AUGMENT EVERYTHING EVERYWHERE FOR EVERYONE

ISMAR

Munich, Germany

Program

Sep 8-9, 2014

Pre-conference Activities:

– Workshops, Tutorials, Industry Day –
– Volkswagen Tracking Challenge, Doctoral Consortium, AR-Games Workshop –

Sep 10-12, 2014

Main Conference:

Science & Technology
Media Arts Social Sciences Humanities & Design

– Keynotes, Papers, Panels, Posters Demonstrations –
– Volkswagen Tracking Challenge, Art Exhibition –

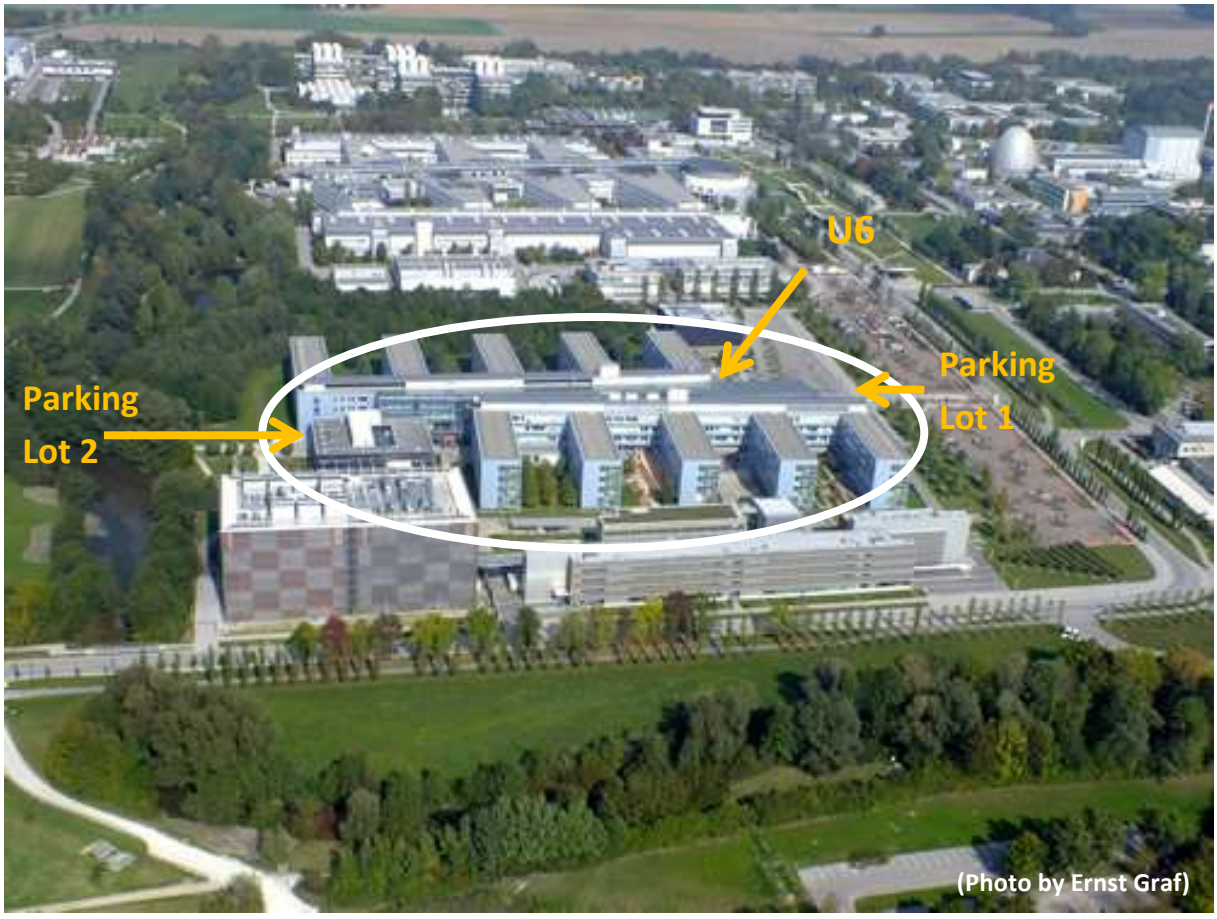
IEEE IEEE computer society IEEE vgtc

Content

Web site: ismar.vgtc.org

Conference Site

Technische Universität München
Forschungscampus Garching
Boltzmannstr. 3 (FMI Building)
Garching b. München



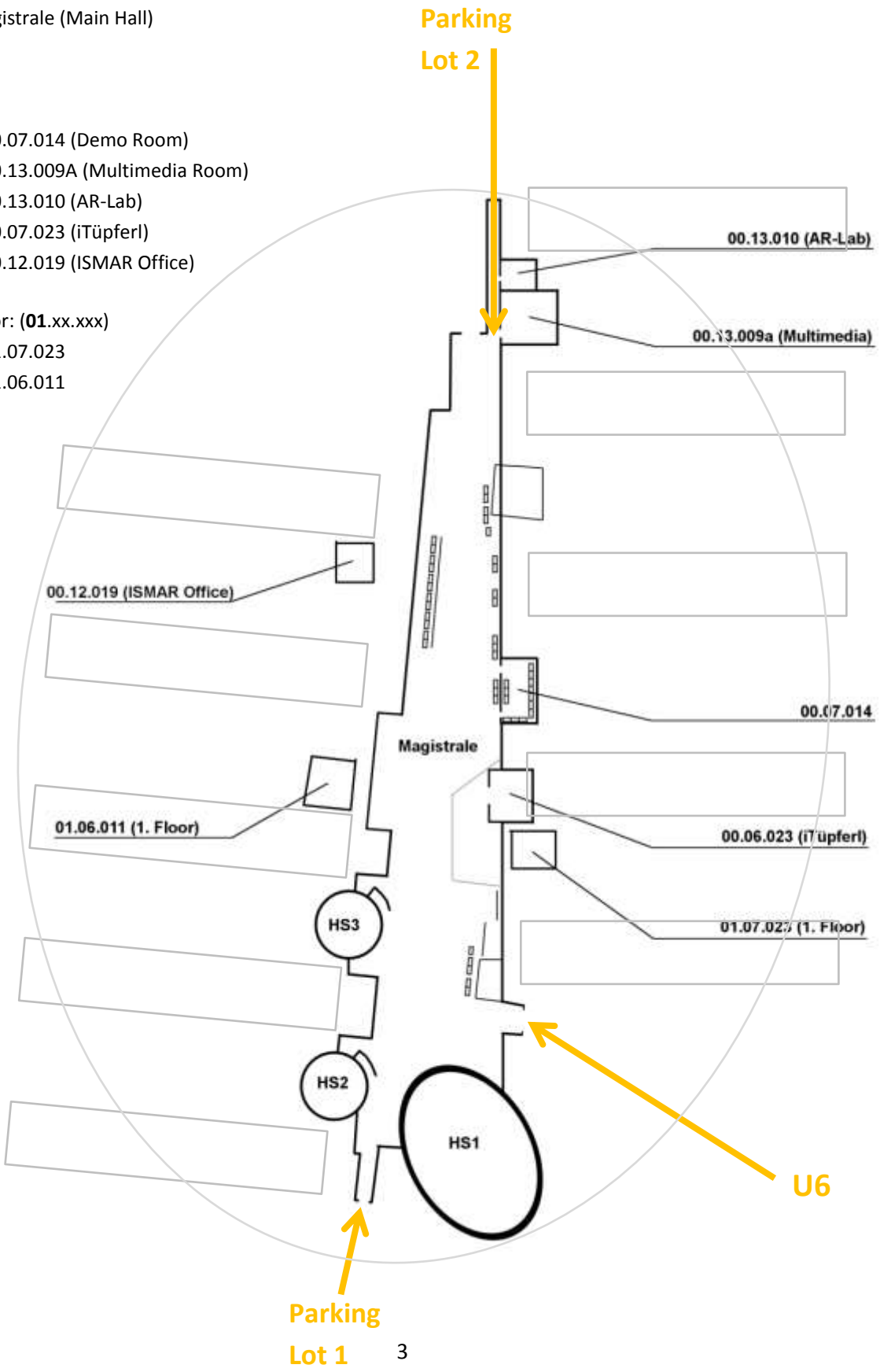
Conference rooms (with the main hall of the CS-Building (“Magistrale”) as the central point of activity)

Ground floor: (**00**.xx.xxx)

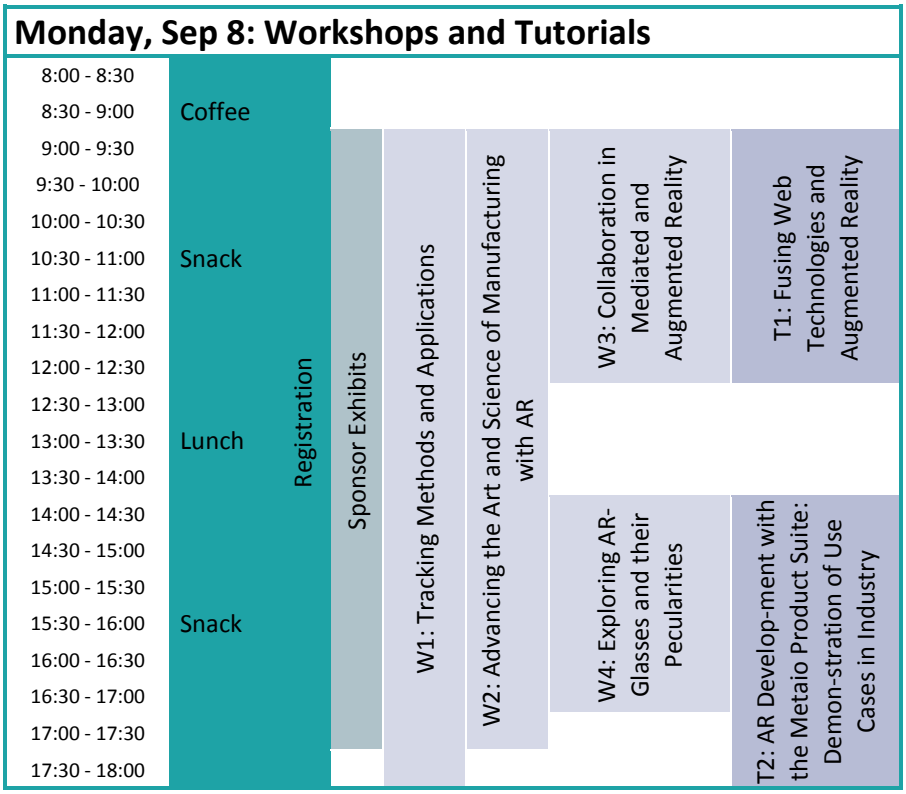
- Magistrale (Main Hall)
- HS1
- HS2
- HS3
- R 00.07.014 (Demo Room)
- R 00.13.009A (Multimedia Room)
- R 00.13.010 (AR-Lab)
- R 00.07.023 (iTüpferl)
- R 00.12.019 (ISMAR Office)

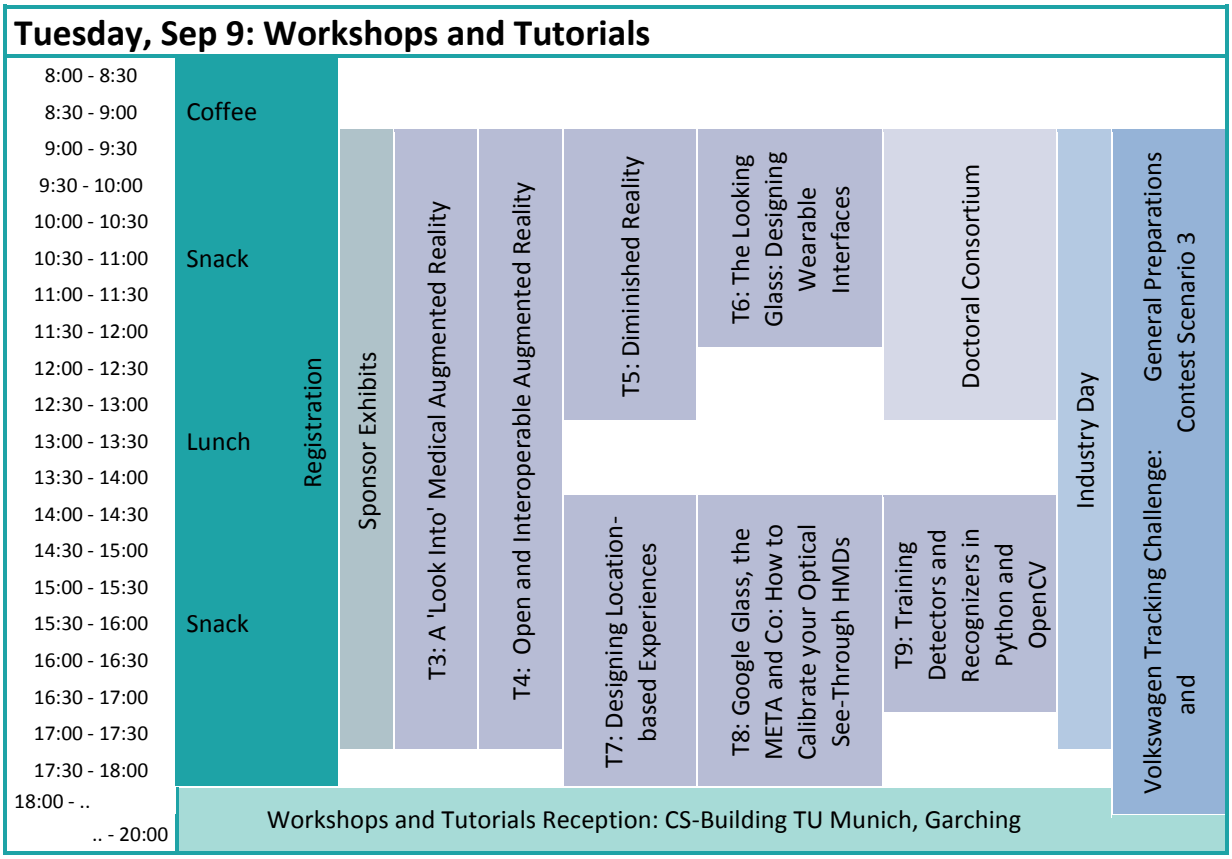
First floor: (**01**.xx.xxx)

