

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

Moti Yung 

Columbia University, New York, NY, USA

More information about this series at <https://link.springer.com/bookseries/558>

Fiona Fui-Hoon Nah · Keng Siau (Eds.)

HCI in Business, Government and Organizations

9th International Conference, HCIBGO 2022

Held as Part of the 24th HCI International Conference, HCII 2022

Virtual Event, June 26 – July 1, 2022

Proceedings



Springer

Editors

Fiona Fui-Hoon Nah
City University of Hong Kong
Hong Kong, Hong Kong

Keng Siau
City University of Hong Kong
Hong Kong, Hong Kong

ISSN 0302-9743

ISSN 1611-3349 (electronic)

Lecture Notes in Computer Science

ISBN 978-3-031-05543-0

ISBN 978-3-031-05544-7 (eBook)

<https://doi.org/10.1007/978-3-031-05544-7>

© The Editor(s) (if applicable) and The Author(s), under exclusive license
to Springer Nature Switzerland AG 2022

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, as well as 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 24th International Conference on Human-Computer Interaction, HCI International 2022 (HCII 2022), was planned to be held at the Gothia Towers Hotel and Swedish Exhibition & Congress Centre, Göteborg, Sweden, during June 26 to July 1, 2022. Due to the COVID-19 pandemic and with everyone's health and safety in mind, HCII 2022 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 5583 individuals from academia, research institutes, industry, and governmental agencies from 88 countries submitted contributions, and 1276 papers and 275 posters were included in the proceedings to appear just before the start of the conference. The contributions thoroughly cover the entire field of human-computer interaction, 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 2022 - 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 2022 - Late Breaking Posters' volumes to be published in the Springer CCIS series.

I would like to thank the Program Board Chairs and the members of the Program Boards of all thematic areas and affiliated conferences for their contribution and support towards the highest scientific quality and overall success of the HCI International 2022 conference; they have helped in so many ways, including session organization, paper reviewing (single-blind review process, with a minimum of two reviews per submission) and, more generally, acting as goodwill ambassadors for the HCII 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.

June 2022

Constantine Stephanidis

HCI International 2022 Thematic Areas and Affiliated Conferences

Thematic Areas

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

Affiliated Conferences

- EPCE: 19th International Conference on Engineering Psychology and Cognitive Ergonomics
- AC: 16th International Conference on Augmented Cognition
- UAHCI: 16th International Conference on Universal Access in Human-Computer Interaction
- CCD: 14th International Conference on Cross-Cultural Design
- SCSM: 14th International Conference on Social Computing and Social Media
- VAMR: 14th International Conference on Virtual, Augmented and Mixed Reality
- DHM: 13th International Conference on Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management
- DUXU: 11th International Conference on Design, User Experience and Usability
- C&C: 10th International Conference on Culture and Computing
- DAPI: 10th International Conference on Distributed, Ambient and Pervasive Interactions
- HCIBGO: 9th International Conference on HCI in Business, Government and Organizations
- LCT: 9th International Conference on Learning and Collaboration Technologies
- ITAP: 8th International Conference on Human Aspects of IT for the Aged Population
- AIS: 4th International Conference on Adaptive Instructional Systems
- HCI-CPT: 4th International Conference on HCI for Cybersecurity, Privacy and Trust
- HCI-Games: 4th International Conference on HCI in Games
- MobiTAS: 4th International Conference on HCI in Mobility, Transport and Automotive Systems
- AI-HCI: 3rd International Conference on Artificial Intelligence in HCI
- MOBILE: 3rd International Conference on Design, Operation and Evaluation of Mobile Communications

