

## Founding Editors

Gerhard Goos

*Karlsruhe Institute of Technology, Karlsruhe, Germany*

Juris Hartmanis

*Cornell University, Ithaca, NY, USA*

## Editorial Board Members

Elisa Bertino

*Purdue University, West Lafayette, IN, USA*

Wen Gao

*Peking University, Beijing, China*

Bernhard Steffen 

*TU Dortmund University, Dortmund, Germany*

Gerhard Woeginger 

*RWTH Aachen, Aachen, Germany*

Moti Yung

*Columbia University, New York, NY, USA*

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

Gavriel Salvendy · June Wei (Eds.)

# Design, Operation and Evaluation of Mobile Communications

Second International Conference, MOBILE 2021

Held as Part of the 23rd HCI International Conference, HCII 2021

Virtual Event, July 24–29, 2021

Proceedings

*Editors*

Gavriel Salvendy  
University of Central Florida  
Orlando, FL, USA

June Wei  
College of Business  
University of West Florida  
Pensacola, FL, USA

ISSN 0302-9743                      ISSN 1611-3349 (electronic)  
Lecture Notes in Computer Science  
ISBN 978-3-030-77024-2              ISBN 978-3-030-77025-9 (eBook)  
<https://doi.org/10.1007/978-3-030-77025-9>

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

© Springer Nature Switzerland AG 2021, corrected publication 2021

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, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG  
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

# Foreword

Human-Computer Interaction (HCI) is acquiring an ever-increasing scientific and industrial importance, and having more impact on people's everyday life, as an ever-growing number of human activities are progressively moving from the physical to the digital world. This process, which has been ongoing for some time now, has been dramatically accelerated by the COVID-19 pandemic. The HCI International (HCII) conference series, held yearly, aims to respond to the compelling need to advance the exchange of knowledge and research and development efforts on the human aspects of design and use of computing systems.

The 23rd International Conference on Human-Computer Interaction, HCI International 2021 (HCII 2021), was planned to be held at the Washington Hilton Hotel, Washington DC, USA, during July 24–29, 2021. Due to the COVID-19 pandemic and with everyone's health and safety in mind, HCII 2021 was organized and run as a virtual conference. It incorporated the 21 thematic areas and affiliated conferences listed on the following page.

A total of 5222 individuals from academia, research institutes, industry, and governmental agencies from 81 countries submitted contributions, and 1276 papers and 241 posters were included in the proceedings to appear just before the start of the conference. The contributions thoroughly cover the entire field of HCI, addressing major advances in knowledge and effective use of computers in a variety of application areas. These papers provide academics, researchers, engineers, scientists, practitioners, and students with state-of-the-art information on the most recent advances in HCI. The volumes constituting the set of proceedings to appear before the start of the conference are listed in the following pages.

The HCI International (HCII) conference also offers the option of 'Late Breaking Work' which applies both for papers and posters, and the corresponding volume(s) of the proceedings will appear after the conference. Full papers will be included in the 'HCII 2021 - Late Breaking Papers' volumes of the proceedings to be published in the Springer LNCS series, while 'Poster Extended Abstracts' will be included as short research papers in the 'HCII 2021 - Late Breaking Posters' volumes to be published in the Springer CCIS series.

The present volume contains papers submitted and presented in the context of the 2nd International Conference on Design, Operation and Evaluation of Mobile Communications (MOBILE 2021), an affiliated conference to HCII 2021. I would like to thank the Co-chairs, Gavriel Salvendy and June Wei, for their invaluable contribution to its organization and the preparation of the proceedings, as well as the members of the Program Board for their contributions and support. This year, the MOBILE affiliated conference has focused on topics related to the design, development, and evaluation of mobile interaction systems, as well as the user experience, acceptance and impact of mobile communications.

I would also like to thank the Program Board Chairs and the members of the Program Boards of all thematic areas and affiliated conferences for their contribution towards the highest scientific quality and overall success of the HCI International 2021 conference.

This conference would not have been possible without the continuous and unwavering support and advice of Gavriel Salvendy, founder, General Chair Emeritus, and Scientific Advisor. For his outstanding efforts, I would like to express my appreciation to Abbas Moallem, Communications Chair and Editor of HCI International News.

