IEEE World Haptics Conference 2013

WHC 2013

April 14-18, 2013 | Daejeon Convention Center, Daejeon, Korea

The 5th Joint Eurohaptics Conference and IEEE Haptics Symposium

PROGRAM AT-A-GLANCE

SUNDAY

WORKSHOPS
Room 102
Haptic Collaboration in Shared Control Tasks
(09:00-17:00)

WORKSHOPS
Room 103
Haptics and BCI (Brain-Computer Interface)
(09:00-12:20)

Lunch Break

WORKSHOPS
Room 105
Quantification of Tactile Feelings: How Can We Analyze, Measure, and DesigN Diverse Textures in Touch?
(13:30-16:55)

TUTORIALS
Room 106
Recent Advance in Collision/Contact Computation for Haptic Rendering
(09:00-12:00)

Lunch Break

TUTORIALS
Room 107
Web Browser-Based Multimodal Interactive Simulation
(13:30-16:30)

Terrace (2F)
Welcome Reception and Artist Talks

MONDAY

ART
Lobby (2F), Room 204, 205
Art Exhibition

Program

Grand Ballroom 1
Plenary Talk byTony J. Prescott

Grand Ballroom 1
Poster Spotlight I

Break

Grand Ballroom 1
Oral Session I

Lunch Break

Grand Ballroom 1
Opening Ceremony & Lifetime Leture by Wayne J. Book

Grand Ballroom 1
Demo Spotlight I

Room 109-111
Poster and Demo Session with Coffee
(Poster I & Demo I)

Grand Ballroom 1
Oral Session II

Break

Grand Ballroom 1
Oral Session III

POP.CON, Downtown Daejeon
Get-together Party in Downtown (Popcorn Party)

TUESDAY

ART
Lobby (2F), Room 204, 205
Art Exhibition

Program

Grand Ballroom 1
Plenary Talk by Masahiko Inami

Grand Ballroom 1
Poster Spotlight II

Break

Grand Ballroom 1
Oral Session IV

Lunch Break

Grand Ballroom 1
Oral Session V

Grand Ballroom 1
Demo Spotlight II

Room 109-111
Poster & Demo Session with Coffee
(Poster II & Demo II)

Conference Hall (3F)
Industry Session

Grand Ballroom 1
Banquet

WEDNESDAY

ART
Lobby (2F), Room 204, 205
Art Exhibition

Program

Grand Ballroom 1
Plenary Talk by Abdulmotaleb El Saddik

Grand Ballroom 1
Poster Spotlight III

Break

Grand Ballroom 1
Oral Session VI

Lunch Break

Grand Ballroom 1
Oral Session VII

Room 109-111
Poster & Demo Session & Coffee
(Poster III & Demo I, II)

Grand Ballroom 1
Oral Session VIII

Break

Grand Ballroom 1
Award Ceremony

Lobby (1F)
Farewell Party with Luck

THURSDAY

Program
Technical Tour

Program
Cultural Tour (optional)

7:00
7:30
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WELCOME MESSAGE

As the general chair of the conference, it is my great pleasure to cordially invite you to the IEEE World Haptics Conference 2013 to be held at the Daejeon Convention Center, Korea from April 14 to 18, 2013. On behalf of the IEEE WHC 2013 Organizing and Steering Committee, I would like to welcome all participants, including the invited speakers, artists, and all guests to the conference. The ultimate objective is to advance our field of haptics through networking among members of academia and industry, as well as with affiliated specialists, and to build mutual understanding and friendship among colleagues from all over the world.

In the IEEE WHC 2013, 5 workshop/tutorials, 3 plenary talks, a lifetime lecture, 8 oral sessions, 92 poster presentations, 80 demonstrations, 4 industry talks, and 8 art exhibitions will provide great opportunities to share the most up-to-date scientific discoveries and innovative ideas. Especially, the industry session will provide a chance to share business insights and technology vision. Eight artists are invited to present their art with haptics technology.

All the members of the Organizing Committee and the editorial board of the IEEE WHC 2013 have exerted every effort to make this a truly successful conference, and the conference sponsors have also generated invaluable contributions. Once again, I express our deepest gratitude for their excellent endorsements and contributions.

I truly hope that you will enjoy these grand events, and plunge into the wonders of the traditional culture and customs in Daejeon, this "hidden jewel of Asia." Great weather, beautiful flowers and delicious cuisine, together with friendly faces and warm welcomes, await you.

With your active participation and support, this conference will achieve a resounding success. I assure you that this conference will be an academically enriching, socially enjoyable, and truly memorable experience for all the delegates and their guests.

Thank you.

Dong-Soo Kwon
General Chair, IEEE WHC 2013

MESSAGE FROM CEB

Welcome to World Haptics Conference 2013 in Daejeon, Korea!

The idea of a Conference Editorial Board (CEB) for the World Haptics Conference (WHC) was conceived in 2008 by the WHC Steering Committee, to provide continuity and consistency for the WHCs by having the same people serving on the board for two meetings (3-year term). The board consists of three editors and a group of Associate Editors (AEs). Lynette Jones, Matthias Harders, and Yasuyoshi Yokokohji served as the editors for WHCs 2009 and 2011. The current editors were appointed by the Steering Committee during WHC 2011 in Istanbul, Turkey. Some of the members of the first editorial board rotated off the board, others were renewed, and new members were recruited. The current CEB consists of Miguel A. Otaduy (Haptic Applications), Hiroyuki Shinoda (Haptic Technology), Hong Z. Tan (Haptic Science), and thirty AEs.

For WHC 2013, we received 212 regular paper submissions. Based on the reviewers' and the AEs' assessments, 125 papers (59%) were accepted. To continue with the single track format that is preferred by most attendees, a small number of papers (32) were selected for oral presentation while the rest of the accepted papers are presented as posters. Prior to the poster sessions, the authors are asked to present a 60 seconds poster teaser to highlight the key contributions. Additionally, there is a record number of 80 demos to be showcased throughout this year's conference.

Each year, some themes emerge through the submitted works. This year, there is a continued trend of increasing number of studies focusing on tactile and fingertip display technologies and human perception and performance with the displays. This trend is balanced by strong contributions in dynamic systems and control, haptic rendering, and many exciting applications including rehabilitation and HCI.

We would like to take this opportunity to thank our dedicated AEs and reviewers for their hard work within a very tight review schedule and during a very busy time of the year. We were surprised when we tallied 382 individuals who reviewed all the regular paper submissions! Many additional individuals, especially Pradeep Misra and Fred Song, supported our work from behind the scenes to ensure that our work went as smoothly as possible. We hope you enjoy the technical programs and the cultural activities at WHC 2013!

With Warmest Regards,
Hong Z. Tan, Miguel A. Otaduy, and Hiroyuki Shinoda
Editors, CEB of IEEE WHC 2013

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PROGRAM DETAILS

▸ SUNDAY APRIL 14

WORKSHOPS & TUTORIALS

09:00-17:00

Room 102

☐ **Workshop: Haptic Collaboration in Shared Control Tasks,** Organizers: Angelika Peer (Technische Universität München, Germany), David Abbink (Delft University of Technology, Netherlands), Ayse Kucukyilmaz (Koc University, Istanbul, Turkey), Cagatay Basdogan (Koc University, Istanbul, Turkey), Ansgar Koene (University of Birmingham, United Kingdom), Satoshi Endo (University of Birmingham, United Kingdom), Alan Wing (University of Birmingham, United Kingdom)

Although recent research has been applied to a wide variety of applications, there is little consensus on how to design or particularly how to evaluate human-human, human-computer and human-robot collaboration systems. Understanding how to quantify and model human physical interaction, how humans learn and adapt, and how such findings can be included into haptic systems, is an area with much potential – and much debate. We propose this workshop, with the goal of offering a platform to discuss open issues in the design and evaluation of human-human, human-computer and human-robot collaboration and haptic shared control systems.

09:00-12:20

Room 103

☐ **Workshop: Haptics and BCI (Brain-Computer Interface),** *Organizers: Mounia Ziat (Northern Michigan University), Anatole Lécuyer (INRIA)*

This workshop focuses on state-of-the-art research in Brain-Computer Interfaces and discusses, among other things, the use of invasive and non-invasive BCI and the use of mental states such as motor imagery as a mean of communication or control of haptic interfaces. Recent years have witnessed the convergence of two kinds of advanced user interfaces: haptic and brain-computer interfaces. The goal of this workshop is to bring together scientists to discuss this novel connection, that is, the use of haptic devices in BCI research, and the use of BCI for controlling haptic devices.

13:30-16:55

Room 105

☐ **Workshop: Quantification of Tactile Feelings: How can We Analyze, Measure, and Design Diverse Textures in Touch?,** *Organizers: Yoshihiro Tanaka (Nagoya Institute of Technology), Junji Watanabe (NTT Communication Science Laboratories / Tokyo Institute of Technology), Shogo Okamoto (Nagoya University), Masashi Nakatani (Columbia University Medical Center)*

This workshop will present methods for the quantification of tactile feelings on the basis of haptic research by the organizers. It is composed of lectures and a hands-on experience program considering the application of the quantification of tactile feelings to industry. Through this workshop, we expect that the participants will:

- Be aware of diversity of texture feelings

- Understand the importance and advantages of quantifying tactile feelings

- Gain knowledge about two different analysis techniques for establishing texture perceptual structure

- Gain insight into applying the design/communication of tactile feelings to industrial products or contexts.

09:00-12:00

Room 106

☐ **Tutorial: Recent Advance in Collision/Contact Computation for Haptic Rendering,** *Organizers: Young J. Kim (Ewha Womans University, Korea), Dangxiao Wang (Beihang University, China), Jeha Ryu (GIST, Korea)*

Collision and contact queries are an essential part of haptic rendering, and they often become the computational bottleneck of such processes. However, it is quite challenging for beginners to keep up with all the published papers and evolving rendering systems for collision detection and contact queries. This tutorial presents to haptic researchers an overview of existing techniques, practical solutions, and discusses how the field will change in the coming years. It explains recent developments designed to achieve interactive performance for haptic applications using both object-space and image-space approaches. It also covers how these collision/contact queries can be integrated into challenging three- and six-degree-of-freedom haptic rendering using penalty- and constraint-based techniques.

13:30-16:30

Room 107

☐ **Tutorial: Web Browser-Based Multimodal Interactive Simulation,** *Organizer: Woojin Ahn (Rensselaer Polytechnic Institute)*

This tutorial will introduce the usefulness and potential of web browser-based multimodal interactive simulations, present a guide for the key programming languages in this space (such as HTML5, JavaScript, and WebGL) and demonstrate how to create multimodal interactive simulations in a web environment.

18:00-19:30

Terrace (2F)

☐ **Welcome Reception and Artist Talks**

Reconnect with colleagues or network with other professionals and form new alliances at this kickoff event.

