

*Commenced Publication in 1973*

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

## Editorial Board

David Hutchison

*Lancaster University, Lancaster, UK*

Takeo Kanade

*Carnegie Mellon University, Pittsburgh, PA, USA*

Josef Kittler

*University of Surrey, Guildford, UK*

Jon M. Kleinberg

*Cornell University, Ithaca, NY, USA*

Friedemann Mattern

*ETH Zurich, Zürich, Switzerland*

John C. Mitchell

*Stanford University, Stanford, CA, USA*

Moni Naor

*Weizmann Institute of Science, Rehovot, Israel*

C. Pandu Rangan

*Indian Institute of Technology, Madras, India*

Bernhard Steffen

*TU Dortmund University, Dortmund, Germany*

Demetri Terzopoulos

*University of California, Los Angeles, CA, USA*

Doug Tygar

*University of California, Berkeley, CA, USA*

Gerhard Weikum

*Max Planck Institute for Informatics, Saarbrücken, Germany*

More information about this series at <http://www.springer.com/series/7409>

Julio Abascal · Simone Barbosa  
Mirko Fetter · Tom Gross  
Philippe Palanque · Marco Winckler (Eds.)

# Human-Computer Interaction – INTERACT 2015

15th IFIP TC 13 International Conference  
Bamberg, Germany, September 14–18, 2015  
Proceedings, Part I

*Editors*

Julio Abascal  
Universidad del País Vasco/Euskal Herriko  
Unibertsitatea  
Donostia-San Sebastián  
Spain

Simone Barbosa  
PUC-Rio  
Rio de Janeiro  
Brazil

Mirko Fetter  
University of Bamberg  
Bamberg  
Germany

Tom Gross  
University of Bamberg  
Bamberg  
Germany

Philippe Palanque  
University Paul Sabatier  
Toulouse  
France

Marco Winckler  
University Paul Sabatier  
Toulouse  
France

ISSN 0302-9743

Lecture Notes in Computer Science

ISBN 978-3-319-22700-9

DOI 10.1007/978-3-319-22701-6

ISSN 1611-3349 (electronic)

ISBN 978-3-319-22701-6 (eBook)

Library of Congress Control Number: 2015946321

LNCS Sublibrary: SL3 – Information Systems and Applications, incl. Internet/Web, and HCI

Springer Cham Heidelberg New York Dordrecht London

© IFIP International Federation for Information Processing 2015

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, 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.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

Springer International Publishing AG Switzerland is part of Springer Science+Business Media  
(www.springer.com)

# Foreword

The 15th IFIP TC.13 International Conference on Human–Computer Interaction, INTERACT 2015, was held during September 14–18, 2015, in Bamberg, Germany, organized by the University of Bamberg. The city of Bamberg is proud of its more than 1,000-year-old center. It has more than 2,400 historically listed buildings and became a UNESCO World Cultural Heritage Site in 1993. With 70,000 inhabitants, Bamberg is a small town in the heart of Europe.

The theme of the 2015 edition was “Connection, tradition, innovation.” In its relatively short history, the human–computer interaction (HCI) area has experienced impressive development. Theories, methodologies, procedures, guidelines, and tools have been progressively proposed, discussed, tested, and frequently adopted by academia and industry. The protagonists of this development created in a short period of time a scientific and technological tradition able to produce high-quality interaction systems. However, the evolution of the computers and networks pose new challenges to all stakeholders. Innovation, based on tradition, is the only way to face these challenges, even if innovation often requires breaking the tradition. In order to make this process possible, INTERACT 2015 provides diverse and abundant connection opportunities. A multidisciplinary approach is characteristic of the HCI field. INTERACT 2015 aimed to connect all the matters able to contribute to the quality of the future interactions among people and computers.

The series of INTERACT international conferences (started in 1984) is supported by Technical Committee 13 on Human–Computer Interaction of the International Federation for Information Processing (IFIP). This committee aims at developing the science and technology of the interaction between humans and computing devices.

IFIP was created in 1960 under the auspices of UNESCO with the aim of balancing worldwide the development of computer technology and Science. Technical Committee 13 is fully conscious of the social importance of information and communication technologies for our world, today and in the future. Therefore, INTERACT 2015 made efforts to attract and host people from all over the world, and to pay attention to the constraints imposed on HCI by differences in culture, language, technological availability, physical, as well as sensory and cognitive differences, among other dimensions of interest.

INTERACT 2015 gathered a stimulating collection of research papers and reports of development and practice that acknowledge the diverse disciplines, abilities, cultures, and societies, and that address all the aspects of HCI, including technical, human, social, and esthetic.

Like its predecessors, INTERACT 2015 aimed to be an exciting forum for communication with people of similar interests, to foster collaboration and learning. Being by nature a multidisciplinary field, HCI requires interaction and discussion among diverse people with different interests and backgrounds. INTERACT 2015 was directed both to the academic and industrial world, always highlighting the latest developments

in the discipline of HCI and its current applications. Experienced HCI researchers and professionals, as well as newcomers to the HCI field, interested in the design or evaluation of interactive software, development of new technologies for interaction, and research on general theories of HCI met in Bamberg.

We thank all the authors who chose INTERACT 2015 as the venue to publish their research. This was again an outstanding year for the conference in terms of submissions in all the technical categories.

We received 651 submissions. Of these, the following were accepted: 93 full research papers; 74 short research papers; eight demos; 30 interactive posters; four organizational overviews; three panels; six tutorials; 11 workshops; and 13 doctoral consortium papers.

The acceptance rate for the full papers was 29.6 % and 26.8 % for short papers.

In order to select the highest-quality contributions, an elaborate review system was organized including shepherding of 38 full research papers that went through a second and sometimes a third round of review. That process was primarily handled by the 32 meta-reviewers who willingly assisted and ensured the selection of high-quality full research papers to be presented at INTERACT 2015.

The final decision on acceptance or rejection of papers was taken in a plenary Program Committee meeting held in Tampere (Finland) in February 2015, aimed to discuss a consistent set of criteria to deal with inevitable differences among the large number of reviewers who were recruited and supported by the meta-reviewers. The technical program chairs and the track chairs, the general chairs, and the members of IFIP Technical Committee 13 participated in the meeting.

Special thanks must go to the track chairs and all the reviewers, who put in an enormous amount of work to ensure that quality criteria were maintained throughout the selection process. We also want to acknowledge the excellent work of the co-chairs of the different sections of the conference and the meta-reviewers of the full research paper track.

We also thank the members of the Organizing Committee, especially Mirko Fetter, local organization chair, who provided us with all the necessary resources to facilitate our work. Finally, we wish to express a special thank you to the proceedings publication chair, Marco Winckler, who did extraordinary work to put this volume together.

September 2015

Tom Gross  
Julio Abascal  
Simone Barbosa  
Philippe Palanque

## IFIP TC13

Established in 1989, the International Federation for Information Processing Technical Committee on Human–Computer Interaction (IFIP TC13) is an international committee of 37 national societies and nine working groups, representing specialists in human factors, ergonomics, cognitive science, computer science, design, and related disciplines. INTERACT is its flagship conference, staged biennially in different countries in the world. From 2017 the conference series will become an annual conference.

IFIP TC13 aims to develop the science and technology of human–computer interaction (HCI) by: encouraging empirical research, promoting the use of knowledge and methods from the human sciences in design and evaluation of computer systems; promoting better understanding of the relation between formal design methods and system usability and acceptability; developing guidelines, models, and methods by which designers may provide better human-oriented computer systems; and, cooperating with other groups, inside and outside IFIP, to promote user orientation and humanization in system design. Thus, TC13 seeks to improve interactions between people and computers, encourage the growth of HCI research and disseminate these benefits worldwide.

The main orientation is toward users, especially non-computer professional users, and how to improve human–computer relations. Areas of study include: the problems people have with computers; the impact on people in individual and organizational contexts; the determinants of utility, usability, and acceptability; the appropriate allocation of tasks between computers and users; modeling the user to aid better system design; and harmonizing the computer to user characteristics and needs.

While the scope is thus set wide, with a tendency toward general principles rather than particular systems, it is recognized that progress will only be achieved through both general studies to advance theoretical understanding and specific studies on practical issues (e.g., interface design standards, software system consistency, documentation, appropriateness of alternative communication media, human factors guidelines for dialogue design, the problems of integrating multimedia systems to match system needs and organizational practices, etc.).

In 1999, TC13 initiated a special IFIP Award, the Brian Shackel Award, for the most outstanding contribution in the form of a refereed paper submitted to and delivered at each INTERACT. The award draws attention to the need for a comprehensive human-centered approach in the design and use of information technology in which the human and social implications have been taken into account. 2007 IFIP TC 13 also launched an accessibility award to recognize an outstanding contribution with international impact in the field of accessibility for disabled users in HCI. In 2013, IFIP TC 13 launched the Interaction Design for International Development (IDID) Award, which recognizes the most outstanding contribution to the application of interactive systems for social and economic development of people in

developing countries. Since the process to decide the award takes place after papers are submitted for publication, the awards are not identified in the proceedings.

IFIP TC 13 also recognizes pioneers in the area of HCI. An IFIP TC 13 pioneer is one who, through active participation in IFIP Technical Committees or related IFIP groups, has made outstanding contributions to the educational, theoretical, technical, commercial, or professional aspects of analysis, design, construction, evaluation, and use of interactive systems. IFIP TC 13 pioneers are appointed annually and awards are handed over at the INTERACT conference.

IFIP TC13 stimulates working events and activities through its working groups (WGs). WGs consist of HCI experts from many countries, who seek to expand knowledge and find solutions to HCI issues and concerns within their domains, as outlined here.

WG13.1 (Education in HCI and HCI Curricula) aims to improve HCI education at all levels of higher education, coordinate and unite efforts to develop HCI curricula and promote HCI teaching.

WG13.2 (Methodology for User-Centered System Design) aims to foster research, dissemination of information and good practice in the methodical application of HCI to software engineering.

WG13.3 (HCI and Disability) aims to make HCI designers aware of the needs of people with disabilities and encourage development of information systems and tools permitting adaptation of interfaces to specific users.

WG13.4 (also WG2.7; User Interface Engineering) investigates the nature, concepts, and construction of user interfaces for software systems, using a framework for reasoning about interactive systems and an engineering model for developing user interfaces.

WG 13.5 (Resilience, Reliability, Safety, and Human Error in System Development) seeks a framework for studying human factors relating to systems failure, develops leading-edge techniques in hazard analysis and safety engineering of computer-based systems, and guides international accreditation activities for safety-critical systems.

