

# **2013 IEEE Virtual Reality**

**(VR 2013)**

**Lake Buena Vista, Florida, USA**

**18 – 20 March 2013**



**IEEE Catalog Number: CFP13VIR-PRT**  
**ISBN: 978-1-4673-4795-2**

# Contents

Supporters .....	ix
Exhibitors .....	ix
Message from the General Chairs.....	x
Message from the Program Chairs .....	xii
IEEE Visualization and Graphics Technical Committee (VGTC) .....	xiii
Conference Committee.....	xiv
International Program Committee.....	xv
Steering Committee.....	xv
Paper Reviewers.....	xvi
Keynote Speaker: Richard Satava .....	xviii
Keynote Speaker: Mark Mine.....	xix
Keynote Speaker: Jeremy Bailenson.....	xx
IEEE VGTC Virtual Reality Career Award 2012: Lawrence Rosenblum .....	xxi
IEEE VGTC Virtual Reality Technical Achievement Award 2012: Dieter Schmalstieg .....	xxii
IEEE VGTC Virtual Reality Career Award 2013: Henry Fuchs .....	xxiii
IEEE VGTC Virtual Reality Technical Achievement Award 2013: Mark Billinghurst .....	xxiv

## Short Papers

### Session: Mixed and Augmented Reality

Dynamic Compact Visualizations for Augmented Reality .....	3
Markus Tatzgern, Denis Kalkofen, Dieter Schmalstieg	

Mixed Simulators: Augmented Physical Simulators with Virtual Underlays .....	7
Samsun Lampotang, David Lizdas, Didier Rajon, Isaac Luria, Nikolaus Gravenstein, Yashwant Bisht, Wilhelm Schwab, William Friedman, Frank Bova, Albert Robinson III	

### Session: Sound and Graphics

Visual Exploration of the Infinite Canvas.....	11
Kaloian Petkov, Charilaos Papadopoulos, Arie E. Kaufman	

### Session: Virtual Humans and Avatars

The Impact of Enhanced Projector Display on the Responses of People to a Violent Scenario in Immersive Virtual Reality .....	15
Aitor Rovira, David Swapp, Richard Southern, Jian J. Zhang, Mel Slater	

An advanced interaction framework for augmented reality based exposure treatment .....	19
Sam Corbett-Davies, Andreas Dünser, Richard Green, Adrian Clark	

## Session: Displays

- General-Purpose Telepresence with Head-Worn Optical See-Through Displays and Projector-Based Lighting ..... 23  
Andrew Maimone, Xubo Yang, Nate Dierk, Andrei State, Mingsong Dou, Henry Fuchs
- A Robust Camera-based Method for Optical Distortion Calibration of Head-Mounted Displays..... 27  
Sangyoon Lee, Hong Hua

## Session: Haptics

- Virtual Alteration of Body Material by Periodic Vibrotactile Feedback ..... 31  
Yosuke Kurihara, Taku Hachisu, Michi Sato, Shogo Fukushima, Hiroyuki Kajimoto

## Session: Interaction and Locomotion

- Nonuniform and Adaptive Coupling Stiffness for Virtual Grasping ..... 35  
Christoph W. Borst, Mores Prachyabrued
- Scalable Maps of Random Dots for Middle-scale Locative Mobile Games..... 39  
Lu Chen, Hongbo Fu, Wing Ho Andy, Chiew-Lan Tai

## Session: Supporting Human Senses

- BurnAR: Involuntary Heat Sensations in Augmented Reality ..... 43  
Peter Weir, Christian Sandor, Matt Swoboda, Thanh Nguyen, Ulrich Eck, Gerhard Reitmayrk, Arindam Dey
- A General Approach for Closed-Loop Registration in AR ..... 47  
Feng Zheng, Ryan Schubert, Greg Welch

## Session: Perception

- Evaluating Usability of Amplified Head Rotations on Base-to-Final Turn for Flight Simulation Training Devices ..... 51  
Luan Le Ngoc, Roy S. Kalawsky

