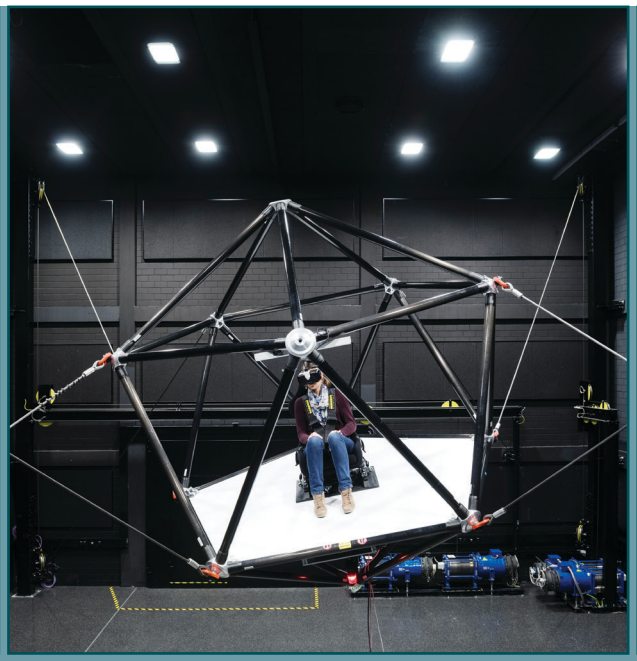
IEEE VR 2018 REUTLINGEN



In Cooperation with the German Association for Electrical, Electronic and Information Technologies: VDE

VDE ITG

IEEE

IEEE computer society

IEEE vgtc

WELCOME TO VR 2018!

It is our great pleasure to welcome you to the 25th IEEE Conference on Virtual Reality and 3D User Interfaces (IEEE VR), the premiere international conference focused on research in these domains! This year the name of the conference changed since the highly successful 12-year IEEE Symposium on 3D User Interfaces is brought back into the main VR conference. It is a tremendous honor to host the conference in Reutlingen on its first return to Germany since 2005. Reutlingen is situated nicely with respect to our research institutes, the city has the charm of a southern German town, and the recently built (2013) Stadthalle and concert venue has a professional team that is experienced in conferences highlighting innovation in technology. This venue has enabled us to create a large program both in scientific content and in terms of demonstration and exhibit space.

Reflecting the increasing interest and significance of research in virtual reality and 3D user interfaces, the conference once again received a record number of submissions this year. A total of 178 submissions were submitted to the Journal Paper track from which 29 were accepted as articles to *IEEE Transactions on Visualization and Computer Graphics* (*TVCG*) resulting in an acceptance rate of 16.3%. All of these will be presented at the IEEE VR 2018 conference, along with 6 additional invited papers that were published in *IEEE TVCG* during the past year. An additional six submissions (3.4%) were recommended for a regular issue of *TVCG* as major revisions with reviewer continuity. A total of 316 submissions were submitted to the Conference Paper track (72 were resubmissions from the Journal Paper track) from which 65 were accepted as conference papers resulting in an acceptance rate of 20.6%. All of these will be presented at the IEEE VR 2018 conference. Considering both the Journal and Conference Paper track and excluding re-submissions we have an acceptance rate of 22.3%.

In addition to the research papers, the conference will feature a variety of thought-provoking presentations, demonstrations, and technical content. We continue the tradition of having a Doctoral Consortium on the first two days of the conference. On Sunday and Monday, we have a total of 6 Tutorials and 11 Workshops. Workshops and Tutorials will be running in parallel such that attendees can decide between five to six options at all times. For the main VR conference, a total of 124 Posters and 21 Research Demonstrations will have three days of public, unsupervised viewing, plus two sessions when attendees will be able to contact and discuss with authors. Two fast forward sessions are scheduled in order to show all attendees what posters have to offer. The conference will feature four expert-led Panels on engaging topics, including Virtual Reality for interdisciplinary applications, Social Mixed Reality, VR/AR in support of application domains, and the future impact of neuroscience and cognitive psychology on virtual environments. We are also happy to announce that the Video showcase will have 14 videos (360 and standard) and along with the supplemental material from the technical papers will be on display throughout the conference. The 3DUI contest is now part of the main VR conference and will be highlighted with a public tournament just before the Banquet.

We are extremely pleased to welcome four distinguished speakers for the keynote talks. Albert "Skip" Rizzo from USC is a world-renown expert in the use of virtual reality for therapy and has been promoting VR4Good. As a director at the Max Planck Institute for Intelligent Systems, Katherine J. Kuchenbecker leads an interdisciplinary team that invents compelling haptic interfaces for touching virtual and remote environments, studies human haptic interaction, and endows autonomous robots with an astute sense of touch. Oliver Riedel from the University of Stuttgart is a pioneer in virtual prototyping and has been invited to give a look back on 25 years of VR in Industry. Helmut Hobmaier from Audi AG has over 30 years experience with virtual and physical prototyping and visualization and will talk about their use in the automotive industry. Finally we have an Invited Technical Talk this year from Robert Menzel, NVIDIA.

This year, as of the early-bird registration date, we have 13 Exhibitors & Sponsors who will be highlighted both during the Exhibitors Lunch as well as before the banquet Wednesday evening. We have two gold sponsors: VICON and Digital Projection, one silver sponsors: ART and eight bronze: Haption, MiddleVR, VR-ON, VISCON, BARCO, WorldViz and Disney Research. Finally, we have one non-profit sponsor, namely the Computer Network Information Center: Chinese Academy of Sciences, and one Research Demo sponsor, KUKA.

For many of us, IEEE VR is the annual social gathering among colleagues and friends in this research community. This year's conference shifted its starting date to Sunday and the first night will be free for people to meet in smaller groups for dinner. On Monday and Tuesday evenings attendees will be transported to the nearby Max Planck Institute for Biological Cybernetics one night, and the Fraunhofer IAO Institute the other night for lab tours, research demonstrations, and receptions. Finally, we continue the tradition of a conference banquet on Wednesday evening highlighting one of our keynote talks, award announcements from the IEEE Visualization and Graphics Technical Committee (VGTC) and the best dissertation award.

This conference was made possible through the tireless efforts of numerous volunteers. Our organizational team is in total 60 members. 90 individuals served on the International Program Committee and International Conference Paper Committee, where many of them served on both committees which resulted in weeks of reviewing numerous papers. We would like to express our sincere gratitude to all who served on the VR 2018 organizing committees, steering committee, and international program committees, as well as to all reviewers of the program content. In particular, we would like to recognize the Paper Program Chairs: Kiyoshi Kiyokawa, Frank Steinicke, Bruce Thomas, Greg Welch and the Conference Paper Program Chairs: Robert J. Teather, Maud Marchal and Takuji Narumi who had an extremely challenging task of managing the large number of submissions and selecting this year's papers. The smooth operation of the conference is made possible with the assistance of over 30 student volunteers; we commend them for their efforts. We would like to express a very special thank you to Meghan Haley for coordinating the paper publishing process, digital content and preparing the program as well as to Michelle Ocampo who served as our Conference Planner from IEEE Computer Society. We are happy to have a cooperation with the German Association for Electrical, Electronic and Information Technologies (VDE ITG) and specifically grateful to Christian Gross, Gueorgui Markov, and Hatice Altintas for their support and excellence in event management. A special thank you to Beate Fülle and Stephanie Bertenbreiter for their expertise in conference management, press relations, and overall efforts as local arrangement chairs. Finally, a special thank you to steering committee member Bernd Fröhlich who provided crucial support and advice with regard to organizing this conference in Germany.

We would also like to acknowledge the support from IEEE, the IEEE Computer Society, the Max Planck Institute for Biological Cybernetics, the Fraunhofer Institute for Industrial Engineering, and our sponsors. Finally, we are grateful to everyone who is attending and actively participating in the conference. We hope that you will find VR 2018 to be engaging, insightful, informative, and, last but not least a fun conference for all!

VR 2018 General Chairs

Betty Mohler, *Max Planck Institute for Biological Cybernetics, Germany*
Torsten W. Kuhlen, *RWTH Aachen University, Germany*
Matthias Bues, *Fraunhofer IAO Stuttgart, Germany*
Evan Suma Rosenberg, *University of Southern California, USA*
[Honorary] Martin Göbel, *FH Bonn-Rhein-Sieg, Germany*





AT-A-GLANCE

Sunday

Workshops & Tutorials

Kleiner Saal A (3rd Floor)
- **Workshop** | BCNAE: Body Consciousness in Natural and Artificial Environments
- LUNCH BREAK
- **Tutorial** | (Haptics) Tangibles within VR

Kleiner Saal B (3rd Floor)
- **Workshop** | VAR4Good: Virtual and Augmented Reality for Good

Kleiner Saal C (3rd Floor)
- **Workshop** | WEVR: Workshop on Everyday Virtual Reality

Kleiner Saal D (3rd Floor)
- **Workshop** | Sonic Interactions for Virtual Environments (SIVE)

Right Foyer (3rd Floor)
- **Tutorial** | (Statistics) The Replication Crisis in Empirical Science
- LUNCH BREAK

Room 1 (1st Floor)
- **Tutorial** | (Displays) Cutting-edge VR/AR Display Technologies (Gaze-, Accommodation-, Motion-aware and HDR-enabled)

DC

Room 2 (1st Floor)
- Doctoral Consortium
- Doctoral Reception

Monday

Workshops & Tutorials

Kleiner Saal A (3rd Floor)
- **Workshop** | KELVAR: K-12+ Embodied Learning through Virtual & Augmented Reality

Kleiner Saal B (3rd Floor)
- **Workshop** | ANIVAE: Animation in Virtual and Augmented Environments
- LUNCH BREAK
- **Workshop** | Virtual Humans and Crowds in Immersive Environments (VHCIE)

Kleiner Saal C (3rd Floor)
- **Workshop** | 3DCVE: Fourth IEEE VR International Workshop on 3D Collaborative Virtual Environments

Kleiner Saal D (3rd Floor)
- **Workshop** | Software Engineering and Architectures for Realtime Interactive Systems (SEARIS)

Right Foyer (3rd Floor)
- **Tutorial** | (Navigation) Navigation Interfaces for VR and Gaming: Theory and Practice
- LUNCH BREAK
- **Tutorial** | (Web3D) Web3D Quickstart

Room 1 (1st Floor)
- **Tutorial** | (Calibration) Calibration Methods for Optical See-Through Head-Mounted Displays
- **Workshop** | HAPTICS: Wearable and portable haptics for VR and AR

DC

Room 2 (1st Floor)
- Doctoral Consortium

Meet for transportation to Institute Visits
(Foyer at the main entrance; *5:00–5:15 PM)*

Coach buses to Tuebingen OR Stuttgart
(Stadthalle; 5:15–6:00 PM)

Institute Visit: Max Planck Institute for Bio. Cyb. in Tuebingen OR
Fraunhofer Institute IAO in Stuttgart
(6:00–10:00 PM)

Coach buses will return to Reutlingen Stadthalle as they fill up with attendees
(8.30–11:00 PM)

09:00 AM
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7:00 PM

Tuesday

VR | Grosser Saal (entrance & 1st Floor) | Kleiner Saal A (3rd Floor) | Kleiner Saal B (3rd Floor) | Entrance Foyer & 1st Floor | Rooms 2nd Floor | Rooms 1, 2 & 3 (1st Floor) | Grosser Saal (1st Floor)

Welcome
(Grosser Saal, Entrance & 1st Floor)

Keynote Speaker by Albert "Skip" Rizzo

Research Demo Fast Forward *(10:00–10:15 AM)*

BREAK

Session 1: Avatars and Virtual Humans | Session 2: Augmented Reality | Session 3: Body and Mind

LUNCH BREAK

Fast-forward Posters A | Session 4: Active Haptics | Panel 1: VR for Interdisciplinary Applications

BREAK

Session 5: Cybersickness | Session 6: Locomotion & Walking | Session 7: 3D hand Interaction and Physics

Exhibits | Research Demos & Videos | 3DUI Contest | Posters *(Quiet Viewing)*

Meet for transportation to Institute Visits
(Foyer at the main entrance, 5:30–5:45 PM)

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Wednesday

VR | Grosser Saal (entrance & 1st Floor) | Kleiner Saal A (3rd Floor) | Kleiner Saal B (3rd Floor) | Entrance Foyer & 1st Floor | Rooms 2nd Floor | Rooms 1, 2 & 3 (1st Floor) | Grosser Saal (1st Floor)

Session 8: Social VR | Session 9: Rendering | Session 10: Multimodality

BREAK

Session 11: Immersion & Embodiment | Session 12: Training | Panel 2: How should social virtual reality work?

LUNCH BREAK

Fast-Forward Posters B | Session 13: Redirected Walking | Panel 3: Getting close to domain users

BREAK

Exhibits | Research Demos & Videos | 3DUI Contest | Posters *(Quiet Viewing)*

Keynote by Katherine J. Kuchenbecker
(Grosser Saal, Entrance & 1st Floor)

Champagne, Exhibits & 3DUI Contest Tournament
(1st floor)
and
Research Demos
(2nd floor)

Main Banquet, VGTC Award Announcements, 3DUI Contest Awards, and
Keynote by Oliver Riedel
(Grosser Saal, Entrance & 1st Floor, 7:15–11:30 PM)

Karaoke (Entrance Foyer, 9:30–11:30 PM)

09:00 AM
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Thursday

VR

	Grosser Saal (entrance & 1st Floor)	Kleiner Saal A (3rd Floor)	Kleiner Saal B (3rd Floor)	Entrance Foyer & 1st Floor	Rooms 2nd Floor	Rooms 1, 2 & 3 (1st Floor)	Grosser Saal (1st Floor)
09:00 AM	Invited Talk & Session 14: Applications	Session 15: Navigation	Session 16: Passive Haptics	Exhibits	Research Demos & Videos	3DUI Contest	Posters *(Quiet Viewing)*
09:30 AM							
10:00 AM							
	BREAK						
10:30 AM	Session 17: Selection and Pointing	Session 18: Hardware & Tracking	Panel 4: The Future Impact of Neuro & Soc Psych				
11:00 AM							
11:30 AM							
12:00 PM							
12:30 PM							
	LUNCH BREAK						
1:00 PM							
1:30 PM							
2:00 PM	Session 19: 360° and Panoramic Videos	Session 20: Learning and Educational VR	Session 21: Visual Perception				
2:30 PM							
3:00 PM							
	BREAK						
3:30 PM	Keynote by Helmut Hobmaier *(Grosser Saal, Entrance & 1st Floor)*						
4:00 PM							
4:30 PM	Closing Remarks, Awards & IEEE VR 2019 Announcement *(Grosser Saal, Entrance & 1st Floor)*						
5:00 PM							