- R 01.07.023
- R 01.06.011

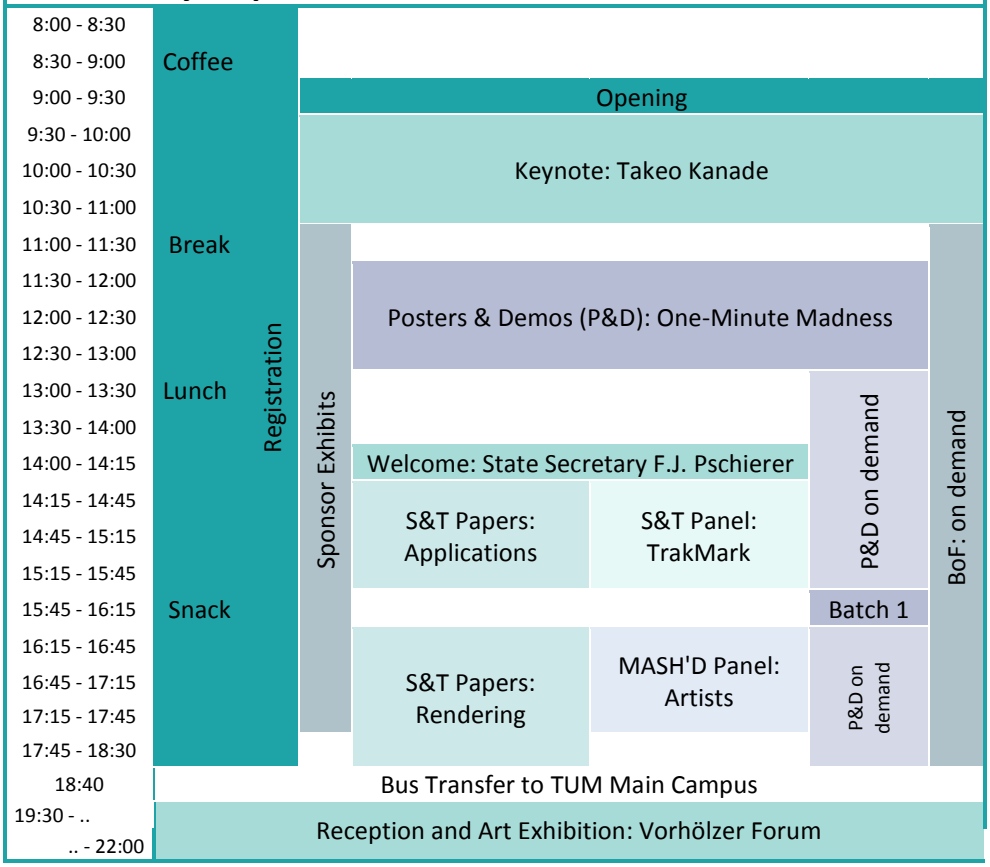


Schedule at a Glance

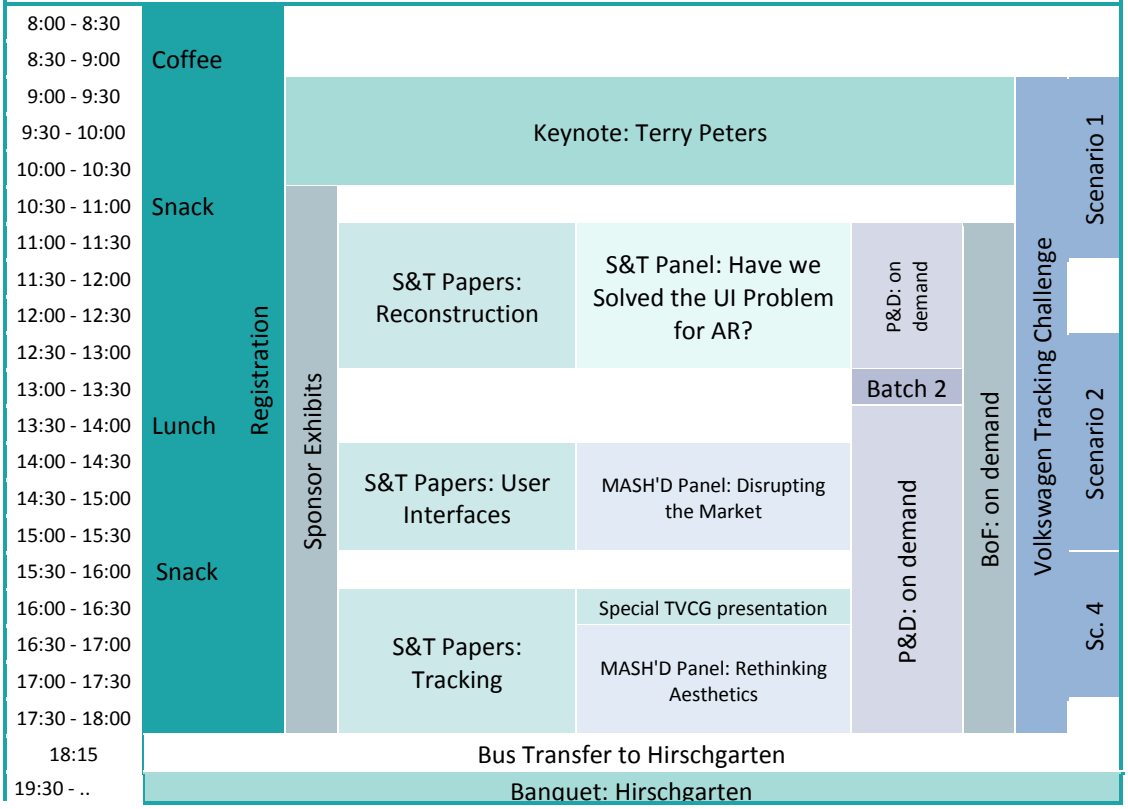




Wednesday, Sep 10: Main Conference



Thursday, Sep 11: Main Conference



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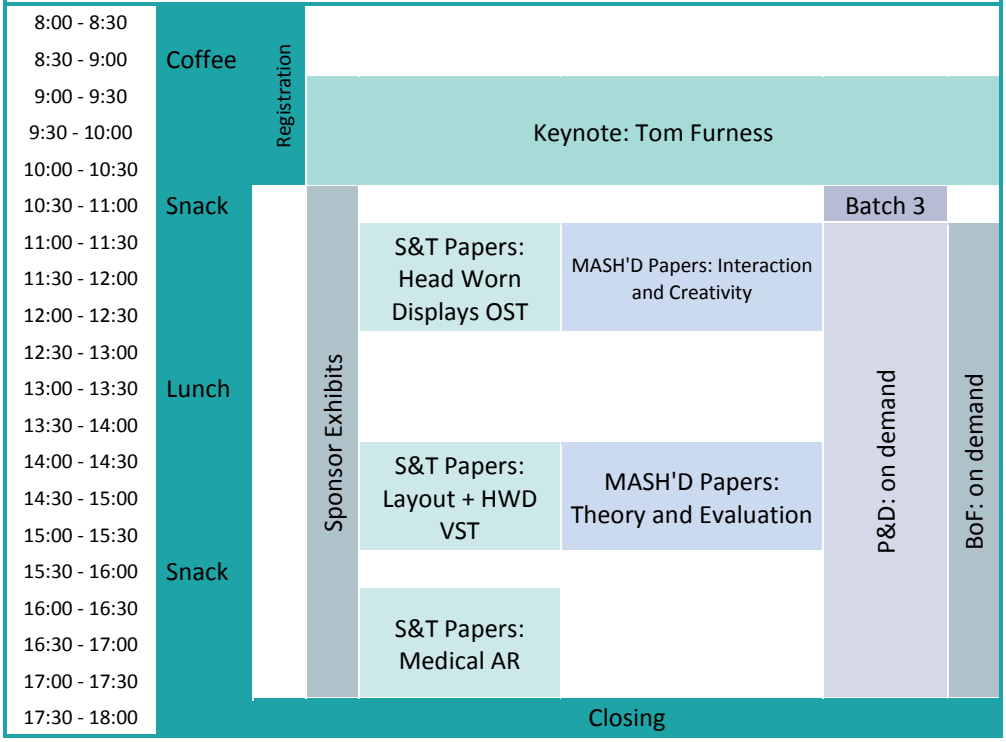
Friday, Sep 12: Main Conference



Keynote Address

Takeo Kanade

Wednesday, Sep. 10, 9:30 – 11:00, HS1

Smart Headlight: A new active augmented reality that improves how the reality appears to a human

Abstract: A combination of computer vision and projector-based illumination opens the possibility for a new type of augmented reality: selectively illuminating the scene to improve or manipulate how the reality itself, rather than its display, appears to a human. One such example is the Smart Headlight being developed at Carnegie Mellon University's Robotics Institute. The project team has been working on a new set of capabilities for the headlight, such as making rain drops and snowflakes disappear, allowing for the high beams to always be on without glare, and enhancing the appearance of objects of interest. This talk will present the idea, approach, and current status of the Smart Headlight Project.

Biography: Takeo Kanade is the U. A. and Helen Whitaker University Professor of Computer Science and Robotics at Carnegie Mellon University. He received his Doctoral degree in Electrical Engineering from Kyoto University, Japan, in 1974. After holding a faculty position there, he joined Carnegie Mellon University in 1980. He was the Director of the Robotics Institute from 1992 to 2001. He also founded and directed the Digital Human Research Center in Tokyo from 2001 to 2010, and the Quality of Life Technology Center at Carnegie Mellon from 2006 to 2012.

Dr. Kanade works in multiple areas of robotics: computer vision, multi-media, manipulators, autonomous mobile robots, medical robotics and sensors, producing more than 400 technical papers and more than 20 patents. The most notable advanced intelligent robotics and vision technologies whose origin and major development are often attributed to Dr. Kanade include: face recognition for which he developed one of the earliest systems in the early 70's, followed by a series of pioneering work on face detection, alignment, and expression analysis; the Lucas-Kanade tracking algorithm that is the basis of today's video motion analysis including video encoding; driverless car for which his Navlab project accomplished the "No Hands Across America" demonstration in 1995 traveling more than 4000km by vision-based autonomous driving; and multi-camera technology that uses a large number of cameras for stereo, scene modeling, and entertainment for which his EyeVision system, a movie Matrix-like replay system used in the broadcast of Super Bowl IIIV , which set the trend we see today.

Dr. Kanade has been elected to the National Academy of Engineering and the American Academy of Arts and Sciences. Awards he received include the Franklin Institute Bower Prize, ACM/AAAI Newell Award, Okawa Award, NEC Computer and Communication Award, Tateishi Grand Prize, Joseph Engelberger Award, Funai Accomplishment Award, IEEE Robotics and Automation Society Pioneer Award, and IEEE PAMI Azriel Rosenfeld Lifetime Accomplishment Award.

Keynote Address

Terry Peters

Thursday, Sep. 11, 9:00 – 10:30, HS1

The Role of Augmented Reality Displays for Guiding Intra-cardiac Interventions

Abstract: Many inter-cardiac interventions are performed either via open-heart surgery, or using minimally invasive approaches, where instrumentation is introduced into the cardiac chambers via the vascular system or heart wall. While many of the latter procedures are often employed under x-ray guidance, for some of these x-ray imaging is not appropriate, and ultrasound is the preferred intra-operative imaging modality. Two such procedures involves the repair of a mitral-valve leaflet, and the replacement of aortic valves. Both employ instruments introduced into the heart via the apex. For the mitral procedure, the standard of care for this procedure employs a 3D Trans-esophageal echo (TEE) probe as guidance, but using primarily its bi-plane mode, with full 3D only being used sporadically. In spite of the clinical success of this procedure, many problems are encountered during the navigation of the instrument to the site of the therapy. To overcome these difficulties, we have developed a guidance platform that tracks the US probe and instrument, and augments the US mages with virtual elements representing the instrument and target, to optimise the navigation process. Results of using this approach on animal studies have demonstrated increased performance in multiple metrics, including total tool distance from ideal pathway, total navigation time, and total tool path lengths, by factors of 3,4,and 5 respectively, as well as a 40 fold reduction in the number of times an instrument intruded into potentially unsafe zones in the heart.
The aortic valve procedure primarily uses X-ray fluoroscopy guidance, but this suffers from the problem of high radiations dose, poor target visibility and potential kidney damage as a result of x-ray contrast administration. To overcome these limitations, we have adopted similar technology to that used for the mitral valve problem, to develop an ultrasound-only solution, again augmented with virtual models of instruments and key targets to guide aortic valve replacement procedures. Preliminary results of this approach on cardiac phantoms indicate that the US-only approach may be as accurate as the standard fluoroscopy-guided technique.

