

Reiner Wichert Kristof Van Laerhoven
Jean Gelissen (Eds.)

Constructing Ambient Intelligence

AmI 2011 Workshops
Amsterdam, The Netherlands, November 16-18, 2011
Revised Selected Papers

 Springer

Volume Editors

Reiner Wichert
Fraunhofer IGD
Fraunhoferstr. 5
64283 Darmstadt, Germany
E-mail: reiner.wichert@igd.fraunhofer.de

Kristof Van Laerhoven
Technical University Darmstadt
Hochschulstr. 10
64289 Darmstadt, Germany
E-mail: kristof@ess.tu-darmstadt.de

Jean Gelissen
Philips Research
High Tech Campus 34 (5.058)
5656 AE Eindhoven, The Netherlands
E-mail: jean.gelissen@philips.com

ISSN 1865-0929
ISBN 978-3-642-31478-0
DOI 10.1007/978-3-642-31479-7
Springer Heidelberg Dordrecht London New York

e-ISSN 1865-0937
e-ISBN 978-3-642-31479-7

Library of Congress Control Number: Applied for

CR Subject Classification (1998): H.4, H.5, H.3, C.2, I.2, J.4

© Springer-Verlag Berlin Heidelberg 2012

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

This volume contains the refereed papers selected for the Workshop Proceedings of the International Joint Conference on Ambient Intelligence (AmI-11) held in Amsterdam in November 2011. The workshops provided a forum for scientists, researchers and engineers from both industry and academia to engage in discussion on newly emerging or rapidly evolving topics in the field of ambient intelligence (AmI). Ambient intelligence is the vision of our future environment where we will be surrounded by various kinds of interfaces supported by computing and networking technology, which will provide intelligent, seamless, and non-obtrusive assistance to humans. In this way, the environment is able to recognize the persons in it, to identify their individual needs, to learn from their behavior, and to act and react in their interest. This broad vision addresses all areas of human life, such as home, work, health care, travel and leisure activities. A great amount of interdisciplinary research will be required in order to achieve this vision.

Since this vision is influenced by many different concepts in information processing and combines multi-disciplinary fields in electrical engineering, computer science, industrial design, user interfaces, and cognitive sciences, considerable research is needed to provide new models of technological innovation within a multi-dimensional society. Thus the AmI vision relies on the large-scale integration of electronics into the environment, enabling the actors, i.e., people and objects, to interact with their surrounding in a seamless, trustworthy, and natural manner.

The Workshop Chairs reflected these unique characteristics of the AmI conference series in the call for workshop proposals using two corresponding measures: (1) by particularly soliciting workshops on in-depth topics to the above-mentioned ambient intelligence flavor of post-PC research and (2) by offering workshop threads for advanced topics. We established a careful review process in which we involved other members of the AmI-11 Organizing Committee and tried to resolve conflicts of overlapping. The large number of very positive responses as well as the large number of attendees (the combined workshops had almost the same number of attendees as the conference) reflect the great success of the event.

The nine accepted workshops turned out to be well distributed over the two threads. The first, WS1 “Aesthetic Intelligence: Designing Smart and Beautiful Architectural Spaces,” discussed the visual and perceptual possibilities that arise from the use of ambient intelligence technology. The focus of the workshop was on the relevance of beauty and aesthetic values for AmI.

Workshop WS2 entitled “Role of Ambient Intelligence in Future Lighting Systems” focused on LED-based artificial lighting. This workshop explored how the vision and principles of the AmI paradigm can be applied to future lighting

controls, where lighting is no longer only a functional on/off system, but a flexible system capable of creating a large range of functional/decoration and ambient light effects.

The workshop on “Interactive Human Behavior Analysis in Open or Public Spaces”, WS3, looked into open spaces where humans exhibit a much larger and interesting range of behaviors, from their interaction with the environment to the way they communicate with each other.

