



Thesis Project Form

Title (tentative): Simulated stroke survivors for mixed-reality medical training

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Description

Motivation and application domain

During clinical practice, physiotherapists need to learn how to rely on haptic feedback from a patient in order to understand their impairment and recovery potential. When treating stroke survivors or persons with brain injuries, therapists need to understand the patient's neuromotor impairment by engaging into physical interaction and, during rehabilitative sessions, detect compensatory behaviors to guide the patient toward true recovery.

A combination of computational models with advanced medical simulation methodologies can be valuable to support physiotherapists training on a wide range of conditions using a controlled and riskless environment.

General objectives and main activities

The main objective of the thesis will be the design and implementation of an artificial agent which simulates the neuromotor impairments which are typically observed in stroke survivors. To this purpose, the project will involve several activities:

1. Integration of a computational model of stroke within an artificial agent architecture;
2. Implementation of an artificial agent in virtual reality;
3. Definition and implementation of visuo-haptic exercises;
4. Data collection: participants, selected from therapists, will be recruited for the experiment;
5. Data analysis.

Training Objectives (technical/analytical tools, experimental methodologies)

1. Software development (e.g., virtual reality scenes using Unity Game Engine)
2. Synchronization of different systems (haptic interfaces, virtual reality tools)
3. Running experiments with physiotherapists, physiotherapy students, and/or persons with no medical background
4. Data analysis in Matlab/Python

Place(s) where the thesis work will be carried out: Bioengineering Lab@Dibris and Joint lab for emerging technologies in simulation at SimAv

Additional information

Maximum number of students: 2