TOC

COMMITTEE MEMBERS

CONFERENCE COMMITTEE

General Chairs

Betty Mohler
Technical University Darmstadt (TU Darmstadt), Germany

Torsten W. Kuhlen
RWTH Aachen University, Germany

Matthias Bues
Fraunhofer IAO Stuttgart, Germany

Evan Suma Rosenberg
University of Southern California, USA

Honorary: Martin Göbel
Bonn-Rhein-Sieg University of Applied Sciences, Germany

Program Chairs

Kiyoshi Kiyokawa
Nara Institute of Science and Technology, Japan

Frank Steinicke
University of Hamburg, Germany

Bruce Thomas
University of South Australia in Adelaide, Australia

Greg Welch
University of Central Florida, USA

Conference Paper Program Chairs

Robert J. Teather
Carleton University, Canada

Maud Marchal
IRISA-INSA Rennes, France

Takuji Narumi
University of Tokyo, Japan

3DUI Contest Chairs

Ryan P. McMahan
University of Texas at Dallas, USA

Rongkai Guo
Kennesaw State University, USA

Benjamin Weyers
RWTH Aachen University, Germany

Doctoral Consortium Chairs

Aleshia Hayes
Indiana Purdue Fort Wayne, USA

Gerd Bruder
University of Central Florida, USA

Pete Willemsen
University of Minnesota Duluth, USA

Tonja Machulla
University of Stuttgart, Germany

Exhibits Chairs

Uwe Kloos
Reutlingen University of Applied Sciences, Germany

David Krum
University of Southern California, USA

Jerome Perret
Haption, France

Stefan Landvogt
Microsoft Corporation, USA

Tobias Meilinger
Max Planck Institute for Biological Cybernetics, Germany

Christoph Runde
VDC Fellbach, Germany

Local Arrangements Chair

Beate Fuelle
Max Planck Institute for Biological Cybernetics, Germany

Stephanie Bertenbreiter
Max Planck Institute for Biological Cybernetics, Germany

Panels Chairs

Mary Whitton
University of North Carolina at Chapel Hill, USA

Betsy Sanders
Rhodes College, USA

Marc Latoschik
Würzburg University, Germany

Suzanne Nooij
Max Planck Institute for Biological Cybernetics, Germany

Posters Chairs

Pablo Figueroa
Universidad de los Andes, Colombia

Gabriel Zachmann
Bremen University, Germany

Xubo Yang
Shanghai Jiao Tong University, China

Publication Chairs

Scott Kuhl
Technical University of Michigan, USA

Daisuke Iwai
Osaka University, Japan

Publicity Chairs

Mirabelle D'Cruz
University of Nottingham, UK

Maki Sugimoto
Keio University, Japan

Bobby Bodenheimer
Vanderbilt University, USA

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University of Texas at San Antonio, USA

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Christoph Borst
University of Louisiana at Lafayette, USA

Jens Grubert
Coburg University of Applied Sciences, Germany

André Hinkenjann
Bonn-Rhein-Sieg University of Applied Sciences, Germany

Patrick Bourdot
LIMSI-CNRS, France

Stephan de la Rosa
Max Planck Institute for Biological Cybernetics, Germany

Student Volunteers Chairs

Johannes Lohmann
University of Tuebingen, Germany

Cristóbal Curio
Reutlingen University of Applied Sciences, Germany

Mari Kyle
University of Southern California, USA

Tutorials Chairs

Benjamin Weyers
RWTH Aachen University, Germany

Rongkai Guo
Kennesaw State University, USA

Tabitha Peck
Davidson College, USA

Anatole Lécuyer
Inria/IRISA Rennes, France

Videos Chairs

J. Adam Jones
University of Mississippi, USA

Regis Kopper
Duke University, USA

Volker Kuchelmeister
University of New South Wales, Australia

Web Chairs

Kyle Johnsen
University of Georgia, USA

Ryan Spicer
University of Southern California, USA

Ayush Bhargava
Clemson University, USA

Kevin Ponto
University of Wisconsin-Madison, USA

Workshops Chairs

Jian Chen
Ohio State University, USA

Ferran Argelaguet
Inria Rennes, France

Tom Vierjahn
RWTH Aachen University, Germany

Katerina Mania
Technical University of Crete, Greece

Alexander Kulik
Bauhaus University Weimar, Germany

STEERING COMMITTEE

Mark Billinghurst
University of South Australia in Adelaide, Australia

Doug Bowman
Virginia Tech, USA

Bernd Fröhlich
Bauhaus-Universitaet Weimar, Germany

Victoria Interrante
University of Minnesota, USA

Kiyoshi Kiyokawa
Nara Institute of Science and Technology (NAIST), Japan

Gudrun Klinker
Technical University of Munich, Germany

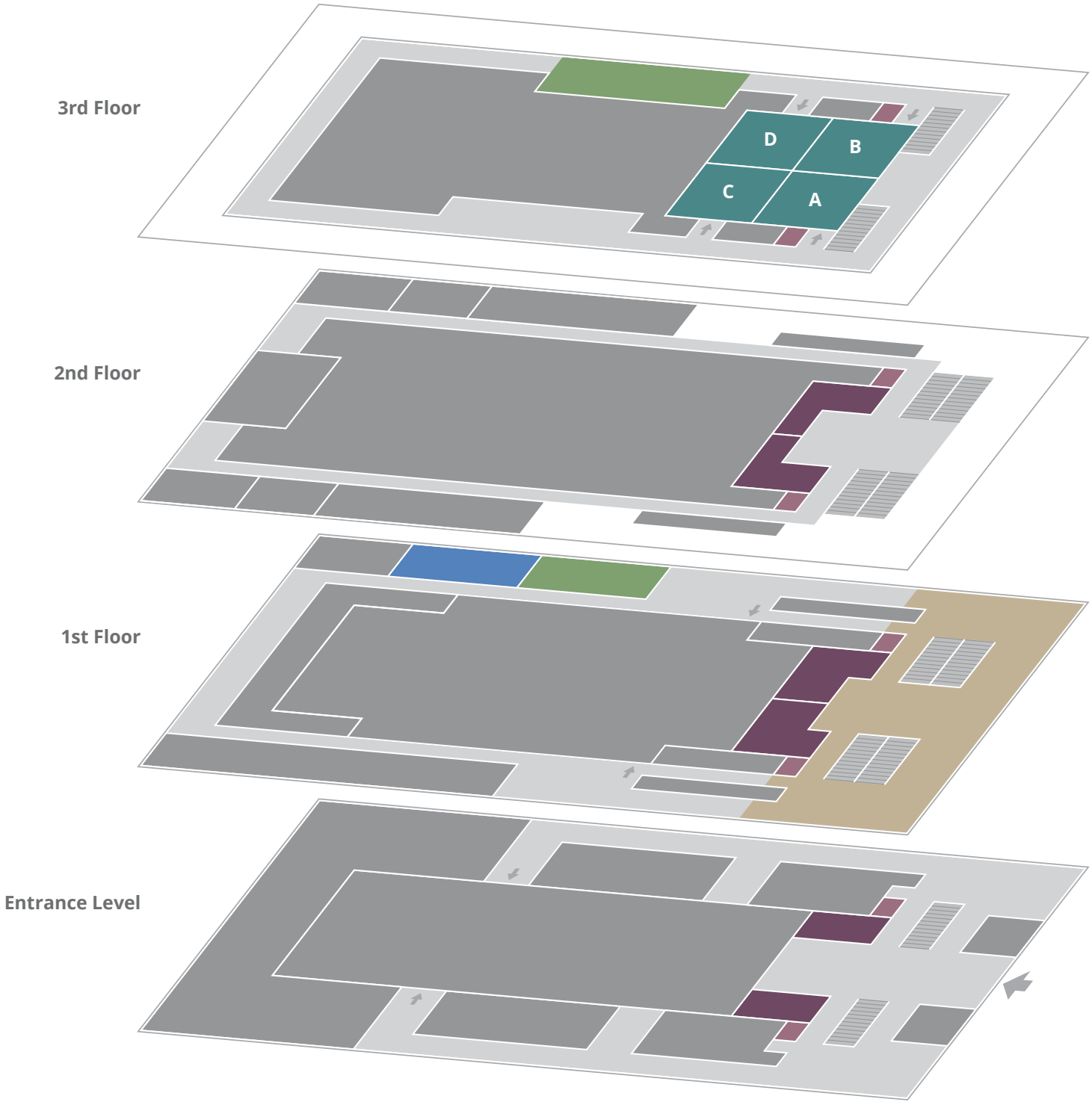
Mark Livingston
Naval Research Laboratory, USA

Benjamin Lok
University of Florida, USA

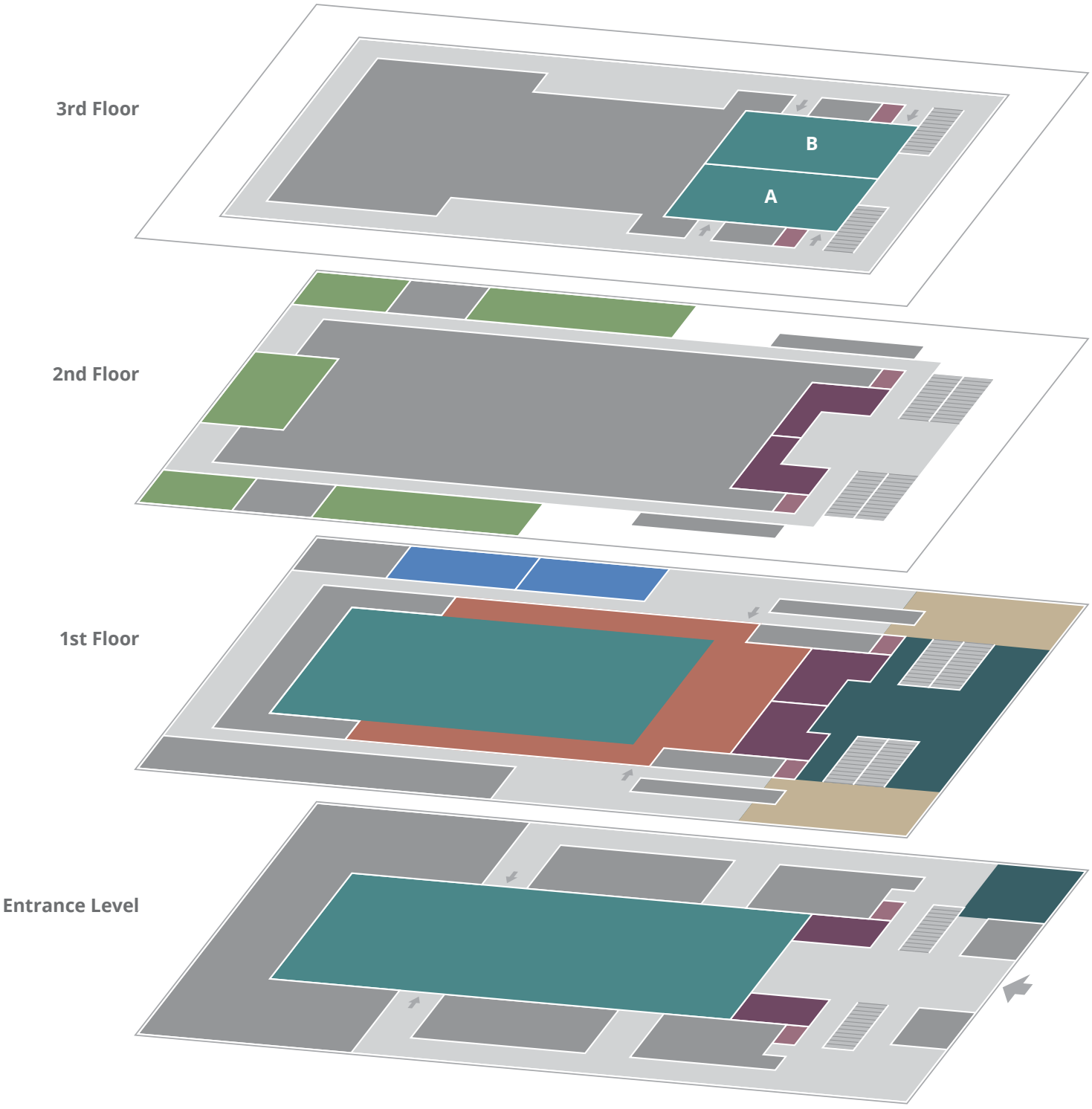
Anthony Steed
University College London, UK

VENUE MAP

Sunday and Monday



Tuesday—Thursday



PROGRAM DETAILS

SUNDAY, 18 MARCH

8:00–9:00 AM

2nd Floor

Registration

12:00–1.30 PM

Self-organized

Lunch Break

In Reutlingen City or food is available for purchase at Stadthalle bars and foodstations.

3:30–4.00 PM

Foyer 1st Floor

Coffee Break

WORKSHOPS | HALF DAY

9:00 AM–12:00 PM

Kleiner Saal A (3rd Floor)

BCNAE: Body Consciousness in Natural and Artificial Environments

Organisers: Irini Giannopulu, Haruo Mizutani

Body consciousness (BC) is a particular knowledge which allows us to be informed of the existence of our body parts, our volume, our postures and movements and our limits in the 3D space. BC is gradually developing via multi-sensory information (visual, vestibular, somatosensory, proprioceptive) from the beginning of life.

We aim to bring together neuroscientists, psychologists, engineers, computer scientists, artists and roboticians, to explore body consciousness in natural environments via fundamental studies and in artificial environments via virtual/ augmented/mixed reality and/or robots. Topics include but are not limited to: Body/postural development; spatial navigation (earth vs air); visuo-vestibular and proprioceptive interactions; immersion (virtual/mixed/augmented reality); virtual art installation.

WORKSHOPS | FULL DAY

9:00 AM–5:30 PM

Kleiner Saal B (3rd Floor)

VAR4Good: Virtual and Augmented Reality for Good

Organizers: Gregory Welch, Bruce Thomas, Mark Billinghurst, Arindam Dey

This workshop will bring together researchers, developers, and industry partners in presenting and promoting research that intends to solve a real-world problem using VR/AR. It will provide a platform to discuss challenges and opportunities to use VR/AR to help humankind and society in more impactful ways. This will help grow a community to create Virtual and Augmented Reality for Good (VAR4Good).

9:00 AM–5:30 PM

Kleiner Saal C (3rd Floor)

WEVR: Workshop on Everyday Virtual Reality

Organizers: Adalberto Simeone, Wendy Powell, Vaughan Powell, Kyle Johnsen, Svetlana Bialkova

The commercial release of consumer grade VR HMDs has allowed a wider user base to experience VR in everyday environments such as their own home or office. These environments pose different challenges than those encountered in conventional laboratories. The Workshop on Everyday VR focuses on the investigation of well-known VR research themes in all those contexts and scenarios not exclusively pertaining to research laboratories and specialist environments.

9:00 AM–5:30 PM

Kleiner Saal D (3rd Floor)

Sonic Interactions for Virtual Environments (SIVE)

Organizers: Michele Geronazzo, Stefania Serafin, Cumhur Erkut, Niels Christian Nilsson, Francesco Grani, Federico Avanzini

Sonic interaction design is defined as the study and exploitation of sound as one of the principal channels conveying information, meaning, and aesthetic/ emotional qualities in interactive contexts. This field lies at the intersection of interaction design and sound and music computing. In the virtual reality community, the focus on research in topics related to auditory feedback has been rather limited when compared, for example, to the focus placed on visual feedback or even on haptic feedback. The main goal of this workshop is to increase among the VR community the awareness of the importance of sonic elements when designing virtual/augmented/mixed reality (VR/AR/MR) environments. We will also discuss how research in other related fields such as film sound theory, product sound design, sound and music computing, game sound design and computer music can inform designers of VR/AR/MR environments. Moreover, the workshop will feature state of the art research on the field of sound for VR/AR/MR environments.