A further workshop theme was dedicated to “User Interaction Methods for Elderly, People with Dementia” in WS 4. It drew on existing developments in this field, ranging from end-user research to interaction development and evaluations.

WS5 “Empowering and Integrating Senior Citizens with Virtual Coaching” focused on the effects of virtual coaches on elderly users and how they can be used to improve the quality of life by aiding in planning daily life activities and mediating meaningful relationships to maintain and expand the social network of the elderly persons.

WS6 “Integration of AMI and AAL Platforms in the Future Internet (FI) Platform Initiative” discussed a new generation of the Internet of the Future, the Future Internet Privacy Public Partnership (FI-PPP), which has been established with help of the European Commission. This workshop focused on the challenges of integrating AMI and AAL platforms with this kind of platform.

“Ambient Gaming” was the focus of WS7 with the aim to create novel player experiences in games by taking inspiration from aspects of AmI and translating these into a gaming context. Various issues were discussed from different perspectives like game design, games research and technology.

WS8 “Human Behavior Understanding: Inducing Behavioral Change” dealt with the problem of modeling human behavior under its multiple facets, for example, expression of emotions, display of complex social and relational behaviors, performance of individual or joint actions.

“Privacy, Trust and Interaction in the Internet of Things” was addressed in workshop WS9. Special attention was given to whether and how experiences with privacy and trust from related areas can be applied to the IoT, where existing conceptualizations need to be extended or modified and where radically new concepts are required.

In conclusion, the valuable contributions compiled in this volume manifest the success and high scientific quality of the workshops within the AmI conference series. With the present proceedings we are all privileged to harvest the fruits of hard work in the preparation, realization and compilation of the workshops. We hope that they are considered by the readers as worthwhile and valuable to be used as a basis for future work.

Table of Contents

Aesthetic Intelligence: Designing Smart and Beautiful Architectural Spaces

Aesthetic Intelligence – Concepts, Technologies and Applications	1
<i>Kai Kasugai, Carsten Röcker, Daniela Plewe, Takashi Kiriyaama, and Virpi Oksman</i>	
Aesthetic Design of Interactive Museum Exhibits	5
<i>Takashi Kiriyaama and Masahiko Sato</i>	
Interactive Architecture in Domestic Spaces	12
<i>Carsten Röcker and Kai Kasugai</i>	
Towards Strategic Media	19
<i>Daniela Alina Plewe</i>	

Ambient Intelligence in Future Lighting Systems

The Role of Ambient Intelligence in Future Lighting Systems – Summary of the Workshop	25
<i>Bernt Meerbeek, Dzmityry Aliakseyeu, Jon Mason, Harm van Essen, and Serge Offermans</i>	
Results of the ‘User Interaction Techniques for Future Lighting Systems’ Workshop at INTERACT 2011	29
<i>Dzmityry Aliakseyeu, Jon Mason, Bernt Meerbeek, Harm van Essen, Serge Offermans, Andrea Alessandrini, Valentina Sanesi, Paulo Carreira, and Chad Eby</i>	
Illumination of Calendar Events in the Household of Older Persons	35
<i>Wilko Heuten and Susanne Boll</i>	
Dynamic Lighting as a Design Tool to Achieve Amenity in Open Space	41
<i>Aimilia Karamouzi, Dimitris Papalexopoulos, and Tasos Varoudis</i>	
On the Use of Mixed Reality Environments to Evaluate Interaction with Light	45
<i>Vassilis-Javed Khan, Martin Walker, Dzmityry Aliakseyeu, and Jon Mason</i>	
Improving the Mood of Elderly with Coloured Lighting	49
<i>Andre Kuijsters, Judith Redi, Boris de Ruyter, and Ingrid Heynderickx</i>	

Interacting with Light Apps and Platforms	57
<i>Serge Offermans, Harm van Essen, and Berry Eggen</i>	
Interacting with Light	63
<i>Alexander Wiethoff and Sven Gehring</i>	

