world HAPTICS 2007

Supplemental Materials

Program

Hands-on Demos

Art Gallery

Company Exhibits

Venue Map

Sponsored by Virtual Reality Society of Japan
In technical cooperation with the IEEE, IEEE Robotics and Automation Society, and IEEE Computer Society / Visualization and Graphics Technical Committee
Visualization and Graphics

THE VIRTUAL REALITY SOCIETY OF JAPAN

World Haptics 2007 Final Program

Time table

1st day (March 22)						
		Multi-Purpose Hall	Room 101	Room 102	Room 201	Room 202
8:15-	Registration			Exhibition	HoD	Art Gallery
9:00-9:15	Opening remark					
9:15-10:30	Session 1A1	Psychophysics I				
10:30-11:00	Break					
11:00-12:15	Session 1A2	Device Design I				
12:15-13:30	lunch					
13:30-14:45	Session 1P1	Control and Dynamics I				
14:45-15:00	Break					
15:00-16:30	Sketches		Sketches			
16:30-17:30	Keynote 1	Prof. Hiroshi Ishii				
17:30-17:40	Short Remark on Technical Committee on Haptics					
17:40-19:30	Reception	Reception (Lobby of Ground Floor)				

2nd day (March 23)						
8:30-	Registration					
9:00-10:00	Session 2A1	Device Design II		Exhibition	HoD	Art Gallery
10:00-10:15	Break					
10:15-11:15	Session 2A2	Modeling and Rendering I				
11:15-11:30	Break					
11:30-12:30	Session 2A3	Control and Dynamics II				
12:30-13:30	lunch					
13:30-14:45	Session 2P1	Psychophysics II				
14:45-15:00	Break					
15:00-16:30	Posters/HoD I		Poster A		HoD I	Art Gallery I
16:30-17:45	Session 2P2	Haptic Systems				
17:45-19:00	Break					
19:00-21:00	Banquet	(Hotel Grand Shinonome)				

3rd day (March 24)						
8:30-	Registration					
9:00-10:00	Keynote 2	Prof. Charles Spence				
10:00-11:00	Session 3A1	Applications		Exhibition	HoD	Art Gallery
11:00-11:30	Break					
11:30-12:30	Session 3A2	Psychophysics III				
12:30-13:30	lunch					
13:30-15:00	Posters/HoD II		Poster B		HoD II	Art Gallery II
15:00-16:00	Session 3P1	Modeling and Rendering II				
16:00-16:30	Break					
16:30-17:45	Session 3P2	Psychophysics IV				
17:45-18:15	Closing					

Social Events

Reception

5:30 p.m. – 7:30 p.m. March 22

@Lobby of Ground Floor of Epochal

Banquet (inc. award ceremony)

7:00 p.m. – 9:00 p.m. March 23

@“Shinnonome no ma(東雲の間)” in Hotel Grand Shinonome

Shuttle bus will pick you up at 6:20 p.m. at main entrance of Epochal

or 7 min. walk from Epochal.

March 22 Thursday (1st day)

9:00-9:15 Opening remark (Multi-Purpose Hall)

9:15-10:30 Session 1A1 Psychophysics I (Lynette Jones and Bernard Adelstein)

A Behavioral Adaptation Approach to Identifying Visual Dependence of Haptic Perception
James Sulzer, Arsalan Salamat, Vikram Chib, J. Edward Colgate

JND Analysis of Texture Roughness Perception Using a Magnetic Levitation Haptic Device
Bertram Unger, Ralph Hollis, Roberta Klatzky

Changing the Haptic Field of View: Tradeoffs of Kinesthetic and Mechanoreceptive Spatial Information
Janet Weisenberger

The Gestalt Principle of Continuation Applies to both the Haptic and Visual Grouping of Elements
Dempsey Chang, Keith Nesbitt, Kevin Wilkins

Haptic Feedback Enhances Force Skill Learning
Dan Morris, Hong Tan, Federico Barbagli, Timothy Chang, Kenneth Salisbury

10:30-11:00 break

11:00-12:15 Session 1A2 Device Design I (Antonio Bicchi and Hiroyuki Shinoda)

Ubi-Pen: Development of a Compact Tactile Display Module and Its Application to a Haptic Stylus
Ki-Uk Kyung, Jun-Seok Park

Braille Display by Lateral Skin Deformation with the STReSS2 Tactile Transducer
Vincent Levesque, Jerome Pasquero, Vincent Hayward

Proposal for Tactile Sense Presentation that Combines Electrical and Mechanical Stimulus
Shinobu Kuroki, Hiroyuki Kajimoto, Naoki Kawakami, Susumu Tachi

Tactile Perception of Rotational Sliding
William Provancher, Brandt Erickson, Federico Barbagli, Hong Tan

Wearable Haptic Display to Present Gravity Sensation
Kouta Minamizawa, Hiroyuki Kajimoto, Naoki Kawakami, Susumu Tachi

12:15-13:30 lunch

13:30-14:45 Session 1P1 Control and Dynamics I (Blake Hannaford and John Hollerbach)

Time-Domain Passivity Control of Haptic Interfaces with Tunable Damping Hardware
Andrew Gosline, Vincent Hayward

Shaping Event-Based Haptic Transients Via an Improved Understanding of Real Contact Dynamics
Jonathan P. Fiene, Katherine J. Kuchenbecker

Impulse-based Control of an Impulsive Haptic Interface
Emmanuel Vander Poorten, Yasuyoshi Yokokohji

Design Guidelines for Wave Variable Controllers in Time Delayed Telerobotics
J. Scot Hart, Gunter Niemeyer

Motion Planning of Encountered-type Haptic Device for Multiple Fingertips Based on Minimum Distance Point Information
Ken Shigeta, Yuji Sato, Yasuyoshi Yokokohji

14:45-15:00 break

15:00-16:30 Sketches (Room 101)

16:30-17:30 Keynote speaker 1 (Multi-Purpose Hall)

Tangible Bits: Beyond Pixels
Professor Hiroshi Ishii

17:30-17:40 Short presentation on Technical Committee on Haptics
Hong Tan

17:40-19:30 Reception (Lobby of ground Floor of Epochal)

March 23 Friday (2nd day)

9:00-10:00 Session 2A1 Device Design II (Vincent Hayward and Dong-Soo Kwon)

Integrating Two Haptic Devices for Performance Enhancement
Enzo Pasquale Scilingo, Nicola Sgambelluri, Giovanni Tonietti, Antonio Bicchi

Finger Ring Tactile Interface Based on Propagating Elastic Waves on Human Fingers
Takayuki Iwamoto, Hiroyuki Shinoda

Large Area Sensor Skin based on Two-Dimensional Signal Transmission Technology
Hiromasa Chigusa, Yasutoshi Makino, Hiroyuki Shinoda

Infrared Thermal Measurement System for Evaluating Model-Based Thermal Displays
Hsin-Ni Ho, Lynette Jones

10:00-10:15 break

10:15-11:15 Session 2A2 Modeling and Rendering I (Gunter Niemeyer and Matthias Harders)

Soft Finger Model with Adaptive Contact Geometry for Grasping and Manipulation Tasks
Matei Ciocarlie, Claire Lackner, Peter Allen

Transparent Rendering of Tool Contact with Compliant Environments
Miguel A. Otaduy, Markus Gross

An Algorithm of State-Space Precomputation Allowing Non-linear Haptic Deformation Modelling Using Finite Element Method
Igor Peterlik, Ludek Matyska

