

MUM 2012

Ulm

4-6 Dec. 2012

11th International Conference on
Mobile and Ubiquitous Multimedia

www.mum2012.org

^{NTT}
docomo

DOCOMO Euro-Labs

net·m

 *In-Cooperation*



SIGCHI
special interest group computer human interaction



interaction-design.org



welcome to MUM 2012

On behalf of the organizing committee we would like to welcome you to this 11th edition of the International Conference on Mobile and Ubiquitous Multimedia, held in Ulm, Germany on 4-6 December 2012.

The goal of the conference is to bring together experts on mobile systems, ubiquitous computing and multimedia. This year we received a record number of 126 research paper submissions around these topics. A rigorous review process was followed with each paper receiving three reviews from international experts. Based upon this process, twenty-seven full papers and eighteen short papers were selected to appear in these proceedings and to be presented at the conference. This results in an acceptance rate of 34.9% for 2012.

In addition to the regular paper submissions, MUM 2012 is very happy to feature a Poster and a Demo session, with 7 accepted posters and 9 accepted demos. The papers cover a range of topics related to the key issues including mobile interaction, video and audio, technically enhanced social interaction, security, concept models and developments tools, field studies and user experiences, and public displays. For the first time, this year we also have a dedicated industry track whose papers

were rigorously reviewed as the other papers but focus on more practical issues coming out of industry research and start-up groups.

We hope that this selection of papers will form the basis of lively discussions at the conference.

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 DOCOMO Euro Labs and the net mobile AG. Secondly, we warmly thank the members of the program committee and the additional reviewers for their helpful feedback and constructive criticisms. 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 2012 in Ulm!

General Chair

Enrico Rukzio, Ulm University, Germany

Technical Program Chairs

Florian Michahelles, ETH Zurich, Switzerland

Kaisa Väänänen-Vainio-Mattila, Tampere University of Technology, Finland

Mark Billinghurst, Human Interface Technology Laboratory, New Zealand

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KEYNOTE SPEAKERS



Dieter Schmalstieg is full professor and head of the Institute for Computer Graphics and Vision at Graz University of Technology (TUG), Austria, where he directs the "Studierstube" research project on augmented reality. His current research interests are augmented reality, virtual reality, real-time graphics, 3D user interfaces, and ubiquitous computing. He received Dipl.-Ing.

(1993), Dr. techn. (1997) and Habilitation (2001) degrees from Vienna University of Technology. He is author and co-author of over 200 peer-reviewed scientific publications, associate editor of IEEE Transactions on Visualization and Computer Graphics, member of the editorial advisory board of computers & graphics, member of the steering committee of the IEEE International Symposium on Mixed and Augmented Reality, chair of the EUROGRAPHICS working group on Virtual Environments (1999-2010), advisor of the K-Plus Competence Center for Virtual Reality and Visualization in Vienna and member of the Austrian Academy of Science. In 2002, he received the START career award presented by the Austrian Science Fund. Since 2008, he is also director of the Christian Doppler Laboratory for Handheld Augmented Reality.

Nigel Davies is a Professor in the Computing Department at Lancaster University and an Adjunct Associate Professor at the University of Arizona, US. He has been a visiting research scientist at the Swedish Institute of Computer Science (SICS), The Sony Electronics Distributed Systems Lab in San Jose, the Bonn-Aachen International Center for Information Technology (B-IT) and ETH Zurich. He has participated actively in the mobile computing research community and served in a number of roles including Program Chair for IEEE WMCSA 2000, Ubicomp 2004 and MobiSys 2006. In addition, Nigel was a founding Associate Editor in Chief of IEEE Pervasive Magazine and a founding Associate Editor of IEEE Transactions on Mobile Computing. Prof. Davies consults for a range of small and large companies and has been an investigator on grants totalling in excess of £3 million. He holds a BSc and PhD in Computer Science, both from Lancaster University, UK.



Tue

Augmented Reality Technology
for Smartphones

Open Public Display Networks:
A Communications Medium for
the 21st Century

Thu

TUESDAY

8
00

Registration

9
00

Welcome & Intro

9
30

Keynote Augmented Reality
Technology for Smartphones
Dieter Schmalstieg

10
30

Coffee break

Session Novel Designs & Insights

Chair: Michael Weber (Ulm University)

11
00

Creating Visibility: Understanding the
Design Space for Food Waste

Eva Ganglbauer, Geraldine Fitzpatrick, Georg Molzer

What Influences Users' Decisions to Take Apps into Use?

