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

Thesis Project Form

Title (tentative): Development of an interactive virtual environment with haptic feedback

Thesis advisor(s): Sabatini Silvio P., Manuela Chessa, Vittorio Sanguineti, Giulia Sedda

E-mail: silvio.sabatini@unige.it

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

Phone: (+39) 010 33 52092

Description

Motivation and application domain

Vision and touch are the main sensory systems through which we interact with the environment. The ability to integrate these sensory modalities allows performing complex tasks, e.g. the recognition and interaction with different textures, but underlying mechanisms are still little known. Its loss involves serious motor-sensory disorders.

General objectives and main activities

The aim of this activity is to develop a system to study and characterize the visual-haptic interaction in an immersive environment. The system will consist of a head-mounted display for virtual reality, a prototypical haptic interface that generates electro-vibrational stimuli and a device for tracking the hand position. The system will allow us to record, manipulate and analyze the visual-haptic interaction of the user with various types of textures: real (ground truth), virtual, electro-vibrational or mixed (mix of the previous ones). The system must be able to assess the mutual influence of visual and haptic sensation in perceptual assessment and compare the different modes of subjective evaluation.

Training Objectives (technical/analytical tools, experimental methodologies)

- Integration of different devices (HTC Vive, Leap Motion, electro vibrational haptic interface)
- Use of programming languages (C ++, C #), and interface with 3D systems (Unity)
- Calibration techniques and co-registration of different reference systems
- Experiments for psychophysical evaluation (Matlab Psychtoolbox)
- Analysis of psychophysical data (Matlab)

Place(s) where the thesis work will be carried out: DIBRIS (Via Opera Pia e Valletta Puggia)

Additional information

Maximum number of students: 2