WG13.6 (Human–Work Interaction Design) aims at establishing relationships between extensive empirical work-domain studies and HCI design. It will promote the use of knowledge, concepts, methods, and techniques that enable user studies to procure a better apprehension of the complex interplay between individual, social, and organizational contexts and thereby a better understanding of how and why people work in the ways that they do.

WG13.7 (Human–Computer Interaction and Visualization) aims to establish a study and research program that will combine both scientific work and practical applications in the fields of HCI and visualization. It will integrate several additional aspects of further research areas, such as scientific visualization, data mining, information design, computer graphics, cognition sciences, perception theory, or psychology, into this approach.

WG13.8 (Interaction Design and International Development) are currently working to reformulate their aims and scope.



WG13.9 (Interaction Design and Children) aims to support practitioners, regulators, and researchers to develop the study of interaction design and children across international contexts.

New Working Groups are formed as areas of significance to HCI arise. Further information is available on the IFIP TC13 website: <http://ifip-tc13.org/>

# IFIP TC13 Members

## Officers

### Chair

Jan Gulliksen, Sweden

### Vice-chair

Philippe Palanque, France

### Vice-Chair for WG and SIG

Simone D.J. Barbosa, Brazil

### Treasurer

Anirudha Joshi, India

### Secretary

Marco Winckler, France

### Webmaster

Helen Petrie, UK

## Country Representatives

### Australia

Henry B.L. Duh  
Australian Computer Society

### Austria

Geraldine Fitzpatrick  
Austrian Computer Society

### Belgium

Monique Noirhomme-Fraiture  
Fédération des Associations  
Informatiques de Belgique

### Brazil

Raquel Oliveira Prates  
Brazilian Computer Society (SBC)

### Bulgaria

Kamelia Stefanova  
Bulgarian Academy of Sciences

### Canada

Heather O'Brien  
Canadian Information Processing Society

### Chile

Jaime Sánchez  
Chilean Society of Computer Science

### Croatia

Andrina Granic  
Croatian Information Technology  
Association (CITA)

### Cyprus

Panayiotis Zaphiris  
Cyprus Computer Society

### Czech Republic

Zdeněk Mikovec  
Czech Society for Cybernetics &  
Informatics

### Denmark

Torkil Clemmensen  
Danish Federation for Information  
Processing

### Finland

Kari-Jouko Räihä  
Finnish Information Processing  
Association

### France

Philippe Palanque  
Société des Electriciens et des  
Electroniciciens (SEE)

### Germany

Tom Gross  
Gesellschaft für Informatik

### Hungary

Cecilia Sik Lanyi  
John V. Neumann Computer  
Society

**Iceland**

Marta Kristin Larusdottir  
The Icelandic Society for Information  
Processing (ISIP)

**India**

Anirudha Joshi  
Computer Society of India

**Ireland**

Liam J. Bannon  
Irish Computer Society

**Italy**

Fabio Paternò  
Italian Computer Society

**Japan**

Yoshifumi Kitamura  
Information Processing Society of Japan

**Korea**

Gerry Kim  
KIISE

**Malaysia**

Chui Yin Wong  
Malaysian National Computer  
Confederation

**The Netherlands**

Vanessa Evers  
Nederlands Genootschap voor  
Informatica

**New Zealand**

Mark Apperley  
New Zealand Computer Society

**Nigeria**

Chris C. Nwannenna  
Nigeria Computer Society

**Norway**

Dag Svanes  
Norwegian Computer Society

**Poland**

Marcin Sikorski  
Poland Academy of Sciences

**Portugal**

Pedro Campos  
Associação Portuguesa para o Desen-  
volvimento da Sociedade da Infor-  
mação (APDSI)

**Slovakia**

Vanda Benešová  
The Slovak Society for Computer  
Science

**South Africa**

Janet L. Wesson  
The Computer Society of South Africa

**Spain**

Julio Abascal  
Asociación de Técnicos de Informática  
(ATI)

**Sweden**

Jan Gulliksen  
Swedish Computer Society

**Switzerland**

Solange Ghernaoui  
Swiss Federation for Information  
Processing

**Tunisia**

Mona Laroussi  
Ecole Supérieure des Communications  
De Tunis (SUP'COM)

**UK**

Andy Dearden  
British Computer Society (BCS)

**USA**

Gerrit van der Veer  
Association for Computing Machinery  
(ACM)

## Expert Members

Nikos Avouris (Greece)  
Simone D.J. Barbosa (Brazil)  
Peter Forbrig (Germany)  
Joaquim Jorge (Portugal)  
Paula Kotzé (South Africa)  
Masaaki Kurosu (Japan)

Gitte Lindgaard (Australia)  
Zhengjie Liu (China)  
Fernando Loizides (Cyprus)  
Dan Orwa (Kenya)  
Frank Vetere (Australia)

## Working Group Chairs

### **WG13.1 (Education in HCI and HCI Curricula)**

Konrad Baumann, Austria

### **WG13.2 (Methodologies for User-Centered System Design)**

Marco Winckler, France

### **WG13.3 (HCI and Disability)**

Helen Petrie, UK

### **WG13.4 (also 2.7) (User Interface Engineering)**

Jürgen Ziegler, Germany

### **WG13.5 (Resilience, Reliability, Safety and Human Error in System Development)**

Chris Johnson, UK

### **WG13.6 (Human-Work Interaction Design)**

Pedro Campos, Portugal

### **WG13.7 (HCI and Visualization)**

Achim Ebert, Germany

### **WG 13.8 (Interaction Design and International Development)**

José Adbelnour Nocera, UK

### **WG 13.9 (Interaction Design and Children)**

Janet Read, UK

## Conference Organizing Committee

### General Conference Co-chairs

Tom Gross, Germany  
Julio Abascal, Spain

### Tutorials Co-chairs

Christoph Beckmann, Germany  
Regina Bernhaupt, France

### Full Papers Chairs

Simone D.J. Barbosa, Brazil  
Philippe Palanque, France

### Workshops Co-chairs

Christoph Beckmann, Germany  
Victor López-Jaquero, Spain

### Short Papers Co-chairs

Fabio Paternò, Italy  
Kari-Jouko Räihä, Finland

### Doctoral Consortium Co-chairs

Geraldine Fitzpatrick, Austria  
Panayiotis Zaphiris, Cyprus

### Posters and Demos Co-chairs

Stephen Brewster, UK  
David McGookin, UK

### Proceedings Chair

Marco Winckler, France

### Organization Overviews Co-chairs

Melanie Fitzgerald, USA  
Kori Inkpen, USA

### Madness Co-chairs

Artur Lugmayr, Finland  
Björn Stockleben, Germany  
Tim Merritt, Denmark

### Panels Co-chairs

Anirudha N. Joshi, India  
Gitte Lindgaard, Australia

### Local Organization Co-chairs

Mirko Fetter, Germany  
Claudia Tischler, Germany

### Open Space Co-chairs

Christoph Beckmann, Germany  
Achim Ebert, Germany

### Student Volunteers Co-chairs

Robert Beaton, USA  
Sascha Herr, Germany

## Program Committee

### Meta-reviewers

Birgit Bomsdorf, Germany  
Gaëlle Calvary, France  
José Campos, Portugal  
Pedro Campos, Portugal  
Luca Chittaro, Italy

Torkil Clemmensen, Denmark  
Paul Curzon, UK  
Achim Ebert, Germany  
Peter Forbrig, Germany  
Michael Harrison, UK

Anirudha Joshi, India  
 Denis Lalanne, Switzerland  
 Effie Law, UK  
 Célia Martinie, France  
 Laurence Nigay, France  
 Monique Noirhomme, Belgium  
 Fabio Paternò, Italy  
 Helen Petrie, UK  
 Antonio Piccinno, Italy  
 Aaron Quigley, UK  
 Kari-Jouko Rähkä, Finland  
 Virpi Roto, Finland

Luciana Salgado Cardoso de Castro,  
 Brazil  
 Paula Alexandra Silva, Ireland  
 Frank Steinicke, Germany  
 Simone Stumpf, UK  
 Allistair Sutcliffe, UK  
 Jean Vanderdonckt, Belgium  
 Gerhard Weber, Germany  
 Astrid Weiss, Austria  
 Marco Winckler, France  
 Panayiotis Zaphiris, Cyprus

## Reviewers

José Abdelnour-Nocera, UK  
 Al Mahmud Abdullah, Australia  
 Silvia Abrahão, Spain  
 Funmi Adebisin, South Africa  
 Ana Paula Afonso, Portugal  
 David Ahlström, Austria  
 Pierre Akiki, Lebanon  
 Deepak Akkil, Finland  
 Hannu Alen, Finland  
 Jan Alexandersson, Germany  
 José Carlos Bacelar Almeida, Portugal  
 Florian Alt, Germany  
 Julian Alvarez, France  
 Junia Coutinho Anacleto, Brazil  
 Leonardo Angelini, Switzerland  
 Craig Anslow, New Zealand  
 Mark Apperley, New Zealand  
 Nathalie Aquino, Paraguay  
 Liliana Ardissono, Italy  
 Carmelo Ardito, Italy  
 Oscar Javier Ariza Núñez, Germany  
 Myriam Arrue, Spain  
 İlhan Aslan, Austria  
 Simon Atfield, UK  
 Nikolaos Avouris, Greece  
 Chris Baber, UK  
 Myroslav Bachynskiy, Germany  
 Jonathan Back, UK  
 Gilles Bailly, France  
 Liam Bannon, Ireland

Emilia Barakova, The Netherlands  
 Javier Barcenila, France  
 Louise Barkhuus, USA  
 Barbara Rita Barricelli, Italy  
 Valentina Bartalesi, Italy  
 Mohammed Basher, Saudi Arabia  
 Christoph Beckmann, Germany  
 Yacine Bellik, France  
 Vanda Benešová, Slovak Republic  
 Kawtar Benghazi, Spain  
 David Benyon, UK  
 François Bérard, France  
 Regina Bernhaupt, Austria  
 Karsten Berns, Germany  
 Nadia Berthouze, UK  
 Raymond Bertram, Finland  
 Mark Billingham, New Zealand  
 Dorrit Billman, USA  
 Silvia Amelia Bim, Brazil  
 Fernando Birra, Portugal  
 Renaud Blanch, France  
 Ann Blandford, UK  
 Mads Boedker, Denmark  
 Davide Bolchini, USA  
 Birgit Bomsdorf, Germany  
 Rodrigo Bonacin, Brazil  
 Paolo Gaspare Bottoni, Italy  
 Fatma Bouali, France  
 Chris Bowers, UK  
 Giorgio Brajnik, Italy

