MARCH 20-26 Waltham, MA, USA

# IEEE VIRTUAL REALITY 10

## IEEE Symposium on 3D User Interfaces
## IEEE Haptics Symposium
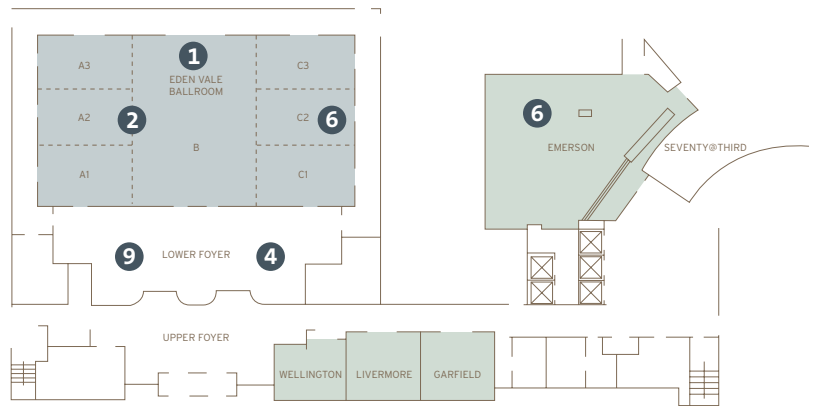
## CONFERENCE PROGRAM

IEEE
VR
20
10

# WELCOME

**Welcome to the 17th incarnation of the IEEE Virtual Reality conference!** As in past years, IEEE VR 2010 promises to be an exciting and inspiring week of events. We are honored again to have as "bookends" to the conference the 5th IEEE Symposium on 3D User Interfaces (3DUI) on the Saturday and Sunday before the conference, and the 18th Haptics Symposium on the Thursday and Friday following it. In addition to 3DUI, the variety of offerings on the weekend includes four in-depth Workshops and five highly instructive Tutorials.

We wish to thank the entire conference committee for handling the many aspects of the week. Without the strong volunteerism in this community, the conference could not happen. We hope attendees take the time to savor the outstanding seafood in New England, take in a whale-watching trip, visit the historical surrounds, and just get to know the real experience that is Boston.
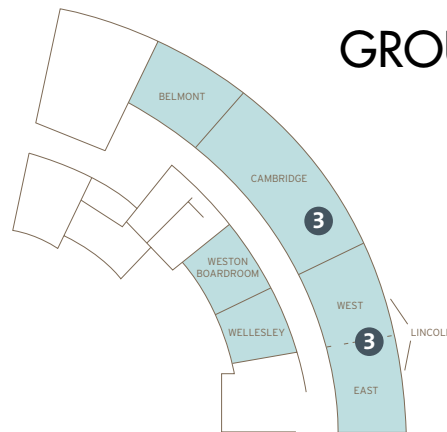
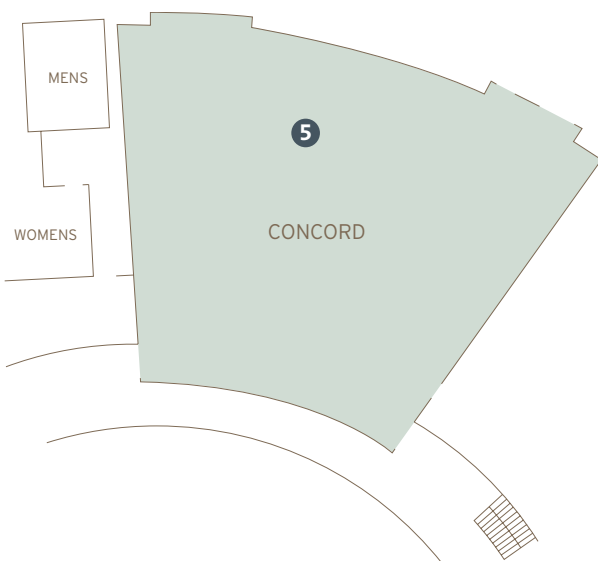*- Robert W. Lindeman & Carolina Cruz-Neira, VR 2010 General Chairs*

# MAP

**1  VR Paper Sessions**
*Eden Vale Ballroom*

**2  3DUI Paper & Haptics Oral Sessions**
*Eden Vale A/B*

**3  VR Workshops, Tutorials and Research Demonstrations**
*Cambridge, Lincoln & Alcott*

**4  VR, 3DUI & Haptics Poster Displays**
*Eden Vale Foyer*

**5  VR Exhibits**
*Concord Ballroom*

**6  Haptics Exhibition & Demonstrations 3DUI Contest & Demonstrations**
*Eden Vale C & Emerson*

**7  Student Volunteer Room**
*Thoreau*

**8  Speaker Prep**
*Hawthorne*
*Saturday - Friday, 7:30 am - 5 pm*

**9  Breakfast**
*Eden Vale Foyer*
*Saturday - Friday, 7:30 am - 8:30 am*
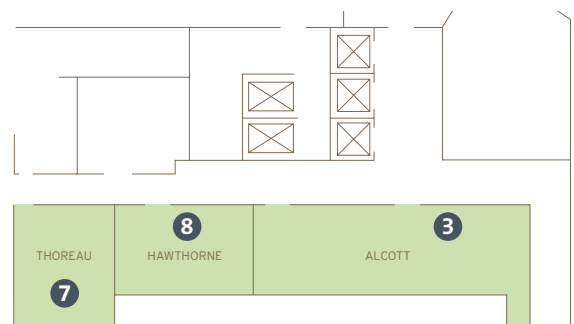
## GROUND LEVEL

## LOWER LEVEL

## MEZZANINE LEVEL

# COMMITTEE MEMBERS

## VR CONFERENCE COMMITTEE

**General Chairs**
Robert W. Lindeman, Worcester Polytechnic Institute
Carolina Cruz-Neira, University of Louisiana at Lafayette

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Gudrun Klinker, Technische Universität München
Ryohei Nakatsu, National University of Singapore

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Torsten Kuhlen, RWTH Aachen University
J. Edward Swan II, Mississippi State University

**Video Chairs**
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Gabriel Zachmann, Technical University of Clausthal

**Panel Chairs**
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Yasuyuki Yanagida, Meijo University

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Luv Kohli, University of North Carolina at Chapel Hill
Ernst Kruijff, Graz University of Technology

**Tutorial Chairs**
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Victoria Interrante, University of Minnesota

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Yoshifumi Kitamura, Osaka University
Laura Monroe, Los Alamos National Laboratories
Dirk Reiners, University of Louisiana at Lafayette
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**Exhibits Chairs**
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Jeffrey Jacobson, PublicVR

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Mark Colton, Brigham Young University

**Awards Chair**
Jaydev Desai, University of Maryland

**Publicity Chair**
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**Local Arrangements Chairs**
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Greg Fischer, Worcester Polytechnic University

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Joseph J. LaViola Jr., University of Central Florida

**Contest Chairs**
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Sébastien Kuntz, Virtools / Dassault Systèmes
Yoshifumi Kitamura, Osaka University

