

February 20, 2019

INGENIEURPRAXIS

for

Student's name

Student ID 0815, Degree EI

Implementation of a dynamically changing virtual environment in CHAI3D

Problem description:

In recent years, various forms of assistive control have been introduced which mainly address a maximization of interaction performance in human-in-the-loop control approaches. Especially semi-autonomous control is highly beneficial in terms of performance as it reduces the cognitive and physical loads onto the user while local control problems can be solved without introducing a communication lag. From a user perspective, however, the introduction of semi-autonomous control reduces controllability of the system, which could lead to negative user experience. Evaluating the quality of this human-in-the-loop control requires a realistic environment which addresses both the visual and the haptic channel of the user.

The main objective of this work is to implement a driving scenario with a dynamically changing two-dimensional virtual environment in the haptic SDK CHAI3D (C++) which is linked to an actuated manipulandum as introduced in [1]. The environment shall be designed for experiments where visuo-tactile congruency and real-time capability is of high interest. Therefore, testing the delays of the whole system will be part of this project.

Work schedule:

- Developing a virtual environment in CHAI3D.
- Testing the delays of the system.
- Documentation of the application.

[1] L. Wei, Z. Najdovski, H. Zhou, S. Deshpande, and S. Nahavandi. Extending support to customised multi-point haptic devices in chai3d. In *2014 IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, pages 1864–1867, Oct 2014.

Supervisor: M. Sc. Jakob Fröhner
Start: 01.03.2019
Delivery: XX.XX.2019

(S. Hirche)
Univ.-Professor