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Masaaki Kurosu (Ed.)

Human-Computer Interaction

Theory, Methods and Tools

Thematic Area, HCI 2021

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

Virtual Event, July 24–29, 2021

Proceedings, Part I



Springer

Editor
Masaaki Kurosu
The Open University of Japan
Chiba, Japan

ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-030-78461-4 ISBN 978-3-030-78462-1 (eBook)
<https://doi.org/10.1007/978-3-030-78462-1>

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

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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 Human-Computer Interaction (HCI 2021) thematic area of HCII 2021. I would like to thank the Chair, Masaaki Kurosu, for his 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 HCI thematic area has focused on topics related to theoretical and methodological approaches to HCI, UX evaluation methods and techniques, emotional and persuasive design, psychological and cognitive aspects of interaction, novel interaction techniques, human-robot interaction, UX and technology acceptance studies, and digital wellbeing, as well as the impact of the COVID-19 pandemic and social distancing on interaction, communication, and work.

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

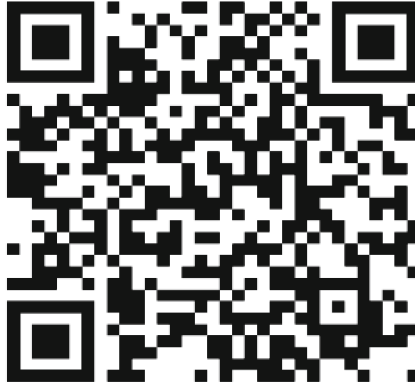
List of Conference Proceedings Volumes Appearing Before the Conference

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>



Human-Computer Interaction Thematic Area (HCI 2021)

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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/>:

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Contents – Part I

HCI Theory, Education and Practice

Human-Computer Natural Interaction Design Practice Based on Unconscious Design Concept.	3
<i>Anyuan Wang and Junnan Ye</i>	
Implementation of Lean Product Development in a University Course and an Industry Project: Lessons Learned from a Comparative Study.	16
<i>Yu-Hsiu Hung and Chia-Hui Fang</i>	
Human Computer Interacting Through a Game Engine: Qualifying Inclusive Design in Architecture	30
<i>Anders Hermund</i>	
Human-Computer Interaction in Education: Keyword and Discipline Network in 20 Years	50
<i>Yongyeon Cho, Huiwon Lim, and Hye Jeong Park</i>	
Building Common Ground: Applying Mutual Learning in the UI/UX Education	66
<i>Wan-Ling Chang and Wen-Hsiang Lu</i>	
Smart Speakers for Inclusion: How Can Intelligent Virtual Assistants Really Assist Everybody?.	77
<i>Eliseo Sciarretta and Lia Alimenti</i>	
A Panel to Confront the Differences in Intersectional HCI	94
<i>Pricila Castelini and Marília Abrahão Amaral</i>	
Information Differentiation in the Information Society: From the Perspective of All Stages of Human Information Activities.	107
<i>Ying Zhao, Ting Xiong, Liang Zhou, Lijia Hu, and Guangyao Li</i>	
Machine-Human Interaction: A Paradigm Shift?	123
<i>Hervé Saint-Louis</i>	
Understanding Agency in Human-Computer Interaction Design	137
<i>Romualdo Gondomar and Enric Mor</i>	
Grounding of Concept, Indexical, and Name	150
<i>Roland Hausser</i>	