Surface Interrogation Methods for Haptic Rendering of Virtual Objects
Anusha Sridaran, Dianne Hansford, Kanav Kahol, Sethuraman Panchanathan

11:15-11:30 break

11:30-12:30 Session 2A3 Control and Dynamics II (Manuel Ferre and Yasuyoshi Yokokohji)

Capturing the Dynamics of Mechanical Knobs
Colin Swindells, Karon E. MacLean

A Haptic Knob with a Hybrid Ultrasonic Motor and Powder Clutch Actuator
Dominique Chapuis, Xavier Michel, Roger Gassert, Chee-Meng Chew, Etienne Burdet, Hannes Bleuler

Task Instruction: The Largest Influence on Human Operator Motion Control Dynamics
David Abbink

Optimal Control of a Robotic System for Human Power Enhancement
Alberto Montagner, Antonio Frisoli, Simone Marcheschi, Emilio Sanchez, Massimo Bergamasco

12:30-13:30 lunch

13:30-14:45 Session 2P1 Psychophysics II (Edouard Gentaz and Seungmoon Choi)

Frequency Analysis of the Detectability of Virtual Haptic Gratings
Steven Cholewiak, Hong Z. Tan

On the Influence of Arm Inertia and Configuration on Motion Planning of Reaching Movements in Haptic Environments
Igor Goncharenko, Mikhail Svinin, Sven Forstmann, Yutaka Kanou, Shigeyuki Hosoe

Intrinsic Hand Muscle Activation for Grasp and Horizontal Transport
Sara A. Winges, Bornali Kundu, John F. Soechting, Martha Flanders

Vibration Enhances Geometry Perception with Tactile Shape Displays
Maria Oyarzabal, Masashi Nakatani, Robert Howe

Frequency Dependence of Perceived Intensity of Steering Wheel Vibration: Effect of Grip Force
Miyuki Morioka, Michael Griffin

14:45-15:00 break

15:00-16:30 Poster Papers/Hands-on Demos/Art Gallery I (Room 101, 201,202)

16:30-17:45 Session 2P2 Haptic Systems (Martin Buss and Makoto Sato)

User Perception and Preference in Model Mediated Telemanipulation
Probal Mitra, Diana Gentry, Gunter Niemeyer

Haptic Broadcasting: Passive Haptic Interactions Using MPEG-4 BIFS
Jongeun Cha, Yongwon Seo, Yeongmi Kim, Jeha Ryu

Dynamic Video Resolution Control Based on Haptic Media in Haptic and Visual Communications
Seiji Kameyama, Yutaka Ishibashi

Effects of Translational and Gripping Force Feedback are Decoupled in a 4-Degree-of-Freedom Telemanipulator
Lawton Verner, Allison Okamura

Visio-Haptic Systems: Half-Mirrors considered Harmful
Christian Sandor, Shinji Uchiyama, Hiroyuki Yamamoto

17:45-19:00 break

19:00-21:00 banquet (inc. award ceremony) (Hotel Grand Shinonome)

March 24 Saturday (3rd day)

9:00-10:00 Keynote speaker 2 (Multi-Purpose Hall)

Tactile Interface Design: A Cognitive Neuroscience Perspective
Professor Charles Spence

10:00-11:00 Session 3A1 Applications (William Harwin and Anatole Lecuyer)

Development of a Motion Teaching System Using an Immersive Projection Display and a Haptics Interface
Mutsuki Matsumoto, Hiroaki Yano, Hiroo Iwata

Comparative Study Between Virtual Fixtures and Shared Control for Rehabilitation
Govindarajan Srimathveeravalli, Venkatraghavan Gourishankar, Kesavadas Thenkurussi

A Haptic/Acoustic Application to Allow Blind the Access to Spatial Information
Fabio De Felice, Floriana Renna, Giovanni Attolico, Arcangelo Distante

Where Are We with Haptic Visualization?
Jonathan C. Roberts, Sabrina Paneels

11:00-11:30 break

11:30-12:30 Session 3A2 Psychophysics III (Jan Weisenberger and Soledad Ballesteros)

Mechanical Impedance of the Hand Holding a Spherical Tool at Threshold and Suprathreshold Stimulation Levels
Ali Israr, Seungmoon Choi, Hong Tan

An Experimentally Verified Model of the Perceived `Coldness' of Objects
Wouter Bergmann Tiest

Texture Gradients and Perceptual Constancy under Haptic Exploration
Barry Hughes, Jin Wang, Daryan Rosic, Katie Palmer

A Visuo-Haptic Device - Telemaque - Increases Kindergarten Children's Handwriting Acquisition
Richard Palluel-Germain, Florence Bara, Anne Hillairet de Boisferon, Bernard B. Hennion , Philippe Gouagout, Edouard Gentaz

12:30-13:30 lunch

13:30-15:00 Poster Papers/Hands-on Demos/Art Gallery II (Room 101, 201,202)

15:00-16:00 Session 3P1 Modeling and Rendering II (Miguel Otaduy and Allison Okamura)

Haptic Models of an Automotive Turn-Signal Switch: Identification and Playback Results
Mark Colton, John Hollerbach

Incorporating Geometric Algorithms in Impedance- and Admittance-Type Haptic Rendering
Ryo Kikuuwe, Hideo Fujimoto

High Resolution Analysis of Impact Sounds and Forces
L-M Reissell, Dinesh Pai

Design and Psychophysical Study of Volume Compression for Haptic Rendering
Nils Jensen, Gabriel Gaus, Gabriele von Voigt, Stephan Olbrich

16:00-16:30 break

16:30-17:45 Session 3P2 Psychophysics IV (Hong Tan and Charles Spence)

Evaluation of Human Performance with Kinematic and Haptic Errors
Tomonori Yamamoto, Allison Okamura

Perceptualizing a "Haptic Edge" with Varing Stiffness Based on Force Constancy: Effect of Surface Normals
Jaeyoung Cheon, Seungmoon Choi

Finger Force Direction Recognition by Principal Component Analysis of Fingernail Coloration Pattern
Yu Sun, John Hollerbach, Stephen Mascaro

Human Performance in a Knob-Turning Task
Netta Gurari, Allison Okamura

Design of a Haptic Zoom: Levels and Steps
Mounia Ziat, Olivier Gapenne, John Stewart, Charles Lenay, Jerome Bausse

17:45-18:15 Closing

Poster Papers (Room 101)

Poster papers will be presented as posters. All of the posters for poster papers must be displayed at their designated locations on the morning of the first day of the conference. These posters will be on display throughout the conference.

Note that the presenters of Group A posters are asked to be at their posters during the second half of the poster session (15:45-16:30) on the second day of the conference and that the presenters of Group B posters are asked to be present at their posters during the first half (13:30-14:15) of the poster session on the third day of the conference.

