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

Dibris

Thesis Project Form

Title (tentative): Virtual training for sensorimotor disorders

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Description

Motivation and application domain

Subjects with neurodegenerative diseases typically present motor disorders and cognitive/attentional disturbances. VR provides a controlled means to investigate motor difficulties by replicating real-life situations with a high cognitive load. It integrates visual stimuli and spatialized audio stimulations to reproduce chaotic, confusing, and hyperstimulating environments. VR technology can be used to promote the development of adaptive skills and even cognitive and motor functional recovery.

General objectives and main activities

Design and validation of a low-cost VR-based device, intended for future clinical use, capable of immersing a subject in a realistic urban environment to experience challenging motor, behavioral, and cognitive situations. The tool will be constructed based on "ADRIS," a semi-immersive virtual reality driving simulator (mediated by three curved screens) already developed at DIBRIS. This prototype needs to be adapted so that it transforms from a driving simulator into a "walking" simulator, and the experience is mediated through immersive wearable headsets. Users will be able to encounter various situations that can occur while walking and provide a range of gait-associated measures, allowing the assessment of the subject's behavioral responses (e.g., reaction time).

Training Objectives (technical/analytical tools, experimental methodologies)

The student will learn to employ an array of methodologies and instrumentation, including:
â€¢ Graphic Engines (Unity3D) and Shaders
â€¢ Virtual Reality (VR) technologies, 3D monitor/projectors
â€¢ Stereoscopic rendering
â€¢ Psychophysics methodologies
â€¢ Task design and data collection with subjects

Place(s) where the thesis work will be carried out: DIBRIS

Additional information

Maximum number of students: 1