Welcome to MUM 2015

On behalf of the organizing committee for MUM 2015, we would like to welcome you to this 14th edition of the International Conference on Mobile and Ubiquitous Multimedia, held at the Ars Electronica Center in Linz, Austria from November 30 to December 2, 2015. The MUM conference series is a distinguished forum for advances in research and technologies that drives innovation in mobile and multimedia systems, applications, and services. At MUM academics and practitioners gather to discuss challenges and achievements from diverse perspectives, in a comfortable and effective single track conference format.

This year we received 89 full and short research paper submissions surrounding these topics. A rigorous review process followed where each paper received at least three reviews from international experts. After this review process, 25 full papers and 8 short papers were selected to appear in these proceedings and to be presented at the conference. This results in an acceptance rate of 37% for 2015. The topics in the paper program are organized in the following sessions: media and applications; studies and findings; detecting, classifying, and recognizing; specific application areas; specific user groups; wearable and mobile interaction; augmented reality; and designing interactions. We hope that this selection of papers will form the basis of lively discussions at the conference as well as new cooperations leading to future research.

The program committee awards best paper awards to the authors of two papers, “Wearable Technology as a Solution for Workplace Safety” and “Effects of Camera Position and Media Type on Lifelogging Images”, along with three further honorable mentions. These awards and honorable mentions were selected due to their very positive reviews and represent a special recognition of excellence.

In addition to the regular paper submissions, MUM 2015 is happy to feature a poster and a demo track again, with 15 accepted posters and 5 accepted demos. This year we introduce a video track with 3 accepted videos as well as a doctoral school with 4 accepted submissions. Altogether, 27 submissions to adjunct categories were accepted for publication in addition to the 33 full and short papers. We encouraged authors of adjunct submissions to submit to multiple categories (i.e. poster, demo, video, and doctoral school). Moreover, we encouraged authors of accepted full and short papers to also submit a demo or video for their papers. Therefore, one paper from the conference proceedings may be represented in multiple presentation categories.

There are a number of people we want to acknowledge, whose help greatly simplified the organization of this conference. Firstly, we acknowledge the support of the University of Applied Sciences Upper Austria, the Johannes Kepler University Linz, and the Ars Electronica Center. Secondly, we warmly thank all the members of the program committee and the additional reviewers for their helpful feedback and constructive criticisms. We would also like to thank all the student volunteers and other persons that contributed to the organization of the conference. Finally, we thank all the authors and participants of this event for sharing new insights, concepts and results on mobile and ubiquitous multimedia research.

We welcome you to enjoy MUM 2015 in Linz!

GENERAL CHAIRS
Clemens Holzmann
University of Applied Sciences Upper Austria, Austria

René Mayrhofer
Johannes Kepler University Linz, Austria

PROGRAM CHAIRS
Jonna Häkkilä
University of Lapland, Finland

Enrico Rukzio
University of Ulm, Germany
Tweet your thoughts and comments on Twitter using #MUM2015 and @MumConf2015
Eye Movement for Multimodal and Ubiquitous Interaction
Ubiquitous computing aspires to support human activity seamlessly with interactive technologies. This involves the proliferation of digital devices of different form and function in our environments, and the appropriation of diverse sensing modalities to observe activity, capture context, and provide natural interfaces to users. For tracking human activities, eye movement is a compelling source of information, as the eyes are where the action is; I will thus argue that eye movement can be leveraged in novel and advanced ways for multimodal and ubiquitous interaction. While the technology has been maturing and become affordable for widespread use, there has not been much innovation in the use of eye gaze for interaction. For over 25 years, gaze pointing has remained the prevailing usage paradigm, although it overloads the sensory role of the eyes with a control function. In this talk I will present work that explores new ways of using eye movement for interaction. I will discuss gaze and touch: how hands and eyes can naturally work together; gaze and motion: how the natural gaze-following of moving stimuli enables new types of interface; and gaze and games: how gaze can be social and fun.

