

2018 IEEE Conference on Virtual Reality and 3D User Interfaces (VR 2018)

**Tuebingen/Reutlingen, Germany
18-22 March 2018**



**IEEE Catalog Number: CFP18VIR-POD
ISBN: 978-1-5386-3366-3**

**Copyright © 2018 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP18VIR-POD
ISBN (Print-On-Demand):	978-1-5386-3366-3
ISBN (Online):	978-1-5386-3365-6
ISSN:	1087-8270

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

Contents

General Chair Message	xvii
Program Chair Message	xix
IEEE Visualization and Graphics Technical Committee (VGTC)	xx
Organizing Committee	xxi
Program Committee	xxii
Steering Committee	xxii
Paper Reviewers	xxiii
Keynote Speaker: Albert “Skip” Rizzo	xxv
Keynote Speaker: Katherine J. Kuchenbecker	xxvi
Keynote Speaker: Helmut Hobmaier	xxvii
Keynote Speaker: Oliver Riedel	xxviii
Keynote Speaker: Robert Menzel	xxix
2018 VGTC Virtual Reality Career Award	xxx
2018 VGTC Virtual Reality Technical Achievement Award	xxxi
Tutorials	xxxii

Conference Papers

Papers Session 1: Avatars and Virtual Humans

Session Chair: Rick Skarbez, Virginia Tech, USA

Investigating the Effects of Anthropomorphic Fidelity of Self-Avatars on Near Field Depth Perception in Immersive Virtual Environments	1
Elham Ebrahimi, Leah S. Hartman, Andrew Robb, Christopher C. Pagano, Sabarish V. Babu	
Simulating Movement Interactions between Avatars & Agents in Virtual Worlds Using Human Motion Constraints	9
Sahil Narang, Andrew Best, Dinesh Manocha	
Any “Body” There? Avatar Visibility Effects in a Virtual Reality Game	17
Jean-Luc Lugin, Philipp Krop, Maximilian Ertl, Richard Klüpfel, Sebastian Stierstorfer, Bianka Weisz, Maximilian Rück, Johann Schmitt, Nina Schmidt, Marc Erich Latoschik	
Empirical Evaluation of Virtual Human Conversational and Affective Animations on Visual Attention in Inter-Personal Simulations	25
Matias Volonte, Andrew Robb, Andrew T. Duchowski, Sabarish V. Babu	

Papers Session 2: Augmented Reality

Session Chair: Yuta Itoh, Tokyo Institute of Technology, Japan

An Evaluation of Bi-Manual Gestures on the Microsoft HoloLens	33
Nikolas Chaconas, Tobias Höllner	
Interacting with Distant Objects in Augmented Reality	41
Matt Whitlock, Ethan Hanner, Jed R. Brubaker, Shaun Kane, Danielle Albers Szafir	

Design and Assessment of a Collaborative 3D Interaction Technique for Handheld Augmented Reality.....	49
Jeronimo G. Grandi, Henrique G. Debarba, Iago Berndt, Luciana Nedel, Anderson Maciel	
Papers Session 3: Body and Mind	
Session Chair: Tabitha Peck, Davidson College, USA	
Performance-Driven Dance Motion Control of a Virtual Partner Character.....	57
Christos Mousas	
Lucid Virtual Dreaming: Antecedents and Consequents of Virtual Lucidity during Virtual Threat.....	65
Jordan T. Quaglia, Andrew Holecek	
Papers Session 4: Active Haptics	
Session Chair: Miguel Otaduy, Universidad Rey Juan Carlos (URJC), Spain	
The Effect of Haptic Prediction Accuracy on Presence	73
Dominik Gall, Marc Erich Latoschik	
Enhancing the Stiffness Perception of Tangible Objects in Mixed Reality Using Wearable Haptics	81
Xavier de Tinguy, Claudio Pacchierotti, Maud Marchal, Anatole Lécuyer	
Effect of Electrical Stimulation Haptic Feedback on Perceptions of Softness-Hardness and Stickiness while Touching a Virtual Object	89
Vibol Yem, Kevin Vu, Yuki Kon, Hiroyuki Kajimoto	
Papers Session 5: Cybersickness	
Session Chair: Torsten Kuhlen, RWTH Aachen University, Germany	
Spatial Updating and Simulator Sickness during Steering and Jumping in Immersive Virtual Environments.....	97
Tim Weißker, Andre Kunert, Bernd Frohlich, Alexander Kulik	
Visually-Induced Motion Sickness Reduction via Static and Dynamic Rest Frames.....	105
Zekun Cao, Jason Jerald, Regis Kopper	
Cybersickness-Provoking Virtual Reality Alters Brain Signals of Persons with Multiple Sclerosis.....	113
Imtiaz Muhammad Arafat, Sharif Mohammad Shahnewaz Ferdous, John Quarles	
Effects of Latency Jitter on Simulator Sickness in a Search Task.....	121
Jan-Philipp Stauffert, Florian Niebling, Marc Erich Latoschik	
Papers Session 6: Locomotion & Walking	
Session Chair: Niels Nielson, Aalborg University Copenhagen, Denmark	
Inducing Compensatory Changes in Gait Similar to External Perturbations Using an Immersive Head Mounted Display	128
Lara Riem, Jacob Van Dehy, Tanya Onushko, Scott Beardsley	
Effect of Virtual Human Gaze Behaviour during an Orthogonal Collision Avoidance Walking Task	136
Sean D. Lynch, Julien Pettré, Julien Bruneau, Richard Kulpa, Armel Crétual, Anne-Hélène Olivier	
You Shall Not Pass: Non-Intrusive Feedback for Virtual Walls in VR Environments with Room-Scale Mapping.....	143
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	
Papers Session 7: 3D Hand Interaction and Physics	
Session Chair: Maud Marchal, IRISA-INSA Rennes, France	
Effects of Hand Representations for Typing in Virtual Reality	151
Jens Grubert, Lukas Witzani, Eyal Ofek, Michel Pahud, Matthias Kranz, Per Ola Kristensson	
Text Entry in Immersive Head-Mounted Display-Based Virtual Reality Using Standard Keyboards.....	159
Jens Grubert, Lukas Witzani, Eyal Ofek, Michel Pahud, Matthias Kranz, Per Ola Kristensson	