Psychophysics

A1 **Toward Visualization of Skill in VR: Adaptive Real-Time Guidance for Learning Force Exertion through the "Shaping" Strategy**
Mikko Rissanen, Yoshihiro Kuroda, Megumi Nakao, Naoto Kume, Tomohiro Kuroda, Hiroyuki Yoshihara

B1 **Group Work about Geometrical Concepts among Blind and Sighted Pupils Using Haptic Interfaces**
Eva-Lotta Sallnas, Jonas Moll, Kerstin Severinson-Eklundh

A2 **Role of Vision on Haptic Length Perception**
Akinori Kumazaki, Kazunori Terada, Akira Ito

B2 **Tilt Perception by Constant Tactile and Constant Proprioceptive Feedback through a Human System Interface**
Franziska Freyberger, Martin Kuschel, Berthold Farber, Martin Buss, Roberta Klatzky

A3 **Discriminability of Real and Virtual Surfaces with Triangular Gratings**
Matthew Kocsis, Hong Z. Tan, Bernard D. Adelstein

B3 **The Effect of Sound on Haptic Perception**
Seung-Chan Kim, Ki-Uk Kyung, Dong-Soo Kwon

A4 **Pursuit Tracking Signals in Haptic Tracking: The Role of Shear Forces and Stimulus Predictability**
Amanda Dawson, Paul Nagelkerke, Romeo Chua, Ian Franks, David Rosenbaum

Device Design

B4 **A Novel Planar 3-DOF Hard-Soft Haptic Teleoperator**
Goran Christiansson, Erik Fritz

A5 **A Hybrid Actuation Approach for Haptic Devices**
Francois Conti, Oussama Khatib

B5 **Effects of Longitudinal Skin Stretch on the Perception of Friction**
Nicholas Sylvester, William Provancher

A6 **A Wearable 3-DOF Wire-driven Force Feedback Device**
Yo-An Lim, Yong Won Seo, Jeha Ryu

B6 **Using an Ultrasonic Transducer: Evidence for an Anisotropic Deprivation of Frictional Cues in Microtexture Perception**
Melisande Biet, Loic Boulon, Francois Martinot, Frederic Giraud, Betty Lemaire-Semail

A7 **Improvement of Shape Distinction by Kinesthetic-Tactile Integration**
Katsunari Sato, Hiroyuki Kajimoto, Naoki Kawakami, Susumu Tachi

B7 **Multi-Fingered Haptic Interface Robot Handling Plural Tool Devices**
Haruhisa Kawasaki, Tetsuya Mouri, Sho Ikenohata, Yoshio Ohtsuka, Takahiro Endo

A8 **Free-Form Tactile Sensor Using 3-Dimensional Shape Capture Sheet**
Takayuki Hoshi, Hiroyuki Shinoda

B8 **A Fingertip Haptic Display for Improving Local Perception of Shape Cues**
Massimiliano Solazzi, Antonio Frisoli, Fabio Salsedo, Massimo Bergamasco

A9 **A 2D-Motion Platform: The Cybercarpet**
Martin Schwaiger, Heinz Ulbrich, Thomas Thummel

B9 **T-PaD: Tactile Pattern Display through Variable Friction Reduction.**
Laura Winfield, John Glassmire, J. Edward Colgate, Michael Peshkin

A10 **Assessing the Efficacy of Variable Compliance Tactile Displays**
Michael Taylor, Aaron Ferber, J. Edward Colgate

B10 **Comfortable Wristband Interface Measuring Myoelectric Pattern**
Yasutoshi Makino, Hiroyuki Shinoda

A11 **Experimental Evaluation of Attachment Methods for a Multifinger Haptic Device**
Gina Donlin, Rainer Leuschke, Blake Hannaford

Control and Dynamics

B11 **General Model of Human-Robot Cooperation Using a Novel Velocity Based Variable Impedance Control**
Vincent Duchaine, Clement M. Gosselin

A12 **Widening 6-DOF Haptic Devices Workspace with an Additional Degree of Freedom**
Florian Gosselin, Claude Andriot, Florian Bergez, Xavier Merlhiot

B12 **Accurate Haptic Teleoperation on Soft Tissues through Slave Friction Compensation by Impedance Reflection**
Pauwel Goethals, Gudrun De Gersem, Mauro Sette, Dominiek Reynaerts, Hendrik Van Brussel

A13 **High Performance Explicit Force Control for Finger Interaction Haptic Interface**
Marco Fontana, Fabio Salsedo, Simone Marcheschi, Federico Tarri, Otniel Rodriguez-Portillo, Massimo Bergamasco

B13 **Enhancing Transparency of a Position-Exchange Teleoperator**
Mohsen Mahvash, Allison Okamura

A14 **Development of a Whole-Sensitive Teleoperated Robot Arm Using Torque Sensing Technique**
Dzmitry Tsetserukou, Riichiro Tadakuma, Hiroyuki Kajimoto, Naoki Kawakami, Susumu Tachi

B14 **A Novel Haptic Interface for Navigation in Large Volume Environments**
Thomas Smith, Alistair Barrow, Russel Barrow, William Harwin

A15 **Development of a String-Based Haptic Interface by Using a Hybrid Control Approach**
Rasul Fesharakifard, Laure Leroy, Philippe Fuchs

B15 **HapStick: A High Fidelty Haptic Simulation for Billiards**
Venkatraghavan Gourishankar, Govindarajan Srimathveeravalli, Kesavadas Thenkurussi

Modeling, Rendering and Applications

A16 **Fast and High Precision Volume Haptics**
Karljohan Lundin Palmerius

B16 **Fast Rendering for a Multifinger Haptic Display**
Blake Hannaford, Rainer Leuschke

A17 **Haptic Rendering on Point Set Surfaces**
Jae-Kyu Lee, Young J. Kim

B17 **Force Feedback is Noticeably Different for Linear versus Nonlinear Elastic Tissue Models**
Sarthak Misra, Allison M. Okamura, K. T. Ramesh

A18 **Construction of Training Environment for Surgical Exclusion with a Basic Study of Multi-finger Haptic Interaction**
Yoshihiro Kuroda, Makoto Hirai, Megumi Nakao, Toshihiko Sato, Tomohiro Kuroda, Yasushi Masuda, Osamu Oshiro

B18 **conTACT ‼ A Vibrotactile Display for Computer Aided Surgery**
Andreas Hein, Melina Brell

A19 **Time-Based Haptic Analysis of Protein Dynamics**
Katrin Bidmon, Guido Reina, Fabian Boes, Juergen Pleiss, Thomas Ertl

B19 **A Modular Software Haptic Interface for Teleoperated Nanomanipulation and AFM Probe Based Characterization of Carbon Nanotubes**
Atanas Dobrinov, Volkmar Eichhorn

A20 **Discrepancy Method for Operation Feel Display Using Body Image Illusion**
Hiromi Mochiyama, Akihito Sano, Naoyuki Takesue, Hideo Fujimoto

Sketches (Room 101)

Sketches will be presented as posters. All sketch posters must be displayed at their designated locations on the morning of the first day. Although the sketch poster session is only on the first day of the conference, these posters will be on display throughout the conference.

