

Virtual and Augmented Reality in Everyday Context (VARECo)

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ABSTRACT

The application of immersive technology in everyday context, such as virtual or augmented reality systems, raises very specific requirements. In this workshop, we asked for submissions describing scientific work, which addresses concepts, developments, tools, and empirical investigations with the focus on this research area. We received 12 submission form which we accepted 11. The submissions address various aspects, such as interaction methods, applications, collaboration, and visualization.

KEYWORDS

virtual reality, augmented reality, mixed reality, 3D user interfaces, everyday context, human-computer interaction

1 INTRODUCTION

In the last decade, Virtual and Augmented Reality (VR/AR) hardware has entered the consumer market, which expands the potential use of VR and AR in everyday contexts, i.e., situations, environments or workflows that are part of everyday life. Examples may be the use of VR for data analysis as part of a data analyst's workflow or the use of AR for supporting spatially dispersed workers in, e.g., maintaining of technical systems. The introduction of VR and AR into the consumer market led to the situation that also smaller companies, educational institutions, and everyone interested can use this technology. While this expands the applicability of VR and AR in everyday settings, it also raises new challenges that

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need to be addressed in current and future research. The challenges are, e.g., long-term use, the integration of hard- and software into existing (work) spaces, or the need for flexible and cheap creation of content. To support research and development in this area of interest, we propose the second version of the workshop on VR and AR in Everyday Context (VARECo) bringing together interested researchers and practitioners to discuss current and future work in this research domain. The workshop is planned in conjunction with MuC 2019 in Hamburg.

This report is partially based on and taken from the report of the first edition of VARECo [1], which took place in Dresden in 2018 .

2 PROGRAM, TARGET AUDIENCE AND ORGANIZATION

The workshop is scheduled as a one-day workshop split into two parts. During the morning session, participants will be invited to orally present their research work and systems, based on peer-reviewed papers that were submitted prior to the workshop. During the talks, the organizers will take notes and classify these for the discussion and working groups planned for the afternoon session. All notes will first be discussed in the audience, such that they can be adapted and extended. The identified topics will be discussed in smaller breakout groups with the overall goal to characterize the research domain of VR/AR in an everyday context and to develop a design space for such systems, which also includes a set of overarching requirements. The latter is planned to be published in a common publication.

For the workshop papers, we invited potential participants to submit ongoing research and development work (explicitly including submissions from industry) as 4-6 pages papers, which address the overall topic of the workshop. Thus, the target audience comprises researchers as well as developers and practitioners from the industry who were

invited to submit and present their (accepted) papers, participate in the workshop and contribute to the working groups in the afternoon session. The workshop's web page (<http://sites.google.com/view/vareco>) offers more information on the topics of the workshop, the submission process (including deadlines), the program, the program committee, as well as information on the workshop organizers.

3 SUBMISSIONS AND REVIEW PROCESS

In addition to the website, the workshop was advertised via various channels, such as mailing lists as well as via the website of Mensch und Computer 2019. For the submission process, the organizers followed the published timeline, which included an extended paper submission, notification, and camera-ready deadline. The paper submission deadline was set to June 5, 2019 and extended for two weeks to June 21, 2019. Until June 21, we received 12 submissions in total, which all entered the reviewing process executed by the program committee of the workshop. Besides the organizers (authors of this report), the program committee consisted of the following persons:

- Christian Mai, LMU Munich
- Jan Gugenheimer, University Ulm
- Thomas Kosch, LMU Munich
- Alexander Ohlei, University of Lübeck
- Daniel Roth, University Würzburg
- Tim Weißker, Universität Weimar

We managed the reviewing process using ConfTool supported by MuC conference. For each paper, the reviewers submitted two reviews, which we distributed to the authors on time (with the notification deadline on July 5, 2019). Reviewers had to review 2-3 papers each.

From the original 12 submissions, we were able to accept 11 with minor revisions, while rejecting one submission. All accepted papers had to be resubmitted as camera-ready version through ConfTool until July 12, 2019. For the camera-ready version, we extended the possible size of the papers from 6 to 8 pages as it turned out during the reviewing process that various submissions would benefit from 2 additional pages, which enabled authors to address the reviewer comments appropriately.

4 SUBMISSION OVERVIEW

In this section, we give an overview of all submitted and finally accepted papers for presentation during the workshop in Hamburg. For this purpose, we grouped the submissions into topics. Topics are interaction, collaboration, visualization, and applications. For the full citations and the papers, please refer to the Mensch und Computer Workshop Proceedings accessible through the GI digital library.

Interaction Research

Functional Workspace for One-Handed Tap and Swipe Microgestures

Bastian Dewitz, Frank Steinicke, Christian Geiger

This paper presents the first insights into an investigation of the use of single-handed micro gestures for mobile devices. They argue that thumb interaction with index, ring, and middle finger is the most appropriate combination for input. In terms of a user study, they gathered empirical evidence to support this assertion.

VIGITIA: Unterstützung von alltäglichen Tätigkeiten an Tischen durch Projected AR

Raphael Wimmer, Florian Echlert

The authors present a project funded by the BMBF with the goal to investigate the influence and effect of using AR-based projection at an office desk. They plan a throughout investigation of the usage of the desk with the goal to identify the relation between desk usage and potential interactions used for AR. An additional goal is to investigate techniques and hardware components supporting the augmentation as well as the tracking of physical props.

Macht Teleportieren faul? Strategien zur Steigerung der natürlichen Fortbewegung in VR

Timo Mantei, Eike Langbehn

Teleportation is a widely used navigation technique in VR applications. The authors raise the question of whether the use of teleportation makes users lazy and thereby apply less physical walking, which is assumed as a much better navigation technique for short-range navigation. After presenting empirical evidence on this issue, they introduce various types of techniques compensating for emerging laziness. The latter has been investigated in a user study, which indicates the envisioned effect.

