

Commenced Publication in 1973

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison

Lancaster University, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Alfred Kobsa

University of California, Irvine, CA, USA

Friedemann Mattern

ETH Zurich, Switzerland

John C. Mitchell

Stanford University, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

Oscar Nierstrasz

University of Bern, Switzerland

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

TU Dortmund University, Germany

Madhu Sudan

Microsoft Research, Cambridge, MA, USA

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Gerhard Weikum

Max Planck Institute for Informatics, Saarbruecken, Germany

Fabio Paternò Boris de Ruyter
Panos Markopoulos Carmen Santoro
Evert van Loenen Kris Luyten (Eds.)

Ambient Intelligence

Third International Joint Conference, AmI 2012
Pisa, Italy, November 13-15, 2012
Proceedings

Volume Editors

Fabio Paternò
CNR-ISTI, Pisa, Italy
E-mail: fabio.paterno@isti.cnr.it

Boris de Ruyter
Philips Research, Eindhoven, The Netherlands
E-mail: boris.de.ruyter@philips.com

Panos Markopoulos
Eindhoven University of Technology, The Netherlands
E-mail: p.markopoulos@tue.nl

Carmen Santoro
CNR-ISTI, Pisa, Italy
E-mail: carmen.santoro@isti.cnr.it

Evert van Loenen
Philips Research, Eindhoven, The Netherlands
E-mail: evert.van.loenen@philips.com

Kris Luyten
Hasselt University, Diepenbeek, Belgium
E-mail: kris.luyten@uhasselt.be

ISSN 0302-9743
ISBN 978-3-642-34897-6
DOI 10.1007/978-3-642-34898-3
Springer Heidelberg Dordrecht London New York

e-ISSN 1611-3349
e-ISBN 978-3-642-34898-3

Library of Congress Control Number: 2012951487

CR Subject Classification (1998): I.2, H.4, H.3, C.2.4, H.5, I.2.11, K.4

LNCS Sublibrary: SL 3 – Information Systems and Application, incl. Internet/Web and HCI

© 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 papers and posters selected for presentation at the International Joint Conference on Ambient Intelligence (AmI 2012) held in Pisa in November 2012.

The vision of ambient intelligence is to provide environments enhanced by intelligent interfaces supported by computing and networking technology embedded in everyday objects, and which enable users to interact with their surroundings in a seamless manner.

More specifically, such environments should result in systems that are aware of the characteristics of users, recognize their needs, learn from their behavior, and are able to intelligently and even proactively act in order to support humans in achieving their goals. Ambient intelligence should also be unobtrusive – interaction should be natural and engaging for the users.

From a scientific point of view, ambient intelligence (AmI) comprises a multi-disciplinary approach covering fields such as computer science, human computer interaction, electrical engineering, industrial design, behavioral sciences, aimed at enriching physical environments with a network of distributed devices, such as sensors, actuators, and computational resources, in order to support users in their everyday activities.

From a technological perspective, AmI represents the convergence of recent achievements in ubiquitous and communication technologies, pervasive computing, intelligent user interfaces and artificial intelligence, just to name a few.

This conference started as the European Symposium on Ambient Intelligence in 2003, and has grown to an annual international event that brings together researchers and serves as a forum to discuss the latest trends and developments in this field.

These AmI 12 proceedings include the latest research into technologies and applications that enable and validate the deployment of the AmI vision.

This year the program contained 18 full papers carefully chosen from a total of 47 submissions (38% acceptance rate). There were also five short papers accepted out of 14 (acceptance rate 36%). All papers were reviewed in a double-blind review process. For some papers this included a conditional acceptance step which required further revisions finally checked by reviewers and Chairs. In addition, the program included five landscape papers (papers that brainstorm on the future evolution of AmI), ten posters, and two demos.

The competition for paper acceptance was strong and final selection was difficult. The published material originates from 27 countries, including Africa, Australia, North and Central America, Japan, Saudi Arabia, Singapore, and Europe.