Biography: Dr. Terry Peters (BE (Hons), PhD, FCCPM, FACPSEM, F Inst P, FCOMP, FAAPM, FIEEE, FMICCAI, C Phys) is a Scientist in the Imaging Research Laboratories at the Robarts Research Institute (RRI), London, ON, Canada, and Professor in the Departments of Medical Imaging and Medical Biophysics and a member of the Graduate Programs in Neurosciences and Biomedical Engineering at Western University Canada. He is also an adjunct Professor at McGill University in Montreal, and Hebei University in Baoding China. Dr. Peters received his graduate training at the University of Canterbury in New Zealand in Electrical Engineering, under the direction of Professor Richard Bates. His PhD work dealt with fundamental issues in Computed Tomography image reconstruction, and resulted in a seminal paper on the topic in 1971, just prior to the beginning of CT's commercial development and worldwide application. For the past 30 years, his research has built on this foundation, focusing on the application of computational hardware and software advances to medical imaging modalities in surgery and therapy. Starting in 1978 at the Montreal Neurological Institute (MNI), Dr. Peters' lab pioneered many of the image-guidance techniques and applications for image-guided neurosurgery. In 1997, Dr. Peters was recruited by the Robarts Research Institute at the University of Western Ontario, London Canada, to establish a focus of image-guided surgery and therapy within the Robarts Imaging Research Laboratories. His lab has expanded over the past seventeen years years to encompass image-guided procedures of the heart, brain, abdomen and spine.
Dr. Peters has authored over 250 peer-reviewed papers and book chapters, a similar number of abstracts, and has delivered over 200 invited presentations. He is a Fellow of the Institute of Electrical and Electronics Engineers, the Canadian College of Physicists in Medicine; the American Association of Physicists in Medicine, the Australasian College of Physical Scientists and Engineers in Medicine, the MICCAI Society, and the Institute of Physics and the Canadian Organization of Medical Physicists. He has mentored over 80 trainees at the Masters, Doctoral and Postdoctoral levels. He received the Dean's Award for Research Excellence at Western University in 2011, and the Hellmuth Prize for Achievement in Research from Western in 2012.

Keynote Address

Tom Furness

Friday, Sep. 12, 9:00 – 10:30, HS1

Seeing Anew: Paradigm Shifting across the Virtuality Continuum

Abstract: As an original pioneer of Virtual Reality, Tom Furness, founder of the international network of HIT Labs, presents both the legacy and future of Mixed and Augmented Reality through innovations that unlock and link minds. Inventing some of the original inspirations that led to the Google Glass and Oculus Rift, his keynote will inspire making creative leaps to realize the promise of research. Since the 1960's, his career has been about how to achieve radical innovation through helping others to "see anew." In inspiring a paradigm shift in thinking about the virtuality continuum, his work and global network of labs has shifted the thinking from being about function to purpose; perception to performance; from capabilities to possibilities.
"The virtuality continuum for me has been really about really bridging between the wonders of the real world and the infinite possibilities of the human imagination."
As Mixed and Augmented Reality innovation begins to transform everyday life, Dr. Furness presents the future role of trans disciplinary research and curriculum in melting the boundaries between Science, Technology, Media, Art, Humanities and Design to teach the next generation of innovators. He shares his future venture of the Virtual World Society that is creating a collaborative initiative of experiential learning, using virtual, mixed and augmented reality as a platform to empower youth to envision and create a better world for tomorrow.
INTERESTING QUOTE:
The real voyage of discovery consists not in seeking new landscapes but in having new eyes. - Marcel Proust (1871-1922)

Biography: Prof. Furness is a pioneer in human interface technology and virtual reality. He received the BS degree in Electrical Engineering from Duke University and the Ph.D. in Engineering and Applied Science from the University of Southampton, England. Dr. Furness is currently a professor of Industrial Engineering and Systems Engineering with adjunct professorships in Electrical Engineering, Mechanical Engineering and Human Centered Design and Engineering at the University of Washington (UW), Seattle, Washington, USA. He is the founder of the Human Interface Technology Laboratory (HIT Lab) at UW and founder and international director of the HIT Lab NZ at the University of Canterbury, Christchurch, New Zealand and the HIT Lab Australia at the University of Tasmania, Launceston, Tasmania. He is also an Erskine Fellow and Adjunct Professor at the University of Canterbury and an Adjunct Professor at the University of Tasmania.
Prior to joining the faculty at the UW, Prof. Furness served a combined 23 years as an U.S. Air Force officer and civilian at the Armstrong Laboratory at Wright-Patterson Air Force Base, Ohio, where he developed advanced cockpits and virtual interfaces for the Department of Defense. He is the author of the Super Cockpit program and served as the Chief of Visual Display Systems and Super Cockpit Director until he joined the University of Washington in 1989. He is credited as a pioneer in developing virtual reality and augmented reality.
Dr. Furness lectures widely and has appeared in many national and international network and syndicated television science and technology documentaries and news programs. He is the inventor of the personal eyewear display, the virtual retinal display, the HALO display and holds 16 patents in advanced sensor, display and interface technologies. With his colleagues Dr. Furness has started 26 companies, two of which are traded on NASDAQ at a market capitalization of $ > 7 B \$ $ (USD). In 1998 he received the Discover Award for his invention of the virtual retinal display.
Dr. Furness is also co-inventor of the SPM (spectral matching) technology licensed to Visualant Inc. He continues to serve as a Senior Scientific Advisor for the company and recently received the 2013 SPIE Prism Award for his invention of the ChromaID technology.
Dr. Furness and his wife Linda live in Seattle, Tofino (Vancouver Island), British Columbia and Christchurch NZ. They have two daughters and four grandchildren. His favorite pastime is playing with his grandchildren.

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The **Augmented Reality** Company

Metaio is the worldwide leader in Augmented Reality technology and research. For over a decade, Metaio has been delivering industry cutting edge technology innovations in the field of Augmented Reality and computer vision. Metaio is also proud to be the only Augmented Reality company serving all segments of the AR value chain. From hardware solutions like the AREngine to end-user software like the Junaio AR Browser, Metaio's cohesive ecosystem supports the healthy growth of the AR industry. Metaio continues to innovate in the field of Augmented Reality and Computer Vision, with dedicated research and development teams who work to bring the best tracking, rendering and interaction methodologies to productive usage in commercial software tools.

Through best-in-class computer vision technology, Metaio serves a 100,000+ developer community with the most powerful Augmented Reality tools. With the Metaio SDK and Creator tools, Metaio is the only company that gives users access to 3D object tracking, continuous visual search and SLAM functionality right out of the box. Develop for free across all major platforms today.

Talk to our specialists right here at ISMAR and visit www.metaio.com

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Papers

Program Chairs

- **Science and Technology (S&T): Simon Julier (University College London, UK), Robert W. Lindeman (Worcester Polytechnic Institute, USA), Christian Sandor (Nara Institute of Science and Technology, Japan)**
- **Media, Arts, Social Sciences, Humanities and Design (MASH'D): Henry Duh (HITLab AU, University of Tasmania, Australia), Julian Stadon (FH Salzburg, Austria), Christopher Stapleton (Simiosys Real World Laboratory, USA)**

Applications [S&T]

Wednesday, Sep 10, 14:15 – 15:45, HS1

Session Chair: Dieter Schmalstieg (TU Graz, Austria)

- AR-IVI – Implementation of In-Vehicle Augmented Reality (Qing Rao, Tobias Tropper, Christian Grünler, Markus Hammon, Samarjit Chakraborty)
- AR-Mentor: Augmented Reality Based Mentoring System (Zhiwei Zhu,Vlad Branzoi, Michael Wolverton, Louise Yarnall, Girish Acharya, Supun Samarasekera, Rakesh Kumar, Glen Murray, Nicholas Vitovitch)
- ThermoTouch: Thermography-Enabled Everywhere Touch Interfaces for Mobile Augmented Reality Applications (Daniel Kurz)
- Towards Augmented Reality User Interfaces in 3D Media Production (Max Krichenbauer, Goshiro Yamamoto,Takafumi Taketomi, Christian Sandor, Hirokazu Kato)

Rendering [S&T]

Wednesday, Sep 10, 16:15 – 18:30, HS1

Session Chair: Wolfgang Broll (TU Ilmenau, Germany)

- Delta Voxel Cone Tracing (Tobias Alexander Franke)
- Importance Weighted Image Enhancement for Prosthetic Vision: An Augmentation Framework (Chris McCarthy, Nick Barnes)
- Interactive Near-Field Illumination for Photorealistic Augmented Reality on Mobile Devices (Kai Rohmer, Wolfgang Büschel, Raimund Dachselt, Thorsten Grosch)
- P-HRTF: Efficient Personalized HRTF Computation for High-Fidelity Spatial Sound (Alok Meshram, Ravish Mehra, Hongsheng Yang, Enrique Dunn, Jan-Michael Frahm, Dinesh Manocha)
- Visibility-Based Blending for Real-Time Applications (Taiki Fukiage, Takeshi Oishi, Katsushi Ikeuchi)

Reconstruction and Fusion [S&T]

Thursday, Sep 11, 11:00 – 12:45, HS1

Session Chair: Walterio Mayol-Cuevas (Briston University, UK)

- Comprehensive Workspace Calibration for Visuo-Haptic Augmented Reality (Ulrich Eck, Frieder Pankratz, Christian Sandor, Gudrun Klinker, Hamid Laga)
- Improved Registration for Vehicular AR using Auto-Harmonization (Eric Foxlin, Thomas Calloway, Hongsheng Zhang)
- Real-Time Illumination Estimation from Faces for Coherent Rendering (Sebastian B. Knorr, Daniel Kurz)
- Recognition and reconstruction of transparent objects for Augmented Reality (Alan Francisco Torres-Gomez, Walterio Mayol-Cuevas)

User Interfaces [S&T]

Thursday, Sep 11, 14:00 – 15:45, HS1

Session Chair: Steven Feiner (Columbia University, USA)

- A Study of Depth Perception in Hand-Held Augmented Reality using Autostereoscopic Displays (Matthias Berning, Daniel Kleinert, Till Riedel, Michael Beigl)
- Grasp-Shell vs Gesture-Speech: A comparison of direct and indirect natural interaction techniques in Augmented Reality (Thammathip Piumsomboon, David Altimira, Hyungon Kim, Adrian Clark, Gun Lee, Mark Billinghurst)
- Improving Co-presence with Augmented Visual Communication Cues for Sharing Experience through Video Conference (Seungwon Kim, Gun Lee, Nobuchika SAKATA, Mark Billinghurst)
- Measurements of Live Actor Motion in Mixed Reality Interaction (Gregory Hough, Ian Williams, Cham Athwal)

Tracking [S&T]

Thursday, Sep 11, 16:00 – 18:00, HS1

Session Chair. Georg Klein (Microsoft Corporation, USA)

- Dense Planar SLAM (Renato Salas-Moreno, Ben Glocker, Paul Kelly, Andrew Davison)
- Pixel-Wise Closed-Loop Registration in Video-Based Augmented Reality (Feng Zheng, Dieter Schmalstieg, Gregory Welch)
- Real-time Deformation, Registration and Tracking of Solids Based on Physical Simulation (Ibai Leizea, Hugo Álvarez, Iker Aguinaga, Diego Borro)
- Semi-Dense Visual Odometry for AR on a Smartphone (Tobias Schöps, Jakob Engel, Daniel Cremers)
- Sticky Projections - A New Approach to Interactive Shader Lamp Tracking (Christoph Resch, Peter Keitler, Gudrun Klinker)

Special TVCG Presentation [S&T]

Thursday, Sep 11, 16:00 – 16:30, HS3

Session Chair: Christian Sandor (Nara Institute of Science and Technology, Japan)

- Making Graphical Information Visible in Real Shadows on Interactive Tabletops (Mariko Isogawa, Daisuke Iwai, Kosuke Sato)

Head-Worn Displays OST [S&T]

Friday, Sep 12, 11:00 – 12:30, HS1

Session Chair: Tom Furness (HITLab, University of Washington, USA)