## Posters

- A Convex Decomposition Methodology for Collision Detection..... 57  
Ashirwad Chowriappa, Raul Wirz, Aditya R. Ashammagari, Thenkurussi Kesavadas
- Exploration of Spatial Augmented Reality on Person ..... 59  
Adrian S Johnson, Yu Sun
- Virtual Audience Customization for Public Speaking Training Procedures ..... 61  
Ana-Despina Tudor, Sandra Poeschl, Nicola Doering
- Awareness of Other: Evaluating the Impact of Proximity Cues in Collaborative Tasks ..... 63  
Wilson J. Sarmiento, Vitor Jorge, Anderson Maciel, Luciana Nedel, César A. Collazos, Jackson Oliveirak, Frederico Faria
- Visual Masking Parameters for Virtual Environments..... 65  
Jason Drummond, Anthony Steed
- Head Tracking for 3D Games: Technology Evaluation using CryENGINE2 and faceAPI ..... 67  
Andrei Sherstyuk, Anton Treskunov
- Natural Head Motion for 3D Social Games..... 69  
Andrei Sherstyuk, Anton Treskunov
- Navigation in a Virtual Environment by Dichotic Listening: Simultaneous Audio Cues for User-Directed  
BCI Classification..... 71  
Ashish Dhital, Amy Ulinski Banic
- Pinch-n-Paste: Direct Texture Transfer Interaction in Augmented Reality ..... 73  
Atsushi Umakatsu, Tomohiro Mashita, Kiyoshi Kiyokawa, Haruo Takemura

Super-KAVE: An Immersive Visualization Tool for Neutrino Physics .....	75
Benjamin Izatt, Kate Scholberg, Ryan P. McMahan	
VR Solutions for Improving Physical Therapy .....	77
Carlo Camporesi, Marcelo Kallmann, Jay J. Han	
A Framework for Immersive VR and Full-Body Avatar Interaction.....	79
Carlo Camporesi, Marcelo Kallmann	
Integrating Head and Full-Body Tracking for Embodiment in Virtual Characters .....	81
David Borland	
ML2VR: Providing MATLAB Users an Easy Transition to Virtual Reality and Immersive Interactivity .....	83
David J. Zielinski, Ryan P. McMahan, Wenjie Lu, Silvia Ferrari	
Full-Field of View Display Combined With Motion Interaction Device.....	85
Dong Li, Jinghui Xie, Dongdong Weng, Yan Mo	
Touch Experience in Augmented Reality .....	87
Dong Li, Jinghui Xie, Dongdong Weng, Yuqian Li	
Collision Prediction and Prevention in a Simultaneous Two-User Immersive Virtual Environment .....	89
Eric R. Bachmann, Jeanette Holm, Michael A. Zmuda, Eric Hodgson	
Improved Resetting in Virtual Environments.....	N/A
Michael Zmuda, Eric Bachmann, Eric Hodgson, Joshua Wonsler	
Latency and Avatars in Virtual Environments and the Effects on Gait for persons with Mobility Impairments.....	93
Gayani Samaraweera, Rongkai Guo, John P. Quarles	
Head Motion Animation using Avatar Gaze Space .....	95
M. S. Ramaiah, Ankit Vijay, Geetika Sharma, Amitabha Mukerjee	
Touch & Move: A Portable Stereoscopic Multi-Touch Table .....	97
David Cyborra, Moritz Albert, Frank Steinicke, Gerd Bruder	
Repetitive Bimanual Integrative Therapy (RABIT) Virtual Rehabilitation System .....	99
Grigore C. Burdea, Colin Defais	
Poster: Do walking motions enhance visually induced self-motion illusions in virtual reality? .....	101
Jacob Freiberg, Timofey Grechkin, Bernhard E. Riecke	
Automatic 3D Selection Technique Assignment Using Real-time Scenario Analysis.....	103
Jeffrey A. Cashion, Chadwick Wingrave, Joseph J. LaViola Jr.	
A Virtual Reality Study on Santa Maria Crater on Mars.....	105
Jue Wang, Keith J. Bennett	
Effectiveness of Occluded Object Representations at Displaying Ordinal Depth Information in Augmented Reality ..	107
Mark A. Livingston, Kenneth R. Moser	
Flexible Spaces: A Virtual Step Outside of Reality.....	109
Khrystyna Vasylevska, Hannes Kaufmann, Mark Bolas, Evan A. Suma	
OSE: an Adaptive User Interface for Fluvial Navigation Training .....	111
Loïc Fricoteaux, Indira Thouvenin	
Towards a Disambiguation Canvas.....	113
Henrique G. Debarba, Jerônimo Grandi, Anderson Maciel, Luciana Nedel, Ronan Boulic	
Motivating People to Perform Better in Exergames: Collaboration vs. Competition in Virtual Environments .....	115
Mateus Nunes, Luciana Nedel, Valter Roesler	