List of Conference Proceedings Volumes Appearing Before the Conference

1. LNCS 13302, Human-Computer Interaction: Theoretical Approaches and Design Methods (Part I), edited by Masaaki Kurosu
2. LNCS 13303, Human-Computer Interaction: Technological Innovation (Part II), edited by Masaaki Kurosu
3. LNCS 13304, Human-Computer Interaction: User Experience and Behavior (Part III), edited by Masaaki Kurosu
4. LNCS 13305, Human Interface and the Management of Information: Visual and Information Design (Part I), edited by Sakae Yamamoto and Hirohiko Mori
5. LNCS 13306, Human Interface and the Management of Information: Applications in Complex Technological Environments (Part II), edited by Sakae Yamamoto and Hirohiko Mori
6. LNAI 13307, Engineering Psychology and Cognitive Ergonomics, edited by Don Harris and Wen-Chin Li
7. LNCS 13308, Universal Access in Human-Computer Interaction: Novel Design Approaches and Technologies (Part I), edited by Margherita Antona and Constantine Stephanidis
8. LNCS 13309, Universal Access in Human-Computer Interaction: User and Context Diversity (Part II), edited by Margherita Antona and Constantine Stephanidis
9. LNAI 13310, Augmented Cognition, edited by Dylan D. Schmorow and Cali M. Fidopiastis
10. LNCS 13311, Cross-Cultural Design: Interaction Design Across Cultures (Part I), edited by Pei-Luen Patrick Rau
11. LNCS 13312, Cross-Cultural Design: Applications in Learning, Arts, Cultural Heritage, Creative Industries, and Virtual Reality (Part II), edited by Pei-Luen Patrick Rau
12. LNCS 13313, Cross-Cultural Design: Applications in Business, Communication, Health, Well-being, and Inclusiveness (Part III), edited by Pei-Luen Patrick Rau
13. LNCS 13314, Cross-Cultural Design: Product and Service Design, Mobility and Automotive Design, Cities, Urban Areas, and Intelligent Environments Design (Part IV), edited by Pei-Luen Patrick Rau
14. LNCS 13315, Social Computing and Social Media: Design, User Experience and Impact (Part I), edited by Gabriele Meiselwitz
15. LNCS 13316, Social Computing and Social Media: Applications in Education and Commerce (Part II), edited by Gabriele Meiselwitz
16. LNCS 13317, Virtual, Augmented and Mixed Reality: Design and Development (Part I), edited by Jessie Y. C. Chen and Gino Fragomeni
17. LNCS 13318, Virtual, Augmented and Mixed Reality: Applications in Education, Aviation and Industry (Part II), edited by Jessie Y. C. Chen and Gino Fragomeni

18. LNCS 13319, Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management: Anthropometry, Human Behavior, and Communication (Part I), edited by Vincent G. Duffy
19. LNCS 13320, Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management: Health, Operations Management, and Design (Part II), edited by Vincent G. Duffy
20. LNCS 13321, Design, User Experience, and Usability: UX Research, Design, and Assessment (Part I), edited by Marcelo M. Soares, Elizabeth Rosenzweig and Aaron Marcus
21. LNCS 13322, Design, User Experience, and Usability: Design for Emotion, Well-being and Health, Learning, and Culture (Part II), edited by Marcelo M. Soares, Elizabeth Rosenzweig and Aaron Marcus
22. LNCS 13323, Design, User Experience, and Usability: Design Thinking and Practice in Contemporary and Emerging Technologies (Part III), edited by Marcelo M. Soares, Elizabeth Rosenzweig and Aaron Marcus
23. LNCS 13324, Culture and Computing, edited by Matthias Rauterberg
24. LNCS 13325, Distributed, Ambient and Pervasive Interactions: Smart Environments, Ecosystems, and Cities (Part I), edited by Norbert A. Streitz and Shin'ichi Konomi
25. LNCS 13326, Distributed, Ambient and Pervasive Interactions: Smart Living, Learning, Well-being and Health, Art and Creativity (Part II), edited by Norbert A. Streitz and Shin'ichi Konomi
26. LNCS 13327, HCI in Business, Government and Organizations, edited by Fiona Fui-Hoon Nah and Keng Siau
27. LNCS 13328, Learning and Collaboration Technologies: Designing the Learner and Teacher Experience (Part I), edited by Panayiotis Zaphiris and Andri Ioannou
28. LNCS 13329, Learning and Collaboration Technologies: Novel Technological Environments (Part II), edited by Panayiotis Zaphiris and Andri Ioannou
29. LNCS 13330, Human Aspects of IT for the Aged Population: Design, Interaction and Technology Acceptance (Part I), edited by Qin Gao and Jia Zhou
30. LNCS 13331, Human Aspects of IT for the Aged Population: Technology in Everyday Living (Part II), edited by Qin Gao and Jia Zhou
31. LNCS 13332, Adaptive Instructional Systems, edited by Robert A. Sottilare and Jessica Schwarz
32. LNCS 13333, HCI for Cybersecurity, Privacy and Trust, edited by Abbas Moallem
33. LNCS 13334, HCI in Games, edited by Xiaowen Fang
34. LNCS 13335, HCI in Mobility, Transport and Automotive Systems, edited by Heidi Krömker
35. LNAI 13336, Artificial Intelligence in HCI, edited by Helmut Degen and Stavroula Ntoa
36. LNCS 13337, Design, Operation and Evaluation of Mobile Communications, edited by Gavriel Salvendy and June Wei
37. CCIS 1580, HCI International 2022 Posters - Part I, edited by Constantine Stephanidis, Margherita Antona and Stavroula Ntoa
38. CCIS 1581, HCI International 2022 Posters - Part II, edited by Constantine Stephanidis, Margherita Antona and Stavroula Ntoa