TUTORIALS | FULL DAY

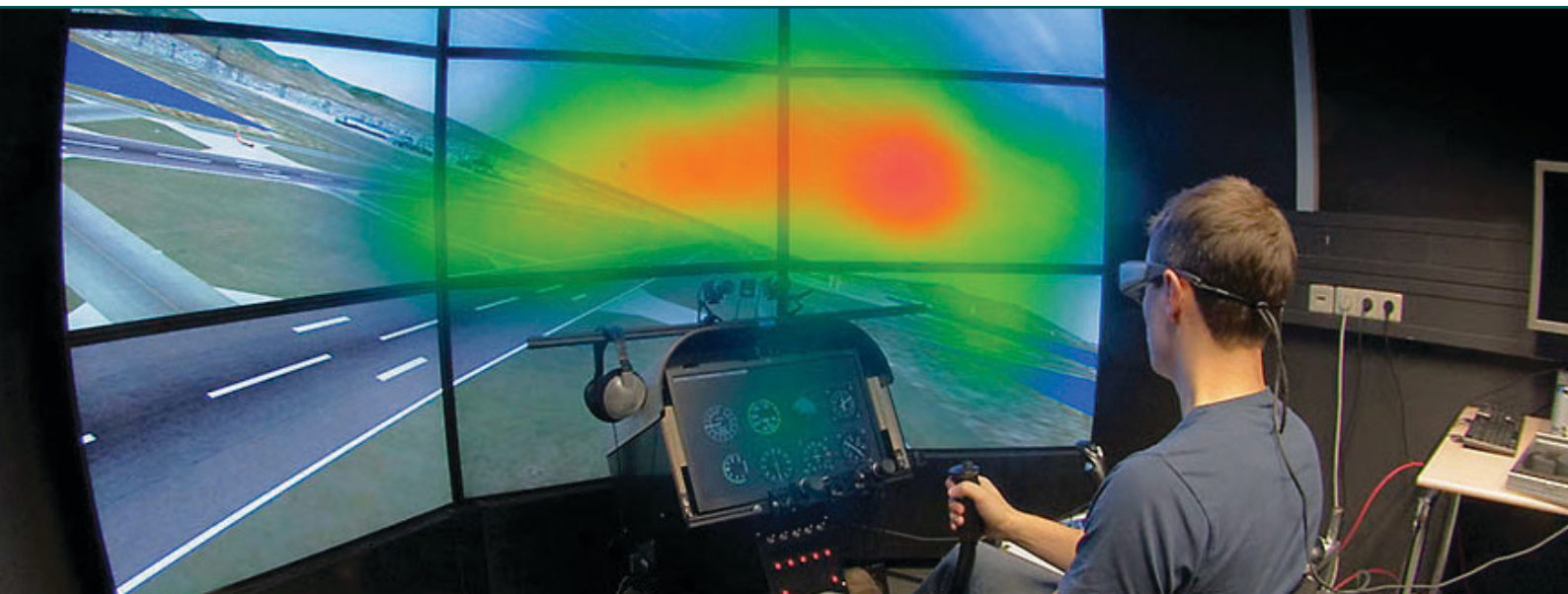
9:00 AM–5:30 PM

Room 1 (1st Floor)

(Displays) Cutting-edge VR/AR Display Technologies (Gaze-, Accommodation-, Motion-aware and HDR-enabled)

Organizers: George Koulieris, Kaan Akşit, Christian Richardt, Rafal Mantiuk, Katerina Mania

Near-eye (VR/AR) displays suffer from technical, interaction as well as visual quality issues which hinder their commercial potential. This tutorial will deliver an overview of cutting-edge VR/AR display technologies, focusing on technical, interaction and perceptual issues which, if solved, will drive the next generation of display technologies. The most recent advancements in near-eye displays will be presented providing (i) correct accommodation cues, (ii) near-eye varifocal AR, (iii) high dynamic range rendition, (iv) gaze-aware capabilities, either predictive or based on eye-tracking as well as (v) motion-awareness. Future avenues for academic and industrial research related to the next generation of AR/VR display technologies will be analyzed.



TUTORIALS | HALF DAY

2:00–5:30 PM

Kleiner Saal A (3rd Floor)

(Haptics) Tangibles within VR: Tracking, Augmenting, and Combining Fabricated and Commercially Available Commodity Devices

Organizers: Alexandre G. de Siqueira, Ayush Bhargava

Virtual Reality (VR) continues to provide an excellent alternative for users to experience diverse environments from the comfort of their homes. The higher the level of immersion, the better the experience. However, the devices one can use to interact with objects in such environments are often restrictive and provide the same generic tactile feedback for contrasting objects, which may adversely affect immersion. One way to address this challenge is to use tangibles. Tangibles combined with tracking devices can provide alternative ways to increase immersion and catered tactile feedback. In this tutorial, we will combine Microsoft Surface Dials, 3D printing, HTC Vive trackers, and the Unity 3D platform –- both as particular products, and as representatives of broader classes of technology – to overcome these challenges. Attendees will be introduced to Open Sound Control (OSC) and TUIO protocols and how to link them to a Unity project. We will also address 3d printing challenges and showcase sample interaction techniques for tangibles within VR applications.

9:00 AM–12:00 PM

Right Foyer (3rd Floor)

(Statistics) The Replication Crisis in Empirical Science: Implications for Human Subject Research in Virtual Environments

Organizers: J. Edward Swan II

This tutorial will first discuss the replication crisis in empirical science. This term was coined to describe recent significant failures to replicate empirical findings in psychology, medicine, and other fields. In many cases, over 50% of previously reported results could not be replicated. This fact has shaken the foundations of several fields: Can empirical results really be believed? Should, for example, medical decisions really be based on empirical research?

After describing the crisis, the tutorial will revisit enough of the basics of empirical science to explain the origins of the replication crisis. The key issue is that hypothesis testing, which in empirical science is used to establish truth, is the result of a probabilistic process. However, the human mind is wired to reason absolutely: Humans have a difficult time understanding probabilistic reasoning. The tutorial will discuss some of the ways that funding agencies, such as the US National Institutes of Health (NIH), have responded to the replication crisis, by, for example, funding replication studies, and requiring that grant recipients publically post anonymized data.

Finally, the tutorial will consider how the Virtual Environments community might respond to the replication crisis. In particular, in our community the reviewing process often considers work that involves systems, architectures, or algorithms. In these cases, the reasoning behind the correctness of the results is usually absolute. Therefore, the standard for accepting papers is that the finding exhibits novelty—to some degree, the result should be surprising. However, this standard does not work for empirical studies (which, typically, involve human experimental subjects). Because empirical reasoning is probabilistic, important results need to be replicated, sometimes multiple times, and by different laboratories. As the replications mount, the field is justified in embracing increasing belief in the results. In other words, consider a field that, in order to accept a paper reporting empirical results, always requires surprise: This is a field that will not progress in empirical knowledge.

The tutorial will end with a call for the community to be more accepting of replication studies. In addition, the tutorial will consider whether actions taken by other fields, in response to the replication crisis, might also be recommendable for the Virtual Environments community.

DOCTORAL CONSORTIUM (DAY 1)

9:00 AM–5:30 PM

Room 2 (1st Floor)

Chairs: Aleshia Hayes, Gerd Bruder, Pete Willemsen, Tonja Machulla

The purpose of the DC is to provide a unique, interactive, supportive, and prestigious mentoring opportunity for select Ph.D. students at any level. This opportunity can make a significant difference by offering a valuable opportunity to get the independent perspectives of senior individuals with a collective breadth and depth of knowledge.

The best presentation at the DC will be honored with the prestigious DC Award. The award will be handed over during the IEEE VR 2018 Award Ceremony on March 22nd, 2018.

6:00–10:00 PM

La Cucinea

Doctoral Consortium Reception

MONDAY, 19 MARCH

8:00–9:00 AM

2nd Floor

Registration

12:00–1.30 PM

Self-organized

Lunch Break

In Reutlingen City or food is available for purchase at Stadthalle bars and foodstations.

WORKSHOPS | HALF DAY

9:00 AM–12:00 PM

Kleiner Saal A (3rd Floor)

KELVAR: Third Workshop on K-12+ Embodied Learning through Virtual & Augmented Reality

Organizers: Iulian Radu, Erica Southgate, Francisco R. Ortega, Shamus Smith, Jerry Alan Fails, Steven Cutchin

K-12+ education is currently undergoing a technological revolution creating opportunities for Virtual-, Augmented-, and Mixed-Reality learning. Technology integration will continue to increase as new technologies become affordable to schools, vocational organizations, universities, and informal educational settings. In this workshop we bring together developers and researchers who are interested in creating the educational contexts of the future. The workshop will enable participants to discuss and discover different approaches for integrating VR, AR, MR technologies, specifically focusing on the potential of embodied learning in various educational contexts.

1:30–5:00 PM

Kleiner Saal A (3rd Floor)

PERCAR: Fourth IEEE VR International Workshop on Perceptual and Cognitive Issues in AR

Organizers: Joe Gabbard, Richard Skarbez, Kiyoshi Kiyokawa, Ernst Kruijff

We expect researchers to submit early work, such as initial analyses of user studies or experimental visualization techniques, although position papers that comprise several pages and summarize a range of previous experiments or experiences (survey) also fall inside the scope of the workshop. Papers should be between 2 and 4 pages in length (excluding references) and may cover one or more of the following topics: depth perception in AR, color perception issues, issues related to visual search / information processing, situational awareness, studies related to selective, focused or divided attention, visualization techniques addressing perceptual or cognitive issues, view management techniques, etc. We also hope to have a PERCAR special issue in PRESENCE, helping to further solidify and grow the community.

9:00 AM–12:00 PM

Kleiner Saal B (3rd Floor)

ANIVAE: First IEEE VR International Workshop on Animation in Virtual and Augmented Environments

Organizers: Franziska Bruckner, Thomas Moser

ANIVAE wants to account the state-of-the-art research in digital humanities with (software) design and visualization for AVR systems, to shape a common understanding, to compare systems and approaches and derive common paradigms, to develop useful and necessary methods and techniques, and to foster new ideas. Topics of interest include (but are not limited to): animated reality vs. mixed reality content, animation techniques in AVR environments, hardware/Software support for animation in AVR, interdisciplinary and intermedia approaches (e.g. games, film, theatre, fine arts etc.), motion and/or performance capture, tools/methods/use cases for Interactive dissemination of animated AVR content, use Cases and Applications of animated content in AVR environments and user Acceptance of animated AVR contents.

1:30–5:00 PM

Kleiner Saal B (3rd Floor)

Virtual Humans and Crowds in Immersive Environments (VHCIE)

Organizers: Ming Lin, Anne-Hélène Olivier, Julien Pettré

Recently many tools, including algorithms and systems, have made it easier to populate immersive virtual environments (VEs) with autonomous characters. Today it is common to explore virtual environments that can reach the size of an entire city that can be populated by many thousands of virtual characters. In this context VHCIE workshop aims at presenting state of the art character and crowd animation techniques for interactive characters, examples of new research opportunities by the availability of populated virtual environment, new research on avatars as well as discussing technological requirements for future applications. We invite submissions of research papers and technical notes (4-8 pages) or position papers and work-in-progress research abstracts (2-3 pages) that are related to Virtual Humans (VH), Virtual Crowds (VC), Immersive populated spaces, Interaction with VH & VC, Multimodal rendering of VH & VC, Virtual Reality applications to VH & VC and anything related to VH or VC!

WORKSHOPS | FULL DAY

9:00 AM–5:00 PM

Kleiner Saal C (3rd Floor)

3DCVE: Fourth IEEE VR International Workshop on 3D Collaborative Virtual Environments

Organizers: Thierry Duval

We invite submissions that address theoretical, technical, and practical topics that are related to collaboration in 3D virtual environments, including but not limited to Immersive collaborative virtual reality, multi-user 3D interaction techniques, social behaviour in collaborative virtual reality, interaction metaphors for collaborative virtual environments, mutual awareness among users / workspace awareness, asymmetric collaboration (e.g., 2D / 3D or immersive / non immersive), and software architectures and frameworks for 3D CVE development and deployment.

9:00 AM–5:00 PM

Kleiner Saal D (3rd Floor)

Software Engineering and Architectures for Realtime Interactive Systems (SEARIS)

Organizers: Marc Erich Latoschik, Dirk Reiners, Wesley Griffin, Pablo Figueroa

SEARIS provides a forum for researchers and practitioners working on the design, development, and support of realtime interactive systems (RIS). These systems span from Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) environments to novel Human-Computer Interaction systems (such as multimodal or multitouch architectures) and entertainment applications in general. Their common principle is a strong user centric orientation which requires real-time processing of simulation aspects as well as input/output events according to perceptual constraints. Therefore, we encourage researchers and developers of real-time human computer interaction systems of all flavors to share their experiences and learn from each other during this workshop. SEARIS wants to account the state-of-the-art in software design and software engineering for realtime interactive systems, to shape a common understanding, to compare systems and approaches and derive common paradigms, to develop useful and necessary methods and techniques, and to foster new ideas. We also welcome reflective and even controversial contributions.

TUTORIALS | HALF DAY

9:00 AM–12:00 PM

Right Foyer (3rd Floor)

(Navigation) Navigation Interfaces for Virtual Reality and Gaming: Theory and Practice

Organizers: Ernst Kruijff, Bernhard E. Riecke

In this course, we will take a detailed look at various breeds of spatial navigation interfaces that allow for locomotion in digital 3D environments such as games, virtual environments or even the exploration of abstract data sets. We will closely look into the basics of navigation, unravelling the psychophysics (including wayfinding) and actual locomotion (travel) aspects. The theoretical foundations form the basis for the practical skillset we will develop, by providing an in-depth discussion of navigation devices and techniques, and a step-by-step discussion of multiple real-world case studies. Doing so, we will cover the full range of navigation techniques from handheld to full-body, highly engaging and partly unconventional methods and tackle spatial navigation with hands-on-experience and tips for design and validation of novel interfaces. In particular, we will be looking at affordable setups and ways to "trick" out users to enable a realistic feeling of self-motion in the explored environments. As such, the course unites the theory and practice of spatial navigation, serving as entry point to understand and improve upon currently existing methods for the application domain at hand.

1:30–5:00 PM

Right Foyer (3rd Floor)

(Web3D) Web3D Quickstart

Organizers: Nicholas F. Polys, Johannes Behr, Timo Sturm, Uwe Woessner

This tutorial will cover the wide range of methods and patterns used to develop interactive 3D applications based on royalty-free and open ISO-IEC standards. As a high-level scene graph language and API above the graphics library, Extensible 3D (X3D) provides a suite of standards including multiple data encodings and language bindings. With the same declarative programming idiom as the WWW, developers can build 2D + 3D Virtual and Mixed Reality applications that integrate with and publish to the WWW ecosystem.