Psychophysics

S1 **The Effect of Weight on the Perception of Vibrotactile Intensity with Handheld Devices**
Hsin-Yun Yao, Vincent Hayward, Manuel Cruz, Danny Grant

S2 **Haptic and Visual Working Memory in Young Adults, Healthy Older Adults, and Mild Cognitive Impairment Adults**
Susana Paz, Julia Mayas, Soledad Ballesteros

S3 **Dynamic Perceptual Maps - A Psychophysical Approach to Spatiotemporal Interactions and Plasticity in Body Perception**
Rupert Holzl, Jorg Trojan, Dieter Kleinbohl

S4 **An Eyetracker Study of the Haptic Cuing of Visual Attention**
Chanon M. Jones, J. Jay Young, Rob Gray, Charles Spence, Hong Z. Tan

S5 **Can A Narrow Field of View Explain the Extremely Small Amount of Tactile Memory During Tactile Search for Change?**
Takako Yoshida, Yuki Miyazaki, Kenji Yokoi, Hiromi Wake, Tenji Wake

S6 **Quantifying the Value of Visual and Haptic Position Feedback During Force-Based Motion Control**
Katherine J. Kuchenbecker, Netta Gurari, Allison M. Okamura

S7 **A Multidimensional Scaling Analysis of Texture Gradient Perception via Haptic Exploration**
Barry Hughes, Kirstin Shields

S8 **Sensory Property in the Fusion of Visual/Haptic Cues by Using Mixed Reality**
Morio Nakahara, Yuichi Ohta, Itaru Kitahara

S9 **Active vs. Passive Touch: The State of Play and the Future**
Mark Symmons, Barry Richardson, Dianne Wuillemin

S10 **Towards Just Noticeable Differences for Natural Frequency of Manually Excited Virtual Dynamic Systems**
Yanfang Li, Volkan Patoglu, Deborah Huang, Marcia O'Malley

S11 **Combining Proprioception and Tactile Information in a Haptic Search Task**
Krista E. Overvliet, Jeroen B.J. Smeets, Eli Brenner

S12 **The Effect of a Distracter Task on the Recognition of Tactile Icons**
Ian Oakley, Junseok Park

S13 **Haptic Roughness Perception of Linear Gratings via Bare Finger or Rigid Probe**
Ryo Kitada, Michael Lawrence, Roberta Klatzky, Susan Lederman

S14 **Proprioceptive Dominance in Visuotactile Spatial Compatibility**
Yuka Igarashi, Norimichi Kitagawa

Device Design

S15 **Hand-held Force Display with Spring-Cam Mechanism for Generating Asymmetric Acceleration**
Tomohiro Amemiya, Hideyuki Ando, Taro Maeda

S16 **Tactile Vocabulary for Tactile Displays**
Lynette Jones, Jacquelyn Kunkel, Edgar Torres

S17 **A Hand-held Display Presenting Visual and Force Information**
Hidenori Kuribayashi, Shoko Nakamura, Yuichiro Kume

S18 **Development of Quantitative Tactile Display Device to Provide Both Pin-Array-Type Tactile Feedback and Thermal Feedback**
Gi-Hun Yang, Ki-Uk Kyung, Mandayam Srinivasan, Dong-Soo Kwon

S19 **Implementing Compact Tactile Display for Fingertips with Multiple Vibrotactile Actuator and Thermoelectric Module**
Tae-Heon Yang, Gi-Hun Yang, Dong-Soo Kwon, Sung-Chul Kang

S20 **Development of Fingertip Type Non-grounding Force Feedback Display**
Norio Nakamura, Yukio Fukui

S21 **Producing Softness Sensation on an Electrostatic Texture Display for Rendering Diverse Tactile Feelings**
Hideaki Yokota, Akio Yamamoto, Hiroaki Yamamoto, Toshiro Higuchi

S22 **Piezoelectric Ultrasonic Actuator for a Haptic Display for Catheterisation**
Stephanie Klages, Thorsten A. Kern, Thorsten Meiss, Roland Werthschuezky

Rendering and Applications

S23 **GPU-Based Distance Map Calculation for Vector Field Haptic Rendering**
Alexander Barlit, Matthias Harders

S24 **Accelerated Proximity Queries for Haptic Rendering of Deformable Models**
Nico Galoppo, Miguel A. Otaduy, Paul Mecklenburg, Markus Gross, Ming C. Lin

S25 **A Viscoelastic Soft Tissue Model for Haptic Surgical Simulation**
Iman Brouwer, Vincent Mora, Denis Laroche

S26 **Roughness Feeling Telepresence System with Communication Time-Delay**
Shogo Okamoto, Masashi Konyo, Takashi Maeno, Satoshi Tadokoro

S27 **Closed Loop Stability Analysis of an Assistance System for Catheterization**
Thorsten A. Kern, Stephanie Klages, Thorsten Meis , Roland Werthschutzky

S28 **Transfer Method of Force Information Using Five-Fingered Haptic Interface Robot**
Takahiro Endo, Haruhisa Kawasaki, Kazushige Kigaku, Tetsuya Mouri

S29 **The Effect of Virtual Haptic Training on Real Surgical Drilling Proficiency**
Christopher Sewell, Nikolas Blevins, Sumanth Peddamatham, Hong Tan, Dan Morris, Kenneth Salisbury

S30 **Experiments in Planar Haptic Contour Exploration**
Kee-Yip Chan, Kelly Kitagawa, Roberto Manduchi

Hands-on Demos **(Room 202)**

HOD1 **Haptic Devices for Endoscopic Surgery Training Simulator**
Takafumi Terada, Masato Ogata, Takaaki Kikukawa, Shin Hongo , Manabu Nagasaka , Kentaro Takanami , Kagenori Kajihara, Masaru Fujino

HOD2 **Hands-On Demo of Direct Manipulation by Tactile Modality for Blind Computer Users**
Shigenobu Shimada, Masami Shinohara , Yutaka Shimizu , Makoto Shimojo

HOD3 **An Impulsive Haptic Interface to Render a Rigid Virtual World**
Emmanuel Vander Poorten, Yasuyoshi Yokokohji

HOD4 **Tactos: a sensory substitution device for an active perception**
Mounia Ziat, Olivier Gapenne , Charles Lenay , John Stewart, Dominique Aubert

HOD5 **Comparing Visual and Haptic Position Feedback**
Katherine Kuchenbecker, Netta Gurari , Allison M. Okamura

HOD6 **Demonstration of Transfer Method of Force Information using Five-Fingered Haptic Interface Robot**
Takahiro Endo, Haruhisa Kawasaki, Kazushige Kigaku , Tetsuya Mouri

HOD7 **Interactive Physics Simulation with 6-DoF Haptics for Industrial Engineering and Design Applications**
Jerome Perret

HOD8 **New 3D to 9D haptic device**
Axel Blonski

HOD9 **Glass Substrate Surface Acoustic Wave Tactile Display**
Hiroyuki Kotani, Masaya Takasaki , Takeshi Mizuno

HOD10 **Bimanual Haptic Tracking Demonstration Project**
Amanda Dawson, Paul Nagelkerke, Romeo Chua, Ian Franks, David Rosenbaum

HOD11 **TPaD: Tactile Pattern Display through Variable Friction Reduction**
Laura Winfield, Michael Peshkin, J. Edward Colgate

HOD12 **PALMbit: An Interface using Own Palms**
Goshiro Yamamoto, Kosuke Sato

HOD13 **A Proximity Sensor Network System Measuring a Center Position of Approaching Object**
Seiji Amamoto, Masatoshi Ishikawa, Makoto Shimojo

HOD14 **Expanding Haptic Display Z-Width Using Analog Damping**
David Weir, Michael Peshkin, J. Edward Colgate

HOD15 **The V-GRAPH Collision Detection Framework**
Maurizio De Pascale, Domenico Prattichizzo

HOD16 **ThermoEnhancer: A Glove Enhancing Thermoesthesia**
Yuki Iwanaka, Kosuke Sato

HOD17 **Multi-finger haptic interaction and stress visualization for surgical training**
Yoshihiro Kuroda, Makoto Hirai, Makoto Hirai, Toshihiko Sato, Tomohiro Kuroda, Yasushi Masuda, Osamu Oshiro

HOD18 **High Resolution Tactile Display**
Masashi Nakatani, Hideyuki Ando, Junji Watanabe, Naoki Kawakami , Susumu Tachi

HOD19 **Information Display Using Thermal Sensation**
Masamichi Sakaguchi, Satoru Yokoi , Jumpei Arata, Hideo Fujimoto