Multi-View Augmented Reality for Underground Exploration.....	117
Mustafa Tolga Eren, Murat Cansoy, Selim Balcisoy	
Perceiving biological motions of real dog actions and human mimicry.....	119
Natsumi Isobe, Michiteru Kitazaki	
Unintended Positional Drift and Its Potential Solutions.....	121
Niels C. Nilsson, Stefania Serafin, Rolf Nordahl	
Synthesizing Reality for Realistic Physical Behavior of Virtual Objects in Augmented Reality Applications for Smart-Phones.....	123
Nir Amar, Meir Raviv, Barak David, Oleg Chernoguz, Jihad El-Sana	
Evaluation of Navigation Skill of Elderly People Using the Cycling Wheel Chair in a Virtual Environment.....	125
Norihiro Sugita, Makoto Yoshizawa, Yoshihisa Kojima, Akira Tanaka, Makoto Abe, Noriyasu Homma, Toshitsugu Kikuchi, Kazunori Seki, Yasunobu Handa	
Flexible and general redirected walking for head-mounted displays.....	127
Ruimin Zhang, Scott A. Kuhl	
Integration of Spatial Sound in Immersive Virtual Environments An Experimental Study on Effects of Spatial Sound on Presence.....	129
Sandra Poeschl, Konstantin Wall, Nicola Doering	
Webizing Mobile AR Contents.....	131
Sangchul Ahn, Heedong Ko, Steven Feiner	
Virtual Air Traffic System Simulation - Aiding the Communication of Air Traffic Effects.....	133
Sebastian Pick, Frank Wefers, Bernd Hentschel, Torsten Kuhlen	
Photometric Display Calibration for Embedded MR Environments.....	135
Steven Braeger, Yiyang Xiong, Charles E. Hughes	
Haptic Transmission System to Recognize Differences in Surface Textures of Objects for Teleexistence.....	137
Tadatoshi Kurogi, Masano Nakayama, Katsunari Sato, Sho Kamuro, Charith Lasantha Fernando, Masahiro Furukawa, Kouta Minamizawa, Susumu Tachi	
Photometric Display Calibration for Embedded MR Environments.....	139
Steven Braeger, Yiyang Xiong, Charles E. Hughes	
Perceived Forward Velocity Increases with Tactile Flow on Seat Pan.....	141
Tomohiro Amemiya, Koichi Hirota, Yasushi Ikei	
Camera pose estimation with a two-dimensional marker grid for haptic navigation.....	143
Tomohiro Amemiya, Hiroaki Gomi	
HARP: A Framework for Visuo-Haptic Augmented Reality.....	145
Ulrich Eck, Christian Sandor	
What is the Effect of Interface Complexity on Risk Perception Tasks?.....	147
Vitor Jorge, Anderson Maciel, Luciana Nedel, Jackson Oliveira, Frederico Faria	
Realistic Immersion of a User into Humanoids of Different Sizes and Proportions in Immersive Virtual Reality.....	149
Weiwei Zhao, Vis. Madhavan	
Pilot Study for Generating Dynamic Olfactory Field Using Scent Projectors.....	151
Yasuyuki Yanagida, Masashi Kajima, Shunpei Suzuki, Yuya Yoshioka	
Dent-Softness Illusion in Mixed Reality Space: Further Experiments and Considerations.....	153
Yohei Sano, Yuichi Hirano, Asako Kimura, Fumihisa Shibata, Hideyuki Tamura	
Visual-olfactory Presentation System Using a Miniaturized Olfactory Display Based on SAW Streaming and Electroosmotic Pumps.....	155
Yossiri Ariyakul, Tomoyuki Aizawa, Takamichi Nakamoto	

