectives (technical/analytical tools, experimental methodologies)

The student will learn:

1. to produce single and multi sensory stimulation
2. to create an experimental protocol
3. to analyze behavioural and psychophysical data;
4. Eye tracking
5. Improve the programming knowledge (Matlab/Python)

Place(s) where the thesis work will be carried out: DIBRIS Bioengineering Lab (Via Opera Pia 13)

Additional information

Maximum number of students: 1