A Framework for Evaluating Persuasive and
Engaging Design in Mobile Apps for Well-Being
Ting-Ray Chang, Eija Kaasinen, Kirsikka Kaipainen

Designing Gestures for Mobile 3D Gaming

Florian Daiber, Lianchao Li, Atonio Krüger

A Mobile Indoor Navigation System Interface Adapted
to Vision-Based Localization

*Andreas Möller, Stefan Diewald, Luis Roalter, Robert Huitl,
Matthias Kranz*

Development and Evaluation of Media-Enhanced
Learning Application

Janne Lahti, Erkki Siira, Vili Törmänen

TUESDAY

12
40

Lunch

14
00

Session Mobile Interaction

Chair: Wolfgang Hürst (Utrecht University)

A Text Input Method for Half-Sized Keyboard using Keying Interval

Takuya Katayama, Kazuya Murao, Tsutomu Terada, Masahiko Tsukamoto

Evaluation Study on Sensor Placement and Gesture Selection for Mobile Devices

Kazuya Murao, Tsutomu Terada, Ai Yano, Ryuichi Matsukura

TouchPosing - Multi-Modal Interaction with Geospatial Data

Florian Daiber, Sven Gehring, Markus Löchtfeld, Antonio Krüger

Coffee break

15
00

Session Technically Enhanced Social Interaction

Chair: Nuno Correia (Universidade Nova de Lisboa)

Saving Energy at Work: The Design of a Pervasive Game for Office Spaces

Jonathan Simon, Marco Jahn, Amro Al-Akkad

Social Devices: Collaborative Co-located Interactions in a Mobile Cloud

Niko Mäkitalo, Jari Pääkkö, Mikko Raatikainen, Varvana Myllärniemi, Timo Aaltonen, Tapani Leppänen, Tomi Männistö, Tommi Mikkonen

An Exploratory Study of User-Generated Spatial Gestures with Social Devices

Kaisa Väänänen-Vainio-Mattila, Thomas Olsson, Jari Laaksonen

Designing Conversation-context Recommendation Display to Support Opportunistic Search in Meetings

Nan Li, Pierre Dillenbourg

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15

TUESDAY

16
15

Coffee break

16
30

Session Security

Chair: Alexander de Luca (University of Munich)



Password Entry Usability and Shoulder Surfing
Susceptibility on Different Smartphone Platform
Florian Schaub, Ruben Deyhle, Michael Weber

Exploring User Preferences for Privacy Interfaces in
Mobile Sensing Applications
*Delphine Christin, Andreas Reinhardt,
Matthias Hollick, Kai Trumpold*

Security in Migratory Interactive Web Applications
Giuseppe Ghiani, Fabio Paternò

17
30

Reception with Posters & Demos

Poster

Blockon: A block based
buildable remote controller
Kohei Matsumura

Charting the Audience Perceptions of
Projected 3D Media Installations
Minna Karukka, Pekka Nisula, Jonna Häkkinä, Jussi Kangasoja

Structural Ties between Idea Generation
Process and Design Decision
Özge Subasi

Heat Maps as a Usability Tool for Multi-Touch Interaction in
Mobile Applications
Florian Lettner, Clemens Holzmann

Mobile Augmented Reality and Adaptive Art: A game-based
Motivation for Energy Savings
René Bühling, Mohammad Obaid, Stephan Hammer, Elisabeth André

Towards next generation barcode scanning
GGábor Sörös, Christian Flörkemeier

User Expectations of mobile mixed reality service content
Leena Ventä-Olkkonen, Maaret Posti, Olli Koskenranta, Jonna Häkkinä

TUESDAY

Demos

An Event-Driven Workflow Framework to Develop Context-Aware Mobile Applications

(demo of corresponding long paper)

Valentim Realinho, Teresa Romão, Eduardo Dias

An Off-the-Shelf Wearable HUD System for Support in Indoor Environments

Christopher Sulisz, Patrick Seeling, Kinjan Shah

Build Interactive Display Surface using Multiple Mobile Devices (demo of corresponding short paper)