MONDAY APRIL 15 ◂

10:00-18:00

Lobby (2F), Room 204,205

☐ **Art Exhibition**

09:00-10:00

Grand Ballroom 1

☐ **Plenary Talk: From Whiskers to Fingertips—A Biomimetic Approach to Active Touch Sensing,** *Tony J. Prescott (University of Sheffielddd, UK)*

Session Chair: Vincent Hayward

How do animals understand the physical world they live in? One answer, due to Gibson, is that their sensory systems are tuned to pick up relevant affordances for behavior, but how is it that the brain and the sensory apparatus become suitably adapted to perform this feat? To cast light on this question we have been investigating active touch sensing in mammals, including humans, and developing biomimetic robots that can help us understand these biological systems whilst also developing useful haptic technologies. An important focus has been on the vibrissal (whisker) system of rodents, and its emergence through evolution and development, which we have investigated through a combination of (i) ethological studies of behaving animals (ii) computational neuroscience models of the neural cir-

cuits involved in vibrissal processing, and (iii) biomimetic robots embodying many of the characteristics of whiskered animals in their design and control. This work has resulted in a series of whiskered robots, the most recent of which, Shrewbot, is able to construct tactile maps of its environment and recognize and track moving objects. We are also studying humanoid touch, focusing on the development of Bayesian strategies for active tactile sensing with robot hands. Here our results have provided the first demonstration of hyperacuity in robot touch whilst also indicating that tactile perception is improved in unstructured environments by appropriate active control. The active sensing framework can also be applied to the development of haptic interfaces for human users that can augment our existing sensory capability. For instance, we are developing a head-mounted "remote touch" system that links distance sensors (ultrasound arrays) with vibrotactile displays. Here an interesting question is how the signals that are delivered through the displays should be modulated to take into account the intentional head and body movements of the user and in order to provide a meaningful and intuitive experience. The talk will present converging lines of evidence, from these different research strands, for the importance of active control in haptics. Our results will also be used to illustrate how experimental, computational, and robotic approaches can operate together to advance our understanding of sensorimotor cognition in behaving systems.

10:00-10:30

Grand Ballroom 1

☐ **Poster Spotlight I**

10:30-10:50

☐ **Coffee Break**

10:50-11:50

Grand Ballroom 1

☐ **Oral Session I: At the Fingertip**

Session Chairs: Matthias Harders, Koji Yatani

[O1-1] Perceptual Collapse: The Fusion of Spatially Distinct Tactile Cues into a Single Percept, *Steven G. Manuel, J. Edward Colgate, Michael A. Peshkin, Roberta L. Klatzky (Northwestern University)*

[O1-2] Haptic Contour Following and Feature Detection with a Contact Location Display, *Jaeyoung Park, William Provancher, David Johnson, Hong Tan (Purdue University)*

[O1-3] Back-To-Back Skin Stretch Feedback for Communicating Five Degree-Of-Freedom Direction Cues, *Ashley Guinan, Nicholas Hornbaker, Andrew Doxon, Markus Montandon, William Provancher (University of Utah)*

[O1-4] Haptic Matching of Directional Force and Skin Stretch Feedback Cues, *Landon T. Gwilliam, Andrew J. Doxon, William R. Provancher (University of Utah)*

11:50-13:10

☐ **Lunch**

13:10-14:10

Grand Ballroom 1

☐ **Opening Ceremony & Lifetime Lecture: A Human in the Loop: Feedback from One Perspective,** *Wayne J. Book (Georgia Institute of Technology, USA)*

Session Chair: Dong-Soo Kwon

One of the most distinctive features of human beings compared to the other animal species is the ability to make and use tools; to fashion from materials in our environment, implements that assist us to feed, house and clothes ourselves; to maintain and entertain ourselves; to defend ourselves and to be aggressors to be defended from. The interaction with these tools has become more and more sophisticated, leaving us humans dependent and sometimes even subservient to the tool we created. But in the end we (human beings) want to rule the systems we build. Consider our role in the human-machine feedback loop. How has this relationship evolved over time? In the context of my assignment for this talk I will focus on how it has evolved over the last 40 years or so I have observed and been involved with research in this field, but also with a longer perspective leading up to that blip of time. Reflections on some wonderful experiences with people and places will support my thoughts.

My own relevant experience begins with machines as great savers-of-labor. As any farm boy in the '50s and '60s would conclude, it's better to be on the tractor than behind the hoe. But the tractor then was only a more powerful hoe. A dumb source of power that pushed the soil as we devised, dropping cotton seed down a tube to be covered for planting, not mindful if the tube were plugged and or if the seed ever reached moist soil. The feedback to me, the driver, came only when the tube overflowed and seed spilled wastefully on the ground after great distances were left unplanted. Our planting "tools" are now more powerful and deliver expensive genetically modified seeds by pneumatic injection with thrifty accuracy seed by seed, but farmers still operate these tools as their ultimate masters. My design to detect a blocked seed tube would no longer be needed but the feedback of proper operation is still essential. Feedback from the cotton hoe was direct and immediate. It was haptic. Feedback from a blocked planter tube or an overloaded engine is less direct and less immediate. Actions taken in response to feedback are sometimes instinctive but often learned and indirect. Instinctive responses are reliable, quick and less cognitively burdensome.

The use of feedback pervades engineered systems and human-machine systems in particular. While feedback involves physical implementation and purely physical feedback loops are important, our most versatile means to devise effective feedback is to treat it as information. With the exploding variety of technologies for sensing, processing and delivering information to all components, the human becomes the most limiting component in the feedback loop in terms of throughput and the human is the slowest to evolve. We haven't kept up with the pace of our machines. Hence the most effective way to keep us in the loop as its master is to adapt the remaining components to effectively and efficiently use our limited capabilities. An examination of the channels of communication to a human in the loop, and the ease with which we respond appropriately, will provide hints at the best use of haptics and some shortcomings that research must address for its most effective use.

14:10-14:50

Grand Ballroom 1

☐ **Demo Spotlight I**

14:50-16:20

Room 109-111

☐ **Poster and Demo Session with Coffee (Poster I & Demo I)**

Poster Session P1: Sensing, Rendering & Application

Session Chair: Ki-Uk Kyung

[P1-1] Haptic Interaction with Objects in a Picture Based on Surface Normal Estimation, *Seung-Chan Kim, Dong-Soo Kwon (Korea Advanced Institute of Science and Technology)*

[P1-2] MPEG-V Standardization for Haptically Interacting with Virtual Worlds, *Jaeha Kim, Yeongmi Kim, Jeha Ryu (Gwangju Institute of Science and Technology)*

[P1-3] Formable Object - a New Haptic Interface for Shape Rendering, *Stefan Klare, Dmitrij Forssilow, Angelika Peer (Technische Universität München)*

[P1-4] Localized Tactile Stimulation by Time-Reversal of Flexural Waves: Case Study with a Thin Sheet of Glass, *Charles Hudin, José Lozada, Vincent Hayward (CEA LIST)*

[P1-5] Deformable Haptic Rendering for Volumetric Medical Image Data, *Sonny Chan, Nikolas H. Blevins, Kenneth Salisbury (Stanford University)*

[P1-6] Strain Limiting for Soft Finger Contact Simulation, *Alvaro G. Perez, Gabriel Cirio, Fernando Hernández, Carlos Garre, Miguel A. Otaduy (URJC Madrid)*

[P1-7] Noncontact Human Force Capturing Based on Surface Hardness Measurement, *Masahiro Fujiwara, Hiroyuki Shinoda (The University of Tokyo)*

[P1-8] Scalable Rendering of Variable Density Point Cloud Data, *Priyadarshini Kumari, Sreeni K. G., Subhasis Chaudhuri (IIT Bombay)*

[P1-9] Rendering Variable-Sized Lump Sensations on a Softness Tactile Display, *Fuminobu Kimura, Akio Yamamoto (The University of Tokyo)*

[P1-10] Tactile Sensing Over Articulated Joints with Stretchable Sensors, *Tapomayukh Bhattacharjee, Advait Jain, Sarvagya Vaish, Marc Killpack, Charlie Kemp (Georgia Institute of Technology)*

[P1-11] MR-Compatible Biopsy Needle with Enhanced Tip Force Sensing, *Santhi Elayaperumal, Jung Hwa Bae, David Christensen, Mark Cutkosky, Bruce Daniel, Joannes M. Costa, Richard J. Black, Fereydoun Faridian, Behzad Moslehi (Stanford University)*

[P1-12] Anisotropic Virtual Coupling with Energy-Based Deflection for Palpating Inhomogeneous Compliant Objects, *Umut Kocak, Karljohan Lundin Palmerius, Matthew David Cooper (Linkoping University)*

[P1-13] A Predictive Model for Haptic Assistance in Robot Assisted Trocar Insertion, *Ashirwad Chowriappa, Raul Wirz Gonzalez, Yong Won Seo, Aditya Reddy Ashammagari, Tushar Kesavadas, Peter Scott, Khurshid Guru, Thenkurussi Kesavadas (The State University of New York; Roswell Park Cancer Institute)*

[P1-14] A High-Performance Velocity Estimator for Haptic Applications, *Kamran Ghaffari Toiserkan, Jozsef Kovecses (McGill University)*

[P1-15] Advanced 2D Machine Palpation for Tissue Abnormality Localization in a Simulated Environment, *Yeongjin Kim, Youngjin Na, Bummo Ahn, Jung Kim (Korea Advanced Institute of Science and Technology)*

[P1-16] Identification of Various Kinds of Papers Using Multi-Axial Tactile Sensor with Micro-Cantilevers, *Kosuke Watanabe, Masayuki Sohgawa, Takeshi Kanashima, Masanori Okuyama, Haruo Noma (Osaka University)*

[P1-17] Tactile Sensing System Including Bidirectionality and Enhancement of Haptic Perception by Tactile Feedback to Distant Part, *Yoshihiro Tanaka, Takanori Nagai, Masamichi Sakaguchi, Michitaka Fujiwara, Akihito Sano (Nagoya Institute of Technology)*

[P1-18] Electrically Multiplexed Tactile Interface: Fusion of Smart Tactile Sensor and Display, *Shunsuke Yoshimoto, Yoshihiro Kuroda, Masataka Imura, Osamu Oshiro, Kosuke Sato (Osaka University)*

[P1-19] Six-DoF Haptic Interaction with Fluids, Solids, and Their Transitions, *Gabriel Cirio, Maud Marchal, Miguel A. Otaduy, Anatole Lecuyer (Inria Rennes; URJC)*

[P1-20] Toward Transparent Virtual Coupling for Haptic Interaction During Contact Tasks, *Myungsin Kim, Dongjun Lee (Seoul National University)*

[P1-21] Adaptive and Embedded Deformation Model: An Approach to Haptic Interaction with Complex Inhomogeneous Elastic Objects, *Kazuyoshi Tagawa, Tatsuya Oishi, Hiromi Tanaka (Ritsumeikan University)*

[P1-22] Lump Detection with a GelSight Sensor, *Xiaodan Jia, Rui Li, Mandayam Srinivasan, Edward Adelson (Massachusetts Institute of Technology)*