Effects of Image Size And Structural Complexity On Time And Precision of Hand Movements in Head Mounted Virtual Reality	167
Anil Ufuk Batmaz, Michel de Mathelin, Birgitta Dresch-Langley	

Efficient Physics-Based Implementation for Realistic Hand-Object Interaction in Virtual Reality.....	175
Markus Höll, Markus Oberweger, Clemens Arth, Vincent Lepetit,	

Soft Hand Simulation for Smooth and Robust Natural Interaction.....	183
Mickeal Verschoor, Daniel Lobo, Miguel A. Otaduy	

Papers Session 8: Social VR

Session Chair: Andrew Robb, Clemson University, USA

Developing and Proving a Framework for Reaction Time Experiments in VR to Objectively Measure Social Interaction with Virtual Agents.....	191
Carolin Wienrich, Richard Gross, Felix Kretschmer, Gisela Müller-Plath	

Social VR: How Personal Space is Affected by Virtual Agents' Emotions.....	199
Andrea Bonsch, Sina Radke, Heiko Overath, Laura M. Asche, Jonathan Wendt, Tom Vierjahn, Ute Habel, Torsten W. Kuhlen	

Social Presence and Cooperation in Large-Scale Multi-User Virtual Reality – The Relevance of Social Interdependence for Location-Based Environments.....	207
C. Wienrich, K. Schindler, N. Döllinger, S. Kock, O. Traupe	

Beyond Replication:Augmenting Social Behaviors in Multi-User Virtual Realities.....	215
Daniel Roth, Constantin Kleinbeck, Tobias Feigl, Christopher Mutschler, Marc Erich Latoschik	

Influences on the Elicitation of Interpersonal Space with Virtual Humans.....	223
David M. Krum, Sin-Hwa Kang, Thai Phan	

Papers Session 9: Rendering

Session Chair: Bernd Fröhlich, Bauhaus-Universitaet Weimar, Germany

Real-Time Re-textured Geometry Modeling Using Microsoft HoloLens	231
Samuel Dong, Tobias Höllerer	

Profiling Distributed Virtual Environments by Tracing Causality	238
Sebastian Friston, Elias Griffith, David Swapp, Alan Marshall, Anthony Steed	

Software-Based Visual Aberration Correction for HMDs.....	246
Feng Xu, Dayang Li	

BrightView: Increasing Perceived Brightness of Optical See-Through Head-Mounted Displays through Unnoticeable Incident Light Reduction	251
Shohei Mori, Sei Ikeda, Alexander Plopski, Christian Sandor	

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

Session Chair: Evan Suma, University of Southern California, USA

Spatially Perturbed Collision Sounds Attenuate Perceived Causality in 3D Launching Events.....	259
Duotun Wang, James Kubricht, Yixin Zhu, Wei Liang, Song-Chun Zhu, Chenfanfu Jiang, Hongjing Lu	

Papers Session 11: Immersion & Embodiment

Session Chair: Gerd Bruder, University of Central Florida, USA

In Limbo: The Effect of Gradual Visual Transition between Real and Virtual on Virtual Body Ownership Illusion and Presence.....	267
Sungchul Jung, Pamela J. Wisniewski, Charles E. Hughes	

Studying the Sense of Embodiment in VR Shared Experiences	273
Rebecca Fribourg, Ferran Argelaguet, Ludovic Hoyet, Anatole Lecuyer	

Papers Session 12: Training

Session Chair: Benjamin Lok, University of Florida, USA

WoaH: A Virtual Reality Work-at-Height Simulator	281
Cédric Di Loreto, Jean-Rémy Chardonnet, Julien Ryard, Alain Rousseau	
Towards Joint Attention Training for Children with ASD – A VR Game Approach and Eye Gaze Exploration	289
Chao Mei, Bushra T. Zahed, Lee Mason, John Quarles	
Synthesizing Personalized Training Programs for Improving Driving Habits via Virtual Reality	297
Yining Lang, Liang Wei, Fang Xu, Yibiao Zhao, Lap-Fai Yu	

Papers Session 13: Redirected Walking

Session Chair: Mary Whitton, University of North Carolina at Chapel Hill, USA

I Can See on My Feet While Walking: Sensitivity to Translation Gains with Visible Feet	305
Lucie Kruse, Eike Langbehn, Frank Steinicke	
Experiencing an Invisible World War I Battlefield Through Narrative-Driven Redirected Walking in Virtual Reality..	313
Run Yu, Zachary Duer, Todd Ogle, Doug A. Bowman, Thomas Tucker, David Hicks, Dongsoo Choi, Zach Bush, Huy Ngo, Phat Nguyen, Xindi Liu	