- Analysing the Effects of a Wide Field of View Augmented Reality Display on Search Performance in Divided Attention Tasks (Naohiro Kishishita, Kiyoshi Kiyokawa, Ernst Kruijff, Jason Orlosky, Tomohiro Mashita, Haruo Takemura)
- Minimizing Latency for Augmented Reality Displays: Frames Considered Harmful (Feng Zheng, Turner Whitted, Anselmo Lastra, Peter Lincoln, Andrei State, Andrew Maimone, Henry Fuchs)
- Performance and Sensitivity Analysis of ~~IN~~DICA: INteraction-free DIsplay CAlibration for Optical See-Through Head-Mounted Displays (Yuta Itoh, Gudrun Klinker)
- SmartColor: Real-Time Color Correction and Contrast for Optical See-Through Head-Mounted Displays (Juan David Hincapié-Ramos, Levko Ivanchuk, Srikanth Kirshnamachari Sridharan, Pourang Irani)

AR Interaction and Creativity [MASH'D]

Friday, Sep 12, 11:00 – 12:30, HS3

Session Chair: Julian Stadon (FH Salzburg, Austria)

- AR PETITE THEATER: Augmented Reality Storybook for Supporting Children's Empathy Behavior (Kyungwon Gil, Jimin Rhim, Taejin Ha, Young Yim Doh, Woontack Woo)
- Effects of Mobile AR-Enabled Interactions on Retention and Transfer for Learning in Art Museum Contexts (Weiquan Lu, Linh-Chi Nguyen, Teong Leong Chuah, Ellen Yi-Luen Do)
- Integrating Augmented Reality to Enhance Expression, Interaction & Collaboration in Live Performances: a Ballet Dance Case (Alexis Clay, Gaël Domenger, Julien Conan, Axel Domenger, Nadine Couture)
- VAL: Visually Augmented Laser cutting to enhance and support creativity (Kristoffer Winge, Rune Haugaard, Timothy Merritt)

Layout and Head-Worn Displays VST [S&T]

Friday, Sep 12, 14:00 – 15:30, HS1

Session Chair: Tobias Höllerer (University of California, Santa Barbara, USA)

- Creating Automatically Aligned Consensus Realities for AR Videoconferencing (Nicolas Lehment, Daniel Merget, Gerhard Rigoll)
- FLARE: Fast Layout for Augmented Reality Applications (Ran Gal, Lioir Shapira, Eyal Ofek, Pushmeet Kohli
- Presence and Discernability in Conventional and Non-Photorealistic Immersive Augmented Reality (William Steptoe, Simon Julier, Anthony Steed)
- WeARHand: Head-Worn, RGB-D Camera-Based, Bare-Hand User Interface with Visually Enhanced Depth Perception (Taejin Ha, Steven Feiner, Woontack Woo)

Theory and Evaluation [MASH'D]

Friday, Sep 12, 14:00 – 15:30, HS3

Session Chair: Henry Duh (HITLab AU, University of Tasmania, Australia)

- A Theory of Meaning for Mixed Reality Walking Tours (Evan Barba)
- Can mobile augmented reality systems assist in portion estimation? A user study (Thomas Stütz, Radomir Dinic, Michael Domhardt, Simon Ginzinger)
- Evaluating Controls for a Point and Shoot Mobile Game: Augmented Reality, Tilt and Touch (Asier Marzo, Benoit Bossavit, Martin Hachet)
- nARratives of augmented worlds (Roy Shilkrot, Mick Montfort, Pattie Maes)

Medical AR [S&T]

Friday, Sep 12, 16:00 – 17:30, HS1

Session Chair: Nassir Navab (TU Munich, Germany)

- Computer-Assisted Laparoscopic Myomectomy by Augmenting the Uterus with Pre-operative MRI Data (Toby Collins, Daniel Pizarro, Adrien Batoli, Nicolas Bourdel)
- Improved Interventional X-ray Appearance (Xiang Wang, Christian Schulte zu Berge, Stefanie Demirci, Pascal Fallavollita, Nassir Navab)
- Single View Augmentation of 3D Elastic Objects (Nazim Haouchine, Jeremie Dequidt, Marie-Odile Berger, Stephane Cotin)

OPTINVENT is the leading maker of the ORA-1 cutting edge augmented reality smart glasses based on disruptive patented technologies and extensive know-how in the field of retinal projection. ORA-1 is an AR smart glasses platform based on a large see-through virtual display capable of supporting a multitude of hands free mobile computing and augmented reality applications with record setting performance. It is the most scalable and power efficient technology in its class and is destined to bring affordable Smart Glasses to the forefront of the professional and consumer markets. www.optinvent.com

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Panels

Chairs

Isidro Navarro (La Salle Campus Barcelona, Spain), Jun Park (Hong-Ik University, South Korea), David Plecher (TU Munich, Germany), Julian Stadon (FH Salzburg, Austria)

TrakMark [S&T]: How to Benchmark AR/MR Geometric Registration and Tracking Methods

Wednesday, Sep 10, 14:15 – 15:45, HS3

Chairs: Hirokazu Kato (Nara Institute of Science and Technology, Japan), Fumihisa Shibata (Ritsumeikan University, Japan)

Panelists: Nassir Navab (TU Munich, Germany), Jürgen Strum (metaio, Germany), Takeshi Kurata (AIST, Japan), Koji Makita (AIST, Japan), Fumihisa Shibata (Ritsumeikan University, Japan)

In the research fields of Augmented Reality (AR) and Mixed Reality (MR), tracking and geometric registration methods are still one of the most important topics. The tracking research field is highly active, and every year, "Tracking" session is scheduled in the ISMAR. The *TrakMark* working group (WG) was established in 2009, as a lower branch of the Special Interest Group on Mixed Reality (SIG-MR), the Virtual Reality Society of Japan (VRSJ), to create the benchmark of AR/MR geometric registration and tracking methods, named *TrakMark*, that permits objective evaluation and comparison of diverse registration and tracking methods.

Topics:

- Introduction to TrakMark, data sets and benchmark testing.
- Presentation of the uniform software environment *Casper Cartridge* and the benchmark standardization activity in ISO/IEC JTC 1.
- Panel discussion about current and future research issues of TrakMark

Beyond the Interface – Artists Panel [MASH'D]

Wednesday, Sep 10, 16:15 – 17:45, HS3

Chair: Marc Garret (Furtherfield, UK)
Panelists: Heath Bunting, Nick Briz, Julian Stadon, Ruth Catlow

This panel will discuss the topics and themes associated with the ISMAR exhibition *Beyond the Interface.* The interface is the boundary across which information is exchanged, causing a transformation in one or both sides of that boundary. Interfaces have always been a site of control, hidden in plain view: symbolic, social or technological. They facilitate and shape the dialogue that happens between different tribes from religions, scientific or philosophical backgrounds; between components of computer systems; or between machines and living beings. This panel will discuss how the exhibited works disrupt, critique or bypass and lifts the veil on contemporary interfaces and this means to them and us.

Have We Solved the User Interaction Problem for Augmented Reality? [S&T]

Thursday, Sep 11, 11:00 – 12:45, HS3

Chair: Bruce H. Thomas (University of South Australia)
Panelists: Steven Feiner (Columbia University, USA), Dieter Schmalstieg (TU Graz, Austria), Shahram Izadi (Microsoft Research, Cambridge, UK), Bruce H. Thomas (University of South Australia)

Commercially available optical see-through displays are just around the corner. Applications will be very much on the rise. With the years of research effort, a rich array of micro-sized sensors, the advent of low cost RGBD cameras and advances in computer vision technology, what are the major research issues for developing user interactions for augmented reality systems? Technology advances and commercialization are now allowing many more researchers to investigate augmented reality without needing the expertise/effort to develop their own low-level technology (hardware, software, and UI techniques). There is still much research required to determine the most effective ways to use this technology for a variety of tasks. Today there is not even a single interaction technique specific to AR that is widely accepted by a mass audience. This panel will explore what issues have been solved and (if there are any) those left to be investigated for user interfaces for augmented reality.

The structure of the panel will be five minutes for each panel member stating their views on the current issues, solved and to be solved. The remainder of the panel will be discussion and Q&A from the floor.

Beyond the Interface – Disrupting the Market [MASH'D]

Thursday, Sep 11, 14:00 – 15:30, HS3

Chair: Marc Garret Furtherfield, UK)
Panelists: Heath Bunting, Tatiana Bazzichelli, Annette Domz, Wolf Lieser

This panel looks at alternative approaches to understanding creative digital industries, marketing and power, and focuses on the boundary between cultural and financial, governmental and political economies. The speakers will examine a range of tactical strategies and disruptive approaches as part of an evaluation of the economic hierarchies in contemporary society and creative production. This discourse will present recent examples that critique traditional approaches to participation within market driven systems, with a particular focus on networked culture, mixed realities, social media, ubiquitous computing, and mass surveillance.

Beyond the Interface – Rethinking Aesthetics [MASH'D]

Thursday, Sep 11, 16:30 – 18:00, HS3

Chair: Ruth Catlow
Panelists: Thomas Grundnigg, Nick Briz, Zach Blas, Erica Scourti

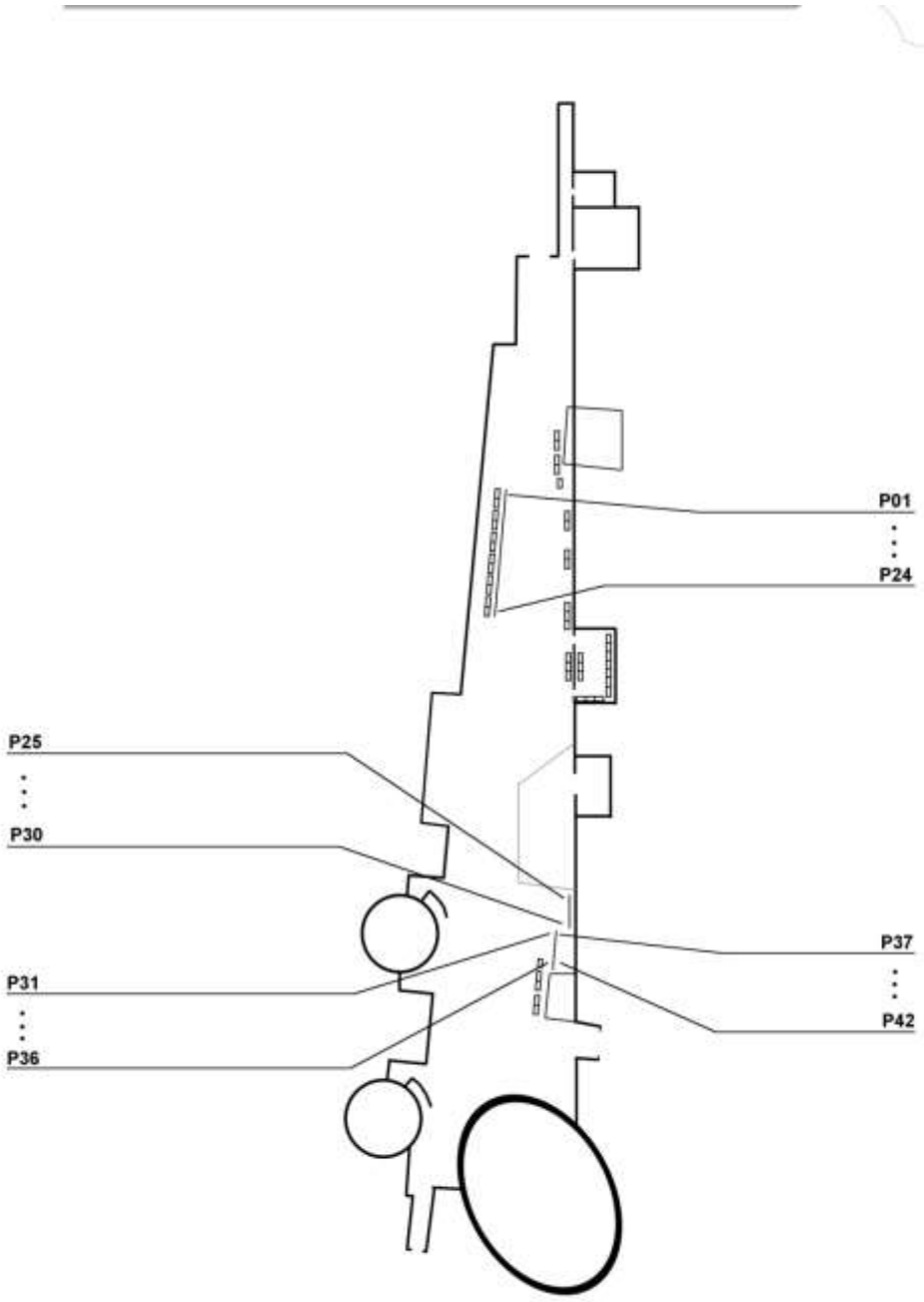
This panel will discuss notions of value and digital processes within a framework that seeks to readdress aesthetics and what rethinking interface aesthetics actually means within a networked and cultural context. Within digital culture, aesthetics has traditionally been orientated around the interface as object/material. In a post Internet mixed reality society, networked social exchanges of data have disrupted the notion of objective/concrete aesthetics, repositioning it to be now both embedded in and constructed by a collective cultural value system. This panel will explore these ideas within a historical aesthetic framework, in order to attempt to reimagine what aesthetics actually are and how they fit into contemporary society.