[P1-23] Fingernail Imaging Calibration Using Active Appearance Models, *Thomas Grieve, John Hollerbach, Stephen Mascaro (University of Utah)*

[P1-24] Periodic Tactile Feedback for Accelerator Pedal Control, *Yosuke Kurihara, Taku Hachisu, Michi Sato, Shogo Fukushima, Hiroyuki Kajimoto (The University of Electro-Communications)*

[P1-25] ViPong: Probabilistic Haptic Feedback for Eyes-Free Interaction, *Steven Strachan, Michael Wiertlewski, Harald Zophoniasson, Margarita Anastassova (CEA, LIST Sensory and Ambient Interfaces Laboratory, France)*

[P1-26] Merging Two Tactile Stimulation Principles: Electrovibration and Squeeze Film Effect, *Frédéric Giraud, Michel Amberg, Betty Lemaire-Semail (L2EP)*

[P1-27] Snap-To-Fit, a Haptic 6 DOF Alignment Tool for Virtual Assembly, *Pontus Olsson, Fredrik Nysjö, Jan-Michaél Hirsch, Ingrid Carlbom (Uppsala University)*

[P1-28] The TaSST: Tactile Sleeve for Social Touch, *Gijs Huisman, Aduén Darriba Frederiks, Elisabeth van Dijk, Dirk Heylen, Ben Krose (University of Twente)*

[P1-29] Virtual Restraint of Hand Position and Posture for Cooperative Virtual Object Manipulation with Ungrounded Force Display Device, *Kinya Fujita, Yukinobu Takehana, Katsuhiro Kamata (Tokyo University of Agriculture and Technology)*

[P1-30] Virtual Coupling Design for Stability and Transparency of Multi-Device Haptic Systems with Delays, *Gianni Bianchini, Domenico Prattichizzo (Università di Siena)*

[P1-31] Real-Time Haptic Rendering and Haptic Telepresence Robotic System for the Visually Impaired, *Chung Hyuk Park, Ayanna Howard (Georgia Institute of Technology)*

[P1-32] Sharp Tactile Sensation using Superposition of Vibrotactile Stimuli in Different Phases, *Tatsuma Sakurai, Hiroyuki Shinoda, Masashi Konyo (The University of Tokyo)*

Demo Session I

Session Chairs: Hiroyuki Kajimoto, Jee-Hwan Ryu

[D1-1] Haptic Feedback for Fingertip Interaction with Touchscreens, *Chen Zhao, Zhaoyuan Ma, Xiaowei Dai, Kwangtaek Kim, Jiawei Gu, Peter Choi, Hong Z. Tan, Ed Colgate (Microsoft Research Asia; Northwestern University)*

[D1-2] TPaD Fire Open Source Haptic Tablet, *Joe Mullenbach, Craig Shultz, Michael Peshkin, James Edward Colgate (Northwestern University)*

[D1-3] The Reactant: At the Lightness of a Touch, *Sandra Coelho (Universidade do Porto)*

[D1-4] A Simulation Environment for Teleoperated Robotic Tasks with Haptic Guidance, *Seokyeol Kim, Jinah Park (Korea Advanced Institute of Science and Technology)*

[D1-5] Adaptive and Embedded Deformation Model: An Approach to Haptic Interaction with Complex Inhomogeneous Elastic Objects, *Kazuyoshi Tagawa, Tatsuya Oishi, Hiromi T. Tanaka (Ritsumeikan University)*

[D1-6] HapTune: Haptic Guidance for Pitch Correction of String Instruments, *Yongjae Yoo, Seungmoon Choi (Pohang University of Science and Technology)*

[D1-7] Neurohaptic Interface @ DGIST, *Jinung An, Sang Hyeon Jin, Berdakh Abibullaev, Seung Hyun Lee, Gwanghee Jang, Hyunju Lee, Jeon-Il Moon (Daegu Gyeongbuk Institute of Science and Technology)*

[D1-8] Stable Bilateral Teleoperation System under various time-delay with Time Domain Passivity Approach, *Ha Van Quang, Jee-Hwan Ryu (Korea University of Technology and Education)*

[D1-9] A Dragonfly with Traveling Vibrotactile Wave, *Won-Hyeong Park, Yu-Joon Kim, Dong-Soo Choi, Sang-Youn Kim (Korea University of Technology and Education)*

[D1-10] Touching and Feeling Fetus, *Jongwoo Choi, Jeaha Kim, Jeha Ryu (Gwang-Ju Institute of Science and Technology)*

[D1-11] Merging of Electrovibration and Squeeze film effects for tactile feedback, *Frédéric Giraud, Michel Amberg, Betty Lemaire-Semail (University Lille1, INRIA)*

[D1-12] TAXEL (TActile + piXEL), *Suntak Park, Youngsung Kim, Bongje Park, Sungryul Yun, Ki-Uk Kyung (Electronics and Telecommunications Research Institute)*

[D1-13] Haptic Buttons for Consumer Products, *Turo Keski-Jaskari, Pauli Laitinen (Aito BV)*

[D1-14] Muscle-Propelled Force Feedback: bringing force feedback to mobile devices, *Pedro Lopes, Patrick Baudisch (Hasso Plattner Institut)*

[D1-15] API for Surround Haptics Displays, *Ali Israr, Ivan Poupyrev (Disney Research)*

[D1-16] Dual Actuated Tactile Device for Displaying Force Contact and Static Friction by Skin Deformation, *Narihiro Nishimura, Daniele Leonardis, Hiroyuki Kajimoto, Massimiliano Solazzi, Antonio Frisoli (University of Electro Communications, PERCRO; Scuola Superiore Sant'Anna)*

[D1-17] Memory-Based Passivation Approach, *Jee-Hwan Ryu, Moon-Young Yoon, Aghil Jafari (Korea University of Technology and Education)*

[D1-18] An Aerial Vibrotactile Display with Floating Visual Images, *Keisuke Hasegawa, Yasuaki Monnai, Masahiro Fujiwara, Kazuma Yoshino, Hiroyuki Shinoda (The University of Tokyo)*

[D1-19] Sharp Tactile Lines by Multiple Vibrations, *Tatsuma Sakurai, Hiroyuki Shinoda, Masashi Konyo (The University of Tokyo; Tohoku University)*

[D1-20] Pseudo-Haptic Rendering for Displaying a Torsional Torque, *Hiroaki Yano, Teruyuki Yoshida, Hiroo Iwata (University of Tsukuba)*

[D1-21] Reproduction of Virtual Lumps in Soft Objects, *Fuminobu Kimura, Akio Yamamoto (The University of Tokyo)*

[D1-22] High-Speed Thermal Display using Water Flow, *Kazuki Imai, Masamichi Sakaguchi, Jumpei Arata (Nagoya Institute of Technology)*

[D1-23] 2D Force Feedback for Haptic Interaction with SPIDAR-Mouse by Mapping 3D Surface to Plane in Molecular Docking, *Kikuo Asai, Norio Takase, Makoto Sato (The Open University of Japan; Isogo Soft; Tokyo Institute of Technology)*

[D1-24] Multi-finger Electrostatic Passive Haptic Feedback on a Visual Display, *Taku Nakamura, Akio Yamamoto (The University of Tokyo)*

[D1-25] Intuitive Operating Force Presenting Method for Skill Training Using Stopper Mechanism, *Mingoo Lee, Masamichi Sakaguchi, Jumpei Arata (Nagoya Institute of Technology)*

[D1-26] Multisensory English Intonation Learning System, *Jungsik Hwang, Minjung Kim, Kwangsu Cho (Sungkyunkwan University)*

[D1-27] Little Trip in the Paris Metro, *Lucie Brunet, Christine Mégard, Gwenaël Changeon, Sabrina Panëels, José Lozada (CEA-List)*

[D1-28] A Precision Haptic Interface for Trocar Insertion Experience, *Ravikiran Chollangi, Yong Wong Seo, T. Kesavadas (State University of New York at Buffalo)*

[D1-29] Haptic Hallucination Sleeve, *Jon Fancher, Erin Smith, Mounia Ziat (Northern Michigan University)*

[D1-30] Haptic Jamming: A Deformable Geometry, Variable Stiffness Tactile Display using Pneumatics and Particle Jamming, *Andrew A. Stanley, James C. Gwilliam, Allison M. Okamura (Stanford University)*

[D1-31] Tactile Sensing over Articulated Joints with Stretchable Sensors, *T. Bhattacharjee, A. Jain, S. Vaish, M. D. Killpack, C. C. Kemp (Georgia Institute of Technology)*

[D1-32] A New Miniature Haptic Button for Handheld Devices, *Semin Ryu, Tae-Heon Yang, Dongbum Pyo, Dong-Soo Kwon (Korea Advanced Institute of Science and Technology; Korea Research Institute of Standards and Science)*

[D1-33] Haptic Editor, *Nobuhisa Hanamitsu, Yuta Takeuchi, Sho Kamuro, Kouta Minamizawa, Susumu Tachi (Keio University; The University of Tokyo)*

[D1-34] Haptic-Feedback of a Force-Sensing Biopsy Needle, *Santhi Elayaperumal, Jung Hwa Bae, David Christensen, Mark R. Cutkosky, Bruce L. Daniel, Richard J. Black, Joannes M. Costa, Fereydoun Faridian, Behzad Moslehi (Stanford University; Intelligent Fiber Optic Systems Corporation)*

[D1-35] Reproduction of the Viscous Liquid Feeling from Sake Bottle by Modulating Vibration, *Sakiko Ikeno, Ryuta Okazaki, Taku Hachisu, Michi Sato, Shogo Fukushima, Hiroyuki Kajimoto (University of Electro-Communications)*

[D1-36] Combined Tactile Display using Electrostatic and Capacitance Force, *Tae-Heon Yang, In-Mook Choi, Min-Seok Kim, Yon-Kyu Park (Korea Research Institute of Standards and Science)*

[D1-37] Vibrotactile Actuators and Systems, *Hsin-Yun Yao, Xuan Duan (Tactile Labs)*

[D1-38] Tactile Search Engine for Online Platform, *Yuta Takeuchi, Hirotaka Katakura, Yusuke Mizushina, Sho Kamuro, Kouta Minamizawa, Susumu Tachi (Keio University; The University of Tokyo)*

[D1-39] Monitor: A Vibrotactile Aid to Improve Environmental Perception of Persons with Severe Hearing Impairment/Deafblindness, *Parivash Ranjbar, Dag Stranneby, Cheryl Akner-Koler, Erik Borg (Örebro University)*

[D1-40] Using Small and Large Scale Gestures Combined with Haptic Feedback to Support Explorative Navigation, *Charlotte Magnusson, Kirsten Rassmus-Gröhn, Delphine Szymczak (Lund University)*