Color Blending in Outdoor Optical See-through AR: The Effect of Real-world Backgrounds on User Interface Color .....	157
Joseph L. Gabbard, J. Edward Swan II, Adam Zarger	
Early Steps Towards Understanding Text Legibility in Handheld Augmented Reality .....	159
Brittany Dao, Joseph L. Gabbard	
Estimation of Detection Thresholds for Acoustic Based Redirected Walking Techniques .....	161
Stefania Serafin, Niels C. Nilsson, Erik Sikstrom, Amalia De Goetzen, Rolf Nordahl	

## Workshops

### Workshop 1: Workshop on Off-The-Shelf Virtual Reality

Organizers: Evan Suma, David Krum, Marc Bolas

### Workshop 2: 6th Workshop on Software Engineering and Architectures for Realtime Interactive Systems (SEARIS) 2013

Organizers: Marc Erich Latoschik, Dirk Reiners, Roland Blach, Pablo Figueroa, Chadwick A. Wingrave

### Workshop 3: Workshop on Immersive Volumetric Interaction (WIVI 2013)

Organizers: Amy Banic, Patrick O'Leary, Zachary Wartell

### Workshop 4: The Second International Workshop on Ambient Information Technologies (AMBIT 2013)

Organizers: Yuichi Itoh, Kiyoshi Kiyokawa, Tatsuhiro Tsuchiya, Naoki Wakamiya, Hiroyuki Ohsaki, Evan Suma, Satoshi Kurihara, Naoki Wakamiya

#### Three-Dimensional Perception in Multi-Slit Vision for Public Display .....

Hideyuki Ando, Taro Maeda, Yohei Miyazaki, Junji Watanabe

#### On Estimating Depressive Tendencies of Twitter Users Utilizing their Tweet Data .....

Sho Tsugawa, Yukiko Mogi, Yusuke Kikuchi, Fumio Kishino, Kazuyuki Fujita, Yuichi Itoh, Hiroyuki Ohsaki

#### U-brella: A Portable Umbrella-shaped Device for Vibrationizing Information .....

Yuichi Fujii, Fumio Kishino, Kazuyuki Fujita, Yuichi Itoh

#### Emoballoon: a Balloon-shaped Interface Recognizing Social Touch Interactions .....

Kosuke Nakajima, Yuichi Itoh, Yusuke Hayashi, Kazuaki Ikeda, Kazuyuki Fujita, Takao Onoye

#### A Next Location Prediction Method for Smartphones using Blockmodels .....

Jun Fukano, Tomohiro Mashita, Takahiro Hara, Kiyoshi Kiyokawa, Haruo Takemura, Shojiro Nishio

#### On the Robustness of Centrality Measures against Link Weight Quantization in Real Weighted Social Networks .....

Masanori Ishino, Sho Tsugawa, Hiroyuki Ohsaki

#### Ambient Party Room: A Room-shaped System Enhancing Communication for Parties or Gatherings .....

Kazuyuki Fujita, Yuichi Itoh, Kazuki Takashima, Kosuke Nakajima, Yusuke Hayashi, Fumio Kishino

#### A Feasibility of Office Interruptibility Estimation based on Ceiling Camera Images and Sounds .....

Kazuaki Aoki, Shigeki Sato, Takahiro Tanaka, Kinya Fujita

#### Learning system for adapting users with user's state classification by vital sensing .....

Junya Nakase, Koichi Moriyama, Kiyoshi Kiyokawa, Masayuki Numao, Mayumi Oyama, Satoshi Kurihara

