Title (tentative): Natural interaction in a shared workspace

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Description

Motivation and application domain
The application domain of this thesis is the study of novel methods and technologies to achieve a Natural Human-Computer Interaction (HCI). In particular, scope of the work is to combine methods and tools from Computer Science and Computer Vision with methods from psychophysics in order to study the perception issues that arise when using HCI, in particular in virtual, augmented and mixed reality environments.

General objectives and main activities
The objective of this thesis is to develop an immersive system, based on augmented and/or mixed reality, to achieve a natural interaction in a shared workspace. People acting in such a workspace should perceive both the virtual and the real objects without misperception issues. In perspective, such a system may be used as a collaborative tool. To this aim, the following aspects should be considered: (i) a presentation of the virtual stimuli without distortions; (ii) a robust and stable tracking of the users’ head, eyes and hands; (iii) a precise calibration and registration of the devices used to build the system. A specific aspect of this activity will be the study of the perception of tridimensionality, through the presentation of virtual stereoscopic 3D stimuli in an augmented/mixed reality system.

Training Objectives (technical/analytical tools, experimental methodologies)
- Setup of the system by using low cost and off-the-shelf devices (e.g. Microsoft Kinect, multiple 3DTV).
- Development and implementation of innovative Computer Vision algorithms to obtain a robust tracking of the user.
- Working prototype of the immersive HCI system.
- Qualitative and quantitative experimental evaluation of its functionalities are expected.

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

Pre-requisite abilities/skills: Computer Vision and 3D geometry, Object oriented programming (C++ or C#)

Maximum number of students: 2