Hans Gellersen is Professor of Interactive Systems at Lancaster University. Hans' research interest is in sensors and devices for ubiquitous computing and human-computer interaction. In recent work he is focusing on eye movement as a source of context information and modality for interaction. Hans was involved in the foundation of the UbiComp conference series, and serves as Associate Editor of ACM TOCHI and the Journal on Personal and Ubiquitous Computing (PUC). Hans has held his chair position at Lancaster since 2001. Previously he was affiliated with the University of Karlsruhe in Germany, where he received his PhD in Computer Science in 1996.

How ubiquitous and pervasive do computer systems have to become before we really start to care about the users?
In 1994 the Ars Electronica Festival was dedicated to “Intelligent Environments” and one of the pioneers of what we call nowadays ubiquitous and mobile computing, Rich Gold from the famous Xerox Parc Laboratories titled his lecture for the festivals symposium: “How smart does our bed have to be before we are afraid to sleep in it?”. A wonderful and forward thinking title, considering that this was more than 20 years ago. A time where most of the concepts for such a future of computing were still speculative and many of them sounded as funny as this title. But now it’s here or at least almost here. We are doing great in the technological developments towards it but when it comes to the social and cultural challenges, it seems we didn’t learn much in the last two decades. So how ubiquitous and mobile can our digital world become at all, if we always just look at the technology behind it? What, if people really get afraid of these systems which we are preparing and implementing right now. And what can we do to get it right?

Gerfried Stocker is artistic and managing director of Ars Electronica since 1995. In this period the Linz based Ars Electronica has evolved from the early festival of Art, Technology and Society into a new type of institution which is engaged in artistic production and education as well in research and development for the industry.
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Credit: Martin Hieslmair
Pick Up and Play: Understanding Tangibility for Cloud Media
Donald McMillan¹, Barry Brown¹, Abigail Sellen², Siân Lindley² and Roy Martens³
1 Stockholm University, Stockholm, Sweden
2 Microsoft Research, Cambridge, UK
3 Essense, Amsterdam, The Netherlands

On-the-fly Entity Resolution from Distributed Social Media Sources for Mobile Search and Exploration
Bernd Opitz¹, Timo Sztylel¹, Michael Jess¹, Florian Knip¹, Christian Bikar¹, Bernd Pfister¹ and Ansgar Scherp²
1 University of Mannheim, Mannheim, Germany
2 ZBW – Leibniz Information Centre for Economics and Kiel University, Kiel, Germany

What’s the deal with privacy apps? A comprehensive exploration of user perception and usability
Hala Assal, Stephanie Hurtado, Asan Imran and Sonia Chiasson
Carleton University, Ottawa, Ontario, Canada

Redefining the Fundamentals of Photography with Cooperative Photography
James Wen¹ and Ayça Ünlüer²
1 University of Gothenburg, Gothenburg, Sweden
2 Chalmers University of Technology, Gothenburg, Sweden

User Experience of Digital News: Two Semi-long Term Field Studies
Emilia Pesonen¹, Satu Jumisko-Pyykkö¹,² and Heli Vääätäjä¹
1 Tampere University of Technology, Tampere, Finland
2 Eindhoven University of Technology, Eindhoven, The Netherlands

Street Art Gangs: Location Based Hybrid Reality Game
Paula Alavesa and Timo Ojala
University of Oulu, Oulu, Finland

Show Me Your Phone, I Will Tell You Who Your Friends Are: Analyzing Smartphone Data To Identify Social Relationships
Delphine Reinhardt¹,³, Franziska Engelmann², Andrey Moerov³ and Matthias Hollick²
1 Fraunhofer FKIE, Bonn, Germany
2 TU Darmstadt, Darmstadt, Germany
3 University of Bonn, Bonn, Germany

Exploring Touch Interaction Methods for Image Segmentation on Mobile Devices
Christoph Korinke¹, Nils Steffen Worzyk² and Susanne Boll²
1 OFFIS – Institute for Information Technology, Oldenburg, Germany
2 University of Oldenburg, Oldenburg, Germany
**Detecting Human Encounters from WiFi Radio Signals**
Vanderhulst Geert¹, Afra Mashhadi², Marzieh Dashti² and Fahim Kawsar¹
1 Bell Laboratories, Antwerp, Belgium
2 Bell Laboratories, Dublin, Ireland