Anke Brock, France  
Barry Brown, Sweden  
Judith Brown, Canada  
Gerd Bruder, Germany  
Duncan Brumby, UK  
Nick Bryan-Kinns, UK  
Stéphanie Buisine, France  
Sabin-Corneliu Buraga, Romania  
Paris Buttfield-Addison, Australia  
Maria Claudia Buzzi, Italy  
Marina Buzzi, Italy  
Cristina Cachero, Spain  
Sybille Caffiau, France  
Paul Cairns, UK  
Roberto Caldara, Switzerland  
Gaëlle Calvary, France  
Licia Calvi, The Netherlands  
José Campos, Portugal  
Pedro Campos, Portugal  
Katia Canepa Vega, Brazil  
Maria-Dolores Cano, Spain  
Maria Beatriz Carmo, Portugal  
Francesco Carrino, Switzerland  
Stefano Carrino, Switzerland  
Luis Carriço, Portugal  
Marcus Carter, Australia  
Daniel Cernea, Germany  
Teresa Chambel, Portugal  
Stéphane Chatty, France  
Monchu Chen, Portugal  
Yu Chen, Switzerland  
Kelvin Cheng, Singapore  
Yoram Chisik, Portugal  
Luca Chittaro, Italy  
Elizabeth Churchill, USA  
Torkil Clemmensen, Denmark  
Gilbert Cockton, UK  
Karin Coninx, Belgium  
Tayana Conte, Brazil  
Stéphane Conversy, France  
Jeremy Cooperstock, Canada  
Nuno Correia, Portugal  
Joëlle Coutaz, France  
Céline Coutrix, France  
Nadine Couture, France  
Chris Creed, UK

Martin Cronel, France  
James Crowley, France  
Jácome Cunha, Portugal  
Paul Curzon, UK  
Marie d'Udekem, Belgium  
Florian Daiber, Germany  
Girish Dalvi, India  
José Danado, UK  
Antonella De Angeli, Italy  
Alexander De Luca, Switzerland  
Maria De Marsico, Italy  
Giorgio De Michelis, Italy  
Leonardo Cunha de Miranda, Brazil  
Boris De Ruyter, The Netherlands  
Clarisse de Souza, Brazil  
Alexandre Demeure, France  
Giuseppe Desolda, Italy  
Ines Di Loreto, France  
Paulo Dias, Portugal  
Shalaka Dighe, India  
Christian Dindler, Denmark  
Anke Dittmar, Germany  
Pierre Dragicevic, France  
Carlos Duarte, Portugal  
Cathy Dudek, Canada  
Henry Been-Lirn Duh, Australia  
Bruno Dumas, Belgium  
Sophie Dupuy-Chessa, France  
Achim Ebert, Germany  
Florian Ehtler, Germany  
Rob Edlin-White, UK  
Jan Engelen, Belgium  
Thomas Erickson, USA  
Elina Eriksson, Sweden  
Dominik Ertl, UK  
Parisa Eslambolchilar, UK  
Marc Fabri, UK  
Carla Faria Leitão, Brazil  
Ava Fatah gen Schieck, UK  
Xavier Ferre, Spain  
Eija Ferreira, Finland  
Mirko Fetter, Germany  
Sebastian Feuerstack, Germany  
Vagner Figueredo de Santana, Brazil  
Daniela Fogli, Italy  
Joan Fons, Spain

Manuel Fonseca, Portugal  
Peter Forbrig, Germany  
Marcus Foth, Australia  
Andre Freire, Brazil  
Carla D.S. Freitas, Brazil  
Jonas Fritsch, Denmark  
Luca Frosini, Italy  
Dominic Furniss, UK  
Nestor Garay-Vitoria, Spain  
J r mie Garcia, France  
Roberto Garc a, Spain  
Jose Luis Garrido, Spain  
Franca Garzotto, Italy  
Isabela Gasparini, Brazil  
Miguel Gea, Spain  
Patrick Gebhard, Germany  
Cristina Gena, Italy  
Giuseppe Ghiani, Italy  
Patrick Girard, France  
Kentaro Go, Japan  
Daniel Gonalves, Portugal  
R ben Gouveia, Portugal  
Nicholas Graham, Canada  
Andrina Granic, Croatia  
Toni Granollers, Spain  
Saul Greenberg, Canada  
John Grundy, Australia  
Nuno Guimaraes, Portugal  
Jan Gulliksen, Sweden  
Rebecca Gulotta, USA  
Mieke Haesen, Belgium  
Hans Hagen, Germany  
Jonna H kkil , Finland  
Jukka H kkinen, Finland  
Jaakko Hakulinen, Finland  
Lynne Hall, UK  
Arnaud Hamon, France  
Chris Harrison, USA  
Daniel Harrison, UK  
Michael Harrison, UK  
Ruediger Heimgaertner, Germany  
Tomi Heimonen, Finland  
Matthias Heintz, UK  
Ingi Helgason, UK  
Susan Catherine Herring, USA  
Wilko Heuten, Germany  
Martin Hitz, Austria  
Thuong Hoang, Australia  
R diger Hoffmann, Germany  
Jennifer Horkoff, UK  
Heiko Hornung, Brazil  
Ko-Hsun Huang, Taiwan,  
Republic of China  
Alina Huldgren, The Netherlands  
Ebba Thora Hvannberg, Iceland  
Aulikki Hyrskykari, Finland  
Ioanna Iacovides, UK  
Netta Iivari, Finland  
Mirja Ilves, Finland  
Yavuz  nal, Turkey  
Poika Isokoski, Finland  
Minna Isomursu, Finland  
Howell Istance, Finland  
Ido A. Iurgel, Germany  
Mikkel R. Jakobsen, Denmark  
Francis Jambon, France  
Jacek Jankowski, Poland  
Maddy Janse, The Netherlands  
Nuno Jardim Nunes, Portugal  
Caroline Jay, UK  
Kasper L vborg Jensen, Denmark  
Mikael Johnson, Finland  
Matt Jones, UK  
Joaquim Jorge, Portugal  
Rui Jose, Portugal  
Anirudha Joshi, India  
Christophe Jouffrais, France  
Anne Joutsenvirta, Finland  
Marko Jurmu, Finland  
Eija Kaasinen, Finland  
Jari Kangas, Finland  
Anne Marie Kanstrup, Denmark  
Victor Kaptelinin, Sweden  
Evangelos Karapanos, Portugal  
Kristiina Karvonen, Finland  
Dinesh Katre, India  
Manolya Kavakli, Australia  
Patrick Gage Kelley, USA  
Ryan Kelly, UK  
Rabia Khan, UK  
Hideki Koike, Japan  
Christophe Kolski, France



Hannu Korhonen, Finland  
Nataliya Kosmyna, France  
Paula Kotze, South Africa  
Christian Kray, Germany  
Per Ola Kristensson, UK  
Sari Kujala, Finland  
Todd Kulesza, USA  
Denis Lalanne, Switzerland  
David Lamas, Estonia  
Michael Lankes, Austria  
Rosa Lanzilotti, Italy  
Przemyslaw Lasota, USA  
Yann Laurillau, France  
Effie Law, UK  
Shaimaa Lazem, UK  
Xavier Le Pallec, France  
Eric Lecolinet, France  
Jong-Seok Lee, South Korea  
Asko Lehmuskallio, Finland  
Antti Leino, Finland  
Juha Leino, Finland  
Tuomas Leisti, Finland  
Jair Leite, Brazil  
Alexander Lenz, UK  
Barbara Leporini, Italy  
Sophie Lepreux, France  
Karen Y. Li, UK  
Edirlei Lima, Brazil  
James Lin, USA  
Mats Lind, Sweden  
Agnes Lisowska Masson, Switzerland  
Zhengjie Liu, China  
Sara Ljungblad, Sweden  
Corrado lo Storto, Italy  
Steffen Lohmann, Germany  
Fernando Loizides, Cyprus  
Victor López-Jaquero, Spain  
Fabien Lotte, France  
Maria Dolores Lozano, Spain  
Yichen Lu, Finland  
Paul Lubos, Germany  
Stephanie Ludi, USA  
Bernd Ludwig, Germany  
Andreas Luedtke, Germany  
Christopher Lueg, Australia  
Jo Lumsden, UK  
Christof Lutteroth, New Zealand  
Kris Luyten, Belgium  
Anderson Maciel, Brazil  
I. Scott MacKenzie, Canada  
Allan MacLean, UK  
Christian Maertin, Germany  
Charlotte Magnusson, Sweden  
Ana Gabriela Maguitman, Argentina  
Päivi Majaranta, Finland  
Marco Manca, Italy  
Nicolai Marquardt, UK  
Célia Martinie, France  
Paolo Masci, UK  
Masood Masoodian, New Zealand  
Maristella Matera, Italy  
Denys J.C. Matthies, Germany  
Peter W. McOwan, UK  
Gerrit Meixner, Germany  
Guy Melançon, France  
Amaia Mendez Zorrilla, Spain  
Maria Menendez Blanco, Italy  
Zdenek Mikovec, Czech Republic  
Jan-Torsten Milde, Germany  
Nicole Mirmig, Austria  
Giulio Mori, Italy  
Roxana Morosanu, UK  
Christiane Moser, Austria  
Marcelle Mota, Brazil  
Omar Mubin, Australia  
Chrystie Myketiak, UK  
Miguel Nacenta, UK  
Lennart Nacke, Canada  
Mathieu Nancel, Canada  
Bonnie Nardi, USA  
David Navarre, France  
Ather Nawaz, Norway  
Luciana Nedel, Brazil  
Alexandra Nemery, France  
Vania Neris, Brazil  
Daniel Nesbitt, UK  
Lene Nielsen, Denmark  
Anton Nijholt, The Netherlands  
Laurence Nigay, France  
Manuel Noguera, Spain  
Monique Noirhomme, Belgium  
Julianne Nyhan, UK  
Clemens Nylandsted Klokmose, Denmark

