



Proceedings of the 7<sup>th</sup> Augmented Human International Conference 2015, Geneva, Switzerland AH2016

Program Co-Chairs: Albrecht Schmidt, University of Stuttgart, Germany Tsutomu Terada, University of Kobe, Japan Woontack Woo, Korea Advanced Institute of Science and Technology Pranav Mistry, Samsung Research America, USA

General Co-Chairs: Jean-Marc Seigneur, University of Geneva, Switzerland Jose M. Hernandez-Munoz, Telefonica I+D, Spain Paul McCullagh, University of Ulster, United Kingdom

Sponsors: Swiss National Science Foundation, Google

ACM International Conference Proceedings Series

ACM Press



The Association for Computing Machinery 2 Penn Plaza, Suite 701 New York New York 10121-0701

ACM COPYRIGHT NOTICE. Copyright © 2016 by the Association for Computing Machinery, Inc. Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, to republish, to post on servers, or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from Publications Dept., ACM, Inc., fax +1 (212) 869-0481, or permissions@acm.org.

For other copying of articles that carry a code at the bottom of the first or last page, copying is permitted provided that the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, +1-978-750-8400, +1-978-750-4470 (fax).

## Notice to Past Authors of ACM-Published Articles

ACM intends to create a complete electronic archive of all articles and/or other material previously published by ACM. If you have written a work that was previously published by ACM in any journal or conference proceedings prior to 1978, or any SIG Newsletter at any time, and you do NOT want this work to appear in the ACM Digital Library, please inform <u>permissions@acm.org</u>, stating the title of the work, the author(s), and where and when published.

ACM ISBN: 978-1-4503-3680-2

## Introduction

The 7<sup>th</sup> Augmented Human International Conference (AH2016) has gathered scientific papers from many different disciplines, especially: augmented vision; augmented hearing; body tracking; augmentation with smart material and through lifelogs; brain augmentation; augmented reality applications; augmented sports; superhuman games; ethics of augmented human technologies... Thus, many papers concentrated on building the human augmentation technologies, which is necessary for them to emerge in the real world. However, few papers investigated the ethical or safety issues of augmented human technologies. The next edition may bring more papers on this essential aspect that must be taken into account for a long-term success of these technologies. Check <a href="http://www.augmented-human.com">http://www.augmented-human.com</a> to subscribe to the mailing list and to be informed about the next editions of the conference. Consider also checking the Springer Journal on Augmented Human Research to get extended research papers on the topic!

## Acknowledgments

Many thanks to: the University of Geneva including CUI, Medi@LAB, ISS, G3S; Geneva Campus Biotech that hosted the presentations in Geneva; Saint François Longchamp ski resort tourism board and city hall that hosted the special Augmented Winter Sports demos session; Dr. Nan-Wei Gong, the great keynote speaker of the conference; the Swiss National Science Foundation that provided funding for the speakers; Google that sponsored the conference; the ACM, which published the proceedings of the conference in its online library; Maurienne TV and the New Scientist journalists, which covered the event, and all the conference organizing team, program committee members and sub-reviewers who reviewed the submitted papers:

Steering Committee: Masahiko Inami, Keio University, Japan Jun Rekimoto, University of Tokyo / Sony Computer Science Laboratories Hideki Koike, Tokyo Institute of Technology Tsutomu Terada, University of Kobe, Japan Hideo Saito, Keio University, Japan Ellen Do Yi Luen, National University of Singapore Suranga Nanayakkara, Singapore University of Technology and Design Albrecht Schmidt, University of Stuttgart, Germany Jean-Marc Seigneur, University of Geneva, Switzerland

Program Co-Chairs: Albrecht Schmidt, University of Stuttgart, Germany Tsutomu Terada, University of Kobe, Japan Woontack Woo, Korea Advanced Institute of Science and Technology Pranav Mistry, Samsung Research America, USA General Co-Chairs: Jean-Marc Seigneur, University of Geneva, Switzerland Jose M. Hernandez-Munoz, Telefonica I+D, Spain Paul McCullagh, University of Ulster, United Kingdom