**Happy and Agreeable? Multi-Label Classification of Impressions in Social Video**
Gilberto Chávez-Martínez¹, Salvador Ruiz-Correa² and Daniel Gatica-Perez¹
1 Idiap Research Institute, Martigny, Switzerland
2 Instituto Potosino de Investigación Científica y Tecnológica, San Luis, Mexico

**Assessing Activity Recognition Feedback in Long-term Psychology Trials**
Manuel Dietrich¹, Eugen Berlin² and Kristof Van Laerhoven³
1 TU Darmstadt, Darmstadt, Germany
2 AGT International, Darmstadt, Germany
3 University of Freiburg, Freiburg, Germany

**Towards Device-to-User Authentication: Protecting Against Phishing Hardware by Ensuring Mobile Device Authenticity using Vibration Patterns**
Rainhard Dieter Findling¹ and René Mayrhofer²
1 University of Applied Sciences Upper Austria, Hagenberg, Austria
2 Johannes Kepler University Linz, Linz, Austria

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**MoCo Motion: Integrating Mobile Devices into a Multiplayer Floor-based Gaming Environment**
Andreas Friedl¹, Jeremiah Diephuis¹, Georgi Kostov¹ and Otto Naderer²
1 University of Applied Sciences Upper Austria, Hagenberg, Austria
2 Ars Electronica Futurelab, Linz, Austria

**Gary: Combining Speech Synthesis and Eye Tracking to Support Struggling Readers**
Gianluca Schiavo, Simonetta Osler, Nadia Mana and Ornella Mich
FBK (Fondazione Bruno Kessler), Trento, Italy

**Sauberes Wiesbaden App: Introducing Mobile E-Participation for a Clean City Project in Germany**
Stephan Böhm¹, Bodo Igler¹, Roberto Morales¹, Frank Sand² and Attila Ertan³
1 RheinMain University of Applied Sciences, Wiesbaden, Germany
2 MBA Wiesbaden GmbH, Wiesbaden, Germany
3 ELW (Entsorgungsbetriebe der Landeshauptstadt Wiesbaden), Wiesbaden, Germany

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**Video Reception**
TUESDAY
01.12.2015

Registration
08:00 - 09:00

Specific Application Areas
09:00 - 10:30

Coffee Break
10:30 - 11:00

Specific User Groups
11:00 - 12:30

Demos/Posters + Lunch
12:30 - 14:00

AEC Highlight Tour
14:00 - 15:30

Coffee Break
15:30 - 16:00

Wearable and Mobile interaction
16:00 - 17:30

Visit of Christmas Market
17:30 - 19:00

Banquet in the Linz Castle
19:00

Credit: Martin Hieslmair
09:00 - 10:30 Paper Session

Specific Application Areas

⭐ Triage Training System: Adjusting the Difficulty Level According to User Proficiency
Yuki Tayama, Ryuga Kato and Ken-Ichi Okada
Keio University, Kanagawa, Japan

TwitSoccer - Knowledge-based Crowdsourcing of live Soccer Events
Markus Löchtfeld¹, Christian Jäckel² and Antonio Krüger¹
1 German Research Center for Artificial Intelligence (DFKI), Saarbrücken, Germany
2 Saarland University, Saarbrücken, Germany

'Weather With You': Evaluating Report Reliability in Weather Crowdsourcing
Evangelos Niforatos¹, Athanasios Vourvopoulos² and Marc Langheinrich¹
1 Università della Svizzera italiana (USI), Lugano, Switzerland
2 Madeira-ITI, Universidade da Madeira, Funchal, Portugal

Comic-Crowd: Interactive Comic Creation that Supports Multiple Storylines, Visualizations, and Platforms
Hiroaki Tobita
Advanced Institute of Industrial Technology (AIIT), Tokyo, Japan

11:00 - 12:30 Paper Session

Specific User Groups

A Wearable and Mobile Intervention Delivery System for Individuals with Panic Disorder
Luis Cruz, Jonathan Rubin, Rui Abreu, Shane Ahern, Hoda Eldardiry and Daniel G. Bobrow
PARC, A Xerox Company, Palo Alto, CA, USA