Art Gallery (Room 201)

ART1 **ANOMAROCARIS**
Hiroo Iwata, Hiroaki Yano, Ryota Ishikawa

ART2 **Aesthetic Touch**
Rosalyn Driscoll

ART3 **Conspiratio: A novel installation which presents the sensation of drinking**
Yuki Hashimoto, Naohisa Nagaya, Minoru Kojima , Satoru Miyajima, Junichiro Ohtaki, Akio Yamamoto, Tomoyasu Mitani, Masahiko Inami ,

ART4 **Haptic-enhanced Drawing**
Junji Watanabe

ART5 **Creation of Virtual Creatures with Sense of Existence in the Real World "Kobito -Virtual Brownies-"**
Takafumi Aoki, Hironori Mitake, Kazuyuki Asano , Takatsugu Kuriyama, Takashi Toyama , Shoichi Hasegawa, Makoto Sato

ART6 **An accessible bas-relief interpertation of W. A. Bouguereau's painting "Idylle Enfantine"**
Ann Cunningham

ART7 **Thermoesthesia**
Kumiko Kushiyama, Shinji Sasada

ART8 **ELDONIA**
Hiroo Iwata, Hiroaki Yano, Yosuke Nakajima

ART9 **Topobo**
Hiroshi Ishii, Hayes Raffle, Amanda Parkes

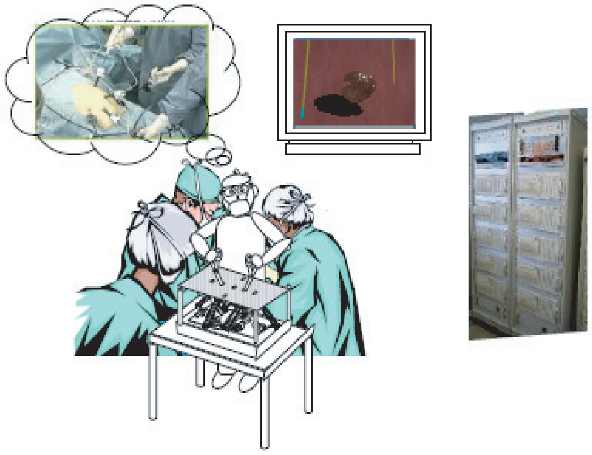
ART10 **Video Kiosk on TMG**
Hiroshi Ishii

HOD01

Haptic Devices for Endoscopic Surgery Training Simulator

T. Terada, M. Ogata, T. Kikukawa, S. Hongo, M. Nagasaka, K. Takanami, K. Kajihara, M. Fujino
Mitsubishi Precision Co.,Ltd.

We have been developing a haptic device for a endoscopic surgery training simulator. This system is composed of two 3-DOF haptic devices and a control board with USB2.0 interface. Theis system is connected to a host computer through Ethernet. Two medical operational tools are connected to haptic devices each through holes on the virtual body, and the operator is able to feel the sense of touch with virtual organs.



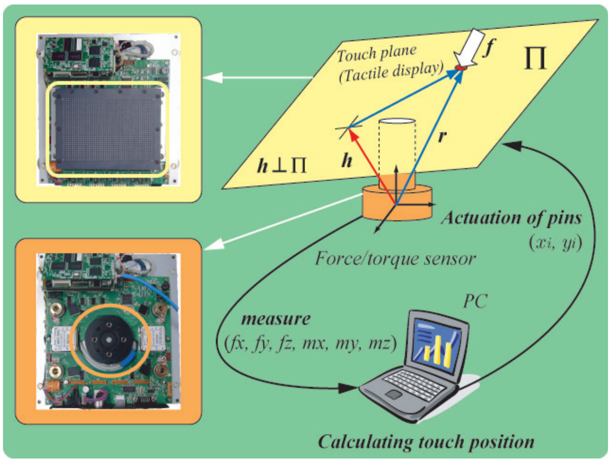
Contact: tterada@mpcnet.co.jp

HOD02

Hands-On Demo of Direct Manipulation by Tactile Modality for Blind Computer Users

Shigenobu Shimada, Masami Shinohara, Yutaka Shimizu, Makoto Shimojo
Tokyo Metropolitan Industrial Technology Research Institute

A basic device combining a tactile display function and a touch position/force direction sensing function is proposed. The trial device consists of two major components, a tactile graphic display and a six-axis force/torque sensor. The force sensor measures six dynamic values generated by touch action on the display surface and a PC estimates the point based on the data. The tactile display is fixed on a solid plate connected firmly with the force sensor in the load center of display component. The fundamental function for achieving the bidirectional communication is to detect the location where user is touching a tangible surface, so we investigated a new method to detect the finger locus. By applying this functions, the click and scroll function by an empty hand were realized.



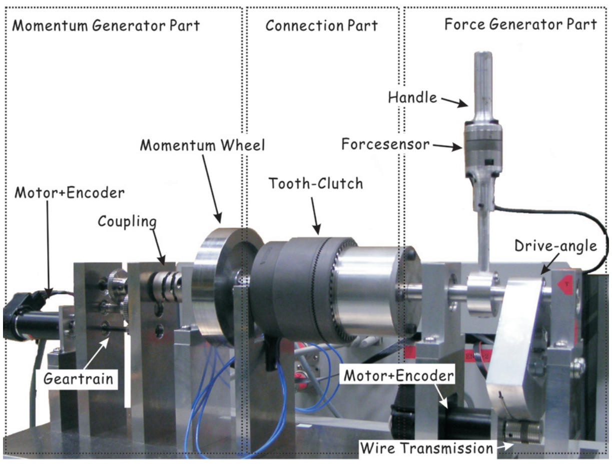
Contact: shimada.shigenobu@iri-tokyo.jp

HOD03

An Impulsive Haptic Interface to Render a Rigid Virtual World

Emmanuel Vander Poorten and Yasuyoshi Yokokohji
Department of Mechanical Engineering and Science, Kyoto University, Japan

We people are all about interaction. Interaction with other people or with objects. Most of the interactions with objects concern rigid objects. Their manipulation is easy to understand and feels natural to us. However, current haptic displays fail to represent rigid objects realistically. The main reason is that they cannot realize a sufficiently high force peak to cancel the operator's momentum upon impact with the virtual object. In this demo the first haptic display capable of applying directly impulses to its operator is presented. The device stores momentum in a momentum wheel proportional to the user's velocity. This momentum is transmitted instantaneously to the user at the predicted instant of impact, by engaging an electromagnetically clutch. A crisp impact is realized.



Contact: manuvdp@manuvdp.mbox.media.kyoto-u.ac.jp

HOD04

Tactos: a sensory substitution device for an active perception

Mounia Ziat, Olivier Gapenne, Charles Lenay, John Stewart & Dominique Aubert

University of Technology of Compiegne

This demo presents a sensory substitution device called Tactos which allows the perception a 2D graphical shapes displayed on a computer screen by using a tactile feedback combined with the subject's exploratory movement in order to construct and perceive the shape.