This tutorial will explore the myriad of approaches, tool chains, and applications for building X3D objects and scenes. This includes: different formats and data types, approaches to multiple input devices and sensors, and deployment to different display devices, including 3D printers. Participants are not expected to have prior experience with X3D or VRML (Virtual Reality Modeling Language); a familiarity with markup languages and JavaScript is beneficial, but not required.

9:00 AM–12:00 PM

Room 1 (1st Floor)

(Calibration) Calibration Methods for Optical See-Through Head-Mounted Displays

Organizers: Jens Grubert, Yuta Itoh, Kenneth Moser, J. Edward Swan II

Optical see-through head-mounted displays (OST HMDs) are major output media for Augmented Reality, which have seen significant growth in popularity and usage among the general public due to the growing release of consumer-oriented models, such as the Microsoft Hololens. Unlike Virtual Reality headsets, OST HMDs inherently support the addition of computer-generated graphics directly into the light path between a user's eyes and their view of the physical world. As with most Augmented and Virtual Reality systems, the physical position of an OST HMD is typically determined by an external or embedded 6-Degree-of-Freedom tracking system. However, in order to properly render virtual objects, which are perceived as spatially aligned with the physical environment, it is also necessary to accurately measure the position of the

user's eyes within the tracking system's coordinate frame. For over 20 years, researchers have proposed various calibration methods to determine this needed eye position.

We present a half-day tutorial, which will provide attendees with all skill levels the required knowledge and techniques to effectively understand and employ calibration procedures in their own OST HMD systems. Participants from the Virtual Reality community will find these techniques beneficial to their applications as well.

1:30–5:00 PM

Room 1 (1st Floor)

HAPTICS: Wearable and portable haptics for VR and AR

Organizers: Claudio Pacchierotti, Miguel Otaduy, Domenico Prattichizzo

Compact, unobtrusive, inexpensive, easy-to-wear, and lightweight haptic devices enable researchers to provide compelling touch sensations to multiple parts of the body, significantly increasing the applicability of haptics in many fields, such as robotics, rehabilitation, gaming, and immersive systems. In this respect, wearable and portable haptics have a particularly great potential in the fields of virtual and augmented reality. Being able to touch virtual objects in a wearable and unobtrusive way may indeed open new exciting avenues for the fields of haptics and VR. Development of these types of haptic devices is quite active, and we can already see applications targeting VR and AR immersive scenarios. This workshop presents a review of wearable and portable haptic systems for VR and AR applications. We will discuss the main technological and design challenges for the development of such haptic interfaces, and we will report on the future perspectives for the field.

DOCTORAL CONSORTIUM (DAY 2)

9:00 AM–5:00 PM

Room 2 (1st Floor)

Chairs: Aleshia Hayes, Gerd Bruder, Pete Willemsen, Tonja Machulla

See Day 1 information.

VISITS TO INSTITUTES

5:00–5:15 PM

Foyer at the Main Entrance

Meet for transport to Institute Visits

5:15–6:00 PM

Coach buses to Tuebingen OR Stuttgart

6:00–10:00 PM

Institute Visit: Max Planck Institute for Bio. Cyb. in Tuebingen OR Fraunhofer Institute IAO in Stuttgart

At the Max Planck Institute for Biological Cybernetics participants can visit the Cyberneum: a state-of-the-art Virtual Reality (VR) research facility, which is part of Heinrich Bülthoffs department for Human Perception Cognition and Action. It is equipped with several sophisticated VR systems that are providing unique opportunities to study human perception and human-machine interaction. This also includes two novel, in-house designed simulators – the CyberMotion Simulator and the Cable Robot Simulator. At the Max Planck Institute for Intelligent Systems, Michael Black, Director of the Department for Perceiving Systems will open the doors to his Capture hall. It houses a 4D full-body scanner – the only one of its kind in the world. It can fully record the body and its movements in space and time in high-definition. With this scanner a precise 3D avatar, the virtual equivalent of a person, can be reproduced.

Fraunhofer IAO will show its Visual Technologies lab, highlighting collaborative VR and Interactive Surfaces such as the 2D/3D projection table and the large-scale FusionWall tiled display. Other highlights are IAO's Immersive Engineering Lab, a VR projection environment integrating a 5,5 m wide Powerwall with a 4-sided CAVE, as well as the Driving Research Lab featuring a full size immersive driving simulator. Furthermore, the High Performance Computing Center of Stuttgart University will open its visualization Lab, highlighting leading-edge VR and visualization research in its 5-sided CAVE and tiled display wall.

8:30–11:00 PM

Coaches buses will return to Reutlingen Stadthalle as they fill up with attendees

TUESDAY, 20 MARCH

8:00–9:00 AM

Main Entrance

Registration

VR

9:00–10:00 AM

Grosser Saal (Entrance & 1st Floor)

Welcome to Main VR Conference

Conference Chairs

Keynote Speaker: Is Clinical Virtual Reality Ready for Primetime?

Albert "Skip" Rizzo, *University of Southern California*

Since the mid-1990s, a significant scientific literature has evolved regarding the outcomes from the use of what we now refer to as Clinical Virtual Reality (VR). This use of VR simulation technology has produced encouraging results when applied to address cognitive, psychological, motor, and functional impairments across a wide range of clinical health conditions. This talk addresses the question, "Is Clinical VR Ready for Primetime?". After a brief description of the various forms of VR technology, I will discuss the trajectory of Clinical VR over the last 20 years and summarize the basic assets that VR offers for creating clinical applications. The discussion then addresses the question of readiness in terms of the theoretical basis for Clinical VR assets, the research to date, the pragmatic factors regarding availability, usability, and costs of Clinical VR content/systems, and the ethical issues for the safe use of VR with clinical populations. My key take home message is that when reviewing the theoretical underpinnings and research findings to date, it is clear that Clinical VR will have a significant impact on future research and practice. Pragmatic issues that can influence adoption across many areas of psychology also appear favorable, but professional guidelines will be needed to promote its safe and ethical use. While there is still much research needed to advance the science in this area, it is predicted that Clinical VR applications will become indispensable tools in the toolbox of psychological researchers and practitioners and will only grow in relevance and popularity in the future.

10:00–10:15 AM

Grosser Saal (Entrance & 1st Floor)

Reasearch Demo Fast Forward

10:15–10:30 AM

Foyer 1st floor

Coffee Break

10:30 AM–5:30 PM

Entrance Foyer & 1st Floor

Exhibits

Rooms 1, 2, & 3 (1st Floor)

3DUI Contest

2nd Floor

Demos & Videos

Grosser Saal (1st Floor)

Posters (Quiet Viewing)

10:30 AM–12:00 PM

Grosser Saal (Entrance & 1st Floor)

Papers Session 1: Avatars and Virtual Humans

[TVCG] **The Effect of Realistic Appearance of Virtual Characters in Immersive Environments - Does the Character's Personality Play a Role?,** Katja Zibrek, Elena Kokkinara, Rachel McDonnell

[Conference] **Investigating the Effects of Anthropomorphic Fidelity of Self-Avatars on Near Field Depth Perception in Immersive Virtual Environments,** Elham Ebrahimi, Leah S. Hartman, Andrew Robb, Christopher C. Pagano, Sabarish V. Babu

[Conference] **Simulating Movement Interactions between Avatars & Agents in Virtual Worlds Using Human Motion Constraints,** Sahil Narang, Andrew Best, Dinesh Manocha

[Conference] **Any "Body" There? Avatar Visibility Effects in a Virtual Reality Game,** Jean-Luc Lugrin, Philipp Krop, Maximilian Ertl, Richard Klüpfel, Sebastian Stierstorfer, Bianka Weisz, Maximilian Rück, Johann Schmitt, Nina Schmidt, Marc Erich Latoschik

[Conference] **Empirical Evaluation of Virtual Human Conversational and Affective Animations on Visual Attention in Inter-Personal Simulations,** Matias Volonte, Andrew Robb, Andrew T. Duchowski, Sabarish V. Babu

Kleiner Saal A (3rd Floor)

Papers Session 2: Augmented Reality

[Conference] **An Evaluation of Bi-Manual Gestures on the Microsoft HoloLens,** Nikolas Chaconas, Tobias Höllerer

[Conference] **Interacting with Distant Objects in Augmented Reality,** Matt Whitlock, Ethan Hanner, Jed R. Brubaker, Shaun Kane, Danielle Albers Szafir

[TVCG] **Driver Behavior and Performance with Augmented Reality Pedestrian Collision Warning: An Outdoor User Study,** Hyungil Kim, Joseph L. Gabbard, Alexandre Miranda Anon, Teruhisa Misu

[TVCG] **Drone-Augmented Human Vision: Exocentric Control for Drones Exploring Hidden Areas,** Okan Erat, Werner Alexander Isop, Denis Kalkofen, Dieter Schmalstieg

[Conference] **Design and Assessment of a Collaborative 3D Interaction Technique for Handheld Augmented Reality,** Jeronimo G. Grandi, Henrique G. Debarba, Iago Berndt, Luciana Nedel, Anderson Maciel

Kleiner Saal B (3rd Floor)

Papers Session 3: Body and Mind

[TVCG-Invited] **Egocentric Mapping of Body Surface Constraints,** Molla Eray, Henrique Galvan Debarba, Ronan Boulic

[Conference] **Performance-Driven Dance Motion Control of a Virtual Partner Character,** Christos Mousas

[TVCG] **Exercise Intensity-driven Level Design,** Biao Xie, Yongqi Zhang, Haikun Huang, Elisa Ogawa, Tongjian You, Lap-Fai Yu

[Conference] **Lucid Virtual Dreaming: Antecedents and Consequents of Virtual Lucidity during Virtual Threat,** Jordan T. Quaglia, Andrew Holecek

[TVCG] **"Do you feel in control?": Towards Novel Approaches to Characterise, Manipulate and Measure the Sense of Agency in Virtual Environments,** Camille Jeunet, Louis Albert, Ferran Argelaguet, Anatole Lécuyer

12:00–2:00 PM

Foyer 1st Floor & 2nd Floor

Exhibitors Lunch & Demos

2:00–3:15 PM

Grosser Saal (Entrance & 1st Floor)

Fast-forward Posters A

Kleiner Saal A (3rd Floor)

Papers Session 4: Active Haptics

[TVCG] **Force Rendering and Its Evaluation of a Friction-based Walking Sensation Display for a Seated User,** Ginga Kato, Yoshihiro Kuroda, Kiyoshi Kiyokawa, Haruo Takemura

[Conference] **The Effect of Haptic Prediction Accuracy on Presence,** Dominik Gall, Marc Erich Latoschik

[Conference] **Enhancing the Stiffness Perception of Tangible Objects in Mixed Reality Using Wearable Haptics,** Xavier de Tinguy, Claudio Pacchierotti, Maud Marchal, Anatole Lécuyer

[Conference] **Effect of Electrical Stimulation Haptic Feedback on Perceptions of Softness-Hardness and Stickiness while Touching a Virtual Object,** Vibol Yem, Kevin Vu, Yuki Kon, Hiroyuki Kajimoto

Kleiner Saal B (3rd Floor)

Panel 1: Virtual Reality for Interdisciplinary Applications

Opportunities for virtual reality research and applications have grown tremendously with the new technologies that have become available at the consumer level. Many disciplines now have the chance to implement virtual reality to address domain-specific problems, but barriers still remain as the potential of virtual reality to non-specialists may not be apparent. This panel gives methods on how to use virtual reality productively in interdisciplinary applications. The panelists will present and discuss their experiences on methods for forging interdisciplinary applications in research and education that lead to innovation in both the area of virtual reality and in other disciplines. Interdisciplinary collaborations draw on the different expertise and strengths of multiple investigators that provide an informed and principled way of addressing innovative problems. Interdisciplinary applications involving virtual reality have high potential for supporting research that translates to solving real-world problems addressing clinical populations—such as anxiety disorders and autism—as well as those that address technology-driven societal challenges such as spatial navigation, social interaction, decision making, and communication with media. This panel will feature researchers who have extensive experience in many of these areas of interdisciplinary application. The panel will begin with speakers providing a short (5 minutes or less) statement on their approach to interdisciplinary application, and an introduction of both the challenges faced and opportunities afforded. The goal will be to take a forward-looking position and to engage the audience in an active dialog about new directions and possibilities for VR applications that are informed by bringing together researchers and educators from the sciences, humanities, and engineering. The panel will focus on such questions as: how do you find and foster ("jumpstart") interdisciplinary collaborations? How do you navigate the issues associated with every discipline having a different jargon? Can you come up with effective plans for achieving publications in each discipline? When do you say "no", that is, how do you avoid becoming an academic VR studio-for-hire?

3:15–4:00 PM

Foyer 1st Floor

Coffee Break

Poster presenters Group A need to be at Poster area in the Grosser Saal

4:00–5:30 PM

Grosser Saal (Entrance & 1st Floor)

Papers Session 5: Cybersickness

[TVCG] **Towards a Machine-learning Approach for Sickness Prediction in 360° Stereoscopic Videos,** Nitish Padmanaban, Timon Ruban, Vincent Sitzmann, Anthony M. Norcia, Gordon Wetzstein

[Conference] **Spatial Updating and Simulator Sickness during Steering and Jumping in Immersive Virtual Environments,** Tim Weißker, Andre Kunert, Bernd Frohlich, Alexander Kulik

[Conference] **Visually-Induced Motion Sickness Reduction via Static and Dynamic Rest Frames,** Zekun Cao, Jason Jerald, Regis Kopper

[Conference] **Cybersickness-Provoking Virtual Reality Alters Brain Signals of Persons with Multiple Sclerosis,** Imtiaz Muhammad Arafat, Sharif Mohammad Shahnewaz Ferdous, John Quarles

[Conference] **Effects of Latency Jitter on Simulator Sickness in a Search Task,** Jan-Philipp Stauffert, Florian Niebling, Marc Erich Latoschik

Kleiner Saal A (3rd Floor)

Papers Session 6: Locomotion & Walking

[TVCG] **Locomotive Recalibration and Prism Adaptation of Children and Teens in Immersive Virtual Environments,** Haley Adams, Gayathri Narasimham, John Rieser, Sarah Creem-Regehr, Jeanine Stefanucci, Bobby Bodenheimer

[Conference] **Inducing Compensatory Changes in Gait Similar to External Perturbations Using an Immersive Head Mounted Display,** Lara Riem, Jacob Van Dehy, Tanya Onushko, Scott Beardsley

[TVCG-Invited] **Collision avoidance behavior between walkers: global and local motion cues,** Sean Dean Lynch, Richard Kulpa, Laurentius Antonius Meerhoff, Julien Pettre, Armel Cretual, Anne-Hélène Olivier

[Conference] **Effect of Virtual Human Gaze Behaviour during an Orthogonal Collision Avoidance Walking Task,** Sean D. Lynch, Julien Pettré, Julien Bruneau, Richard Kulpa, Armel Crétual, Anne-Hélène Olivier

[Conference] **You Shall Not Pass: Non-Intrusive Feedback for Virtual Walls in VR Environments with Room-Scale Mapping,** Mette Boldt, Michael Bonfert, Inga Lehne, Melina Cahnbley, Kim Korsching, Ioannis Bikas, Stefan Finke, Martin Hanci, Valentin Kraft, Boxuan Liu, Tram Nguyen, Alina Panova, Ramneek Singh, Alexander Steenbergen, Rainer Malaka, Jan Smeddinck

Kleiner Saal B (3rd Floor)

Papers Session 7: 3D Hand Interaction and Physics

[Conference] **Effects of Hand Representations for Typing in Virtual Reality,** Jens Grubert, Lukas Witzani, Eyal Ofek, Michel Pahud, Matthias Kranz, Per Ola Kristensson

[Conference] **Text Entry in Immersive Head-Mounted Display-Based Virtual Reality Using Standard Keyboards,** Jens Grubert, Lukas Witzani, Eyal Ofek, Michel Pahud, Matthias Kranz, Per Ola Kristensson

[Conference] **Effects of Image Size And Structural Complexity On Time And Precisionof Hand Movements in Head Mounted Virtual Reality,** Anil Ufuk Batmaz, Michel de Mathelin, Birgitta Dresp-Langley

[Conference] **Efficient Physics-Based Implementation for Realistic Hand-Object Interaction in Virtual Reality,** Markus Höll, Markus Oberweger, Clemens Arth, Vincent Lepetit,

[Conference] **Soft Hand Simulation for Smooth and Robust Natural Interaction,** Mickeal Verschoor, Daniel Lobo, Miguel A. Otaduy

5:30–5:45 PM

Registration Desk

Meet for transport to Institute Visits

5:45–6:15 PM

Coach buses to Tuebingen OR Stuttgart

6:15–10:00 PM

Institute Visit: Max Planck Institute for Bio. Cyb. In Tuebingen OR Fraunhofer Institute IAO in Stuttgart

See Monday Night Institute Visit description.