Papers Session 14: Applications

Session Chair: Maki Sugimoto, Keio University, Japan

Fluid Sketching—Immersive Sketching Based on Fluid Flow	475
Sevinc Eroglu, Sascha Gebhardt, Patric Schmitz, Dominik Rausch, Torsten Wolfgang Kuhlen	
Automatic Furniture Arrangement Using Greedy Cost Minimization.....	491
Peter Kán, Hannes Kaufmann	

Papers Session 15: Navigation

Session Chair: Anatole Lecuyer, Inria/IRISA Rennes, France

Interactive Exploration Assistance for Immersive Virtual Environments Based on Object Visibility and Viewpoint Quality	355
Sebastian Freitag, Benjamin Weyers, Torsten W. Kuhlen	
RST 3D: A Comprehensive Gesture Set for Multitouch 3D Navigation	363
Alexander Kulik, André Kunert, Magdalena Kei, Bernd Froehlich	
Rapid, Continuous Movement Between Nodes as an Accessible Virtual Reality Locomotion Technique.....	371
M. P. Jacob Habgood, David Moore, David Wilson, Sergio Alapont	

Papers Session 16: Passive Haptics

Session Chair: Rob Lindeman, University of Canterbury, New Zealand

Cognitive and Touch Performance Effects of Mismatched 3D Physical and Visual Perceptions	379
Jason Hochreiter, Salem Daher, Gerd Bruder, Greg Welch	

Papers Session 17: Selection and Pointing

Session Chair: Wolfgang Stürzlinger, Simon Fraser University, Canada

Transferability of Spatial Maps: Augmented Versus Virtual Reality Training	387
Nicko R. Caluya, Alexander Plopski, Jayzon F. Ty, Christian Sandor, Takafumi Taketomi, Hirokazu Kato	
User Preference for SharpView-Enhanced Virtual Text during Non-Fixated Viewing	394
Trey Cook, Nate Phillips, Kristen Massey, Alexander Plopski, Christian Sandor, J. Edward Swan II	
Visual Perception of Real World Depth Map Resolution for Mixed Reality Rendering.....	401
Lohit Petikam, Andrew Chalmers, Taeyhun Rhee	
Human Compensation Strategies for Orientation Drifts	409
Tobias Feigl, Christopher Mutschler, Michael Philippsen	

Simulated Reference Frame: A Cost-Effective Solution to Improve Spatial Orientation in VR	415
Thinh Nguyen-Vo, Bernhard E. Riecke, Wolfgang Stuerzlinger	

Papers Session 18: Hardware & Tracking

Session Chair: Henry Fuchs, University of North Carolina at Chapel Hill, USA

Augmented Reality Driving Using Semantic Geo-Registration	423
Han-Pang Chiu, Varun Murali, Ryan Villamil, G. Drew Kessler, Supun Samarasekera, Rakesh Kumar	
Cascaded 3D Full-Body Pose Regression from Single Depth Image at 100 FPS	431
Shihong Xia, Zihao Zhang, Le Su	
Coded Light Based Extensible Optical Tracking System.....	439
Dong Li, Danli Wang, Dongdong Weng, Yue Li, Hang Xun, Yihua Bao	

Papers Session 19: 360° and Panoramic Videos

Session Chair: Sei Ikeda, Ritsumeikan University, Japan

Generating VR Live Videos with Tripod Panoramic Rig	446
Feng Xu, Tianqi Zhao, Bicheng Luo, Qionghai Dai	

Papers Session 20: Learning and Educational VR

Session Chair: Kyle Johnson, University of Georgia, USA

Neurophysiology of Visual-Motor Learning during a Simulated Marksmanship Task in Immersive Virtual Reality....	451
Jillian M. Clements, Regis Kopper, David J. Zielinski, Hrishikesh Rao, Marc A. Sommer, Elayna Kirsch, Boyla O. Mainsah, Leslie M. Collins, Lawrence G. Appelbaum	
Active Assembly Guidance with Online Video Parsing.....	459
Bin Wang, Guofeng Wang, Andrei Sharf, Yangyan Li, Fan Zhong, Xueying Qin, Daniel CohenOr, Baoquan Chen	
Teacher-Guided Educational VR: Assessment of Live and Pre-recorded Teachers Guiding Virtual Field Trips.....	467
Christoph W. Borst, Nicholas G. Lipari, Jason W. Woodworth	
Immersive Visualization of Abstract Information: An Evaluation on Dimensionally-Reduced Data Scatterplots.....	483
Jorge A. Wagner Filho, Marina F. Rey, Carla M.D.S. Freitas, Luciana Nedel	