Each paper had at least two independent reviews from reviewers who were matched by expertise area to the topic of each paper. The Chairs handled borderline cases, and requested additional reviews when needed.

In addition to the main conference, seven workshops were held prior to the main AmI 2012 event, and stimulated interesting discussions on specific relevant topics.

A special thanks goes to the dedicated work of the 54 Program Committee members involved in the review panel who came from Europe and North America, thus reflecting the international spirit of AmI participation. Their names are listed in the conference proceedings and on the website.

We would also like to express our gratitude to ACM SIGCHI, Interaction-design.org, SIGCHI Italy, IFIP WG 2.7/13.4 for their help in creating interest in the conference.

Finally, we would like to thank the conference Organizing Committee for their dedicated support, as well as the paper presenters and conference participants who contributed to the vibrant discussions, presentations, and workshops held at AmI 2012.

Fabio Paternò
Boris de Ruyter
Panos Markopoulos
Carmen Santoro
Evert van Loenen
Kris Luyten

Organization

The 6th European Conference on Ambient Intelligence, AmI 2012, was held in Pisa, Italy.

General Chairs

Fabio Paternò
Boris de Ruyter

CNR-ISTI, HIIS Laboratory, Italy
Philips Research Europe, The Netherlands

Full Papers

Panos Markopoulos

Eindhoven University of Technology,
The Netherlands

Carmen Santoro

CNR-ISTI, HIIS Laboratory, Italy

Short Papers

Evert van Loenen
Kris Luyten

Philips Research Europe, The Netherlands
Hasselt University, Expertise Centre for Digital
Media, Belgium

Landscapes

Adrian David Cheok

Mixed Reality Lab, National University of
Singapore

Posters

Davy Preuveneers
Davide Spano

University of Leuven, Belgium
CNR-ISTI, HIIS Laboratory, Italy

Demos

Giuseppe Ghiani
Giulio Mori

CNR-ISTI, HIIS Laboratory, Italy
CNR-ISTI, HIIS Laboratory, Italy

Workshops

Gerrit Meixner
Ben Schouten

DFKI, Germany
Eindhoven University of Technology,
The Netherlands

Doctoral Consortium

Manfred Tscheligi	University of Salzburg, Austria
Volker Wulf	University of Siegen and Fraunhofer-FIT, Germany

Local Organization

Giulio Galesi	CNR-ISTI, HIIS Laboratory, Italy
---------------	----------------------------------

Program Committee

Emile Aarts	Philips Research, The Netherlands
Julio Abascal	University of the Basque Country, Spain
Ville Antila	VTT, Finland
Carmelo Ardito	University of Bari, Italy
Juan Carlos Augusto	University of Ulster, UK
Yolande Berbers	University of Leuven, Belgium
Regina Bernhaupt	Ruwido, Austria
Gerald Bieber	Fraunhofer IGD-R, Germany
Oliver Brdiczka	Palo Alto Research Center, CA, USA
Gaelle Calvary	LIG-IIHM, University of Grenoble, France
Javier Caminero	Telefónica I D, Spain
Luis Carriço	Universidade de Lisboa, Portugal
Stefano Chessa	University of Pisa, Italy
Karin Coninx	University of Hasselt, Belgium
Marco de Sa	Yahoo! Research, CA, USA
Monica Divitini	NTNU, Norway
Jose Carlos Dos Santos Danado	CNR-ISTI, HIIS Laboratory, Italy
Morten Fjeld	Chalmers University of Technology, Sweden
Jacqueline Floch	SINTEF, Norway
Mathias Funk	TU Eindhoven, The Netherlands
Francesco Furfari	CNR-ISTI, Italy
Luciano Gamberini	University of Padova, Italy
Maurits Clemens Kaptein	TU Eindhoven, The Netherlands
Fahim Kawsar	Alcatel-Lucent, Belgium
Javed Vassilis Khan	Breda University, The Netherlands
Gerd Kortuem	The Open University, UK
Vassilis Kostakos	University of Oulu, Finland
Kyriakos Kritikos	FORTH-ICS, Greece
Ben Krose	University of Amsterdam, The Netherlands
Brian Lim	Carnegie Mellon University, PA, USA
Alexander Meschtscherjakov	University of Salzburg, Austria
Vittorio Miori	CNR-ISTI, Italy
Michael Nebeling	ETH Zurich, Switzerland
Laurence Nigay	LIG-IIHM, University of Grenoble, France