16:20-17:20

Grand Ballroom 1

☐ **Oral Session II: Tactile Displays**

Session Chairs: Hiroyuki Kajimoto, Junji Watanabe

[O2-1] Haptic Jamming: A Deformable Geometry, Variable Stiffness Tactile Display Using Pneumatics and Particle Jamming, *Andrew A. Stanley, James C. Gwilliam, Allison M. Okamura (Stanford University)*

[O2-2] Aerial Display of Vibrotactile Sensation with High Spatial-Temporal Resolution Using Large-Aperture Airborne Ultrasound Phased Array, *Keisuke Hasegawa, Hiroyuki Shinoda (The University of Tokyo)*

[O2-3] Multi-Finger Electrostatic Passive Haptic Feedback on a Visual Display, *Taku Nakamura, Akio Yamamoto (The University of Tokyo)*

[O2-4] Fingertip Friction Modulation Due to Electrostatic Attraction, *David J. Meyer, Michael A. Peshkin, J. Edward Colgate (Northwestern University)*

17:20-17:30

☐ **Break**

17:30-18:30

Grand Ballroom 1

☐ **Oral Session III: Perception & Cognition**

Session Chairs: Knut Drewing, Masashi Nakatani

[O3-1] An Engineered Tactile Afferent Modulation Platform to Elicit Compound Sensory Nerve Action Potentials in Response to Force Magnitude, *Elmer K. Kim, Kristoffer Sugg, Nicholas Langhals, Sarah Lightbody, Melissa Baltrusaitis, Melanie Urbanchek, Paul Cederna, Gregory J. Gerling (University of Virginia)*

[O3-2] Can the Feel of the Haptic Interaction Modify a User's Emotional State?, *Elia Gatti, Giandomenico Caruso, Monica Bordegoni, Charles Spence (Politecnico di Milano)*

[O3-3] Tactile Flash Lag Effect: Taps with Changing Intensities Lead Briefly Flashed Taps, *Lihan Chen (Peking University)*

[O3-4] "Invitation to the Voyage": The Design of Tactile Metaphors to Fulfill Occasional Travelers' Needs in Transportation Networks, *Lucie Brunet, Christine Megard, Sabrina Panëels, Gwénaël Changeon, José Lozada (CEA-LIST)*

20:00-late

POP.CON, Downtown Daejeon

☐ **Get-together Party in Downtown (Popcorn Party)**

We are preparing a get together party downtown, where you will have a chance to get to know each other, make new friendships or just renew old business partnerships.

TUESDAY APRIL 16

10:00-18:00

Lobby (2F), Room 204, 205

☐ **Art Exhibition**

09:00-10:00

Grand Ballroom 1

☐ **Plenary Talk: Should I Touch it?—Haptics Beyond its Physicality,** *Masahiko Inami (Keio University, Japan)*

Session Chair: Hiroyuki Shinoda

Sometimes, we have to pinch ourselves to make sure we are not dreaming. Haptics is one of the most important modalities in order to sense the presence and confirms the reality in both physical and virtual worlds.

In daily life, we exploit a variety of input and output modalities, and the modalities that involve contact with our bodies can dramatically affect our ability to experience and express ourselves.

To understand the human perception in a scientific aspect, we must focus on both individual and combined effects of our sensory modalities. Therefore, in the pursuit for applications of haptic-based interaction, we should give attention to multi/cross modal effect both in micro and macro sense.

This talk will present several approaches that use multi/cross modal interfaces and how haptics can be simulated in multi modal interfaces.

They include Augmented Haptics, RobotPHONE, Fur Display, Animated Paper, Galvanic Vestibular Stimulation, Chewing Jockey and Reality Jockey.

10:00-10:30

Grand Ballroom 1

☐ **Poster Spotlight II**

10:30-10:50

☐ **Coffee Break**

10:50-11:50

Grand Ballroom 1

☐ **Oral Session IV: Motor Learning & Rehab**

Session Chairs: Angelika Peer, Greg Gerling

[O4-1] Role of Haptic Cues in Motor Learning, *Dongwon Kim, Brandon Johnson, Brent Gillespie, Rachael Seidler (University of Michigan)*

[O4-2] Understanding the Role of Haptic Feedback in a Teleoperated/Prosthetic Grasp and Lift Task, *Jeremy DeLaine Brown, Andrew Paek, Mashaal Syed, Marcia O'Malley, Patricia A. Shewokis, Jose Luis Contreras-Vidal, Brent Gillespie (University of Michigan)*

[O4-3] Combined Tendon Vibration and Virtual Reality for Post-Stroke Hand Rehabilitation, *Mike Domenik Rinderknecht, Yeongmi Kim, Laura Santos-Carreras, Hannes Bleuler, Roger Gassert (ETH Zurich)*

[O4-4] AssistOn-Mobile: A Series Elastic Holonomic Mobile Platform for Upper Extremity Rehabilitation, *Mine Sarac, Mehmet Alper Ergin, Volkan Patoglu (Sabancı University)*

11:50-13:10

☐ **Lunch**

13:10-14:10

Grand Ballroom 1

☐ **Oral Session V: Texture & Rendering**

Session Chairs: Dangxiao Wang, Seungmoon Choi

[O5-1] Six-Degree-Of-Freedom Haptic Rendering Using Translational and Generalized Penetration Depth Computation, *Yi Li, Min Tang, Sanyuan Zhang, Young J. Kim (Ewha Womans University; Zhejiang University)*

[O5-2] Generating Haptic Texture Models from Unconstrained Tool-Surface Interactions, *Heather Culbertson, Helena Juliette Thomasin Unwin, Benjamin E Goodman, Katherine J. Kuchenbecker (University of Pennsylvania)*

[O5-3] Data-Driven Haptics: Addressing Inhomogeneities and Computational Formulation, *Anatolii Sianov, Matthias Harders (ETH Zurich; The University of Sheffield)*

[O5-4] Dynamic Simulation of Tool-Mediated Texture Interaction, *Craig G. McDonald, Katherine J. Kuchenbecker (University of Pennsylvania)*

14:10-14:50

Grand Ballroom 1

☐ **Demo Spotlight II**

14:50-16:20

Room 109-111

☐ **Poster and Demo Session with Coffee (Poster II & Demo II)**

Poster Session P2: Technology
Session Chair: Ian Oakley

[P2-1] Dynamic Model Displacement for Model-Mediated Teleoperation, *Xiao Xu, Giulia Paggetti, Eckehard Steinbach (Technische Universität München)*

[P2-2] Dynamic Frictional Constraints for Robot Assisted Surgery, *Stuart A. Bowyer, Ferdinando Rodriguez y Baena (Imperial College London)*

[P2-3] The Influence of Handle-Avatar Mapping Uncertainty on Torque Fidelity of 6-DOF Haptic Rendering, *Dangxiao Wang, Youjiao Shi, Shuai Liu, Yuru Zhang, Jing Xiao (Beihang University)*

[P2-4] A Tele-Rehabilitation System with Bilateral Haptic Feedback to Both the Therapist and the Patient Via Time-Delay Environment, *Xibo Wang, Jiting Li (Beihang University)*

[P2-5] Haptic Size Aftereffects Revisited, *Astrid M.L. Kappers, Wouter Bergmann Tiest (VU University Amsterdam)*

[P2-6] Active Contour Following to Explore Object Shape with Robot Touch, *Uriel Martinez-Hernandez, TJ Dodd, Lorenzo Natale, Giorgio Metta, Tony J. Prescott, Nathan Lepora (University of Sheffield)*

[P2-7] Identification of Vibrotactile Patterns: Building Blocks for Tactons, *Mojtaba Azadi, Lynette Jones (Massachusetts Institute of Technology)*

[P2-8] Cerebellum-Based Adaptation for Fine Haptic Control Over the Space of Uncertain Surfaces, *Hector Barron-Gonzalez, John Porrill, Nathan Lepora, Eris Chinellato, Giorgio Metta, Tony J. Prescott (University of Sheffield)*

[P2-9] Haptic Feedback in Endovascular Tele-Surgery Simulation through Vasculature Phantom Morphology Changes, *Carlos R. Tercero Villagran, Zoran Najdovski, Seiichi Ikeda, Saeid Nahavandi, Toshio Fukuda (Nagoya University)*

[P2-10] The Effects of Laterotactile Information on Lump Localization through a Teletaction System, *Calum Roke, Adam Spiers, Tony Pipe, Chris Melhuish (Bristol Robotics Laboratory)*

[P2-11] On the role of cutaneous force in teleoperation: subtracting kinesthesia from complete haptic feedback, *Asad Tirmizi, Claudio Pacchierotti, Domenico Prattichizzo (University of Siena)*

[P2-12] Haptic Teleoperation under Variable Delay and Actuator Saturation, *Farzad Hashemzadeh, Mahdi Tavakoli, Iraj Hassanzadeh (University of Tabriz; University of Alberta)*

[P2-13] High Performance Teleoperation Using Switching Robust Control, *César Augusto López Mart'nez, Marinus Jacobus Gerardus van de Molengraft, Maarten Steinbuch (Eindhoven University of Technology)*

[P2-14] Neuromuscular Analysis based Tuning of Haptic Shared Control Assistance for UAV Collision Avoidance, *Jan Smisek, M.M. van Paassen, M. Mulder, David A. Abbink (Delft University of Technology)*

[P2-15] Cartesian and Joint Space Teleoperation for Nonholonomic Steerable Needles, *Ann Majewicz, Allison M. Okamura (Stanford University)*

[P2-16] Avoiding Conflicts of Operators in Multi-User Teleoperation Systems, *Takahiro Kanno, Yasuyoshi Yokokohji (Kyoto University)*

[P2-17] What's Around Me? Multi-Actuator Haptic Feedback on the Wrist, *Sabrina Panëels, Margarita Anastassova, Steven Strachan, Sophie Pham Van, Saranya Sivacoumarane, Christian Bolzmacher (CEA-LIST)*

[P2-18] MR-Brake with Permanent Magnet As Passive Actuator for Haptics, *Ozan Erol, Hakan Gurocak (Washington State University)*

[P2-19] Visio-Acoustic Screen for Contactless Touch Interface with Tactile Sensation, *Kazuma Yoshino, Hiroyuki Shinoda (The University of Tokyo)*

[P2-20] Haptic Stylus with Inertial and Vibro-Tactile Feedback, *Atakan Arasan, Cagatay Basdogan, Tevfik Metin Sezgin (Koc University)*

[P2-21] Hairlytop interface: an interactive surface display comprised of hair-like soft actuators, *Takuya Nojima, Yoshiharu Ooide, Hiroki Kawaguchi (University of Electro-Communications)*

[P2-22] Simultaneous Geometry and Texture Display Based on Lateral Force for Touchscreen, *Satoshi Saga, Ramesh Raskar (Tohoku University)*

[P2-23] 2-DOF Contact Location Display for Manipulating Virtual Objects, *Seiedmuhammad Yazdian, Andrew Doxon, David Johnson, Hong Tan, William Provancher (University of Utah)*

