

Combining passive haptics and movement gain in Virtual Reality

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Context

One form of improving the feeling of connectedness between the virtual and real world in Virtual Reality is by using passive haptics surfaces, such as walls and tables. By calibrating the virtual surface in the same place as a virtual counterpart, the user is capable of feel as the virtual object as being real, as they can touch the object.

However, when a more dynamic scene with objects in multiple positions, to enable haptics in the virtual world, multiple physical objects need to be placed and properly calibrated. A way of overcoming this issue is by using perception manipulation, which rely on visual dominance to manipulate the surrounding virtual environment (VE). One of the main techniques is movement gain, which enables users' movements to be amplified for them to reach easily remote parts of the virtual scene. By combining passive haptics and movement gain, users may increase their reach with a single physical proxy and increasing presence with the virtual environment.

Goal

The goal of this project is to develop a novel way to use passive haptics surfaces in a Virtual Reality scene by using a combination of passive haptics and movement gain using a single proxy. The prototype needs to: 1) calibrate a physical object to match a virtual object; 2) apply movement gain to amplify users' movements 3) dynamically change the gain to match virtual objects in the 3d scene. The group may also implement a game that uses passive haptics and movement gain.

The minimal solution will provide an implementation that satisfies the above goals, but this is an open-ended project: there is plenty of room for creativity in orienting the design and exploring different ways to satisfy these goals. Each group will meet weekly with the project supervisor to collaboratively orient the direction of the project.

Pre-requisites:

- Basic implementation skills of Unity3D
- Basic understanding of user-centered design
- Experience with Virtual reality is desired but not essential.

Acquired Skills:

- A deep understanding of Virtual Reality technologies Implementation skills
- Application of HCI research methods to design.
- Outstanding projects may lead to a scientific publication.



Example of Movement gain in Virtual Reality, users reach for a surface located-within arm's reach, while their virtual hand is able to touch an object that is located in a distance two times bigger than they could reach.