Superhuman Sports & Augmented Winter Sports Chair: Takuya Nojima, University of Electro-communications, Japan

Other Organizing Members:

Alexandre Mollard, Press, Radio, TV and Journalists Chair Emin Huseynov, Posters, Demos & Students Design Competition Chair Dylan Belgy, Students Design Competition Lead Assistant Dinara Sanikidze, Socio-Technical Panel Lead Assistant Damian Fernandez Canosa, Sponsorship Marketing Lead Assistant Florence Shih, Social Networking Lead Assistant

Socio-Technical Panel:

Prof. Alexandre Mauron, Faculty of Medicine, University of Geneva, Switzerland Lawyer, Dr. Pascal Verniory, Direction Générale des Systèmes d'Information, Geneva State, Switzerland

Program Review Committee:

Michael Rohs, Leibniz Universität Hannover, Germany Johannes Schoening, Hasselt University, Belgium Florian Michahelles, Siemens Corporation, Germany Jochen Huber, MIT Media Lab & Singapore University of Technology and Design Max Muhlhauser, Technische Universitaet Darmstadt, Germany Shachar Maidenbaum, Hebrew University of Jerusalem, Israel Kris Luyten, Hasselt University, Belgium Kai Kunze, Keio University, Japan Jorgen Steimle, Max Planck Institute for Informatics, Germany Alexandra Ion, Hasso Plattner Institute, Germany Liwei Chan, Keio University, Japan Takuya Nojima, University of electro-communications, Japan Raphael Wimmer, University of Regensburg, Germany Laurent Herault, CEA, France Daniel Wessolek, Bauhaus University Weimar, Germany Enrico Rukzio, Ulm University, Germany Florian Alt, University of Munich, Germany Christian Sandor, Nara Institute of Science and Technology, Japan Ian Oakley, Ulsan National Institute of Science and Technology, Korea Roy Shilkrot, MIT Media Lab, USA Kristof Van Laerhoven, University of Freiburg, Germany Bing-Yu Chen, National Taiwan University Yasuaki Kakehi, Keio Univerity, Japan Peter Froehlich, AIT Austrian Institute of Technology, Austria

Bruce Thomas, University of South Australia Patricia Gouveia, Noroff University College, Norway Martin Rieser, UWE Bristol, United Kingdom Karla Felix Navarro, UTS, Australia Ido Iurgel, University of Applied Sciences Rhine-Waal, Germany Guillaume Moreau, Ecole Centrale de Nantes, France Gabriele Ferri, Indiana University, Bloomington, USA Masaaki Fukumoto, Microsoft Research, Japan Christian Holz, Yahoo Labs, Germany Andreas Bulling, Max Planck Institute for Informatics, Germany Annie Rouard, Université de Savoie, France Robert Riener, Swiss Federal Institute of Technology in Zurich, Switzerland Thierry Pun, University of Geneva, Switzerland Guillaume Chanel, University of Geneva, Switzerland Giovanna Di Marzo Serugendo, University of Geneva, Switzerland Jean-Henry Morin, University of Geneva, Switzerland Laurent Moccozet, University of Geneva, Switzerland Lim Joo Hwee, Institute for Infocomm Research, Singapore Yung Shin Van Der Sype, University of Leuven, Belgium Katarzyna Wac, University of Copenhagen, Denmark René Meier, Lucerne University of Applied Sciences and Arts, Switzerland Pascal Verniory, Direction Générale des Systèmes d'Information, Etat de Genève, Switzerland Alan Winfield, University of the West of England, United Kingdom Dzmitry Tsetserukou, Skolkovo Institute of Science and Technology, Russia Anusha Withana, Singapore University of Technology and Design Axel Graeser, Universität Bremen, Germany Anton Nijholt, University of Twente, The Netherlands Reda Teiar, Université de Reims, France Ludovic Seifert, Université de Rouen, France Alexandre Mauron, Université de Genève, Suisse Gregoire Millet, Université de Lausanne, Switzerland Luis Sanchez, University of Cantabria, Spain Evangelos Theodoridis, CTI, Greece Rajiv Ramdhany, Lancaster University, UK Jaroslaw Domaszewicz, WUT, Poland Lucia Gonzalez, Edenway, France Natividad Martinez, University of Reutlingen, Germany Ralf Seepold, HTWG Konstanz, Germany Xavier Titi, University of Geneva, Switzerland Fabien Lotte, INRIA, France Jean-Marie Normand, Ecole Centrale de Nantes, France Samir Otmane, Université d'Evry, France