Help Radar: Ubiquitous Assistance for Newly Arrived Immigrants
Stephanie Schwarz¹, Estefania Palacio Salazar², Jan Bobeth¹, Nicoletta Bersia³ and Manfred Tscheligi¹
1 AIT Austrian Institute of Technology GmbH, Vienna, Austria
2 FH Campus Wien, Vienna, Austria
3 Telecom Italia, Torino, Italy

Enabling Accessibility through Multimodality? Interaction Modality Choices of Older Adults
Julia Himmelsbach, Markus Garschall, Sebastian Egger, Susanne Steffek and Manfred Tscheligi
AIT Austrian Institute of Technology GmbH, Vienna, Austria

'Weather With You': Evaluating Report Reliability in Weather Crowdsourcing
Evangelos Niforatos¹, Athanasios Vourvopoulos² and Marc Langheinrich¹
1 Università della Svizzera italiana (USI), Lugano, Switzerland
2 Madeira-ITI, Universidade da Madeira, Funchal, Portugal

Localization of Storyboards for Cross-Cultural User Studies
Tanja Walsh¹, Helen Petrie² and Anqi Zhang²
1 Tampere University of Technology, Tampere, Finland
2 University of York, York, UK
A Smartphone Application for Voice Browsing RFID Smart Shelves  
Kamruddin Nur, Zulqarnain Rashid, and Rafael Pous  
Universitat Pompeu Fabra, Barcelona, Spain

Destmaster – Improved Destination Input System For The UR-Walking Application  
Stefan Covaci, Maximilian Frick, Florian Krämer and Julian Pörsch  
University of Regensburg, Regensburg, Germany

Emotion-based Music Recommendation using Supervised Learning  
Karl-Arnold Bodarwé, Jenny Noack, and Philipp Jean-Jacques  
University of Regensburg, Regensburg, Germany

FROY: Exploring Sentiment-Based Movie Recommendations  
Philip Gaag, Daniel Granvogl, Robert Jackermeier, Florian Ludwig, Johannes Rosenlöher and Alexander Uitz  
University of Regensburg, Regensburg, Germany

GRASPhere: A Prototype to Augment Indirect Touch with Grasping Gestures  
Dorin-Mircea Popovici, Radu-Daniel Vatavu and Mihai Polceanu  
1 Ovidius University of Constanta, Constanta, Romania  
2 University Stefan cel Mare of Suceava, Suceava, Romania  
3 Florida International University, Miami, FL, USA

InfoFinder: Just-in-Time Information Interface from the Combination of an HWD with a Smartwatch  
Jianming Wu and Tomonori Yazaki  
KDDI R&D Laboratories Inc., Japan

Nombot – Simplify Food Tracking  
Bettina Graf, Maike Krüger, Felix Müller, Alexander Ruhland and Andrea Zech  
University of Regensburg, Regensburg, Germany

Collaborative Landmark Mining With A Gamification Approach  
Florian Bockes, Laura Edel, Matthias Ferstl and Andreas Schmid  
University of Regensburg, Regensburg, Germany

Woody: A Location-based Smartphone Game to Increase Children’s Outdoor Activities in Urban Environments  
Paul Spiesberger, Florian Jungwirth, Christoph Wöß, Stefan Bachl, Johannes Harms and Thomas Grechenig  
Vienna University of Technology, Vienna, Austria

Mobile for Older Adults: Towards Designing Multimodal Interaction  
Michela Ferron, Nadia Mana and Ornella Mich  
FBK (Fondazione Bruno Kessler), Trento, Italy

Landmark Mining on a Smartwatch Using Speech Recognition  
Jana Helgath, Simon Provinsky, and Timo Schaschek  
University of Regensburg, Regensburg, Germany