July 2021

Constantine Stephanidis

# **HCI International 2021 Thematic Areas and Affiliated Conferences**

## **Thematic Areas**

- HCI: Human-Computer Interaction
- HIMI: Human Interface and the Management of Information

## **Affiliated Conferences**

- EPCE: 18th International Conference on Engineering Psychology and Cognitive Ergonomics
- UAHCI: 15th International Conference on Universal Access in Human-Computer Interaction
- VAMR: 13th International Conference on Virtual, Augmented and Mixed Reality
- CCD: 13th International Conference on Cross-Cultural Design
- SCSM: 13th International Conference on Social Computing and Social Media
- AC: 15th International Conference on Augmented Cognition
- DHM: 12th International Conference on Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management
- DUXU: 10th International Conference on Design, User Experience, and Usability
- DAPI: 9th International Conference on Distributed, Ambient and Pervasive Interactions
- HCIBGO: 8th International Conference on HCI in Business, Government and Organizations
- LCT: 8th International Conference on Learning and Collaboration Technologies
- ITAP: 7th International Conference on Human Aspects of IT for the Aged Population
- HCI-CPT: 3rd International Conference on HCI for Cybersecurity, Privacy and Trust
- HCI-Games: 3rd International Conference on HCI in Games
- MobiTAS: 3rd International Conference on HCI in Mobility, Transport and Automotive Systems
- AIS: 3rd International Conference on Adaptive Instructional Systems
- C&C: 9th International Conference on Culture and Computing
- MOBILE: 2nd International Conference on Design, Operation and Evaluation of Mobile Communications
- AI-HCI: 2nd International Conference on Artificial Intelligence in HCI

## **List of Conference Proceedings Volumes Appearing Before the Conference**

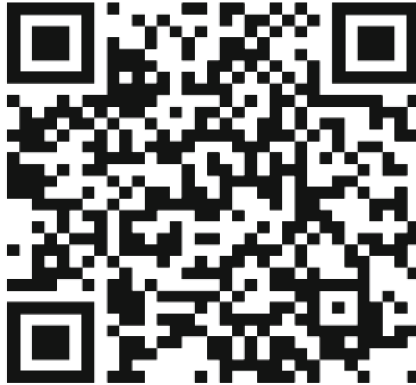
1. LNCS 12762, Human-Computer Interaction: Theory, Methods and Tools (Part I), edited by Masaaki Kurosu
2. LNCS 12763, Human-Computer Interaction: Interaction Techniques and Novel Applications (Part II), edited by Masaaki Kurosu
3. LNCS 12764, Human-Computer Interaction: Design and User Experience Case Studies (Part III), edited by Masaaki Kurosu
4. LNCS 12765, Human Interface and the Management of Information: Information Presentation and Visualization (Part I), edited by Sakae Yamamoto and Hirohiko Mori
5. LNCS 12766, Human Interface and the Management of Information: Information-rich and Intelligent Environments (Part II), edited by Sakae Yamamoto and Hirohiko Mori
6. LNAI 12767, Engineering Psychology and Cognitive Ergonomics, edited by Don Harris and Wen-Chin Li
7. LNCS 12768, Universal Access in Human-Computer Interaction: Design Methods and User Experience (Part I), edited by Margherita Antona and Constantine Stephanidis
8. LNCS 12769, Universal Access in Human-Computer Interaction: Access to Media, Learning and Assistive Environments (Part II), edited by Margherita Antona and Constantine Stephanidis
9. LNCS 12770, Virtual, Augmented and Mixed Reality, edited by Jessie Y. C. Chen and Gino Fragomeni
10. LNCS 12771, Cross-Cultural Design: Experience and Product Design Across Cultures (Part I), edited by P. L. Patrick Rau
11. LNCS 12772, Cross-Cultural Design: Applications in Arts, Learning, Well-being, and Social Development (Part II), edited by P. L. Patrick Rau
12. LNCS 12773, Cross-Cultural Design: Applications in Cultural Heritage, Tourism, Autonomous Vehicles, and Intelligent Agents (Part III), edited by P. L. Patrick Rau
13. LNCS 12774, Social Computing and Social Media: Experience Design and Social Network Analysis (Part I), edited by Gabriele Meiselwitz
14. LNCS 12775, Social Computing and Social Media: Applications in Marketing, Learning, and Health (Part II), edited by Gabriele Meiselwitz
15. LNAI 12776, Augmented Cognition, edited by Dylan D. Schmorrow and Cali M. Fidopiastis
16. LNCS 12777, Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management: Human Body, Motion and Behavior (Part I), edited by Vincent G. Duffy
17. LNCS 12778, Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management: AI, Product and Service (Part II), edited by Vincent G. Duffy