Subreviewers:

Adrian Leu, Aitor Rovira, Alice Giordani, Artem Dementyev, Ashley Colley, Attila Victor Achenbach, Benjamin Knorlein, Cédric Honnet, Charith Fernando, Choonsung Shin, Christian Lessig, Christiana Tsiourti, Cindy Kao, Cristina Manresa-Yee, Da-Yuan Huang, David Dobbelstein, David Lindlbauer, Dominique Tan, Faye Wu, Federico Parietti, Florian Geiselhart, Florian Perteneder, Frédéric Davesne, Guillaume Bouyer, Hao-Chuan, Hiroyuki Kajimoto, Hsiang-Ting Chen, Hyeongmook Lee, Hyoseok Yoon, Jan Gugenheimer, Jan Rod, Joe Newbold, Junichi Yamaoka, Katrin Plaumann, Ken Nakagaki, Keng-Teck Ma, Kyle Olszewski, Lazhari Assassi, Liem Hoang, Lieu-Hen Chen, Marios Fanourakis, Mark Rice, Marketa Dolejsova, Martin Murer, Martin Weigel, Mattia Gustarini, Max Pfeiffer, Mohamed Khamis, Nadia Zenati, Naoya Koizumi, Niels Henze, Pascal Knierim, Paul Strohmeier, Pedro Lopes, Robert Walter, Sang-Won Leigh, Santiago Focke Martinez, Shanaka Ransiri, Siyan Zhao, Stefan Schneegass, Stephan Pölzer, Thijs Roumen, Thomas Kubitza, Tian Gan, Valentin Schwind, Wolfgang Büschel, Xavi Benavides, Xiangpeng Liu, Xingchen Wang, Yi-Chi Liao, Yi-Ling Chen, Ying Mao, Yomna Abdelrahman, Youngkyoon Jang, Youngkyoon Jang and Yuta Sugiura.

## **Table of Contents**

Article 1: "Generating Materials for Augmented Reality Applications using Natural Language", Sebastian Buntin.

Article 2: "CASPER: A Haptic Enhanced Telepresence Exercise System for Elderly People", Azusa Kadomura, Akira Matsuda and Jun Rekimoto.

Article 3: "Workspace Awareness in Collaborative AR using HMDs: A User Study Comparing Audio and Visual Notifications", Marina Cidota, Stephan Lukosch, Dragos Datcu and Heide Lukosch.

Article 4: "Predicting Grasps with a Wearable Inertial and EMG Sensing Unit for Low-Power Detection of In-Hand Objects", Marian Theiss, Philip M. Scholl and Kristof Van Laerhoven.

Article 5: "Exploring Eye-Tracking-Driven Sonification for the Visually Impaired", Michael Dietz, Maha El Gar and Ionut Damian.

Article 6: "Feedback for Smooth Pursuit Gaze Tracking Based Control", Jari Kangas, Oleg Spakov, Poika Isokoski, Deepak Akkil, Jussi Rantala and Roope Raisamo.

Article 7: "Smart Handbag as a Wearable Public Display – Exploring Concepts and User Perceptions", Ashley Colley, Minna Pakanen, Saara Koskinen, Kirsi Mikkonen and Jonna Häkkilä.

Article 8: "A Lifelog System for Detecting Psychological Stress with Glass-equipped Temperature Sensors", Hiroki Yasufuku, Tsutomu Terada and Masahiko Tsukamoto.

Article 9: "Finding Motifs in Large Personal Lifelogs", Na Li, Martin Crane, Cathal Gurrin and Heather J. Ruski.

Article 10: "Supporting Precise Manual-handling Task using Visuo-haptic Interaction", Akira Nomoto, Yuki Ban, Takuji Narumi, Tomohiro Tanikawa and Michitaka Hirose.