[P2-24] Prototype Of A VR Upper-limb Rehabilitation System Enhanced With Motion-based Tactile Feedback, *Davud Sadihov, Bastian Migge, Roger Gassert, Yeongmi Kim (ETH Zurich)*

[P2-25] Development of a New Miniature Kinesthetic Actuator with Vibrotactile Feedback for Handheld Interfaces, *Dongbum Pyo, Semin Ryu, Byung-Kil Han, Junseok Park, Dong-Soo Kwon (Korea Advanced Institute of Science and Technology)*

[P2-26] A Framework for the Classification of Dexterous Haptic Interfaces Based on the Identification of the Most Frequently Used Hand Contact Areas, *Franck Gonzalez, Florian Gosselin, Wael Bachta (CEA-LIST)*

[P2-27] Sensory Augmentation of Stiffness Using Fingerpad Skin Stretch, *Zhan Fan Quek, Samuel Schorr, Ilana Nisky, Allison M. Okamura, William Provancher (Stanford University)*

[P2-28] Vibrotactile Stimuli for Augmented Haptic Feedback in Robot-Assisted Surgery, *Adrian Ramos Peon, Claudio Pacchierotti, Domenico Prattichizzo (University of Siena)*

[P2-29] A Preliminary Study on a Twisted Strings-Based Elbow Exoskeleton, *Dmitry Popov, Igor Gaponov, Jee-Hwan Ryu (Korea University of Technology and Education)*

[P2-30] Design and Optimization of Support Structures for Tactile Feedback, *Iris Jiang, Yuki Ishikawa, Jack Lindsay, Blake Hannaford (University of Washington)*

[P2-31] What You Touch Is What You Get: Self-Assessing a Minimalist Tactile Sensory Substitution Device, *Luca Brayda, Claudio Campus, Monica Gori (Istituto Italiano di Tecnologia)*

[P2-32] Design and Evaluation of Pactors for Managing Attention Capture, *Ying (Jean) Zheng, Ellen Su, John Morrell (Yale University)*

Demo Session II

Session Chairs: Hiroyuki Kajimoto, Jee-Hwan Ryu

[D2-1] Development of Object Interaction Skills: Manipulating a Joystick, *Netta Gurari, Gabriel Baud-Bovy (Istituto Italiano di Tecnologia)*

[D2-2] A New Haptic Touch Panel Display, *Shin Norieda, Makoto Sato (NEC; Tokyo Institute of Technology)*

[D2-3] Twisted Strings-Based Elbow Exoskeleton, *Dmitry Popov, Igor Gaponov, Jee-Hwan Ryu (Korea University of Technology and Education)*

[D2-4] Touch Surfaces with Active Tactile Feedback for Automotive Applications, *I. Zoller, A. Brüninghaus, T.A. Kern (Continental Automotive GmbH)*

[D2-5] Haptic Snapping Guided Hangul Learning System, *UiTae Kim, Seokyeol Kim, Jinah Park (Korea Advanced Institute of Science and Technology)*

[D2-6] Affordable Laparoscopic Training with a Haptic Liver, *Felix G. Hamza-Lup, Dorin M. Popovici, Crenguta M. Bogdan, Adrian Seitan (Ovidius University)*

[D2-7] Real-Time Human-Haptic Interaction through Kinect, *Lei Wei, Saeid Nahavandi (Deakin University)*

[D2-8] Stable Haptic Interaction for Admittance Type Haptic Displays, *Khalis Totorkulov, Jee-Hwan Ryu (Korea University of Technology and Education)*

[D2-9] Telesurgical Notification via Haptuator, *R. L'Orsa, K. Zareinia, L. S. Gan, C. Macnab, G. Sutherland (University of Calgary; IMRIS)*

[D2-10] Haptic 3D Movie, *Sunyoung Oh, Heewon Kim, Insub Song, Jeaha Kim, Jeha Ryu (Gwangju Institute of Science and Technology)*

[D2-11] Haptic Stylus with Inertial and Vibro-Tactile Feedback *Atakan Arasan, Cagatay Basdogan, T. Metin Sezgin (Koc University)*

[D2-12] Simulation of Teleoperated Steerable Needles, *Ann Majewicz, Allison Okamura (Stanford University)*

[D2-13] Home Shopping with Haptic Broadcasting System *Dongkue Kim, Jeha Ryu (Gwangju Institute of Science and Technology)*

[D2-14] Gesture Output: Eyes-Free Output Using a Force Feedback Touch Surface, *Christoph Sterz, Andreas Rau, Anne Roudaut, Patrick Baudisch (Hasso Plattner Institute)*

[D2-15] A Deformation-Based Tactile Feedback System with Shear Feedback, *Calum Roke, Adam Spiers, Tony Pipe, Chris Melhuish (Bristol Robotics Laboratory)*

[D2-16] HandCorpus, a New Open-Access Repository for Sharing Experimental Data and Results on Human and Artificial Hands, *Matteo Bianchi, Minas Liarokapis (Italian Institute of Technology, University of Pisa; National Technical University of Athens)*

[D2-17] Teleoperated Robotic Finger with Bio-Inspired Tactile Feedback, *Giacomo Spigler, Calogero Maria Oddo, Marco Controzzi, Domenico Camboni, Christian Cipriani, Maria Chiara Carrozza (Scuola Superiore Sant'Anna)*

[D2-18] Depth Image-Based 6-DOF Haptic Rendering Algorithm *Jaeha Kim, Chang-Gyu Lee, Jeha Ryu (Gwangju Institute of Science and Technology)*

[D2-19] Dynamic Haptics Library, *Gunhyuk Park, Sunwook Kim, Jaecheon Sa, Moonchae Joung, Seungmoon Choi (Pohang University of Science and Technology; LG Co., Ltd.)*

[D2-20] Transparent Surface Acoustic Wave Tactile Display, *Masaya Takasaki, Ryo Tamon, Takeshi Mizuno (Saitama University)*

[D2-21] Simultaneous Geometry and Texture Display Based on Lateral Force for Touchscreen, *Satoshi Saga, Ramesh Raskar (Tohoku University; Massachusetts Institute of Technology)*

[D2-22] A Motion-based Multimodal Human-Robot Interface for Virtual Collaboration, *Young Eun Song, Hyoung Il Son, Mihoko Niitsuma, Takashi Kubota, Hideki Hashimoto (The University of Tokyo)*

[D2-23] Haptic Xylophone, *Joong-Youn Lee, Sang Eon Lee, Jinah Park (Korea Institute of Science and Technology Information; Korea Advanced Institute of Science and Technology)*

[D2-24] Meditate Touch nr. 2 with Actuators, *Cheryl Akner Koler, Souzan Youssouf (Konstfack University College of Arts)*

[D2-25] Haptic Interaction with Depth-Encoded Video, *Seung-Chan Kim, Ki-Uk Kyung, Dong-Soo Kwon (Korea Advanced Institute of Science and Technology; Electronics and Telecommunications Research Institute)*

[D2-26] Data-Driven Modeling and Rendering of Isotropic Textures, *Heather Culbertson, Craig G. McDonald, Benjamin E. Goodman, Katherine J. Kuchenbecker (University of Pennsylvania)*

[D2-27] Hairlytop Interface for a Dense Hair-Like Surface Display *Takuya Nojima, Yoshiharu Ooide, Hiroki Kawaguchi (University of Electro-Communications)*

[D2-28] Ultrasonic Haptic Feedback for Gestural Interfaces using a Moveable Hand-Mounted Array, *Graham Wilson, Euan Freeman, Tom Carter, Sue Ann Seah, Stephen Brewster, Sriram Ubrimanian (University of Glasgow; University of Bristol)*

[D2-29] Variable Attention Capture (VAC) Pactors for Seated Posture Guidance, *Ying (Jean) Zheng, Ellen Su, John B. Morrell (Yale University)*

[D2-30] Tee-R: Platform for the Study of Virtual Task-Oriented Motion and its Correlation to Surface Biopotentials, *Ivan Figueroa, Omar Aguilar, Joel C. Huegel (Tec de Monterrey)*

[D2-31] Haptic Feedback Using Ungrounded Back-To-Back Lateral Skin Stretch Feedback, *Markus N. Montandon, Ashley L. Guinan, Nicholas C. Hornbaker, Andrew J. Doxon, William R. Provancher (University of Utah)*

[D2-32] Polymer-clay Haptic Display to Present Spacial Vibro-Tactile Sensation, *Yuta Ueda, Yusuke Mizusina, Kouta Minamizawa, Susumu Tachi (Keio University)*

[D2-33] Augmentation of Force Feedback with Skin Stretch to Enhance Stiffness Perception, *Zhan Fan Quek, Sam Schorr, Ilana Nisky, Allison Okamura, William Provancher (Stanford University; University of Utah)*

[D2-34] Vibrotactile Messenger Device for Visually Impaired People, *Dongwook Shin, Kwangsu Cho (Sungkyunkwan University)*

[D2-35] Gestural Mobile Interface with Active Kinesthetic Haptic Feedback, *Byung-Kil Han, Seung-Chan Kim, Jeong-yean Yang, Dongbum Pyo, Jong Gwan Lim, Jiwon Seo, Dong Soo Kwon (Korea Advanced Institute of Science and Technology)*

[D2-36] High-Performance Flexible Tactile Sensors, *Min-Seok Kim, Hyi-Jun Shin, Yon-Kyu Park (Korea Research Institute of Standards and Science)*

[D2-37] Holistic Haptic Display for Tactile, Kinaesthetic and Thermal Sensation, *Tae-Heon Yang, Sang-Youn Kim, Yon-Kyu Park (Korea Research Institute of Standards and Science; Korea University of Technology and Education)*

[D2-38] A Watch-Like Tactile Bracelet, *Sabrina Panëels, Margarita Anastassova, Steven Strachan, Christian Bolzmacher (CEA-List)*

[D2-39] Contactless Touch Interface with Tactile Sensation using Visio-Acoustic Screen, *Kazuma Yoshino, Hiroyuki Shinoda (The University of Tokyo)*

[D2-40] Touching Virtual Objects with TAMO, *Luca Brayda, Claudio Campus, Monica Gori (Istituto Italiano di Tecnologia)*

16:20-18:20

Conference Hall (3F)

☐ **Industry Session**

Session Chairs: Jeha Ryu, Munchae Joung

[I1] Current Status and Future Perspective of Haptic Technologies for Consumer Electronic Devices, *Woo Sok Chang (Vice President, LG Electronics Inc)*

[I2] Three Marketable Values of Haptics – Confirmation, Realism, and Rich Communication, *Rob Lacroix (VP R&D, Immersion Corporation)*

[I3] Trends & Technical Issues of Commercial Mobile Haptic technology in the point of view of Mobile component industry, *Hewon Jung (Director of R&D Center, Hysonic)*

[I4] Haptics for Mainstream- Taking a Leap in Technology Hype Curve to Plateau of Productivity, *Pauli Laitinen (Co-founder and CTO, Aito Bv)*

19:00-20:30

Grand Ballroom 1 (2F)

☐ **Banquet**

Please don't miss this opportunity to experience a special night in Korea. We are sure for participants to enjoy the entertainment during the dinner, and this will serve to bring the participants closer together. This evening banquet promises to give you an unforgettable evening in Daejeon, Korea.