Zeljko Obrenovic	Eindhoven University of Technology, The Netherlands
Philippe Palanque	IRIT, France
Volkmar Pipek	University of Siegen, Germany
Davy Preuveneers	University of Leuven, Belgium
Aaron Quigley	The University of St. Andrews, UK
Joerg Rett	SAP Research Center Darmstadt, Germany
Enrico Rukzio	Ulm University, Germany
Albert Ali Salah	Bogazici University, Turkey
Thomas Schlegel	TU Dresden, Germany
Dirk Schnelle-Walka	TU Darmstadt, Germany
Johannes Schöning	DFKI, Germany
Ahmed Seffah	UTT, France
Kostas Stathis	Royal Holloway University of London, UK
Gunnar Stevens	University of Siegen, Germany
Manfred Tscheligi	University of Salzburg, Austria
Kaisa Väänänen-Vainio-Mattila	Tampere University of Technology, Finland
Kristof Van Laerhoven	TU Darmstadt, Germany
Jo Vermeulen	University of Hasselt, Belgium
Reiner Wichert	IGD Fraunhofer, Germany
Massimo Zancanaro	Fondazione Bruno Kessler, Italy

Table of Contents

Long Papers

Context-Based Fall Detection Using Inertial and Location Sensors	1
<i>Hristijan Gjoreski, Mitja Luštrek, and Matjaž Gams</i>	
Enhancing Accelerometer-Based Activity Recognition with Capacitive Proximity Sensing	17
<i>Tobias Grosse-Puppenthal, Eugen Berlin, and Marko Borazio</i>	
Adaptive User Interfaces for Smart Environments with the Support of Model-Based Languages	33
<i>Sara Bongartz, Yucheng Jin, Fabio Paternò, Joerg Rett, Carmen Santoro, and Lucio Davide Spano</i>	
Back of the Steering Wheel Interaction: The Car Braille Keyer	49
<i>Sebastian Osswald, Alexander Meschtscherjakov, Nicole Mirnig, Karl-Armin Kraessig, David Wilfinger, Martin Murer, and Manfred Tscheligi</i>	
PermissionWatcher: Creating User Awareness of Application Permissions in Mobile Systems	65
<i>Eric Struse, Julian Seifert, Sebastian Üllenbeck, Enrico Rukzio, and Christopher Wolf</i>	
Exploring Non-verbal Communication of Presence between Young Children and Their Parents through the Embodied Teddy Bear	81
<i>Kaisa Väänänen-Vainio-Mattila, Tomi Haustola, Jonna Häkkinä, Minna Karukka, and Katja Kytökorpi</i>	
Automatic Behavior Understanding in Crisis Response Control Rooms	97
<i>Joris Ijsselmuiden, Ann-Kristin Grosselfinger, David Münch, Michael Arens, and Rainer Stiefelwagen</i>	
Combining Implicit and Explicit Methods for the Evaluation of an Ambient Persuasive Factory Display	113
<i>Ewald Strasser, Astrid Weiss, Thomas Grill, Sebastian Osswald, and Manfred Tscheligi</i>	
Context Awareness in Ambient Systems by an Adaptive Multi-Agent Approach	129
<i>Valérien Guivarch, Valérie Camps, and André Péninou</i>	