Posters

Chairs:

Nobuchika Sakata (Osaka University, Japan), Veronica Teichrieb (Federal University of Pemambuco, Brazil), Marcus Tönnis (TU Munich, Germany)

All posters and demonstrations will be presented in a "One Minute Madness" session. Afterwards they will be on display throughout the entire conference, as individually arranged by the authors. Special, guaranteed presentation times are also arranged three batches.



One Minute Madness

Wednesday, Sep 10, 11:30 – 13:00, HS1

1-minute presentation of every poster and demonstration.

Batch 1

Wednesday, Sep 10, 15:45 – 16:15, Magistrale

[P01] A Mobile Augmented Reality System to Assist Auto Mechanics (Darko Stanimirovic, Nina Damasky, Sabine Webel, Dirk Koriath, Andrea Spillner, Daniel Kurz)

[P02] A Preliminary Study on Altering Surface Softness Perception using Augmented Color and Deformation (Parinya Punpongsanon, Daisuke Iwai, Kosuke Sato)

[P03] Combining Multi-touch and Device Movement in Mobile Augmented Reality Manipulations (Asier Marzo, Benoît Bossavit, Martin Hachet)

[P04] Exploring Social Augmentation Concepts for Public Speaking using Peripheral Feedback and Real-Time Behavior Analysis (Ionut Damian, Chiew Seng Sean Tan, Tobias Baur, Johannes Schöning, Kris Luyten, Elisabeth André)

[P05] Indirect Augmented Reality Considering Real-World Illumination Change (Fumio Okura, Takayuki Akaguma, Tomokazu Sato, Naokazu Yokoya)

[P06] MOBIL: A Moments based Local Binary Descriptor (Abdelkader BELLARBI, Samir Otmane, Nadia ZENATI-HENDA, Samir BENBELKACEM)

[P07] Non-Parametric Camera-Based Calibration of Optical See-Through Glasses for Augmented Reality Applications (Martin Klemm, Harald Hoppe, Fabian Seebacher)

[P08] The Posture Angle Threshold between Airplane and Window Frame Metaphors (Marcus Tönnis, Sandro Weber, Gudrun Klinker)

[P09] Touch Gestures for Improved 3D Object Manipulation in Mobile Augmented Reality (Philipp Tiefenbacher, Andreas Pflaum, Gerhard Rigoll)

[P10] Towards Mobile Augmented Reality for the Elderly (Daniel Kurz, Anton Fedosov, Stefan Diewald, Jörg Güttler, Barbara Geilhof, Matthias Heuberger)

[P11] View management for webized mobile AR contents (Jungbin Kim, Joohyun Lee, Byounghyun Yoo, Sangchul Ahn, Heedong Ko)

[P12] Visual-Inertial 6-DOF Localization for a Wearable Immersive VR/AR System (Ludovico Carozza, Frederic Bosche', Mohamed Abdel-Wahab)

Batch 2

Thursday, Sep 11, 13:00 – 13:30, Magistrale

[P13] Augmentation of Live Excavation Work for Subsurface Utilities Engineering (Stéphane Côté, Ian Létourneau, Jade Marcoux-Ouellet)

[P14] Augmented Reality Binoculars on the Move (Taragay Oskiper, Mikhail Sizintsev, Vlad Branzoi, Supun Samarasekera, Rakesh Kumar)

[P15] HMD Video See Though AR with Unfixed Cameras Vergence (Vincenzo Ferrari, Fabrizio Cutolo, Emanuele Maria Calabrò, Mauro Ferrari)

[P17] Contact-view: A Magic-lens Paradigm Designed to Solve the Dual-view Problem (Klen Čopič Pucihar, Paul Coulton)

[P18] Utilizing Contact-view as an Augmented Reality Authoring Method for Printed Document Annotation (Klen Čopič Pucihar, Paul Coulton)

[P19] Local Optimization for Natural Feature Tracking Targets (Elias Tappeiner, Dieter Schmalstieg, Tobias Langlotz)

[P20] Motion Detection based Ghosted Views for Occlusion Handling in Augmented Reality (Arthur Padilha, Veronica Teichrieb)

[P21] Ongoing development of a user-centered, AR testbed in industry (Luca Bertuccelli, Taimoor Khawaja, Paul O'Neill, Bruce Walker)

[P22] QR Code Alteration for Augmented Reality Interactions (Han Park, Taegyu Kim, Jun Park)

[P23] Smartwatch-Aided Handheld Augmented Reality (Darko Stanimirovic, Daniel Kurz)

[P24] Towards User Perspective Augmented Reality for Public Displays (Jens Grubert, Hartmut Seichter, Dieter Schmalstieg)

[P25] Turbidity-based Aerial Perspective Rendering for Mixed Reality (Carlos Morales, Takeshi Oishi, Katsushi Ikeuchi)
[P26] Using Augmented Reality to Support Information Exchange of Teams in the Security Domain (Dragos Datcu, Marina Cidota, Heide Lukosch, Stephan Lukosch)
[P27] Visualization of Solar Radiation Data in Augmented Reality (Maria Beatriz Carmo, Ana Paula Cláudio, António Ferreira, Ana Paula Afonso, Paula Redweik, Cristina Catita, Miguel Centeno Brito, José Nunes Pedrosa)

Batch 3

Friday, Sep 12, 10:30 – 11:00, Magistrale

[P16] Device vs. User Perspective Rendering in Google Glass AR Applications (João Paulo Lima, Rafael Roberto, João Marcelo Teixeira, Veronica Teichrieb)
[P28] A Reconstructive See-Through Display (Ky Waegel)
[P29] A single co-lived augmented world or many solipsistic fantasies? (Nicola Liberati)
[P30] AIBLE: An Inquiry-Based Augmented Reality Environment for teaching astronomical phenomena (Stéphanie Fleck, Gilles Simon, Christian Bastien)
[P31] An Augmented and Virtual Reality System for Training Autistic Children (Lakshmi Prabha Nattamai Sekar, Alexandre Santos, Dimitar Mladenov, Olga Beltramello)
[P32] AR for the comprehension of linear perspective in the Renaissance masterpiece The Holy Trinity (Masaccio, 1426) (Giovanni Landi)
[P33] CI-Spy: Using Mobile-AR for Scaffolding Historical Inquiry Learning (Gurjot Singh, Doug Bowman, Todd Ogle, David Hicks, David Cline, Eric Ragan, Aaron Johnson, Rosemary Zlokas)
[P34] Classifications of Augmented Reality Uses in Marketing (Ana Javornik)
[P35] Contextually Panned and Zoomed Augmented Reality Interactions Using COTS Heads Up Displays (Alex Hill, Harrison Leach)
[P36] Interacting with your own hands in a fully immersive MR system (Franco Tecchia, Giovanni Avveduto, Marcello Carrozzino, Raffaello Brondi, Massimo Bergamasco, Leila Alem)
[P37] Interactive Deformation of Real Objects (Jungsik Park, Byung-Kuk Seo, Jong-Il Park)
[P38] Representing Degradation of Real Objects Using Augmented Reality (Takuya Ogawa, Manabe Yoshitsugu, Noriko Yata)
[P39] Social Panoramas Using Wearable Computers (Carolin Reichherzer, Alaeddin Nassani, Mark Billinghurst)
[P40] View Independence in Remote Collaboration Using AR (Matthew Tait, Mark Billinghurst)

Posters from the Doctoral Consortium

Friday, Sep 12, 10:30 – 11:00, Magistrale

[P41] Video See Through AR Head-Mounted Display for Medical Procedures **(Fabrizio Cutolo**, EndoCAS Center, Department of Translational Research and New Technologies in Medicine and Surgery University of Pisa, Italy; thesis supervisors: Paolo Domenico Parchi and Vincenzo Ferrari)
[P42] Corneal Imaging in Localization and HMD interaction **(Alexander Plopski**, Osaka University, Japan; thesis supervisors: Kiyoshi Kiyokawa, Haruo Takemura, and Christian Nitschke)
[P43] Semantic Contextual Augmented Reality Environments (**Dariusz Rumiński**, Poznań University of Economics, Poland; thesis supervisor: Krzysztof Walczak)
[P44] Designing Support for Collaboration around Physical Artefacts: Using Augmented Reality in Learning Environments (**Jason Weigel**, University of Queensland, Australia; thesis supervisors: Stephen Viller and Mark Schulz)

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Demonstrations

Chairs:

Maki Sugimoto (Keio University, Japan), Ross Smith (University of South Australia), Frieder Pankratz (TU Munich, Germany), Julian Stadon (FH Salzburg, Austria)

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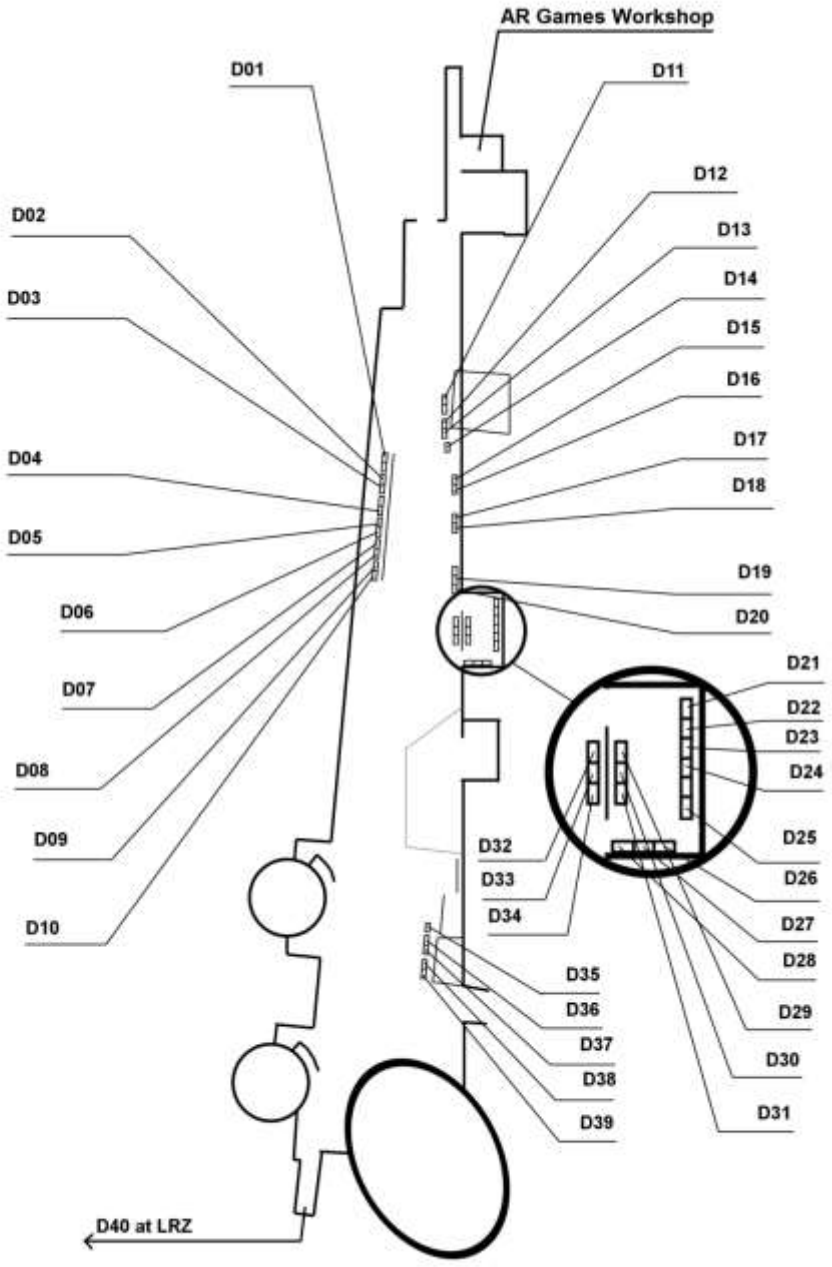

One Minute Madness

Wednesday, Sep 10, 11:30 – 13:00, HS1

1-minute presentation of every poster and demonstration.