Ming Li, Leif Kobbelt

Creating web-based interactive public display applications with the PuReWidgets toolkit

Jorge Cardoso, Rui José

Find My Stuff: A Search Engine for Everyday Objects

Pascal Knierim, Jens Nickels, Steffen Musiol, Florian Schaub, Bastian Könings, Björn Wiedersheim, Michael Weber

MagMobile: Enhancing Social Interactions with Rapid View-Stitching Games of Mobile Devices

Da-Yuan Huan, Tzu-Wen Chang, Min-Lun Tsai, Chien-Pang Lin, Neng-Hao Yu, Mike Y. Chen, Yi-Ping Hung

MobIES: Extending Mobile Interfaces Using External Screens

Dennis Schneider, Julian Seifert, Enrico Rukzio

Personal Routine Visualization using Mobile Devices

Nuno Correia, Jared Hawkey, Sofia Oliveira, Olivier Perriquet, Cristiano Lopes

Security in Migratory Interactive Web Applications

(demo of corresponding long paper)

Giuseppe Ghiani, Fabio Paternò

Service Fusion: Interactive 3D User interface

Seamus Hickey, Leena Arhipainen, Erno Kuusela, Minna Pakanen, Matti Pouke, Antti Karhu

Toolkit Support for Projected Ubiquitous Displays

(demo of corresponding long paper)

John Hardy, Jason Alexander

tripzoom – An App to Improve your Mobility Practices

Gregor Broll, Hu Cao, Peter Ebben, Paul Holleis, Koen Jacobs, Johan Koolwaaij, Marko Luther, Bertrand Souville

Uncovering Device Whispers in Smart Homes

Simon Mayer, Christian Beckel, Bram Scheidegger, Claude Barthels, Gábor Sörös

WEDNESDAY

8
30

Registration

9
00

Session Mobile Augmented Reality and Mobile Video

Chair: Matthias Baldauf (FTW)

LightBeam: Interacting with Augmented Real-World Objects in Pico Projections (long)

Jochen Huber, Jürgen Steimle, Chunyuan Liao, Qiong Liu, Max Mühlhäuser

HiStory - A Hierarchical Storyboard Interface Design for Video Browsing on Mobile Devices (short)

Wolfgang Hürst, Dimitri Darzentas

The Mobile Vision Mixer: A mobile network based live video broadcasting system in your mobile phone (short)

Arvid Engstrom, Goranka Zoric, Oskar Juhlin, Ramin Tous

Real-Time Annotation of Video Objects on Tablets (long)

João Silva, Diogo Cabral, Nuno Correia, Carla Fernandes

ProPane: Fast and Precise Video Browsing on Mobile Phones

Roman Ganhör

Coffee break

10
30

Session Models & Tools

Chair: Matthias Kranz (Luleå University of Technology)

ConWIZ: A tool supporting contextual Wizard of Oz simulation

Thomas Grill, Ondrej Polacek, Manfred Tscheligi

An Event-Driven Workflow Framework to Develop Context-Aware Mobile Applications

Valentim Realinho, Teresa Romão, Eduardo Dias

Object Circles: Modeling physical objects as social relationships

Florian Michahelles, Philip Probst

Dynamic Tiling Display: Building an Interactive Display Surface using Multiple Mobile Devices

Ming Li, Leif Kobbelt

Model for Landmark Highlighting in Mobile Web Services

Pekka Kallioniemi, Markku Turunen

11
00

WEDNESDAY


12
30

Lunch


14
00

Session Industry Track

Chair: Paul Holleis (DOCOMO Euro-Labs) & Sebastian Böhm (net mobile AG)

 Checking In or Checked In: Comparing Large-Scale Manual and Automatic Location Disclosure Patterns (long)
Eric Malmi, Trinh Minh Tri Do, Daniel Gatica-Perez

 Private Public Screens - Detached Multi-User Interaction with Large Displays through Mobile Augmented Reality (short)
Matthias Baldauf, Katrin Lasinger, Peter Froehlich

 Testdroid: automated remote UI testing on Android (short)
Jouko Kaasila, Denzil Ferreira, Vassilis Kostakos, Timo Ojala

evoGuide: Implementation of a Tour Guide Support Solution with Multimedia and Augmented-Reality Content (short)