Towards Fuzzy Transfer Learning for Intelligent Environments	145
<i>Jethro Shell and Simon Coupland</i>	
Gesture Profile for Web Services: An Event-Driven Architecture to Support Gestural Interfaces for Smart Environments	161
<i>Radu-Daniel Vatavu, Cătălin-Marian Chera, and Wei-Tek Tsai</i>	
Using Markov Logic Network for On-Line Activity Recognition from Non-visual Home Automation Sensors	177
<i>Pedro Chahuara, Anthony Fleury, François Portet, and Michel Vacher</i>	
Multi-Classifer Adaptive Training: Specialising an Activity Recognition Classifier Using Semi-supervised Learning	193
<i>Božidara Cvetković, Boštjan Kaluža, Mitja Luštrek, and Matjaž Gams</i>	
Sound Environment Analysis in Smart Home	208
<i>Mohamed A. Sehili, Benjamin Lecouteux, Michel Vacher, François Portet, Dan Istrate, Bernadette Dorizzi, and Jérôme Boudy</i>	
Contextual Wizard of Oz: A Framework Combining Contextual Rapid Prototyping and the Wizard of Oz Method	224
<i>Doris Zachhuber, Thomas Grill, Ondrej Polacek, and Manfred Tscheligi</i>	
Recognizing the User Social Attitude in Multimodal Interaction in Smart Environments	240
<i>Berardina De Carolis, Stefano Ferilli, and Nicole Novielli</i>	
Evolutionary Feature Extraction to Infer Behavioral Patterns in Ambient Intelligence	256
<i>Leila S. Shafit, Pablo A. Haya, Manuel García-Herranz, and Eduardo Pérez</i>	
Personalization of Content on Public Displays Driven by the Recognition of Group Context	272
<i>Ekaterina Kurdyukova, Stephan Hammer, and Elisabeth André</i>	

Short Papers

Towards the Generation of Assistive User Interfaces for Smart Meeting Rooms Based on Activity Patterns	288
<i>Michael Zaki and Peter Forbrig</i>	
Reducing Dementia Related Wandering Behaviour with an Interactive Wall	296
<i>Saskia Robben, Kyra Bergman, Sven Haitjema, Yannick de Lange, and Ben Kröse</i>	

Gesture Based Semantic Service Invocation for Human Environment Interaction	304
<i>Carsten Stockl�w and Reiner Wichert</i>	
Understanding Complex Environments with the Feedforward Torch	312
<i>Jo Vermeulen, Kris Luyten, and Karin Coninx</i>	
Open Objects for Ambient Intelligence	320
<i>Paulo Ricca and Kostas Stathis</i>	

Landscape Papers

Towards Accessibility in Ambient Intelligence Environments	328
<i>George Margetis, Margherita Antona, Stavroula Ntoa, and Constantine Stephanidis</i>	
INCOME – Multi-scale Context Management for the Internet of Things	338
<i>Jean-Paul Arcangeli, Amel Bouzeghoub, Val�rie Camps, Marie-Fran�oise Canut, Sophie Chabridon, Denis Conan, Thierry Desprats, Romain Laborde, Emmanuel Lavinal, S�bastien L�riche, Herv� Maurel, Andr� P�ninou, Chantal Taconet, and Pascale Zarat�</i>	
New Forms of Work Assistance by Ambient Intelligence: Overview of the Focal Research Topic of BAuA	348
<i>Armin Windel and Matthias Hartwig</i>	
Living Labs as Educational Tool for Ambient Intelligence	356
<i>Ben Kr�se, Mettina Veenstra, Saskia Robben, and Marije Kanis</i>	
Intel Collaborative Research Institute - Sustainable Connected Cities . . .	364
<i>Johannes Sch�ning, Yvonne Rogers, Jon Bird, Licia Capra, Julie A. McCann, David Prendergast, and Charles Sheridan</i>	