Interactive Human Behavior Analysis in Open or Public Spaces

International Workshop on Interactive Human Behavior Analysis in Open or Public Spaces	68
<i>Hayley Hung, Jean-Marc Odobez, and Dariu Gavrilă</i>	
Look at Who’s Talking: Voice Activity Detection by Automated Gesture Analysis	72
<i>Marco Cristani, Anna Pesarin, Alessandro Vinciarelli, Marco Crocco, and Vittorio Murino</i>	
User Behaviour Captured by Mobile Phones	81
<i>Wouter B. Teeuw, Johan Koolwaaij, and Arjan Peddemors</i>	
Kinect Sensing of Shopping Related Actions	91
<i>Mirela Popa, Alper Kemal Koc, Leon J.M. Rothkrantz, Cai Feng Shan, and Pascal Wiggers</i>	
A Feature Set Evaluation for Activity Recognition with Body-Worn Inertial Sensors	101
<i>Syed Agha Muhammad, Bernd Niklas Klein, Kristof Van Laerhoven, and Klaus David</i>	
Person Detection for Indoor Videosurveillance Using Spatio-temporal Integral Features	110
<i>Adrien Descamps, Cyril Carincotte, and Bernard Gosselin</i>	
Person Authentication and Activities Analysis in an Office Environment Using a Sensor Network	119
<i>Shuai Tao, Mineichi Kudo, Hidetoshi Nonaka, and Jun Toyama</i>	
Using Human Motion Intensity as Input for Urban Design	128
<i>Esben S. Poulsen, Hans J. Andersen, Rikke Gade, Ole B. Jensen, and Thomas B. Moeslund</i>	

User Interaction Methods for Elderly, People With Dementia

Sensor Based Monitoring for People with Dementia: Searching for Movement Markers in Alzheimer’s Disease for a Early Diagnostic	137
<i>Andre Hoffmeyer, Kristina Yordanova, Stefan Teipel, and Thomas Kirste</i>	

Functional Requirements for Assistive Technology for People with Cognitive Impairments and Dementia	146
<i>F.J.M. Meiland, M.E. de Boer, J. van Hoof, J. van der Leeuw, L. de Witte, M. Blom, I. Karkowski, M.D. Mulvenna, and R.M. Dröes</i>	
Concept and Realization of an Individual Reminder Service for People Suffering from Dementia	152
<i>Holger Storf, Mario Schmitt, Taslim Arif, Wolfgang Putz, Michael Eisenbarth, and Özgür Ünalán</i>	
Graphical User Interface for an Elderly Person with Dementia	157
<i>Christian Tamanini, Martin Majewski, Andreas Wieland, Christian Schlehüser, and Felix Kamieth</i>	
Empowering and Integrating Senior Citizens with Virtual Coaching	
Empowering and Integrating Senior Citizens with Virtual Coaching (Workshop Summary)	162
<i>Andreas Braun, Peter H.M.P. Roelofsma, Dieter Ferring, and Milla Immonen</i>	
Technology and Aging: Inhibiting and Facilitating Factors in ICT Use	166
<i>Anja Leist and Dieter Ferring</i>	
How Older Adults Experience Wellness Monitoring?	170
<i>Salla Muuraiskangas, Jaana Kokko, and Marja Harjumaa</i>	
How Avatar Based Communication Can Improve Decision Making Quality	175
<i>Peter H.M.P. Roelofsma</i>	
Preference for Combining or Separating Events in Human and Avatar Decisions	181
<i>Peter H.M.P. Roelofsma and Leo Versteeg</i>	
Dynamic User Representation in Video Phone Applications	184
<i>Andreas Braun and Reiner Wichert</i>	
Sex Differences in User Acceptance of Avatars	189
<i>Leo Versteeg and Peter H.M.P. Roelofsma</i>	
User-Centered Design for and with Elderly Users in V2me	192
<i>Kerstin Klauß and Peter Klein</i>	

