



Thesis Project Form

Title (tentative): Augmenting human abilities through Supernumerary limbs or through Collaboration with others

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Description

Motivation and application domain

Virtual Reality (VR) provides a platform to study human coordination in multitasking environments. Our research has developed a Self-Augmented/Collaborative modular VR system that allow performing different tasks with a simulated third hand. The system offers two distinct interaction modes:

â€¢ Collaborative Mode: Two participants interact in a shared VR space, coordinating movements to complete a given task.

â€¢ Self-Augmented Mode: A single participant performs tasks using utilizing two hands and a foot-controlled third hand.

Through this study, we aim to analyze how the additional limbâ€™whether controlled by a second player or by the primary userâ€™impacts cognitive load, human motor skills, and coordination under different conditions in VR environments.

General objectives and main activities

The main goal of this thesis is to conduct a user study using the VR platform, collect behavioral and performance data, and analyze the impact of different task conditions on cognitive load. The thesis will include:

1. Experimental Design & Setup.
2. Data Collection & Processing.
3. Data Analysis & Interpretation.

Training Objectives (technical/analytical tools, experimental methodologies)

The student will gain experience in:

1. Background Literature Review: Understanding cognitive load measurement and VR-based multitasking studies.
2. Experiment Design: Setting up a controlled study with defined variables.
3. VR System Interaction: Working with Unity, VR headsets, and tracking systems.
4. Data Processing & Analysis: Utilizing Python, MATLAB, or R for data visualization and statistical analysis.
5. Human-Computer Interaction: (HCI) Evaluation â€™ Assessing user experience and task difficulty in immersive environments.

Place(s) where the thesis work will be carried out: DIBRIS, via allâ€™Opera Pia 13, Genova

Additional information

Pre-requisite abilities/skills: previous experience with Unity

Maximum number of students: 2