WEDNESDAY APRIL 17

10:00-18:00

Lobby (2F), Room 204, 205

☐ **Art Exhibition**

09:00-10:00

Grand Ballroom 1

☐ **Plenary Talk by Abdulmotaleb El Saddik**

Session Chair: Jeha Ryu

Almost a century ago, many memories of a person were virtually lost as soon as the remembered person left the space and time of their loved ones. Only a few decades later, thanks to advances in audio and visual research and development, recording such memories finally became possible. Through the advances in multimedia technology such as photographic image technology and audio recordings, and much later, video cameras, and DVDs, we gained the ability to see into the past much better than our biological memories would allow. These media have facilitated the recovery of memories, and many of us now sometimes sit around the old pictures' album (digital) to reflect and remember the nice memories we have of our loved ones. Would it not be exciting to be able to restore the smell, touch and hug of remembered ones whenever we desired their affection? Would it not be interesting to share and recall past memories of beloved ones by recording and later replaying their physical stimuli, along with their picture and audio recordings?

These ideas have triggered a new direction in research concerned with recording, storing, retrieving, and playing back haptic stimuli to bring our memories with far or lost loved ones; this is what we call haptic as a new media! Multimedia haptics involves integrating and coordinating the presentation of haptic and other types of media in the multimedia application. Generally, multimedia system consists of media acquisition or creation, content authoring, and transmission and consumption components. The potential of haptics as a new media is quite significant for many applications such as tele-presence, tele-learning, tele-medicine, tele-operation in hazardous environments, industrial design and testing, medicine, gaming, and any related interactive virtual reality application. In this Talk we will give an overview of haptic from a multimedia perspective and discuss some research issues and address some challenges.

10:00-10:30

Grand Ballroom 1

☐ **Poster Spotlight III**

10:30-10:50

☐ **Coffee Break**

10:50-11:50

Grand Ballroom 1

☐ **Oral Session VI: Tactile Displays & Perception**

Session Chairs: Darren Edge, Ali Israr

[O6-1] Wearable Tactile Display of Directions for Pedestrian Navigation: Comparative Lab and Field Evaluations, *Mayuree Srikulwong, Eamonn O'Neill (University of Thai Chamber of Commerce)*

[O6-2] Generation of Directional Wind by Colliding Airflows, *Koichi Hirota, Yoko Ito, Tomohiro Amemiya, Yasushi Ikei (University of Tokyo)*

[O6-3] Flexible Visuo-Haptic Display, *Suntak Park, Bongje Park, Sung-Koo Park, Harsha Prahlad, Philip von Guggenberg, Ki-Uk Kyung (Electronics and Telecommunications Research Institute)*

[O6-4] Navigation in the Fingertip, *Alessandro Moscatelli, Naceri Abdeldjallil, Marc Ernst (Bielefeld University)*

11:50-13:10

☐ **Lunch**

13:10-14:10

Grand Ballroom 1

☐ **Oral Session VII: Hand Training & Modeling**

Session Chairs: Gabriel Baud-Bovy, Domenico Prattichizzo

[O7-1] Anticipatory Vibrotactile Cueing Facilitates Grip Force Adjustment, *Shogo Okamoto, Michael Wiertlewski, Vincent Hayward (Nagoya University)*

[O7-2] Vibrotactile Feedback of Pose Error Enhances Myoelectric Control of a Prosthetic Hand, *Ryan Christiansen, Jose Luis Contreras-Vidal, Brent Gillespie, Patricia A. Shewokis, Marcia O'Malley (Rice University)*

[O7-3] An EMG-Based Robotic Hand Exoskeleton for Bilateral Training of Grasp, *Claudio Loconsole, Daniele Leonardis, Michele Barsotti, Antonio Frisoli, Massimiliano Solazzi, Massimo Bergamasco, Marco Troncossi, Mohammad Mozaffari Foumashi, Claudio Mazzotti, Vincenzo Parenti Castelli (Scuola Superiore Sant'Anna)*

[O7-4] Deformable Haptic Model Generation Through Manual Exploration, *Orcun Goksel, Seokhee Jeon, Matthias Harders, Gabor Szekely (ETH Zürich)*

14:10-15:40

Room 109-111

☐ **Poster and Demo Session with Coffee (Poster III & Demo I,II)**

Poster Session P3: Human Perception, Performance & Evaluation

Session Chair: Sang-Youn Kim

[P3-1] Biases in Visuo-Haptic Matching of Curvature, *George Van Doorn, Mark Symmons (Monash University)*

[P3-2] Illusion of Motion Induced by Tendon Electrical Stimulation, *Hiroyuki Kajimoto (The University of Electro-Communications / Japan Science and Technology Agency)*

[P3-3] Haptics Assisted Training (HAT) System for Children's Handwriting, *Young-Seok Kim, Michael Collins, William Bulmer, Sidhant Sharma, James Mayrose (Tactus Technologies, Inc.)*

[P3-4] Preliminary Study on Haptics-Stimulation Based Brainwave Entrainment, *Dangxiao Wang, Mu Xu, Yuru Zhang, Jing Xiao (Beihang University)*

[P3-5] Effects of Multi-modal Guidance for the Acquisition of Sight Reading Skills: A Case Study with Simple Drum Sequences, *In Lee, Seungmoon Choi (Pohang University of Science and Technology (POSTECH))*

[P3-6] Visual and Force Feedback Time-Delays Change Telepresence: Quantitative Evidence from Crossmodal Congruecy Task, *Ali Sengül, Francois Rivest, Michiel van Elk, Olaf Blanke, Hannes Bleuler (Ecole Polytechnique Fédérale de Lausanne (EPFL))*

[P3-7] Introducing the Shape-Length Illusion, *Myrthe Plaisier, Marc Ernst (Bielefeld University)*

[P3-8] Live-Line Maintenance Training Using Robotics Technology, *Yaser Maddahi, Kourosh Zareinia, Tim Olson, Wes Mueller, Nariman Sepehri (University of Manitoba)*

[P3-9] Mass and Density Estimates Contribute to Perceived Heaviness with Weights That Depend on the Densities Reliability, *Knut Drewing, Wouter Bergmann Tiest (Giessen University)*

[P3-10] A Bidirectional Haptic Device for the Training and Assessment of Handwriting Capabilities, *Nicolò Pedemonte, Thierry Laliberte, Clement Gosselin (Université Laval)*

[P3-11] A First Look at Individuals' Affective Ratings of Vibrations, *Hasti Seifi, Karon MacLean (University of British Columbia)*

[P3-12] Stability Analysis of Trilateral Haptic Collaboration, *Jian Li, Mahdi Tavakoli, Qi Huang (University of Electronic Science and Technology of China)*

[P3-13] Human Force Reproduction Error Depends upon Force Level, *Bram Onneweer, Winfred Mugge, Alfred C. Schouten (Delft University of Technology)*

[P3-14] A Novel Haptic Training Method through Skill Decomposition, *Lingzhi Liu, Guanyang Liu, Yuru Zhang (Beihang University)*

[P3-15] Slip-Induced Vibration Influences the Grip Reflex: A Pilot Study, *Michael Wiertlewski, Satoshi Endo, Alan Wing, Vincent Hayward (Northwestern University)*

[P3-16] Conservatism of Passivity Criteria for Stability Analysis of Trilateral Haptic Systems, *Jian Li, Mahdi Tavakoli, Victor Mendez, Qi Huang (University of Electronic Science and Technology of China)*

[P3-17] Psychophysical Study of Air Jet Based Tactile Stimulation, *Mohamed Yacine Tsalamlal, Nizar Ouarti, Mehdi Ammi (University of Paris-Sud)*

[P3-18] Natural Variation in Skin Thickness Argues for Mechanical Stimulus Control by Force Instead of Displacement, *Yuxiang Wang, Kara Marshall, Yoshichika Baba, Ellen Lumpkin, Gregory J. Gerling (University of Virginia)*

[P3-19] An Asymmetry in Force Perception Contingent on Motion Reversal, *Yon Visell, Vincent Hayward (Drexel University)*

[P3-20] Reaction Times to Constraint Violation in Haptics: Comparing Vibration, Visual and Audio Stimuli, *Adrian Ramos Peon, Domenico Prattichizzo (Istituto Italiano di Tecnologia)*

[P3-21] Judged Consonance of Tactile and Auditory Frequencies, *Ryuta Okazaki, Taku Hachisu, Michi Sato, Shogo Fukushima, Vincent Hayward, Hiroyuki Kajimoto (The University of Electro-Communications)*

[P3-22] An Evaluation of the Effects on Postural Stability of a Force-Feedback Rendered by a Low-Cost Haptic Device in Various Tasks, *Gabriel Baud-Bovy, Fabio Tatti, N. Alberto Borghese (Istituto Italiano di Tecnologia)*

[P3-23] Using Traditional Horizontal-Vertical Illusion Figures and Single Lines to Directly Compare Haptics and Vision, *Jacqui Howell, Mark Symmons, George Van Doorn (Monash University)*

[P3-24] Vibrotactile Inputs to the Feet Can Modulate Vection, *Ildar Farkhatdinov, Nizar Ouarti, Vincent Hayward (Institut des Systémes Intelligents et de Robotique)*

[P3-25] Is the Human Operator in a Teleoperation System Passive?, *Matthew Dyck, Ali Jazayeri, Mahdi Tavakoli (University of Alberta)*

[P3-26] Evaluation of Haptic Feedback Cues on Vehicle Teleoperation Performance in an Obstacle Avoidance Scenario, *Akif Hacinecipoglu, Erhan ilhan Konukseven, Bugra Koku (Middle East Technical University)*

[P3-27] Stability Analysis of Teleoperation Systems under Strictly Passive and Non-Passive Operator, *Ali Jazayeri, Matthew Dyck, Mahdi Tavakoli (University of Alberta)*

[P3-28] Stability Analysis of Delayed 4-Channel Bilateral Teleoperation Systems, *Noushin Miandashti, Mahdi Tavakoli (University of Alberta)*

15:40-16:40

Grand Ballroom 1

☐ **Oral Session VIII: Dynamics & Control**

Session Chairs: Antonio Frisoli, Katherine Kuchenbecker

[O8-1] Haptic Transparency Increases the Generalizability of Motor Learning During Telemanipulation, *Jeroen Wildenbeest, David A. Abbink, Jack Schorsch (Delft University of Technology)*

[O8-2] Improving Tactile Feedback with an Impedance Adapter, *Jack Lindsay, Richard J. Adams, Blake Hannaford (University of Washington)*

[O8-3] Frequency-Domain Mapping Approach of Stability Bounds for Loop Shaping of Bilateral Controllers, *Geert-Jan Evers, Gerrit Naus, Marinus Jacobus Gerardus van de Molengraft, Maarten Steinbuch (Eindhoven University of Technology)*

[O8-4] The Role of Mechanical Properties on the Behaviour and Performance of Multi-DoF Haptic Devices, *Sara Shayan Amin, Laszlo Kovacs, Jozsef Kovecses (McGill University)*

17:00-18:00

Grand Ballroom 1

☐ **Award Ceremony**

18:00-19:30

Lobby (1F)

☐ **Farewell Party with Luck**

All participants are invited to the farewell party. You can enjoy good food and a lucky draw event. This farewell party will serve as a good memory of your last night in Korea.