39. CCIS 1582, HCI International 2022 Posters - Part III, edited by Constantine Stephanidis, Margherita Antona and Stavroula Ntoa
40. CCIS 1583, HCI International 2022 Posters - Part IV, edited by Constantine Stephanidis, Margherita Antona and Stavroula Ntoa

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



Preface

The use and role of technology in the business and organizational context have always been at the heart of human-computer interaction (HCI) since the start of management information systems. In general, HCI research in such a context is concerned with the ways humans interact with information, technologies, and tasks in the business, managerial, and organizational contexts. Hence, the focus lies in understanding the relationships and interactions between people (e.g., management, users, implementers, designers, developers, senior executives, and vendors), tasks, contexts, information, and technology. Today, with the explosion of the metaverse, social media, big data, and the Internet of Things, new pathways are opening in this direction, which need to be investigated and exploited.

The 9th International Conference on HCI in Business, Government and Organizations (HCIBGO 2022), an affiliated conference of the HCI International (HCII) conference, promoted and supported multidisciplinary dialogue, cross-fertilization of ideas, and greater synergies between research, academia, and stakeholders in the business, managerial, and organizational domain.

HCI in business, government, and organizations ranges across a broad spectrum of topics from digital transformation to customer engagement. The HCIBGO conference facilitates the advancement of HCI research and practice for individuals, groups, enterprises, and the society at large. The topics covered include emerging areas such as artificial intelligence and machine learning, blockchain, service design, live streaming in electronic commerce, visualization, and workplace design.

One volume of the HCII 2022 proceedings is dedicated to this year's edition of the HCIBGO conference and it focuses on topics related to digital transformation in business, government, and organizations; intelligent data analysis and business analytics; user experience and innovation design; HCI in the workplace; and retail, commerce, and customer engagement.

Papers of this volume are included for publication after a minimum of two single-blind reviews from the members of the HCIBGO Program Board or, in some cases, from members of the Program Boards of other affiliated conferences. We would like to thank all of them for their invaluable contribution, support, and efforts.

June 2022

Fiona Fui-Hoon Nah
Keng Siau

9th International Conference on HCI in Business, Government and Organizations (HCIBGO 2022)

Program Board Chairs: **Fiona Fui-Hoon Nah** and **Keng Siau**, City University of Hong Kong, Kowloon Tong, Kowloon, Hong Kong

- Kaveh Abhari, San Diego State University, USA
- Andreas Auinger, University of Applied Sciences Upper Austria, Austria
- Michel Avital, Copenhagen Business School, Denmark
- Denise Baker, Missouri University of Science and Technology, USA
- Valerie Bartelt, University of Denver, USA
- Kaveh Bazargan, Allameh Tabataba'i University, Iran
- Langtao Chen, Missouri University of Science and Technology, USA
- Constantinos K. Coursaris, HEC Montréal, Canada
- Brenda Eschenbrenner, University of Nebraska at Kearney, USA
- JM Goh, Simon Fraser University, Canada
- Netta Iivari, University of Oulu, Finland
- Qiqi Jiang, Copenhagen Business School, Denmark
- Yi-Cheng Ku, Fu Jen Catholic University, Taiwan
- Murad Moqbel, University of Texas Rio Grande Valley, USA
- Natalie Pang Lee San, National University of Singapore, Singapore
- Norman Shaw, Ryerson University, Canada
- Jia Shen, Rider University, USA
- Martin Stabauer, Johannes Kepler University Linz, Austria
- Werner Wetzlinger, University of Applied Sciences Upper Austria, Austria
- I-Chin Wu, National Taiwan Normal University, Taiwan
- Dezhi Wu, University of South Carolina, USA
- Jie Yu, University of Nottingham Ningbo China, 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-2022.php>