User acceptance of augmented reality glasses in comparison to other interaction methods for controlling a hand exoskeleton

Tobias Ableitner, Surjo Soekadar, Andreas Schilling, Christophe Strobbe1, Gottfried Zimmermann

This paper presents results addressing disabilities in hand movement after stroke. The authors discuss the use of a neural-guided hand exoskeleton, which has the potential to support such neuronal damages. However, these hardware systems may have implications on social acceptance. Thus, the authors investigated this aspect in a user study with 62 healthy subjects, which showed differences on social dependencies depending in the context of use.

Evaluierung der sozialen Akzeptanz verschiedener Interaktionsarten für Augmented-Reality-Datenbrillen

Nils Adrian Mack, Ludger Schmidt

In this paper, the authors discuss the potential impact of interaction techniques in AR on the social acceptance of AR glasses per se. As first results, they present and discuss the outcomes of a small user study with ten participants who had to interact using various types of interaction methods in differing context. The context here was defined as the audience present during the interaction. The major result is that audio input is affected by social context.

The AR-Marker in the Urban Space

Simon Nestler, Sebastian Pranz, Klaus Neuburg

This paper focuses on the application of AR in urban spaces. The challenge the authors address is the use of elements in this environment as AR markers. Beside supporting 6 DOF tracking, authors argue that such markers enable AR systems to guide users through urban environments. In the latter case, the marker's role in technical tracking decreases.

Applications

Supporting Musical Practice Sessions Through HMD-Based Augmented Reality

Karola Marky, Andreas Weiß, Thomas Kosch

In this paper, the authors present a concept to apply AR head-mounted displays to support musical practice. The major argument is that musical practice takes part mainly without the support of experts "right when they are needed". The work is planned to be based on a modular concept, which should support various types of assistance modes to make the help as adaptive as possible.

Adjusting AR-Workflows of Care Tasks: Experiences from an initial study

Marc Janssen, Michael Prilla

The use of AR technology in caregiving may have a high potential due to support caregivers in the execution of processes. In this context, processes need to be executed reliably but also need to offer some flexibility. The presented study investigates an AR-based system in terms of usability if used to support such processes in the wild.

Collaboration

Overview of Collaborative Virtual Environments using Augmented Reality

Nico Feld, Benjamin Weyers

This paper presents a design space focusing on the use of AR in collaboration. The authors highlight the use of various terms and come up with an structurization of various areas of use, in which AR as technology supports collaboration. The authors concluded that research on scenarios is missing, in which collaboration partners have similar roles.

Software Engineering for AR-Systems considering User-Centered Design Approaches

Thomas Schweiß, Lisa Thomaschewski, Annette Kluge, Benjamin Weyers

Software engineering techniques may not consider hardware aspects in the design process. In the case of AR, interaction techniques, as well as aspects emerging from the projection technique, have to be considered in the development process of the applications. Therefore, the authors present a user-centered engineering process to develop AR systems for everyday use. They show the feasibility of the developed method by means of a use case.

Interactive Visualization

Designing an Interactive Visualization for Coordinating Road Construction Sites in Virtual Reality

Manuela Uhr, Sina Haselmann, Lea Steep, Joschka Eikhoff, Frank Steinicke

This work presents an approach for a multi-level and 3D visualization prototype for road construction planning. Based on a prototype, the authors conducted a user study focusing on usability. The results show overall positive feedback also supported by an additional expert review.

5 CONCLUSION

In conclusion, the submitted papers present a wide range of topics considering the use of VR and AR technology in an everyday context, which will foster a lively discussion as well as the identification of new research directions in the field.

THE ORGANIZERS

Benjamin Weyers is currently Assistant Professor at the University of Trier and Head of the Human-Computer Interaction Group. He is interested in the development and research on interactive analysis methods for abstract and scientific data using immersive systems as well as the integration of VR and AR into everyday working scenarios.

Daniel Zielasko is currently a Ph.D. candidate at the Virtual Reality and Immersive Visualization group at RWTH Aachen University. There he worked on different interdisciplinary projects together with neuroscientists, such as the EU flagship project HBP (Human Brain Project) and the SMHB (Supercomputing and Modeling for the Human Brain). He received his Master degree in Computer Science in 2013 at RWTH Aachen University and is now working on the integration of VR technologies and methods into existing analysis workflows. He has a special interest in the prevention of cybersickness and the design of convincing and innovative 3D user interfaces.

Alexander Kulik is a postdoctoral researcher with the Virtual Reality and Visualization Research Group at Bauhaus-Universität Weimar. Before his PhD research on collaborative 3D user interfaces, he studied industrial design. He is enthusiastic about user interfaces that leverage our cognitive, manual, and social skills for expressive interactions. His current research focuses on interactive systems for bimanual and social cooperation.

Eike Langbehn is a doctoral candidate and research associate at the Human-Computer Interaction group at the University of Hamburg since January 2015. His research is focused on locomotion and interaction in virtual reality. Particularly, he investigates spatial perception as well as exploits perceptual limitations and illusions for “redirected

walking” techniques with the goal to enable natural walking in a room-scale virtual reality setup.

Markus Funk is Senior User Experience Researcher at Nuance Communications. Before, he was a post-doctoral Human-Computer Interaction researcher and area head at the Technical University of Darmstadt. He is an expert in Augmented Reality, Virtual Reality, and Human-Drone Interaction. Markus is interested in using Virtual Reality for education and is further researching how Virtual Reality can be made more immersive by using haptic feedback.

REFERENCES

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