Ethics in Human-Centered Design	161
<i>Jun Iio, Atsushi Hasegawa, Shigeyoshi Iizuka, Seiji Hayakawa, and Hiroshi Tsujioka</i>	
AI Creativity and the Human-AI Co-creation Model	171
<i>Zhuohao Wu, Danwen Ji, Kaiwen Yu, Xianxu Zeng, Dingming Wu, and Mohammad Shidujaman</i>	
Two-Way Human-Agent Trust Relationships in Adaptive Cognitive Agent, Adaptive Tasking Scenarios: Literature Metadata Analysis	191
<i>Daniel Kennedy and Maartje Hidalgo</i>	
A Review of Multimodal Interaction in Intelligent Systems	206
<i>May Jorella Lazaro, Sungho Kim, Jaeyong Lee, Jaemin Chun, Gyungbhin Kim, EunJeong Yang, Aigerim Bilyalova, and Myung Hwan Yun</i>	
An Unheimlich Media: Bringing the Uncanny into the World	220
<i>Kenneth Feinstein</i>	
Implementation Goals for Multimodal Interfaces in Human-Computer Interaction	230
<i>Sónia Rafael and Victor M. Almeida</i>	
UX Evaluation Methods, Techniques and Tools	
Guidelines for Collecting Automatic Facial Expression Detection Data Synchronized with a Dynamic Stimulus in Remote Moderated User Tests . . .	243
<i>Félix Giroux, Pierre-Majorique Léger, David Briegne, François Courtemanche, Frédérique Bouvier, Shang-Lin Chen, Salima Tazi, Emma Rucco, Marc Fredette, Constantinos Coursaris, and Sylvain Sénécal</i>	
Distributed Remote Psychophysiological Data Collection for UX Evaluation: A Pilot Project	255
<i>Auréli Vasseur, Pierre-Majorique Léger, François Courtemanche, Elise Labonte-Lemoyne, Vanessa Georges, Audrey Valiquette, David Briegne, Emma Rucco, Constantinos Coursaris, Marc Fredette, and Sylvain Sénécal</i>	
A Chatbot Solution for eGLU-Box Pro: The Usability Evaluation Platform for Italian Public Administrations	268
<i>Stefano Federici, Maria Laura Mele, Marco Bracalenti, Maria Laura De Filippis, Rosa Lanzilotti, Giuseppe Desolda, Simone Borsci, Giancarlo Gaudino, Antonello Cocco, Massimo Amendola, and Emilio Simonetti</i>	

ERM-AT Applied to Social Aspects of Everyday Life	280
<i>Masaaki Kurosu and Ayako Hashizume</i>	
Civil Aircraft Cockpit Human Machine Interactive Dynamic Assessment Quality Improvement Based on System Engineering	291
<i>Qun Kuang, Jingjin Zhang, and Fei Li</i>	
Is Usability Evaluation of DSL Still a Trending Topic?	299
<i>Ildevana Poltronieri, Allan Christopher Pedroso, Avelino Francisco Zorzo, Maicon Bernardino, and Marcia de Borba Campos</i>	
A Sentiment Analysis Web Platform for Multiple Social Media Types and Language-Specific Customizations	318
<i>Stavros Giannakis, Christina Valavani, and Christina Alexandris</i>	
FLM-2A: Towards Automated HCI Modeling of Android Applications Based on a Modified Version of the Keystroke Level Model	329
<i>Savvas Theofilou, Nikolas Vardas, and Christos Katsanos</i>	
Quality in Use -Case Study for Evaluation-	343
<i>Shin'ichi Fukuzumi and Noriko Wada</i>	
How to Evaluate a Good Conversation? An Evaluation Framework for Chat Experience in Smart Home.	351
<i>Xiantao Chen, Liang Ma, Menghua Jia, Yajuan Han, Jiaqi Mi, and Meng Xu</i>	
Collaborative Heuristic Inspection: Evaluator Experiences and Organization of Work.	363
<i>Yavuz Inal, Jo D. Wake, and Frode Guribye</i>	
Emotional and Persuasive Design	
Blossoms: Preliminary Experiment on Sharing Empathy Online	375
<i>Chizumi Shimamura, Peeraya Sripian, and Midori Sugaya</i>	
An Emotional Tactile Interaction Design Process	384
<i>Chor-Kheng Lim</i>	
Continuous Monitoring of Interactive Exhibits in Museums as Part of a Persuasive Design Approach	396
<i>Walter Ritter, Andreas Künz, Katrin Paldán, Guido Kemper, and Mathias Gort</i>	
Engaging New Residents' City Exploration Using a Gamified Location- Based Information Interactive System	412
<i>Yiyi Zhang, Yujia Cao, and Tatsuo Nakajima</i>	

