Lecture Notes in Computer Science 2411

Edited by G. Goos, J. Hartmanis, and J. van Leeuwen

Springer
Berlin
Heidelberg
New York
Barcelona
Hong Kong
London
Milan
Paris
Tokyo

Fabio Paternò (Ed.)

Human Computer Interaction with Mobile Devices

4th International Symposium, Mobile HCI 2002
Pisa, Italy, September 18-20, 2002
Proceedings

Springer

Series Editors

Gerhard Goos, Karlsruhe University, Germany
Juris Hartmanis, Cornell University, NY, USA
Jan van Leeuwen, Utrecht University, The Netherlands

Volume Editor

Fabio Paternò
Consiglio Nazionale delle Ricerche, ISTI
Via G. Moruzzi,1, 56124 Pisa, Italy
E-mail: fabio.paterno@cnuce.cnr.it

Cataloging-in-Publication Data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Human computer interaction with mobile devices : 4th international symposium ; proceedings / Mobile HCI 2002, Pisa, Italy, September 18 - 20, 2002. Fabio Paternò (ed.). - Berlin ; Heidelberg ; New York ; Barcelona ; Hong Kong ; London ; Milan ; Paris ; Tokyo : Springer, 2002
(Lecture notes in computer science ; Vol. 2411)
ISBN 3-540-44189-1

CR Subject Classification (1998): H.5.2, H.5.3, H.5, H.4, C.2, I.2.1

ISSN 0302-9743
ISBN 3-540-44189-1 Springer-Verlag Berlin Heidelberg New York

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-Verlag. Violations are liable for prosecution under the German Copyright Law.

Springer-Verlag Berlin Heidelberg New York,
a member of BertelsmannSpringer Science+Business Media GmbH

http://www.springer.de

© Springer-Verlag Berlin Heidelberg 2002
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Steingräber Satztechnik GmbH, Heidelberg
Printed on acid-free paper SPIN: 10873714 06/3142 5 4 3 2 1 0

Preface

It was a wager, but it has worked. Mobile HCI used to be a workshop, often held in conjunction with other events. Instead, this time it was a true symposium. I felt there was a need for this change because of the ever-increasing interest prompted by the issues involved in interactive mobile systems and the lack of specific events focusing on such aspects. Although there are events addressing the broad area of ubiquitous computing, they tend to concentrate on other topics. For example, a paper on criteria for the design of interactive mobile phone applications would be considered inappropriate for such events, whereas it would certainly be relevant for Mobile HCI.

The response to the symposium has been positive in terms of submissions and participation. The contributions, especially the long papers, were selected carefully by the International Program Committee. The result is a set of interesting and stimulating papers that address such important issues as location awareness, design criteria for PDAs, context-dependent systems, innovative case studies, usability evaluation in small devices, and novel interfaces for mobile devices. The interest shown in the symposium has truly been worldwide: we have authors from 16 countries on three continents. There is a good balance of contributions from academia and industry. The final program of the symposium included two technical invited speakers (Brad Myers from Carnegie Mellon University and Luca Passani from Openwave), 18 full papers and 32 short papers, as well as a session with a representative of the European Commission to present and discuss their future programs in this area, and a number of interactive demos that allow participants to have direct experience of innovative results.

More generally, we can note that recent years have seen the introduction of many types of computers and devices (e.g., cellphones, PDAs, etc.) and the availability of this wide range of devices has become a fundamental challenge for designers of interactive software systems. Users wish to be able to seamlessly access information and services regardless of the device they are using, even when the system or the environment changes dynamically. To this end, computer-based applications need to run on a wide spectrum of devices. These challenges are addressed in research projects such as the CAMELEON IST Project (http://giove.cnuce.cnr.it/cameleon.html), which I coordinate. The project's main point is to develop methods and tools able to support the design and development of highly usable context-sensitive interactive software systems with the support of models that allow designers to better manage the increasing complexity of design. The resulting applications should behave like chameleons! They should be able to change their forms depending upon the types of devices utilized by users to perform their tasks and the surrounding environment.

Last, but not least, let me thank all those who helped to organize the symposium, in particular, the International Program Committee and Carmen Santoro who managed the symposium website and chaired the tutorial and workshop program.

