Technology
Arts Sciences
TH Köln

Project Order

Interaction Lab

written by

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Interactive Systems in SS 2017

Supervisor:
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Institute for Media- and Phototechnology

Project Order of Interaction Lab

Project Manager: Vera Brockmeyer

Problem Analysis:

The demand for Virtual Reality (VR) devices and applications increased heavily since the first consumer devices like *HTC Vive* and *Oculus Rift* were released during last years. But the development of the first Head-Mounted-Display dates back to 1966 and was developed by Sutherland and Goertz.

One main difficulty of the current development of VR-applications is the lack of standardisation of the Software Development Kit (SDK) and interfaces. The most acknowledged suppliers *HTC* and *Oculus* do not work together or force standards for VR application development. Thus, all applications are system related and incompatible with other devices. Accordingly, each device offers different opportunities of interaction methods. These methods could be divided in the acknowledged categories selecting, grabbing, manipulating, movement and indirect controlling via widgets, gestures and voice input. Several suppliers currently offer different devices for interaction. And with focus on the grabbing and positioning methods, the most common are the *Oculus*-HMD, *HTC Vive*-HMD, *HTC Vive*-Controller, data gloves and motion capturing systems for hand-tracking like the *LeapMotion*-Controller.

Currently there exist no interaction laboratory that compares the different methods of interaction with objects, e.g. different methods for grabbing objects far away. Similar laboratories [1][3][2] exist where the user can experience virtual reality in different settings but the user can not compare different methods of interaction. This circumstance claims a virtual laboratory, where different interaction methods could be compared, demonstrated or tested in virtual test scenes. Thus, user friendly interaction methods which are not tiring and do not destroy the immersion could be improved by researcher. Another aspect of those methods is the increasing usability of VR applications and potential consumer will prefer devises with their implementation. Therefore, the profit of VR device suppliers will be squeezed.

Objective and Requirements:

A virtual interface laboratory is required for the development of an environment to test and compare interaction methods and to develop new ones. A further aspect of the laboratory is the use for teaching purposes or to give students a tool for the technical realisation of interaction studies in virtual (or augmented) reality environments. Thus, one task is to develop sophisticated test scenes for testing the interaction methods. These scenes should implement test exercises in different difficulty levels and represent typical and well-known environments like shops.

Solution Concept

The Agent provides a concept of an interaction laboratory for grabbing and positioning interactions at close or far range. It includes two test scenes, where the first is a

practise room, in which the users can get familiar with the interaction methods. The second scene is designed as a supermarket. This environment was chosen because it offers various possibilities of exercises under changing difficulties like grabbing small mushrooms, fetching distantly placed tins or putting goods into boxes or shelves. The exercises are offered in form of a shopping list that tells the participant what goods have to be grabbed and repositioned. These various shopping list are predefined and all goods have to put into a shopping basket, for example.

All rooms are implemented in Unity and the VR components are controlled by the same framework. Further, the *HTC Vive*-HMD and the corresponding controllers are used to run the interactions, imaging and orientation in the environment. It is planned to realise at least six interaction methods of grabbing and positioning. Additional, the complete framework should be compatible with new test scenes and other interaction categories.

Services

The agent is bound to deliver a scientific project documentation in English language. Each project member is called upon to write her own chapter about her contributions. This documentation will be handed in in form of a PDF file and in printed form twice.

A final project presentation is required in September or October. This presentation includes a 30 minutes talk, a live demonstration of the final result and a following discussion.

Furthermore the delivery of all resulting data files like the program code, content and artwork is required. This data has to be copied on a USB-Stick or in a cloud folder with appropriate access rights.

A brief project profile is inquired which includes a short description, two or more significant images and an optional video.

Budget:

Material	**Kosten in EUR**
HTV Vive, 2 light houses and 2 Vive Controller	900
Unity IDE	0
Steam	0
Visual Studio IDE	0
Computer for HTV Vive	1800
notebooks for each team member	private computer
Github Repository	0
Projectplace - Projectmanagement Web Application	0
Google Drive Folder (Memory Space in Cloud)	0
3D Object Assets of furniture and goods	0
Gesamt	2700

Boundary Conditions:

The first Prototype has to be presented on 01.06.2017 at 10:35 by the project manager. Furthermore, periodic meetings with the responsible professor are required and those have to be arranged via email during the lecture period of SS 2017. Unfortunately the facilities are only available at official business hours of the TH Cologne Building.

Appointments and Milestones

Completion of the Project Planning	24.04.2017
First Prototype - Paper Mockup	30.04.2017
Second Prototype	31.05.2017
Third Prototype	30.06.2017
Completion of the documentation and video	14.07.2017
Final Release	15.07.2017

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Date and Signature of Principal Date and Signature of Agent

References

[1] Jonathan Lin and Jürgen P Schulze. Towards naturally grabbing and moving objects in vr. *Electronic Imaging*, 2016(4):1–6, 2016.

[2] Steam. The Lab. http://store.steampowered.com/app/450390/. Visted: 28. March 2017.

[3] Technische Hochschule Chemnitz. Human-Machine Interaction Lab. https://www.tu-chemnitz.de/mb/ArbeitsWiss/forschung/labore/human_machine_interaction_lab. Visted: 28. March 2017.