



Thesis Project Form

Title (tentative): Visual feedback manipulation for low-cost neurorehabilitation enhancing movement recovery

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Description

Motivation and application domain

Over the years, the growth of low-cost devices opened up new scenarios for technology-driven rehabilitation settings to engage patients in challenging tasks with reduced caregiver efforts and reduced economic impact. On the other side, low-cost systems based on simple bodyweight exercises, albeit adopting virtual reality (VR) and motion tracking tools, do not usually go beyond the exploitation of stereotyped task-oriented exercises. Visual feedback (VF) is often simplified and regulated by basic performance metrics.

General objectives and main activities

The general goal is to develop a new generation of bidirectional human-computer interfaces for neurorehabilitation, based on low-cost technologies and usable in supervised and unsupervised (telerehabilitation) contexts, focused on advanced VF presentation and manipulation in bodyweight exercises. The main activities will consist in:

- study new methods for VF presentation and manipulation in VR exercises for upper-limb functional rehabilitation, investigating what type of VF manipulations leads to better or faster learning of new motor strategies in healthy participants
- assess, by means of pilot studies, the feasibility of the approach and its effectiveness, by studying the neurological underpinnings linked with the specific VF manipulation during the practice of the exercises for upper-limb.

Training Objectives (technical/analytical tools, experimental methodologies)

1. Background literature analysis
2. Definition of the Experimental set-up
3. Development of the pipeline for VF manipulation
4. Data collection and analysis

Place(s) where the thesis work will be carried out: DIBRIS, via all'Opera Pia 13

Additional information

Maximum number of students: 1