Poster Papers

IE Sim – A Flexible Tool for the Simulation of Data Generated within Intelligent Environments	373
<i>Jonathan Synnott, Liming Chen, Chris Nugent, and George Moore</i>	
Intention Recognition with Clustering	379
<i>Fariba Sadri, Weikun Wang, and Afroditi Xafi</i>	
Behavior Modeling and Recognition Methods to Facilitate Transitions between Application-Specific Personalized Assistance Systems	385
<i>Arun Ramakrishnan, Zubair Bhatti, Davy Preuveneers, Yolande Berbers, Aliaksei Andrushevich, Rolf Kistler, and Alexander Klapproth</i>	

<i>LumaFluid: A Responsive Environment to Stimulate Social Interaction in Public Spaces</i>	391
<i>Gianluca Monaci, Tommaso Gritti, Martine van Beers, Ad Vermeulen, Bram Nab, Inge Thomassen, Marigo Heijboer, Sandra Suijkerbuijk, Wouter Walmink, and Maarten Hendriks</i>	
A Cost-Based Model for Service Discovery in Smart Environments	397
<i>Michele Girolami, Francesco Furfari, and Stefano Chessa</i>	
On the Use of Video Prototyping in Designing Ambient User Experiences	403
<i>Nikolaos Batalas, Hester Bruikman, Annemiek Van Drunen, He Huang, Dominika Turzynska, Vanessa Vakili, Natalia Voynarovskaya, and Panos Markopoulos</i>	
Automatic Power-Off for Binaural Hearing Instruments	409
<i>Bernd Tessendorf, Peter Derleth, Manuela Feilner, Daniel Roggen, Thomas Stiefmeier, and Gerhard Tröster</i>	
Proposal and Demonstration of Equipment Operated by Blinking	415
<i>Masaki Kato, Tatsuya Kobori, Takayuki Suzuki, Shigenori Ioroi, and Hiroshi Tanaka</i>	
CASi – A Generic Context Awareness Simulator for Ambient Systems	421
<i>Jörg Cassens, Felix Schmitt, Tobias Mende, and Michael Herczeg</i>	
A Conceptual Framework for Supporting Adaptive Personalized Help-on-Demand Services	427
<i>William Burns, Liming Chen, Chris Nugent, Mark Donnelly, Kerry-Louise Skillen, and Ivar Solheim</i>	
Demo Papers	
Developing Touchless Interfaces with GestIT	433
<i>Lucio Davide Spano</i>	
Tool Support for Probabilistic Intention Recognition Using Plan Synthesis	439
<i>Frank Krüger, Kristina Yordanova, and Thomas Kirste</i>	
Workshops	
Aesthetic Intelligence: The Role of Design in Ambient Intelligence	445
<i>Carsten Röcker, Kai Kasugai, Daniela Plewe, Takashi Kiriyaama, and Artur Lugmayr</i>	

Workshop on Ambient Intelligence Infrastructures (WAmIi)	447
<i>Alina Weffers, Johan Lukkien, and Tanir Ozcelebi</i>	
Sixth International Workshop on Human Aspects in Ambient Intelligence (HAI 2012)	449
<i>Juan Carlos Augusto, Tibor Bosse, Cristiano Castelfranchi, Diane Cook, Mark Neerincx, and Fariba Sadri</i>	
Context-Aware Adaptation of Service Front-Ends	451
<i>Francisco Javier Caminero Gil, Fabio Paternò, and Jean Vanderdonckt</i>	
2nd International Workshop on Ambient Gaming	453
<i>Janienke Sturm, Pepijn Rijnbout, and Ben Schouten</i>	
Designing Persuasive Interactive Environments	455
<i>Marco Rozendaal, Aadjan van der Helm, Walter Aprile, Arnold Vermeeren, Tilde Bekker, Marije Kanis, and Wouter Middendorf</i>	
Applying AmI Technologies to Crisis Management	457
<i>Monica Divitini, Babak Farshchian, Jacqueline Floch, Ragnhild Halvorsrud, Simone Mora, and Michael Stiso</i>	
Author Index	459