Batch 1

Wednesday, Sep 10, 15:45 – 16:15, Magistrale and R 00.07.014

[D01] Integrating Highly Dynamic RESTful Linked Data APIs in a Virtual Reality Environment (Felix Leif Keppmann, Tobias Käfer, Steffen Stadtmüller, René Schubotz and Andreas Harth)

[D05] G-SIAR: Gesture-Speech Interface for Augmented Reality (Thammathip Piumsomboon, Adrian Clark and Mark Billinghurst)

[D06] Device vs. User-Perspective Rendering in AR applications for Monocular Optical See-Through Head-Mounted Displays (João Paulo Lima, Rafael Roberto, João Marcelo Teixeira and Veronica Teichrieb)

[D07] The Fashion Studio (Alin Popescu)

[D08] User Friedly Calibration and Tracking for Optical Stereo See-Through Augmented Reality (Folker Wientapper, Timo Engelke, Jens Keil, Harald Wuest and Johanna Mensik)

[D16] Plucky: Plucking Data At the Flick of a Wrist (Hafez Rouzati, Amber Standley and John Murray)

[D18] Mobile Augmented Reality - 3D Object Selection and Reconstruction with an RDBD Sensor and Scene Understanding (Daniel Wagner, Gerhard Reitmayr, Alessandro Mulloni, Erick Mendez and Serafin Diaz)

[D21] High Volume Offline Image Recognition (Tomasz Adamek, Luis Martinell, Miquel Ferrarons, Alex Torrents and David Marimon)

[D28] Markerless Augmented Reality Solution for Industrial Manufacturing (Boris Meden, Sebastian Knoedel and Steve Bourgeois)

[D30] Comprehensive Workspace Calibration for Visuo-Haptic Augmented Reality (Ulrich Eck, Frieder Pankratz, Christian Sandor, Gudrun Klinker and Hamid Laga)

[D36] Movie On the Road: a Multimedia-Augmented Tourist Experience with CDVS Descriptors (Giovanni Ballocca, Attilio Fiandrotti, Marco Gavelli, Massimo Mattelliano, Michele Morello, Alessandra Mosca and Paolo Vergori)

[D39] On-Site Augmented Collaborative Architecture Visualization (David Schattel, Marcus Tönnis, Gudrun Klinker, Gerhard Schubert and Frank Petzold)

Batch 2

Thursday, Sep 11, 13:00 – 13:30, Magistrale and R 00.07.014

[D04] Interaction-Free Calibration for Optical See-through Head-mounted Displays based on 3D Eye Localization (Yuta Itoh and Gudrun Klinker)

[D09] Tracking Texture-less, Shiny Objects with Descriptor Fields (Alberto Crivellaro, Yannick Verdie, Kwang Yi, Pascal Fua and Vincent Lepetit)

[D11] On the Use of Augmented Reality Techniques in a Telerehabilitation Environment for Wheelchair Users' Training (Daniel Caetano, Fernando Mattioli, Edgard Lamounier and Alexandre Cardoso)

[D12] Dense Planar SLAM (Renato Salas-Moreno, Ben Glocker, Paul Kelly and Andrew Davison)

[D13] A complete interior design solution with diminished reality (Sanni Siltanen, Henrikki Saraspää and Jari Karvonen)

[D15] Displaying Free-viewpoint Video with User Controlable Head Mounted Display DEMO (Yuko Yoshida and Tetsuya Kawamoto)

[D17] Mobile Augmented Reality - Tracking, Mapping and Rendering (Daniel Wagner, Gerhard Reitmayr, Alessandro Mulloni, Erick Mendez and Serafin Diaz)

[D19] Tablet system for visual overlay of 3D virtual object onto real environment (Hiroyuki Yoshida, Takuya Okamoto and Hideo Saito)

[D23] Towards Augmented Reality User Interfaces in 3D Media Production (Max Krichenbauer, Goshiro Yamamoto, Takafumi Taketomi, Christian Sandor and Hirokazu Kato)

[D27] Insight: Webized Mobile AR and Real-life Use Cases (Sangchul Ahn, Joohyun Lee, Jinwoo Kim, Sungkuk Chun, Jungbin Kim, Iltae Kim, Junsik Shim, Byounghyun Yoo and Heedong Ko)

[D29] [D29] Exploring Multimodal Interaction Techniques for a Mixed Reality Digital Surface (Martin Fischbach, Chris Zimmerer, Anke Giebler-Schubert and Marc Erich Latoschik)

[D33] Thermal Touch: Thermography-Enabled Everywhere Touch Interfaces for Mobile Augmented Reality Applications (Daniel Kurz)

[D38] MRI Design Review System (Andreas Behmel, Wolfgang Höhl and Thomas Kienzl)

[D40] [CAVE LRZ] The Collaborative Design Platform Protocol – A Protocol for a Mixed Reality Installation for Improved Incorporation of Laypeople in Architecture (Tibor Goldschwendt, Christoph Anthes, Gerhard Schubert, Dieter Kranzlmüller and Frank Petzold)

Batch 3

Friday, Sep 12, 10:30 – 11:00, Magistrale and R 00.07.014

[D02] QubeAR : Cube Style QR code AR Interaction (Han Park, Taegyu Kim and Jun Park)

[D03] Fast Vision-based Multiplanar Scene Modeling in Unprepared Environments (Javier Vigueras)

[D10] Towards User Perspective Augmented Reality for Public Displays (Jens Grubert, Hartmut Seichter and Dieter Schmalstieg)

[D14] "It's a Pirate's Life" AR game (David Molyneaux and Selim Benhimane)

[D20] Smartwatch-Aided Handheld Augmented Reality (Darko Stanimirovic and Daniel Kurz)

[D22] Sticky Projections - A New Approach to Interactive Shader Lamp Tracking (Christoph Resch)

[D24] Measurement of Perceptual Tolerance for Inconsistencies within Mixed Reality Scenes (Gregory Hough, Ian Williams and Cham Athwal)

[D25] Adventurous Dreaming Highflying Dragon: A Full Body Game for Children with Attention Deficit Hyperactivity Disorder (ADHD) (Yasaman Hashemian, Marientina Gotsis and David Baron)

[D26] An X-Ray visualization metaphor for automotive Surround View (Juri Platonov, Thomas Gebauer and Pawel Kaczmarczyk)

[D31] Placing Information near to the Gaze of the User (Marcus Tönnis and Gudrun Klinker)

[D32] Real-Time Illumination Estimation from Faces for Coherent Rendering (Sebastian B. Knorr and Daniel Kurz)

[D34] RGB-D-T Camera System for AR Display of Temperature Change (Kazuki Matsumoto, Wataru Nakagawa, Francois Sorbier, Maki Sugimoto, Hideo Saito, Shuji Senda, Takashi Shibata and Akihiko Iketani)

[D35] AR Box Maze (Shogo Miyata, Naoto Ienaga, Jaejun Lee, Taichi Sono, Shuma Hagiwara, Maki Sugimoto and Hideo Saito)

[D37] A Mobile Augmented Reality System for Portion Estimation (Thomas Stütz, Radomir Dinic, Michael Domhardt and Simon Ginzinger)

Demos from the AR-Games Workshop

Friday, Sep 12, 10:30 – 11:00, Magistrale and AR-Lab 00.013.010

[D41] Augmented Cluedo

Lumus Ltd. was founded in 2000 by a world class team of physicists and optics specialists, whose disruptive and pioneering approach has created a scientific breakthrough in wearable display technology – the Light-guide Optical Element (LOE). The patented LOE is an ultra-thin, see-through lens that displays large, high quality images in front of the eye and enables the design of display eyewear with a natural look of eyeglasses and sunglasses. With its game-change crystal clear transparent optics, Lumus enables true Augmented Reality enabling wearers to seamless blend the real and digital worlds. See http://lumusvision.com/

ISMAR Sponsor

Wikitude GmbH is the renowned pioneer in the mobile augmented reality (AR) industry powering AR apps and solutions for smartphones, tablets and smart glasses. Its fully in-house developed AR technology is available through the Wikitude AR SDK and Wikitude Studio, enabling brands, agencies and developers to achieve their AR project goals. With tens of thousands of developer accounts and thousands of published AR apps, Wikitude is the globally leading AR technology platform. The company chairs the international AR standardization as part of the Open Geospatial Consortium (OGC). Wikitude® is a registered trademark of Wikitude GmbH, for more information please visit: www.wikitude.com

ISMAR Sponsor

Founded in 2009, Diotasoft is a start-up that aims to become the leader in professional AR solutions. Our technology is based on a generic software foundation that integrates innovative research from the common laboratory of CEA and Diotasoft, such as a precise and robust markerless 3D tracking algorithm, called Constrained SLAM, patented in 2011. Our solutions are particularly adapted for industrial needs and to visualize PLM data inside the real workspace. So we are able to provide innovative, value-adding AR solutions in the fields of education and training, production and maintenance support, and sales and marketing for the automotive, aeronautics, construction and consumer goods industries, among others. For more information, see http://www.diotasoft.com/

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Tutorials

Chairs:

Isidro Navarro (La Salle Campus Barcelona, Spain), Jun Park (Hong-Ik University, South Korea), David Plecher (TU Munich, Germany), Julian Stadon (FH Salzburg, Austria)

T1: Fusing Web Technologies and Augmented Reality

Monday, 9:00-12:30, HS3

Organizer: Ulrich Bockholt (Fraunhofer IGD, Germany)

Topics:

- Use of Web-standards (e.g. WebGL/WebRTC) as basis technologies for Augmented Reality Systems.
- Distribution of Rendering/Tracking/Interaction algorithms in client/server configurations.
- Streaming technologies used in the development of Augmented Reality frameworks.
- Transcoding services for the integration of Augmented Reality applications into PDM environments.
- Use of RDFs (Resource Description Framework) and sematic wiki for the formulation of tracking/processing/visualisation services available for different resources (e.g. for captured sensor data)
- Exemplary AR applications developed with the help of Web-based technologies

T2: AR Development with the Metaio Product Suite – Demonstration of Use Cases in Industry

Monday, 14:00-18:00, HS3

Organizers: Frank Angermann (metaio, Germany), Maximilian Krushwitz (metaio, Germany)

Schedule:

14:00 - 14:30	1. Overview of the Metaio software suite
14:30 - 15:00	2. Complete AR pipeline from idea to solution
15:00 - 17:30	3. Practical AR Use Cases with implementation Bavarian National Museum use case demonstration Volkswagen Marta use case demonstration AR at SAP use case demonstration
17:30 - 18:00	4. Outlook: Future corporate backend integration Wearable devices in AR New tracking approaches Metaio ISMAR papers & posters Introduction of upcoming InsideAR conference

T3: A 'Look into' Medical Augmented Reality

Tuesday, 9:00 – 17:30, HS3

Organizers: Yuji Oyamada, Ph.D. (Waseda University, Japan), Pascal Fallavollita, Ph.D. (TU Munich, Germany)

Schedule:

9:00 - 9:45	Keynote talk: Prof Nassir Navab, Advanced in Medical Augmented Reality
10:00 - 10:45	Technical talk 1: System Components of Medical AR technology (Oyamada)

10:45 - 11:00	Coffee break
11:00 - 12:00	Technical talk 2: Visualization in Medical AR (Schulte zu Berge)
12:00 - 13:00	Lunch break
13:00 - 14:00	Keynote talk: Dr. med. Simon Weidert, First experiences of Medical AR in the OR
14:00 - 14:45	Technical talk 3: User Interfaces in Medical AR (Fallavollita)
14:45 - 15:00	Coffee break
15:00 - 16:00	Travel to Hospital lab
16:00 - 17:30	Demo tour at NARVIS Lab

T4: Open and Interoperable Augmented Reality **Tuesday, 9:00 – 17:30, R 00.013.009A**

Organizers: Christine Perey (PEREY Research & Consulting and AR Community founder), Rob Manson (BuildAR and MobAR), Marius Preda (Institut MINES-Telecom), Neil Trevett (NVIDIA and Khronos Group), Martin Lechner (Wikitude GmbH), George Percivall (OGC), Timo Engelke (Fraunhofer IGD), Peter Lefkin (MIPI Alliance), Bruce Mahone (SAE International), Mary Lynne Nielsen (IEEE Standards Association)

Schedule:

9:00 - 9:30	1. Overview
9:30 - 10:15	2. Khronos Group
10:15 - 10:45	3. MIPI Alliance
10:45 - 11:15	Break
11:15 - 12:00	4. IEEE Standards Association
12:00 - 12:45	5. Open Geospatial Consortium
12:45 - 14:00	Lunch
14:00 - 14:30	6. MPEG
14:30 - 15:00	7. Web3D Consortium
15:00 - 15:30	8. SAE International
15:30 - 16:00	Break
16:00 - 16:30	9. Open Source Web-based AR
16:30 - 17:30	10. Panel Discussion

T5: Diminished Reality **Tuesday, 9:00 – 13:00, R 00.07.014**

Organizers: Hideyuki Tamura (Ritsumeikan Univeristy, Japan), Hideo Saito (Keio University, Japan), Fumihisa Shibata (Ritsumeikan University, Japan), Maki Sugimoto (Keio University, Japan)

Schedule:

9:00 - 9:15	Opening
9:15 - 10:00	Keynote Talk: Survey of Diminished Reality
10:00 - 12:00	Contributed talks
12:00 - 13:00	Panel discussion and/or interactive session

T6: The Glass Class – Designing Wearable Interfaces

Tuesday, 9:00 – 12:00, HS2

Organizer: Mark Billinghurst (The HIT Lab NZ, University of Canterbury, New Zealand)

Schedule:

9:00 - 9:10	Introduction
9:10 - 9:30	Technology Overview
9:30 - 10:00	Design Guidelines
10:00 - 10:15	Demos
10:15 - 10:45	Development/Prototyping Tools
10:45 - 11:00	Demos
11:00 - 11:30	Wearable Technology
11:30 - 11:40	Example Application
11:40 - 12:00	Research Directions and Further Resources