The Impact of Facial Attractiveness and Affective Person Knowledge on Visual Awareness	429
<i>Junchen Shang and Hong Yang</i>	
Integrating SSTQUAL, Kano Model and Attractiveness Engineering to Analyze User's Emotional Needs in Self Check-in Service	439
<i>Hsuan-Min Hsu and Hsi-Jen Chen</i>	
Technological Influence on Self-esteem: Towards a Research Agenda Through a Systematic Literature Review	451
<i>Luã Marcelo Muriana and Maria Cecilia Calani Baranauskas</i>	
Research on Emotional Design of Visual Interaction Based on Cognitive Psychology	472
<i>Zhang Zhang and Yilian Hao</i>	
Comparison of Kawaii Feelings for Magnets with Different Shapes Between 2007 and Present	482
<i>Michiko Ohkura and Tipporn Laohakangvalvit</i>	
Comparison of Color Features of Kawaii Fashion Styles in Japan	494
<i>Peeraya Sripiian, Keiko Miyatake, Tipporn Laohakangvalvit, and Michiko Ohkura</i>	
Emotions and Cognition in HCI	
Voice Switching in Voice-Enabled Digital Assistants (VDAs).	509
<i>Dania Bilal and Jessica K. Barfield</i>	
Facial Emotion Recognition in UX Evaluation: A Systematic Review	523
<i>Erico de Souza Veriscimo, João Luiz Bernardes Júnior, and Luciano Antonio Digiampietri</i>	
Analysis of Emotion in Socioenactive Systems	537
<i>Diego Addan Gonçalves, Ricardo Edgard Caceffo, and Maria Cecilia Calani Baranauskas</i>	
Affective Robot Learner: Implementation of Artificial Emotion System Inspired by Educational Psychology	547
<i>Binnur Görer and H. Levent Akin</i>	
Effect of Shifting Own Hand Position in Virtual Space on Mental Body Model.	564
<i>Hikari Kobayashi, Miki Matsumuro, Fumihisa Shibata, and Asako Kimura</i>	

Rehabilitation Aims and Assessed Brain Activity by Means of Brain-Computer Interfaces in People in a Vegetative State - Preliminary Results . . .	573
<i>Marian-Silviu Poboroniuc, Dănuț-Constantin Irimia, and Gheorghe Popescu</i>	
Online Classification of Cognitive Control Processes Using EEG and fNIRS: A Stroop Experiment	584
<i>Leonhard Schreiner, Gerald Hirsch, Ren Xu, Patrick Reitner, Harald Pretl, and Christoph Guger</i>	
A New Algorithm to Find Isometric Maps for Comparison and Exchange of Facial Expression Perceptions	594
<i>Masashi Shinto and Jinhui Chao</i>	
Definition and Estimation of Dimension in Facial Expression Space	606
<i>Masashi Shinto, Reiner Lenz, and Jinhui Chao</i>	
Mobile Multitasking in Urban Contexts: Habituation and Countermeasures	624
<i>Zoubeir Tkiouat, Pierre-Majorique Léger, and Ryad Titah</i>	
Automatic Recognition of Experienced Emotional State from Body Movement	635
<i>Jan-Niklas Voigt-Antons, Petr Devaikin, and Tanja Kojić</i>	
Author Index	653

Contents – Part II

Novel Interaction Techniques

Performance Evaluation and Efficiency of Laser Holographic Peripherals. . . .	3
<i>Alexander Fedor, Muluaem Hailom, Talha Hassan, Vu Ngoc Phuong Dinh, Vuong Nguyen, and Tauheed Khan Mohd</i>	
Using Real-Pen Specific Features of Active Stylus to Cope with Input Latency	17
<i>Roman Kushnirenko, Svitlana Alkhimova, Dmytro Sydorenko, and Igor Tolmachov</i>	
Comparing Eye Tracking and Head Tracking During a Visual Attention Task in Immersive Virtual Reality.	32
<i>Jose Llanes-Jurado, Javier Marín-Morales, Masoud Moghaddasi, Jaikishan Khatri, Jaime Guixeres, and Mariano Alcañiz</i>	
Investigation of Motion Video Enhancement for Image-Based Avatars on Small Displays.	44
<i>Tsubasa Miyauchi, Wataru Ganaha, Masashi Nishiyama, and Yoshio Iwai</i>	
Sound Symbolic Words as a Game Controller	56
<i>Yuji Nozaki, Shu Watanabe, and Maki Sakamoto</i>	
Towards Improved Vibro-Tactile P300 BCIs	65
<i>Rupert Ortner, Josep Dinarès-Ferran, Danut-Constantin Irimia, and Christoph Guger</i>	
Talking Through the Eyes: User Experience Design for Eye Gaze Redirection in Live Video Conferencing	75
<i>Wooyeong Park, Jeongyun Heo, and Jiyeon Lee</i>	
Evaluating the Accuracy and User Experience of a Gesture-Based Infrared Remote Control in Smart Homes.	89
<i>Heinrich Ruser, Susan Vorwerk, Cornelia Eicher, Felix Pfeifer, Felix Piela, André Kaltenbach, and Lars Mechold</i>	
Detection of Finger Contact with Skin Based on Shadows and Texture Around Fingertips	109
<i>Yuto Sekiya, Takeshi Umezawa, and Noritaka Osawa</i>	

