

# Mobile Interaction with the Real World

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## ABSTRACT

The workshop on Mobile Interaction with the Real World (MIRW 2009) will invite papers which focus on new mobile and wearable input and output interfaces which allow simpler and straightforward interactions with mobile services and applications. An inherent problem of current mobile devices are their limited output and input capabilities. This workshop continues a successful series of workshops (2006-2008) that focus on new approaches to overcome these issues. Examples are the usage of external visual interfaces (e.g. projector phones, public displays, interactive surfaces) and additional input capabilities (e.g. gestures, on-body interfaces, pointing) and innovative feedback mechanisms (e.g. tactile feedback). The workshop combines technical presentations with the presentation of prototypes and focused discussions to drive interaction between participants.

## Categories and Subject Descriptors

H.5.2 [Interfaces and Presentation]: User Interfaces - Interaction styles; I.3.6 [Computer Graphics]: Methodology and Techniques - Interaction techniques

## General Terms

Performance, Design, Experimentation, Human Factors.

## Keywords

Mobile interaction, mobile device, smart objects, real world, wearable computing.

## 1. INTRODUCTION

Mobile devices are a pervasive part of our everyday lives. People use mobile phones, PDAs, and mobile media player almost everywhere. These devices are the first truly pervasive interaction devices that are currently used for a huge variety of services and applications. Stordahl et al. for example forecast that in the year 2010 over 90% of the population in Western Europe will use mobile phones [2].

However, mobile device's immanent size restriction leads to key limitations such as a small visual display and limited input capabilities. Furthermore, current mobile user interfaces often disengage from the environment. To overcome these limitations we saw increased interest in extending the interaction boundaries of mobile device by developing novel input and output interfaces.

The mobile interaction with the real world workshop series provides a forum which concentrates on mobile and wearable

interaction with real world objects. The work on mobile applications, concepts, and techniques enabling the user to interact with real world objects using mobile devices have shown promising results [3,4,5]. Examples for this are for instances the usage of RFID/NFC equipped mobile devices for interactions with smart objects such as advertisement posters or vending machines; the usage of mobile devices as a universal remote control or the usage of mobile devices for direct interactions (e.g. based on image recognition) with objects in a museum. When looking at this research area the following questions occur:

- Which kinds of interaction techniques with the real world exist?
- What technologies can be used to implement mobile and wearable interaction with the real world?
- How can real world objects and services be described?
- How should systems and services for this kind of mobile and wearable interactions be designed?
- What should appropriate user interfaces look like?
- What does the interaction design and usability look like for mobile and wearable interaction with physical objects?
- Can these interfaces be generated automatically?
- Should real world services be defined in a standardized way (e.g. with semantic web services)?
- How can real world objects be associated with new services?
- Which issues concerning privacy and security arise from this new kind of mobile interaction?
- How can interaction with real world entities help people with special needs?

Following the successful series of workshops on "Mobile Interaction with the Real World" at MobileHCI 2006 to 2008<sup>1</sup>, we will continue this workshop as a forum that concentrates on mobile and wearable interactions with real world objects.

## 2. RESEARCH THEMES

Topics of the workshop are application, frameworks, and user studies in the area of mobile interaction with the real world. Possible research themes include (but are not limited to):

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<sup>1</sup> MIRW 2006: <http://www.hcilab.org/events/mirw2006/>

MIRW 2007: <http://www.medien.ifi.lmu.de/mirw2007/>

MIRW 2008: <http://mirw08.offis.de/>

- Extending the user interface beyond the mobile device
- Mobile interaction with real world objects and smart objects
- Wearable computing and wearable input devices
- Multimodal interaction techniques using mobile phones
- Augmented and mixed reality on mobile devices
- Interaction techniques using external displays, projector phones or floor displays
- Using mobile device's sensors for pervasive applications
- Novel interfaces for conveying spatial information
- Pervasive interaction metaphors
- Guidelines and standards for mobile interactions with the real world
- Interaction techniques using multiple mobile devices
- Support of knowledge processes and collaboration through mobile and wearable technologies

### 3. GOALS

The main goal of the workshop is to develop an understanding of how mobile and wearable devices can be used to interact with the real world. We seek for new ideas, prototypes, and insights as basis to develop a deeper understanding of the field. We will provide an open forum to share information, results, and ideas on current research in this area. This workshop encourages discussion about future topics concerning mobile interaction with the real world. Furthermore we aim to develop new ideas on how mobile devices can be exploited for new forms of interaction with the environment. We will bring together researchers and practitioners who are concerned with design, development, and implementation of new applications and services using personal mobile and wearable devices as user interfaces. Furthermore, the workshop aims at conveying hands-on experience with current state-of-the-art technology through demonstration sessions.

### 4. ORGANIZERS

Andreas Zimmermann, Fraunhofer FIT, Germany  
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Andreas is working as a senior researcher in the department "Information in Context" at the Fraunhofer Institute for Applied Information Technology (FIT) in Sankt Augustin (Germany). He has a strong research background in context-aware computing and artificial intelligence, and his further research interests include areas such as nomadic systems and end-user control of ubiquitous computing environments. Within the scope of two European projects he currently manages, he is responsible for the user-centred design process and for the design of software architectures.

