

2010 9th IEEE International Symposium on Mixed and Augmented Reality

(ISMAR 2010)

**Seoul, South Korea
13 – 16 October 2010**



**IEEE Catalog Number: CFP10MAR-PRT
ISBN: 978-1-4244-9343-2**

Contents

Supporting Organizations	viii
Message from the Symposium General Chairs.....	ix
Message from the Science & Technology Program Chairs	x
IEEE Visualization and Graphics Technical Committee.....	xii
Task Force on Human Centered Computing (TFHCC)	xiii
Conference Committee.....	xiv
Area Chairs	xiv
Steering Committee	xiv
International Program Committee and Reviewers	xv
Keynote Speaker: Augmenting Reality for Medicine, Training, Presence and Telepresence	xviii
Henry Fuchs (University of North Carolina, Chapel Hill)	
Keynote Speaker: Augmented Dreams.....	xix
Boris Debackere (Lab Manager at V2, The Netherlands)	

Papers

Session 1: Perception in AR: Issues and Solutions (1)

Perceptual Issues in Augmented Reality Revisited	3
Ernst Kruijff, J. Edward Swan II, Steven Feiner	
The Effect of Out-of-focus Blur on Visual Discomfort When Using Stereo Displays.....	13
Tobias Blum, Matthias Wieczorek, André Aichert, Radhika Tibrewal, Nassir Navab	
Image-based Ghostings for Single Layer Occlusions in Augmented Reality	19
Stefanie Zollmann, Denis Kalkofen, Erick Mendez, Gerhard Reitmayr	
An Augmented Reality X-Ray System Based on Visual Saliency.....	27
Christian Sandor, Andrew Cunningham, Arindam Dey, Ville-Veikko Mattila	

Session 2: Tracking

Determining the Point of Minimum Error for 6DOF Pose Uncertainty Representation.....	37
Daniel Pustka, Jochen Willneff, Oliver Wenisch, Peter Lükewille, Kurt Achatz, Peter Keitler, Gudrun Klinker	
Accurate Real-time Tracking Using Mutual Information.....	47
Amaury Dame, Eric Marchand	
Point-and-Shoot for Ubiquitous Tagging on Mobile Phones.....	57
Wonwoo Lee, Youngmin Park, Vincent Lepetit, Woontack Woo	
Foldable Augmented Maps	65
Sandy Martedi, Hideaki Uchiyama, Guillermo Enriquez, Hideo Saito, Tsutomu Miyashita, Takenori Hara	
Management of Tracking for Industrial AR Setups	73
Peter Keitler, Benjamin Becker, Gudrun Klinker	

Session 3: AR for User Guidance

Task Support System by Displaying Instructional Video onto AR Workspace	83
Michihiko Goto, Yuko Uematsu, Hideo Saito, Shuji Senda, Akihiko Iketani	

Evaluation of the Virtual Mirror as a Navigational Aid for Augmented Reality Driven Minimally Invasive Procedures.....	91
Christoph Bichlmeier, Ekkehard Euler MD, Tobias Blum, Nassir Navab	

Session 4: Real-Virtual Interactions

Differential Instant Radiosity for Mixed Reality	99
Martin Knecht, Christoph Traxler, Oliver Mattausch, Werner Purgathofer, Michael Wimmer	

Foreground and Shadow Occlusion Handling for Outdoor Augmented Reality.....	109
Boun Vinh Lu, Tetsuya Kakuta, Rei Kawakami, Takeshi Oishi, Katsushi Ikeuchi	

Session 5: Perception in AR: Issues and Solutions (2)

The Importance of Eye-contact for Collaboration in AR Systems	119
Erik Prytz, Susanna Nilsson, Arne Jönsson	

Experiences with an AR Evaluation Test Bed: Presence, Performance, and Physiological Measurement	127
Maribeth Gandy, Richard Catrambone, Blair MacIntyre, Chris Alvarez, Elsa Eiriksdottir, Matthew Hilimire, Brian Davidson, Anne Collins McLaughlin	

Effects of a Retroreflective Screen on Depth Perception in a Head-mounted Projection Display.....	137
Rui Zhang, Hong Hua	

A Practical Multi-viewer Tabletop Autostereoscopic Display	147
Gu Ye, Andrei State, Henry Fuchs	

Session 6: Tracking and Reconstruction

The City of Sights: Design, Construction, and Measurement of an Augmented Reality Stage Set.....	157
Lukas Gruber, Steffen Gauglitz, Jonathan Ventura, Stefanie Zollmann, Manuel Huber, Michael Schlegel, Gudrun Klinker, Dieter Schmalstieg, Tobias Höllerer	

Build Your World and Play In It: Interacting with Surface Particles on Complex Objects.....	165
Brett R. Jones, Rajinder Sodhi, Roy H. Campbell, Guy Garnett, Brian P. Bailey	

Positioning, Tracking and Mapping for Outdoor Augmentation.....	175
Jayashree Karlekar, Steven ZhiYing Zhou, Weiquan Lu, Zhi Chang Loh, Yuta Nakayama, Daniel Hii	