HCI International 2023

The 25th International Conference on Human-Computer Interaction, HCI International 2023, will be held jointly with the affiliated conferences at the AC Bella Sky Hotel and Bella Center, Copenhagen, Denmark, 23–28 July 2023. 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://2023.hci.international/>.

General Chair
Constantine Stephanidis
University of Crete and ICS-FORTH
Heraklion, Crete, Greece
Email: general_chair@hci2023.org

<http://2023.hci.international/>



Contents

Digital Transformation in Business, Government, and Organizations

Explore the Influence of Smart Contract on Online Lending	3
<i>Cheng-Hsin Chiang, Vipin Saini, Yu-Chen Yang, and Tsai-Wen Shih</i>	
Better Decision-Making Through Collaborative Development of Proposals	11
<i>Björn Ebbinghaus and Martin Mauve</i>	
Design and Implementation of a Collaborative Idea Evaluation System	24
<i>Andreas Hermann</i>	
COVID-19 AI Inspector	41
<i>Carlos Alexander Jarquin, Ryan Collin De Leon, and Yung-Hao Wong</i>	
Leveraging Human and Machine Capabilities for Analyzing Citizen Contributions in Participatory Urban Planning and Development: A Design-Oriented Approach	56
<i>Gerrit C. Küstermann and Eva A. C. Bittner</i>	
The Increasing e-Competence Gap: Developments over the Past Five Years in the German Public Sector	73
<i>Michael Koddebusch, Sebastian Halsbenning, Paul Kruse, Michael Rückers, and Jörg Becker</i>	
Transforming Cultural Heritage—A Digital Humanity Perspective with Virtual Reality	87
<i>Ling-Ling Lai, Sinn-Cheng Lin, and Han-Chian Wang</i>	
An Epistemological Analysis of the “Brain in a Vat” Approach for the Philosophy of Artificial Intelligence	97
<i>Batnasan Luvaanjalba and Bo-chiuan Su</i>	
Fans with Benefits - Posting User-Generated Content on Brand-Owned Social Media Channels	112
<i>Jawin Schell and Christopher Zerres</i>	
The Economic Theoretical Implications of Blockchain and Its Application in Marine Debris Removal	127
<i>Ting Jung Tsao</i>	

Intelligent Data Analysis and Business Analytics

The Corpus of Emotional Valences for 33,669 Chinese Words Based
on Big Data 141
*Chia-Yueh Chang, Yen-Cheng Chen, Meng-Ning Tsai, Yao-Ting Sung,
Yu-Lin Chang, Shu-Yen Lin, Shu-Ling Cho, Tao-Hsing Chang,
and Hsueh-Chih Chen*

Predicting the Usefulness of Questions in Q&A Communities:
A Comparison of Classical Machine Learning and Deep Learning
Approaches 153
Langtao Chen

Building a “Corpus of 7 Types Emotion Co-occurrences Words”
of Chinese Emotional Words with Big Data Corpus 163
*Ching-Hui Chen, Yu-Lin Chang, Yen-Cheng Chen, Meng-Ning Tsai,
Yao-Ting Sung, Shu-Yen Lin, Shu-Ling Cho, Tao-Hsing Chang,
and Hsueh-Chih Chen*

China’s CO₂ Emissions Interval Forecasting Based on an Improved
Nonlinear Fractional-Order Grey Multivariable Model 182
Hang Jiang, Xijie Zhang, and Peiyi Kong

User-Centered Assembly Knowledge Documentation: A Graph-Based
Visualization Approach 194
Christian Kruse, Daniela Becks, and Sebastian Venhuis

An Ensemble Learning Method for Constructing Prediction Model
of Cardiovascular Diseases Recurrence 208
Yen-Hsien Lee, Tin-Kwang Lin, Yu-Yang Huang, and Tsai-Hsin Chu