Usability Requirements for Mobile Accessibility: A Study on the Vision Impairment  
Clauirton Siebra, Tatiana Gouveia, Jefte Macedo, Walter Correia, Marcelo Penha, Fabio Silva, Andre Santos, Marcelo Anjos and Fabiana Florentin  
1 CIn/Samsung, Universidade Federal de Pernambuco, Recife, Brazil  
2 Universidade Federal de Pernambuco, Recife, Brazil  
3 SIDI - Samsung, Campinas, Brazil

UI-CAT: Calculating User Interface Complexity Metrics for Mobile Applications  
Andreas Riegler and Clemens Holzmann  
University of Applied Sciences Upper Austria, Hagenberg, Austria

Augmented Reality-Based Training of the PCB Assembly Process  
Jürgen Hahn, Bernd Ludwig and Christian Wolff  
University of Regensburg, Regensburg, Germany

Understanding Usage Control Requirements in Pervasive Memory Augmentation Systems  
Agon Bexheti and Marc Langheinrich  
Università della Svizzera italiana (USI), Lugano, Switzerland
Interaction Visualization and Analysis in Automation Industry  
Christian Grossauer, Clemens Holzmann, Dustin Steiner and Andreas Guetz  
University of Applied Sciences Upper Austria, Hagenberg, Austria

MoCo Motion: Integrating Mobile Devices into a Multiplayer Floor-based Gaming Environment  
Andreas Friedl¹, Jeremiah Diephuis¹, Georgi Kostov¹ and Otto Naderer²  
1 University of Applied Sciences Upper Austria, Hagenberg, Austria  
2 Ars Electronica Futurelab, Linz, Austria

WristRotate - A Personalized Motion Gesture Delimiter for Wrist-Worn Devices  
Frederic Kerber, Philipp Schardt and Markus Löchtefeld  
DFKI, Saarbrücken, Germany

Design Probes Study on User Perceptions of a Smart Glasses Concept  
Jonna Häkkilä¹, Farnaz Vahabpour¹, Ashley Colley², Jani Väyrynen² and Timo Koskela²  
1 University of Lapland, Rovaniemi, Finland  
2 University of Oulu, Oulu, Finland

Effects of Camera Position and Media Type on Lifelogging Images  
Katrin Wolf¹, Yomna Abdelrahman², David Schmid², Tilman Dingler² and Albrecht Schmidt²  
1 BTK – University of Art and Design, Berlin, Germany  
2 University of Stuttgart, Stuttgart, Germany

Towards Device-to-User Authentication: Protecting Against Phishing Hardware by Ensuring Mobile Device Authenticity using Vibration Patterns  
Rainhard Dieter Findling¹ amnd René Mayrhofer²  
1 University of Applied Sciences Upper Austria, Hagenberg, Austria  
2 Johannes Kepler University Linz, Linz, Austria

Detecting Users Handedness for Ergonomic Adaptation of Mobile User Interfaces  
Markus Löchtefeld¹, Philipp Schardt¹, Antonio Krueger¹ and Sebastian Boring²  
1 DFKI, Saarbrücken, Germany  
2 University of Copenhagen, Copenhagen, Denmark

Gary: Combining Speech Synthesis and Eye Tracking to Support Struggling Readers  
Gianluca Schiavo, Simonetta Osler, Nadia Mana and Ornella Mich  
FBK (Fondazione Bruno Kessler), Trento, Italy

Exploring AR Poster as an Interface to Personal Health Data  
Juho Rantakari¹, Ashley Colley¹ and Jonna Häkkilä²  
1 University of Oulu, Oulu, Finland  
2 University of Lapland, Rovaniemi, Finland

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2 Johannes Kepler University Linz, Linz, Austria

Wearable Technology as a Solution for Workplace Safety  
Mareike Kritzler, Martin Bäckman, Anders Tenfält, and Florian Michahelles  
Siemens Corporation, Berkeley, CA, USA

Wearable and Mobile interaction

Wearable and Mobile interaction

12:30 - 14:00

Demos

Interaction Visualization and Analysis in Automation Industry  
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University of Applied Sciences Upper Austria, Hagenberg, Austria

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Siemens Corporation, Berkeley, CA, USA

Wearable and Mobile interaction

Wearable and Mobile interaction
WEDNESDAY
02.12.2015

11:00 - 12:30
Designing Interactions

10:30 - 11:00
Coffee Break

13:30 - 14:30
Closing Keynote
How ubiquitous and pervasive do computer systems have to become before we really start to care about the users?

