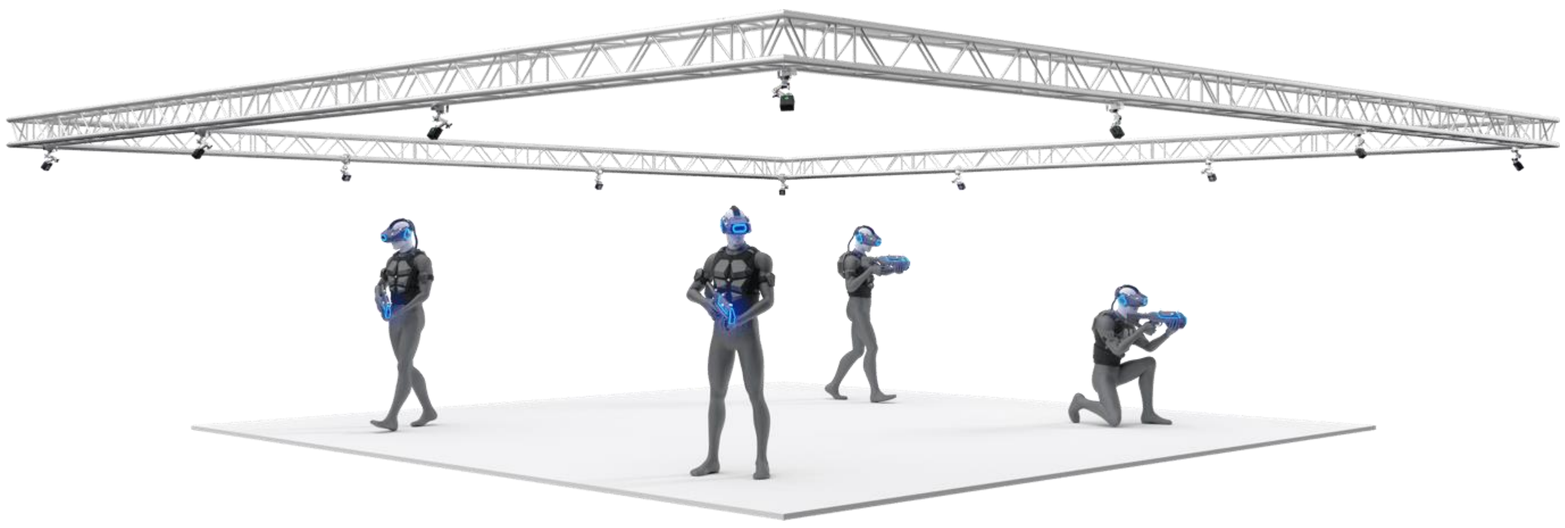
Topic: Creating a Heterogeneous Display Space for Mixed Reality

Project PRIM



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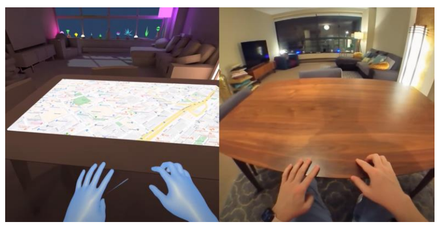
Description

Most of the current work in the field of Mixed Reality (Augmented Reality and Virtual Reality) is treating both technologies in an isolated way. They focus on either using only VR or only AR to interact or collaborate on a task. However, similar to our current workflow where we use different types of technologies to interact and collaborate (e.g., smartphone combined with a laptop and or a tablet), Mixed Reality technologies are mainly going to extend this workflow and not replace it.

Researchers in the field of HCI already started to explore potential ways of combining different types of display devices inside of one tracked space [1]. In the ShareVR project, researcher combined a VR HMD with a tracked display (simulating a phone) and a floor projection. This allows people that are not using a VR HMD to still be able to interact, collaboration and play with a VR user. Continuing this line of thought, we can see that a future interactive Mixed Reality space will be able to track the position of different display technologies (AR,VR, mobile…) and allow users to play and collaborate inside this space seamlessly.

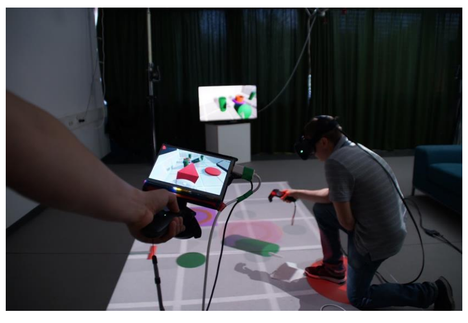
Examples/Sources:



https://www.youtube.com/watch?v=sv6T-tg6RL4

Goal

The goal of the project is to setup and develop this physical space that is able to track and combine different types of Mixed Reality display technologies (e.g. VR Headset, AR Headset) but also traditional displays (e.g., Tablet, Projector, Smartphone) inside of one Unity Scene. The students will have access to a specific room in the DIVA group at Telecom Paris which has all the necessary hardware to setup this environment (e.g. Truss structure, Prime 13 OptiTrack System, VR Headsets, AR Headsets Tablets and Phones). The first part of the project will be to setup and calibrate the OptiTrack system and then integrate its tracking data into a Unity project. The second part will focus on writing a multi-player Unity application, integrating all the different technologies into this scene and create a smart space that is able to track and display any content on any of these devices. In a last part, students will implement one short demo application (e.g., game or collaborative task) highlighting the ability of this new space.



https://www.youtube.com/watch?v=cQxArK3Bu9M

Prerequisite

- Object Oriented Programming (e.g. Java, C++, C#)
- Basic understanding of Computer Graphics
- Basic understanding of Human-Computer Interaction (HCI) Methods
- First experiences working with 3D Game Engines (e.g. Unity3D, UnrealEngine)

Acquired skills

- Being able to setup a state of the art motion tracking space using OptiTrack
- Being able to develop VR applications for the Oculus Quest in Unity3D
- Being able to develop AR applications for the HoloLense 2 in Unity3D
- Understanding the spatial paradigm behind Augmented and Virtual Reality

[1] Jan Gugenheimer, Evgeny Stemasov, Julian Frommel, and Enrico Rukzio. 2017. ShareVR: Enabling Co-Located Experiences for Virtual Reality between HMD and Non-HMD Users. In Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17). Association for Computing Machinery, New York, NY, USA, 4021–4033. DOI:https://doi.org/10.1145/3025453.3025683

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