Michael O Grady, Ireland  
Aisling Ann O’Kane, UK  
Marianna Obrist, UK  
Lars Oestreicher, Sweden  
Jarno Ojala, Finland  
Patrick Oladimeji, UK  
Kathia Oliveira, France  
Thomas Olsson, Finland  
Dan Orwa, Kenya  
Nuno Otero, Sweden  
Benoit Otjacques, Luxembourg  
Saila Ovaska, Finland  
Janne Paavilainen, Finland  
Xinru Page, USA  
Ana Paiva, Portugal  
Jose Ignacio Panach Navarrete, Spain  
Eleftherios Papachristos, Greece  
Konstantinos Papoutsakis, Greece  
Avi Parush, Israel  
Oscar Pastor, Spain  
Fabio Paternò, Italy  
Celeste Lyn Paul, USA  
Andriy Pavlovych, Canada  
Roberto Pereira, UK  
Vinícius Carvalho Pereira, Brazil  
Mark J. Perry, UK  
Hele Petrie, UK  
Antoinio Piccinno, Italy  
Lara Piccolo, UK  
Emmanuel Pietriga, France  
Thomas Pietrzak, France  
Frank Pollick, UK  
Ravi Poovaiah, India  
Roman Popp, Austria  
Christopher Power, UK  
Raquel Prates, USA  
Costin Pribeanu, Romania  
Angel Puerta, USA  
Kai Puolamäki, Finland  
Victor M.R. Penichet, Spain  
Aaron Quigley, UK  
Kari-Jouko Rähkä, Finland  
Roope Raisamo, Finland  
Venkatesh Rajamanickam, India  
Nitendra Rajput, India  
Ismo Rakkolainen, Finland  
Jussi Rantala, Finland  
Alberto Raposo, Brazil  
Dimitrios Raptis, Denmark  
Umar Rashid, UK  
Kirsten Rasmus-Gröhn, Sweden  
Matthias Rauterberg, The Netherlands  
Janet Read, UK  
Mandryk Regan Lee, Canada  
Patrick Reignier, France  
Christian Remy, Switzerland  
Karen Renaud, UK  
Yann Riche, USA  
Fabien Ringeval, Germany  
Thomas Rist, Germany  
Paola Rodriguez, Colombia  
Markus Rohde, Germany  
Teresa Romão, Portugal  
Jose Rouillard, France  
Virpi Roto, Finland  
Thijs Roumen, Germany  
Gustavo Alberto Roveló Ruiz, Belgium  
Elisa Rubegni, Switzerland  
Simon Ruffieux, Switzerland  
Jaime Ruiz, USA  
Angel Ruiz-Zafra, Spain  
Rimvydas Rukšenas, UK  
Horacio Saggion, Spain  
Pascal Salembier, France  
Luciana Salgado Cardoso de Castro,  
Brazil  
Antti Salovaara, Finland  
Leonardo Sandoval, UK  
Carmen Santoro, Italy  
Corina Sas, UK  
Andreas Savva, UK  
Taufique Sayeed, Austria  
Gianluca Schiavo, Italy  
Antonio Giovanni Schiavone, Italy  
Albrecht Schmidt, Germany  
Stefan Schneegass, Germany  
Kevin Schneider, Canada  
Vinicius Segura, Brazil  
Marcos Serrano, France  
Ehud Sharlin, Canada  
Sumita Sharma, Finland  
Moushumi Sharmin, USA  
Abhishek Shrivastava, India  
Beat Signer, Belgium

Harri Siirtola, Finland  
Paula A. Silva, Ireland  
Bruno S. Silva, Brazil  
Carlos CL Silva, Portugal  
João Carlos Silva, Portugal  
Jose Luis Silva, Portugal  
Paula Alexandra Silva, Ireland  
Milene Silveira, Brazil  
Carla Simone, Italy  
Shamus Smith, Australia  
Andreas Sonderegger, Switzerland  
Keyur Sorathia, India  
Fabio Sorrentino, Italy  
Hamit Soyel, UK  
Oleg Spakov, Finland  
Lucio Davide Spano, Italy  
Mark Vincent Springett, UK  
Jan Stage, Denmark  
Christian Stary, Austria  
Katarzyna Stawarz, UK  
Frank Steinicke, Germany  
Gerald Stollnberger, Austria  
Markus Stolze, Switzerland  
Simone Stumpf, UK  
Noi Sukaviriya, USA  
Allistar Sutcliffe, UK  
David Mark Swallow, UK  
Tapio Takala, Finland  
Chee-wee Tan, Denmark  
Franck Tarpin-Bernard, France  
Carlos Teixeira, Portugal  
Luis Teixeira, Portugal  
Daniel Tetteroo, The Netherlands  
Jakob Tholander, Sweden  
Nigel Thomas, UK  
Liisa Tiittula, Finland  
Nava Tintarev, UK  
Martin Tomitsch, Australia  
Ilaria Torre, Italy  
Marilyn Tremaine, USA  
Daniela Trevisan, Brazil  
Sanjay Tripathi, India  
Janice Tsai, USA  
Manfred Tscheligi, Austria  
Huawei Tu, UK  
Outi Tuisku, Finland  
Phil Turner, UK  
Susan Ellen Turner, UK  
Markku Turunen, Finland  
Blase Ur, USA  
Heli Väätäjä, Finland  
Stefano Valtolina, Italy  
Judy van Biljon, South Africa  
Jos P. van Leeuwen, The Netherlands  
Paul van Schaik, UK  
Jeroen Vanattenhoven, Belgium  
Jean Vanderdonckt, Belgium  
Jari Varsaluoma, Finland  
Radu-Daniel Vatavu, Romania  
Angel Velazquez-Iturbide, Spain  
Hanna Venesvirta, Finland  
Jayant Venkatanathan, India  
Gilles Venturini, France  
Arnold Vermeeren, The Netherlands  
Karel Vermeulen, UK  
Frédéric Vernier, France  
Markel Vigo, UK  
Nadine Vigouroux, France  
Chris Vincent, UK  
Giuliana Vitiello, Italy  
Arnd Vitzthum, Germany  
Dhaval Vyas, Australia  
Mike Wald, UK  
Jim Wallace, Canada  
Tanja Carita Walsh, Finland  
Robert Walter, Germany  
Leon Watts, UK  
Gerhard Weber, Germany  
Rina Wehbe, Canada  
Astrid Weiss, Austria  
Janet Louise Wesson, South Africa  
Graham Wilson, UK  
Stephanie Wilson, UK  
Marco Winckler, France  
Theophilus Winschiers, Namibia  
Chui Yin Wong, Malaysia  
Wolfgang Wörndl, Germany  
Volker Wulf, Germany  
Yeliz Yesilada, Turkey  
Salu Ylirisku, Finland  
Nur Haryani Zakaria, Malaysia  
Massimo Zancanaro, Italy  
Panayiotis Zaphiris, Cyprus  
Jürgen Ziegler, Germany

## Sponsors and Supporters

### Sponsors

Microsoft  
**Research**

**OXFORD**  
UNIVERSITY PRESS



**Noldus**  
Information Technology

### Supporters



**Mensch-Computer-Interaktion**  
**Human-Computer Interaction**

# Contents – Part I

## Accessibility

Assisted Interaction Data Analysis of Web-Based User Studies . . . . .	1
<i>Xabier Valencia, J. Eduardo Pérez, Unai Muñoz, Myriam Arrue, and Julio Abascal</i>	
Technology Acceptance Evaluation by Deaf Students Considering the Inclusive Education Context . . . . .	20
<i>Soraia Silva Prietch and Lucia Vilela Leite Filgueiras</i>	
Understanding Touch and Motion Gestures for Blind People on Mobile Devices . . . . .	38
<i>Marco Romano, Andrea Bellucci, and Ignacio Aedo</i>	
Virtual Buttons for Eyes-Free Interaction: A Study . . . . .	47
<i>Jens Bauer and Achim Ebert</i>	

## Accessible Interfaces for Blind People

Comparing Concurrent and Retrospective Verbal Protocols for Blind and Sighted Users . . . . .	55
<i>Andreas Savva, Helen Petrie, and Christopher Power</i>	
Exploring Map Orientation with Interactive Audio-Tactile Maps . . . . .	72
<i>Alistair D.N. Edwards, Nazatul Naquiah Abd Hamid, and Helen Petrie</i>	
Inclusive Production of Tactile Graphics . . . . .	80
<i>Jens Bornschein, Denise Prescher, and Gerhard Weber</i>	
Navigation Problems in Blind-to-Blind Pedestrians Tele-assistance Navigation . . . . .	89
<i>Jan Balata, Zdenek Mikovec, and Ivo Maly</i>	

## Accessible Interfaces for Older Adults

Prototyping TV and Tablet Facebook Interfaces for Older Adults . . . . .	110
<i>José Coelho, Fábio Rito, Nuno Luz, and Carlos Duarte</i>	
Socially Networked or Isolated? Differentiating Older Adults and the Role of Tablets and Television . . . . .	129
<i>José Coelho and Carlos Duarte</i>	

Using Photo Diaries to Elicit User Requirements from Older Adults: A Case Study on Mobility Barriers . . . . .	147
<i>David Swallow, Helen Petrie, Christopher Power, and Alistair D.N. Edwards</i>	
<b>Affective HCI and Emotions and Motivational Aspects</b>	
Design Criteria for Stimulating Emotions in Web Applications . . . . .	165
<i>Giulio Mori, Fabio Paternò, and Ferdinando Furci</i>	
Emotion Detection in Non-native English Speakers' Text-Only Messages by Native and Non-native Speakers . . . . .	183
<i>Ari Hautasaari and Naomi Yamashita</i>	
Making Decisions About Digital Legacy with Google's Inactive Account Manager . . . . .	201
<i>Raquel O. Prates, Mary Beth Rosson, and Clarisse S. de Souza</i>	
Shedding Lights on Human Values: An Approach to Engage Families with Energy Conservation . . . . .	210
<i>Janine Huizenga, Lara S.G. Piccolo, Meia Wippoo, Christoph Meili, and Andrew Bullen</i>	
Gamification of Online Surveys: Design Process, Case Study, and Evaluation . . . . .	219
<i>Johannes Harms, Stefan Biegler, Christoph Wimmer, Karin Kappel, and Thomas Grechenig</i>	
Mind the Gap! Comparing Retrospective and Concurrent Ratings of Emotion in User Experience Evaluation . . . . .	237
<i>Anders Bruun and Simon Ahm</i>	
Recognizing Emotions in Human Computer Interaction: Studying Stress Using Skin Conductance . . . . .	255
<i>Alexandros Liapis, Christos Katsanos, Dimitris Sotiropoulos, Michalis Xenos, and Nikos Karousos</i>	
LEGO Pictorial Scales for Assessing Affective Response . . . . .	263
<i>Mohammad Obaid, Andreas Dünser, Elena Moltchanova, Danielle Cummings, Johannes Wagner, and Christoph Bartneck</i>	
The Influence of Motivation on Emotional Experience in E-commerce. . . . .	281
<i>Samaneh Soleimani and Effie Lai-Chong Law</i>	
The Presenter Experience of Canvas Presentations. . . . .	289
<i>Leonhard Lichtschlag, Philipp Wacker, Martina Ziefle, and Jan Borchers</i>	

Using Online Reviews as Narratives to Evoke Designer’s Empathy. . . . . 298  
*Christiane Grünloh, Åke Walldius, Gerhard Hartmann,  
and Jan Gulliksen*

**Alternative Input**

AirDisplay: Experimenting with Air Flow as a Communication Medium . . . . 316  
*Omar Mowafi, Mohamed Khamis, and Wael Abouelsaadat*