14:30 - 15:00
Closing

08:00 - 09:00
Registration

09:00 - 10:30
Augmented Reality

12:30 - 13:30
Lunch

15:00 - 18:30
Doctoral School
Augmented Reality

A Benchmark for Interactive Augmented Reality Instructions for Assembly Tasks
Markus Funk¹, Thomas Kosch¹, Scott W. Greenwald² and Albrecht Schmidt¹
1 University of Stuttgart, Stuttgart, Germany
2 MIT Media Lab, Cambridge, MA, USA

Augmenting Food with Information
Niels Henze¹, Thomas Olsson², Stefan Schneegass¹, Alireza Sahami Shirazi³ and Kaisa Väänänen-Vainio-Mattila²
1 University of Stuttgart, Stuttgart, Germany
2 Tampere University of Technology, Tampere, Finland
3 Yahoo! Labs, Sunnyvale, CA, USA

Deriving Design Guidelines for Ambient Light Systems
Andrii Matvienko¹, Vanessa Cobus¹, Heiko Müller¹, Jutta Fortmann¹, Andreas Löcken¹, Susanne Boll¹, Maria Rauschenberger², Janko Timmermann², Christoph Trappe² and Wilko Heuten²
1 University of Oldenburg, Oldenburg, Germany
2 OFFIS – Institute for Information Technology, Oldenburg, Germany

Influence of Temporal Delay and Display Update Rate in an Augmented Reality Application Scenario
Ming Li, Katrin Arning, Luisa Vervier, Martina Ziefiel and Leif Kobbelt
RWTH Aachen University, Aachen, Germany

Designing Interactions

Building Interactive Experiences Block by Block
Rossana Santos¹² and Nuno Correia¹
1 NOVA-LINCS – Universidade NOVA de Lisboa, Caparica, Portugal
2 Instituto Politécnico de Setúbal, Caparica, Portugal

De+re: A Design Concept For Provoking Meaningful Interactive Experiences
Florian Güldenpfennig and Geraldine Fitzpatrick
Vienna University of Technology, Vienna, Austria

Authoring Context-dependent Cross-device User Interfaces based on Trigger/Action Rules
Giuseppe Ghiani, Marco Manca and Fabio Paternò
CNR-ISTI, HIIS Laboratory, Pisa, Italy

Opportunistic At-Glance Information Acquisition on Interactive Public Displays
Hannu Kukka, Jorge Goncalves, Alexander Samodelkin and Timo Ojala
University of Oulu, Oulu, Finland
15:00 - 18:30

Doctoral School

Active Office: Designing for Physical Activity in Digital Workplaces
Kathrin Probst
University of Applied Sciences Upper Austria, Hagenberg, Austria

Collaborative Security Code Review
Hala Assal
Carleton University, Ottawa, Ontario, Canada

The Mind Behind the Glass: Human Factors in the Design of Collaborative AR Environments
Marion Koelle and Matthias Kranz
University of Passau, Passau, Germany

Biometric and Sensoric Authentication on Mobile Devices
Rainhard Dieter Findling
University of Applied Sciences Upper Austria, Hagenberg and Johannes Kepler University Linz, Linz, Austria

MUM 2015 is held at the Ars Electronica Center (AEC) in Linz, which is also known as the „Museum of the Future“ and is one of the most important sights in Linz. Participants of the conference will be able to visit the museum and discover its exhibitions. Moreover, Linz has a long history of Christmas markets, which will be open during the conference.

Linz is the third-largest city of Austria and capital of the state of Upper Austria (German: Oberösterreich). The city boasts an atmospheric old town (1.000 years old) with a thriving music and entertainment scene, museums, theatres, concert halls, festivals, marathons, the Linz triathlon, unique shops and numerous cafes. The river Danube is the main tourism and transport connection that runs through the city.
City Map Linz

For fast and easy navigation open this map on your smartphone: https://goo.gl/j0t6H5