8:30–11:00 PM

Coaches buses will return to Reutlingen Stadthalle as they fill up with attendees

WEDNESDAY, 21 MARCH

8:00–9:00 AM

Main Entrance

Registration

9:00 AM–3:15 PM

Entrance Foyer & 1st Floor

Exhibits

Rooms 1, 2, & 3 (1st Floor)

3DUI Contest

2nd Floor

Demos & Videos

Grosser Saal (1st Floor)

Posters (Quiet Viewing)

VR

9:00–10:30 AM

Grosser Saal (Entrance & 1st Floor)

Papers Session 8: Social VR

[Conference] **Developing and Proving a Framework for Reaction Time Experiments in VR to Objectively Measure Social Interaction with Virtual Agents,** Carolin Wienrich, Richard Gross, Felix Kretschmer, Gisela Müller-Plath

[Conference] **Social VR: How Personal Space is Affected by Virtual Agents' Emotions,** Andrea Bonsch, Sina Radke, Heiko Overath, Laura M. Asche, Jonathan Wendt, Tom Vierjahn, Ute Habel, Torsten W. Kuhlen

[Conference] **Social Presence and Cooperation in Large-Scale Multi-User Virtual Reality – The Relevance of Social Interdependence for Location-Based Environments,** C. Wienrich, K. Schindler, N. Döllinger, S. Kock, O. Traupe

[Conference] **Beyond Replication:Augmenting Social Behaviors in Multi-User Virtual Realities,** Daniel Roth, Constantin Kleinbeck, Tobias Feigl, Christopher Mutschler, Marc Erich Latoschik

[Conference] **Influences on the Elicitation of Interpersonal Space with Virtual Humans,** David M. Krum, Sin-Hwa Kang, Thai Phan

Kleiner Saal A (3rd Floor)

Papers Session 9: Rendering

[TVCG] **HySAR: Hybrid Material Rendering by an Optical See-Through Head-Mounted Display with Spatial Augmented Reality Projection,** Takumi Hamasaki, Yuta Itoh, Yuichi Hiroi, Daisuke Iwai, Maki Sugimoto

[Conference] **Real-Time Re-textured Geometry Modeling Using Microsoft HoloLens,** Samuel Dong, Tobias Höllerer

[Conference] **Profiling Distributed Virtual Environments by Tracing Causality,** Sebastian Friston, Elias Griffith, David Swapp, Alan Marshall, Anthony Steed

[Conference] **Software-Based Visual Aberration Correction for HMDs,** Feng Xu, Dayang Li

[Conference] **BrightView: Increasing Perceived Brightness of Optical See-Through Head-Mounted Displays through Unnoticeable Incident Light Reduction,** Shohei Mori, Sei Ikeda, Alexander Plopski, Christian Sandor

Kleiner Saal B (3rd Floor)

Papers Session 10: Multimodality: Sound, Olfactory, and Gustatory Displays

[TVCG] **Midair Ultrasound Fragrance Rendering,** Keisuke Hasegawa, Liwei Qiu, Hiroyuki Shinoda

[TVCG] **New Thermal Taste Actuation Technology for Future Multisensory Virtual Reality and Internet,** Kasun Karunanayaka, Nurafiqah Johari, Surina Hariri, Hanis Camelia, Kevin Stanley Bielawski, Adrian David Cheok

[TVCG] **Diffraction Kernels for Interactive Sound Propagation in Dynamic Environments,** Atul Rungta, Carl Schissler, Nicholas Rewkowski, Ravish Mehra, Dinesh Manocha

[Conference] **Spatially Perturbed Collision Sounds Attenuate Perceived Causality in 3D Launching Events,** Duotun Wang, James Kubricht, Yixin Zhu, Wei Liang, Song-Chun Zhu, Chenfanfu Jiang, Hongjing Lu

[TVCG] **Effects of Unaugmented Periphery and Vibrotactile Feedback on Proxemics with Virtual Humans in AR,** Myungho Lee, Gerd Bruder, Tobias Höllerer, Greg Welch

10:30–11:00 AM

Coffee Break

11:00 AM–12:30 PM

Grosser Saal (Entrance & 1st Floor)

Papers Session 11: Immersion & Embodiment

[TVCG] **The Impact of Avatar Personalization and Immersion on Virtual Body Ownership, Presence, and Emotional Response,** Thomas Waltemate, Dominik Gall, Daniel Roth, Mario Botsch, Marc Erich Latoschik

[Conference] **In Limbo: The Effect of Gradual Visual Transition between Real and Virtual on Virtual Body Ownership Illusion and Presence,** Sungchul Jung, Pamela J. Wisniewski, Charles E. Hughes

[TVCG] **The Effect of Gender Body-Swap Illusions on Working Memory and Stereotype Threat,** Tabitha C. Peck, My Doan, Kimberly A. Bourne, Jessica J. Good

[Conference] **Studying the Sense of Embodiment in VR Shared Experiences,** Rebecca Fribourg, Ferran Argelaguet, Ludovic Hoyet, Anatole Lecuyer

[TVCG] **NotifiVR: Exploring Interruptions and Notifications in Virtual Reality,** Sarthak Ghosh, Lauren Winston, Nishant Panchal, Philippe Kimura-Thollander, Jeff Hotnog, Douglas Cheong, Gabriel Reyes, Gregory D. Abowd

Kleiner Saal A (3rd Floor)

Papers Session 12: Training

[TVCG-Invited] **The Implementation and Validation of a Virtual Environment for Training Powered Wheelchair Manoeuvres,** Nigel W. John, Serban R. Pop, Thomas W. Day, Panagiotis D. Ritsos, Christopher J. Headleand

[TVCG] **A Comparison of Virtual and Physical Training Transfer of Bimanual Assembly Tasks,** María Murcia-López, Anthony Steed

[Conference] **WoaH: A Virtual Reality Work-at-Height Simulator,** Cédric Di Loreto, Jean-Rémy Chardonnet, Julien Ryard, Alain Rousseau

[Conference] **Towards Joint Attention Training for Children with ASD – A VR Game Approach and Eye Gaze Exploration,** Chao Mei, Bushra T. Zahed, Lee Mason, John Quarles

[Conference] **Synthesizing Personalized Training Programs for Improving Driving Habits via Virtual Reality,** Yining Lang, Liang Wei, Fang Xu, Yibiao Zhao, Lap-Fai Yu

Kleiner Saal B (3rd Floor)

Panel 2: How Should Social Virtual Reality Work?

There are now several social applications for immersive virtual reality systems. Recent studies show that users are starting to engage with these systems for more extended periods, and that they are reaching audiences that wouldn't normally socialise in online games. The applications provide a variety of different ways of engaging with spaces, different tasks to engage with and different representations of humans. This panel will raise and discuss issues around the future of such systems. How should social mixed reality should be constructed in order to support the types of experience that we want to have. We will bring together platform holders and developers with researchers. We will take an inter-disciplinary look at the issues.

12:30–2:00 PM

Self-organized

Lunch Break

In Reutlingen City or food is available for purchase at Stadthalle bars and foodstations.

2:00–3:15 PM

Grosser Saal (Entrance & 1st Floor)

Fast-Forward Posters B

Kleiner Saal A (3rd Floor)

Papers Session 13: Redirected Walking

[TVCG] **You Spin my Head Right Round: Threshold of Limited Immersion for Rotation Gains in Redirected Walking,** Patric Schmitz, Julian Hildebrandt, André Calero Valdez, Leif Kobbelt, Martina Ziefle

[TVCG-Invited] **Analyses of Gait Parameters of Younger & Older Adults during (Non-)Isometric Virtual Walking,** Omar Janeh, Gerd Bruder, Frank Steinicke, Alessandro Gulberti, Monika Poetter-Nerger

[Conference] **I Can See on My Feet While Walking: Sensitivity to Translation Gains with Visible Feet,** Lucie Kruse, Eike Langbehn, Frank Steinicke

[Conference] **Experiencing an Invisible World War I Battlefield Through Narrative-Driven Redirected Walking in Virtual Reality,** Run Yu, Zachary Duer, Todd Ogle, Doug A. Bowman, Thomas Tucker, David Hicks, Dongsoo Choi, Zach Bush, Huy Ngo, Phat Nguyen, Xindi Liu

Kleiner Saal B (3rd Floor)

Panel 3: Getting close to domain users: VR and AR in support of application domains

The last couple of years have been marked by an explosion of solutions in the VR and AR domains: the accepted norm of this market has been to provide users with lightweight VR and AR displays, input controllers that recognize human gestures, superior tracking solutions, as well as software development environments that enable much faster prototyping and development of high quality applications. Those contemporary commercial off the shelf VR/AR hardware and software solutions are not only affordable to research laboratories, their price also makes them accessible to large number of potential users – having uninterrupted access to inexpensive tools is an important element of the diffusion process and adoption of any innovation.

While VR community witnesses a renewed vigor and a wealth of studies in the domain of basic research, the absence of equally vibrant research in different application domains that most directly benefit users is also evident. This lack of extensive research focused on testing suitability and effectiveness of different VR/AR solutions in application domains inevitably results with a lack of tried and proven standards on how and when to use VR/AR solutions effectively and efficiently in those domains. The existence of those standards is one of several major elements that masses of users need if they are to change their daily practices and incorporate VR/AR solutions in their work environments. The promise of large scale adoption of VR/AR solutions therefore still remains the promise in many application domains.

We believe this point in time is perfect to start bringing our understandings from basic research and start actively applying them to a diverse set of application domains. The goal of this panel is to raise awareness and bring to the attention of the VR/AR research community the various needs and opportunities for research in different application domains.

3:15–4:00 PM

Foyer 1st Floor

Coffee Break

Poster presenters Group B will be at their posters in the Grosser Saal

4:00–5:00 PM

Grosser Saal (Entrance & 1st Floor)

Keynote Speaker: Tactile Reality

Katherine Kuchenbecker, *Max Planck Institute for Intelligent Systems*

Touching an object causes rich haptic cues that enable you to understand the object's physical properties and adeptly control the interaction. Although human experience centers on physical contact with tangible items, few computer systems provide the user with high-fidelity touch feedback, limiting their intuitiveness. Haptic interfaces are mechatronic systems that modulate the physical interaction between a human and his or her tangible surroundings. Such interfaces typically involve mechanical, electrical, and computational layers that work together to sense user motions or forces, quickly process these inputs with other information, and physically respond by actuating elements of the user's surroundings. By way of three examples, this talk will demonstrate that well-designed tactile feedback can greatly increase the realism of virtual worlds. First, we created a simple visuo-audio-tactile simulator to help dental students learn to find cavities in teeth. The user watches a video of a real dental tool interacting with a tooth while simultaneously feeling an authentic rendering of the associated contact vibrations. Second, we created the world's most realistic haptic virtual surfaces by recording and modeling what a user feels when touching 100 real objects with an instrumented stylus. The perceptual effects of displaying the resulting data-driven friction forces, tapping transients, and texture vibrations were quantified by having users compare the original surfaces to their virtual versions. Third, we extended the haptic texture concept to capture how a real robot vibrates as it moves its joints and tied this model to measured user motions. The resulting vibrotactile experiences were formally evaluated and then added to an immersive game that lets the user feel what it would be like to turn into a robot. While much work remains to be done, we are starting to see the tantalizing potential of systems that leverage tactile cues to allow a user to interact with virtual environments as though they were real.

5:00–7:15 PM

1st Floor

Champagne, Exhibits & 3DUI Contest Tournament

2nd Floor

Research Demos

7:15–11:30 PM

Grosser Saal (Entrance & 1st Floor)

Main Banquet, VGTC Award Announcements, and 3DUI Contest Awards

Keynote Speaker: 25 years of VR in Industry: Pioneers, Enablers, Applications - and some Vintage Metal

Oliver Riedel, *University of Stuttgart*

In current public perception, VR is often considered a fairly new thing, being around for only the last three to four years - while of course it's not at all new. Being researched for more than the last 25 years, VR has been a valuable tool in the industry almost as long. This talk will take the journey from some of the early VR pioneers to industrial VR applications of today and tomorrow, and look into the past and the future of enabling technologies for VR - including a close look to some of the really early VR hardware.

9:30–11:30 PM

Entrance Foyer

Karaoke

THURSDAY, 22 MARCH

8:00–9:00 AM

Main Entrance

Registration

9:00 AM–3:00 PM

Entrance Foyer & 1st Floor

Exhibits

Rooms 1, 2, & 3 (1st Floor)

3DUI Contest

2nd Floor

Demos & Videos

Grosser Saal (1st Floor)

Posters (Quiet Viewing)

VR

9:00–10:30 AM

Grosser Saal (Entrance & 1st Floor)

Invited Technical Talk

The Pro-VR Challenge - A Technical Deep Dive into NVIDIA's VR Technologies, Robert Menzel

NVIDIA VRWorks is a comprehensive suite of technology geared towards helping application and headset developers to create amazing virtual reality experiences. This talk will introduce some of VRWorks' components, explain the functionality and dive a bit deeper into the technical aspects behind these features.

