

Master 2 Internship Proposal: Wall Displays versus Virtual Reality in Collaborative Tasks

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Figure 1. The intern will work with (a) the WILDER wall (6×2 meters for $14\,400 \times 4\,800$ pixels, driven by a rendering cluster of 10 workstations, and equipped with an air-gesture tracking system and a touch sensitive frame) and (b) two Vive Pro Head Mounted Displays.

Ultra-high resolution wall-sized displays (ultra-walls, see Figure 1-(a)) allow to display a huge amount of pixels and are appropriate platforms for visualizing and manipulating a large amount of data [7, 8, 9]. Given the large room in front of them, they are also adapted to collaborative interaction [1, 3, 6].

However, ultra-walls are expensive, need large rooms, and are complex devices. For instance, a touch-sensitive $6\,m \times 2\,m$ ultra-wall at $60\,dpi$ with gestures tracking systems recently built in our lab cost of 300 k€. In addition, ultra-walls need large rooms, and given the number of pixels to be rendered, they should be driven by a cluster of workstations. For these reasons, these platforms, although powerful, can be very power-consuming and complex to maintain and program.

In comparison, a Virtual Reality (VR) setup with head-mounted displays (HMDs, Figure 1-(b)) is not too expensive (5 k€ for a 2 HMDs setup), does not need (necessarily) large rooms, are easy to maintain and relatively easy to program (*e.g.*, using Unity 3D). Moreover, several works suggest using VR HMDs for visualization and data analytics, in particular, in a collaborative context [2, 4, 5, 11].

The goal of the internship is to compare a wall display and VR setup with several HMDs in collaborative tasks. For this purpose, the work of the internship will be divided into three main tasks:

- Review the literature on collaborative work in the context of wall displays and virtual reality;
- design and implement an experiment, and in particular appropriate tasks, to compare a wall display and a VR setup;
- run the experiment and analyze the results.

The intern will use Unity3D [10] to develop the experimental software and existing infrastructure to run such an application on a wall display. Note that, depending on the intern's preference, the internship could either focus on the theories underlying the topic or the implementation issues (*e.g.*, building software running both on a wall display and VR HMDs). Contact me to discuss!

Requirements for Applicants: Human-Computer Interaction (Evaluation of Interactive Systems, Experimental Design and Analysis, Groupware and Collaborative Work), Virtual reality (Fundamentals of Virtual & Augmented Reality, Advanced Immersive Interactions), and some experience with Unity3D.

Duration and period: 6 months starting in March.

Location: Université Paris-Saclay, Bâtiment 660.

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