Character Input Method Working on 1-in. Round Screen for Tiny Smartwatches	123
<i>Ojiro Suzuki, Toshimitsu Tanaka, and Yuji Sagawa</i>	
One Stroke Alphanumeric Input Method by Sliding-in and Sliding-out on the Smartwatch Screen	135
<i>Toshimitsu Tanaka, Hideaki Shimazu, and Yuji Sagawa</i>	
Research on Hand Detection in Complex Scenes Based on RGB-D Sensor	147
<i>Jin Wang, Zhen Wang, Shan Fu, and Dan Huang</i>	
It's a Joint Effort: Understanding Speech and Gesture in Collaborative Tasks	159
<i>Isaac Wang, Pradyumna Narayana, Dhruva Patil, Rahul Bangar, Bruce Draper, Ross Beveridge, and Jaime Ruiz</i>	
Human-Robot Interaction	
Analysing Action and Intention Recognition in Human-Robot Interaction with ANEMONE	181
<i>Beatrice Alenljung and Jessica Lindblom</i>	
A Robot that Tells You It is Watching You with Its Eyes	201
<i>Saizo Aoyagi, Yoshihiro Sejima, and Michiya Yamamoto</i>	
Am I Conquering the Robot? the Impact of Personality on the Style of Cooperation with an Automatic System	216
<i>Rou Hsiao and Wei-Chi Chien</i>	
Kansei Evaluation of Robots in Virtual Space Considering Their Physical Attributes	228
<i>Shun Imura, Kento Murayama, Peeraya Sripian, Tipporn Laohakangvalvit, and Midori Sugaya</i>	
The Use of a Sex Doll as Proxy Technology to Study Human-Robot Interaction	241
<i>An Jacobs, Charlotte I. C. Jewell, and Shirley A. Elprama</i>	
Relationship Between Robot Designs and Preferences in Kawaii Attributes	251
<i>Tipporn Laohakangvalvit, Peeraya Sripian, Midori Sugaya, and Michiko Ohkura</i>	
Perceived Robot Attitudes of Other People and Perceived Robot Use Self-efficacy as Determinants of Attitudes Toward Robots	262
<i>Rita Latikka, Nina Savela, Aki Koivula, and Atte Oksanen</i>	

Research on Interactive Experience Design of Peripheral Visual Interface of Unmanned Logistics Vehicle	275
<i>Zehua Li and Qianwen Chen</i>	
A Measurement of Attitude Toward Working with Robots (AWRO): A Compare and Contrast Study of AWRO with Negative Attitude Toward Robots (NARS)	288
<i>Lionel P. Robert Jr.</i>	
Service Sector Professionals' Perspective on Robots Doing Their Job in the Future.	300
<i>Nina Savela, Rita Latikka, Reetta Oksa, and Atte Oksanen</i>	
User Experience Best Practices for Human-Robot Interaction	318
<i>Dorothy Shamonsky</i>	
Application for the Cooperative Control of Mobile Robots with Energy Optimization	329
<i>José Varela-Aldás, Christian Ichina, Belén Ruales, and Víctor H. Andaluz</i>	
Educational Robot European Cross-Cultural Design.	341
<i>Anna-Maria Velentza, Stavros Ioannidis, Nefeli Georgakopoulou, Mohammad Shidujaman, and Nikolaos Fachantidis</i>	
Digital Wellbeing	
Designing for Self-awareness: Evidence-Based Explorations of Multimodal Stress-Tracking Wearables	357
<i>Riccardo Chianella, Marco Mandolfo, Riccardo Lolatto, and Margherita Pillan</i>	
Annoyed to Discontinue: Factors Influencing (Dis)Continuance of Using Activity Tracking Wearables.	372
<i>Kaja J. Fietkiewicz and Aylin Ilhan</i>	
Human Computer Interaction Challenges in Designing Pandemic Trace Application for the Effective Knowledge Transfer Between Science and Society Inside the Quadruple Helix Collaboration	390
<i>A. Gallego, E. Gaeta, A. Karinsalo, V. Ollikainen, P. Koskela, L. Peschke, F. Folkvord, E. Kaldoudi, T. Jämsä, F. Lupiáñez-Villanueva, L. Pecchia, and G. Fico</i>	
A Study on the Usability of Different Age Groups to the Interface of Smart Bands.	402
<i>Xiao-Yu Jia and Chien-Hsiung Chen</i>	