Richard Hable, Thomas Rößler, Christina Schuller

Personal Feature Extraction via Grip Force Sensors mounted on a Mobile Phone (short)

Toshiki Iso, Masakatsu Tsukamoto, Tsutomu Horikoshi, Takeshi Higuchi

The scanner at your finger tips - analysis of the effectiveness of the scan mouse device (short)

Matthias Wyss, Alexander Ilic, Florian Michahelles

Coffee break

15
30



16
00

Session Audio & Music

Chair: Timo Ojala (University of Oulu)



Affective Quality of Audio Feedback in Different Contexts

Julia Seebode, Robert Schleicher, Sebastian Möller

Assessing the impact of language style on emergent

leadership perception from ubiquitous audio

Dairazalia Sanchez-Cortes, Petr Motlicek, Daniel Gatica-Perez

The Sound of Music: Sharing Song Selections between

Collocated Strangers in Public Urban Places

Jan Seeburger, Marcus Foth, Dian Tjondronegoro

MyTerritory - Evaluation of Outdoor Gaming Prototype

for Music Discovery

Arto Lehtiniemi, Jarmo Ojala

Social event / Dinner Ratskeller Ulm

19
00



Marktplatz 1
89073 Ulm
+49 731 8 80 17 40

see map on page 26
for walking directions



scan this code to
start navigation

THURSDAY

9
00

Registration

9
30

Keynote Open Public Display Networks: A Communications Medium for the 21st Century Nigel Davies

10
30

Coffee break

11
00

Session Field Studies & User Experiences Chair: Katrin Arning (RWTH Aachen)

Driving Behavior Analysis with Smartphones: Insights from a Controlled Field Study
Johannes Paefgen, Flavius Kehr, Yudan Zhai, Florian Michahelles

Fresh and local: the rural produce market as a site for co-design, ubiquitous technological intervention and digital-economic development

Alan Chamberlain, Andy Crabtree, Mark Davies, Chris Greenhalgh, Tom Rodden, Stela Valchovska, Kevin Glover

Two field trials on the efficiency of unsolicited Bluetooth proximity marketing
Timo Ojala, Fabio Kruger, Vassilis Kostakos, Ville Valkama

Towards Better UIs for Mobile Learning - Experiences in Using Mobile Phones as Multimedia Tools at Schools in Rural Panama
Elba Del Carmen Valderrama Bahamóndez, Jonna Häkkinä, Albrecht Schmidt

"It would be handy if it had pictures, if you can't read"
- Young digital natives as mobile phone users
Marianne Kinnula, Katja Moilanen, Atte Kinnula

Insights into user experiences and acceptance of mobile indoor navigation devices
Katrin Arning, Martina Ziefle, Ming Li, Leif Kobbelt

Lunch

12
40

14
00

Session Public Displays

Chair: Nigel Davies (Lancaster University)



Toolkit Support for Projected Ubiquitous Displays

John Hardy, Jason Alexander

Designing "Interacting Places" for a Student Community

using a Communicative Ecology Approach

Nemanja Memarovic, Marc Langheinrich, Elisa Rubegni, Andreia David, Ivan Elhart

Direct, Bodily or Mobile Interaction? Comparing Interaction Techniques for Personalized Public Displays

Ekaterina Kurdyukova, Mohammad Obaid, Elisabeth Andre



Don't Queue Up! User Attitudes Towards Mobile Interactions with Public Terminals

Julian Seifert, Alexander De Luca, Enrico Rukzio

15
20

15
45

Closing and
announcement of
MUM 2013

Ulm, founded around 850, is rich in history and traditions as a former Free Imperial City. Internationally, Ulm is primarily known for having the church with the tallest steeple in the world, the Gothic minster (German: Ulmer Münster) and as the birthplace of Albert Einstein.



© B. Steinhauer

The steeple measures 161.5 metres (530 ft), containing 768 steps. From the top level at 143 m (469 ft) there is a panoramic view of Ulm and Neu-Ulm in Bavaria and, in clear weather, a vista of the Alps. The final stairwell to the top (known as the third Gallery) is a tall, spiraling staircase that has barely enough room for one person. Entrance to the minster is free, entrance to the steeple costs 4€.