T7: Designing Location-Based Experiences

Tuesday, 14:00 – 18:00, HS2

Organizer: Mark Melnykowycz (idezo, Zurich, Switzerland)

Schedule:

14:00 - 15:00	1. Story structure and communication patterns: Evolution of communications technology and consumption patterns, Linear and nonlinear story structures, Story progression in different media (books, movies, games, etc)
15:00 - 16:00	2. Design of AR/MR mobile apps: Fundamental differences between AR/MR technologies, User experience design tools, Discussion of current location-based AR/MR apps
16:00 - 16:15	Break
16:15 - 17:15	3. Ghosts of Venice Case Study: Value of ghost stories for location app design, Process of translating written stories to location stories, Production of integrating story with user interaction needs
17:15 - 18:00	4. Workshop: Pick a story and mobile app goal, Break down the design process for this specific case study

T8: Google Glass, the META and Co.: How to Calibrate Your Optical See-Through HMDs

Tuesday, 14:00 – 18:00, R 01.06.011

Organizers: Jens Grubert (TU Graz, Austria), Yuta Itoh (TU Munich, Germany)

Schedule:

14:00 – 14:15	Welcome and introduction
	Theory
14:15 – 15:00	Introduction to OST Calibration
15:00 – 15:15	Coffee break
15:15 – 16:15	Details of OST Calibration

16:15 – 16:30	Coffee break
	Practice
16:30 – 16:30	Hands on session: calibration of OST HMDs
17:30 – 17:50	Discussion: experiences, feedback
17:50 – 18:00	Wrap-up, mailing list

T9: Training Detectors and Recognizers in Python and Open CV

Tuesday, 14:00 – 17:00, R 00.07.014

Organizer: Joseph Howse (Nummist Media, Canada)

Schedule:

14:00 - 14:25	1. Setting up OpenCV and related libraries
	Windows XP/Vista/7/8
	Mac 10.6+ using MacPorts
	Debian Linux and its derivatives, including Ubuntu
14:25 - 14:50	2. Building a GUI app that processes and displays a live camera feed
14:50 - 15:10	3. Detecting human faces (and other subjects) using prebuilt Haar cascades
	Concept of Haar cascades
	Implementation of a Haar-based detector in OpenCV
	Our GUI for detection
15:10 - 15:25	4. Break
15:25 - 16:15	5. Training a custom Haar cascade to detect cat faces
	Obtaining annotated training images
	Parsing annotation data and preprocessing the training images
	Using OpenCV's training tools
16:15 - 16:40	6. Recognizing faces of individual humans and individual cats
	Local binary pattern histograms (LBPH) – concept and OpenCV implementation
	Our GUI for incrementally training and testing an LBPH recognizer
	Fisherfaces – concept and OpenCV implementation
	Eigenfaces – concept and OpenCV implementation
16:40 - 17:00	7. Demos and discussion of attendees' work (optional) or discussion of the project's portability to Android and iOS

Workshops

Chairs:

Hartmut Seichter (FH Schmalkalden, Germany), Manuel Huber (TU Munich, Germany), Dirk Reiners (University of Louisiana at Lafayette, USA)

W1: Tracking Methods & Applications

Monday, 9:00-18:00, HS2

Organizers: Jonathan Ventura (University of Colorado, Colorado Springs, USA), Daniel Wagner (Qualcomm, Austria), Daniel Kurz (metaio, Germany), Harald Wuest, Fraunhofer IGD, Germany, Selim Benhimane (Intel, USA)

Schedule:

9:00 - 9:15	Welcome message
9:15 - 10:00	Keynote I
10:00 - 11:00	Paper session I
11:00 - 11:15	Break
11:15 - 12:15	Paper session II
12:15 - 13:30	Lunch
13:30 - 14:15	Keynote II
14:15 - 15:30	Activity reports from organizers
15:30 - 15:45	Break
15:45 - 16:15	Break-out session
16:15 - 16:45	Reports from break-out session
16:45 - 17:00	Closing words
17:00 - 18:00	Demo session

W2: Advancing the Art and Science of Manufacturing with AR

Monday, 9:00-17:30, R 00.13.009A

Organizers: Christine Perey (AR Community and AR for Enterprise Alliance), Fridolin Wild (Open University), Kaj Helin (VTT Technical Research Centre of Finland), Miroslav Janak (Technical University of Košice), Paul Davies (Boeing), Patrick Ryan (Newport News Shipbuilding)

Schedule:

9:00 - 9:30	Overview and introductions of participants
9:30 - 10:00	AR in Technical Data Delivery
10:00 - 10:30	AR for Tool and Shop Floor Awareness Assistance
10:30 - 11:00	AR for Quality Inspection
11:00 - 11:15	break
11:15 - 12:00	Panel Discussion on AR in Pilots and Projects vs. Production Environments
12:00 - 13:00	Lunch
13:00 - 15:00	Development of Workshop Consensus statements on 3 themes

15:00 - 15:15 Break
15:15 - 17:00 Development of Recommended Research Agenda
17:00 - 17:30 Workshop outcomes

W3: Collaboration in Mediated and Augmented Reality

Monday, 9:00-12:30, R 00.07.014

Organizers: Stephan Lukosch (TU Delft, The Netherlands), Mark Billinghurst (University of Canterbury, New Zealand), Kiyoshi Kiyokawa (Osaka University, Japan), Leila Alem (CSIRO, Australia)

Topics:

- Case studies on using MR/AR for collaboration
- Tools for building collaborative MR/AR systems
- Effects of MR/AR on trust, presence, and coordination
- Interaction models for collaboration in MR/AR
- Tools for collaboration in MR/AR
- Collaboration awareness in MR/AR
- Other related work

W4: Exploring AR-Glasses and Their Peculiars

Monday, 14:00-17:00, R 00.07.014

Organizers: Markus Eder (Wikitude, Austria), Martin Lechner (Wikitude, Austria), Dr. Thomas Stütz, (FH Salzburg, Austria), Julian Stadon (FH Salzburg, Austria)

Topics:

1. Introductory lecture on AR Glasses, different kinds of AR Glasses (see-through/non-see-through, monocular/binocular etc.), applications and SDK for AR Glasses
2. Hands-on interactive session with the participants to try out the various kinds of AR glasses and the applications on them
3. Interactive Breakout-Sessions of the participants, covering several aspects of what makes AR Glasses unique to conventional AR form factors, including (but dependent on topics of interest of the attendees)
    a. UI
    b. UX
    c. Applications and Use Cases
    d. Software SDKs
    e. Other topics of interest from the audience

    The goal of the breakout sessions is to work together in an interactive way with the attendees to understand what end users, AR application developers, AR hardware and AR software developers need to consider when building or using AR Glasses, compared to AR on smartphones, tablets and laptops.

4. Summary session of lessons learnt during the workshop

Doctoral Consortium

Tuesday, Sep 9, 9:00-12:00, R 01.06.011

Chairs:

Winyu Chinthammit (HIT Lab AU, University of Tasmania, Australia), Si Jung „Jun“ Kim (University of Nevada, USA)

Mentors: Steven Feiner (Columbia University, USA), Takeshi Kurata (NAIST, Japan), Dieter Schmalstieg (TU Graz, Austria)

Presentations:

- **Fabrizio Cutolo**, EndoCAS Center, Department of Translational Research and New Technologies in Medicine and Surgery University of Pisa, Italy: *Video See Through AR Head-Mounted Display for Medical Procedures*. (Thesis supervisors: Paolo Domenico Parchi and Vincenzo Ferrari)
- **Alexander Plopski**, Osaka University, Japan; thesis supervisors: *Corneal Imaging in Localization and HMD interaction* (Thesis supervisors: Kiyoshi Kiyokawa, Haruo Takemura, and Christian Nitschke)
- **Dariusz Rumiński**, Poznań University of Economics, Poland: *Semantic Contextual Augmented Reality Environments* (Thesis supervisor: Krzysztof Walczak)
- **Jason Weigel**, University of Queensland, Australia: *Designing Support for Collaboration around Physical Artefacts: Using Augmented Reality in Learning Environments* (Thesis supervisors: Stephen Viller and Mark Schulz)

AR-Games Workshop

Monday, Sep 1 - Tuesday, Sep 9, AR-Lab 00.013.010

Chairs:

Frieder Pankratz (TU Munich, Germany), Martin Dechant (University of Regensburg, Germany)

This workshop takes place for a full week before ISMAR. In a game jam, students with backgrounds in IT and design/art jointly explore and develop in- schemes towards combining state-of-the-art Augmented Reality and Games technology to develop entertaining applications.

Topic:

Augmented Cluedo: Gather clues by solving small riddles, distributed in the conference area, using your smartphone. Use these clues to uncover the secret that is hidden in the local AR laboratory and compete with other players. A thrilling game experience for all conference attendees.

The results are shown in the demonstration area.

Project Members: Srikrishna Bhat (University of Oulu, Finland), Aytek Aman (Bilkent University, Ankara, Turkey), Jake Sims (University of Portsmouth, UK), Andreas Pritschet (University of Regensburg, Germany), Maximilian Schubert (University of Regensburg, Germany), Stella Delonge (TU Munich, Germany)

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Bayerisches Staatsministerium für Wirtschaft und Medien, Energie und Technologie

Birds of a Feather

On demand, Wednesday, Sep 10 - Friday, Sep 12, R 01.06.011 and R 01.07.023

Chairs:

Lakshmi Prabha (CERN, Geneva, Switzerland), Christine Perey (Spime Wrangler, Switzerland)

ISMAR 2014 will have Birds-of-a-Feather (BOF) sessions. BOFs provide the opportunity for groups of people who share common interests, goals, technologies, environments, or backgrounds to meet and conduct informal presentations, discussions and/or demonstrations at ISMAR2014.

Birds-of-a-Feathers sessions can be proposed and must be chaired by a registered ISMAR2014 attendee. All BOF sessions are open to all registered ISMAR2014 attendees. A BOF event topics and discussion must relate to augmented and mixed reality, with the focus on research, development and technology rather on a commercial product or for-profit company's goals.

BOF sessions will take place only during the designated time slots. The available time slots for BOF sessions can be selected in the form. It is the responsibility of the BOF session proposer to examine the main conference session schedule and to select a time that minimizes potential for overlapping interests. There are limited number of rooms in the conference venue assigned for BOF sessions that can be allotted based on a first-come first-served basis. ISMAR2014 attendees are free to join all BOF sessions on a first-come first-served basis, subject to the maximum capacity of the room.

All Birds of a Feather session requests are subject to a review and approval process.

Procedure:

There will be a message board near the registration desk displaying the list of proposed BOF sessions with the room number and timing details. Do check it frequently to keep track of planned and ongoing sessions.

You can propose further sessions on-site by filling out a form available at the registration desk. Your proposal will be promptly reviewed and you will be notified of the decision ASAP by the ISMAR BOF chairs based on the time slots and room availability. Once approved, the session will be added to the message board. The chair of a BOF session grants ISMAR2014 permission to provide their e-mail address on the BOF schedule such that interested parties can be directed to the BOF session chair for all inquiries.

For further queries, please contact the **Birds-of-Feather Chairs @** bof_chairs[at]ismar14.org

Industry Day

Tuesday, Sep 9, 9:00 – 17:30, HS1

Chairs:

David Marimon (Catchoom, Spain), Selim Benhimane (Intel, USA), Daniel Gelder (metaio, Germany)

The Industry Day will gather professionals and scientists interested in the commercial use of Mixed and Augmented Reality and the latest available solutions in the market.

Panelists: Dieter Langer (Airbus Cassidian), nn (Bavarian National Museum), Stéphane Côte (Bentley Systems), Paul R. Davies (Boeing), David Marimon (Catchoom), Harald Dittmann (Continental), Uli Bockholt (Fraunhofer IGD), Jeroen Mol (Glow Interactive BV), Selim Benhimane (Intel Corporation, Perceptual Computing Group), Sabine Webel (metaio), Josep Ballesté (Mitsubishi Electric, Image Division), Carl Byers (Ngrain), Neil Trevett (Nvidia), Kayvan Mirza (Optinvent), Christine Perey (Perey Research and Consulting), Ralf Rabaetje (RTT – eDxcite), Armin Roux (Siemens AG, Customer Service Division), Michael Gervautz (Qualcomm, Vuforia), Gerben Harmsen (twnkls), Martin Lechner (Wikitude)

Schedule:

9:00 – 9:15	Welcome
9:15 - 10:15	AR for Enterprise and Industrial Applications I
10:15 - 10:45	Break
10:45 - 11:45	AR for Enterprise and Industrial Applications II
11:45 - 12:45	Enabling Technologies: Hardware and Networks
12:45 - 14:00	Lunch
14:00 - 15:00	Enabling Technologies: Software Technologies
15:00 - 15:30	Break
15:30 - 16:30	Consumer Applications: Museums, Advertising and Showrooming with AR
16:30 - 17:30	Demonstrations

Further information: http://ismarindustryday.com/

Volkswagen Tracking Challenge

Tuesday + Thursday, Sep 9+11, Magistrale + iTüpferl

Chairs:

Christoffer Menk (Volkswagen AG, Germany), Ulrich Rautenberg (Volkswagen AG, Germany), Patrick Maier (TU Munich, Germany), Andreas Dippon (TU Munich, Germany), Christian Waechter (TU Munich, Germany), Daniel Pustka (A.R.T. GmbH, Germany), Murali Chari (Qualcomm, Austria)

Vision-based tracking technologies, used especially for tracking vehicle components, are one of the most crucial base technologies required for a widespread application of Augmented Reality in the automotive and industrial domain. The Volkswagen Tracking Challenge aims to provide a forum for scientific exchange between researchers from academia and industry, as well as an opportunity to get in contact with potential customers in the environment of the Volkswagen Group.