Development of a Socio-technical System for an Age-Appropriate Domestic Environment 196
Daniel Tantinger, Sven Feilner, Matthias Struck, and Christian Weigand

Using Technology for Improving the Social and Physical Activity-Level of the Older Adults 201
Milla Immonen, Anna Sachinopoulou, Jouni Kaartinen, and Antti Konttila

Integration of AMI and AAL Platforms in the Future Internet (FI) Platform Initiative

Workshop: Integration of AMI and AAL Platforms in the Future Internet (FI) Platform Initiative 206
Antonio Kung, Francesco Furfari, Mohammad-Reza Tazari, Atta Badii, and Petra Turkama

Ambient Gaming

Ambient Gaming and Play: Opportunities and Challenges 213
Janienke Sturm and Ben Schouten

Around Play and Interaction Design Research 218
Vanessa De Luca, Maresa Bertolo, and Michele Zannoni

Gaming for Therapy in a Healthcare Smart Ambient 224
Rui Neves Madeira, Octavian Postolache, and Nuno Correia

Evocative Experiences in the Design of Objects to Encourage Free-Play 229
Andrea Rosales, Ernesto Arroyo, and Josep Blat

Playful Moments of Activity 233
Rob Tieben, Janienke Sturm, Tilde Bekker, and Ben Schouten

i-PE: A Decentralized Approach for Designing Adaptive and Persuasive Intelligent Play Environments 238
Pepijn Rijnbout, Linda de Valk, Mark de Graaf, Tilde Bekker, Ben Schouten, and Berry Eggen

An Investigation of Extrinsic-Oriented Ambient Exploration for Gaming Applications 245
Radu-Daniel Vatavu and Ionuț-Alexandru Zaiți

Human Behavior Understanding: Inducing Behavioral Change

Challenges of Human Behavior Understanding for Inducing Behavioral Change	249
<i>Albert Ali Salah and Bruno Lepri</i>	
Human Behavior Understanding for Inducing Behavioral Change: Social and Theoretical Aspects	252
<i>Bruno Lepri, Albert Ali Salah, Fabio Pianesi, and Alex Sandy Pentland</i>	

Privacy, Trust and Interaction in the Internet of Things

Privacy, Trust and Interaction in the Internet of Things	264
<i>Johann Schrammel, Christina Hochleitner, and Manfred Tscheligi</i>	
On the Internet of Things, Trust is Relative	267
<i>Lothar Fritsch, Arne-Kristian Groven, and Trenton Schulz</i>	
How Will Software Engineers of the Internet of Things Reason about Trust?	274
<i>Andrew J.B. Fugard, Elke Beck, and Magdalena Gärtner</i>	
Privacy Implications of the Internet of Things	280
<i>Ivan Gudymenko, Katrin Borcea-Pfitzmann, and Katja Tietze</i>	
In Things We Trust? Towards Trustability in the Internet of Things (Extended Abstract)	287
<i>Jaap-Henk Hoepman</i>	
Privacy in Pervasive Social Networks	296
<i>Olf Mabrouki, Abdelghani Chibani, and Yacine Amirat</i>	

Doctoral Colloquium

Self-adaptive Architectures of Building Management Systems: Approaches, Methods, Algorithms	302
<i>Aliaksei Andrushevich, Ralf Salomon, and Alexander Klapproth</i>	
A Pattern Language of Firefighting Frontline Practice to Inform the Design of Ubiquitous Computing	308
<i>Sebastian Deneff</i>	
Understanding Total Hip Replacement Recovery towards the Design of a Context-Aware System	313
<i>Juan Jimenez Garcia</i>	

Model-Based Evaluation of Adaptive User Interfaces.....	318
<i>Michael Quade</i>	
Supporting Behavior Change in Cooperative Driving	323
<i>Qonita Shahab</i>	
Author Index	329