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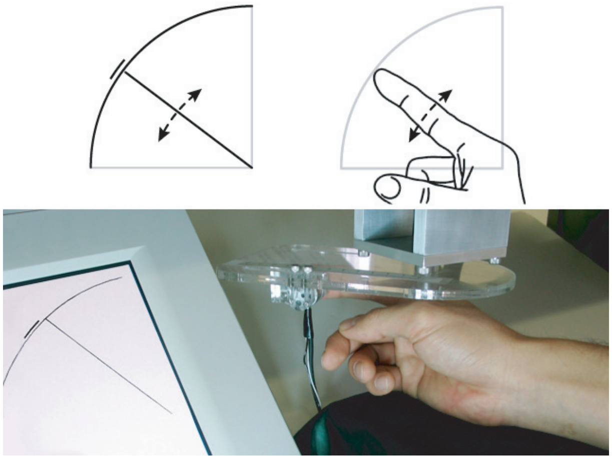
HOD05

Comparing Visual and Haptic Position Feedback

Katherine J. Kuchenbecker, Netta Gurari, and Allison M. Okamura

Haptic Exploration Lab, Johns Hopkins University, United States

Users cannot precisely control the motion of a prosthetic or remote robot arm without some method of observing its movement. Complementing sketch S6, this demonstration lets participants directly compare the usefulness of visual and haptic position feedback during force-based control of a virtual finger. Participants will interact with our custom one-degree-of-freedom haptic interface using their right index finger, attempting to point a virtual finger at a target zone shown on the computer monitor. Participants will perform several repetitions of this targeting task under two conditions: visual feedback of the proxy's motion (seen on the monitor) and haptic feedback (felt through their finger). After interacting with the demo, participants will be able to vote for their preferred feedback type.



Contact: kuchenbecker@seas.upenn.edu

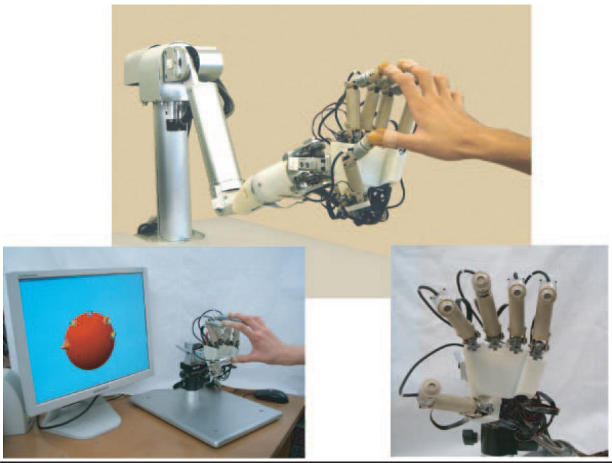
HOD06

Demonstration of Transfer Method of Force Information using Five-Fingered Haptic Interface Robot

Takahiro Endo, Haruhisa Kawasaki, Kazushige Kigaku and Tetsuya Mouri

Gifu University, Japan

A five-fingered haptic interface robot called HIRO II which can present the sense of touch on the fingertips is exhibited. The robot is placed opposite to the human hand and it presents haptic feeling in wide operation space as well as provides the sense of security. In the demo, we present a force transfer method and a developed skill transfer system. Furthermore, thorough this demo, we demonstrate the haptic rendering of the frictional force by using the HIRO II.



Contact: tendo@gifu-u.ac.jp

HOD07

Interactive Physics Simulation with 6-DoF Haptics for Industrial Engineering and Design Applications

Pierre Vercruysse

Haption

We present a Haptic device from the Virtuose family with a complete interface with the CAD software Catia V5. We demonstrate the applications of haptics for engineering: assembly/disassembly validation, ergonomic analysis, maintenance training. Our solutions are now in use by several automotive and aerospace companies.

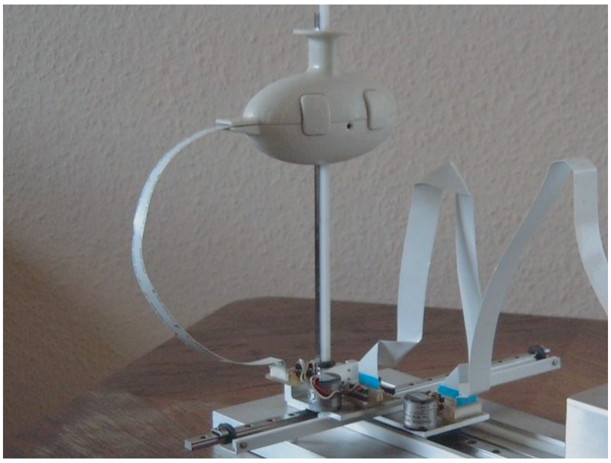
Contact: pierre.vercruysse@haption.com

HOD08

New 3D to 9D haptic device

Axel Blonski

A new computer input and haptic device may influence various computer software architectures of the future. The God- given skills of arm movement positioning the hand from biceps and shoulder muscles and in addition the imagination of everyday`s objects 3D location can be used in a special input device: a hand grasp with added two mouse click buttons on top of a new shift device can move arbitrarily through a cube space gently and if released, remains exactly where it is. The workspace can be mapped linearly for 3D content navigation. Trackball in the handle, scroll wheel, force feedback, incremental dimensions can further enhance the tool. The friction can be reduced down to very sensitive precise positioning.



Contact: blonskiburo@gmx.de

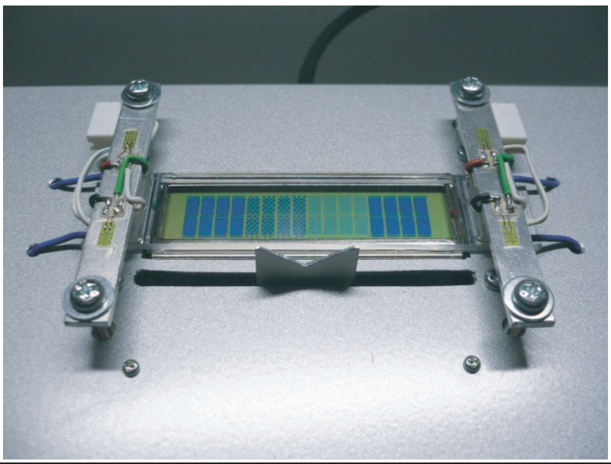
HOD09

Glass Substrate Surface Acoustic Wave Tactile Display

Hiroyuki Kotani, Masaya Takasaki, Takeshi Mizuno

Saitama University, Japan

A novel method to provide human tactile sensation using surface acoustic wave (SAW) was proposed. A stator transducer material (piezoelectric material) of a SAW tactile display, however, had constraint of size and shape. To solve this problem, a glass substrate SAW tactile display is proposed to excite and propagate SAW on a non-piezoelectric material surface. Additionally, installation of a glass transducer on an LCD to indicate tactile sensation with visual information is suggested.



Contact: hktn121@mech.saitama-u.ac.jp
masaya@mech.saitama-u.ac.jp

HOD10

Bimanual Haptic Tracking Demonstration Project

Paul Nagelkerke (1), Amanda Dawson (2), Romeo Chua (1), Ian Franks (1), David Rosenbaum (2)

(1) University of British Columbia (2) Moss Rehabilitation Research Institute (3) Pennsylvania State University

This demonstration project will allow participants to haptically track with both arms under conditions similar to those experienced by experiment participants in submission #132, Pursuit Tracking Signals in Haptic Tracking. A pair of computer-controlled robotic systems enable the 2D movement of magnets along a glass surface in either correlated or uncorrelated patterns in relation to one another. On top of the magnets are thin film force sensors sensitive to vertical pressure. Participants in the experiment are asked to follow the surface magnets by virtue of light touch (up to 0.3744 N or 0.0841 pound force. Participants can try making many "impossible" bimanual movements, such as 90-degree out-of-phase movements and different between-hand velocity movements, by virtue of haptically tracking.