Assessing the Effectiveness of Digital Advertising for Green Products:
A Facial Expression Evaluation Approach 221
Chang Yueh Wang and Fang Suey Lin

Predicting Hospital Admission by Adding Chief Complaints Using
Machine Learning Approach 233
I-Chin Wu, Chu-En Chen, Zhi-Rou Lin, Tzu-Li Chen, and Yen-Yi Feng

User Experience and Innovation Design

Easy Hand Gesture Control of a ROS-Car Using Google MediaPipe
for Surveillance Use 247
Christian Diego Allena, Ryan Collin De Leon, and Yung-Hao Wong

A Survey-Based Study to Identify User Annoyances of German Voice Assistant Users	261
<i>Annebeth Demaeght, Josef Nerb, and Andrea Müller</i>	
Factors that Influence Cookie Acceptance: Characteristics of Cookie Notices that Users Perceive to Affect Their Decisions	272
<i>Julia Giese and Martin Stabauer</i>	
The Factors Influencing the Willingness of Investors to Use Robo-Advisors	286
<i>Yi-Cheng Ku and Hai-Xuan Wang</i>	
Holistic Approach to the Social Acceptance of Building Information Modelling Applications	300
<i>Jari Laarni and Esa Nykänen</i>	
Attracting Future Students' Attention by an UX-Optimized Website	311
<i>Christina Miclau, Luisa Herzog, and Andrea Müller</i>	
Developing Personas for Designing Health Interventions	325
<i>Gaayathri Sankar, Soussan Djamassbi, Yunus Dogan Telliel, Adarsha S. Bajracharya, Daniel J. Amante, and Qiming Shi</i>	
An Analysis of Gender Differences in the Innovative Function Design of Supermarket Self-service Checkout Kiosk	337
<i>Sheng-Ming Wang and Chen Han</i>	
HCI in the Workplace	
Evaluation of the Change in the Quality of Reports with the Application of Gamification in a Corporative Institution	353
<i>Publio Pastrolin Cavalcante and Sergio Antonio Andrade Freitas</i>	
Designing a Workplace Violence Reporting Tool for Healthcare Workers in Hospital Settings	368
<i>Meagan Foster, Karthik Adapa, Amy Cole, Amro Khasawneh, Anna Soloway, Jeffrey Francki, Nancy Havill, and Lukasz Mazur</i>	
Electronic Performance Monitoring: Review of Theories, Conceptual Framework, and Study Proposal	388
<i>Thomas Kalischko and René Riedl</i>	
Strategies for Working Remotely: Responding to Pandemic-Driven Change with Cross-Organizational Community Dialog	407
<i>Elaine M. Raybourn</i>	

Designing a Worker Companion - Design Implications from On-Site
and Remote Participatory Design in the Context of Industry 4.0 417
Jorge Ribeiro, Cristina Santos, Elsa Oliveira, and Ricardo Melo

Development and Evaluation of a Tangible Interaction Concept
for Assembly Workstations 430
Swenja Sawilla and Thomas Schlegel

Retail, Commerce, and Customer Engagement

Smart Fitting Rooms: Acceptance of Smart Retail Technologies
in Omni-Channel Physical Stores 445
Larissa Brümmer and Silvia Zaharia

Unfolding the Practices of Live Streaming: A Dramaturgical Theory
Perspective 463
Tsai-Hsin Chu, Yi-Ling Shen, and Yen-Hsien Lee

Research on the Design of New Retail Service System Based on Service
Design Concept – Setting Electronic Product Recycling Service System
as an Example 481
Wei Ding and Qian Wu

Consumers’ Trust Mechanism and Trust Boundary on Humanizing
Customer Service Chatbots in E-commerce 493
Yimeng Qi, Rong Du, and Ruiqian Yang

Online Shopping During COVID-19: A Comparison of USA and Canada 510
Norman Shaw, Brenda Eschenbrenner, and Ksenia Sergueeva

A Better Shopping Experience Through Intelligent Lists: Mobile
Application and Service Design to Improve the Financial Lives of Young
Adults 526
Jung Joo Sohn and Abhay Sunil

Design of Engagement Platforms for Customer Involvement 542
Fang-Wu Tung and Yu-Wei Chen

Author Index 553