**Poster Chairs**
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Daniel F. Keefe, University of Minnesota
Alexander Kulik, Bauhaus-Universität Weimar

**Web Chair**
Clifford Lindsay, Worcester Polytechnic Institute
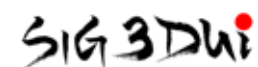
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# PROGRAM AT-A-GLANCE

## SATURDAY

*Eden Vale Foyer*

**Breakfast** (8:00)

### TUTORIALS

*Cambridge*
**Tutorial 1:** Controlling Your World: Scripting in Second Life (Hands On Tutorial) (8:30 am - 5:30 pm)

*Lincoln*
**Tutorial 2:** Developing VR Applications with the inVRs Framework (8:30 am - 12:30 pm)

*Lincoln*
**Tutorial 3:** Walking through Virtual Worlds: One Virtual Step for Man, One Giant Leap for VR? (Hands On Tutorial)(1:30 pm - 5:30 pm)

### WORKSHOPS

*Alcott*
**Workshop 1:** Cloud-Mobile Convergence for Virtual Reality (CMCVR) (8:30 am - 5:30 pm)

### 3DUI

Introduction & Keynote Speaker

*Eden Vale Foyer*
Break

*Eden Vale A/B*
Papers 1: Games & Music

Poster FF (12 pm - 12:15 pm)

Lunch Break

*Eden Vale A/B*
Papers 2: Travel

*Eden Vale Foyer*
Poster Viewing & Break

*Eden Vale A/B*
Papers 3: Selection, Manipulation & Control

## SUNDAY

*Eden Vale Foyer*

**Breakfast** (8:00)

### TUTORIALS

*Lincoln*
**Tutorial 4:** Designing Immersive VR Systems: From Bits to Bolts (8:30 am - 12:30 pm)

*Lincoln*
**Tutorial 5:** Building your own Projection-based VR Display system (1:30 pm - 5:30 pm)

### WORKSHOPS

*Alcott*
**Workshop 2:** SEARIS: 3rd Workshop on Software Engineering and Architectures for Real-time Interactive Systems (8:30 am - 5:30 pm)

*Cambridge*
**Workshop 3:** Medical Virtual Environments (8:30 am - 12:30 pm)

*Cambridge*
**Workshop 4:** PIVE: Perceptual Illusions in Virtual Environments (1:30 pm - 5:30 pm)

### 3DUI

*Eden Vale A/B*
Papers 4: **Show On & Show Through**

*Eden Vale A/B*
Papers 5: Hardware Interfaces

*Eden Vale Foyer*
Break

*Eden Vale A/B*
Papers 6: Manipulating Augmented Reality

Lunch Break

*Eden Vale A/B*
Papers 7: Multi-Display & Multi-Touch

*Eden Vale C & Eden Vale Foyer*
Contest / Demos & Break (2:30 pm - 4:30 pm)

*Eden Vale A/B*
Awards & Closing (4:30 pm - 4:45pm)

### VR

*Concord Ballroom*
VR Welcome Reception (6 pm - 10 pm)

## MONDAY

*Eden Vale Foyer*

**Breakfast** (8:00)

### VR

*Eden Vale Ballroom*
Opening Remarks

*Eden Vale Ballroom*
Papers 1: AR Studies

*Eden Vale Ballroom/ Concord*
Demo FF & Break

*Eden Vale Ballroom*
Papers 2: Interaction

Lunch Break

*Eden Vale Ballroom*
Papers 3: Gestures

*Eden Vale Ballroom/ Concord*
Poster FF & Break

*Eden Vale Ballroom*
Papers 4: AR Applications

*Emerson*
Panel: What is VR?

*Concord Ballroom* — VR Exhibits

*Cambridge & Lincoln* — VR Research Demos

*WPI Open House*
Buses from 5:45 pm - 7 pm

WPI Open House and Live Demos Reception (food provided) (7 pm - 10:45 pm)

# Conference Schedule

| Time | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY |
|------|---------|-----------|----------|--------|
| 7:00 | | | | |
| 7:30 | *Eden Vale Foyer* | *Eden Vale Foyer* | *Eden Vale Foyer* | *Eden Vale Foyer* |
| 8:00 | Breakfast | Breakfast | Breakfast | Breakfast |
| | **VR** | | **HAPTICS** | **HAPTICS** |
| 8:30 | *Eden Vale Ballroom* | **VR** | *Eden Vale A/B* | *Eden Vale A/B* |
| | Keynote Speaker | *Eden Vale Ballroom* | Oral 1: Technology: Tactile and Fingertip Systems | Oral 3: Technology: Kinesthetic Haptic Systems |
| 9:00 | | Papers 8: Collaboration & Distribution | | |
| 9:30 | | | | |
| 10:00 | | | *Eden Vale A/B* | *Eden Vale Foyer, Eden Vale C & Emerson* |
| | *Concord Ballroom* | *Concord Ballroom* | Teasers: Posters/Demos 1 | Break, Poster & Demo viewing |
| 10:30 | Break | Break | *Eden Vale Foyer, Eden Vale C & Emerson* | |
| | *Eden Vale Ballroom* | *Eden Vale Ballroom* | Break, Poster & Demo viewing | |
| 11:00 | Papers 5: Presence | Papers 9: Perception | | *Eden Vale A/B* |
| 11:30 | | | | Oral 4: Applications: Haptics in Guidance |
| 12:00 | | | | |
| 12:30 | | | | |
| | Lunch Break | Lunch Break | Lunch Break | Lunch Break |
| 1:00 | | | | |
| 1:30 | | | | |
| 2:00 | *Eden Vale Ballroom* | *Eden Vale Ballroom* | *Eden Vale A/B* | *Eden Vale A/B* |
| | Papers 6: VR Applications | Papers 10: Tracking | Oral 2: Humans: Human Haptic Perception and Performance | Spotlight on Industry: The Future of Interaction in Mobile Devices |
| 2:30 | | | | |
| 3:00 | | | | *Eden Vale A/B* |
| 3:30 | *Concord Ballroom* | *Concord Ballroom* | *Eden Vale A/B* | Oral 5: Applications: Haptics in Medical and Rehabilitation Applications |
| | Break | Break | Teasers: Posters/Demos 2 | |
| | *Eden Vale Ballroom* — Papers 7: Multi-Modal Interfaces / *Emerson* — Panel: Design for the Experience?! | *Eden Vale Ballroom* Papers 11: Graphics (3:45 pm - 5 pm) | *Eden Vale Foyer, Eden Vale C & Emerson* Break, Poster & Demo viewing | Award Ceremony and Closing (4:30 pm - 5 pm) |
| 4:00 | | | | |
| 4:30 | | | | |
| 5:00 | | Best Paper & Closing (5 pm - 5:30 pm) | | |
| 5:30 | | | | |
| 6:00 | *Eden Vale Foyer* Posters | | *Lobby* From 5:50 pm - 6:10 pm buses will be departing for the Museum of Science | |
| 6:30 | | | | |
| 7:00 | | **HAPTICS** | *Museum of Science* Haptics Banquet (Sponsored by SensAble Technologies; 6:30 pm - 9:30 pm) ; Buses depart Museum of Science to conference hotel at 10pm | |
| 7:30 | *Eden Vale Ballroom* Dinner Banquet | *Eden Vale Ballroom* Haptics Welcome Reception | | |
| 8:00 | | | | |
| 8:30 | | | | |
| 9:00 | | | | |