Papers Session 21: Visual Perception

Session Chair: Victoria Interrante, University of Minnesota, USA

Yea Big, Yea High: A 3D User Interface for Surface Selection by Progressive Refinement in Virtual Environments	320
Bret Jackson, Brighten Jelke, Gabriel Brown	
Analysis of Proximity-Based Multimodal Feedback for 3D Selection in Immersive Virtual Environments.....	327
Oscar Ariza, Gerd Bruder, Nicholas Katakis, Frank Steinicke	
Pointing at Wiggle 3D Displays.....	335
Michaël Ortega, Wolfgang Stuerzlinger	
Perception of Redirected Pointing Precision in Immersive Virtual Reality	341
Henrique G. Debarba, Jad-Nicolas Khoury, Sami Perrin, Bruno Herbelin, Ronan Boulic	
Performance Envelopes of In-Air Direct and Smartwatch Indirect Control for Head-Mounted Augmented Reality	347
Dennis Wolf, John J. Dudley, Per Ola Kristensson	

Posters

Light Projection-Induced Illusion for Controlling Object Color	499
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.....	501
Daniel Andersen, Voicu Popescu	

Agency Enhances Body Ownership Illusion of Being a Virtual Bat	505
Anastassia Andreassen, Niels Christian Nilsson, Stefania Serafin	
Spatial Asynchronous Visuo-Tactile Stimuli Influence Ownership of Virtual Wings	503
Anastassia Andreassen, Niels Christian Nilsson, Stefania Serafin	
A Threefold Approach for Precise and Efficient Locomotion in Virtual Environments with Varying Accessibility	507
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	509
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	511
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.....	513
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.	515
David Brickler, Sabarish V. Babu, Jeffrey Bertrand, Ayush Bhargava	
Reducing VR Sickness through Peripheral Visual Effects.....	517
Helmut Buhler, Sebastian Misztal, Jonas Schild	
Smart Choices for Deviceless and Device-based Manipulation in Immersive Virtual Reality	519
Fabio M. Caputo, Daniel Mendes, Alessia Bonetti, Giacomo Saletti, Andrea Giachetti	
Virtual Content Creation Using Dynamic Omnidirectional Texture Synthesis.....	521
Chih-Fan Chen, Evan Suma Rosenberg	
Redirected Walking in Irregularly Shaped Physical Environments with Dynamic Obstacles	523
Haiwei Chen, Samantha Chen, Evan Suma Rosenberg	
Real-time 3D Face Reconstruction and Gaze Tracking for Virtual Reality	525
Shu-Yu Chen, Lin Gao, Yu-Kun Lai, Paul L. Rosin, Shihong Xia	
Path Prediction using LSTM Network for Redirected Walking	527
Yong-Hun Cho, Dong-Yong Lee, In-Kwon Lee	
Reverse Disability Simulation in a Virtual Environment.....	529
Tanvir Irfan Chowdhury, Sharif Mohammad Shahnewaz Ferdous, Tabitha C. Peck, John Quarles	
Virtual Buzzwire: Assessment of aPrototype VR Game for Stroke Rehabilitation	531
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	533
Rory M.S. Clifford, Humayun Khan, Simon Hoermann, Mark Billingham, Robert W. Lindeman	
Augmentation of Road Surfaces with Subsurface Utility Model Projections.....	535
Stéphane Côté, Alexandra Mercier	
Augmented Reality Visualization of Joint Movements for Physical Examination and Rehabilitation	537
Henrique Galvan Debarba, Marcelo Elias de Oliveira, Alexandre Ladermann, Sylvain Chague, Caecilia Charbonnier	
Tracking a Consumer HMD with a Third Party Motion Capture System	539
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	541
Nianchen Deng, Yanqing Zhou, Jiannan Ye, Xubo Yang	
Mobile AR In and Out: Towards Delay-based Modeling of Acoustic Scenes.....	543
Cumhur Erkut, Jonas Holfelt, Stefania Serafin	