Experiencing the Elements – User Study with Natural Material Probes . . . . . 324  
*Jonna Häkkilä, Yun He, and Ashley Colley*

PrintPut: Resistive and Capacitive Input Widgets for Interactive 3D Prints . . . 332  
*Jesse Burstyn, Nicholas Fellion, Paul Strohmeier, and Roel Vertegaal*

ReservoirBench: An Interactive Educational Reservoir Engineering  
Workbench. . . . . 340  
*Sowmya Somanath, Allan Rocha, Hamidreza Hamdi, Ehud Sharlin,  
and Mario Costa Sousa*

Shape-Change for Zoomable TUIs: Opportunities and Limits of a Resizable  
Slider . . . . . 349  
*Céline Coutrix and Cédric Masclet*

**Alternative Input Devices for People with Disabilities**

Eyes and Keys: An Evaluation of Click Alternatives Combining Gaze  
and Keyboard. . . . . 367  
*Ken Neth Yeoh, Christof Lutteroth, and Gerald Weber*

Interactions Under the Desk: A Characterisation of Foot Movements  
for Input in a Seated Position . . . . . 384  
*Eduardo Velloso, Jason Alexander, Andreas Bulling,  
and Hans Gellersen*

Life in the Fast Lane: Effect of Language and Calibration Accuracy  
on the Speed of Text Entry by Gaze . . . . . 402  
*Kari-Jouko Räihä*

**Interfaces for Cognitive Support**

Cognitive Accessibility for Mentally Disabled Persons. . . . . 418  
*Stefan Johansson, Jan Gulliksen, and Ann Lantz*

Design and Evaluation of Mobile Learning Applications for Autistic  
Children in Pakistan . . . . . 436  
*Muneeb Imtiaz Ahmad and Suleman Shahid*

Exercises for German-Speaking Children with Dyslexia . . . . .	445
<i>Maria Rauschenberger, Silke Füchsel, Luz Rello, Clara Bayarri, and Jörg Thomaschewski</i>	
Serious Games for Cognitive Training in Ambient Assisted Living Environments – A Technology Acceptance Perspective . . . . .	453
<i>Jan Wittland, Philipp Brauner, and Martina Ziefle</i>	
<b>Brain-Computer Interaction</b>	
Continuous Mental Effort Evaluation During 3D Object Manipulation Tasks Based on Brain and Physiological Signals . . . . .	472
<i>Dennis Wobrock, Jérémy Frey, Delphine Graeff, Jean-Baptiste de la Rivière, Julien Castet, and Fabien Lotte</i>	
Continuous Tactile Feedback for Motor-Imagery Based Brain-Computer Interaction in a Multitasking Context . . . . .	488
<i>Camille Jeunet, Chi Vi, Daniel Spelmezan, Bernard N’Kaoua, Fabien Lotte, and Sriram Subramanian</i>	
Towards Brain Computer Interfaces for Recreational Activities: Piloting a Drone . . . . .	506
<i>Nataliya Kosmyna, Franck Tarpin-Bernard, and Bertrand Rivet</i>	
<b>Cognitive Factors</b>	
A Human Cognitive Processing Perspective in Designing E-Commerce Checkout Processes . . . . .	523
<i>Marios Belk, Panagiotis Germanakos, Argyris Constantinides, and George Samaras</i>	
Bilingual Reading Experiences: What They Could Be and How to Design for Them . . . . .	531
<i>Clément Pillias and Pierre Cubaud</i>	
Dynamic Workload Adjustments in Human-Machine Systems Based on GSR Features . . . . .	550
<i>Jianlong Zhou, Ju Young Jung, and Fang Chen</i>	
Text Touching Effects in Active Reading: The Impact of the Use of a Touch-Based Tablet Device . . . . .	559
<i>Hirohito Shibata, Kentaro Takano, and Shun’ichi Tano</i>	
<b>Author Index</b> . . . . .	577



## Contents – Part II

### Computer-Supported Cooperative Work and Social Computing

EmbodiNet: Enriching Distributed Musical Collaboration Through Embodied Interactions . . . . .	1
<i>Dalia El-Shimy and Jeremy R. Cooperstock</i>	
Preference Elicitation and Negotiation in a Group Recommender System . . . .	20
<i>Jesús Omar Álvarez Márquez and Jürgen Ziegler</i>	
The #selfiestation: Design and Use of a Kiosk for Taking Selfies in the Enterprise . . . . .	38
<i>Casey Dugan, Sven Laumer, Thomas Erickson, Wendy Kellogg, and Werner Geyer</i>	
The LuminUs: Providing Musicians with Visual Feedback on the Gaze and Body Motion of Their Co-performers . . . . .	47
<i>Evan Morgan, Hatice Gunes, and Nick Bryan-Kinns</i>	
An Artifact Ecology in a Nutshell: A Distributed Cognition Perspective for Collaboration and Coordination . . . . .	55
<i>Christina Vasiliou, Andri Ioannou, and Panayiotis Zaphiris</i>	
Assessing a Collaborative Application for Comic Strips Composition . . . . .	73
<i>Eleonora Mencarini, Gianluca Schiavo, Alessandro Cappelletti, Oliviero Stock, and Massimo Zancanaro</i>	
Augmenting Collaborative MOOC Video Viewing with Synchronized Textbook . . . . .	81
<i>Nan Li, Łukasz Kidziński, and Pierre Dillenbourg</i>	
EXCITE: EXploring Collaborative Interaction in Tracked Environments . . . .	89
<i>Nicolai Marquardt, Frederico Schar dong, and Anthony Tang</i>	
The Usefulness of Method-Resources for Evaluating a Collaborative Training Simulator . . . . .	98
<i>Ebba Thora Hvannberg, Gyda Halldorsdottir, and Jan Rudinsky</i>	
<b>End-User Development</b>	
Flat Design vs Traditional Design: Comparative Experimental Study . . . . .	106
<i>Ivan Burmistrov, Tatiana Zlokazova, Anna Izmalkova, and Anna Leonova</i>	

How to Organize the Annotation Systems in Human-Computer Environment: Study, Classification and Observations . . . . .	115
<i>Anis Kalboussi, Nizar Omheni, Omar Mazhoud, and Ahmed Hadj Kacem</i>	
Mini-Orb: A Personal Indoor Climate Preference Feedback Interface . . . . .	134
<i>Markus Rittenbruch, Jared Donovan, and Yasuhiro Santo</i>	
Prototyping the Self-Authored Video Interview: Challenges and Opportunities . . . . .	150
<i>Stephen Snow, Markus Rittenbruch, and Margot Brereton</i>	
<b>Evaluation Methods/Usability Evaluation</b>	
An Empirical Study of the Effects of Three Think-Aloud Protocols on Identification of Usability Problems . . . . .	159
<i>Anders Bruun and Jan Stage</i>	
An Observational Study of How Experienced Programmers Annotate Program Code . . . . .	177
<i>Craig J. Sutherland, Andrew Luxton-Reilly, and Beryl Plimmer</i>	
Around-Device Interactions: A Usability Study of Frame Markers in Acquisition Tasks . . . . .	195
<i>Fernando Garcia-Sanjuan, Alejandro Catala, Geraldine Fitzpatrick, and Javier Jaen</i>	
On Applying Experience Sampling Method to A/B Testing of Mobile Applications: A Case Study . . . . .	203
<i>Myunghee Lee and Gerard J. Kim</i>	
Usability Aspects of the Inside-in Approach for Ancillary Search Tasks on the Web . . . . .	211
<i>Marco Winckler, Ricardo Cava, Eric Barboni, Philippe Palanque, and Carla Freitas</i>	
Using Affinity Diagrams to Evaluate Interactive Prototypes . . . . .	231
<i>Andrés Lucero</i>	
What Users Prefer and Why: A User Study on Effective Presentation Styles of Opinion Summarization . . . . .	249
<i>Xiaojun Yuan, Ning Sa, Grace Begany, and Huahai Yang</i>	
A Comparison of Five HSV Color Selection Interfaces for Mobile Painting Search . . . . .	265
<i>Min Zhang, Guoping Qiu, Natasha Alechina, and Sarah Atkinson</i>	

Computer-Related Attribution Styles: Typology and Data Collection Methods. . . . .	274
<i>Adelka Niels and Monique Janneck</i>	
Reciprocity in Rapid Ethnography: Giving Back by Making the Small Things Count . . . . .	292
<i>Pieter Duysburgh and Karin Slegers</i>	
Testing the Unknown – Value of Usability Testing for Complex Professional Systems Development . . . . .	300
<i>Kimmo Tarkkanen, Ville Harkke, and Pekka Reijonen</i>	
<b>Eye Tracking</b>	
An Empirical Investigation of Gaze Selection in Mid-Air Gestural 3D Manipulation . . . . .	315
<i>Eduardo Velloso, Jayson Turner, Jason Alexander, Andreas Bulling, and Hans Gellersen</i>	
Four Eyes See More Than Two: Shared Gaze in the Car . . . . .	331
<i>Sandra Trösterer, Magdalena Gärtner, Martin Wuchse, Bernhard Maurer, Axel Baumgartner, Alexander Meschtscherjakov, and Manfred Tscheligi</i>	
Gaze+touch vs. Touch: What’s the Trade-off When Using Gaze to Extend Touch to Remote Displays? . . . . .	349
<i>Ken Pfeuffer, Jason Alexander, and Hans Gellersen</i>	
<b>Gesture Interaction</b>	
Gestu-Wan - An Intelligible Mid-Air Gesture Guidance System for Walk-up-and-Use Displays . . . . .	368
<i>Gustavo Rovelto, Donald Degraen, Davy Vanacken, Kris Luyten, and Karin Coninx</i>	
Natural Interaction with Video Environments Using Gestures and a Mirror Image Avatar . . . . .	387
<i>Christian Kray, Dennis Wilhelm, Thore Fechner, and Morin Ostkmap</i>	
Sci-Fi Gestures Catalog: Understanding the Future of Gestural Interaction . . .	395
<i>Lucas S. Figueiredo, Mariana Pinheiro, Edvar Vilar Neto, Thiago Chaves, and Veronica Teichrieb</i>	
TV Interaction Beyond the Button Press: Exploring the Implications of Gesture, Pressure and Breath as Interaction Mechanisms for a TV User Interface. . . . .	412
<i>Regina Bernhaupt, Antoine Desnos, Michael Pirker, and Daniel Schwaiger</i>	

