Human Computer Interaction
Prof. Dr. Patrick Baudisch
Masterprojekt Sommersemester 2016

Virtual Reality: Haptic Squatting

Background

Modern virtual reality systems, such as the **HTC Vive** allow users to walk around freely in virtual experiences. As a consequence, the most expensive resource consumed by such systems is not the headset or graphics system anymore, but space itself. The key idea behind the haptic squatting project (squatting = “Hausbesetzung”) is not to rent such space in the form of large apartments or gyms, but to instead **use public spaces,** such as Potsdam Hauptbahnhof.

The software/hardware you are your team mates will write

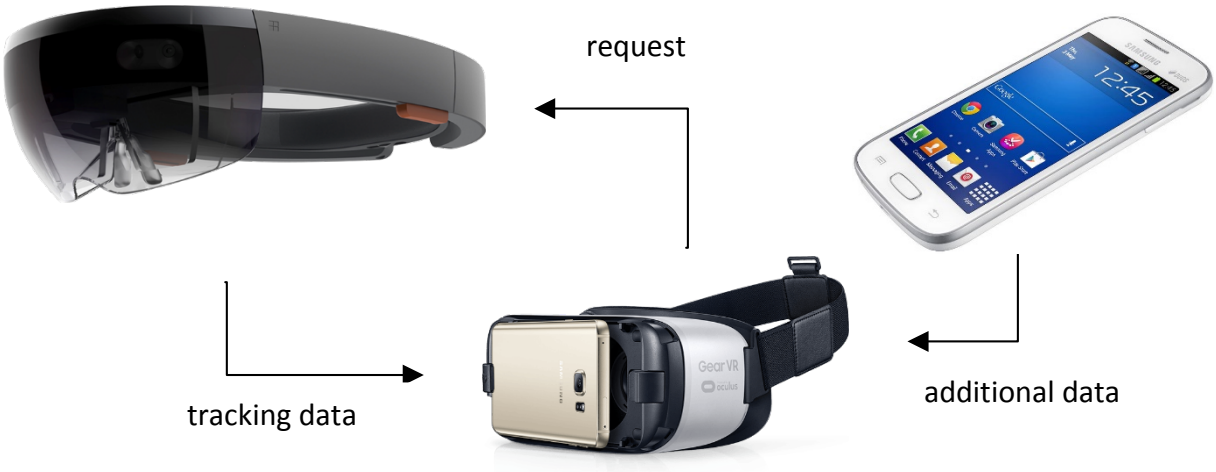
You will implement a hardware/software system that allows a VR experience to be played back in a crowded public space. Your main challenge will be to prevents users from accidentally bumping into stairs, escalators, or other people. Instead, you will integrate these elements into the experience in a meaningful way, so that physical stairs are located where users’ experiences also have stairs and where users bump into obstacles only where their experience says they will. Your system will cover the following functionality.

Offline tools:

1) **Survey the available space:** Digitize the map and map out the resources offered by the location, such as cold area, staircase, escalator, revolving doors, and moving walkways.
2) **Define the VR experiences in a modular format** for that it consists of tiles connected by generic paths.
3) **Re-layout the experience** so as to map to the available space.

And at runtime:

4) **Render the world** in Unity
5) **Track the user** inside the space. We will offer a Microsoft Hololens for that purpose.
6) **Track obstacles:** Track moving obstacles and integrate them into the experience.
7) **Sense collisions etc.** e.g., using accelerometers to sense how the user is affected by the environment.



You will use Windows Holographic (HoloLens) and Gear VR for VR in public spaces

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Objective: figure out how to use public spaces for Virtual Reality

Ideally, you have experience in **Unity3D development (C#),** in **3D computer graphics** and mobile VR setups, but you can also learn these on the project. If you had taken **HCI2** and enjoyed it, that would be nice, but is not mission critical.

To get you started, take a look at…

- Sra et al. 2016 – "Procedurally Generated Virtual Reality from 3D Reconstructed Physical Space"
- Vasylevska et al. 2013 – "Flexible Spaces: Dynamic Layout Generation for Infinite Walking in Virtual Environments"
- Quentin Stevens – "The Ludic City"

Contact

Come talk to us
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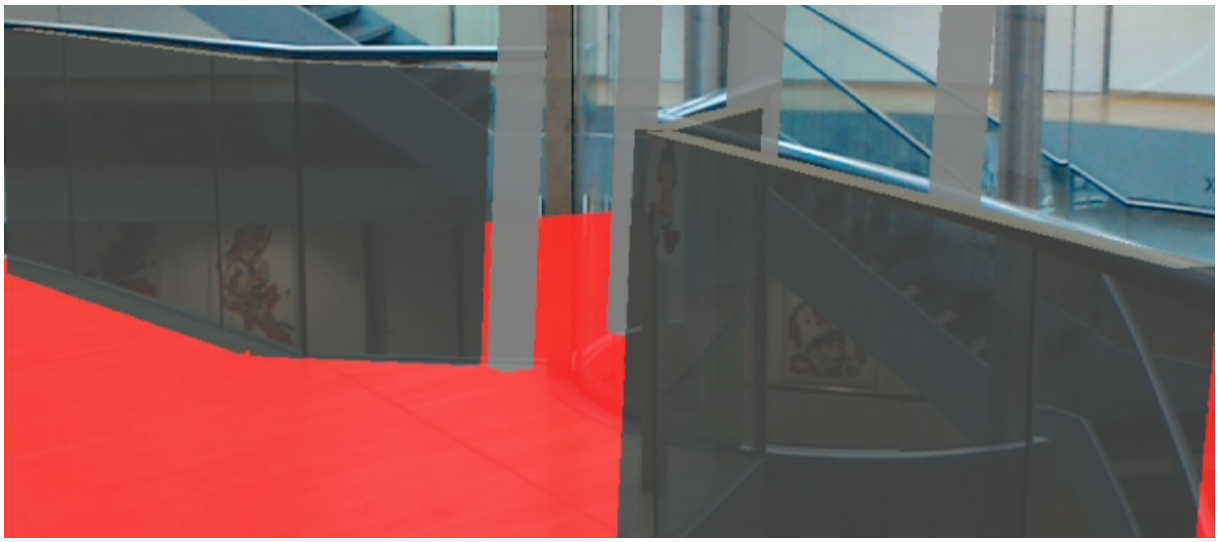

To get you started, we will provide you with a simple code base that registers space in the HPI main building