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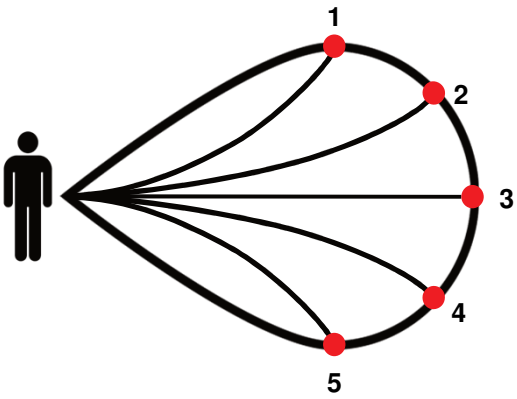
IWF
Institut für Werkzeugmaschinen und Fertigung
Institute of Machine Tools and Manufacturing

Adaptive Short-term Path Prediction for Spontaneous Human Locomotion

Keywords: Path Prediction, VR Locomotion, Virtual Environments

Overview

It was shown years ago that real walking is the best kind of locomotion for virtual reality applications to achieve a maximum immersive experience. Since moving your own body to move your virtual counterpart requires a large physical space, there have been algorithmic approaches which compress extensive virtual environments into small physical spaces (so-called Redirected Walking). These algorithms exploit limitations of the human sensory system and manipulate the translation of the motion between the real and the virtual world. In order to optimise this manipulation, it is beneficial to reliably predict, where a person would go in the near future. In a recent study, it was shown that a short-term path prediction is best approximated by using clothoid arcs which end on a drop-shaped contour.



In this thesis, you will implement this prediction and extend it to be real-time applicable to a person moving in a virtual environment.

Tasks

Your task is to research on Redirected Walking and general VR locomotion incl. human locomotion models. Then, you implement the earlier described prediction model and make it adaptable to a person's walking speed. Further, based on the layout of the virtual environment, you eliminate certain trajectories in case they end up in an inaccessible virtual location. For your evaluation, you design, implement and conduct a short user study, in which you prove your implementation's functionality and real-time capability.

You present your work in an intermediate and a final presentation to the ICVR lab. Finally, you summarise your results in a written report.

Workpackages

- Literature research on the state-of-the-art of Redirected Walking and general VR locomotion
- Implementation of the prediction model with adaptions to walking speed and virtual accessibility
- Design and Implementation of a user study
- Intermediate and final presentation
- Written report

Skills

- Programming skills, preferably in C#/C++
- VR and Unity experience is a plus
- Strong communication and interpersonal skills

Results

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

Contact

Christian Hirt, LEE L201 hirtc@ethz.ch
Andreas Kunz, LEE L208 kunz@iwf.mavt.ethz.ch

icvr
innovation center virtual reality