**HCI and Security**

- “I Agree”: The Effects of Embedding Terms of Service Key Points  
in Online User Registration Form . . . . . 420  
*Matjaž Kljun, Jernej Vičič, Klen Čopič Pucihar, and Branko Kavšek*
- Automatic Privacy Classification of Personal Photos . . . . . 428  
*Daniel Buschek, Moritz Bader, Emanuel von Zezschwitz,  
and Alexander De Luca*
- CipherCard: A Token-Based Approach Against Camera-Based Shoulder  
Surfing Attacks on Common Touchscreen Devices . . . . . 436  
*Teddy Seyed, Xing-Dong Yang, Anthony Tang, Saul Greenberg,  
Jiawei Gu, Bin Zhu, and Xiang Cao*
- Digital Signage Effectiveness in Retail Stores. . . . . 455  
*Mari Ervasti, Juha Häikiö, Minna Isomursu, Pekka Isomursu,  
and Tiina Liuska*
- Toward a Deeper Understanding of Data Analysis, Sensemaking,  
and Signature Discovery . . . . . 463  
*Sheriff Jolaoso, Russ Burtner, and Alex Endert*

**HCI for Developing Regions and Social Development**

- HCI Practices in the Nigerian Software Industry . . . . . 479  
*Abiodun Ogunyemi, David Lamas, Emmanuel Rotimi Adagunodo,  
and Isaias Barreto da Rosa*
- Penan’s Oroo’ Short Message Signs (PO-SMS): Co-design of a Digital  
Jungle Sign Language Application . . . . . 489  
*Tariq Zaman and Heike Winschiers-Theophilus*
- The Whodunit Challenge: Mobilizing the Crowd in India. . . . . 505  
*Aditya Vashistha, Rajan Vaish, Edward Cutrell, and William Thies*
- Wayfinding Behavior in India. . . . . 522  
*Naveed Ahmed*

**HCI for Education**

- Evaluating Digital Tabletop Collaborative Writing in the Classroom . . . . . 531  
*Philip Heslop, Anne Preston, Ahmed Kharrufa, Madeline Balaam,  
David Leat, and Patrick Olivier*

Evaluating the Accuracy of Pre-kindergarten Children Multi-touch Interaction . . . . . 549  
*Vicente Nacher and Javier Jaen*

The 5-Step Plan: Empowered Children’s Robotic Product Ideas . . . . . 557  
*Lara Lammer, Astrid Weiss, and Markus Vincze*

Using IMUs to Identify Supervisors on Touch Devices . . . . . 565  
*Ahmed Kharrufa, James Nicholson, Paul Dunphy, Steve Hodges, Pam Briggs, and Patrick Olivier*

Design and Usability Evaluation of Adaptive e-learning Systems Based on Learner Knowledge and Learning Style . . . . . 584  
*Mohammad Alshammari, Rachid Anane, and Robert J. Hendley*

How Does HCI Research Affect Education Programs? A Study in the Brazilian Context . . . . . 592  
*Isabela Gasparini, Simone Diniz Junqueira Barbosa, Milene Selbach Silveira, Sílvia Amélia Bim, and Clodis Boscaroli*

MindMiner: A Mixed-Initiative Interface for Interactive Distance Metric Learning . . . . . 611  
*Xiangmin Fan, Youming Liu, Nan Cao, Jason Hong, and Jingtao Wang*

**Author Index** . . . . . 629

# Contents – Part III

## HCI for Global Software Development

An Interactive Approach for Inspecting Software System Measurements . . . .	1
<i>Taimur Khan, Henning Barthel, Karsten Amrhein, Achim Ebert, and Peter Liggesmeyer</i>	
Non-response, Social Exclusion, and False Acceptance: Gatekeeping Tactics and Usability Work in Free-Libre Open Source Software Development . . . . .	9
<i>Mikko Rajanen, Netta Iivari, and Arto Lanamäki</i>	
Task Allocation Between UX Specialists and Developers in Agile Software Development Projects . . . . .	27
<i>Kati Kuusinen</i>	

## HCI in Healthcare

Breathe with Touch: A Tactile Interface for Breathing Assistance System . . .	45
<i>Bin Yu, Loe Feijs, Mathias Funk, and Jun Hu</i>	
Low-Income Parents’ Values Involving the Use of Technology for Accessing Health Information . . . . .	53
<i>David Muñoz and Rosa I. Arriaga</i>	
Probing the Potential of Multimedia Artefacts to Support Communication of People with Dementia . . . . .	71
<i>Alina Huldtgren, Fabian Mertl, Anja Vormann, and Chris Geiger</i>	
Smartphone-Based Gait Measurement Application for Exercise and Its Effects on the Lifestyle of Senior Citizens . . . . .	80
<i>Takahiro Miura, Ken-ichiro Yabu, Atsushi Hiyama, Noriko Inamura, Michitaka Hirose, and Tohru Ifukube</i>	

## HCI Studies

Swimming the Channels: An Analysis of Online Archival Reference Enquiries . . . . .	99
<i>Joseph Pugh and Christopher Power</i>	
“Not Some Trumped Up Beef”: Assessing Credibility of Online Restaurant Reviews. . . . .	116
<i>Marina Kobayashi, Victoria Schwanda Sosik, and David Huffaker</i>	

An Empirical Investigation of the Practices and Challenges Specific to International User Studies . . . . .	132
<i>Sabine Madsen, Lene Nielsen, Heidi Hautopp, and Iben Jensen</i>	
Entity-Centric Visualization of Open Data . . . . .	149
<i>Sajan Raj Ojha, Mladjan Jovanovic, and Fausto Giunchiglia</i>	
Mindful Gaming: How Digital Games Can Improve Mindfulness . . . . .	167
<i>Jacek Sliwinski, Mary Katsikitis, and Christian Martyn Jones</i>	
The Affordances of Broken Affordances . . . . .	185
<i>Martin Gielsgaard Grünbaum and Jakob Grue Simonsen</i>	

### **Human-Robot Interaction**

Deploying Robots in a Production Environment: A Study on Temporal Transitions of Workers' Experiences . . . . .	203
<i>Daniela Wurhofer, Thomas Meneweger, Verena Fuchsberger, and Manfred Tscheligi</i>	
Finding Objects Faster in Dense Environments Using a Projection Augmented Robotic Arm . . . . .	221
<i>Hind Gacem, Gilles Bailly, James Eagan, and Eric Lecolinet</i>	
It's Not the Way You Look, It's How You Move: Validating a General Scheme for Robot Affective Behaviour . . . . .	239
<i>Jekaterina Novikova, Gang Ren, and Leon Watts</i>	

### **Interactive Tabletops**

HoverSpace: Analyses of the Perceived Spatial Affordances of Hover Interaction Above Tabletop Surfaces . . . . .	259
<i>Paul Lubos, Oscar Ariza, Gerd Bruder, Florian Daiber, Frank Steinicke, and Antonio Krüger</i>	
In-Situ Occlusion Resolution for Hybrid Tabletop Environments . . . . .	278
<i>Jan Riemann, Mohammadreza Khalilbeigi, and Max Mühlhäuser</i>	
MovemenTable: The Design of Moving Interactive Tabletops. . . . .	296
<i>Kazuki Takashima, Yusuke Asari, Hitomi Yokoyama, Ehud Sharlin, and Yoshifumi Kitamura</i>	

### **Mobile and Ubiquitous Interaction**

If You Are Happy and You Know It, Say "I'm Here": Investigating Parents' Location-Sharing Preferences . . . . .	315
<i>Paolo Massa, Chiara Leonardi, Bruno Lepri, Fabio Pianesi, and Massimo Zancanaro</i>	

Navigation in Long Forms on Smartphones: Scrolling Worse than Tabs, Menus, and Collapsible Fieldsets . . . . .	333
<i>Johannes Harms, Martina Kratky, Christoph Wimmer, Karin Kappel, and Thomas Grechenig</i>	
Synchronising Live Second Screen Applications with TV Broadcasts Through User Feedback . . . . .	341
<i>Pedro Centieiro, Teresa Romão, A. Eduardo Dias, and Rui Neves Madeira</i>	
UbiBeam: Exploring the Interaction Space for Home Deployed Projector-Camera Systems . . . . .	350
<i>Jan Gugenheimer, Pascal Knierim, Christian Winkler, Julian Seifert, and Enrico Rukzio</i>	
Cue Now, Reflect Later: A Study of Delayed Reflection of Diary Events. . . . .	367
<i>Ming Ki Chong, Jon Whittle, Umar Rashid, and Chee Siang Ang</i>	
Tick that Box: Interactive Paper Documents . . . . .	376
<i>Yomna Abdelrahman, Thomas Kubitzka, Katrin Wolf, Norman Pohl, and Albrecht Schmidt</i>	
Towards Deeper Understanding of User Experience with Ubiquitous Computing Systems: Systematic Literature Review and Design Framework. . . . .	384
<i>Kaisa Väänänen-Vainio-Mattila, Thomas Olsson, and Jonna Häkkinen</i>	
<i>uCanvas</i> : A Web Framework for Spontaneous Smartphone Interaction with Ubiquitous Displays . . . . .	402
<i>Tilman Dingler, Tobias Bagg, Yves Grau, Niels Henze, and Albrecht Schmidt</i>	
Wireless Smartphone Mirroring in Video Calls . . . . .	410
<i>Henrik Sørensen, Kenton O'Hara, Phil Gosset, and Jesper Kjeldskov</i>	
<b>Multi-screen Visualization and Large Screens</b>	
Disperse: Enabling Web-Based Visualization in Multi-screen and Multi-user Environments . . . . .	418
<i>Megan Monroe and Casey Dugan</i>	
Evaluation of Distance-Aware Bimanual Manipulation Techniques for Large High-Resolution Displays. . . . .	436
<i>Anke Lehmann and Oliver Staadt</i>	
Should I Stay or Should I Go? Selecting Between Touch and Mid-Air Gestures for Large-Display Interaction . . . . .	455
<i>Mikkel R. Jakobsen, Yvonne Jansen, Sebastian Boring, and Kasper Hornbæk</i>	



## Participatory Design

- Funky-Design-Spaces: Interactive Environments for Creativity Inspired by Observing Designers Making Mood Boards* . . . . . 474  
*Andrés Lucero*
- Kwento: Using a Participatory Approach to Design a Family Storytelling Application for Domestic Helpers . . . . . 493  
*Kakit Cheong and Alex Mitchell*
- Paper or Pixel? Comparing Paper- and Tool-Based Participatory Design Approaches . . . . . 501  
*Matthias Heintz, Effie Lai-Chong Law, and Samaneh Soleimani*
- Participatory Design in Practice: The Case of an Embroidered Technology. . . 518  
*Laura Cortés-Rico and Giovanni Piedrahita-Solórzano*