Side columns (Tuesday & Wednesday): *Concord Ballroom* — VR Exhibits; *Cambridge & Lincoln* — VR Research Demos

## ▶ SATURDAY MARCH 20

**7:30 am - 8:30 am**

*Eden Vale Foyer*

☐ Breakfast

### TUTORIALS

**8:30 am - 5:30 pm**

*Cambridge*

☐ **Tutorial 1:** Controlling Your World: Scripting in Second Life (Hands On Tutorial)

**8:30 am - 12:30 pm**

*Lincoln*

☐ **Tutorial 2:** Developing VR Applications with the inVRs Framework

**1:30 pm - 5:30 pm**

*Lincoln*

☐ **Tutorial 3:** Walking through Virtual Worlds: One Virtual Step for Man, One Giant Leap for VR? (Hands On Tutorial)

### WORKSHOPS

**8:30 am - 5:30 pm**

*Alcott*

☐ **Workshop 1:** Cloud-Mobile Convergence for Virtual Reality (CMCVR)

### 3DUI SYMPOSIUM

**9:00 am - 9:15 am**

*Eden Vale A/B*

☐ **Introduction**

**9:15 am - 10:30 am**

*Eden Vale A/B*

☐ **Keynote Speaker**
Interactive "Smart" Computers, Takeo Igarashi

**10:30 am - 11:00 am**

*Eden Vale Foyer*

☐ **Break**

**11:00 am - 12:00 pm**

*Eden Vale A/B*

☐ **Papers Session 1: Games & Music**
**RealNav: Exploring Natural User Interfaces for Locomotion in Video Games**, Brian Williamson, Chadwick Wingrave, Joseph J. LaViola Jr.
**Evaluating Natural Interaction Techniques in Video Games [Technote]**, Ryan P. McMahan, Alexander Joel D. Alon, Shaimaa Lazem, Robert J. Beaton, David Machaj, Michael Schaefer, Mara G. Silva, Anamary Leal, Robert Hagan, Doug A. Bowman
**Piivert: Percussion-based Interaction for Immersive Virtual Environments [Technote]**, Florent Berthaut, Martin Hachet, Myriam Desainte-Catherine

**12:00 pm - 12:15 pm**

*Eden Vale A/B*

☐ **Poster Fast Forward**

**12:15 pm - 1:30 pm**

☐ **Lunch Break**

**1:30 pm - 2:45 pm**

*Eden Vale A/B*

☐ **Papers Session 2: Travel**
**Walking Up and Down in Immersive Virtual Worlds: Novel Interactive Techniques Based on Visual Feedback**, Maud Marchal, Anatole Lécuyer, Gabriel Cirio, Laurent Bonnet, Mathieu Emily
**Effects of Travel Technique and Gender on a Divided Attention Task in a Virtual Environment**, Evan A. Suma, Samantha L. Finkelstein, Seth Clark, Paula Goolkasian, Larry F. Hodges
**Virtual Collision Notification [Technote]**, Kristopher J. Blom, Steffi Beckhaus

**2:45 pm - 4:00 pm**

*Eden Vale Foyer*

☐ **Posters Viewing & Break**

**4:00 pm - 5:00 pm**

*Eden Vale A/B*

☐ **Papers Session 3: Selection, Manipulation & Control**
**Revisiting Path Steering for 3D Manipulation Tasks**, Lei Liu, Jean-Bernard Martens, Robert van Liere
**An Evaluation of Menu Properties and Pointing Techniques in a Projection-based VR Environment [Technote]**, Kaushik Das, Christoph W. Borst
**Audio Haptic Feedbacks for an Acquisition Task in a Multi-Target context [Technote]**, Bob Ménélas, Lorenzo Picinalli, Brian F. G. Katz, Patrick Bourdot

## SUNDAY MARCH 21 ◀

**7:30 am - 8:30 am**

*Eden Vale Foyer*

☐ Breakfast

### TUTORIALS

**8:30 am - 12:30 pm**

*Lincoln*

☐ **Tutorial 4:** Designing Immersive VR Systems: From Bits to Bolts

**1:30 pm - 5:30 pm**

*Lincoln*

☐ **Tutorial 5:** Building your own Projection-based VR Display System

### WORKSHOPS

**8:30 am - 5:30 pm**

*Alcott*

☐ **Workshop 2:** SEARIS: 3rd Workshop on Software Engineering and Architectures for Realtime Interactive Systems

**8:30 am - 12:30 pm**

*Cambridge*

☐ **Workshop 3:** Medical Virtual Environments

**1:30 pm - 5:30 pm**

*Cambridge*

☐ **Workshop 4:** PIVE: Perceptual Illusions in Virtual Environments

### 3DUI SYMPOSIUM

**8:45 am - 9:30 am**

*Eden Vale A/B*

☐ **Papers Session 4: Show On & Show Through**
**Improving Co-located Collaboration with Show-Through Techniques**, Ferran Argelaguet, André Kunert, Alexander Kulik, Bernd Froehlich
**Augmented Foam Sculpting for Capturing 3D Models**, Michael R. Marner, Bruce H. Thomas

**9:30 am - 10:30 am**

*Eden Vale A/B*

☐ Papers Session 5: Hardware Interfaces

**The Implementation of a Novel Walking Interface within an Immersive Display [Technote]**, David Swapp, Julian Williams, Anthony Steed

**Contact Sensing and Interaction Techniques for a Distributed, Multimodal Floor Display [Technote]**, Yon Visell, Severin Smith, Alvin Law, Rishi Rajalingham, Jeremy R. Cooperstock

**A Multi-Touch enabled Human-Transporter Metaphor for Virtual 3D Traveling [Technote]**, Dimitar Valkov, Frank Steinicke, Gerd Bruder, Klaus Hinrichs

**10:30 am - 11:00 am**

*Eden Vale Foyer*

☐ Break

**11:00 am - 12:15 pm**

*Eden Vale A/B*

☐ Papers Session 6: Manipulating Augmented Reality

**What Do You Do When Two Hands Are Not Enough? Interactive Selection of Bonds Between Pairs of Tangible Molecules**, Patrick Maier, Marcus Tönnis, Gudrun Klinker, Alexander Raith, Markus Drees, Fritz Kühn

**An Empirical Evaluation of Virtual Hand Techniques for 3D Object Manipulation in a Tangible Augmented Reality Environment**, Taejin Ha, Woontack Woo