Towards Real time 3D Tracking and Reconstruction on a GPU Using Monte Carlo Simulations.....	185
Jairo R. Sánchez, Hugo Álvarez, Diego Borro	

Session 7: Interactive Modeling

Keyframe-based Modeling and Tracking of Multiple 3D Objects.....	193
Kiyoung Kim, Vincent Lepetit, Woontack Woo	

Interactive Modelling for AR Applications.....	199
John Bastian, Ben Ward, Rhys Hill, Anton van den Hengel, Anthony Dick	

Advanced Self-contained Object Removal for Realizing Real-time Diminished Reality in Unconstrained Environments	207
Jan Herling, Wolfgang Broll	

Posters

An Automatic Parallax Adjustment Method for Stereoscopic Augmented Reality Systems	215
Wen-Chao Chen, Fu-Jen Hsiao, Chung-Wei Lin	
Painterly Rendering with Coherence for Augmented Reality.....	217
Jiajian Chen, Greg Turk, Blair MacIntyre	
k-MART: Authoring Tool for Mixed Reality Contents.....	219
Jinhyuk Choi, Youngsun Kim, Myonghee Lee, Gerard J. Kim, Yanghee Nam, Yongmoo Kwon	
A Precise Controllable Projection System for Projected Virtual Characters and Its Calibration.....	221
Jochen Ehnes	
Generating Vision based Lego Augmented Reality Training and Evaluation Systems	223
Timo Engelke, Sabine Webel, Nirit Gavish	
Augmented Reality in Large Environments: Application to Aided Navigation in Urban Context.....	225
V. Gay-Bellile, P. Lothe, S. Bourgeois, E. Royer, S. Naudet Collette	
Color Harmonization for Augmented Reality	227
Lukas Gruber, Denis Kalkofen, Dieter Schmalstieg	
Extended Investigations of User-Related Issues in Mobile Industrial AR	229
Jens Grubert, Daniel Hamacher, Rüdiger Mecke, Irina Böckelmann, Lutz Schega, Anke Huckauf, Mario Urbina, Michael Schenk, Fabian Doil, Johannes Tümler	
Digital Diorama System for Museum Exhibition.....	231
Oribe Hayashi, Kazuhiro Kasada, Takuji Narumi, Tomohiro Tanikawa, Michitaka Hirose	
KHARMA: An Open KML/HTML Architecture for Mobile Augmented Reality Applications	233
Alex Hill, Blair MacIntyre, Maribeth Gandy, Brian Davidson, Hafez Rouzati	
EXMAR: EXPanded view of Mobile Augmented Reality.....	235
Sungjae Hwang, Hyungeun Jo, Jung-hee Ryu	
Haptic Simulation of Breast Cancer Palpation: A Case Study of Haptic Augmented Reality	237
Seokhee Jeon, Benjamin Knoerlein, Matthias Harders, Seungmoon Choi	
Range-Finding Projectors: Visualizing Range Information without Sensors.....	239
Shingo Kagami	
3D Discrepancy Check via Augmented Reality	241
Svenja Kahn, Harald Wuest, Didier Stricker, Dieter W. Fellner	
Augmentation of Check in/out Model for Remote Collaboration with Mixed Reality	243
Ginga Kamei, Takeshi Matsuyama, Ken-ichi Okada	
Sensor Synchronization for AR Applications.....	245
Tuomas Kantonen	
Light-Weight Marker Hiding for Augmented Reality	247
Otto Korkalo, Miika Aittala, Sanni Siltanen	
An Immersive e-Learning System Providing Virtual Experience.....	249
SuWoong Lee, Jong-gook Ko, Seokbin Kang, Junsuk Lee	
Designing and Comparing Two-Handed Gestures to Confirm Links between User Controlled Objects.....	251
Patrick Maier, Marcus Tönnis, Gudrun Klinker	
Augmented Reality for Board Games	253
Eray Molla, Vincent Lepetit	