Attention to Breathing in Response to Vibrational and Verbal Cues in Mindfulness Meditation Mediated by Wearable Devices	415
<i>Eunseong Kim, Jeongyun Heo, and Jeongmin Han</i>	
CHIAPON: An Anthropomorphic Character Notification System that Discourages Their Excessive Smartphone Use	432
<i>Kazuyoshi Murata</i>	
Designing for App Usage Motivation to Support a Gluten-Free Diet by Comparing Various Persuasive Feedback Elements	446
<i>Katrin Paldán, Andreas Künz, Walter Ritter, and Daire O. Broin</i>	
Better Performance Through Mindfulness: Mobile Application Design for Mindfulness Training to Improve Performance in College Athletes.	463
<i>Félicia Roger-Hogan, Tayler Wullenweber, and Jung Joo Sohn</i>	
Holdable Devices: Supporting Mindfulness, Psychological Autonomy and Self-Regulation During Smartphone Use	476
<i>Federico Julien Tiersen and Rafael Alejandro Calvo</i>	
Measurement and Analysis of Body Movements in Playing Futsal Using Smartphones.	496
<i>Tomohito Yamamoto, Kento Sugiyama, and Ryohei Fukushima</i>	
Using e-Health in the Prevention Against Covid-19: An Approach Based on the Theory of Planned Behavior.	507
<i>Meryem Zoghلامي, Salma Ayeb, and Kaouther Saied Ben Rached</i>	
HCI in Surgery	
Construction of a Knowledge Base for Empirical Knowledge in Neurosurgery	521
<i>Ayuki Joto, Takahiro Fuchi, Hiroshi Noborio, Katsuhiko Onishi, Masahiro Nonaka, and Tsuneo Jozen</i>	
VR-Based Surgery Navigation System with 3D User Interface for Robot-Assisted Laparoscopic Partial Nephrectomy	538
<i>Masanao Koeda, Akihiro Hamada, Atsuro Sawada, Katsuhiko Onishi, Hiroshi Noborio, and Osamu Ogawa</i>	
Comparative Study of Potential-Based and Sensor-Based Surgical Navigation in Several Liver Environments	551
<i>Takahiro Kunii, Miho Asano, Kanako Fujita, Katsunori Tachibana, and Hiroshi Noborio</i>	
Voxel-Based Route-Search Algorithm for Tumor Navigation and Blood Vessel Avoidance	566
<i>Takahiro Kunii, Miho Asano, and Hiroshi Noborio</i>	

Development of a VR/HMD System for Simulating Several Scenarios of Post-Operative Delirium.	582
<i>Jumpei Matsuura, Takahiro Kunii, Hiroshi Noborio, Kaoru Watanabe, Katsuhiko Onishi, and Hideo Nakamura</i>	
Selection and Evaluation of Color/Depth Camera for Imaging Surgical Stoma	601
<i>Michiru Mizoguchi, Masatoshi Kayaki, Tomoki Yoshikawa, Miho Asano, Katsuhiko Onishi, and Hiroshi Noborio</i>	
Investigation of the Hashing Algorithm Extension of Depth Image Matching for Liver Surgery	615
<i>Satoshi Numata, Masanao Koeda, Katsuhiko Onishi, Kaoru Watanabe, and Hiroshi Noborio</i>	
Study on the Image Overlay Approach to AR Navigation System for Transsphenoidal Surgery.	625
<i>Katsuhiko Onishi, Seiyu Fumiyama, Masahiro Nonaka, Masanao Koeda, and Hiroshi Noborio</i>	
Evaluation of Depth-Depth-Matching Speed of Depth Image Generated from DICOM by GPGPU.	644
<i>Daiki Yano, Masanao Koeda, Hiroshi Noborio, and Katsuhiko Onishi</i>	
Author Index	657

