

Guest Editors' Introduction: Special Section on the IEEE International Symposium on Mixed and Augmented Reality (ISMAR)

Gudrun Klinker, Tobias Höllerer, Hideo Saito, and Oliver Bimber

THE IEEE International Symposium on Mixed and Augmented Reality (ISMAR) continues to be the leading venue for disseminating the latest in AR and MR research, applications, technologies, and companies, and this special section presents significantly extended versions of the three best papers from the IEEE ISMAR 2009 Proceedings. These papers place particular emphasis on two of the most important active research areas in the AR and MR field: tracking, and applications including usability studies.

IEEE ISMAR 2009 had 130 submissions. ISMAR has a two-tiered reviewing system consisting of a group of 12 area chairs, as well as an international program committee and outside reviewers, altogether comprising 173 AR/MR experts. The review process of each paper was organized by an area chair. It received at least four reviews from PC members. These were reported by the area chair and discussed at length during a physical meeting of the area chair committee in Orlando in July 2009. The overall acceptance rate of 19.3 percent is an indication of the significant effort expended in selecting the best papers. A separately installed awards committee of pioneering and leading MR and AR researchers from around the globe reexamined the long papers with the five highest scores to select the Best Paper, the Best Student Paper, and an Honorable Mention.

The authors of the three papers with awards were asked to submit an extended version of their conference paper, with a clear focus of additional content that expands and enhances the scientific contribution of the original conference paper. A standard *IEEE Transactions on Visualization and Computer Graphics (TVCG)* reviewing cycle was initiated and all accepted papers underwent multiple revisions and reviews by each reviewer. Significant efforts by many people were invested to ensure the quality of this special section, and we guest editors are very grateful.

Steven Henderson and Steven Feiner received the Best Paper Award for their contribution: "Exploring the Benefits

of Augmented Reality Documentation for Maintenance and Repair." It reports on a prototype system to support military personnel in performing maintenance tasks in a turret. Impressively, the system has been installed and extensively tested in the narrow space of a real turret with real mechanical engineers.

The Best Student Paper was presented by Nate Hagbi, Oriel Bergig, Jihad El-Sana, and Mark Billinghurst: "Shape Recognition and Pose Estimation for Mobile Augmented Reality." Although tracking has been a topic for a long time, most current solutions use specialized algorithms referring to given shape properties or locally planar textures. This paper presents the Nestor system, which allows users to present new 2D shapes. It automatically analyzes its contour and generates a shape descriptor from projective invariants of concavities in the contour. Subsequently, the contour can be tracked and augmented in 3D.

Susanna Nilsson, Björn J.E. Johansson, and Arne Jönsson received an Honorable Mention for their paper: "Cross-Organizational Collaboration Supported by Augmented Reality." They report on extensive user studies for supporting collaboration between rescues services in firefighting scenarios. As pointed out in the paper, providing collaborative AR support is not a straightforward extension to single-user interfaces, yet it bears particular promise since users with different interests and background (such as policemen, firefighters, and military personnel) can share real artifacts such as a map of the environment while augmenting it with individualized information in individual views in HMDs.

Thanks to the IEEE ISMAR 2009 Awards Committee, including Henry Fuchs, University of North Carolina at Chapel Hill, Hirokazu Kato, NAIST, Ulrich Neumann, University of Southern California, Didier Stricker, DFKI, Reinhold Behringer, Leeds MU, Mark Livingston, Naval Research Laboratory, and Bruce Thomas, University of South Australia, who selected the best papers for inclusion in this special section. Finally, thanks to the reviewers who provided very detailed and careful reviews for the included papers.

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Gudrun Klinker, PhD, studied computer science (informatics) at the Friedrich-Alexander Universität Erlangen, Universität Hamburg (Diplom) and Carnegie-Mellon University (PhD) in Pittsburgh, focusing on research topics in computer vision. In 1989, she joined the Cambridge Research Laboratory of Digital Equipment Corporation in Boston, working in the visualization group on the development of a reusable tele-collaborative data exploration environment to analyze and visualize 3D and higher-dimensional data in medical and industrial applications. Since 1995, she has been researching various aspects of the newly emerging concept of Augmented Reality, first at the European Computer-Industry Research Center, then at the Fraunhofer Institute for Computer Graphics, and since 2000 at the Technical University of Munich. Here, her research focus lies in developing approaches to ubiquitous augmented reality that lend themselves to realistic industrial applications. Professor Klinker is one of the cofounders of the IEEE International Symposium of Augmented Reality (ISMAR). She has served on numerous program committees such as VR, VRST, 3DUI, and UIST. She is the author or coauthor of more than 100 reviewed scientific publications.

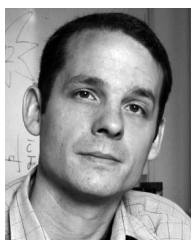


Tobias Höllerer received the graduate degree in informatics from the Technical University of Berlin and the MS and PhD degrees in computer science from Columbia University. He is an associate professor of computer science at the University of California, Santa Barbara, where he codirects the Four Eyes Laboratory, conducting research in the four I's of Imaging, Interaction, and Innovative Interfaces. He is a recipient of the US National Science Foundation's (NSF)

CAREER award, for his work on "Anywhere Augmentation," which enables mobile computer users to place annotations in 3D space wherever they go. Dr. Höllerer has published more than 100 international journal, conference, and workshop papers in the areas of augmented and virtual reality, information visualization, 3D displays and interaction, mobile and wearable computing, and adaptive user interfaces.



Hideo Saito received the BE, ME, and PhD degrees in electrical engineering from Keio University, Japan, in 1987, 1989, and 1992, respectively. He has been on the faculty of Department of Electrical Engineering, Keio University, since 1992. From 1997 to 1999, he was a Visiting Researcher at the Robotics Institute, Carnegie Mellon University, where he joined the Virtualized Reality project. Since 2006, he has been a professor in the Department of Information and Computer Science, Keio University. He is currently the leader of the research project "Technology to Display 3D Contents into Free Space," supported by CREST, JST, Japan. He won the Best Paper Awards at 3DSA 2010 and VSMM 2010. He also won the Honorable Mention for Best Short Paper award at IEEE-VR2011. His research interests include computer vision, mixed reality, virtual reality, and 3D video analysis and synthesis. He is a senior member of the IEEE and IEICE, Japan.



Oliver Bimber led the Augmented Reality Group at the Bauhaus-University Weimar until March 2010. Since October 2009, he has been heading the Institute of Computer Graphics at the Johannes Kepler University Linz, Austria. Bimber coauthored the book "Displays: Fundamentals and Applications" with Rolf R. Hainich, the book "Spatial Augmented Reality" with Ramesh Raskar (MIT), more than 30 journal articles, and numerous other peer-reviewed conference papers. Since 2005, he has been serving on the editorial board of *IEEE Computer*. He and his group received several scientific achievement awards for their research, publications, and inventions. The VIOSO GmbH was founded in his group and is recipient of numerous start-up awards. Bimber's research interests include visual computing, real-time rendering and visualization, computer vision, image analysis and processing, optics, and human visual perception in the context of next-generation display, imaging, and illumination technologies. More information can be found at www.jku.at/cg.