**AR-Mote: A wireless device for Augmented Reality Environment [Technote]**, Giandomenico Caruso, Guido Maria Re

**12:30 pm - 1:30 pm**

☐ Lunch Break

**1:30 pm - 2:30 pm**

*Eden Vale A/B*

☐ Papers Session 7: Multi-Display & Multi-Touch

**Comparison of Multimodal Interactions in Perspective-corrected Multi-display Environment**, Ryo Fukazawa, Kazuki Takashima, Garth Shoemaker, Yoshifumi Kitamura, Yuichi Itoh, Fumio Kishino

**Extending the Virtual Trackball Metaphor to Rear Touch Input [Technote]**, Sven Kratz, Michael Rohs

**The Design and Evaluation of 3D Positioning Techniques for Multi-touch Displays [Technote]**, Anthony Martinet, Géry Casiez, Laurent Grisoni

**2:30 pm - 2:45 pm**

*Eden Vale A/B*

☐ Contest / Demos Introduction

**2:45 pm - 4:30 pm**

*Eden Vale C & Eden Vale Foyer*

☐ Contest / Demos & Break

**4:30 pm - 4:45 pm**

*Eden Vale A/B*

☐ Awards & Closing

## VR CONFERENCE

**6:00 pm - 10:30 pm**

*Concord Ballroom*

☐ VR Welcome Reception

## ▶ MONDAY MARCH 22

**7:30 am - 8:30 am**

*Eden Vale Foyer*

☐ Breakfast

## VR CONFERENCE

**8:30 am - 9:00 am**

*Eden Vale Ballroom*

☐ Opening Remarks

**9:00 am - 10:30 am**

*Eden Vale Ballroom*

☐ Paper Session 1: AR Studies

**Photorealistic Rendering for Augmented Reality: A Global Illumination and BRDF Solution**, Saulo Pessoa, Guilherme Moura, João Lima, Veronica Teichrieb, Judith Kelner

**The Role of Latency in the Validity of AR Simulation**, Cha Lee, Scott Bonebrake, Tobias Höllerer, Doug A. Bowman

**Performance Evaluation Method for Mobile Computer Vision Systems using Augmented Reality**, Jonas Nilsson, Anders C.E. Ödblom, Jonas Fredriksson, Adeel Zafar, Fahim Ahmed

**An Evaluation of Physical Affordances in Augmented Virtual Environments: Dataset Grounding and Magic Lens**, Leonard D. Brown, Hong Hua

**10:30 am - 11:00 am**

*Concord Ballroom*

☐ Break

*Eden Vale Ballroom*

☐ Research Demo Fast Forward

**11:00 am - 12:30 pm**

*Eden Vale Ballroom*

☐ Paper Session 2: Interaction

**Enabling Functional Validation of Virtual Cars Through Natural Interaction Metaphors**, Mathias Moehring, Bernd Froehlich

**Improved Redirection with Distractors: A Large-Scale-Real-Walking Locomotion Interface and its Effect on Navigation in Virtual Environments**, Tabitha C. Peck, Henry Fuchs, Mary C. Whitton

**Visual-Olfactory Display Using Olfactory Sensory Map**, Aiko Nambu, Takuji Narum, Kunihiro Nishimura, Tomohiro Tanikawa, Michitaka Hirose

**Effect Based Scene Manipulation for Multimodal VR Systems**, Matthias Haringer, Steffi Beckhaus

**Egocentric Space-Distorting Visualizations for Rapid Environment Exploration in Mobile Mixed Reality**, Christian Sandor, Andrew Cunningham, Ulrich Eck, Donald Urquhart, Graeme Jarvis, Arindam Dey, Sebastien Barbier, Michael R. Marner, Sang Rhee

**12:30 pm - 2:00 pm**

☐ Lunch Break

**2:00 pm - 3:15 pm**

*Eden Vale Ballroom*

☐ Paper Session 3: Gestures

**GUD WIP: Gait-Understanding-Driven Walking-In-Place**, Jeremy D. Wendt, Mary C. Whitton, Frederick P. Brooks, Jr.

**Breaking the Status Quo: Improving 3D Gesture Recognition with Spatially Convenient Input Devices**, Michael Hoffman, Paul Varcholik, Joseph J. LaViola Jr.

**Buttonless Clicking: Intuitive Select and Pick-release Through Gesture Analysis**, Ali Choumane, Géry Casiez, Laurent Grisoni

**3:15 pm - 3:45 pm**

*Concord Ballroom*

☐ Break

*Eden Vale Ballroom*

☐ Poster Fast Forward

**3:45 pm - 5:15 pm**

*Eden Vale Ballroom*

☐ Paper Session 4: AR Applications

**Virtually Augmenting Hundreds of Real Pictures: An Approach based on Learning, Retrieval, and Tracking**, Julien Pilet, Hideo Saito

**More Than Meets the Eye: An Engineering Study to Empirically Examine the Blending of Real and Virtual Color Spaces**, Joseph L. Gabbard, Jason Zedlitz, J. Edward Swan II, Woodrow W. Winchester III

**Twinkle: Interacting with Physical Surfaces Using Handheld Projector**, Takumi Yoshida, Yuki Hirobe, Hideaki Nii, Naoki Kawakami, Susumu Tachi

**In-Place Sketching for Content Authoring in Augmented Reality Games**, Nate Hagbi, Raphaël Grasset, Oriel Bergig, Mark Billinghurst, Jihad El-Sana

**3:45 pm - 5:45 pm**

*Emerson*

☐ **Panel: What is VR?**

**5:45 pm - 7:00 pm**

*Buses to WPI*

**7.00 pm - 10.45 pm**

*WPI*

☐ **WPI Open House and Live Demos Reception (food provided)**

# ▶ TUESDAY MARCH 23

## VR CONFERENCE

**7:30 am - 8:30 am**

*Eden Vale Foyer*

☐ **Breakfast**

**8:45 am - 10:30 am**

*Eden Vale Ballroom*

☐ **Keynote Speaker**
Breaking Down the Walls: The Future of Second Life, Howard Look

**10:30 am - 11:00 am**

*Concord Ballroom*

☐ **Break**

**11:00 am - 12:30 pm**

*Eden Vale Ballroom*

☐ **Paper Session 5: Presence**
**Is the Rubber Hand Illusion Induced by Immersive Virtual Reality?**, Ye Yuan, Anthony Steed

**Virtual Experience Test: A Virtual Environment Evaluation Questionnaire,** Dustin B. Chertoff, Brian Goldiez, Joseph J. LaViola, Jr

**The Contribution of Real-Time Mirror Reflections of Motor Actions on Virtual Body Ownership in an Immersive Virtual Environment**, Mar González-Franco, Daniel Pérez-Marcos, Bernhard Spanlang, Mel Slater

**Avatar Self-Embodiment Enhances Distance Perception Accuracy in Non-Photorealistic Immersive Virtual Environments**, Lane Phillips, Brian Ries, Michael Kaeding, Victoria Interrante

**12:30 pm - 2:00 pm**

☐ **Lunch Break**

**2:00 pm - 3:15 pm**

*Eden Vale Ballroom*

☐ **Paper Session 6: VR Applications**
**Simulation of Genetic Inheritance in the Generation of Virtual Characters**, Roberto C. Cavalcante Vieira, Creto Augusto Vidal, Joaquim B. Cavalcante-Neto