## Pointing and Gesture Interaction

- Better Than You Think: Head Gestures for Mid Air Input . . . . . 526  
*Katrin Plaumann, Jan Ehlers, Florian Geiselhart, Gabriel Yuras, Anke Huckauf, and Enrico Rukzio*
- Enhancing Pinch-Drag-Flick Paradigm with Two New Gestures: Two-Finger-Tap for Tablets and Tap&Tap for Smartphones . . . . . 534  
*Alessio Bellino*
- Estimating Production Time of Touchless Hand Drawing Gestures . . . . . 552  
*Orlando Erazo, José A. Pino, and Pedro Antunes*
- The Costs and Benefits of Combining Gaze and Hand Gestures for Remote Interaction . . . . . 570  
*Yanxia Zhang, Sophie Stellmach, Abigail Sellen, and Andrew Blake*

## Social Interaction

- Sharing Wishes on Public Displays: Using Technology to Create Social Places . . . . . 578  
*Vinicius Ferreira, Junia Anacleto, and Andre Bueno*
- Social Interaction Design Patterns for Urban Media Architecture. . . . . 596  
*Luke Hespanhol and Peter Dalsgaard*
- Thinking Like Disney: Supporting the Disney Method Using Ambient Feedback Based on Group Performance. . . . . 614  
*Sarah Tausch, Fabius Steinberger, and Heinrich Hußmann*

Eery Space: Facilitating Virtual Meetings Through Remote Proxemics. . . . . 622  
*Maurício Sousa, Daniel Mendes, Alfredo Ferreira,  
João Madeiras Pereira, and Joaquim Jorge*

**Author Index** . . . . . 631

# Contents – Part IV

## Tangible and Tactile Interaction

Child or Adult? Inferring Smartphone Users' Age Group from Touch Measurements Alone . . . . .	1
<i>Radu-Daniel Vatavu, Lisa Anthony, and Quincy Brown</i>	
Designing of 2D Illusory Tactile Feedback for Hand-Held Tablets . . . . .	10
<i>Youngsun Kim, Jaedong Lee, and Gerard J. Kim</i>	
Need for Touch in Human Space Exploration: Towards the Design of a Morphing Haptic Glove – ExoSkin . . . . .	18
<i>Sue Ann Seah, Marianna Obrist, Anne Roudaut, and Sriram Subramanian</i>	
Tactile Communication in Extreme Contexts: Exploring the Design Space Through Kiteboarding . . . . .	37
<i>André Schmidt, Mads Kleemann, Timothy Merritt, and Ted Selker</i>	
Glass+Skin: An Empirical Evaluation of the Added Value of Finger Identification to Basic Single-Touch Interaction on Touch Screens . . . . .	55
<i>Quentin Roy, Yves Guiard, Gilles Bailly, Éric Lecolinet, and Olivier Rioul</i>	
Physical Playlist: Bringing Back the Mix-Tape . . . . .	72
<i>Daniel Burnett, Adrian Gradinar, Joel Porter, Mike Stead, Paul Coulton, and Ian Forrester</i>	
Tangible Voting: A Technique for Interacting with Group Choices on a Tangible Tabletop . . . . .	79
<i>Valérie Maquil, Eric Tobias, and Thibaud Latour</i>	

## Tools for Design

Dico: A Conceptual Model to Support the Design and Evaluation of Advanced Search Features for Exploratory Search . . . . .	87
<i>Emanuel Felipe Duarte, Edson Oliveira Jr., Filipe Roseiro Cogo, and Roberto Pereira</i>	
Revealing Differences in Designers' and Users' Perspectives: A Tool-Supported Process for Visual Attention Prediction for Designing HMIs for Maritime Monitoring Tasks . . . . .	105
<i>Sebastian Feuerstack and Bertram Wortelen</i>	

Worth-Centered Design in Practice: Lessons from Experience and Research Agenda . . . . .	123
<i>Fatoumata Camara and Gaëlle Calvary</i>	

## **Touch and Haptic**

Actuated Shear: Enabling Haptic Feedback on Rich Touch Interfaces . . . . .	140
<i>Bernhard Maurer, Roland Buchner, Martin Murer, and Manfred Tscheligi</i>	

Characterizing the Influence of Motion Parameters on Performance When Acquiring Moving Targets . . . . .	148
<i>Alexandre Kouyoumdjian, Nicolas Férey, Patrick Bourdot, and Stéphane Huot</i>	

Comparing Fatigue When Using Large Horizontal and Vertical Multi-touch Interaction Displays . . . . .	156
<i>Shiroq Al-Megren, Ahmed Kharrufa, Jonathan Hook, Amey Holden, Selina Sutton, and Patrick Olivier</i>	

Touch, Movement and Vibration: User Perception of Vibrotactile Feedback for Touch and Mid-Air Gestures . . . . .	165
<i>Christian Schönauer, Annette Mossel, Ionuț-Alexandru Zaiți, and Radu-Daniel Vatavu</i>	

Where to Start? Exploring the Efficiency of Translation Movements on Multitouch Devices . . . . .	173
<i>Quan Nguyen and Michael Kipp</i>	

## **User and Task Modelling**

Enhanced Task Modelling for Systematic Identification and Explicit Representation of Human Errors . . . . .	192
<i>Racim Fahssi, Célia Martinie, and Philippe Palanque</i>	

EvolutionWorks: Towards Improved Visualization of Citation Networks . . . . .	213
<i>Jason Wilkins, Jaakko Järvi, Ajit Jain, Gaurav Kejriwal, Andruid Kerne, and Vijay Gumudavelly</i>	

Quantifying Object- and Command-Oriented Interaction . . . . .	231
<i>Alix Goguey, Julie Wagner, and Géry Casiez</i>	

Users, Bystanders and Agents: Participation Roles in Human-Agent Interaction . . . . .	240
<i>Antonia L. Krummheuer</i>	

## Visualization

Augmented Happiness: Simple Color Changes Influence Users’ Conceptual Choices . . . . .	248
<i>Diana Löffler, Wolfgang Paier, Takashi Toriizuka, Mio Ikeda, and Jörn Hurtienne</i>	
Investigating Representation Alternatives for Communicating Uncertainty to Non-experts . . . . .	256
<i>Miriam Greis, Thorsten Ohler, Niels Henze, and Albrecht Schmidt</i>	
Proxemic Flow: Dynamic Peripheral Floor Visualizations for Revealing and Mediating Large Surface Interactions . . . . .	264
<i>Jo Vermeulen, Kris Luyten, Karin Coninx, Nicolai Marquardt, and Jon Bird</i>	
Self-Actuated Displays for Vertical Surfaces . . . . .	282
<i>Patrick Bader, Valentin Schwind, Norman Pohl, Niels Henze, Katrin Wolf, Stefan Schneegass, and Albrecht Schmidt</i>	

## Visualization 3D

3D-HUDD – Developing a Prototyping Tool for 3D Head-Up Displays . . . . .	300
<i>Nora Broy, Matthias Nefzger, Florian Alt, Mariam Hassib, and Albrecht Schmidt</i>	
Design and Evaluation of Mirror Interface MIOSS to Overlay Remote 3D Spaces . . . . .	319
<i>Ryo Ishii, Shiro Ozawa, Akira Kojima, Kazuhiro Otsuka, Yuki Hayashi, and Yukiko I. Nakano</i>	
Improving Spatial Awareness for Human Trajectory Visualization in Space-Time Cubes . . . . .	327
<i>Tiago Gonçalves, Ana Paula Afonso, and Bruno Martins</i>	
MStoryG: Exploring Serendipitous Storytelling Within High Anxiety Public Spaces . . . . .	335
<i>Clinton Jorge, Valentina Nisi, Julian Hanna, Nuno Nunes, Miguel Caldeira, and Amanda Marinho</i>	

## Visualization in Virtual Spaces

Estimating Visual Comfort in Stereoscopic Displays Using Electroencephalography: A Proof-of-Concept . . . . .	354
<i>Jérémy Frey, Aurélien Appriou, Fabien Lotte, and Martin Hachet</i>	

Exploring the Use of Virtual Environments in an Industrial Site Design Process . . . . .	363
<i>Ashley Colley, Jani Väyrynen, and Jonna Häkkinen</i>	
Pointing in Spatial Augmented Reality from 2D Pointing Devices . . . . .	381
<i>Renaud Gervais, Jérémy Frey, and Martin Hachet</i>	
The Comparison of Performance, Efficiency, and Task Solution Strategies in Real, Virtual and Dual Reality Environments . . . . .	390
<i>Frederic Raber, Antonio Krüger, and Gerrit Kahl</i>	
<b>Wearable Computing</b>	
Hard-to-Get-at Data from Difficult-to-Access Users . . . . .	409
<i>Bob Fields, Andy Bardill, Lisa Marzano, and Kate Herd</i>	
Oh, What a Night! Effortless Sleep Monitoring at Home . . . . .	417
<i>Bert Vandenberghe and David Geerts</i>	
SKInteract: An On-body Interaction System Based on Skin-Texture Recognition . . . . .	425
<i>Manuel Prätorius, Aaron Scherzinger, and Klaus Hinrichs</i>	
Towards a Model of Virtual Proxemics for Wearables . . . . .	433
<i>Junia Anacleto and Sidney Fels</i>	
ZENse - Supporting Everyday Emotional Reflection . . . . .	448
<i>Christian Löw, Chalid Gad-El-Hak, Roman Ganhör, and Hilda Tellioglu</i>	
<b>Demonstrations</b>	
BlurtLine: A Design Exploration to Support Children with ADHD in Classrooms . . . . .	456
<i>Dorothe Smit and Saskia Bakker</i>	
Cooperation in Real-Time Using a Virtual Environment. . . . .	461
<i>Máté Köles, Károly Hercegfı, Balázs Péter Hámornik, Emma Lógó, Bálint Szabó, and Anita Komlódi</i>	
Diving into the Data Ocean . . . . .	465
<i>Dieter Meiller</i>	
ETA Wizard App: Make Design and Evaluation of Accessible Electronic Travel Aids Easy . . . . .	469
<i>Limin Zeng, Gerhard Weber, and Alexander Fickel</i>	

