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Avatars for Co-located Collaborations in HMD-based Virtual Environments

2019 | Konferenzveröffentlichung
IEEE VR 2019, 26th IEEE Conference on Virtual Reality and 3D User Interfaces, Osaka, March, 2019, S. 968-969
Herder, Jens; Brettschneider, Nico; de Mooij, Jeroen; Ryskeldiev, Bektur

Published:	2019
Weblink:	https://opus4.kobv.de/opus4-hs-duesseldorf/2139
Digital Object Identifier:	10.1109/VR.2019.8798132

Abstract

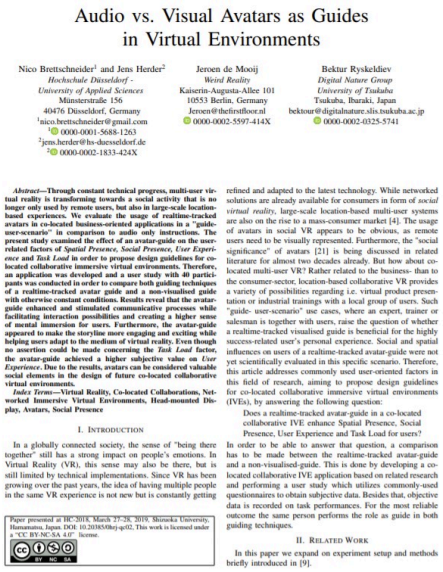
Multi-user virtual reality is transforming towards a social activity that is no longer only used by remote users, but also in large-scale location-based experiences. Usage of realtime-tracked avatars in co-located business-oriented applications with a ”guide-user-scenario” is examined for user-related factors of Spatial Presence, Social Presence, User Experience and Task Load. A user study was conducted in order to compare both techniques of a realtime-tracked avatar and a non-visualised guide. Results reveal that the avatar-guide enhanced and stimulated communicative processes while facilitating interaction possibilities and creating a higher sense of mental immersion for users and engagement.

Audio vs. Visual Avatars as Guides in Virtual Environments

2019 | Konferenzveröffentlichung

21th International Conference on Human and Computer, HC-2018, March 27–28, 2019, Shizuoka University, Hamamatsu, Japan., S. 9

Brettschneider, Nico; Herder, Jens; de Mooij, Jeroen; Ryskeldiev, Bektur



Audio vs. Visual Avatars as Guides in Virtual Environments

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***Abstract*—Through constant technical progress, multi-user virtual reality is transforming towards a social activity that is no longer only used by remote users, but also in large-scale location-based experiences. We evaluate the usage of realtime-tracked avatars in co-located business-oriented applications in a "guide-user-scenario" in comparison to audio only instructions. The present study examined the effect of an avatar-guide on the user-related factors of *Spatial Presence*, *Social Presence*, *User Experience* and *Task Load* in order to propose design guidelines for co-located collaborative immersive virtual environments. Therefore, an application was developed and a user study with 40 participants was conducted in order to compare both guiding techniques of a realtime-tracked avatar guide and a non-visualised guide with otherwise constant conditions. Results reveal that the avatar-guide enhanced and stimulated communicative processes while facilitating interaction possibilities and creating a higher sense of mental immersion for users. Furthermore, the avatar-guide appeared to make the storyline more engaging and exciting while helping users adapt to the medium of virtual reality. Even though no assertion could be made concerning the *Task Load* factor, the avatar-guide achieved a higher subjective value on *User Experience*. Due to the results, avatars can be considered valuable social elements in the design of future co-located collaborative virtual environments.**

***Index Terms*—Virtual Reality, Co-located Collaborations, Networked Immersive Virtual Environments, Head-mounted Display, Avatars, Social Presence**

I. Introduction

In a globally connected society, the sense of "being there together" still has a strong impact on people's emotions. In Virtual Reality (VR), this sense may also be there, but is still limited by technical implementations. Since VR has been growing over the past years, the idea of having multiple people in the same VR experience is not new but is constantly getting refined and adapted to the latest technology. While networked solutions are already available for consumers in form of *social virtual reality*, large-scale location-based multi-user systems are also on the rise to a mass-consumer market [4]. The usage of avatars in social VR appears to be obvious, as remote users need to be visually represented. Furthermore, the "social significance" of avatars [21] is being discussed in related literature for almost two decades already. But how about co-located multi-user VR? Rather related to the business- than to the consumer-sector, location-based collaborative VR provides a variety of possibilities regarding i.e. virtual product presentation or industrial trainings with a local group of users. Such "guide- user-scenario" use cases, where an expert, trainer or salesman is together with users, raise the question of whether a realtime-tracked visualised guide is beneficial for the highly success-related user's personal experience. Social and spatial influences on users of a realtime-tracked avatar-guide were not yet scientifically evaluated in this specific scenario. Therefore, this article addresses commonly used user-oriented factors in this field of research, aiming to propose design guidelines for co-located collaborative immersive virtual environments (IVEs), by answering the following question:

> Does a realtime-tracked avatar-guide in a co-located collaborative IVE enhance Spatial Presence, Social Presence, User Experience and Task Load for users?

In order to be able to answer that question, a comparison has to be made between the realtime-tracked avatar-guide and a non-visualised-guide. This is done by developing a co-located collaborative IVE application based on related research and performing a user study which utilizes commonly-used questionnaires to obtain subjective data. Besides that, objective data is recorded on task performances. For the most reliable outcome the same person performs the role as guide in both guiding techniques.