July 2002 Fabio Paternò

Program Committee

Stephen Brewster – University of Glasgow, UK
Luca Chittaro – Universiy of Udine, Italy
Keith Cheverst – University of Lancaster, UK
Joelle Coutaz – University of Grenoble, France
Nicholas Graham – Queen's University, Canada
Mary Czerwinski – Microsoft Research, USA
Alan Dix – vfridge limited and University of Lancaster, UK
Mark Dunlop – University of Strathclyde, UK
Phil Gray – University of Glasgow, UK
Nicholas Graham – Queen's University, Canada
Tom Gross – Fraunhofer FIT, Germany
Laurence Nigay – University of Grenoble, France
Dan Olsen – Brigham Young University, USA
Reinhardt Opperman – Fraunhofer FIT, Germany
Fabio Paternò (Chair) – ISTI CNR, Italy
Angel Puerta – RedWhale Software, USA
Matthias Rauterberg – University of Eindhoven, The Netherlands
Daniel Salber – IBM T.J. Watson Research Center, USA
Carmen Santoro – ISTI CNR, Italy
Albrecht Schmidt – Universität Karlsruhe, Germany
Mathias Schneider-Hufschmidt – Siemens, Germany
Ahmed Seffah – Concordia University, Canada
Constantine Stephanidis – FORTH, Greece
Kaisa Vaananen – Nokia, Finland
Jean Vanderdonckt – University of Louvain, Belgium
Bruno von Niman – Ericsson Enterprise, Sweden

Sponsoring Organizations

ERCIM
IFIP TC13
ACM-SIGCHI
ACM SIGCHI-Italy
ISTI-CNR

Table of Contents

Invited Speakers

Mobile Devices for Control 1
B.A. Myers

Building Usable Wireless Applications for Mobile Phones 9
L. Passani

Location Awareness

A Diary Study of Rendezvousing:
Group Size, Time Pressure and Connectivity 21
M. Colbert

Automated Multimedia Diaries of Mobile Device Users
Need Summarization 36
M. Gelgon, K.Tilhou

Personal Location Agent for Communicating Entities (PLACE) 45
J. Lin, R. Laddaga, H. Naito

Distributing Event Information
by Simulating Word-of-Mouth Exchanges 60
E.M. Huang, M. Terry, E. Mynatt, K. Lyons, A. Chen

Design Support for PDAs

A New Transcoding Technique for PDA Browsers,
Based on Content Hierarchy 69
F.J. González-Castaño, L. Anido-Rifón, E. Costa-Montenegro

Sorting Out Searching on Small Screen Devices 81
M. Jones, G. Buchanan, H. Thimbleby

Context Dependent Systems

Adapting Applications in Mobile Terminals
Using Fuzzy Context Information 95
J. Mäntyjärvi, T. Seppänen

Direct Combination:
A New User Interaction Principle for Mobile and Ubiquitous HCI 108
S. Holland, D.R. Morse, H. Gedenryd

ASUR++: A Design Notation for Mobile Mixed Systems 123
E. Dubois, P. Gray, L. Nigay

Innovative Case Studies

Designing Lol@, a Mobile Tourist Guide for UMTS 140
G. Pospischil, M. Umlauft, E. Michlmayr

Location-Aware Shopping Assistance:
Evaluation of a Decision-Theoretic Approach 155
T. Bohnenberger, A. Jameson, A. Krüger, A. Butz

handiMessenger:
Awareness-Enhanced Universal Communication for Mobile Users 170
S. Hibino, A. Mockus

Usability Evaluation in Small Devices

An Empirical Study of the Minimum Required Size
and the Minimum Number of Targets
for Pen Input on the Small Display 184
S. Mizobuchi, K. Mori, X. Ren, Y. Michiaki

KSPC (Keystrokes per Character)
as a Characteristic of Text Entry Techniques 195
I.S. MacKenzie

Lost or Found? A Usability Evaluation
of a Mobile Navigation and Location-Based Service 211
D. Chincholle, M. Goldstein, M. Nyberg, M. Eriksson

Towards an Improved Readability on Mobile Devices:
Evaluating Adaptive Rapid Serial Visual Presentation 225
G. Öquist, M. Goldstein

Novel User Interfaces for Mobile Devices

Mobile and Collaborative Augmented Reality:
A Scenario Based Design Approach 241
L. Nigay, P. Salembier, T. Marchand, P. Renevier, L. Pasqualetti

The Unigesture Approach:
One-Handed Text Entry for Small Devices 256
V. Sazawal, R. Want, G. Borriello