Grosser Saal (Entrance & 1st Floor)

Papers Session 14: Applications

[Conference] **Fluid Sketching—Immersive Sketching Based on Fluid Flow,** Sevinc Eroglu, Sascha Gebhardt, Patric Schmitz, Dominik Rausch, Torsten Wolfgang Kuhlen

[Conference] **Automatic Furniture Arrangement Using Greedy Cost Minimization,** Peter Kán, Hannes Kaufmann

Kleiner Saal A (3rd Floor)

Papers Session 15: Navigation

[Conference] **Interactive Exploration Assistance for Immersive Virtual Environments Based on Object Visibility and Viewpoint Quality,** Sebastian Freitag, Benjamin Weyers,Torsten W. Kuhlen

[Conference] **RST 3D: A Comprehensive Gesture Set for Multitouch 3D Navigation,** Alexander Kulik, André Kunert, Magdalena Keil, Bernd Froehlich

[TVCG-Invited] **Efficient VR and AR Navigation through Multiperspective Occlusion Management,** Meng-Lin Wu, Voicu Popescu

[TVCG] **Saliency in VR: How do people explore virtual environments?,** Vincent Sitzmann, Ana Serrano, Amy Pavel, Maneesh Agrawala, Diego Gutierrez, Belen Masia, Gordon Wetzstein

[Conference] **Rapid, Continuous Movement Between Nodes as an Accessible Virtual Reality Locomotion Technique,** M. P. Jacob Habgood, David Moore, David Wilson, Sergio Alapont

Kleiner Saal B (3rd Floor)

Papers Session 16: Passive Haptics

[TVCG] **Evaluating Remapped Physical Reach for Hand Interactions with Passive Haptics in Virtual Reality,** Dustin T. Han, Mohamed Suhail, Eric D. Ragan

[TVCG] **Ascending and Descending in Virtual Reality: Simple and Safe System using Passive Haptics,** Ryohei Nagao, Keigo Matsumoto, Takuji Narumi, Tomohiro Tanikawa, Michitaka Hirose

[Conference] **Cognitive and Touch Performance Effects of Mismatched 3D Physical and Visual Perceptions,** Jason Hochreiter, Salem Daher, Gerd Bruder, Greg Welch

[TVCG] **MRTouch: Adding Touch Input to Head-Mounted Mixed Reality,** Robert Xiao, Julia Schwarz, Nick Throm, Andrew D. Wilson, Hrvoje Benko

[TVCG] **The Critical Role of Self-Contact for Embodiment in Virtual Reality,** Sidney Bovet, Henrique Galvan Debarba, Bruno Herbelin, Eray Molla, Ronan Boulic

10:30–11:00 AM

Foyer 1st Floor

Coffee Break

11:00 AM–12:30 PM

Grosser Saal (Entrance & 1st Floor)

Papers Session 17: Selection and Pointing

[Conference] **Transferability of Spatial Maps: Augmented Versus Virtual Reality Training,** Nicko R. Caluya, Alexander Plopski, Jayzon F. Ty, Christian Sandor, Takafumi Taketomi, Hirokazu Kato

[Conference] **User Preference for SharpView-Enhanced Virtual Text during Non-Fixated Viewing,** Trey Cook, Nate Phillips, Kristen Massey, Alexander Plopski, Christian Sandor, J. Edward Swan II

[Conference] **Visual Perception of Real World Depth Map Resolution for Mixed Reality Rendering,** Lohit Petikam, Andrew Chalmers, Taeyhun Rhee

[Conference] **Human Compensation Strategies for Orientation Drifts,** Tobias Feigl, Christopher Mutschler, Michael Philippsen

[Conference] **Simulated Reference Frame: A Cost-Effective Solution to Improve Spatial Orientation in VR,** Thinh Nguyen-Vo, Bernhard E. Riecke, Wolfgang Stuerzlinger

Kleiner Saal A (3rd Floor)

Papers Session 18: Hardware & Tracking

[TVCG-Invited] **Fabricating Diminishable Visual Markers for Geometric Registration in Projection Mapping,** Hirotaka Asayama, Daisuke Iwai, Kosuke Sato

[TVCG] **Widening Viewing Angles of Automultiscopic Displays using Refractive Inserts,** Geng Lyu, Xukun Shen, Taku Komura, Kartic Subr, Lijun Teng

[Conference] **Augmented Reality Driving Using Semantic Geo-Registration,** Han-Pang Chiu, Varun Murali, Ryan Villamil, G. Drew Kessler, Supun Samarasekera, Rakesh Kumar

[Conference] **Cascaded 3D Full-Body Pose Regression from Single Depth Image at 100 FPS,** Shihong Xia, Zihao Zhang, Le Su

[Conference] **Coded Light Based Extensible Optical Tracking System,** Dong Li, Danli Wang, Dongdong Weng,Yue Li, Hang Xun, Yihua Bao

Kleiner Saal B (3rd Floor)

Panel 4: The Future Impact of Neuroscience and Cognitive Psychology on Virtual Environments

Virtual environments (VEs: Virtual Reality, Augmented Reality, Mixed Reality, and Augmented Virtuality) have benefitted from the fields Neuroscience and Cognitive Psychology. Many VE techniques are based on known findings such as change blindness and the rubber hand illusion. Neuroscience, Cognitive, and Clinical Psychology have also benefits for VE technologies, such as treatments for phobias and pain modification. This panel will explore new VE research directions and potential impacts associated with Neuroscience and Cognitive Psychology.

The rapid advancement of sensing technologies (such as electroencephalography (EEG), near field infrared brain scan (fNIRS), positron emission tomography (PET) and Magnetic resonance imaging (MRI)) have created new opportunities to better understand brain/behaviour relationships using VEs. We are now able to gain a better understanding of the impact of VEs on learning, training, supporting industrial tasks, and long-term usage. VE technology is now entering a phase of being a consumer/commodity product. The panel with explore how the wide spread usage of VEs effect their usage for treatments in the Neuroscience and Cognitive Psychology domain. The current authoring tools are lowering the barrier of entry into the development of virtual worlds.

12:30–1:45 PM

Self-organized

Lunch Break

In Reutlingen City or food is available for purchase at Stadthalle bars and foodstations.

1:45–3:00 PM

Grosser Saal (Entrance & 1st Floor)

Papers Session 19: 360° and Panoramic Videos

[TVCG] **Parallax360: Stereoscopic 360° Scene Representation for Head-Motion Parallax,** Bicheng Luo, Feng Xu, Christian Richardt, Jun-Hai Yong

[TVCG] **The Effect of Transition Type in Multi-View 360° Media,** Andrew MacQuarrie and Anthony Steed

[Conference] **Generating VR Live Videos with Tripod Panoramic Rig,** Feng Xu, Tianqi Zhao, Bicheng Luo, Qionghai Dai

[TVCG] **Detection Thresholds for Rotation and Translation Gains in 360° Video-based Telepresence Systems,** Jingxin Zhang, Eike Langbehn, Dennis Krupke, Nicholas Katzakis, Frank Steinicke

[TVCG] **Gaze-aware streaming solutions for the next generation of mobile VR experiences,** Pietro Lungaro, Rickard Sjöberg, Alfredo José Fanghella Valero, Ashutosh Mittal, Konrad Tollmar

Kleiner Saal A (3rd Floor)

Papers Session 20: Learning and Educational VR

[Conference] **Neurophysiology of Visual-Motor Learning during a Simulated Marksmanship Task in Immersive Virtual Reality,** Jillian M. Clements, Regis Kopper, David J. Zielinski, Hrishikesh Rao, Marc A. Sommer, Elayna Kirsch, Boyla O. Mainsah, Leslie M. Collins, Lawrence G. Appelbaum

[TVCG] **Evaluating Multiple Levels of an Interaction Fidelity Continuum on Performance and Learning in Near-Field Training Simulations,** Ayush Bhargava, Jeffrey W. Bertrand, Anand K. Gramopadhye, Kapil C. Madathil, Sabarish V. Babu

[Conference] **Active Assembly Guidance with Online Video Parsing,** Bin Wang, Guofeng Wang, Andrei Sharf, Yangyan Li, Fan Zhong, Xueying Qin, Daniel CohenOr, Baoquan Chen

[Conference] **Teacher-Guided Educational VR: Assessment of Live and Prerecorded Teachers Guiding Virtual Field Trips,** Christoph W. Borst, Nicholas G. Lipari, Jason W. Woodworth

[Conference] **Immersive Visualization of Abstract Information: An Evaluation on Dimensionally-Reduced Data Scatterplots,** Jorge A. Wagner Filho, Marina F. Rey, Carla M.D.S. Freitas, Luciana Nedel

Kleiner Saal B (3rd Floor)

Papers Session 21: Visual Perception

[Conference] **Yea Big, Yea High: A 3D User Interface for Surface Selection by Progressive Refinement in Virtual Environments,** Bret Jackson, Brighten Jelke, Gabriel Brown

[Conference] **Analysis of Proximity-Based Multimodal Feedback for 3D Selection in Immersive Virtual Environments,** Oscar Ariza, Gerd Bruder, Nicholas Katzakis, Frank Steinicke

[Conference] **Pointing at Wiggle 3D Displays,** Michaël Ortega, Wolfgang Stuerzlinger

[Conference] **Perception of Redirected Pointing Precision in Immersive Virtual Reality,** Henrique G. Debarba, Jad-Nicolas Khoury,Sami Perrin, Bruno Herbelin, Ronan Boulic

[Conference] **Performance Envelopes of In-Air Direct and Smartwatch Indirect Control for Head-Mounted Augmented Reality,** Dennis Wolf, John J. Dudley, Per Ola Kristensson

3:00–3:30 PM

Foyer 1st Floor

Coffee Break

Please Remove Posters and Setups

3:30–4:30 PM

Grosser Saal (Entrance & 1st Floor)

Keynote Speaker: Virtual Reality and Visualization Research at Audi

Helmut Hobmaier, *AUDI AG*

In this presentation we will show how, at Audi design, physical and virtual processes are connected, how they support each other and how we get the best out of both worlds. We will show the bandwidth of our visualization content, the specific use cases for them and how we share resources between different departments. We will address the point that, in our opinion, it's necessary to bring the tools to where are they needed, specifically to the CAD-specialists and the designers and how our strategy is to implement this.

4:30–5:00 PM

Grosser Saal (Entrance & 1st Floor)

Closing Remarks: Awards & IEEE VR 2019 Announcement

POSTERS

Tuesday—Thursday, Grosser Saal (1st floor)

Light Projection-Induced Illusion for Controlling Object Color, Ryo Akiyama, Goshiro Yamamoto, Toshiyuki Amano, Takafumi Taketomi, Alexander Plopski, Christian Sandor, Hirokazu Kato

An AR-Guided System for Fast Image-Based Modeling of Indoor Scenes, Daniel Andersen, Voicu Popescu

Agency Enhances Body Ownership Illusion of Being a Virtual Bat, Anastassia Andreasen, Niels Christian Nilsson, Stefania Serafin

Spatial Asynchronous Visuo-Tactile Stimuli Influence Ownership of Virtual Wings, Anastassia Andreasen, Niels Christian Nilsson, Stefania Serafin

A Threefold Approach for Precise and Efficient Locomotion in Virtual Environments with Varying Accessibility, Thomas Arnskov, Anders Elmholdt, Kristian Jensen, Nicklas Kristoffersen, Jonas Litvinas, Frederik L. Waldhausen, Niels C. Nilsson, Rolf Nordahl, Stefania Serafin

Collaborative Production Line Planning with Augmented Fabrication, Doris Aschenbrenner, Meng Li, Radoslaw Dukalski, Jouke Verlinden, Stephan Lukosch

Evaluation of Optical See-Through Head-Mounted Displays in Training for Critical Care and Trauma, Ehsan Azimi, Alexander Winkler, Emerson Tucker, Long Qian, Manyu Sharma, Jayfus Doswell, Nassir Navab, Peter Kazanzides

Towards Revisiting Passability Judgments in Real and Immersive Virtual Environments, Ayush Bhargava, Kathryn M. Lucaites, Leah Hartman, Hannah Solini, Jeffrey W. Bertrand, Andrew C. Robb, Christopher C. Pagano, Sabarish V. Babu

Towards Evaluating the Effects of Stereoscopic Viewing and Haptic Interaction on Perception-Action Coordination, David Brickler, Sabarish V. Babu, Jeffrey Bertrand, Ayush Bhargava

Reducing VR Sickness through Peripheral Visual Effects, Helmut Buhler, Sebastian Misztal, Jonas Schild

Smart Choices for Deviceless and Device-based Manipulation in Immersive Virtual Reality, Fabio M. Caputo, Daniel Mendes, Alessia Bonetti, Giacomo Saletti, Andrea Giachetti

Virtual Content Creation Using Dynamic Omnidirectional Texture Synthesis, Chih-Fan Chen, Evan Suma Rosenberg

Redirected Walking in Irregularly Shaped Physical Environments with Dynamic Obstacles, Haiwei Chen, Samantha Chen, Evan Suma Rosenberg

Real-time 3D Face Reconstruction and Gaze Tracking for Virtual Reality, Shu-Yu Chen, Lin Gao, Yu-Kun Lai, Paul L. Rosin, Shihong Xia

Path Prediction using LSTM Network for Redirected Walking, Yong-Hun Cho, Dong-Yong Lee, In-Kwon Lee

Reverse Disability Simulation in a Virtual Environment, Tanvir Irfan Chowdhury, Sharif Mohammad Shahnewaz Ferdous, Tabitha C. Peck, John Quarles

Virtual Buzzwire: Assessment of aPrototype VR Game for Stroke Rehabilitation, Chris G. Christou, Despina Michael-Grigoriou, Dimitris Sokratous

The Effect of Immersive Displays on Situation Awareness in Virtual Environments for Aerial Firefighting Air Attack Supervisor Training, Rory M.S. Clifford, Humayun Khan, Simon Hoermann, Mark Billinghurst, Robert W. Lindeman

Augmentation of Road Surfaces with Subsurface Utility Model Projections, Stéphane Côté, Alexandra Mercier

Augmented Reality Visualization of Joint Movements for Physical Examination and Rehabilitation, Henrique Galvan Debarba, Marcelo Elias de Oliveira, Alexandre Ladermann, Sylvain Chague, Caecilia Charbonnier

Tracking a Consumer HMD with a Third Party Motion Capture System, Henrique Galvan Debarba, Marcelo Elias de Oliveira, Alexandre Lädermann, Sylvain Chagué, Caecilia Charbonnier

A Calibration Method for On-Vehicle AR-HUD System Using Mixed Reality, Nianchen Deng, Yanqing Zhou, Jiannan Ye, Xubo Yang

Mobile AR In and Out: Towards Delay-based Modeling of Acoustic Scenes, Cumhur Erkut, Jonas Holfelt, Stefania Serafin

Head-to-Body-Pose Classification in No-Pose VR Tracking Systems, Tobias Feigl, Christopher Mutschler, Michael Philippsen