Competitors: Diotasoft, Institute for Infocomm Research, Fraunhofer IGD, metaio, Voxar Labs, "I X-TECH" LLC

Scenario 1: Thursday, Sep 11, 9:00 – 11:30, Magistrale
Tracking a Rotating Vehicle

Exact localization of 3D coordinates on a rotating vehicle model; Correct superimposition of virtual data on the real vehicle.

Scenario 2: Thursday, Sep 11, 12:30 – 15:30, Magistrale
Tracking and Learning on Different Vehicles

Exact determination of exterior and interior parts of a vehicle defined by 3D coordinates.

Scenario 3: Tuesday, Sep 9, 9:00 – 19:00, Magistrale
Tracking with High Accuracy

Accurate placement of adapters at position defined by 3D coordinates.

Scenario 4: Thursday, Sep 9, 15:45 – 17:15, iTüpferl
Tracking Inside an Unknown Area

Tracking in an unknown corridor and identification of certain elements based on given 3D coordinates.

Further information: http://www.tracking-challenge.de

Sponsored by VOLKSWAGEN AKTIENGESELLSCHAFT

Art Exhibition

Wednesday, Sep 10, 19:30 – 22:00, Vorhölzer Forum + Weißer Saal

Curators:

Marc Garret (Furtherfield, UK), Julian Stadon (FH Salzburg, Austria)

Location:
Department of Architecture, TU Munich, Arcisstr. 21, Level 5, Munich (Main Campus of TU Munich, Downtown)

Bus service between the Garching Campus and the Main Campus:

Leaving from	At	Arriving at	At
Garching Campus	18:40	Downtown Campus	19:20
Downtown Campus	22:00	Garching Campus	22:30

The Art Exhibition will remain open until Friday, Sep 12
Opening hours: Wednesday 19:00 – 22:00, Thursday 10:00 – 17:00, Friday 10:00 – 16:00

Artists: Erica Scourti, Jennifer Chan, Nick Briz, Julian Oliver, Mez Breeze, Heath Bunting, Pierre Proske, Genetic Moo, Zach Blas.

The interface is the boundary across which information is exchanged, causing a transformation in one or both sides of that boundary. This exhibition features art that disrupts or bypasses this interface. Interfaces have always been a site of control, hidden in plain view: symbolic, social or technological. They facilitate and shape the dialogue that happens between different tribes from religions, scientific or philosophical backgrounds; between components of computer systems; or between machines and living beings.

Technological/designed interfaces deploy audiovisual and tactile inputs with touch screens, mice, joysticks and buttons on our mobile phones, games consoles, televisions, radios and laptops. Amazed and engaged, we forget to question how we might be being dominated and reprogrammed by the very facilities that were supposed to free us as part of the Digital Revolution. Lori Emerson suggests this is an “overwhelming push to disempower users/consumers with closed devices”. [1]

The artists in this exhibition, critical practitioners in art and technology, lift the veil on contemporary interfaces; setting out alternative routes, aesthetic visions and disruptive behaviours.

[1] Against the Frictionless Interface! An Interview with Lori Emerson
http://www.furtherfield.org/features/interviews/against-frictionless-interface-interview-loriemerson

Bios

- **Jennifer Chan** is an artist-curator who works in and outside of traditional exhibition spaces. Her work explores institutional critique and feminist perspectives in video and web-based media. Chan is a recipient of the Mississauga Art Awards for Emerging Visual Talent in 2008. She has exhibited her work at Transmediale 2012, GLI.TC/H Festival, Portland Art Museum, Images Festival, and Low Lives International Exhibition of Live Networked Performances. http://jennifer-chan.com/
- **Nick Briz** is a new-media artist, educator && organizer based in Chicago IL + am an active participant in digital culture and experimental new-media, specifically through my work/research/writing on glitch art, remix-culture && digital literacy + he regularly organizes events related to these theories/practices +

teaches courses on these theories/practices at the Marwen Foundation && the School of the Art Institute of Chicago. http://nickbriz.com

- **Heath Bunting** was born a Buddhist in Wood Green, London, UK and is able to make himself laugh.(currently, reduced to only smile) He is a co-founder of both net.art and sport-art movements and is banned for life from entering the USA for his anti-genetic work. His self-taught and authentically independent work is direct and uncomplicated and has never been awarded a prize. He is both Britain's most important practising artist and the World's most famous computer artist. http://www.irational.org/heath/
- **Pierre Proske** is an electronic media artist specialising in interactive installations and immersive experiences. He is also founder and director of the electronic media arts organisation Media Lab Melbourne. Pierre explores the pervasiveness of technology in science and culture and its relationship to nature. Alongside electronic art projects he also works as a sound designer and electronic musician. He has exhibited or performed in Australia, Sweden, Bhutan, Peru, Canada, Iceland, Brazil, Japan, Austria and the Netherlands. http://www.digitalstar.net/
- **Erica Scourti** works with video, performance, online and with text, and has shown internationally at Kunstverein Munich, Museum of Contemporary Art, Athens, Museo Reine Sofia, Kunstmuseum Bonn and Jeu de Paume Museum, as well as festivals such as Recontres Internationales and Impakt as well as extensively in the UK, most recently at Banner Repeater, Grand Union, New Bridge Project, Enclave, and ICA.
- **Zach Blas** is an artist, writer, and curator whose work engages technology, queerness, and politics. Currently, he is an Assistant Professor in the Department of Art at the University at Buffalo. His work has been written about and featured in Art Review, Frieze, Art Papers, Hyperallergic, Rhizome, Mousse Magazine, The Atlantic, Al Jazeera America, The New Inquiry, Leonardo Electronic Almanac, and Wired. http://www.zachblas.info/
- **Julian Oliver** is a New Zealander, Critical Engineer and artist based in Berlin. His work and lectures have been presented at many museums, galleries, international electronic-art events and conferences, including the Tate Modern, Transmediale, the Chaos Computer Congress, Ars Electronica, FILE and the Japan Media Arts Festival. Julian has received several awards, most notably the distinguished Golden Nica at Prix Ars Electronica 2011 for the project Newstweek (with Daniil Vasiliev). http://julianoliver.com/output/
- **Mez Breeze** is an Australian-based artist and practitioner of net.art, working primarily with code poetry, electronic literature, and digital multimedia works combining text, code, image and sound. Born Mary-Anne Breeze, she uses a number of avatar nicknames, including Mez and Netwurker. As of May 2014, Mez is the only Digital Poet who's a non-USA citizen to have her comprehensive career archive (called "The Mez Breeze Papers") housed at Duke University, through their David M. Rubenstein Rare Book & Manuscript Library. https://www.vizify.com/mez-breeze
- **Genetic Moo** (Nicola Schauerman and Tim Pickup) have been creating individual interactive art works for over 5 years. They create Microworlds, digital ecosystems and living installations that are always changing, mutating, and evolving in front of your eyes. Both gained Masters degrees from the Lansdown Centre for Electronic Arts. They have exhibited extensively in galleries, festivals and museums. http://www.geneticmoo.com
- **Tatiana Bazzichelli** is a curator and researcher on hacktivism and network culture. She is Director of Programming Development at The WYE in Berlin, where she runs the Disruption Network Lab. She joined in 2012 the Centre for Digital Cultures/ Leuphana University of Lüneburg, working as a Post-Doctoral researcher until March 2014. She was programme curator at transmediale festival in Berlin, initiating in 2011. http://networkingart.eu, http://disruptiv.biz, http://www.disruptionlab.org
- **Mac Garret** is co-director and cofounder, with artist Ruth Catlow of the Internet arts online collectives and communities – Furtherfield.org and the physical space Furtherfield Gallery and Furtherfield commons space in London, UK. Co-curating various contemporary Media Arts exhibitions, projects nationally and internationally. Co-editor of Artists Re: thinking Games with Ruth Catlow and Corrado Morgana 2010. Currently researching a Media Art history PhD at the University of London, Birkbeck. http://furtherfield.org, http://marcgarrett.org, http://furtherfield.org/gallery
- **Julian Stadon** is a media artist, curator, PhD student, and Senior Lecturer in Interface/Interaction Design at Salzburg University of Applied Sciences. He is the director of MARart.org and is also the European MASH'D chair for ISMAR and Overlord at Dorkbot Perth and Dorkbot Salzburg.

Julian has presented research at Ars Electronica, ISEA, Translife, and the Royal Science Centre. He is currently researching a PhD on Post-biological Data Bodies and Identity in Mixed Reality Art Networks http://marart.org/, http://julianstadon.tumblr.com/LinkedIn Profile

- **Ruth Catlow**: An artist who works with emancipatory network cultures, practices and poetics Ruth is cofounder and artistic director, with Marc Garrett, of Furtherfield for arts, technology & social change. Furtherfield's online hub provides a forum for exchange and critical review, & public exhibition & lab venues in the heart of Finsbury Park, London, provide physical space for free exhibitions, events, residencies and workshops. These are scratch spaces for commissions & exhibitions to tour nationally and internationally, to strengthen the expressive & democratic potential of shared techno-social landscape. http://furtherfield.org, http://ruthcatlow.net, http://furtherfield.org/gallery
- **Thomas Grundnigg** is a Senior Lecturer and Researcher in the Dept. of MultiMediaArt at the Salzburg University of Applied Sciences and part of the research group TRACE/Munich. Currently he prepares his dissertation on the conditions of possibility for politics of space.
  Grundnigg is co-founder of the Salzburg-Sarajevo Academy and recipient of the Erhard Busek Honorary Prize for Intercultural Exchange for his engagement in South-Eastern Europe.
- **Dr. Annette Doms** operates in the art market since more than 15 years. As an art expert with a focus on the fields of contemporary art, new media and computer art, she is primarily responsible for the development of company-specific communication concepts and the exclusive advice to business customers as well as to the establishment and development of public and private art collections.
  Since 2013 founder & artistic director at UNPAINTED media art fair. Since 2011 director at ICAA = Independent Contemporary Art Advisors. Since 2010 founder of the ARTWARD http://www.icaa.ac/, http://www.unpainted.net/en/
- **Wolf Lieser** discovered digital art at a beach in Florida in 1987. The American artist Laurence Gartel showed him graphic art, which he had created on his Commodore computer and printed out with a color printer. From this moment on, Lieser was enthralled by this young, technically and socially ambitious art form. He founded the Digital Art Museum as an online-gallery in 1998, opened one of the first galleries for digital art worldwide in London in 1999, and has run the DAM in Berlin since 2003. In 2010, a DAM branch was opened in Cologne. The bi-annual dam digital art award for outstanding artistic achievement in digital art exists since 2005. http://www.dam.org/

Evening Events

Tuesday: Workshops and tutorials reception

In the Magistrale of the TU Munich FMI building, Garching (ISMAR venue), 18:00 – 20:00

Address: Technische Universität München, Forschungscampus Garching, Boltzmannstr. 3 (FMI Building), Garching b. München

Wednesday: Art exhibition and reception

At TUM Vorhölzer Forum, Downtown Munich (Main Campus of TU Munich), 19:30 – 22:00

A roof-top bar on top of the main building of TU Munich in the department of Architecture. If the weather is nice, you have a grand view down onto the city of Munich.[1]

Address: Department of Architecture, TU Munich, Arcisstr. 21, Level 5, Munich
http://www.vf.ar.tum.de/en/startseite/

Bus service between the Garching Campus and the Main Campus:

Leaving from	At	Arriving at	At
Garching Campus	18:40	Downtown Campus	19:20
Downtown Campus	22:00	Garching Campus	22:30

Further details will be presented on the information board next to the registration desk.

Thursday: Conference Banquet

At Königlicher Hirschgarten, 19:30 – 23:00

The largest Biergarten of the world (yet, we will be indoors – safe and dry). Close to the Nymphenburg Palace.

Address: Königlicher Hirschgarten, Hirschgartenallee 1, Munich (Nymphenburg),
http://www.hirschgarten.com/

Bus service between the Garching Campus and Hirschgarten:

Leaving from	At	Arriving at	At
Garching Campus	18:15	Hirschgarten	19:00
Hirschgarten	23:00	Garching Campus	23:30

Further details will be presented on the information board next to the registration desk.

[1] The Vorhölzer Forum serves beer from the Weihenstephan brewery, the oldest still existing beer brewery of the world (since 1040) – which is part of the life sciences department of TU Munich. http://www.goethe.de/kue/flm/prj/kub/pan/en4054122.htm

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