IWF
Institut für Werkzeugmaschinen und Fertigung
Institute of Machine Tools and Manufacturing

Collision Feedback for Real Walking in Virtual Reality

Keywords: Virtual Reality, Real Walking, Actuators, Haptic Feedback

Overview

Studies have shown that real walking is the most natural navigation method for in large virtual environments. This means that a user wearing a head-mounted display can walk in the real world and his movements are tracked and translated to the virtual world he sees. However, at this point there is no haptic feedback and the user can simply pass through objects and walls.
In this thesis you will develop new feedback methods for collisions of the user's head with virtual objects to keep people from walking through things. Possible techniques could include just not letting the camera pass through the wall, fading the camera to black or using a vibration motor.
After implementing these techniques, they need to be evaluated in a user study to see which ones are accepted and understood by users .

Tasks

In a first part you will review the state of the art in collision feedback for virtual objects and select the most promising ones, that can be applied to real walking. Then you will implement the collision detection in the virtual environment and the selected feedback techniques. For the vibration feedback you also need to select the hardware, design an attachment for the head-mounted display and write the required software. In the last part you will conduct a user study, comparing the different feedback methods.

Work packages

•Get familiar with the state of the art of real walking in virtual environments

•Research and design collision feedback for real walking in virtual environments

•Build a haptic feedback device that can be attached to our head-mounted display

•Implement the developed feedback techniques

•Run an experiment comparing the techniques

Skills

•Experience with C++ or other object oriented programing languages

•Interest in Virtual Reality

•Experience with Unity3D is an advantage

Results

The results of this thesis have to be summarized in a written report and will be presented to the ICVR group in a 20 min talk.

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