**Multimodal Virtual Reality Application for the Study of Unilateral Spatial Neglect**, Inna Tsirlin, Eve Dupierrix, Sylvie Chokron, Theophile Ohlmann, Sabine Coquillart

**Can You Help Me Concentrate Room?** , Mohamad Nadim Adi, David Roberts

**VRACK - Virtual Reality Augmented Cycling Kit: Design and Validation**, Richard Ranky, Mark Sivak, Jeffrey Lewis, Venkata Gade, Judith E. Deutsch, Constantinos Mavroidis

**3:15 pm - 3:45 pm**

*Concord Ballroom*

☐ **Break**

**3:45 pm - 5:15 pm**

*Eden Vale Ballroom*

☐ **Paper Session 7: Multi-Modal Interfaces**
**Synthesizing Contact Sounds Between Textured Models**, Zhimin

Ren, Hengchin Yeh, Ming C. Lin

**Sound Synthesis and Evaluation of Interactive Footsteps for Virtual Reality Applications**, Rolf Nordahl, Stefania Serafin, Luca Turchet

**Auto-Calibration of Cylindrical Multi-Projector Systems**, Behzad Sajadi, Aditi Majumder

**3:45 pm - 5:45 pm**

*Emerson*

☐ **Panel: Design for the Experience?!**

**5:45 pm - 7:15 pm**

*Eden Vale Foyer*

☐ **Posters**

**8:00 pm - 10:45 pm**

*Eden Vale Ballroom*

☐ **Dinner Banquet**

# WEDNESDAY MARCH 24 ◀

## VR CONFERENCE

**7:30 am - 8:30 am**

*Eden Vale Foyer*

☐ Breakfast

**9:00 am - 10:30 am**

*Eden Vale Ballroom*

☐ **Paper Session 8: Collaboration & Distribution**
**Effects of Viewing Conditions and Rotation Methods in a Collaborative Tabletop AR Environment**, Sangyoon Lee, Hong Hua

**On Error Bound Estimation for Motion Prediction**, Rynson W.H. Lau, Kenneth Lee

**Mixed Reality in Virtual World Teleconferencing**, Tuomas Kantonen, Charles Woodward, Neil Katz

**Streaming 3D Shape Deformations in Collaborative Virtual Environment,** Ziying Tang, Guodong Rong, Xiaohu Guo, B. Prabhakaran

**10:30 am - 11:00 am**

*Concord Ballroom*

☐ **Break**

**11:00 am - 12:30 pm**

*Eden Vale Ballroom*

☐ **Paper Session 9: Perception**
**Change Blindness Phenomena for Stereoscopic Projection Systems**, Frank Steinicke, Gerd Bruder, Klaus Hinrichs, Pete Willemsen

**Influence of Tactile Feedback and Presence on Egocentric Distance Perception in Virtual Environments**, Farahnaz Ahmed, Joseph D. Cohen, Katherine S. Binder, Claude L. Fennema

**Detection Thresholds for Label Motion in Visually Cluttered Displays**, Stephen D. Peterson, Magnus Axholt, Matthew Cooper, Stephen R. Ellis

**Can You Stand on Virtual Grounds? A Study on Postural Affordances in Virtual Reality**, Tony Regia-Corte, Maud Marchal, Anatole Lécuyer

**12:30 pm - 2:00 pm**

☐ **Lunch Break**

**2:00 pm - 3:15 pm**

*Eden Vale Ballroom*

☐ **Paper Session 10: Tracking**
**Real-time Panoramic Mapping and Tracking on Mobile Phones**, Daniel Wagner, Alessandro Mulloni, Tobias Langlotz, Dieter Schmalstieg

**A Real-time Multi-cue Hand Tracking Algorithm Based on Computer Vision**, Zhigeng Pan, Yang Li, Mingmin Zhang, Chao Sun, Kangde Guo, Xing Tang, Steven Zhiying Zhou

**Markerless Tracking Using Polar Correlation of Camera Optical Flow**, Prince Gupta, Niels da Vitoria Lobo, Joseph J. Laviola Jr.

**3:15 pm - 3:45 pm**

*Concord Ballroom*

☐ Break

**3:45 pm - 5:00 pm**

*Eden Vale Ballroom*

☐ **Paper Session 11: Graphics**

**Real-Time Continuum Grass,** Kan Chen, Henry Johan

**Single-pass 3D Lens Rendering and Spatiotemporal "Time Warp" Example,** Jan-Phillip Tiesel, Christoph W. Borst, Kaushik Das, Emad Habib

**GPU Implementation of 3D Object Selection by Conic Volume Techniques in Virtual Environments,** Tobias Rick, Anette von Kapri, Torsten Kuhlen

**5:00 pm - 5:30 pm**

*Eden Vale Ballroom*

☐ **Best Paper & Closing**

## HAPTICS SYMPOSIUM

**7.00 pm - 9.00 pm**

*Eden Vale Ballroom*

☐ **Haptics Welcome Reception**

# ▶ THURSDAY MARCH 25

## HAPTICS SYMPOSIUM

**7:30 am - 8:30 am**

*Eden Vale Foyer*

☐ **Breakfast**

**8:30 am - 10:10 am**

*Eden Vale A/B*

☐ **Oral 1: Technology: Tactile and Fingertip Systems**

**Paper: A New Fabric-based Softness Display,** Matteo Bianchi, Alessandro Serio, Enzo Pasquale Scilingo, Antonio Bicchi

**Paper: 3D Force Prediction Using Fingernail Imaging with Automated Calibration,** Thomas Grieve, Lucas Lincoln, Yu Sun, John M. Hollerbach, Stephen A. Mascaro

**Paper: Design of Electrotactile Stimulation to Represent Distribution of Force Vectors,** Katsunari Sato, Susumu Tachi

**Abstract: Design of a Novel Finger Haptic Interface for Contact and Orientation Display,** Massimiliano Solazzi, Antonio Frisoli, Massimo Bergamasco

**Paper: Design of a Vibrotactile Display via a Rigid Surface,** Yon Visell, Jeremy R. Cooperstock

**Paper: High Frequency Acceleration Feedback Significantly Increases the Realism of Haptically Rendered Textured Surfaces,** William McMahan, Joseph M. Romano, Amal M. Abdul Rahuman, Katherine J. Kuchenbecker

**Paper: Emulating Human Attention-Getting Practices with Wearable Haptics,** Matthew A. Baumann, Karon E. MacLean, Thomas W. Hazelton, Ashley McKay

**10:10 am - 10:45 am**

*Eden Vale A/B*

☐ **Teasers: Posters/Demos 1**

**Using Force Sensors and Neural Models to Encode Tactile Stimuli as Spike-based Responses,** Elmer K. Kim, Gregory J. Gerling, Scott A. Wellnitz, Ellen A. Lumpkin

**Discrimination of Consonant Articulation Location by Tactile Stimulation of the Forearm,** Elaine Y. Wong, Ali Israr, Marcia K. O'Malley