Niels Henze, OFFIS, Germany  
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Niels is working as a research assistant and PhD student in the Multimedia and Internet Information Services division at the research institute OFFIS in Oldenburg, Germany. He was involved in some national and European research projects such as the European IST project ENABLED for providing visually impaired with

universal access to digital information and the project InterMedia researching in interaction with media using personal networked devices. Among his other research interests are advances in accessing digital information using real world entities.

Xavier Righetti, EPFL, Switzerland  
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Xavier is a research assistant and PhD student in the Virtual Reality Lab (VRLab) at Ecoles Polytechniques Fédérales de Lausanne (EPFL), Switzerland. He is currently involved in the European Network of Excellence Intermedia in which he focuses on the design and development of modular wearable components for user input / output, processing and storage. His vision is the usage of wearable devices on demand and their ad-hoc collaboration once worn by a user.

Enrico Rukzio, Lancaster University, United Kingdom  
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Enrico is working as an academic fellow and lecturer in the Computing Department at Lancaster University. Enrico's research interests are physical mobile interactions and applications as well as context-aware mobile services. Enrico believes that mobile devices which were so far mostly used for interactions between the user and the device itself will more and more be used for interactions with objects in the real world. Currently he works new interaction techniques for projector phones and mobile interactions with floor displays, interactive surfaces and public displays. More details about Enrico can be found at [www.rukzio.de](http://www.rukzio.de).

### 4.1 Program Committee

- Susanne Boll, University of Oldenburg, Germany
- Gregor Broll, NTT DoCoMo Euro-Labs, Germany
- Dominique Guinard, ETH Zurich and SAP Research, Switzerland
- Jonna Häkkinä, Nokia Multimedia, Finland
- Christian Kray, Newcastle University, UK
- Andreas Lorenz, Fraunhofer FIT, Germany
- Martin Pielot, OFFIS Institute for Information Technology, Germany
- Benjamin Poppinga, OFFIS Institute for Information Technology, Germany
- Derek Reilly, Georgia Institute of Technology, United States
- Michael Rohs, Deutsche Telekom Laboratories, Germany
- Johannes Schöning, DFKI Saarbrücken, Germany
- Daniel Thalmann, EPFL, Switzerland

### 5. ACCEPTED PAPERS

The workshop received 22 submissions and each submission received 2-4 blind reviews from the program committee and the organizers. All the papers were assessed and discussed in a telephone conference held by the organizers. The following 10 contributions were accepted for presentation at the workshop which leads to an acceptance rate of 45%. All authors of accepted

papers and some additional selected ones have been invited to demonstrate their systems in a dedicated workshop session.

*View & Share: Exploring Co-Present Viewing and Sharing of Pictures using Personal Projection.* Andrew Greaves and Enrico Rukzio (Lancaster University, UK).

*Mobile Little Big Planet: An Augmented Reality Game for Camera Projector Phones.* Markus Löchtefeld (DFKI, Germany), Johannes Schöning (DFKI, Germany), Michael Rohs (Deutsche Telekom Laboratories, Germany) and Antonio Krüger (DFKI, Germany).

*What is That? Object Recognition from Natural Features on a Mobile Phone.* Niels Henze, Torben Schinke and Susanne Boll (University of Oldenburg, Germany).

*Magnification for Distance Pointing.* Ferry Pramudianto (Fraunhofer FIT, Germany), Andreas Zimmermann (Fraunhofer FIT, Germany) and Enrico Rukzio (Lancaster University, UK).

*Supporting Hand Gesture Manipulation of Projected Content with Mobile Phones.* Matthias Baldauf and Peter Fröhlich (Telecommunications Research Center Vienna, Austria).

*Cocktail: Exploiting Bartenders' Gestures for Mobile Interaction.* Jong-Woon Yoo, Woomin Hwang, Hyunchul Seok, Sung Kyu Park and Chulmin Kim (KAIST, Republic of Korea).

*Shopping in the Real World: Interacting with a Context-Aware Shopping Trolley.* Darren Black (Systematic, Denmark), Nils Jakob Clemmensen (Nordjyske Medier, Denmark) and Mikael B. Skov (Aalborg University, Denmark).

*Towards Interactive Museum: Mapping Cultural Contexts to Historical Objects.* Ki-Woong Park, Sung Kyu Park, Jong-Woon Yoo and Kyu Ho Park (KAIST, Republic of Korea).

*Separation of User Interfaces from Services of Ambient Computing Environments: A Conceptual Framework.* Andreas Lorenz (Fraunhofer FIT, Germany).

*Amazon-on-Earth: Wedding Web Based Services with the Real World.* Amnon Dekel, Niv Noach and Barak Schiller. (The Hebrew University Jerusalem, Israel).

## 6. Acknowledgment

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- [5] Henze, N., Broll, G., Rukzio, E., Rohs, M. *Mobile Interaction with the Real World: Workshop in conjunction with Mobile HCI 2008.* BIS-Vlg. ISBN 3814221346.