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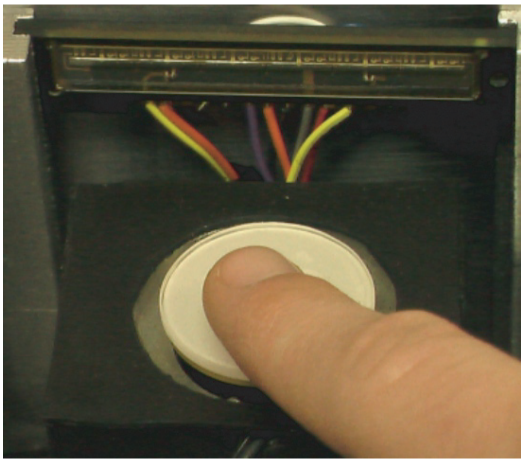
HOD11

TPaD: Tactile Pattern Display through Variable Friction Reduction

Laura Winfield, J. Edward Colgate, Michael Peshkin, John Glassmire

Northwestern University

This demonstration illustrates the effectiveness of the TPaD, Tactile Pattern Display, in creating compelling illusions of texture, and useful haptic feedback for virtual controls. Further discussion on the TPaD is provided in the poster paper "TPaD: Tactile Pattern Display Through Variable Friction Reduction." The TPaD is a novel haptic field display for creating texture sensations through variations in surface friction. Varying the surface friction between the finger and the haptic interface is a way of indirectly controlling shear forces on the finger during active exploration. In this demonstration we show several texture sensations which can be created on the TPaD, including smooth bumps, fish scales, and rough sandpaper. We also demonstrate the effectiveness of the TPaD as a means of feedback for virtual controls.



Contact: l-winfield@northwestern.edu

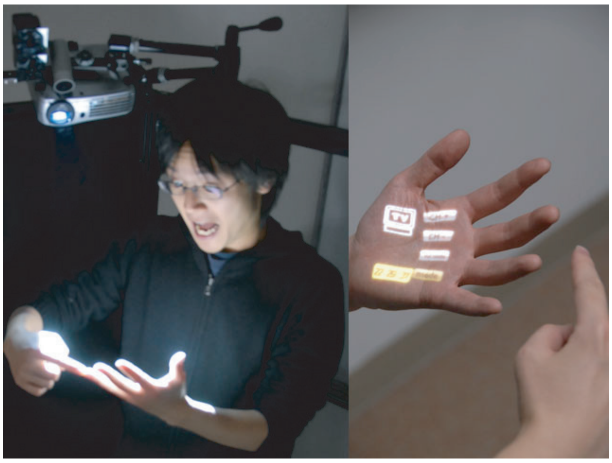
HOD12

PALMbit : An Interface using Own Palms

Goshiro Yamamoto, Kosuke Sato

Graduate School of Engineering Science, Osaka University, Japan

The PALMbit, which has a haptic feedback with user's palms, provides natural operations without hand-worn nor device-grasping by utilizing palms as an I/O interface. The operation and information display on the palm are realized with a camera and a tracking projector. PALMbit recognizes actions of fingertip-to-fingertip contact as input operation. The user is able to operate intuitively according to one's own mental body image and the natural haptic feedback. A man has not only his/her physical body, but also own mental body image and superior sensoriums. In this research, a user interface has been designed in view of these features. Applications, an image viewer and a controller of appliances, demonstrate intuitive hand operations without special gloves.



Contact: goshiro@sens.sys.es.osaka-u.ac.jp

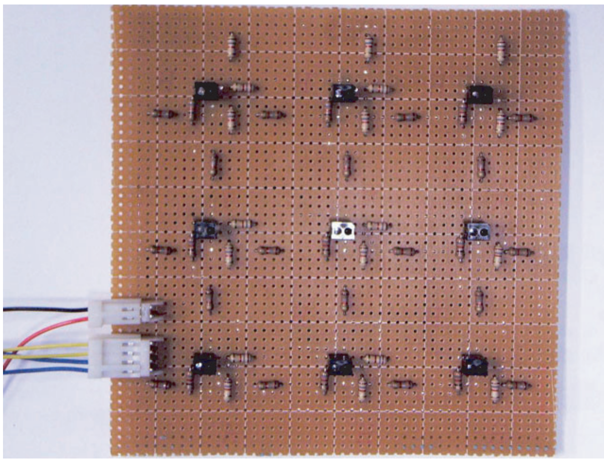
HOD13

A Proximity Sensor Network System Measuring a Center Position ofApproaching Object

Seiji Amamoto(*) , Makoto Shimojo(*) and Masatoshi Ishikawa(**)

University of Electro-Communications, Japan (*)University of Tokyo, Japan (**)

A proximity sensor network system has been developed in this study. It can detect the center of an object as well as the distance to the object. In addition, the sensor can be attached to a free-form surface and requires only six wires. Moreover, it has high-speed response characteristics because it's consisted of analog circuits. In this paper, the theory of the sensor is shown and the characteristics of the sensor are verified with a prototype.



Contact: Seiji Amamoto:amamoto@rm.mce.uec.ac.jp
Makoto Shimojo:shimojo@mce.uec.ac.jp

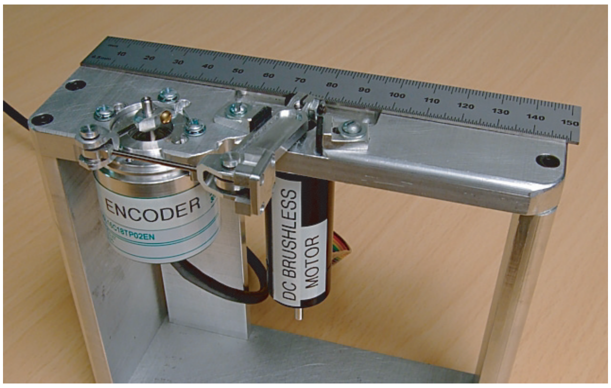
HOD14

Expanding Haptic Display Z-Width Using Analog Damping

David W. Weir, Michael A. Peshkin, J. Edward Colgate

Northwestern University, Laboratory for Intelligent Mechanical Systems, Department of Mechanical Engineering
Evanston, Illinois, USA

This demonstration illustrates the use of analog electrical damping to increase the Z-width of a haptic display. The dynamic range of impedances that can be stably rendered is termed Z-width and is a measure of quality. The maximum attainable Z-width for a given sampling rate depends on the physical damping present in the mechanism: greater physical damping allows a greater Z-width.
We use analog circuitry to provide physical damping on the electrical side of the motor, instead of utilizing a mechanical damper. The analog circuitry in the linear current amplifier is designed to estimate back EMF, proportional to velocity, generated by the motor windings. This signal is fed back to the current controller to add physical damping to the system.