PoP-EYE Environment: Mixed Reality Using 3D Photo Collections.....	255
Frank Nagl, Paul Grimm, Bastian Birnbach, Daniel F. Abawi	
Video Stabilization to a Global 3D Frame of Reference by Fusing Orientation Sensor and Image Alignment Data	257
Oscar Nestares, Yoram Gat, Horst Haussecker, Igor Kozintsev	
Augmented Telepresence Using Autopilot Airship and Omni-directional Camera	259
Fumio Okura, Masayuki Kanbara, Naokazu Yokoya	
Time-Domain Augmented Reality Based on Locally Adaptive Video Sampling	261
Tatsuro Orikasa, Shingo Kagami, Koichi Hashimoto	
3DOF Tracking Accuracy Improvement for Outdoor Augmented Reality.....	263
Joonsuk Park, Jun Park	
Validating Spatial Augmented Reality for Interactive Rapid Prototyping	265
Shane R. Porter, Michael R. Marner, Ross T. Smith, Joanne E. Zucco, Bruce H. Thomas	
North-centred Orientation Tracking on Mobile Phones	267
Gerhard Schall, Alessandro Mulloni, Gerhard Reitmayr	
Large Area Indoor Tracking for Industrial Augmented Reality	269
Fabian Scheer, Stefan Müller	
Camera Pose Navigation using Augmented Reality.....	271
Jun Shingu, Eleanor Rieffel, Don Kimber, Jim Vaughan, Pernilla Qvarfordt, Kathleen Tuite	
SnapAR: Storing Snapshots for Quick Viewpoint Switching in Hand-Held Augmented Reality.....	273
Mengu Sukan, Steven Feiner	
A Multi-Sensor Platform for Wide-area Tracking.....	275
Christian Waechter, Manuel Huber, Peter Keitler, Michael Schlegel, Gudrun Klinker	
Floyd-Warshall All-Pair Shortest Path for Accurate Multi-Marker Calibration	277
Lejing Wang, Maximilian Springer, Hauke Heibel, Nassir Navab	
MTMR: A Conceptual Interior Design Framework Integrating Mixed Reality with the Multi-Touch Tabletop Interface	279
Dong Wei, Steven Zhiying Zhou, Du Xie	
AR-based Visibility Evaluation for Preserving Landscapes of Historical Buildings	281
Nobuyoshi Yabuki, Kyoko Miyashita, Tomohiro Fukuda	
Various Tangible Devices Suitable for Mixed Reality Interactions.....	283
Taichi Yoshida, Masashi Tsukadaira, Asako Kimura, Fumihsisa Shibata, Hideyuki Tamura	
Camera Motion Tracking in a Dynamic Scene	285
Jung-Jae Yu, Jae-Hean Kim	
ARCrowd-A Tangible Interface for Interactive Crowd Simulation	287
Feng Zheng, Hongsong Li	
Origami Recognition System Using Natural Feature Tracking	289
Kening Zhu, Owen Noel Newton Fernando, Adrian David Cheok, Mark Fiala, Theam Wei Yang	

Tutorials

Message From The Tutorial Chairs	293
John Quarles, Fumihsisa Shibata, Namgyu Kim	
Fundamentals of Head Worn Displays	293
Jannick P. Rolland and Kevin P. Thompson	

Handheld Augmented Reality Game Design	294
Blair MacIntyre	

Development Cycles for Qualified Visibility Testing In Augmented Reality	294
Marcus Tönnis	

Workshops

Message From The Workshop Chairs	295
Christine Perey, Hirokazu Kato, Woontack Woo	

Mobile AR Summit @ISMAR2010	295
Christine Perey, Jung-hee Ryu, Woontack Woo	

Mobile Collaborative Augmented Reality	296
Leila Alem, Tony Huang	

Devices that Alter Perception	296
Carson Reynolds, Alvaro Cassinelli, Tomoko Hayashi, Danielle Wilde, Alexis Zerroug, Jussi Ängeslevä, Matt Karau, Susanna Hertrich	

Augmented Reality Super Models	297
Gerhard Reitmayr, Clemens Arth	

Mobile-AR Application Contest with Samsung Wave Phone & Workshop	297
Young-Jun Kim, Say Jang	

An Intermediate Report of TrakMark WG ~International Voluntary Activities on Establishing Benchmark Test Schemes for AR/MR Geometric Registration and Tracking Methods.....	298
Fumihisa Shibata, Sei Ikeda, Takeshi Kurata, Hideaki Uchiyama, the TrakMark WG	

Demonstrations

Message from the Laboratory Demonstrations and Research Showcases Cochairs	305
Suya You, Jong Weon Lee	

Feature Tracking and Object Recognition on a Hand-held.....	306
Taehee Lee, Stefano Soatto	

Origami Recognition System Using Natural Feature Tracking	307
Kening Zhu, Owen Noel Newton Fernando, Theam Wei Yang, Adrian David Cheok, Mark Fiala	

Breast Cancer Palpation System using Haptic Augmented Reality.....	308
Seokhee Jeon, Benjamin Knoerlein, Matthias Harders, Gabjong Han, Seungmoon Choi	

Demo for Differential Instant Radiosity for Mixed Reality	309
Christoph Traxler, Martin Knecht	

A Web Service Platform Dedicated to Building Mixed Reality Solutions	310
Petros Belimpasakis, Petri Selonen, Yu You	

AR Shooter: An Augmented Reality Shooting Game System	311
D. Weng, D. Li, W. Xu, Y. Liu, Y. Wan	

Foldable Augmented Maps	312
Sandy Martedi, Hideaki Uchiyama, Guillermo Enriquez, Hideo Saito, Tsutomu Miyashita, Takenori Hara	

Smart Glasses: An Open Environment for AR Apps.....	313
Martin Kurze, Axel Roselius	

Color Plate	315
--------------------------	------------

Author Index.....	319
--------------------------	------------