18. LNCS 12779, Design, User Experience, and Usability: UX Research and Design (Part I), edited by Marcelo Soares, Elizabeth Rosenzweig, and Aaron Marcus
19. LNCS 12780, Design, User Experience, and Usability: Design for Diversity, Well-being, and Social Development (Part II), edited by Marcelo M. Soares, Elizabeth Rosenzweig, and Aaron Marcus
20. LNCS 12781, Design, User Experience, and Usability: Design for Contemporary Technological Environments (Part III), edited by Marcelo M. Soares, Elizabeth Rosenzweig, and Aaron Marcus
21. LNCS 12782, Distributed, Ambient and Pervasive Interactions, edited by Norbert Streitz and Shin'ichi Konomi
22. LNCS 12783, HCI in Business, Government and Organizations, edited by Fiona Fui-Hoon Nah and Keng Siau
23. LNCS 12784, Learning and Collaboration Technologies: New Challenges and Learning Experiences (Part I), edited by Panayiotis Zaphiris and Andri Ioannou
24. LNCS 12785, Learning and Collaboration Technologies: Games and Virtual Environments for Learning (Part II), edited by Panayiotis Zaphiris and Andri Ioannou
25. LNCS 12786, Human Aspects of IT for the Aged Population: Technology Design and Acceptance (Part I), edited by Qin Gao and Jia Zhou
26. LNCS 12787, Human Aspects of IT for the Aged Population: Supporting Everyday Life Activities (Part II), edited by Qin Gao and Jia Zhou
27. LNCS 12788, HCI for Cybersecurity, Privacy and Trust, edited by Abbas Moallem
28. LNCS 12789, HCI in Games: Experience Design and Game Mechanics (Part I), edited by Xiaowen Fang
29. LNCS 12790, HCI in Games: Serious and Immersive Games (Part II), edited by Xiaowen Fang
30. LNCS 12791, HCI in Mobility, Transport and Automotive Systems, edited by Heidi Krömker
31. LNCS 12792, Adaptive Instructional Systems: Design and Evaluation (Part I), edited by Robert A. Sottilare and Jessica Schwarz
32. LNCS 12793, Adaptive Instructional Systems: Adaptation Strategies and Methods (Part II), edited by Robert A. Sottilare and Jessica Schwarz
33. LNCS 12794, Culture and Computing: Interactive Cultural Heritage and Arts (Part I), edited by Matthias Rauterberg
34. LNCS 12795, Culture and Computing: Design Thinking and Cultural Computing (Part II), edited by Matthias Rauterberg
35. LNCS 12796, Design, Operation and Evaluation of Mobile Communications, edited by Gavriel Salvendy and June Wei
36. LNAI 12797, Artificial Intelligence in HCI, edited by Helmut Degen and Stavroula Ntoa
37. CCIS 1419, HCI International 2021 Posters - Part I, edited by Constantine Stephanidis, Margherita Antona, and Stavroula Ntoa

38. CCIS 1420, HCI International 2021 Posters - Part II, edited by Constantine Stephanidis, Margherita Antona, and Stavroula Ntoa
39. CCIS 1421, HCI International 2021 Posters - Part III, edited by Constantine Stephanidis, Margherita Antona, and Stavroula Ntoa