Investigating the Reason for Increased Postural Instability in Virtual Reality for Persons with Balance Impairments, Sharif Mohammad Shahnewaz Ferdous, Tanvir Irfan Chowdhury, Imtiaz Muhammad Arafat, John Quarles

Heterogeneous, Distributed Mixed Reality Applications. A Concept, Pablo Figueroa, José Tiberio Hernández, Frédéric Merienne, Jean-Rémy Chardonnet, José Dorado, J. Sebastián Lopez

Immersive Visual Analysis to Explore Mystery at Wildlife Preserve, Aleksandr Fritz, Bo Sun, Wei Xu

Touchless Haptic Feedback for VR Rhythm Games, Orestis Georgiou, Craig Jeffrey, Ziyuan Chen, Bao Xiao Tong, Shing Hei Chan, Boyin Yang, Adam Harwood, Tom Carter

Knowledge Spaces in VR: Intuitive Interfacing with a Multiperspective Hypermedia Environment, Peter Gerjets, Martin Lachmair, Martin V. Butz, Johannes Lohmann

An Investigation of Head Motion and Perceptual Motion Cues' Influence on User Depth Perception of Augmented Reality Neurosurgical Simulators, Hamza Ghandorh, Roy Eagleson, Sandrine de Ribaupierre

Model Retrieval by 3D Sketching in Immersive Virtual Reality, Daniele Giunchi, Stuart James, Anthony Steed

Immersive Virtual Fieldwork: Advances for the Petroleum Industry, Luiz Gonzaga Jr, Mauricio Roberto Veronez, Gabriel Lanzer Kannenberg, Demetrius Nunes Alves, Caroline Lessio Cazarin, Leonardo Gomes Santana, Jean Luca de Fraga, Leonardo C. Inocencio, Lais Vieira de Souza, Fernando Marson, Fabiane Bordin, Francisco M.W. Tognoli

Gaze Guidance in Immersive Environments, Steve Grogorick, Georgia Albuquerque, Marcus Magnor

Immersive Robot-Assisted Virtual Reality Therapy for Neurologically-Caused Gait Impairments, Negin Hamzeheinejad, Samantha Straka, Dominik Gall, Franz Weilbach, Marc Erich Latoschik

Deep Localization on Panoramic Images, Atsutoshi Hanasaki, Hideaki Uchiyama, Atsushi Shimada, Rin-ichiro Taniguchi

An Approach to Embodiment and Interactions with Digital Entities in Mixed-Reality Environments, Mohamed Handosa, Hendrik Schulze, Denis Gračanin, Matthew Tucker, Mark Manuel

Investigating a Sparse Peripheral Display in a Head-Mounted Display for VR Locomotion, Abraham M. Hashemian, Alexandra Kitson, Thinh Nguyen-Vo, Hrvoje Benko, Wolfgang Stuerzlinger, Bernhard E. Riecke

Preliminary Environment Mapping for Redirected Walking, Christian Hirt, Markus Zank, Andreas Kunz

The Relationship between Visual Attention and Simulator Sickness: A Driving Simulation Study, Anne Hoesch, Sandra Poeschl, Florian Weidner, Roberto Walter, Nicola Doering

Personal Perspective: Using Modified World Views to Overcome Real-Life Limitations in Virtual Reality, Adrian H. Hoppe, Florian van de Camp, Rainer Stiefelhagen

Please Don't Puke: Early Detection of Severe Motion Sickness in VR, Courtney Hutton, Shelby Ziccardi, Julio Medina, Evan Suma Rosenberg

Real-time Control Operation Support of Unstable System by Visual Feedback, Tomohiro Ichiyama, Atsushi Matsubayashi, Yasutoshi Makino, Hiroyuki Shinoda

Comparing VR Display with Conventional Displays for User Evaluation Experiences, Quinate Ihemedu-Steinke, Gerrit Meixner, Michael Weber

Towards Standardization of Medical Trials Using Virtual Experimenters, Zachariah J. Inks, Matias Volonte, Sarah Beadle, Bjoern Horing, Andrew C. Robb, Sabarish V. Babu

What Can VR Systems Tell Sports Players? Reaction-based Analysis of Baseball Batters in Virtual and Real Worlds, Mariko Isogawa, Dan Mikami, Takehiro Fukuda, Naoki Saijo, Kosuke Takahashi, Hideaki Kimata, Makio Kashino

3D Touch-and-drag: Gesture-free 3D Manipulation with Finger Tracking, Thomas Jung, Patrick Bauer

HIPS - A Virtual Reality Hip Prosthesis Implantation Simulator, Maximilian Kaluschke, René Weller, Gabriel Zachmann, Luigi Pelliccia, Mario Lorenz, Philipp Klimant, Sebastian Knopp, Johannes P. G. Atze, Falk Möckel

Augmented Reality System for Aiding Mild Alzheimer Patients and Caregivers, Keynes Masayoshi Kanno, Edgard Afonso Lamounier Jr., Alexandre Cardoso, Ederaldo José Lopes, Gerson Flávio Mendes de Lima

Towards Situated Knee Trajectory Visualization for Self Analysis in Cycling, Oral Kaplan, Goshiro Yamamoto, Takafumi Taketomi, Yasuhide Yoshitake, Alexander Plopski, Christian Sandor, Hirokazu Kato

Olfactory Display Based on Sniffing Action, Shingo Kato, Takamichi Nakamoto

Effect of Reclining Angle on the Perception of Horizontal Plane for HMD Users, Hideki Kawai, Hiroki Hara, Yasuyuki Yanagida

The Effect of Immersionon Emotional Responses to Film Viewing in a Virtual Environment, Aelee Kim, Minha Chang, Yeseul Choi, Sohyeon Jeon, Kyoungmin Lee

A User-Based Comparison of Two Augmented Reality Glasses, Elisa Maria Klose, Ludger Schmidt

Using EEG to Decode Subjective Levels of Emotional Arousal during an Immersive VR Roller Coaster Ride, F. Klotzsche, A. Mariola, S Hofmann, V. V. Nikulin, A. Villringer, M. Gaebler

Using Industrial Robots as Haptic Devices for VR-Training, Sebastian Knopp, Mario Lorenz, Luigi Pelliccia, Philipp Klimant

HangerOVER: Mechanism of Controlling the Hanger Reflex Using Air Balloon for HMD Embedded Haptic Display, Yuki Kon, Takuto Nakamura, Vibol Yem, Hiroyuki Kajimoto

Illusory Body Ownership between Different Body Parts: Synchronization of Right Thumb and Right Arm, Ryota Kondo, Maki Sugimoto, Kouta Minamizawa, Masahiko Inami, Michiteru Kitazaki, Yamato Tani

Design of a Virtual Reality and Haptic Setup Linking Arousals to Training Scenarios: a Preliminary Stage, Konstantinos Koumaditis, Francesco Chinello, Sarune Venckute

Evaluation of Environment-Independent Techniques for 3D Position Marking in Augmented Reality, Wallace S. Lages, Yuan Li, Doug A. Bowman

Using Pico Projectors With Spatial Contextual Awareness To Create Augmented Knowledge Spaces For Interdisciplinary Engineering Teams, Isabel Leber, Matthias Merk, Gabriela Tullius, Peter Hertkorn

Pop the Feed Filter Bubble: Making Reddit Social Media a VR Cityscape, Rhema Linder, Alexandria M. Stacy, Nic Lupfer, Andruid Kerne, Eric D. Ragan

A Method of View-dependent Stereoscopic Projection on Curved Screen, Juan Liu, Hanchao Li, Lu Zhao, Siwei Zhao, Guowen Qi, Yulong Bian, Xiangxu Meng, Chenglei Yang

Behavioral Simulation of Passengers in a Waiting Hall, Shaohua Liu, Xiyuan Song, Hao Jiang, Min Shi, Tianlu Mao

VR-Assisted vs Video-Assisted Teacher Training, Jean-Luc Lugrin, Sebastian Oberdörfer, Marc Erich Latoschik

Casting Virtual Shadows Based on Brightness Induction for Optical See-Through Displays, Shinnosuke Manabe, Sei Ikeda, Asako Kimura, Fumihisa Shibata

Touchless Haptic Feedback for Supernatural VR Experiences, Jonatan Martinez, Daniel Griffiths, Valerio Biscione, Orestis Georgiou, Tom Carter

Biomechanical Parameters Under Curvature Gains and Bending Gains in Redirected Walking, Keigo Matsumoto, Ayaka Yamada, Anna Nakamura, Yasushi Uchmura, Keitaro Kawai, Tomohiro Tanikawa

Intraousseous Access Simulator in Newborns VR System, Sergio Medina-Papagayo, Byron Perez-Gutierrez, Lizeth Vega-Medina, Hernando Leon-Rodriguez, Norman Jaimes, Claudia Alarcon, Alvaro Uribe-Quevedo

Comparing Interface Affordances for Controlling a Push Broom in VR, Noah Miller, Pete Willemsen, Robert Feyen

Immersive Exploration of OSGi-based Software Systems in Virtual Reality, Martin Misiak, Doreen Seider, Sascha Zur, Arnulph Fuhrmann, Andreas Schreiber

AR in a Large Area through Instance Recognition with Hybrid Sensors, Ken Miyamoto, Takahiro Kashima, Osamu Tsukahara

Impact of Alignment Point Distance Distribution on SPAAM Calibration of Optical See-Through Head-Mounted Displays, Kenneth R. Moser, Mohammed Safayet Arefin, J. Edward Swan II

A Study of Cybersickness and Sensory Conflict Theory Using a Motion-Coupled Virtual Reality System, Adrian K. T. Ng, Leith K. Y. Chan, Henry Y. K. Lau

Effect of Environment Size on Curvature Redirected Walking Thresholds, Anh Nguyen, Yannick Rothacher, Andreas Kunz, Peter Brugger, Bigna Lenggenhager

Object Size Perception in Immersive Virtual Reality:Avatar Realism Affects the Way We Perceive, Nami Ogawa, Takuji Narumi, Michitaka Hirose

A Framework for Virtual 3D Manipulation of Face in Video, Jungsik Park, Jong-Il Park

Real-Time Marker-Based Finger Tracking with Neural Networks, Dario Pavllo, Thibault Porssut, Bruno Herbelin, Ronan Boulic

Vive Tracking Alignment and Correction Made Easy, Alex Peer, Peter Ullich, Kevin Ponto

COP: A New Continuous Packing Layout for 360 VR Videos, Qikai Pei, Juan Guo, Haiwen Lu, Guilong Ma, Wensong Li, Xinyu Zhang

Human Indentification Using Neural Network-Based Classification of Periodic Behaviors in Virtual Reality, Duc-Minh Pham

Mixed Reality Collaboration Between Human-Agent Teams, Thai Phan, Wolfgang Hönig, Nora Ayanian

Using Cybersickness Indicators to Adapt Navigation in Virtual Reality: A Pre-study, Jérémy Plouzeau, Jean-Rémy Chardonnet, Frédéric Merienne

Concept for Rendering Optimizations for Full Human Field of View HMDs, Daniel Pohl, Nural Choudhury, Markus Achtelik

Effects of Visual Realism and Moving Detail on Cybersickness, Matti Pouke, Artfu Tiiro, Steven M. LaValle, Timo Ojala

Smart Adaptation of BIM for Virtual Reality, Depending on Building Project Actors' Needs: the Nursery Case, Pierre Raimbaud, Frédéric Merienne, Florence Danglade, Ruding Lou, José Tiberio Hernández, Pablo Figueroa

AirwayVR: Learning Endotracheal Intubation in Virtual Reality, Pavithra Rajeswaran, Na-Teng Hung,Thenkurussi Kesavadas, John Vozenilek, Praveen Kumar

A Path-based Attention Guiding Technique for Assembly Environments with Target Occlusions, Patrick Renner, Jonas Blattgerste, Thies Pfeiffer

Using Vertex Displacements to Distort Virtual Bodies and Objects while Preserving Visuo-tactile Congruency during Touch, Marius Rubo, Matthias Gamer

A Preliminary Investigation of the Effects of Discrete Virtual Rotation on Cybersickness, Andreas N. Ryge, Casper Vollmers, Jonatan S. Hvass, Lars K. Andersen, Theis Berthelsen, Jon R. Bruun-Pedersen, Niels C. Nilsson, Rolf Nordahl

Voice Conversion System Based on Deep Neural Network Capable of Parallel Computation, Kunihiko Sato, Jun Rekimoto

Teach Me A Story : an Augmented Reality Application for Teaching History in Middle School, Barbara Schiavi, Franck Gechter, Céline Gechter, Albert Rizzo

Movement Visualizer for Networked Virtual Reality Platforms, Omar Shaikh, Yilu Sun, Andrea Stevenson Won

Augmented Reality-Based Personalized Virtual Operative Anatomyfor Neurosurgical Guidance and Training, Weixin Si, Xiangyun Liao, Qiong Wang, Pheng-Ann Heng

A Comparative Study of the Learning Outcomes and Experience of VR in Education, Yoana Slavova, Mu Mu

Gaze Direction in a Virtual EnvironmentVia a DynamicFull-image Color Effect, Mason Smith, Ann McNamara

Towards Mobile 3D Telepresence Using Head-worn Devices and Dual-Purpose Screens, Shoaib R. Soomro, Osman Eldes, Hakan Urey

Rendering of Pressure and Textures Using Wearable Haptics in Immersive VR Environments, Giovanni Spagnoletti, Leonardo Meli, Tommaso Lisini Baldi, Guido Gioioso, Claudio Pacchierotti, Domenico Prattichizzo

Light Virtual Reality Systems for the Training of Conditionally Automated Vehicle Drivers, Daniele Sportillo, Alexis Paljic, Luciano Ojeda, Philippe Fuchs, Vincent Roussarie

Redirected Scene Rotation for Immersive Movie Experiences, Travis Stebbins, Eric D. Ragan

Selecting Invisible Objects, Junwei Sun, Wolfgang Stuerzlinger

A Multisensory Virtual Environment for OSH Training, Mina Tahsiri, Glyn Lawson, Che Abdullah, Tessa Roper

Scope of Manipulability Sharing: a Case Study for Sports Training, Yoshiyuki Tanaka, Tadayoshi Shiokawa, Mitsuhisa Shiokawa

An Exploration on the Integration of Vibrotactile and Force Cues for 3D Interactive Tasks, Stanley Tarng, Aida Erfanian, Yaoping Hu, Frédéric Merienne

A Realtime Virtual Grasping System for Manipulating Complex Objects, Hao Tian, Changbo Wang, Xinyu Zhang

User Performance of VR-Based Tissue Dissection Under The Effects of Force Models and Tracing Speeds, Fernando Trejo, Yaoping Hu

The Effects of Olfactory Stimulation and Active Participation on Food Cravings in Virtual Reality, Nikita Mae B. Tuanquin, Simon Hoermann, Carl Jame Petersen, Robert W. Lindeman

Phase-Aligned Foveated Rendering for Virtual Reality Headsets, Eric Turner, Haomiao Jiang, Damien Saint-Macary, Behnam Bastani

Hybrid Decision Support System for Traffic Engineers, Manuela Uhr, Joachim Nitschke, Jingxin Zhang, Frank Steinicke