Article 11: "Success Imprinter: A Method for Controlling Mental Preparedness Using Psychological Conditioned Information", Kyosuke Futami, Tsutomu Terada and Masahiko Tsukamoto.

Article 12: "A Dance Performance Environment in which Performers Dance with Multiple Robotic Balls", Shuhei Tsuchida, Tsutomu Terada and Masahiko Tsukamoto.

Article 13: "An Activity Recognition Method by Measuring Circumference of Body Parts", Kentaro Tsubaki, Tsutomu Terada and Masahiko Tsukamoto.

Article 14: "DreamHouse: NUI-based Photo-realistic AR Authoring System for Interior Design", Jinwoo Park, Sung Sil Kim, Hyerim Park and Woontack Woo.

Article 15: "Empathizing Audiovisual Sense Impairments - Interactive Real-Time Illustration of Diminished Sense Perception", Fabian Werfel, Roman Wiche, Jochen Feitsch and Christian Geiger.

Article 16: "Laplacian Vision: Augmenting Motion Prediction via Optical See-Through Head-Mounted Displays", Yuta Itoh, Jason Orlosky, Kiyoshi Kiyokawa and Gudrun Klinker.

Article 17: "Enhancing Effect of Mediated Social Touch between Same Gender by Changing Gender Impression", Keita Suzuki, Masanori Yokoyama, Yuki Kinoshita, Takayoshi Mochizuki, Tomohiro Yamada and Sho Sakurai.

Article 18: "TalkingCards: Using Tactile NFC Cards for Accessible Brainstorming", Georg Regal, Elke Mattheiss, David Sellitsch and Manfred Tscheligi.

Article 19: "Usability and Cost-effectiveness in Brain-Computer Interaction: Is it User Throughput or Technology Related?", Athanasios Vourvopoulos and Sergi Bermudez I Badia.

Article 20: "HearThere: Networked Sensory Prosthetics Through Auditory Augmented Reality", Spencer Russell, Gershon Dublon and Joseph A. Paradiso.

Article 21: "Wearability Factors for Skin Interfaces", Xin Liu, Katia Vega, Pattie Maes and Joseph A. Paradiso.

Article 22: "Improvements on a Novel Hybrid Tracking System", Markus Zank, Leyla Kern and Andreas Kunz.

Article 23: "Sensible Shadow: Tactile Feedback from Your Own Shadow", Takefumi Hiraki, Shogo Fukushima and Takeshi Naemura.

Article 24: "TombSeer: Illuminating the Dead ", Isabel Pedersen, Nathan Gale and Pejman Mirza-Babaei.

Article 25: "Haptic Assistive Bracelets for Blind Skier Guidance", Marco Aggravi, Gionata Salvietti and Domenico Prattichizzo.

Article 26: "We Are Super-Humans: Towards a Democratisation of the Socio-Ethical Debate on Augmented Humanity", Maurizio Caon, Vincent Menuz and Johann Roduit.

Article 27: "Reading-based Screenshot Summaries for Supporting Awareness of Desktop Activities", Tilman Dingler, Passant El Agroudy, Gerd Matheis and Albrecht Schmidt.

Article 28: "Charting Design Preferences on Wellness Wearables", Juho Rantakari, Virve Inget, Ashley Colley and Jonna Häkkilä.

Article 29: "Joint Trajectory Generation and Control for Overground Robot-based Gait Rehabilitation System MOPASS", Santiago Focke Martinez, Olena Kuzmicheva and Axel Graeser.

Article 30: "Synthesizing Pseudo Straight View from A Spinning Camera Ball", Ryohei Funakoshi, Yoji Okudera and Hideki Koike.

Article 31: "AR-Arm: Augmented Visualization for Guiding Arm Movement in the First-Person Perspective", Ping-Hsuan Han, Kuan-Wen Chen, Chen-Hsin Hsieh, Yu-Jie Huang and Yi-Ping Hung.

Article 32: "Come Alive! Augmented Mobile Interaction with Smart Hair", Masaru Ohkubo, Shuhei Umezu and Takuya Nojima.