▶ THURSDAY APRIL 18

09:00-15:00

☐ **Technical Tour**

IEEE WHC 2013 will have a free technical tour visiting outstanding research institutes in Daejeon, Korea on April 18. An English spoken staff accompanies the participants from the venue for the day.

09:00 - 09:30 | Depart from Daejeon Convention Center

09:30 - 11:30 | Electronics and Telecommunications Research Institute (ETRI) and Korea Research Institute of Standards and Science (KRISS)

11:30 -12:00 | Korea Advanced Institute of Science and Technology (KAIST) Campus Tour

12:00 -13:30 | Lunch at the Faculty Club

13:30 - 15:00 | KAIST Lab tours

15:00 - 15:30 | Return to Daejeon Convention Center

09:00-18:00

☐ **Cultural Tour (Optional)**

For WHC 2013 participants, the organizing committee made a special selection of tours with discounted fee. Participants will be able to appreciate Korea's rich history and fascinating landscape while refreshing their hardworking minds and bodies over splendid scenery and historical sites. (Please note that this program is just optional and if the minimum number of required persons is not reached, tours may be subject to change.)

[Half Day Tour] Life of the Earth Gumsan

April 18, 2013, 13:00-18:00

[Full Day Tour] Baekje History

April 18, 2013, 08:30-18:00

[Full Day Tour] Modern Time Culture & Healing

April 18, 2013, 08:30-18:00

[Medical Tour] Introduction to the Oriental Medicinal Wells Aesthetic

[Medical Tour] Comprehensive Health Screening

ART EXHIBITION

[A1] Haptic Intelligentsia, *Main Artist: Joong Han Lee (Netherlands)*

[A2] Tangible Topography, *Invited Artist: Kyuha Shim (Senseable City Lab at MIT, USA)*

[A3] Grass, *Invited Artists: Jinsil Hwaryoung Seo, Maxine Kim, Lisa Guo (Texas A&M University, USA; Simon Fraser Univerisity, Canada)*

[A4] Feet into Place, *Invited Artists: Stefano Papetti, Federico Fontana, Marco Civolani (Zurich University of the Arts, Switzerland; University of Verona, Italy; University of Udine, Italy)*

[A5] Synaptic Traces, *Invited Artists: Seojin Baek, Yejin Cho (Wearable Garment, Korea)*

[A6] Situpright: Casual Information Visualization of Human Sitting Posture, *Invited Artist: Chan Wook Min (Yonsei University, Korea)*

[A7] Augmented Magic, *Invited Artist: Beka Iglesias (Portugal)*

[A8] Sound Installation Using Sand, *Invited Artist: NEZZ (KAIST, Korea)*

[A9] Touch Nature: Hug@ree, *Invited Artists: Mónica Mendes, Pedro Ângelo, Nuno Correia (FBA/UL, Portugal)*

Daejeon Metropolitan City

Daejeon Metropolitan City is a center of knowledge and information, situated at the center of the Korean Peninsula. Daejeon is easily accessible from any place in Korea as it is the hub of national transportation, linking the whole country from east to west and from north to south. It is an important place where traffic diverges into two major expressways, the Gyungbu Expressway going to the east and the Honam Expressway to the west.

The science festival, the largest-scale ever in Korea, is to be held at the Expo park in Daejeon. The international exposition (Expo '93) at Daejeon created the Hanbit Tower and the Expo Bridge.

Daejeon is home to Daedeok Valley, a cradle for high-tech industry, where Daedeok Science Town, the best R&D park in Korea, is located. Daedeok Science Town is home to around 70 research institutes, including Korea Advanced Institute of Science and Technology (KAIST), Electronics and Telecommunications Research Institute (ETRI), and Korea Research Institute of Standards and Science (KRISS). As the home to world-class research institutes that are focused on fundamental science, information technology, biotechnology, nanotechnology, and space technology, Daejeon offers a highly favorable environment for the successful exchange of knowledge, close cooperation, and innovative research results.

Daejeon Convention Center

Daejeon Convention Center (DCC) is equipped with a lot of professional and convenient conference facilities: all technical devices, 2 restaurants, a business center, a convenient store, a flower shop and a tour agency. Moreover, Daejeon Convention Center (DCC) offers a one-stop service from planning to execution processes on conventions, exhibitions, and events by directly operating and managing DCC Korea. All equipment is state-of-the-art and will surely meet all participants of IEEE WHC 2013.

The convention Complex looks down on the Gapcheon river, where Daejeon citizen enjoy the recreation and picnics. It is only 10-minute walking distance from the Convention Complex to Daejeon Culture & Arts Center, Municipal Museum of Arts, Hanbat Arboretum which is the Korea's biggest artificial metropolitan arboretum. Moreover, there are Daedeok Innopolis, National Science Museum, and Expo Park near by the Convention Complex, which provide experiences to the latest science and technology. A lot of wonderful hotels, restaurants and stores are located closer to DCC within 10~20min. Car distance and diverse travel sources around DCC will make your visit to Korea more exciting and rewarding.

IEEE Technical Committee on Haptics (TCH)
http://www.worldhaptics.org

BACKGROUND

The multidisciplinary international haptics research community has enjoyed a healthy and steady growth in recent years. The IEEE Technical Committee on Haptics (TCH) was founded under the IEEE Robotics and Automation Society (RAS) and the Computer Society (CS) in 2006 and 2007, respectively. In 2006 it was awarded by the RAS as the "Most Active Technical Committee", and in 2011, the TCH became solely sponsored by RAS, with the status of Special Technical Community under CS.

ACTIVITIES

TCH will again offer in 2013, as it did in 2009 and 2011, the successful TCH student exchange program for fostering interdisciplinary research, with two exchanges supported. In addition, the TCH Early Career Award will be awarded again in 2013, as it was in 2009 and 2011. All TCH members are invited to participate in these activities. Our website and mailing list offers an up to date source of information on events, publications, contacts of relevant people and industries in the field to all haptics professionals and researchers.

MISSION

The goals of the IEEE Technical Committee on Haptics are to integrate the diverse interests of the highly interdisciplinary haptics research community and to improve communication among the different fields.
The TCH serves to coordinate the scheduling of major haptics conferences, facilitate special sessions and workshops, promote journal issues and book publications, support student programs, organize focused events, and contribute towards the IEEE Transactions on Haptics.

GETTING INVOLVED

Membership in the IEEE TC on Haptics is easy and open to all individuals interested in haptics research at a professional level. There are no membership fees and IEEE membership is not required to join. Visit the IEEE TC Haptics website at http://www.worldhaptics.org for more information, details about joining, conference announcements, and much more. Membership in TCH now exceeds 600. We hope you will join us!

Antonio Frisoli, Chair
William Provancher, Co-Chair
Jee-Hwan Ryu, Co-Chair

IEEE Technical Committee on Haptics Executive Committee

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Join us! Go to http://www.worldhaptics.org/

We are sponsored by the IEEE-Robotics and Automation Society.
Membership is free and does not require membership of IEEE or its societies.

IEEE TRANSACTIONS ON

HAPTICS

CALL FOR PAPERS

IEEE Transactions on Haptics (ToH) is a scholarly archival journal published quarterly that addresses the science, technology and applications associated with information acquisition and object manipulation through touch. Haptic interactions relevant to this journal include all aspects of manual exploration and manipulation of objects by humans, machines and interactions between the two, performed in real, virtual, teleoperated or networked environments

ToH accepts regular, short and survey papers, as well as brief communications. Papers may be submitted online via:

mc.manuscriptcentral.com/th-cs

Detailed information for authors may be found at:

computer.org/toh

Research areas of relevance to this publication includes, but is not limited to, the following topics:

- Human haptic and multi-sensory perception and action
- Aspects of motor control that explicitly pertain to human haptics
- Haptic interactions via passive or active tools and machines
- Devices that sense, enable, or create haptic interactions locally or at a distance
- Haptic rendering and its association with graphic and auditory rendering in virtual reality
- Algorithms, controls, and dynamics of haptic devices, users, and interactions between the two
- Human-machine performance and safety with haptic feedback
- Haptics in the context of human-computer interactions
- Systems and networks using haptic devices and interactions, including multi-modal feedback
- Application of the above, for example in areas such as education, rehabilitation, medicine, computer-aided design, skills training, computer games, driver controls, simulation and visualization

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EUROHAPTICS

Call for Participation

Eurohaptics is a major international conference and the primary European meeting for researchers in the field of human haptics and touch enabled computer applications. This diverse field covers research in areas including human haptic perception, haptic hardware, through end-applications such as surgical simulation, rehabilitation robotics, communication, and haptic feedback for design and applied arts. Eurohaptics 2014 is part of the activities taking place under the auspices of the Eurohaptics Society (http://eurohaptics.org/)

The Eurohaptics conference was incepted in 2001, Birmingham, UK and was held in Edinburgh, UK; Dublin, Ireland; and Munich, Germany before joining the IEEE Haptics Symposium every other year to form the World-Haptics Conference (Pisa,Italy; Tsukuba, Japan; Salt Lake City, USA; Istanbul, Turkey). In the alternate years, Eurohaptics was held in Paris, France; Madrid, Spain; Amsterdam, The Netherlands; and Tampere, Findland.

Eurohaptics 2014, to be held in the **City of Versailles**, France, will provide researchers from academia and industry with an opportunity to present ideas and establish contacts with other haptics researchers from around the world. Haptic hardware and software developers will be able to gain information about the latest haptics research, as well as to demonstrate their creations to a wider audience.

Eurohaptics 2014 will take place June 24–27, 2014 (workshops, June 24) and is chaired by Vincent Hayward of the Université Pierre et Marie Curie (UPMC) in Paris. It will be held on the premises of the *Ecole Nationale Supérieure d'Architecture de Versailles*, Versailles France (http://www.versailles.archi.fr), located in the former stables of the *Palace of Versailles* (*Chateau de Versailles*, http://www.chateauversailles.fr). Conference attendees will have the flexibility to stay in the conveniently-equipped city of Versailles, or to commute from Paris, since the school is easily accessible from Paris via three lines of commuter train (20 minutes).