Head-to-Body-Pose Classification in No-Pose VR Tracking Systems	545
Tobias Feigl, Christopher Mutschler, Michael Philippsen	
Investigating the Reason for Increased Postural Instability in Virtual Reality for Persons with Balance Impairments ..	547
Sharif Mohammad Shahnewaz Ferdous, Tanvir Irfan Chowdhury, Imtiaz Muhammad Arafat, John Quarles	
Heterogeneous, Distributed Mixed Reality Applications. A Concept	549
Pablo Figueroa, José Tiberio Hernández, Frédéric Merienne, Jean-Rémy Chardonnet, José Dorado, J. Sebastián Lopez	
Immersive Visual Analysis to Explore Mystery at Wildlife Preserve	551
Aleksandr Fritz, Bo Sun, Wei Xu	
Touchless Haptic Feedback for VR Rhythm Games	553
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.....	555
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.....	557
Hamza Ghandorh, Roy Eagleson, Sandrine de Ribaupierre	
Model Retrieval by 3D Sketching in Immersive Virtual Reality.....	559
Daniele Giunchi, Stuart James, Anthony Steed	
Immersive Virtual Fieldwork: Advances for the Petroleum Industry.....	561
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	563
Steve Grogorick, Georgia Albuquerque, Marcus Magnor	
Immersive Robot-Assisted Virtual Reality Therapy for Neurologically-Caused Gait Impairments	565
Negin Hamzeheinejad, Samantha Straka, Dominik Gall, Franz Weilbach, Marc Erich Latoschik	
Deep Localization on Panoramic Images.....	567
Atsutoshi Hanasaki, Hideaki Uchiyama, Atsushi Shimada, Rin-ichiro Taniguchi	
An Approach to Embodiment and Interactions with Digital Entities in Mixed-Reality Environments.....	569
Mohamed Handosa, Hendrik Schulze, Denis Gra anin, Matthew Tucker, Mark Manuel	
Investigating a Sparse Peripheral Display in a Head-Mounted Display for VR Locomotion.....	571
Abraham M. Hashemian, Alexandra Kitson, Thinh Nguyen-Vo, Hrvoje Benko, Wolfgang Stuerzlinger, Bernhard E. Riecke	
Preliminary Environment Mapping for Redirected Walking.....	573
Christian Hirt, Markus Zank, Andreas Kunz	
The Relationship between Visual Attention and Simulator Sickness: A Driving Simulation Study.....	575
Anne Hoesch, Sandra Poeschl, Florian Weidner, Roberto Walter, Nicola Doering	
Personal Perspective: Using Modified World Views to Overcome Real-Life Limitations in Virtual Reality	577
Adrian H. Hoppe, Florian van de Camp, Rainer Stiefelhagen	
Please Don't Puke: Early Detection of Severe Motion Sickness in VR.....	579
Courtney Hutton, Shelby Ziccardi, Julio Medina, Evan Suma Rosenberg	
Real-time Control Operation Support of Unstable System by Visual Feedback	581
Tomohiro Ichiyama, Atsushi Matsubayashi, Yasutoshi Makino, Hiroyuki Shinoda	
Comparing VR Display with Conventional Displays for User Evaluation Experiences.....	583
Quinate Ihemedu-Steinke, Gerrit Meixner, Michael Weber	
Towards Standardization of Medical Trials Using Virtual Experimenters.....	585
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	587
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	589
Thomas Jung, Patrick Bauer	
HIPS - A Virtual Reality Hip Prosthesis Implantation Simulator	591
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	593
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	595
Oral Kaplan, Goshiro Yamamoto, Takafumi Taketomi, Yasuhide Yoshitake, Alexander Plopski, Christian Sandor, Hirokazu Kato	
Olfactory Display Based on Sniffing Action	597
Shingo Kato, Takamichi Nakamoto	
Effect of Reclining Angle on the Perception of Horizontal Plane for HMD Users	599
Hideki Kawai, Hiroki Hara, Yasuyuki Yanagida	
The Effect of Immersion on Emotional Responses to Film Viewing in a Virtual Environment.....	601
Aelee Kim, Minha Chang, Yeseul Choi, Sohyeon Jeon, Kyoungmin Lee	
A User-Based Comparison of Two Augmented Reality Glasses	603
Elisa Maria Klose, Ludger Schmidt	
Using EEG to Decode Subjective Levels of Emotional Arousal during an Immersive VR Roller Coaster Ride.....	605
F. Klotzsche, A. Mariola, S Hofmann, V. V. Nikulin, A. Villringer, M. Gaebler	
Using Industrial Robots as Haptic Devices for VR-Training.....	607
Sebastian Knopp, Mario Lorenz, Luigi Pelliccia, Philipp Klimant	
HangerOVER: Mechanism of Controlling the Hanger Reflex Using Air Balloon for HMD Embedded Haptic Display	609
Yuki Kon, Takuto Nakamura, Vibol Yem, Hiroyuki Kajimoto	
Illusory Body Ownership between Different Body Parts: Synchronization of Right Thumb and Right Arm	611
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	613
Konstantinos Koumaditis, Francesco Chinello, Sarune Venckute	
Evaluation of Environment-Independent Techniques for 3D Position Marking in Augmented Reality	615
Wallace S. Lages, Yuan Li, Doug A. Bowman	
Using Pico Projectors With Spatial Contextual Awareness To Create Augmented Knowledge Spaces For Interdisciplinary Engineering Teams	617
Isabel Leber, Matthias Merk, Gabriela Tullius, Peter Hertkorn	
Pop the Feed Filter Bubble: Making Reddit Social Media a VR Cityscape.....	619
Rhema Linder, Alexandria M. Stacy, Nic Lupfer, Andruid Kerne, Eric D. Ragan	
A Method of View-dependent Stereoscopic Projection on Curved Screen.....	621
Juan Liu, Hanchao Li, Lu Zhao, Siwei Zhao, Guowen Qi, Yulong Bian, Xiangxu Meng, Chenglei Yang	
Behavioral Simulation of Passengers in a Waiting Hall.....	623
Shaohua Liu, Xiyuan Song, Hao Jiang, Min Shi, Tianlu Mao	
VR-Assisted vs Video-Assisted Teacher Training	625
Jean-Luc Lugin, Sebastian Oberdörfer, Marc Erich Latoschik	