**Characterization and Simulation of Tactile Sensors,** Zachary Pezzementi, Erica Jantho, Lucas Estrade, Gregory D. Hager

**Haptic Illusion of Elasticity by Tactile Suppression during Motor Activity,** Taku Hachisu, Sayaka Oshima, Yuki Hashimoto, Hiroyuki Kajimoto

**Demo: Haptic Illusion of Elasticity by Tactile Suppression during Motor Activity,** Taku Hachisu, Sayaka Oshima, Yuki Hashimoto, Hiroyuki Kajimoto

**Evaluating Populations of Tactile Sensors for Curvature Discrimination,** Isabelle I. Rivest, Gregory J. Gerling

**Haptic Figure-Ground Differentation via a Haptic Glance,** Dianne Pawluk, Ryo Kitada, Aneta Abramowicz, Cheryl Hamilton, Susan J. Lederman

**Dynamic Switching Control of Haptic Transmission Direction in Remote Control System,** Tatsuya Watanabe, Yutaka Ishibashi, Norishige Fukushima, Shinji Sugawara

**Virtual Object Manipulation System with Substitutive Display of Tangential Force and Slip by Control of Vibrotactile Phantom Sensation,** Tatsuya Ooka, Kinya Fujita

**Comparison of Three Designs for Haptic Button Edges on Touchscreens,** Toni Pakkanen, Roope Raisamo, Jukka Raisamo, Katri Salminen, Veikko Surakka

**A Finger Attachment to Generate Tactile Feedback and Make 3D Gesture Detectable by Touch Panel Sensor,** Itsuo Kumazawa

**An Initial Study of Visuohaptic Simulation of Point-charge Interactions,** Jaeyoung Park, Kwangtaek Kim, Hong Z. Tan, Ron Reifenberger, Gary Bertoline, Tallulah Hoberman, Deborah Bennett

**Interaction Control for a Brake Actuated Manipulator,** Brian Dellon, Yoky Matsuoka

**Haptic Interaction with Volumetric Datasets Using Surface-based Haptic Libraries,** Silvio H. Rizzi, Cristian J. Luciano, P. Pat Banerjee

**Design, Fabrication, and Testing of a Piezoresistive Hardness Sensor in Minimally Invasive Surgery,** Masoud Kalantari, Mohammadreza Ramezanifard, Roozbeh Ahmadi, Javad Dargahi, Jozsef Kovecses

**A Preliminary Experimental Study on Haptic Teleoperation of Mobile Robot with Variable Force Feedback Gain,** Ildar Farkhatdinov, Jee-Hwan Ryu, Jinung An

**Simplified Design of Haptic Display by Extending One-point Kinesthetic Feedback to Multipoint Tactile Feedback,** Kouta Minamizawa, Domenico Prattichizzo, Susumu Tachi

**Initial Study for Creating Linearly Moving Vibrotactile Sensation on Mobile Device,** Jongman Seo, Seungmoon Choi

**Demo: Linearly Moving Vibrotactile Sensation on Handheld Mobile Device,** Jongman Seo, Seungmoon Choi

**New Experimental Method based Biological Soft Tissue Modeling,** Bummo Ahn, Jung Kim

**Physically-Based Analytical Modelling of Deformable Haptic Environments,** Kevin C. Walker, David Wang

**Co-presentation of Force Cues for Skill Transfer via Shared-control Systems,** Dane Powell, Marcia K. O'Malley

**HITPROTO: a Tool for the Rapid Prototyping of Haptic Interactions for Haptic Data Visualization,** Sabrina A. Panëels, Jonathan C. Roberts, Peter J. Rodgers

**Haptic Guides in Cooperative Virtual Environments: Design and Human Performance Evaluation,** Sehat Ullah, Paul Richard, Samir Otmane, Mickael Naud, Malik Mallem

**IN-HAPTICS: Interactive Navigation using Haptics,** Richard D. Walker IV, Sean B. Andersson, Calin A. Belta, Pierre E. Dupont

**The QuickHaptics microAPI: Enabling Haptic Mashups,** David Chen, Venkat Gourishankar, Curt Rawley, Georges Grinstein

**Stiffness Modulation for Haptic Augmented Reality: Extension to 3D Interaction,** Seokhee Jeon, Seungmoon Choi

**Demo: Stiffness Modulation for Haptic Augmented Reality: Extension to 3D Interaction,** Seokhee Jeon, Seungmoon Choi

**Design and evaluation of a vibrotactile seat to improve spatial awareness while driving,** John Morrell, Kamil Wasilewski

**Demo: A Vibrotactile Seat and Driving Simulator for Improved Spatial Awareness,** John Morrell, Kamil Wasilewski, Hari Vasudevan

**Demo: Expressive, Wearable Haptic Displays,** Matthew Pan, Matthew A. Baumann, Thomas W. Hazelton, Karon E. MacLean, Elizabeth A. Croft

**Demo: Tactile Gaming Vest (TGV),** Saurabh Palan, Ruoyao Wang, Nathaniel Naukam, Katherine J. Kuchenbecker

**Demo: A Vibrotactile Feedback Approach to Posture Guidance**, Ying (Jean) Zheng, John B. Morrell

**Demo: Haptic Display via a Vibrating, Rigid Surface**, Yon Visell, Guillaume Millet, Jeremy Cooperstock

**Demo: The Haptic Board**, Zhihao Jiang, Mohit Bhoite, Katherine J. Kuchenbecker

**Demo: Dial-based Haptic Interface**, Laehyun Kim, Wanjoo Park, Hyunchul Cho, Sehyung Park

**Demo: MasterFinger-2: Multifinger Haptic Device for Virtual Object Manipulation**, Pablo Cerrada, Manuel Ferre, Rafael Aracil, Jorge Barrio, Pablo García-Robledo

**Demo: Haptic Negotiation and Role Exchange with the Haptic Board Game**, S. Ozgur Oguz, Ayse Kucukyilmaz, Tevfik Metin Sezgin, Cagatay Basdogan

**Demo: GPU-Based Haptic Rendering of 3D Smoke**, Meng Yang, Jingwan Lu, Alla Safonova, Katherine J. Kuchenbecker

**Demo: Interactive Simulation of Needle Insertion Using a Magnetic Levitation Haptic Interface**, Bing Wu

**Demo: Simulating Dental Procedures with a Magnetic Levitation Haptic Interface,** Yu Ge

**Demo: Virtual Reality Dental Simulator**, DangXiao Wang, YuRu Zhang, WanLin Zhou, Ge Yu, Jun Wu, Hui Zhao

**Demo: Haptic Bite Articulation**, Venkat Gourishankar, Curt Rawley

**Demo: Stiffness Shifting: Improving the Perceived Hardness of a Virtual Surface**, Gabjong Han, Seokhee Jeon, Seungmoon Choi

**Demo: Exchanging Tracking for Accurate Force Display in Multiple Degree-of-freedom Teleoperation**, Paul Griffiths, Allison Okamura

**Demo: Force Feedback Teleoperation for EOD Manipulation Tasks**, Martin Buehler, Wes Huang, Mark Claffee, Emilie Phillips, Walt Aviles, Jonathan Miller

## 10:45 am - 12:15 pm
*Eden Vale Foyer, Eden Vale C & Emerson*

☐ **Break, Poster & Demo viewing**

Posters and demonstrations will be up during the whole conference.