Generating Narratives from Personal Digital Data: Using Sentiment, Themes, and Named Entities to Construct Stories . . . . .	473
<i>Elaine Farrow, Thomas Dickinson, and Matthew P. Aylett</i>	
Interactive Light Feedback: Illuminating Above-Device Gesture Interfaces . . .	478
<i>Euan Freeman, Stephen Brewster, and Vuokko Lantz</i>	
StoreAnt: A System to Support Finding Collaborative Systems Evaluation Methods. . . . .	482
<i>Marcella Leandro Costa de Souza, Lidia Silva Ferreira, Raquel Oliveira Prates, and Marília Lyra Bergamo</i>	
TUIOFX—Toolkit Support for the Development of JavaFX Applications for Interactive Tabletops . . . . .	486
<i>Mirko Fetter and David Bimamisa</i>	
<b>Interactive Posters</b>	
“I Was Here”: Enabling Tourists to Leave Digital Graffiti or Marks on Historic Landmarks. . . . .	490
<i>Matjaž Kljun and Klen Čopič Pucihar</i>	
A Hybrid Approach for Visualizing Spatial and Non-spatial Data Types of Embedded Systems . . . . .	495
<i>Ragaad AlTarawneh, Shah Rukh Humayoun, and Achim Ebert</i>	
A Multi-modal System for Public Speaking: Pilot Study on Evaluation of Real-Time Feedback . . . . .	499
<i>Fiona Dermody, Alistair Sutherland, and Margaret Farren</i>	
A Study on How to Express Non-manual Markers in the Electronic Dictionary of Japanese Sign Language. . . . .	502
<i>Mina Terauchi and Yuji Nagashima</i>	
Applying “Out of Body” Vibrotactile Illusion to Two-Finger Interaction for Perception of Object Dynamics . . . . .	506
<i>Jaedong Lee, Youngsun Kim, and Gerard J. Kim</i>	
Designing IDA - An Intelligent Driver Assistant for Smart City Parking in Singapore. . . . .	510
<i>Andreea I. Niculescu, Mei Quin Lim, Seno A. Wibowo, Kheng Hui Yeo, Boon Pang Lim, Michael Popow, Dan Chia, and Rafael E. Banchs</i>	
Development of Usability-Criteria for the Selection Process of Document Management Systems . . . . .	514
<i>Antje Heinicke, Christina Bröhl, Ioannis Dokas, Katrin Walbaum, Jennifer Bützler, and Christopher Schlick</i>	

Digital Co-design Applied to Healthcare Environments:	
A Comparative Study . . . . .	518
<i>Lei Shi, James MacKrill, Elisavet Dimitrokali, Carolyn Dawson, and Rebecca Cain</i>	
Dual Camera Magic Lens for Handheld AR Sketching . . . . .	523
<i>Klen Čopič Pucihar, Jens Grubert, and Matjaž Kljun</i>	
Enabling Naturalness and Humanness in Mobile Voice Assistants . . . . .	528
<i>Sanjay Ghosh and Jatin Pherwani</i>	
Estimation of Radius of Curvature of Lumbar Spine Using Bending Sensor for Low Back Pain Prevention . . . . .	533
<i>Takakuni Iituka, Kyoko Shibata, and Yoshio Inoue</i>	
Evaluation of Dispatcher Requirements on Automated Customer Feedback in Public Transport . . . . .	537
<i>Cindy Mayas, Stephan Hörold, Anselmo Stelzer, Frank Englert, and Heidi Krömker</i>	
Experiences of Teaching HCI to a Multidisciplinary Cohort of Computing and Design Students . . . . .	542
<i>Omar Mubin, Abdullah Al Mahmud, and Suleman Shahid</i>	
Experiencing a Home Energy Management System: Finding Opportunities for Design . . . . .	546
<i>Bingxin Ni, Abdullah Al Mahmud, and David V. Keyson</i>	
Eye Strain from Switching Focus in Optical See-Through Displays . . . . .	550
<i>Jaeun Yu and Gerard J. Kim</i>	
First Impression Matters: Exploring the Mediating Effect of Previous Experience on the Perception of Beauty and Usability . . . . .	555
<i>Suleman Shahid and Omar Mubin</i>	
Informing Costumers via Interactive Shelves . . . . .	559
<i>Peter Rogelj</i>	
Intelligent Ankle-Foot Orthosis by Energy Regeneration for Controllable Damping During Gait in Real Time. . . . .	563
<i>Kyoko Shibata, Yoshio Inoue, and Hironobu Satoh</i>	
Interactive Check System for Facilitating Self-awareness of Dorm Students in Upper Secondary Education . . . . .	569
<i>Shigenori Akamatsu, Masanobu Yoshida, Hironobu Satoh, and Takumi Yamaguchi</i>	



Interactive Toys in the Home: A Parents Perspective . . . . . 573  
*Omar Mubin, Duncan Rutishauser, Mauricio Novoa, Derek Wainohu, and Suleman Shahid*

Learning Lessons from Controlled Studies to Investigate Users’ Resilience Strategies . . . . . 578  
*Jonathan Day, George Buchanan, and Stephann Makri*

LightWatch: A Wearable Light Display for Personal Exertion. . . . . 582  
*Jutta Fortmann, Janko Timmermann, Bengt Lüers, Marius Wybrands, Wilko Heuten, and Susanne Boll*

Perceptive Media – Adaptive Storytelling for Digital Broadcast . . . . . 586  
*Adrian Gradinar, Daniel Burnett, Paul Coulton, Ian Forrester, Matt Watkins, Tom Scutt, and Emma Murphy*

Redesigning Interaction in CODES . . . . . 590  
*Elisa Leo de Oliveira, Evandro Manara Miletto, and Luciano Vargas Flores*

Small Community Size of Private SNS for Bonding Relationship: Development of a Research Framework . . . . . 594  
*Hyeonjung Ahn and Sangwon Lee*

Sushi Train Interface: Passive and Interactive Information Sharing . . . . . 599  
*Tomomi Takashina and Yuji Kokumai*

Tangible Microscope with Intuitive Stage Control Interface . . . . . 603  
*Tomomi Takashina, Hitoshi Kawai, and Yuji Kokumai*

Touch Skin: Proprioceptive Input for Small Screen Devices . . . . . 607  
*Changhyeon Lee, Jaedong Lee, and Gerard J. Kim*

Towards In-Air Gesture Control of Household Appliances with Limited Displays . . . . . 611  
*Euan Freeman, Stephen Brewster, and Vuokko Lantz*

Video-Conferencing in E-commerce Website: Effect on Perceived Service Quality and Trust. . . . . 616  
*Suleman Shahid, Abdullah Al Mahmud, and Omar Mubin*

**Organizational Overview**

Contextual Interaction Design Research: *Enabling HCI* . . . . . 621  
*Martin Murer, Alexander Meschtscherjakov, Verena Fuchsberger, Manuel Giuliani, Katja Neureiter, Christiane Moser, Ilhan Aslan, and Manfred Tscheligi*

Organisational Overview: Institute for Design and Assessment of Technology, Vienna University of Technology (TU Wien) . . . . .	624
<i>Geraldine Fitzpatrick, H. Tellioglu, W. Zagler, M. Pohl, F. Güldenpfennig, O. Hödl, R. Ganhör, P. Mayer, and C. Frauenberger</i>	
Technology Experience Research: A Framework for Experience Oriented Technology Development. . . . .	626
<i>Manfred Tscheligi, Sebastian Egger, Peter Fröhlich, Cristina Olaverri-Monreal, and Georg Regal</i>	
Usability Testing Practice at MIMOS Usability Lab . . . . .	628
<i>Norfarhana Abdollah, Ashok Sivaji, and Masitah Ghazali</i>	
<b>Panels</b>	
Design, Innovation and Respect in the Global South . . . . .	630
<i>Jose Abdelnour-Nocera, Chris Csikszentmihályi, Torkil Clemmensen, and Christian Sturm</i>	
Interaction and Humans in Internet of Things . . . . .	633
<i>Markku Turunen, Daniel Sonntag, Klaus-Peter Engelbrecht, Thomas Olsson, Dirk Schnelle-Walka, and Andrés Lucero</i>	
Role of Conferences in Shaping the Field of HCI . . . . .	637
<i>Jan Gulliksen, Simone Diniz Junqueira Barbosa, Anirudha Joshi, Shaun Lawson, and Philippe Palanque</i>	
<b>Tutorials</b>	
Design and Rapid Evaluation of Interactive Systems in Theory and Practice . . . . .	640
<i>Jochen Denzinger and Tom Gross</i>	
How to Design and Build New Musical Interfaces . . . . .	642
<i>Sidney Fels and Michael Lyons</i>	
Sketching User Experiences Tutorial . . . . .	644
<i>Nicolai Marquardt</i>	
Tutorial on Human Computer Interaction for Third Places - THCI-3P . . . . .	647
<i>Junia Anacleto, Sidney Fels, and Roberto Calderon</i>	
Tutorial: Modern Regression Techniques for HCI Researchers . . . . .	651
<i>Martin Schmettow</i>	
Working with Child Participants in Interaction Design. . . . .	655
<i>Janet C. Read</i>	

**Workshops**

Fostering Smart Energy Applications . . . . . 657  
*Masood Masoodian, Elisabeth André, and Thomas Rist*

Human Work Interaction Design (HWID): Design for Challenging  
 Work Environments. . . . . 659  
*Verena Fuchsberger, Martin Murer, Manfred Tscheligi,  
 José Abdelnour-Nocera, Pedro Campos, Frederica Gonçalves,  
 and Barbara Rita Barricelli*

IFIP WG 13.2 Workshop on User Experience and User-Centered  
 Development Processes . . . . . 661  
*Marco Winckler, Regina Bernhaupt, Peter Forbrig, and Stefan Sauer*

IFIP WG 13.5 Workshop on Resilience, Reliability, Safety and Human  
 Error in System Development. . . . . 663  
*Chris Johnson, Mike Feary, Célia Martinie, Phil Palanque,  
 and Regina Peldszus*

Learning Beyond the Classroom: For and About Older  
 and Disabled People . . . . . 665  
*Gerhard Weber, Christopher Power, Helen Petrie, and Jenny Darzentas*

Mediation and Meaning in HCI . . . . . 667  
*Susanne Bødker, Olav W. Bertelsen, Liam Bannon, Clarisse de Souza,  
 Simone Barbosa, and Raquel Prates*

Methods for Undertaking Research on Technology with Older  
 and Disabled People . . . . . 669  
*Helen Petrie, Blathin Gallagher, and Jenny Darzentas*

Social Image Research in the Age of Selfies. . . . . 671  
*Casey Dugan and Sven Laumer*

The Landscape of UX Requirements Practices . . . . . 673  
*Gregorio Convertino, Nancy Frishberg, Jettie Hoonhout,  
 Rosa Lanzilotti, Marta Kristín Lárusdóttir, and Effie Lai-Chong Law*

Workshop on Designing Interaction and Visualization for Mobile  
 Applications (DIViM 2015) . . . . . 675  
*Shah Rukh Humayoun, Achim Ebert, Steffen Hess,  
 and Gerrit van der Veer*

Workshop on Interactivity in Healthcare Systems (IHS). . . . . 677  
*Vicki Hanson, Gemma Webster, and Matt Dennis*

**Author Index** . . . . . 679