Casting Virtual Shadows Based on Brightness Induction for Optical See-Through Displays.....	627
Shinnosuke Manabe, Sei Ikeda, Asako Kimura, Fumihisa Shibata	
Touchless Haptic Feedback for Supernatural VR Experiences	629
Jonatan Martinez, Daniel Griffiths, Valerio Biscione, Orestis Georgiou, Tom Carter	
Biomechanical Parameters Under Curvature Gains and Bending Gains in Redirected Walking	631
Keigo Matsumoto, Ayaka Yamada, Anna Nakamura, Yasushi Uchmura, Keitaro Kawai, Tomohiro Tanikawa	
Intraosseous Access Simulator in Newborns VR System	633
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.....	635
Noah Miller, Pete Willemsen, Robert Feyen	
Immersive Exploration of OSGi-based Software Systems in Virtual Reality	637
Martin Misiak, Doreen Seider, Sascha Zur, Arnulph Fuhrmann, Andreas Schreiber	
AR in a Large Area through Instance Recognition with Hybrid Sensors	639
Ken Miyamoto, Takahiro Kashima, Osamu Tsukahara	
Impact of Alignment Point Distance Distribution on SPAAM Calibration of Optical See-Through Head-Mounted Displays	641
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	643
Adrian K. T. Ng, Leith K. Y. Chan, Henry Y. K. Lau	
Effect of Environment Size on Curvature Redirected Walking Thresholds.....	645
Anh Nguyen, Yannick Rothacher, Andreas Kunz, Peter Brugger, Bigna Lenggenhager	
Object Size Perception in Immersive Virtual Reality: Avatar Realism Affects the Way We Perceive	647
Nami Ogawa, Takuji Narumi, Michitaka Hirose	
A Framework for Virtual 3D Manipulation of Face in Video.....	649
Jungsik Park, Jong-Il Park	
Real-Time Marker-Based Finger Tracking with Neural Networks.....	651
Dario Pavlo, Thibault Porssut, Bruno Herbelin, Ronan Boulic	
Vive Tracking Alignment and Correction Made Easy.....	653
Alex Peer, Peter Ullrich, Kevin Ponto	
COP: A New Continuous Packing Layout for 360 VR Videos	655
Qikai Pei, Juan Guo, Haiwen Lu, Guilong Ma, Wensong Li, Xinyu Zhang	
Human Identification Using Neural Network-Based Classification of Periodic Behaviors in Virtual Reality.....	657
Duc-Minh Pham	
Mixed Reality Collaboration Between Human-Agent Teams	659
Thai Phan, Wolfgang Hönig, Nora Ayanian	
Using Cybersickness Indicators to Adapt Navigation in Virtual Reality: A Pre-study	661
Jérémy Plouzeau, Jean-Rémy Chardonnet, Frédéric Merienne	
Concept for Rendering Optimizations for Full Human Field of View HMDs.....	663
Daniel Pohl, Nural Choudhury, Markus Achtelik	
Effects of Visual Realism and Moving Detail on Cybersickness.....	665
Matti Pouke, Arttu Tiiri, Steven M. LaValle, Timo Ojala	
Smart Adaptation of BIM for Virtual Reality, Depending on Building Project Actors' Needs: the Nursery Case	667
Pierre Raimbaud, Frédéric Merienne, Florence Danglade, Ruding Lou, José Tiberio Hernández, Pablo Figueroa	

AirwayVR: Learning Endotracheal Intubation in Virtual Reality	669
Pavithra Rajeswaran, Na-Teng Hung,Thenkurussi Kesavadas, John Vozenilek, Praveen Kumar	
A Path-based Attention Guiding Technique for Assembly Environments with Target Occlusions.....	671
Patrick Renner, Jonas Blattgerste, Thies Pfeiffer	
Using Vertex Displacements to Distort Virtual Bodies and Objects while Preserving Visuo-tactile Congruency during Touch.....	673
Marius Rubo, Matthias Gamer	
A Preliminary Investigation of the Effects of Discrete Virtual Rotation on Cybersickness	675
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	677
Kunihiko Sato, Jun Rekimoto	
Teach Me A Story: an Augmented Reality Application for Teaching History in Middle School.....	679
Barbara Schiavi, Franck Gechter, Céline Gechter, Albert Rizzo	
Movement Visualizer for Networked Virtual Reality Platforms	681
Omar Shaikh, Yilu Sun, Andrea Stevenson Won	
Augmented Reality-Based Personalized Virtual Operative Anatomyfor Neurosurgical Guidance and Training	683
Weixin Si, Xiangyun Liao, Qiong Wang, Pheng-Ann Heng	
A Comparative Study of the Learning Outcomes and Experience of VR in Education	685
Yoana Slavova, Mu Mu	
Gaze Direction in a Virtual EnvironmentVia a DynamicFull-image Color Effect.....	687
Mason Smith, Ann McNamara	
Towards Mobile 3D Telepresence Using Head-worn Devices and Dual-Purpose Screens.....	689
Shoaib R. Soomro, Osman Eldes, Hakan Urey	
Rendering of Pressure and Textures Using Wearable Haptics in Immersive VR Environments	691
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	693
Daniele Sportillo, Alexis Paljic, Luciano Ojeda, Philippe Fuchs, Vincent Roussarie	
Redirected Scene Rotation for Immersive Movie Experiences	695
Travis Stebbins, Eric D. Ragan	
Selecting Invisible Objects	697
Junwei Sun, Wolfgang Stuerzlinger	
A Multisensory Virtual Environment for OSH Training.....	699
Mina Tahsiri, Glyn Lawson, Che Abdullah, Tessa Roper	
Scope of Manipulability Sharing: a Case Study for Sports Training.....	701
Yoshiyuki Tanaka, Tadayoshi Shiokawa, Mitsuhisa Shiokawa	
An Exploration on the Integration of Vibrotactile and Force Cues for 3D Interactive Tasks	703
Stanley Tarnq, Aida Erfanian, Yaoping Hu, Frédéric Merienne	
A Realtime Virtual Grasping System for Manipulating Complex Objects	705
Hao Tian, Changbo Wang, Xinyu Zhang	
User Performance of VR-Based Tissue Dissection Under The Effects of Force Models and Tracing Speeds	707
Fernando Trejo, Yaoping Hu	
The Effects of Olfactory Stimulation and Active Participation on Food Cravings in Virtual Reality.....	709
Nikita Mae B. Tuanquin, Simon Hoermann, Carl Jame Petersen, Robert W. Lindeman	