#### Detecting CNV-like variation when remembering and generating continuous motion .....

Hiroyuki Iizuka, Mika Sunagawa, Masataka Niwa, Hideyuki Ando, Taro Maeda

### Workshop 5: Workshop on Virtual and Augmented Assistive Technology

Organizers: John Quarles, Victoria Interrante, Belinda Lange,

# Tutorials

Tutorial 1: Simplifying VR: MiddleVR for Unity  
Sébastien Kuntz (organizer)

Tutorial 2: All About Avatars, and Why They Are Important  
Jacquelyn Ford Morie (organizer)

Tutorial 3: Virtual Reality Technology - An Introduction  
Grigore (Greg) Burdea (organizer)

# Videos

Providing Guidance for Maintenance Operations Using Automatic Markerless Augmented Reality System .....	237
Hugo Álvarez, Iker Aguinaga, Diego Borro	
Parallel Tracking and Mapping in Hofburg Festsaal .....	238
Georg Gerstweiler, Hannes Kaufmann, Olga Kosyрева, Christian Schönauer, Emanuel Vonach	
Drumming in Immersive Virtual Reality: The Body Shapes the Way We Play.....	240
Konstantina Kilteni, Ilias Bergstom, Mel Slater	
Creating 3D Projection on Tangible Object .....	241
Pekka Nisula, Jussi Kangasoja, Minna Karukka	
An Interactive Virtual Reality System for On-Orbit Servicing.....	242
Mikel Sagardia, Katharina Hertkorn, Thomas Hulin, Robin Wolff, Johannes Hummel, Janki Dodiya, Andreas Gerndt	
3D Reconstruction and Thermal Mapping in Fire Brigade Operations .....	243
Christian Schönauer, Emanuel Vonach, Georg Gerstweiler, Hannes Kaufmann	

# Additional Papers

VRCEMIG: a Virtual Reality System for Real Time Control of Electric Substations.....0.....	165
A. Cardoso, E. Lamounier Jr., G. Lima, L. Oliveira, L. Mattioli, G. Junior, A. Silva, K. Nogueira	
Smelling Screen: Presenting a Virtual Odor Source on a LCD Screen.....0.....	167
H. Matsukura, T. Yoneda, H. Ishida	
AES-risk: An Environment for Simulation of Risk Perception.....0.....	169
V. Jorge, L. Nedel, A. Maciel, J. Oliveira, F. Faria	
An Middleware for Motion Capture Devices Applied to Virtual Rehab.....0.....	171
E. Damasceno, A. Cardoso, E. Lamounier Jr.	
An Actuated Stage for a Tablet Computer: Generation of Tactile Feedback .....	173
and Communication using the Motion of the Whole Tablet I. Kumazawa, R. Koizumi	
Real-time Rendering of Extended Fractional View Integral Photography.....0.....	175
S. Kimura, K. Yanaka	
Using Game Engine to Enhance Mobility Modeling in Network Simulations.....	177
X. Luo	
Shugo-robot face by Visual Psychophysics Lab and Center for Human-robot .....	179
Symbiosis Research Y. Murofushi, N. Isobe, R. Tasaki, K. Terashima, M. Kitazaki	
Animal biological motion and its fake motion by Visual Psychophysics Lab.....	181
N. Isobe, M. Kitazaki	
Open Virtual Reality.....	183
M. Bolas, J. Iliff, P. Hoberman, N. Burba, T. Phan, I. McDowall, P. Luckey, D. Krum	
Rapid Generation of Personalized Avatars.....	185
E. Suma, D. Krum, T. Phan, M. Bolas	
Creating 3D Projection on Tangible Objects.....	187
P. Nisula, J. Kangasoja, M. Karukka	
Immersive Virtual Reality On-The-Go.....	193
A. Basu, K. Johnsen, K. Bogert, P. Wins	
Serious Games for Training, Rehabilitation and Workforce Development.....	195
J. Bertrand, L. Dukes, P. Dukes, E. Ebrahimi, A. Hayes, N. Mack, J. McClendon, D. Parmar, T. Pence, B. Shannon A. Wachter, Y. Wu, S. Babu, L. Hodges	