**<http://2021.hci.international/proceedings>**



## **2nd International Conference on Design, Operation and Evaluation of Mobile Communications (MOBILE 2021)**

Program Board Chairs: **Gavriel Salvendy**, *University of Central Florida, USA* and  
**June Wei**, *University of West Florida, USA*

- Štefan Bojnec, Slovakia
- Su Mon Chit, Malaysia
- Dhanapal Durai Dominic, Malaysia
- Zhongwei Gu, China
- Dedi Inan, Indonesia
- P. S. JosephNg, Malaysia
- Mitsuru Kodama, Japan
- Kai Koong, USA
- Taowen Le, USA
- Caihong Liu, China
- Manlu Liu, USA
- Andy Lu, USA
- Alok Mishra, Turkey
- Kongkiti Phusavat, Thailand
- Bharat S. Rawal Kshatriya, USA
- Omair Shafiq, Canada
- Sharon Mirella Wakhu, Kenya
- Fuhong Wang, China
- Jiaqin Yang, USA
- Shuiqing Yang, China
- Lifan Yang, China
- Peiyan Zhou, China

The full list with the Program Board Chairs and the members of the Program Boards of all thematic areas and affiliated conferences is available online at:

**<http://www.hci.international/board-members-2021.php>**



# **HCI International 2022**

The 24th International Conference on Human-Computer Interaction, HCI International 2022, will be held jointly with the affiliated conferences at the Gothia Towers Hotel and Swedish Exhibition & Congress Centre, Gothenburg, Sweden, June 26 – July 1, 2022. It will cover a broad spectrum of themes related to Human-Computer Interaction, including theoretical issues, methods, tools, processes, and case studies in HCI design, as well as novel interaction techniques, interfaces, and applications. The proceedings will be published by Springer. More information will be available on the conference website: <http://2022.hci.international/>:

General Chair

Prof. Constantine Stephanidis

University of Crete and ICS-FORTH

Heraklion, Crete, Greece

Email: [general\\_chair@hci2022.org](mailto:general_chair@hci2022.org)

<http://2022.hci.international/>



# Contents

## Designing, Developing and Evaluating Mobile Interaction Systems

|   |     |
|---|-----|
| Design of Customer Satisfaction Evaluation System Based on Big Data. . . . .  | 3   |
| <i>Long Cheng, Jing Cao, and Zhongwei Gu</i>  |     |
| The Evaluation Framework for Wearable Devices Service Quality Based on SERVQUAL Model . . . . .                             | 11  |
| <i>Youxiang Cui, Haibo Tang, and Zhongwei Gu</i>  |     |
| Customer Satisfaction Evaluation Method Based on Big Data. . . . .  | 19  |
| <i>Zhongwei Gu, Youxiang Cui, Haibo Tang, and Xiao Liu</i>  |     |
| Investigation of Information Requirements for Smartwatch-Based Evacuation Support System . . . . .                          | 27  |
| <i>Tomoko Izumi, Fumiya Takarai, Takayoshi Kitamura, and Yoshio Nakatani</i>  |     |
| Application of Improved DTW Algorithm in Smart Home Industry. . . . .   | 38  |
| <i>Wen Jiang, Yiling Zhao, and Zhongwei Gu</i>  |     |
| Research on Risk Management of Digital Currency Based on Blockchain Technology in Mobile Commerce . . . . .                 | 45  |
| <i>Xinyu Li and Peiyan Zhou</i>   |     |
| Developing a Mobile Learning Application for Preschooler . . . . .  | 68  |
| <i>Yaw Hee Man, Su Mon Chit, and Abdul Samad Bin Shibghatullah</i>  |     |
| Transformation the Business of eCommerce Through Blockchain . . . . .   | 85  |
| <i>Uttam Kumar Roy and Weining Tang</i>   |     |
| Task Characteristics and Participants' Creative Performance in Crowdsourcing Contexts . . . . .                             | 92  |
| <i>Yuan Sun, Zhoujian Fan, and Anand Jeyaraj</i>  |     |
| Design City Trip Management App in the Kuala Lumpur Context During Pandemic Covid-19: A Preliminary Research Case . . . . . | 100 |
| <i>Chee Ling Thong, Su Mon Chit, Lee Yen Chaw, and Chiu Yi Lee</i>  |     |
| Towards Efficient Distance Studies: Online Course Management System (CMS) . . . . .   | 113 |
| <i>S. M. Topazal, Kamal Ali Alezabi, and Chee Ling Thong</i>  |     |