Phase-Aligned Foveated Rendering for Virtual Reality Headsets	711
Eric Turner, Haomiao Jiang, Damien Saint-Macary, Behnam Bastani	
Hybrid Decision Support System for Traffic Engineers	713
Manuela Uhr, Joachim Nitschke, Jingxin Zhang, Frank Steinicke	
RIDERS: Road Inspection & Driver Simulation.....	715
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?.....	717
Kristoffer Waldow, Arnulph Fuhrmann, Stefan M. Grünvogel	
Immersing Web3D Furniture into Real Interior Images	721
Chao Wang, Shuang Liang, Jinyuan Jia	
Tetrahedral Mesh Visualization in a Game Engine	719
Kuo Cheng Wang, Kishore Adimulam, Thenkurussi Kesavadas	
Memory Task Performance across Augmented and Virtual Reality	723
Pete Willemsen, William Jaros, Charles McGregor, Edward Downs, Maranda Berndt, Alexander Passofaro	
A Calibration Method for Large-Scale Projection Based Floor Display System	725
Chun Xie, Hidehiko Shishido, Yoshinari Kameda, Kenji Suzuki, Itaru Kitahara	
Evaluation of Hand Gesture Annotation in Remote Collaboration Using Augmented Reality	727
Shohei Yamada, Naiwala P. Chandrasiri	
Adopting the Roll Manipulation for Redirected Walking.....	729
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	731
Shunsuke Yoshida	
Force Push: Exploring Expressive Gesture-to-Force Mappings for Indirect 3D Object Manipulation.....	733
Run Yu, Doug A. Bowman	
Evaluation of Hand-Based Interaction for Near-Field Mixed Reality with Optical See-Through Head-Mounted Displays	739
Zhenliang Zhang, Benyang Cao, Dongdong Weng, Yue Liu, Yongtian Wang, Hua Huang	
Inverse Virtual Reality: Intelligence-Driven Mutually Mirrored World.....	735
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.....	737
Zhenliang Zhang, Yue Li, Dongdong Weng, Yue Liu, Yongtian Wang	
VR Touch Museum.....	741
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.....	743
Peter Ziegler, Daniel Roth, Andreas Knot, Michael Kreuzer, Sebastian von Mammen	
Space Tentacles - Integrating Multimodal Input into a VR Adventure Game.....	745
Chris Zimmerer, Martin Fischbach, Marc Erich Latoschik	

Research Demos

A Virtual Reality Simulator to Detect Acrophobia in Work-at-Height Situations	747
Jean-Rémy Chardonnet, Cédric Di Loreto, Julien Ryard, Alain Rousseau	
Demonstration of Gaze-aware Video Streaming Solutions for Mobile VR	749
Saeik Firdose, Pietro Lungaro, Konrad Tollmar	

Hands-Free Interaction for Augmented Reality in Vascular Interventions	751
Alon Grinshpoon, Shirin Sadri, Gabrielle J. Loeb, Carmine Elvezio, Steven K. Feiner	
A Demonstration of FaceDisplay: Asymmetric Multi-User Interaction for Mobile VR.....	753
Jan Gugenheimer, Evgeny Stemasov, Harpreet Sareen, Enrico Rukzio	
A Demonstration of ShareVR: Co-Located Experiences for Virtual Reality between HMD and Non-HMD Users	755
Jan Gugenheimer, Evgeny Stemasov, Julian Frommel, Enrico Rukzio	
In-Car 6-DoF Mixed Reality for Rear-Seat and Co-Driver Entertainment.....	757
Jonas Haeling, Christian Winkler, Stephan Leenders, Daniel Kesselheim, Axel Hildebrand, Marc Necker	
A Virtual Hip Replacement Surgery Simulator with Realistic Haptic Feedback.....	759
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.....	761
Shingo Kato, Masaaki Iseki, Takamichi Nakamoto	
Game Room Map Integration in Virtual Environments for Free Walking	763
Marilyn Keller, Frédéric Exposito	
HangerOVER: Development of HMD-Embedded Haptic Display Using the Hanger Reflex and VR application.....	765
Yuki Kon, Takuto Nakamura, Rei Sakuragi, Hirotaka Shionoiri, Vibol Yem, and Hiroyuki Kajimoto	
Redirected Spaces: Going Beyond Borders	767
Eike Langbehn, Paul Lubos, Frank Steinicke	
Multisensory Virtual Reality Exposure Therapy.....	769
Alexander Marquardt, Christina Trepkowski, Jens Maiero, Ernst Kruijff, André Hinkenjann	
Attention Guiding using Augmented Reality in Complex Environments	771
Patrick Renner, Thies Pfeiffer	
A Demo of The Matrix Has You: Realizing Slow Motion in Full-Body Virtual Reality.....	773
Michael Rietzler, Florian Geiselhart, Julia Brich, Enrico Rukzio	
Applying Multi-User Virtual Reality to Collaborative Medical Training	775
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.....	777
Mike Sinclair, Eyal Ofek, Christian Holz, Inrak Choi, Eric Whitmire, Evan Strasnick, Hrvoje Benko	
Cliffhanger-VR.....	779
Marcel Tiator, Ben Fischer, Laurin Gerhardt, David Nowottnik, Hendrik Preu, Christian Geiger	
AnimationVR - Interactive Controller-based Animating in Virtual Reality	781
Daniel Vogel, Paul Lubos, Frank Steinicke	
Mobius Walker: Pitch and Roll Redirected Walking	783
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	785
Shogo Yamashita, Shunichi Suwa Takashi Miyaki, Jun Rekimoto	
Softness-Hardness and Stickiness Feedback Using Electrical Stimulation while Touching a Virtual Object	787
Vibol Yem, Kevin Vu, Yuki Kon, Hiroyuki Kajimoto	