Contents – Part III

Design Case Studies

Graphic Representations of Spoken Interactions from Journalistic Data: Persuasion and Negotiations	3
<i>Christina Alexandris, Vasilios Floros, and Dimitrios Mourouzidis</i>	
A Study on Universal Design of Musical Performance System	18
<i>Sachiko Deguchi</i>	
Developing a Knowledge-Based System for Lean Communications Between Designers and Clients	34
<i>Yu-Hsiu Hung and Jia-Bao Liang</i>	
Learn and Share to Control Your Household Pests: Designing a Communication Based App to Bridge the Gap Between Local Guides and the New Users Looking for a Reliable and Affordable Pest Control Solutions	49
<i>Shima Jahani, Raman Ghafari Harivand, and Jung Joo Sohn</i>	
Developing User Interface Design Strategy to Improve Media Credibility of Mobile Portal News.	67
<i>Min-Jeong Kim</i>	
Elderly-Centered Design: A New Numeric Typeface for Increased Legibility	85
<i>Yu-Ren Lai and Hsi-Jen Chen</i>	
Research on Interactive Experience Design of Peripheral Visual Interface of Autonomous Vehicle	97
<i>Zehua Li, Xiang Li, JiHong Zhang, Zhixin Wu, and Qianwen Chen</i>	
Human-Centered Design Reflections on Providing Feedback to Primary Care Physicians	108
<i>Ashley Loomis and Enid Montague</i>	
Interaction with Objects and Humans Based on Visualized Flow Using a Background-Oriented Schlieren Method	119
<i>Shieru Suzuki, Shun Sasaguri, and Yoichi Ochiai</i>	
Research on Aging Design of News APP Interface Layout Based on Perceptual Features	138
<i>Zhixin Wu, Zehua Li, Xiang Li, and Hongqian Li</i>	

Research on Modular Design of Children's Furniture Based on Scene Theory	153
<i>Junnan Ye, Wenhao Li, and Chaoxiang Yang</i>	
A Design Method of Children Playground Based on Bionic Algorithm	173
<i>Fei Yue, Wenda Tian, and Mohammad Shidujaman</i>	
Bias in, Bias Out – the Similarity-Attraction Effect Between Chatbot Designers and Users	184
<i>Sarah Zabel and Siegmard Otto</i>	
Research on Immersive Virtual Reality Display Design Mode of Cantonese Porcelain Based on Embodied Interaction.	198
<i>Shengyang Zhong, Yi Ji, Xingyang Dai, and Sean Clark</i>	
Design and Research of Children's Robot Based on Kansei Engineering	214
<i>Siyao Zhu, Junnan Ye, Menglan Wang, Jingyang Wang, and Xu Liu</i>	
User Experience and Technology Acceptance Studies	
Exploring Citizens' Attitudes Towards Voice-Based Government Services in Switzerland.	229
<i>Matthias Baldauf, Hans-Dieter Zimmermann, and Claudia Pedron</i>	
Too Hot to Enter: Investigating Users' Attitudes Toward Thermoscanners in COVID Times	239
<i>Alice Bettelli, Valeria Orso, Gabriella Francesca Amalia Pernice, Federico Corradini, Luca Fabbri, and Luciano Gamberini</i>	
Teens' Conceptual Understanding of Web Search Engines: The Case of Google Search Engine Result Pages (SERPs)	253
<i>Dania Bilal and Yan Zhang</i>	
What Futuristic Technology Means for First Responders: Voices from the Field.	271
<i>Shaneé Dawkins, Kerrienne Morrison, Yee-Yin Choong, and Kristen Greene</i>	
Blinking LEDs: Usability and User Experience of Domestic Modem Routers Indicator Lights.	292
<i>Massimiliano Dibitonto</i>	
The Smaller the Better? A Study on Acceptance of 3D Display of Exhibits of Museum's Mobile Media	303
<i>Xinhao Guo, Jingjing Qiao, Ran Yan, Ziyun Wang, and Junjie Chu</i>	