Short Papers

"Just-in-Place" Information for Mobile Device Interfaces 271
J. Kjeldskov

Pushing Web Pages into Personal Digital Assistants:
Need, Tools and Solutions 276
E. Costa-Montenegro, F.J. González-Castaño,
J. García-Reinoso, J. Vales-Alonso, L. Anido-Rifón

Émigré: Metalevel Architecture and Migratory Work 281
P. Dourish, A. van der Hoek

Interactions Model and Code Generation for J2ME Applications 286
D. Carboni, S. Sanna, S. Giroux, G. Paddeu

An Interface with Weight:
Taking Interaction by Tilt beyond Disembodied Metaphors 291
D. Fallman

UML Modelling of Device-Independent Interfaces and Services
for a Home Environment Application 296
O. Mayora-Ibarra, E. Cambranes-Martínez, C. Miranda-Palma,
A. Fuentes-Penna, O. De la Paz-Arroyo

iTutor: A Wireless and Multimodal Support
to Industrial Maintenance Activities 302
L. Tummolini, A. Lorenzon, G. Bo, R. Vaccaro

ArtemisExpress: A Case Study
in Designing Handheld Interfaces for an Online Digital Library 306
K. Luchini, C. Quintana, E. Soloway

Addressing Mobile HCI Needs through Agents 311
G. O'Hare, M. O'Grady

Consistent Multi-device Design Using Device Categories 315
M. van Welie, B. de Groot

New Generation of IP-Phone Enabled Mobile Devices 319
M. Kohno, J. Rekimoto

A Content Provider-Specified Web Clipping Approach
for Mobile Content Adaptation 324
S. Yang, H. Lee, K. Chung, H. Kim

Case Study: A PDA Example of User Centered Design 329
H. Lamberts

Leveraging the Context of Use in Mobile Service Design 334
B. de Groot, M. van Welie

A Ubiquitous Computing Environment for Language Learning 339
M. Paredes, M. Ortega, P.P. Sánchez-Villalón,
J.Á. Velázquez-Iturbide

XHTML in Mobile Application Development 344
A. Kaikkonen, V. Roto

Understanding Contextual Interactions
to Design Navigational Context-Aware Applications 349
N.A. Bradley, M.D. Dunlop

Towards Scalable User Interfaces in 3D City Information Systems 354
T. Vainio, O. Kotala, I. Rakkolainen, H. Kupila

Mobile Image Messaging –
Anticipating the Outlines of the Usage Culture 359
A. Soronen, V. Tuomisto

Remote Control of Home Automation Systems with Mobile Devices 364
L. Tarrini, R. Bianchi Bandinelli, V. Miori, G. Bertini

Low-Resolution Supplementary Tactile Cues
for Navigational Assistance 369
T. Sokoler, L. Nelson, E.R. Pedersen

Mobile Interface for a Smart Wheelchair 373
J. Abascal, D. Cagigas, N. Garay, L. Gardeazabal

Utilizing Gaze Detection to Simulate the Affordances of Paper
in the Rapid Serial Visual Presentation Format 378
G. Öquist, S. Björk, M. Goldstein

On Interfaces for Mobile Information Retrieval 383
E. Schofield, G. Kubin

User Requirement Analysis and Interface Conception
for a Mobile, Location-Based Fair Guide 388
F. Hermann, F. Heidmann

A Cross-Modal Electronic Travel Aid Device 393
F. Fontana, A. Fusiello, M. Gobbi, V. Murino, D. Rocchesso,
L. Sartor, A. Panuccio

Globalization of Voice-Enabled Internet Access Solutions 398
C. Chesta

Map-Based Access to Multiple Educational On-Line Resources
from Mobile Wireless Devices 404
P. Brusilovsky, R. Rizzo

Supporting Adaptivity to Heterogeneous Platforms
through User Models 409
L. Marucci, F. Paternò

Visualizing Bar Charts on WAP Phones 414
L. Chittaro, A. Camaggio

Structured Menu Presentation Using Spatial Sound Separation 419
G. Lorho, J. Hiipakka, J. Marila

"Do as I Say! ... But Who Says what I Should Say – or Do?"
On the Definition of a Standard Spoken Command Vocabulary
for ICT Devices and Services 425
B. von Niman, C. Chaplin, J.-A. Collado-Vega, L. Groh,
S. McGlashan, W. Mellors, D. van Leeuwen

Author Index 431