RIDERS: Road Inspection & Driver Simulation, Mauricio R. Veronez, Luiz Gonzaga Jr, Fabiane Bordin, Lucas Kupssinsku, Gabriel Lanzer Kannenberg, Tiago Duarte, Leonardo G. Santana, Jean Luca de Fraga, Demetrius Nunes Alves, Fernando Pinho Marson

Do Textures and Global Illumination Influence the Perception of Redirected Walking Based on Translational Gain?, Kristoffer Waldow, Arnulph Fuhrmann, Stefan M. Grünvogel

Immersing Web3D Furniture into Real Interior Images, Chao Wang, Shuang Liang, Jinyuan Jia

Tetrahedral Mesh Visualization in a Game Engine, Kuocheng Wang, Kishore Adimulam,Thenkurussi Kesavadas

Memory Task Performance across Augmented and Virtual Reality, Pete Willemsen, William Jaros, Charles McGregor, Edward Downs, Maranda Berndt, Alexander Passofaro

A Calibration Method for Large-Scale Projection Based Floor Display System, Chun Xie, Hidehiko Shishido, Yoshinari Kameda, Kenji Suzuki, Itaru Kitahara

Evaluation of Hand Gesture Annotation in Remote Collaboration Using Augmented Reality, Shohei Yamada, Naiwala P. Chandrasiri

Adopting the Roll Manipulation for Redirected Walking, Tatsuki Yamamoto, Keigo Matsumoto, Takuji Narumi, Tomohiro Tankkawa, Michitaka Hirose

On-the-fly Simulator of Tabletop Light-field 3-D Displays Powered by a Game Engine, Shunsuke Yoshida

Force Push: Exploring Expressive Gesture-to-Force Mappings for Indirect 3D Object Manipulation, Run Yu, Doug A. Bowman

Evaluation of Hand-Based Interaction for Near-Field Mixed Reality with Optical See-Through Head-Mounted Displays, Zhenliang Zhang, Benyang Cao, Dongdong Weng, Yue Liu, Yongtian Wang, Hua Huang

Inverse Virtual Reality: Intelligence-Driven Mutually Mirrored World, Zhenliang Zhang, Benyang Cao, Jie Guo, Dongdong Weng, Yue Liu, Yongtian Wang

Physics-Inspired Input Method for Near-Field Mixed Reality Application Using Latent Active Correction, Zhenliang Zhang, Yue Li, Dongdong Weng, Yue Liu, Yongtian Wang

VR Touch Museum, Yuchen Zhao, Maurizio Forte, Regis Kopper

Simulator Sick but still Immersed: A Comparison of Head-Object Collision Handling and their Impact on Fun, Immersion, and Simulator Sickness, Peter Ziegler, Daniel Roth, Andreas Knote, Michael Kreuzer, Sebastian von Mammen

Space Tentacles - Integrating Multimodal Input into a VR Adventure Game, Chris Zimmerer, Martin Fischbach, Marc Erich Latoschik

RESEARCH DEMOS

Tuesday—Thursday, 2nd floor

A Virtual Reality Simulator to Detect Acrophobia in Work-at-Height Situations, Jean-Rémy Chardonnet, Cédric Di Loreto, Julien Ryard, Alain Rousseau

Demonstration of Gaze-aware Video Streaming Solutions for Mobile VR, Saeik Firdose, Pietro Lungaro, Konrad Tollmar

Hands-Free Interaction for Augmented Reality in Vascular Interventions, Alon Grinshpoon, Shirin Sadri, Gabrielle J. Loeb, Carmine Elvezio, Steven K. Feiner

A Demonstration of FaceDisplay: Asymetric Multi-User Interaction for Mobile VR, Jan Gugenheimer, Evgeny Stemasov, Harpreet Sareen, Enrico Rukzio

A Demonstration of ShareVR: Co-Located Experiences for Virtual Reality between HMD and Non-HMD Users, Jan Gugenheimer, Evgeny Stemasov, Julian Frommel, Enrico Rukzio

In-Car 6-DoF Mixed Reality for Rear-Seat and Co-Driver Entertainment, Jonas Haeling, Christian Winkler, Stephan Leenders, Daniel Keßelheim, Axel Hildebrand, Marc Necker

A Virtual Hip Replacement Surgery Simulator with Realistic Haptic Feedback, Maximilian Kaluschke, Réne Weller, Gabriel Zachmann, Luigi Pelliccia, Mario Lorenz, Philipp Klimant, Sebastian Knopp, Johannes P. G. Atze, Falk Möckel

Demonstration of Olfactory Display Based on Sniffing Action, Shingo Kato, Masaaki Iseki, Takamichi Nakamoto

Game Room Map Integration in Virtual Environments for Free Walking, Marilyn Keller, Frédéric Exposito

HangerOVER: Development of HMD-Embedded Haptic Display Using the Hanger Reflex and VR application, Yuki Kon, Takuto Nakamura, Rei Sakuragi, Hirotaka Shionoiri,Vibol Yem, Hiroyuki Kajimoto

Redirected Spaces: Going Beyond Borders, Eike Langbehn, Paul Lubos, Frank Steinicke

Multisensory Virtual Reality Exposure Therapy, Alexander Marquardt, Christina Trepkowski, Jens Maiero, Ernst Kruijff, André Hinkenjann

Attention Guiding using Augmented Reality in Complex Environments, Patrick Renner, Thies Pfeiffer

A Demo of The Matrix Has You: Realizing Slow Motion in Full-Body Virtual Reality, Michael Rietzler, Florian Geiselhart, Julia Brich, Enrico Rukzio

Applying Multi-User Virtual Reality to Collaborative Medical Training, Jonas Schild, Sebastian Misztal, Benjamin Roth, Leonard Flock, Thomas Luiz, Dieter Lerner, Markus Herkersdorf, Konstantin Wegner, Markus Neuberger, Andreas Franke, Claus Kemp, Johannes Pranghofer, Sven Seele, Helmut Buhler, Rainer Herpers

Three Haptic Shape-Feedback Controllers for Virtual Reality, Mike Sinclair, Eyal Ofek, Christian Holz, Inrak Choi, Eric Whitmire, Evan Strasnick, Hrvoje Benko

Cliffhanger-VR, Marcel Tiator, Ben Fischer, Laurin Gerhardt, David Nowottnik, Hendrik Preu, Christian Geiger

AnimationVR - Interactive Controller-based Animating in Virtual Reality, Daniel Vogel, Paul Lubos, Frank Steinicke

Mobius Walker: Pitch and Roll Redirected Walking, Tatsuki Yamamoto, Jumpei Shimatani, Isamu Ohashi, Keigo Matsumoto, Takuji Narumi, Tomohiro Tanikawa, Michitaka Hirose

Water Flow Measurement Technology Assessing Spatial User Interaction in an Underwater Immersive Virtual Reality Environment, Shogo Yamashita, Shunichi Suwa, Takashi Miyaki, Jun Rekimoto

Softness-Hardness and Stickiness Feedback Using Electrical Stimulation while Touching a Virtual Object, Vibol Yem, Kevin Vu, Yuki Kon, Hiroyuki Kajimoto

DOCTORAL CONSORTIUM

Sunday—Monday, Room 2 (1st floor)

Encounter-type Haptic Interfaces for Virtual Reality Musical Instruments, Alberto Boem

Locomotion with Virtual Agents in the Realm of Social Virtual Reality, Andrea Bönsch

Robot Supported Virtual and Augmented Reality, Emanuel Vonach

High-fidelity Interaction for Virtual and Augmented Reality, Eric Whitmire

MR Pharmacy: Adaptive User Interfaces and Biofeedback for Therapy in Mixed Reality Environments, Fariba Mostajeran

Guiding People in Complex Indoor Environments using Augmented Reality, Georg Gerstweiler

Towards Reverse Disability Simulation in a Virtual Environment, Tanvir Irfan Chowdhury

Optical Touch Sensing on Non-Parametric Rear-Projection Surfaces, Jason Hochreiter

Leveraging Configuration Spaces and Navigation Functions for Redirected Walking, Jerald Thomas

Predicting Performance During a Dynamic Target Acquisition Task in Immersive Virtual Reality, Jillian Clements

Natural Human-Robot Interaction in Virtual Reality Telepresence Systems, Jingxin Zhang

Real-time MonoSLAM Vizualization in Virtual Reality, Loki Rasmussen

Shopping in Virtual Reality, Marco Speicher

Mediated Physicality: Inducing Illusory Physicality of a Virtual Human via Environmental Objects, Myungho Lee

Prompting Techniques for Guidance and Action Assistance Using Augmented-Reality Smart-Glasses, Patrick Renner

The Influence of Avatar Representation and Behavior on Communication, Saher A. Aseeri

Walk-Centric User Interfaces, Wallace S. Lages

Evaluating the Effectiveness of Head-Mounted Display Virtual Reality (HMD VR) Environment on Students' Learning for a Virtual Collaborative Engineering Assembly Task, Wen Huang

VIDEOS

Tuesday—Thursday, 2nd floor

Until Jesse 360, Miriam Ross

CarpetVR: the Magic Carpet Meets the Magic Mirror, Victor Lempitsky, Alexander Vakhitov, Andrew Starostin

3D Tune-In: 3D-games for Tuning and Learning about Hearing Aids, Lorenzo Picinali

VR Music, Ali Rastegar

Realtime Collision Avoidance for Mechanisms with Complex Geometries, Mikel Sagardia, Alexander Martín Turrillas, Thomas Hulin

360° Video - Light Design Experience, Manuel Dudczig

Secret Detours: A Garden in Singapore, Elke Reinhuber, Benjamin Seide, Ross Williams

Augmented VR, Antonis Karakottas, Alexandros Papachristou, Alexandros Doumanoglou, Nikolaos Zioulis, Dimitrios Zarpalas, Petros Daras

AnimationVR - Interactive Controller-based Animating in Virtual Reality, Daniel Vogel, Paul Lubos, Frank Steinicke

Use of Virtual Reality to Teach Teamwork and Patient Safety in Surgical Education, Tobias Todsen, Jacob Melchiors, Kasper Wennerwaldt

The Depth Light, McKennon McMillian, Hunter Finney, Jonathan Hopper, J. Adam Jones

Auto-scaled Full Body Avatars for Virtual Reality: Facilitating Interactive Virtual Body Modification, Tuukka M. Takala, Heikki Heiskanen

Beacon Virtua, Andrew Woods, Paul Bourke, Nick Oliver

Virtual Immersion. Simulating Immersive Experiences in VR, Volker Kuchelmeister

3DUI CONTEST

Tuesday—Thursday, Rooms 1, 2 & 3 (1st Floor)

The 9th annual IEEE 3DUI Contest invited researchers, students, enthusiasts, and professionals to develop and present 3D User Interfaces (3DUIs) for three different tasks in fully immersive Virtual Environments (VEs): 1) Ladder Climbing, 2) First-Person View Flying, and 3) Tower Stacking. New to this year's edition of the 3DUI Contest is that participating teams compete against each other in a tournament during the conference. We selected eight teams to present their solutions during the conference as interactive demos and to participate in the tournament that will occur just before the banquet.

3DUI-League: 9th Annual 3DUI Contest, Rongkai Guo, Ryan P. McMahan, Benjamin Weyers

Fluid VR: Extended Object Associations for Automatic Mode Switching in Virtual Reality, Mayra Donaji Barrera Machuca, Junwei Sun, Duc-Minh Pham, Wolfgang Stuerzlinger

3DUI Contest 2018 - Team NaN, Christian Hirt, Anh Nguyen, Markus Zank

3DUI Contest 2018: 3D Interaction, Bo Sun, Aleksandr Fritz, Vincent Perry, Paul Havig, Simon Su

Climb, Direct, Stack: Smart Interfaces for ELeague Contest, Yuan Li, Run Yu, Lei Zhang, Wallace S. Lages, Doug A. Bowman

Batmen Forever: Unified Virtual Hand Metaphor for Consumer VR Setups, André Montes Rodrigues, Mario Nagamura, Luis Gustavo Freire da Costa, Marcelo Knorich Zuffo

Climb, Fly, Stack: Design of Tangible and Gesture-Based Interfaces for Natural and Efficient Interaction, Alexandre Audinot, Emeric Goga, Vincent Goupil, Carl-Johan Jorgensen, Adrien Reuzeau, Ferran Argelaguet

3DAthlon: 3D Gestural Interfaces to Support a 3-Stage Contest in VR, Jeronimo G. Grandi, Henrique G. Debarba, Juliano Franz, Victor Oliveira, Abel Ticona, Gabrielle A. Souza, Izadora Berti, Steeven Villa, Luciana Nedel, Anderson Maciel

Toward Intuitive 3D User Interfaces for Climbing, Flying and Stacking, Antonin Bernardin, Guillaume Cortes, Rebecca Fribourg, Tiffany Luong, Florian Nouviale, Hakim Si-Mohammed

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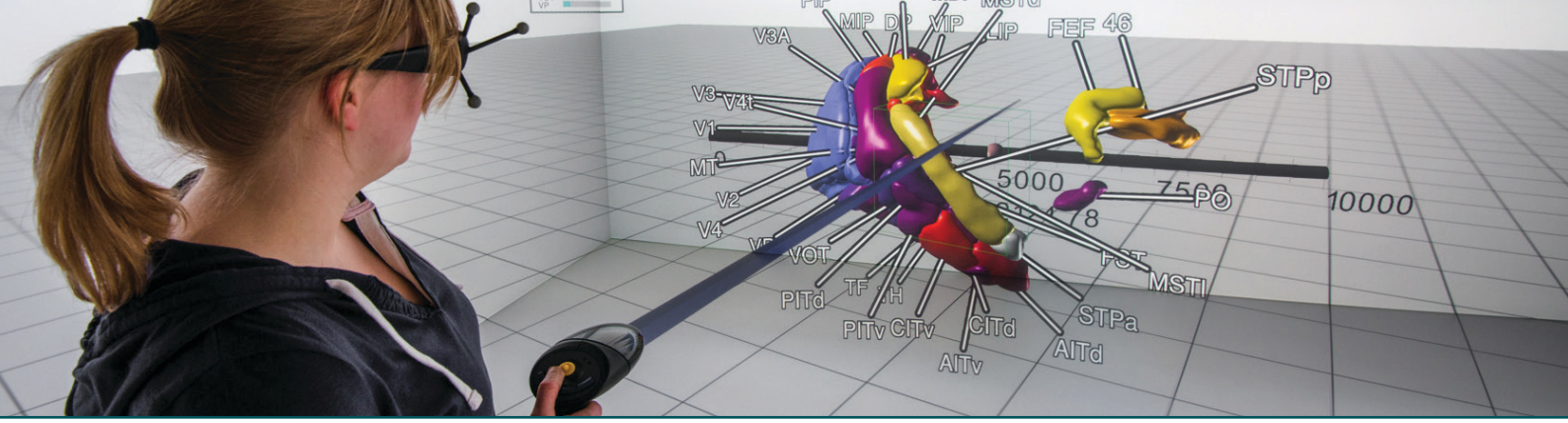

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