## 12:15 pm - 1:45 pm

☐ **Lunch Break**

## 1:45 pm - 3:20 pm
*Eden Vale A/B*

☐ **Oral 2: Humans: Human Haptic Perception and Performance**

**Paper: Perceptual Space and Adjective Rating of Sinusoidal Vibrations Perceived via Mobile Device**, Inwook Hwang, Seungmoon Choi

**Paper: Haptic Exploration of Spheres: Techniques and Initial Experiments**, Blake Hannaford, Jesse Dosher, Sugandhan Venkatachalam

**Abstract: Psychophysical Detection of Inclusions with the Bare Finger amidst Softness Differentials** , Leigh A. Baumgart, Gregory J. Gerling, Ellen J. Bass

**Paper: Human vs. Robotic Tactile Sensing: Detecting Lumps in Soft Tissue**, James C. Gwilliam, Zachary Pezzementi, Erica Jantho, Allison M. Okamura, Steven Hsiao

**Paper: Redundant Coding of Simulated Tactile Key Clicks with Audio Signals**, Hsiang-Yu Chen, Jaeyoung Park, Hong Z. Tan, Steve Dai

**Paper: Perceptual Representations of Parametrically-Defined and Natural Objects Comparing Vision and Haptics**, Nina Gaißert, Christian Wallraven

**Abstract: Effects of Kinesthetic Information on Working Memory for 2D Sequential Selection Task**, Gabjong Han, Jaebong Lee, In Lee, Seokhee Jeon, Seungmoon Choi

## 3:20 pm - 3:50 pm
*Eden Vale A/B*

☐ **Teasers: Posters/Demos 2**

**Exploring the Underlying Structure of Haptic-based Handwritten Signatures using Visual Data Mining Techniques**, Nizar Sakr, Fawaz A. Alsulaiman, Julio J. Valdés, Abdulmotaleb El Saddik, Nicolas D. Georganas

**Towards Real-Time Haptic Exploration using a Mobile Robot as Mediator**, Chung Hyuk Park, Ayanna M. Howard

**Haptic Characteristics of some Activities of Daily Living**, Brittany Redmond, Rachel Aina, Tejaswi Gorti, Blake Hannaford

**Haptic System for Hand Rehabilitation Integrating an Interactive Game with an Advanced Robotic Device**, Mark Sivak, Ozer Unluhisarcikli, Brian Weinberg, Paolo Bonato, Constantinos Mavroidis

**Demo: A Haptic System for Hand Rehabilitation Integrating an Interactive Game with a Robotic Device**, Mark Sivak, Ozer Unluhisarcikli, Brian Weinberg, Paolo Bonato, Constantinos Mavroidis

**Haptic System Design for MRI-Guided Needle Based Prostate Brachytherapy**, Hao Su, Weijian Shang, Gregory A. Cole, Kevin Harrington, Gregory S. Fischer

**Stability Analysis of Haptic Interfaces for Different Types of Sampled Signals and Virtual Environment Implementations**, Amir Haddadi, Keyvan Hashtrudi-Zaad

**Active Handrest for Precision Manipulation and Ergonomic Support**, Mark A. Fehlberg, Brian T. Gleeson, Levi C. Leishman, William R. Provancher

**Skin Nonlinearities and their Effect on User Perception for Rotational Skin StretchPete Shull**, Karlin Bark, Mark Cutkosky

**Cooperative Teleoperation Control with Projective Force Mappings**, Pawel Malysz, Shahin Sirouspour

**Design of a Haptic Simulator for Osteosynthesis Screw Insertion**, Ann Majewicz, Jason Glasser, Rosemary Bauer, Stephen M. Belkoff, Simon C. Mears, Allison M. Okamura

**Demo: Haptic Simulator for Osteosynthesis Screw Insertion**, Ann Majewicz, Jason Glasser, Rosemary Bauer, Stephen Belkoff, Simon Mears, Allison Okamura

**Finding a Feature on a 3D Object through Single-Digit Haptic Exploration**, Kristina Huynh, Cara E. Stepp, Lee W. White, J. Edward Colgate, Yoky Matsuoka

**Surface Waves and Spatial Localization in Vibrotactile Displays**, Lynette A. Jones, David Held, Ian Hunter

**A Two-grid Iterative Approach for Real Time Haptics Mediated Interactive Simulation of Deformable Objects**, Venkata S Arikatla, Suvranu De

**Dilatant Fluid Based Tactile Display -Basic Concept-**, Satoshi Saga, Koichiro Deguchi

**Perceptual Thresholds for Single vs. Multi-Finger Haptic Interaction**, H. Hawkeye King, Regina Donlin, Blake Hannaford

**NUVABAT: Northeastern University Virtual Ankle and Balance Trainer**, Ye Ding, Mark Sivak, Brian Weinberg, Constantinos Mavroidis, Maureen Holden

**Towards Physics-based Interactive Simulation of Electrocautery Procedures using PhysX**, Zhonghua Lu, Ganesh Sankaranarayanan, Dhanannjay Deo, Dingfang Chen, Suvranu De

**Demo: Laparoscopic Adjustable Gastric Banding Simulator**, Ganesh Sankaranarayanan, Tansel Halic, Zhonghua Lu, James D. Adair, Daniel B. Jones, Suvranu De

**Tactile Mouse Using Friction Control**, Masaya Takasaki, Hiroyuki Kotani, Ryo Tamon, Takeshi Mizuno

**Friction Measurements on a Large Area TPaD**, Nicholas D. Marchuk, J. Edward Colgate, Michael A. Peshkin

**Demo: The Large Area TPaD**, Nicholas Marchuk, Dan Johnson, John Ware, J. Edward Colgate, Michael A. Peshkin

**A Basic Study on Tactile Displays Using Velvet Hand Illusion**, Yuji Kawabe, Abdullah Cham, Masahiro Ohka, Tetsu Miyaoka

**Establishing Multimodal Telepresence Sessions using the Session Initiation Protocol (SIP) and Advanced Haptic Codecs**, H. Hawkeye King , Blake Hannaford, Julius Kammerly, Eckehard Steinbachy

**Spatially Distributed Tactile Feedback for Kinesthetic Motion Guidance**, Pulkit Kapur, Mallory Jensen, Laurel J. Buxbaum, Steven A. Jax, Katherine J. Kuchenbecker

**Modeling Pneumatic Bubble Displacements with Membrane Theory**, Louis Kratchman, Jian Wen, Marc Michener, R. Brent Gillespie

**A Higher Order Polynomial Reproducing Radial Basis Function Neural Network (HOPR-RBFN) for Real-time Interactive Simulations of Nonlinear Deformable Bodies with Haptic Feedback**, Dhanannjay Deo, Suvranu De