II. Related Work

In this paper we expand on experiment setup and methods briefly introduced in [9].

Paper presented at HC-2018, March 27-28, 2019, Shizuoka University, Hamamatsu, Japan. DOI: 10.20385/0hrj-qc02. This work is licensed under a "CC BY-NC-SA 4.0" license.

Published: 2019

Weblink: https://opus4.kobv.de/opus4-hs-duesseldorf/2385

Digital Object Identifier: 10.20385/0hrj-qc02

Abstract

Through constant technical progress, multi-user virtual reality is transforming towards a social activity that is no longer only used by remote users, but also in large-scale location-based experiences. We evaluate the usage of realtime-tracked avatars in co-located business-oriented applications in a "guide-user-scenario" in comparison to audio only instructions. The present study examined the effect of an avatar-guide on the user-related factors of Spatial Presence, Social Presence, User Experience and Task Load in order to propose design guidelines for co-located collaborative immersive virtual environments. Therefore, an application was developed and a user study with 40 participants was conducted in order to compare both guiding techniques of a realtime-tracked avatar guide and a non-visualised guide with otherwise constant conditions. Results reveal that the avatar-guide enhanced and stimulated communicative processes while facilitating interaction possibilities and creating a higher sense of mental immersion for users. Furthermore, the avatar-guide appeared to make the storyline more engaging and exciting while helping users adapt to the medium of virtual reality. Even though no assertion could be made concerning the Task Load factor, the avatar-guide achieved a higher subjective value on User Experience. Due to the results, avatars can be considered valuable social elements in

the design of future co-located collaborative virtual environments.

Mixed Reality Experience - How to Use a Virtual (TV) Studio for Demonstration of Virtual Reality Applications

2018 | Konferenzveröffentlichung

GRAPP 2018 - 13th International Conference on Computer Graphics Theory and Applications, S. 281-287

Herder, Jens; Ladwig, Philipp; Vermeegen, Kai; Hergert, Dennis; Busch, Florian; Klever, Kevin; Holthausen, Sebastian; Ryskeldiev, Bektur

Published: 2018

Weblink: https://opus4.kobv.de/opus4-hs-duesseldorf/1582

Digital Object Identifier: 10.5220/0006637502810287

Abstract

The article discusses the question of “How to convey the experience in a virtual environment to third parties?” and explains the different technical implementations which can be used for live streaming and recording of a mixed reality experience. The real-world applications of our approach include education, entertainment, e- sports, tutorials, and cinematic trailers, which can benefit from our research by finding a suitable solution for their needs. We explain and outline our Mixed Reality systems as well as discuss the experience of recorded demonstrations of different VR applications, including the need for calibrated camera lens parameters based on realtime encoder values.

Design and Virtual Studio Presentation of a Traditional Archery Simulator

2010 | Konferenzveröffentlichung

Proceedings of the Entertainment Interfaces Track 2010 at Interaktive Kulturen, Duisburg, Germany, September 12-15, 2010, S. 37-44

Geiger, Christian; Herder, Jens; Göbel, Sebastian; Heinze, Christin; Marinos, Dionysios

Published: 2010

Weblink: https://opus4.kobv.de/opus4-hs-duesseldorf/1615

Abstract

In this paper we describe the design of a virtual reality simulator for traditional intuitive archery. Traditional archers aim without a target figure. Good shooting results require an excellent body-eye coordination that allows the user to perform identical movements when drawing the bow. Our simulator provides a virtual archery experience and supports the user to learn and practice the motion sequence of traditional archery in a virtual environment. We use an infrared tracking system to capture the user’s movements in order to correct his movement. To provide a realistic haptic feedback a real bow is used as interaction device. Our system provides a believable user experience and supports the user to learn how to shoot in the traditional way. Following a user-centered iterative design approach we developed a number of prototypes and evaluated them for refinement in sequent iteration cycles. For illustration purposes we created a short video clip in our virtual studio about this project that presents the main ideas in an informative yet entertaining way.

Interaktive Echtzeit-3D-Visualisierung Webbasierte Darstellung: Mobilisierung und Homing von Blutstammzellen

2006 | Sammelbandbeitrag / Buchkapitel
Mensch and Computer 2006: Mensch und Computer im Struktur Wandel, S. 405-409
Herder, Jens; Kronenwett, Ralf; Lambertz, Simone; Kiefer, Georg; Freihoff, Johann

Published: 2006

Weblink: https://opus4.kobv.de/opus4-hs-duesseldorf/1673

Abstract

Die interaktive Echtzeit 3D-Visualisierung Mobilisierung und Homing von Blutstammzellen wurde konzipiert, um ein sehr komplexes medizinisches Wissen mit den Mitteln der 3-dimensionalen Visualisierung in Echtzeit und des Internets sowie der daraus resultierenden Interaktivität aufzubereiten. Dies musste auf einer Ebene geschehen, die es hinterher auch jedem Nicht-Mediziner erlaubt, die grundlegenden biologischen und medizinischen Sachverhalte nachzuvollziehen. Das Resultat: Eine informative und didaktische Anwendung, aus einer Mischung von interaktiven 3D-Stationen und erklärenden 3D-Animationen. Diskutiert werden die Methodik der Konzeptionsphase und die Interaktionstechniken.

Publikationen als Download [Stand: 15.01.2024]

herder@hs-duesseldorf.de, Zuletzt geändert am
15.01.2024 12:41