Article 33: "Projection Based Virtual Tablets System Involving Robust Tracking of Rectangular Objects and Hands", Yasushi Sugama, Taichi Murase and Yusaku Fujii.

Article 34: "Augmented Winter Ski with AR HMD", Kevin Fan, Jean-Marc Seigneur, Jonathan Guislain, Suranga Nanayakkara and Masahiko Inami.

Article 35: "Electrosmog Visualization through Augmented Blurry Vision", Kevin Fan, Jean-Marc Seigneur, Suranga Nanayakkara and Masahiko Inami.

Article 36: "Augmentation of Human Protection Functions Using Wearable and Sensing System", Ryoichiro Shiraishi, Takehiro Fujita, Kento Inuzuka, Rintaro Takashima and Yoshiyuki Sankai.

Article 37: "EXILE: Experience based Interactive Learning Environment", Taihei Kojima, Atsushi Hiyama, Kenjirou Kobayashi, Sachiko Kamiyama, Naokata Ishii, Michitaka Hirose and Hiroko Akiyama.

Article 38: "Diagram Presentation using Loudspeaker Matrix for Visually Impaired People: Sound Characteristics for Pattern Recognition", Takahiro Miura, Junya Suzuki, Ken-Ichiro Yabu, Kazutaka Ueda and Tohru Ifukube.

Article 39: "PeaceKeeper: Augmenting the Awareness and Communication of Noise Pollution in Student Dormitories", Henrik Lanng, Anders S. Lykkegaard, Søren Thornholm, Philip A. Holst Tzannis and Nervo Verdezoto.

Article 40: "Semi-automatic Multiple Player Tracking of Soccer Games using Laser Range Finders", Yuma Kabeya, Fumiharu Tomiyasu and Kenji Mase.

Article 41: "Expressing Human State via Parameterized Haptic Feedback for Mobile Remote Implicit Communication", Jeffrey R. Blum and Jeremy R. Cooperstock.

Article 42: "Social Sensing: a Wi-Fi based Social Sense for Perceiving the Surrounding People", Yoni Halperin, Galit Buchs, Shachar Maidenbaum, Maya Amenou and Amir Amedi.

Article 43: "A Pedagogical Virtual Machine for Assembling Mobile Robot using Augmented Reality", Malek Alrashidi, Ahmed Alzahrani, Michael Gardner and Victor Callaghan.

Article 44: "A Co-located Meeting Support System by Scoring Group Activity using Mobile Devices", Hiroyuki Adachi, Seiko Myojin and Nobutaka Shimada.

Article 45: "s-Helmet: A Ski Helmet for Augmenting Peripheral Perception", Evangelos Niforatos, Ivan Elhart, Anton Fedosov and Marc Langheinrich.

Article 46: "SkiAR: Wearable Augmented Reality System for Sharing Personalized Content on Ski Resort Maps", Anton Fedosov, Ivan Elhart, Evangelos Niforatos, Alexander North and Marc Langheinrich.

Article 47: "3D Position Estimation of Badminton Shuttle Using Unsynchronized Multiple-View Videos", Hidehiko Shishido, Yoshinari Kameda, Itaru Kitahara and Yuichi Ohta.

Article 48: "Neurogoggles for Multimodal Augmented Reality", Sylvain Cardin, Howard Ogden, Daniel Perez-Marcos, John Williams, Tomo ohno, Tej Tadi, Nicolas Bourdaud, Gangadhar Garipelli, Leandre Bolomey and Arthur Giroux.

Article 49: "On Control Interfaces for the Robotic Sixth Finger", Irfan Hussain, Gionata Salvietti and Domenico Prattichizzo.

Article 50: "Repeated Cycling Sprints with Different Restricted Blood Flow Levels", Sarah Willis, Laurent Alvarez, Grégoire Millet and Fabio Borrani.

Article 51: "Metamorphosis Hand: Dynamically Transforming Hands", Nami Ogawa, Yuki Ban, Sho Sakurai, Takuji Narumi, Tomohiro Tanikawa and Michitaka Hirose.