Doctoral Consortium

Encounter-type Haptic Interfaces for Virtual Reality Musical Instruments	789
Alberto Boem	
Locomotion with Virtual Agents in the Realm of Social Virtual Reality	791
Andrea Bönsch	
Robot Supported Virtual and Augmented Reality	794
Emanuel Vonach	
High-fidelity Interaction for Virtual and Augmented Reality	796
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	801
Georg Gerstweiler	
Towards Reverse Disability Simulation in a Virtual Environment	803
Tanvir Irfan Chowdhury	
Optical Touch Sensing on Non-Parametric Rear-Projection Surfaces.....	805
Jason Hochreiter	
Leveraging Configuration Spaces and Navigation Functions for Redirected Walking.....	807
Jerald Thomas	
Predicting Performance During a Dynamic Target Acquisition Task in Immersive Virtual Reality.....	810
Jillian Clements	
Natural Human-Robot Interaction in Virtual Reality Telepresence Systems	812
Jingxin Zhang	
Real-time MonoSLAM Visualization in Virtual Reality	814
Loki Rasmussen	
Shopping in Virtual Reality	816
Marco Speicher	
Mediated Physicality: Inducing Illusory Physicality of a Virtual Human via Environmental Objects	818
Myungho Lee	
Prompting Techniques for Guidance and Action Assistance Using Augmented-Reality Smart-Glasses.....	820
Patrick Renner	
The Influence of Avatar Representation and Behavior on Communication.....	823
Saher A. Aseeri	
Walk-Centric User Interfaces.....	825
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	827
Wen Huang	

Videos

360° Video - Light Design Experience	830
Manuel Dudczig	
Augmented VR	831
Antonis Karakottas, Alexandros Papachristou, Alexandros Doumanoglou, Nikolaos Zioulis, Dimitrios Zarpalas, Petros Daras	

Virtual Immersion. Simulating Immersive Experiences in VR.....	832
Volker Kuchelmeister	
CarpetVR: the Magic Carpet Meets the Magic Mirror.....	833
Victor Lempitsky, Alexander Vakhitov, Andrew Starostin	
The Depth Light.....	834
McKennon McMillian, Hunter Finney, Jonathan Hopper, J. Adam Jones	
3D Tune-In: 3D-games for Tuning and Learning about Hearing Aids	836
Lorenzo Picinali	
VR Music.....	837
Ali Rastegar	
Secret Detours: A Garden in Singapore	838
Elke Reinhuber, Benjamin Seide, Ross Williams	
Until Jesse 360	839
Miriam Ross	
Realtime Collision Avoidance for Mechanisms with Complex Geometries.....	840
Mikel Sagardia, Alexander Martín Turrillas, Thomas Hulin	
Auto-scaled Full Body Avatars for Virtual Reality: Facilitating Interactive Virtual Body Modification	841
Tuukka M. Takala, Heikki Heiskanen	
Use of Virtual Reality to Teach Teamwork and Patient Safety in Surgical Education.....	842
Tobias Todsen, Jacob Melchior, Kasper Wennerwaldt	
AnimationVR - Interactive Controller-based Animating in Virtual Reality.....	843
Daniel Vogel, Paul Lubos, Frank Steinicke	
Beacon Virtua	844
Andrew Woods, Paul Bourke, Nick Oliver	

3DUI CONTEST

3DUI-League: 9th Annual 3DUI Contest	845
Rongkai Guo, Ryan P. McMahan, Benjamin Weyers	
Fluid VR: Extended Object Associations for Automatic Mode Switching in Virtual Reality.....	846
Mayra Donaji Barrera Machuca, Junwei Sun, Duc-Minh Pham, Wolfgang Stuerzlinger	
3DUI Contest 2018 - Team NaN	848
Christian Hirt, Anh Nguyen, Markus Zank	
3DUI Contest 2018: 3D Interaction	850
Bo Sun, Aleksandr Fritz, Vincent Perry, Paul Havig, Simon Su	
Climb, Direct, Stack: Smart Interfaces for ELeague Contest.....	852
Yuan Li, Run Yu, Lei Zhang, Wallace S. Lages, Doug A. Bowman	
Batmen Forever: Unified Virtual Hand Metaphor for Consumer VR Setups.....	854
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.....	856
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.....	858
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.....	860
Antonin Bernardin, Guillaume Cortes, Rebecca Fribourg, Tiffany Luong, Florian Nouviale, Hakim Si-Mohammed	