**Demo: T-Pod: A Novel Multi-modal Handheld Device with Fingertip Shear Feedback**, William Provancher, Charles Stewart, Markus Montandon, Aaron Greer

**Demo: A New Fabric-based Softness Display**, Alessandro Serio, Matteo Bianchi, Enzo Pasquale Scilingo, Antonio Bicchi

**Demo: A Mutual Tactile Communication Device by Controlling Air Pressure**, Satuki Nakata, Yuki Hashimoto, Hiroyuki Kajimoto

**Demo: Realistic Haptic Contacts and Textures for Tablet Computing**, Joseph M. Romano, Katherine J. Kuchenbecker

**Demo: Novel 4-State Programmable Brakes in a 2 DOF Passive Haptic Display**, Yaroslav Tenzer, Brian L. Davies, Ferdinando Rodriguez y Baena

**Demo: Low-cost Microcontroller Solutions for Haptic Device Motor Control**, Ivan Figueroa, Alejandro Aguilar, Joel Huegel

**Demo: Angle Tracking and Location At-home System for Bi-manual Rehabilitation (ATLAS-BR) Smart Glove**, Mark Sivak, Avi Bajpai, Drew Lentz, Caitlyn Bintz, Andrew Clark, Jason Chrisos, Maureen K. Holden, Constantinos Mavroidis

**Demo: A Novel Haptic-based Interface for Training Interventional Radiology Procedures**, Chris Hughes, Nigel John

**Demo: Fiber-Optic Intubation Simulator with Haptic Feedback**, Ankur Baheti, Yuri Millo, Jaydev P. Desai

**Demo: High-Frequency Tactile Feedback for the da Vinci Surgical System**, Dorsey Standish, Jamie Gewirtz, William McMahan, Paul Martin, Katherine J. Kuchenbecker

## 3:50 pm - 5:20 pm
*Eden Vale Foyer, Eden Vale C & Emerson*

☐ **Break, Poster & Demo viewing**
Posters and demonstrations will be up during the whole conference.

## 5:50 pm - 6:10 pm
*Lobby*

☐ Buses depart for Museum of Science

## 6:30 pm - 9:30 pm
*Museum of Science*

☐ **Haptics Banquet**
Sponsored by SensAble Technologies; Buses depart Museum of Science for conference hotel at 10 pm.

# ▶ FRIDAY MARCH 26

## HAPTICS SYMPOSIUM

## 7:30 am - 8:30 am
*Eden Vale Foyer*

☐ **Breakfast**

## 8:30 am - 9:50 am
*Eden Vale A/B*

☐ **Oral 3: Technology: Kinesthetic Haptic Systems**
**Abstract: Enhancing Rate-hardness of Energy-bounding Algorithm by Considering Coulomb Friction of Haptic Interface,** Jaeha Kim, Changhoon Seo, Jeha Ryu, Jong-Phil Kim

**Paper: Unconditional Stability Analysis of Dual-user Teleoperation Systems**, Behzad Khademian, Keyvan Hashtrudi-Zaad

**Paper: An Iterative Approach to Optimizing Multi-user Networked Haptic Simulations**, Sina Niakosari, Shahin Sirouspour

**Paper: Measuring and Incorporating Slip in Data-Driven Haptic Rendering**, Raphael Höver, Matthias Harders

**Paper: Force and Contact Location Shading Thresholds for Smoothly Rendering Polygonal Models**, Andrew J. Doxon, David E. Johnson, Hong Z. Tan, William R. Provancher

**Abstract: Expressive Haptic Rendering with Cartoon-Inspired Effects**, Brian Gleeson, David E. Johnson

## 9:50 am - 11:05 am
*Eden Vale Foyer, Eden Vale C & Emerson*

☐ **Break, Poster & Demo viewing**
Posters & demonstrations will be up during the whole conference.

## 11:05 am - 12:30 pm
*Eden Vale A/B*

☐ **Oral 4: Applications: Haptics in Guidance**
**Paper: Effects of Haptic Guidance and Disturbance on Motor Learning: Potential Advantage of Haptic Disturbance**, Jaebong Lee, Seungmoon Choi

**Paper: Progressive Haptic and Visual Guidance for Training in a Virtual Dynamic Task**, Joel C Huegel, Marcia K O'Malley

**Paper: A Vibrotactile Feedback Approach to Posture Guidance**, Ying (Jean) Zheng, John B. Morrell

**Abstract: Torso-Based Tactile Feedback System for Patients with Balance Disorders**, Steven W. Wu, Richard E. Fan, Christopher R. Wottawa, Eileen G. Fowler, James W. Bisley, Warren S. Grundfest, Martin O. Culjat

**Paper: BlindAid: Virtual Environment System for Self-Reliant Trip Planning and Orientation and Mobility Training**, David W. Schloerb, Orly Lahav, Joseph G. Desloge, Mandayam A. Srinivasan

**Paper: Haptic Negotiation and Role Exchange for Collaboration in Virtual Environments**, S. Ozgur Oguz, Ayse Kucukyilmaz, Tevfik Metin Sezgin, Cagatay Basdogan

## 12:30 pm - 2:00 pm

☐ **Lunch Break**

## 2:00 pm - 3:00 pm
*Eden Vale A/B*

☐ **Spotlight on Industry: The Future of Interaction in Mobile Devices**
Dr. Leo Kärkkäinen, Distinguished Scientist, Nokia

## 3:00 pm - 4:30 pm
*Eden Vale A/B*

☐ **Oral 5: Applications: Haptics in Medical and Rehabilitation Applications**
**Paper: Fiber-Optic Intubation Simulator with Force Feedback**, Ankur R. Baheti, Yuri Millo, Jaydev P. Desai

**Paper: Haptic Noise Cancellation: Restoring Force Perception in Robotically-Assisted Beating Heart Surgery**, Shelten G. Yuen, Karl-Alexander Dubec, Robert D. Howe

**Paper: Gait Rehabilitation System for Stair Climbing and Descending**, Hiroaki Yano, Shintaro Tamefusa, Naoki Tanaka, Hideyuki Saitou, Hiroo Iwata

**Paper: Gait Rehabilitation Therapy Using Robot Generated Force Fields Applied at the Pelvis**, M. Pietrusinski, I. Cajigas, Y. Mizikacioglu, M. Goldsmith, P. Bonato, C. Mavroidis

**Paper: Haptic Gait Retraining for Knee Osteoarthritis Treatment**, Pete Shull, Kristen Lurie, Mihye Shin, Thor Besier, Mark Cutkosky

**Paper: ReFlex, a Haptic Wrist Interface for Motor Learning and Rehabilitation**, Dominique Chapuis, Remco Benthem de Grave, Olivier Lambercy, Roger Gassert

## 4:30 pm - 5:00 pm
*Eden Vale A/B*

☐ **Award Ceremony and Closing**

# IEEE TRANSACTIONS ON
# HAPTICS

# CALL FOR PAPERS

*IEEE Transactions on Haptics (ToH)* is a scholarly archival journal published quarterly that will address 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

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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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