Ulm Minster, tallest church in the world

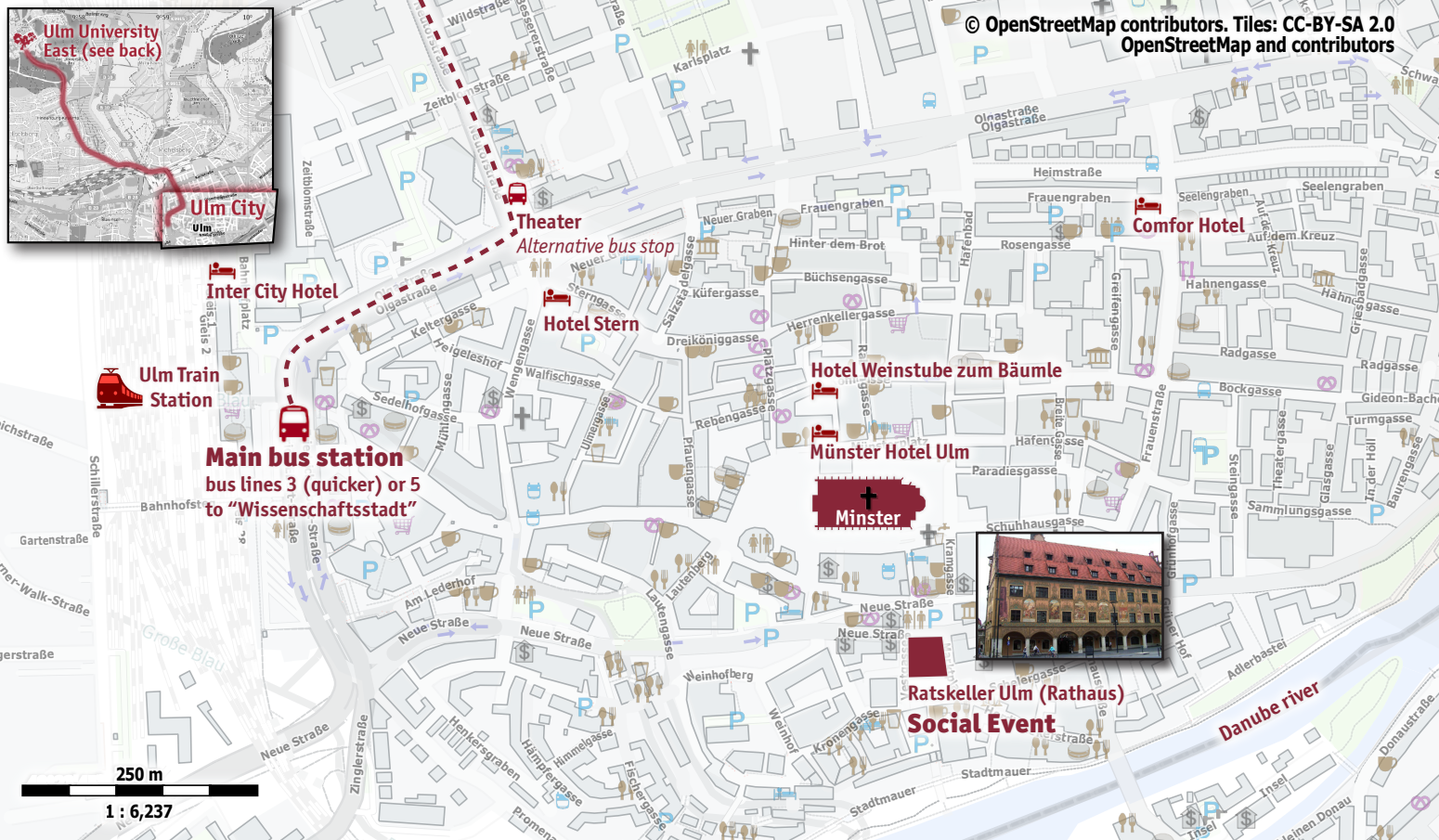
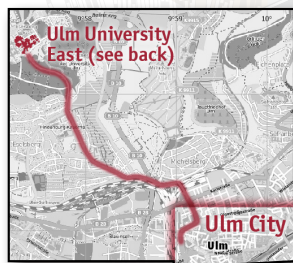
Also, during the time of the conference, the Ulm Christmas market is taking place in front of the minster, daily between 10 am and 8.30 pm, and worth a visit.



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CITY MAP

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VENUE MAP