|   |     |
|---|-----|
| A Review on the Research of Producer Services Supply Chain in China . . . .   | 126 |
| <i>Siqi Yin, Caihong Liu, Yi Xie, and Yu Shui</i>   |     |
| An Evaluation on Entity Extraction and Semantic Similarity Metrics<br>to Facilitate Medical Text Analysis Based on WordNet . . . . .  | 138 |
| <i>Qinwei Zhang and Runtong Zhang</i>   |     |
| Investigating Issues Related to VAT Collection and Management<br>in Chinese Mobile Commerce. . . . .  | 152 |
| <i>Peiyan Zhou and Xiaochun Lin</i>   |     |
| Competitive Intelligence in Technological Innovation:<br>An Exploratory Study . . . . .   | 167 |
| <i>Peng Zhou</i>  |     |
| <b>User Experience, Acceptance and Impact of Mobile Communications</b>  |     |
| Accessibility Challenges of Video Conferencing Technology . . . . .   | 185 |
| <i>Nicole Anderson</i>  |     |
| Technology Craving and Withdrawal: Exploring Compulsive Mobile<br>App Use . . . . .   | 195 |
| <i>Jeffrey A. Clements</i>  |     |
| The Use of mPOS in Mexico . . . . .   | 207 |
| <i>Sunday Adewale Olaleye and Manuela Gutiérrez-Leefmans</i>  |     |
| Augmented Reality-Based Dance Training System: A Study<br>of Its Acceptance . . . . .   | 219 |
| <i>Javid Iqbal and Manjit Singh Sidhu</i>   |     |
| Stakeholder Perceptions in the Context of Community Risk Reduction<br>(CRR): Self-reported Hazards as Two-Way Communication Between First<br>Responders and the Communities They Serve. . . . . | 229 |
| <i>Katelynn A. Kapalo, Kevin P. Pfeil, Joseph A. Bonnell,<br/>and Joseph J. LaViola Jr.</i>   |     |
| Global Challenges of Mobile Communication. . . . .  | 243 |
| <i>Taowen Le</i>  |     |
| The Impact of Mobile IT on the Service Innovation Performance<br>of Manufacturing . . . . .   | 254 |
| <i>Caihong Liu, Hannah Ji, and June Wei</i>   |     |
| User Co-creation Value of Short-Video Platform from the Perspective<br>of Interactivity: The Mediating Role of Psychological Attachment. . . . .  | 263 |
| <i>Yumei Luo, Dongyan Li, and Qiongwei Ye</i>   |     |

|  |            |
|--|------------|
| <b>Bibliometric Structured Review of Mobile Information Systems . . . . .</b>  | <b>284</b> |
| <i>Sunday Adewale Olaleye, Ismaila Temitayo Sanusi,<br/>and Oluwaseun Alexander Dada</i>                                       |            |
| <b>Analysis of Malaria Information on a Social Media Platform . . . . .</b>  | <b>298</b> |
| <i>Benjamin Omwando and Jin Zhang</i>  |            |
| <b>The Influence and Prospect of Mobile Communication Technology<br/>on Advanced Manufacturing Industry . . . . .</b>          | <b>317</b> |
| <i>Mei Shao, Miao Zhang, and Yue Jiang</i>   |            |
| <b>Learners' Perception on Integration of Human Personality Types on Mobile<br/>Learning Platform . . . . .</b>                | <b>329</b> |
| <i>Kasthuri Subaramaniam and Sellappan Palaniappan</i>   |            |
| <b>Correction to: Learners' Perception on Integration of Human Personality<br/>Types on Mobile Learning Platform . . . . .</b> | <b>C1</b>  |
| <i>Kasthuri Subaramaniam and Sellappan Palaniappan</i>   |            |
| <b>Author Index . . . . .</b>  | <b>345</b> |