Papers/Abstracts submission	February 17, 2014
Tutorials/Workshops proposals	March 31, 2014
Demontrations/Exhibits proposals	April 28, 2014

2014 IEEE Haptics Symposium

http://hapticssymposium.org

Call for Participation

The IEEE Haptics Symposium, founded in 1992, is a vibrant forum where psychophysicists, engineers and designers of applications and interactions come together to share advances, spark new collaborations and envision a future that benefits from rich physical interactions between computers and human operators, generated through haptic (force and tactile) devices. In 2014, Haptics Symposium will take place **February 24-27, 2014** at the Doubletree Hotel in downtown **Houston, TX, USA.** This Haptics Symposium will be a standalone IEEE-sponsored conference, featuring a full day of tutorials and workshops (February 24), followed by two and a half days for the main conference in a single track (February 25-27).

Important dates

Papers and Extended Abstracts due:	September 30, 2013
Tutorial / workshop proposals due:	October 20, 2013
Demos & Exhibits due:	December 15, 2013

As the fourth-largest city in the United States, Houston is home to a respected and energetic arts community, celebrated restaurants, world-renowned theater groups, and a significant international community boasting vivid cultural scenes. Such offerings have landed Houston at the top of Forbes' 2012 list of the "Coolest cities in America" and seventh on the New York Times' list of "46 places to go in 2013," ranking higher than all other U.S. cities. Everything is "bigger in Texas," and Houston is no exception. The Bayou City is known as the energy capital of the world, and is home the world's largest medical center.

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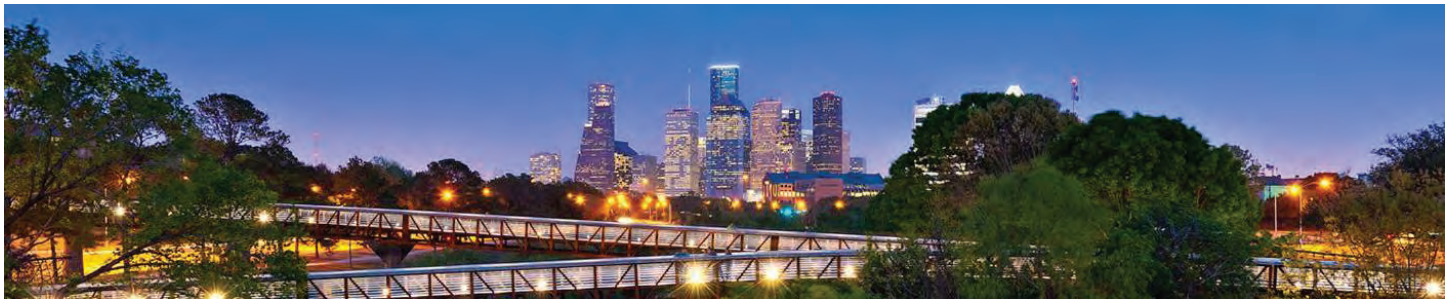

We hope you will join us for the IEEE Haptics Symposium in 2014!

Marcia O'Malley and Seungmoon Choi, Co-Chairs
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Call for Preliminary Proposals for Hosting IEEE WHC 2015 in North America

The IEEE World Haptics Conference (WHC) is organized bi-annually. It aims to bring together an international community of researchers to discuss the latest advancements in "haptics" and future directions. The IEEE WHC is jointly sponsored by the IEEE Robotics and Automation Society (RAS) and the EuroHaptics Society (EHS).

The IEEE WHC Steering Committee meets annually to evaluate proposals for hosting future WHC conferences. The earlier conferences were held in the following locations and the continents:

2005 Italy, Europe
2007 Japan, Asia
2009 USA, North America
2011 Turkey, Europe
2013 S. Korea, Asia

The conference rotates each year between Europe, Asia, and North America. Accordingly, the IEEE WHC 2015 will be held in North America. The IEEE WHC Steering Committee cordially invites any interested parties to submit their preliminary proposals to host IEEE WHC 2015 in North America and present their proposal at the upcoming IEEE WHC 2013 Steering Committee meeting in S. Korea.

The proposal should include the following information:
- The name and contact information of the General Chair
- Conference theme
- Location (city and the proposed conference site)
- Dates (tentative)
- Any major changes from previous years (submission categories, target acceptance ratio, paper presentation format).

Please e-mail your proposal to cbasdogan@ku.edu.tr. Do not hesitate to contact me if you have questions or concerns.

Cagatay Basdogan
The Steering Committee Chair

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FLOOR PLAN

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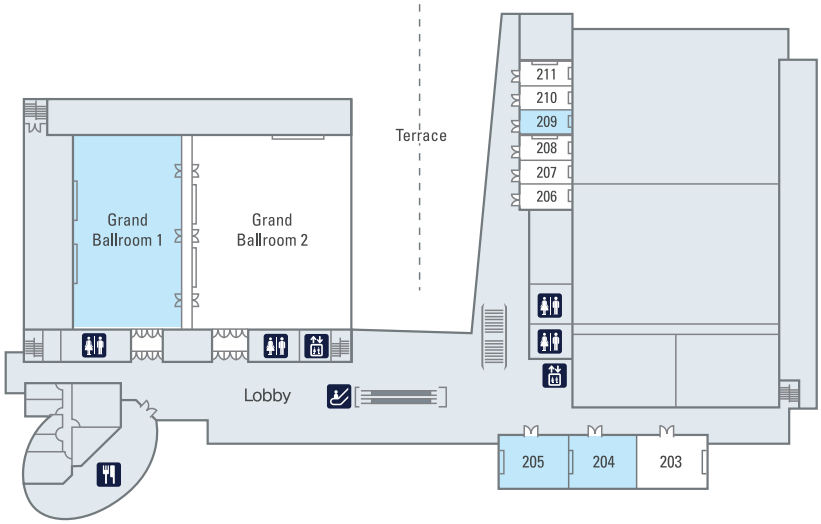
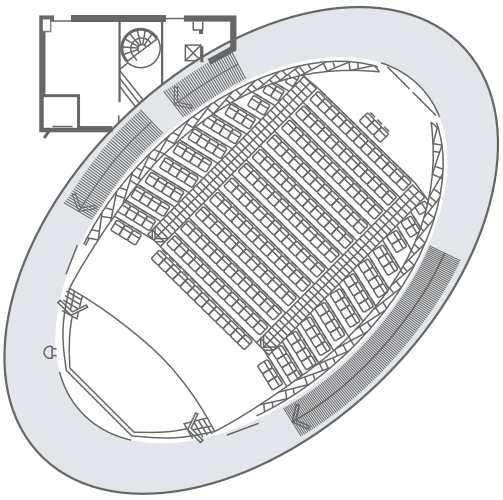


DCC 3F



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Registration	Lobby (2F)	Oral Session	Grand Ballroom 1
Workshop 1	Room 102	Plenary Speech	Grand Ballroom 1
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Preview Room	Room 209	Industry Exhibition	Room 109 ~ 111

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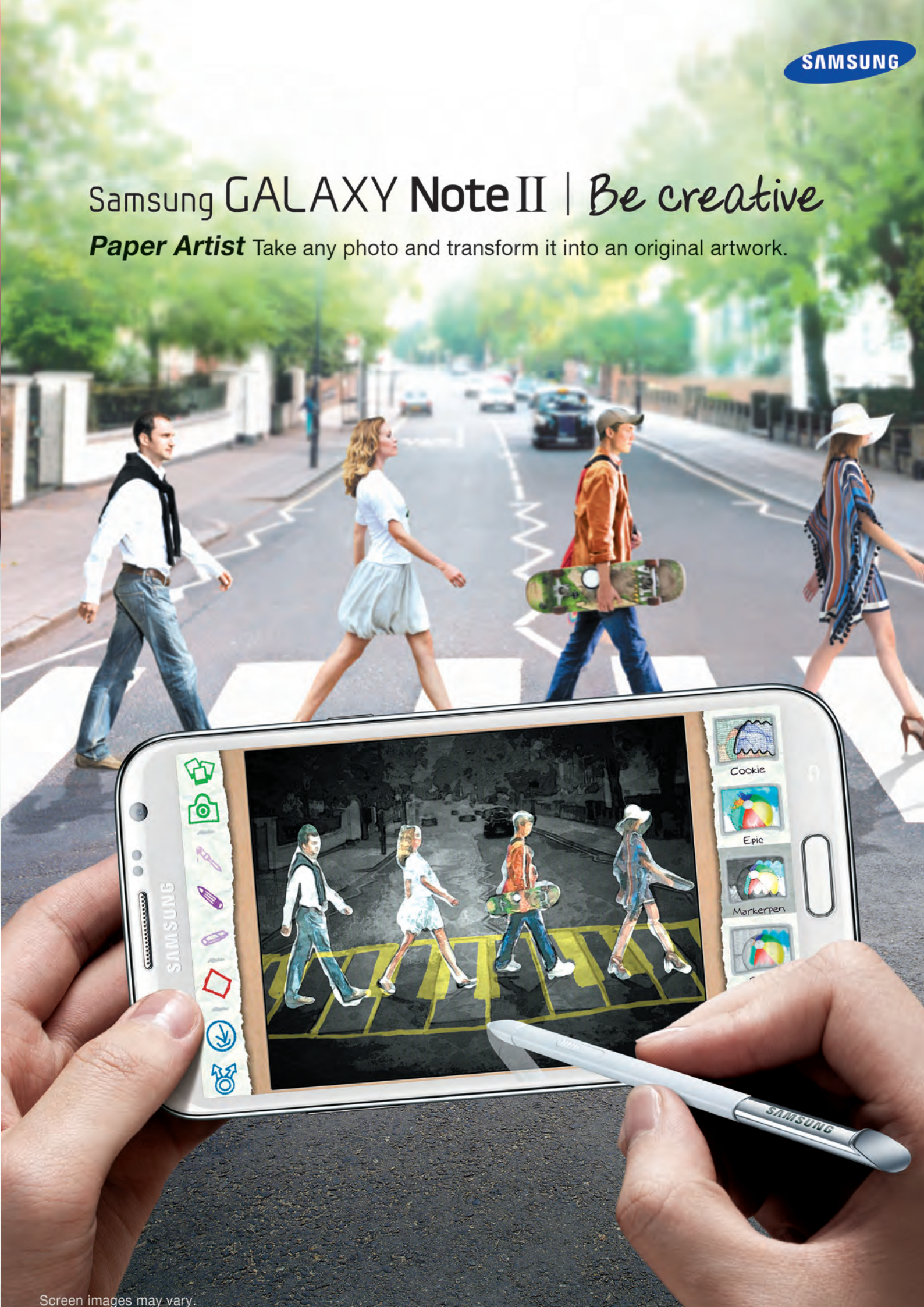
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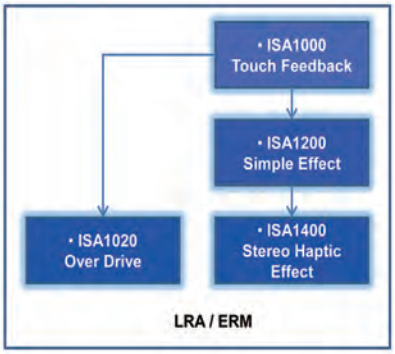

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