Research on Information Visualization Design for Public Health Security Emergencies.	325
<i>Wenkui Jin, Xurong Shan, and Ke Ma</i>	
Comparative Study of the Interaction of Digital Natives with Mainstream Web Mapping Services	337
<i>Marinos Kavouras, Margarita Kokla, Fotis Liarokapis, Katerina Pastra, and Eleni Tomai</i>	
Success is not Final; Failure is not Fatal – Task Success and User Experience in Interactions with Alexa, Google Assistant and Siri	351
<i>Miriam Kurz, Birgit Brüggemeier, and Michael Breiter</i>	
Research on the Usability Design of HUD Interactive Interface.	370
<i>Xiang Li, Bin Jiang, Zehua Li, and Zhixin Wu</i>	
Current Problems, Future Needs: Voices of First Responders About Communication Technology	381
<i>Kerriane Morrison, Shanee Dawkins, Yee-Yin Choong, Mary F. Theofanos, Kristen Greene, and Susanne Furman</i>	
Exploring the Antecedents of Verificator Adoption	400
<i>Tihomir Orehovački and Danijel Radošević</i>	
Are Professional Kitchens Ready for Dummies? A Comparative Usability Evaluation Between Expert and Non-expert Users.	418
<i>Valeria Orso, Daniele Veri, Riccardo Minato, Alessandro Sperduti, and Luciano Gamberini</i>	
Verification of the Appropriate Number of Communications Between Drivers of Bicycles and Vehicles	429
<i>Yuki Oshiro, Takayoshi Kitamura, and Tomoko Izumi</i>	
User Assessment of Webpage Usefulness.	442
<i>Ning Sa and Xiaojun Yuan</i>	
How Workarounds Occur in Relation to Automatic Speech Recognition at Danish Hospitals	458
<i>Silja Vase</i>	
Secondary Task Behavioral Analysis Based on Depth Image During Driving	473
<i>Hao Wen, Zhen Wang, and Shan Fu</i>	

Research on the Relationship Between the Partition Position of the Central Control Display Interface and the Interaction Efficiency	486
<i>JiHong Zhang, Haowei Wang, and Zehua Li</i>	

HCI, Social Distancing, Information, Communication and Work

Attention-Based Design and Selective Exposure Amid COVID-19 Misinformation Sharing	501
<i>Zaid Amin, Nazlena Mohamad Ali, and Alan F. Smeaton</i>	

Digital Communication to Compensate for Social Distancing: Results of a Survey on the Local Communication App DorfFunk	511
<i>Matthias Berg, Anne Hess, and Matthias Koch</i>	

An Evaluation of Remote Workers' Preferences for the Design of a Mobile App on Workspace Search	527
<i>Cátia Carvalho, Edirlei Soares de Lima, and Hande Ayanoglu</i>	

Feasibility of Estimating Concentration Level for not Disturbing Remote Office Workers Based on Kana-Kanji Conversion Confirmation Time	542
<i>Kinya Fujita and Tomoyuki Suzuki</i>	

A Smart City Stakeholder Online Meeting Interface	554
<i>Julia C. Lee and Lawrence J. Henschen</i>	

Fostering Empathy and Privacy: The Effect of Using Expressive Avatars for Remote Communication	566
<i>Jieun Lee, Jeongyun Heo, Hayeong Kim, and Sanghoon Jeong</i>	

PerformEyebrow: Design and Implementation of an Artificial Eyebrow Device Enabling Augmented Facial Expression.	584
<i>Motoyasu Masui, Yoshinari Takegawa, Nonoka Nitta, Yutaka Tokuda, Yuta Sugiura, Katsutoshi Masai, and Keiji Hirata</i>	

Improving Satisfaction in Group Dialogue: A Comparative Study of Face-to-Face and Online Meetings.	598
<i>Momoko Nakatani, Yoko Ishii, Ai Nakane, Chihiro Takayama, and Fumiya Akasaka</i>	

EmojiCam: Emoji-Assisted Video Communication System Leveraging Facial Expressions.	611
<i>Kosaku Namikawa, Ippei Suzuki, Ryo Iijima, Sayan Sarcar, and Yoichi Ochiai</i>	

Pokerepo Join: Construction of a Virtual Companion Experience System	626
<i>Minami Nishimura, Yoshinari Takegawa, Kohei Matsumura, and Keiji Hirata</i>	

Visual Information in Computer-Mediated Interaction Matters: Investigating the Association Between the Availability of Gesture and Turn Transition Timing in Conversation	643
<i>James P. Trujillo, Stephen C. Levinson, and Judith Holler</i>	
Author Index	659