Contact: d-weir@northwestern.edu, peshkin@northwestern.edu, colgate@northwestern.edu

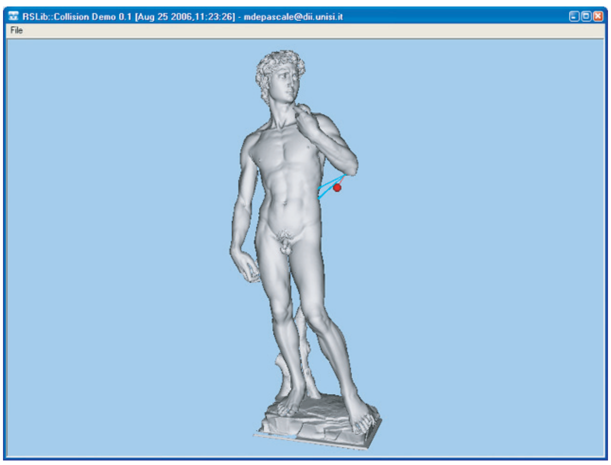
HOD15

The V-GRAPH Framework - Bounded-Time Collision Detection for Haptics

Maurizio de Pascale, Gianluca de Pascale, Domenico Prattichizzo

SIRSLab - Robotics and Systems Lab, University of Siena

The V-GRAPH is a framework for collision detection specifically targeted at point-like haptic interactions with multi-million meshes such as those commonly used in virtual museum applications. The core algorithm is able to perform runtime proximity queries in bounded-time, as low as few microseconds per cycle on common personal computers, independently from the number of primitives composing the mesh. This demo application has been developed to shows off the performance of the framework. It allows the user to haptically explore models of 3D scanned statues. Additional info can be found at
http://sirslab.dii.unisi.it/research/haptic/projects/v-graph/



Contact: mdepascale@dii.unisi.it

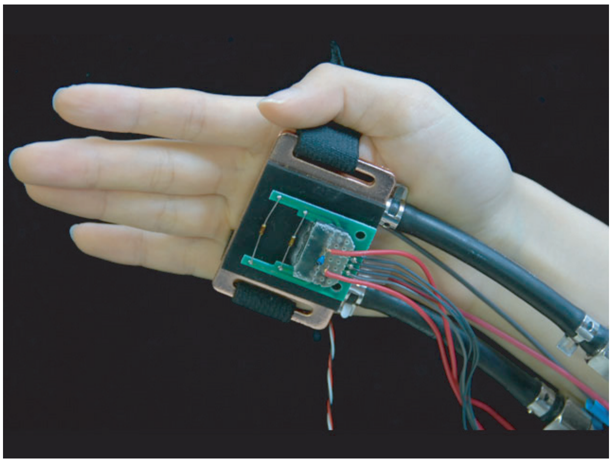
HOD16

ThermoEnhancer: A Glove Enhancing Thermoesthesia

Yuki Iwanaka, Kosuke Sato

Graduate School of Engineering Science, Osaka University, Japan

We propose the technique of augmenting human thermal sensing ability beyond the usual psychological limit. We construct a glove type augmenting system, ThermoEnhancer. When a user wearing the system touches an object, its temperature information obtained by a temperature sensor is amplified and displayed to the user's palm using a Peltier heat/cool device embedded in the system. In the demonstration, users wear ThermoEnhancer and touch various kinds of objects around them including their own bodies, then feel temperatures augmented. As a result, the users can perceive a weaker thermal stimulation and a tiny temperature change.We believe that thermo enhancement is one of promising fields in haptic interface."



Contact: yuki@sens.sys.es.osaka-u.ac.jp

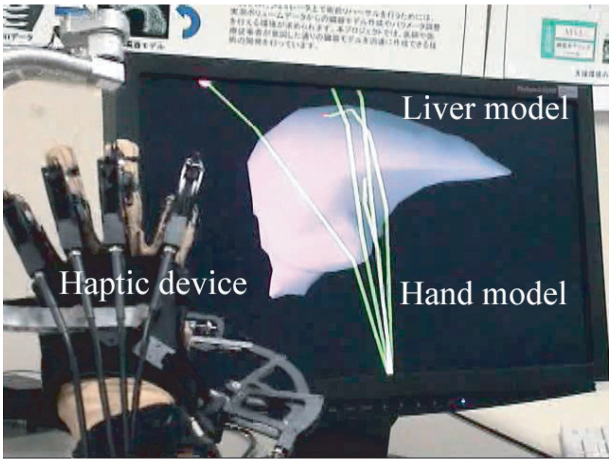
HOD17

Multi-finger haptic interaction and stress visualization for surgical training

Y. Kuroda(1), M. Hirai(2), M. Nakao(3), T. Sato(4), T. Kuroda(5), Y. Masuda(1), O. Oshiro(1)

(1) Graduate School of Engineering Science, Osaka University, Japan
(2) Production Systems Research Laboratory, Kobe Steel, Ltd., Japan
(3) Graduate School of Information Science, NAIST, Japan
(4) Institute for Frontier Medical Sciences, Kyoto University, Japan
(5) Department of Medical Informatics, Kyoto University Hospital, Japan

We propose an organ exclusion training simulator with multi-finger haptic device and stress visualization. The method was applied to surgical exclusion which is an important manipulation of pushing aside organ to make a hidden tissue visible or to enlarge workspace. The system equips FEM-based soft tissue deformation and CyberForce haptic device. Real-time simulation was achieved with a prototype system and training trial suggested the effectiveness of the visualization for the training.



Contact: ykuroda@bpe.es.osaka-u.ac.jp

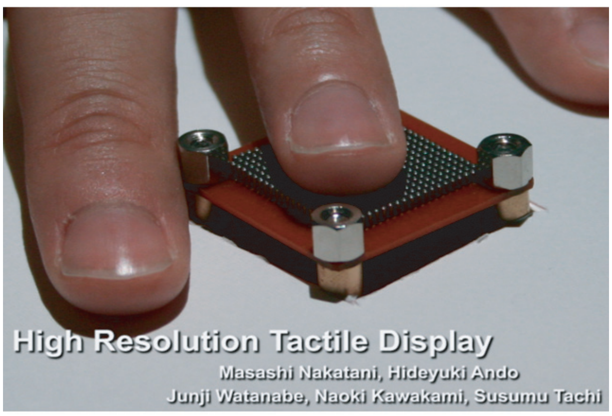
HOD18

High Resolution Tactile Display

Masashi Nakatani(1), Hideyuki Ando(2), Junji Watanabe(2), Naoki Kawakami(1) and Susumu(1) Tachi

(1): The University of Tokyo, (2): NTT Communication Science Laboratories

We proposed a tactile display which can present the sense of presence and movement of an object. To develop the display, we chose to use a pin-matrix type tactile display (composed of steel pins 0.8 mm in diameter with 1.0 mm center-to-center spacing) whose tactors move only in the vertical direction. The vertical indentation was decided to be suitable for this application, because it can achieve high spatial resolution of the contactors. There are four advantages of adapting a passive pin matrix as follows: 1. Ease to change the resolution, 2. Simple actuation mechanism, 3. Durability and 4. Scalability. The method we propose is really easy to increase or decrease the number of pin-rods according to the application.



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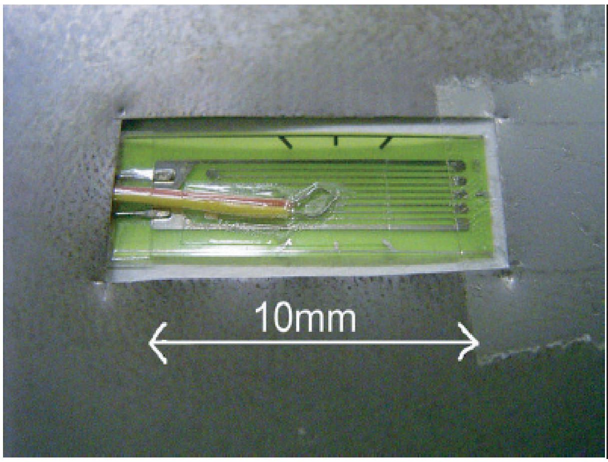
HOD19

Information Display Using Thermal Sensation

Masamichi Sakaguchi, Satoru Yokoi, Jumpei Arata, Hideo Fujimoto

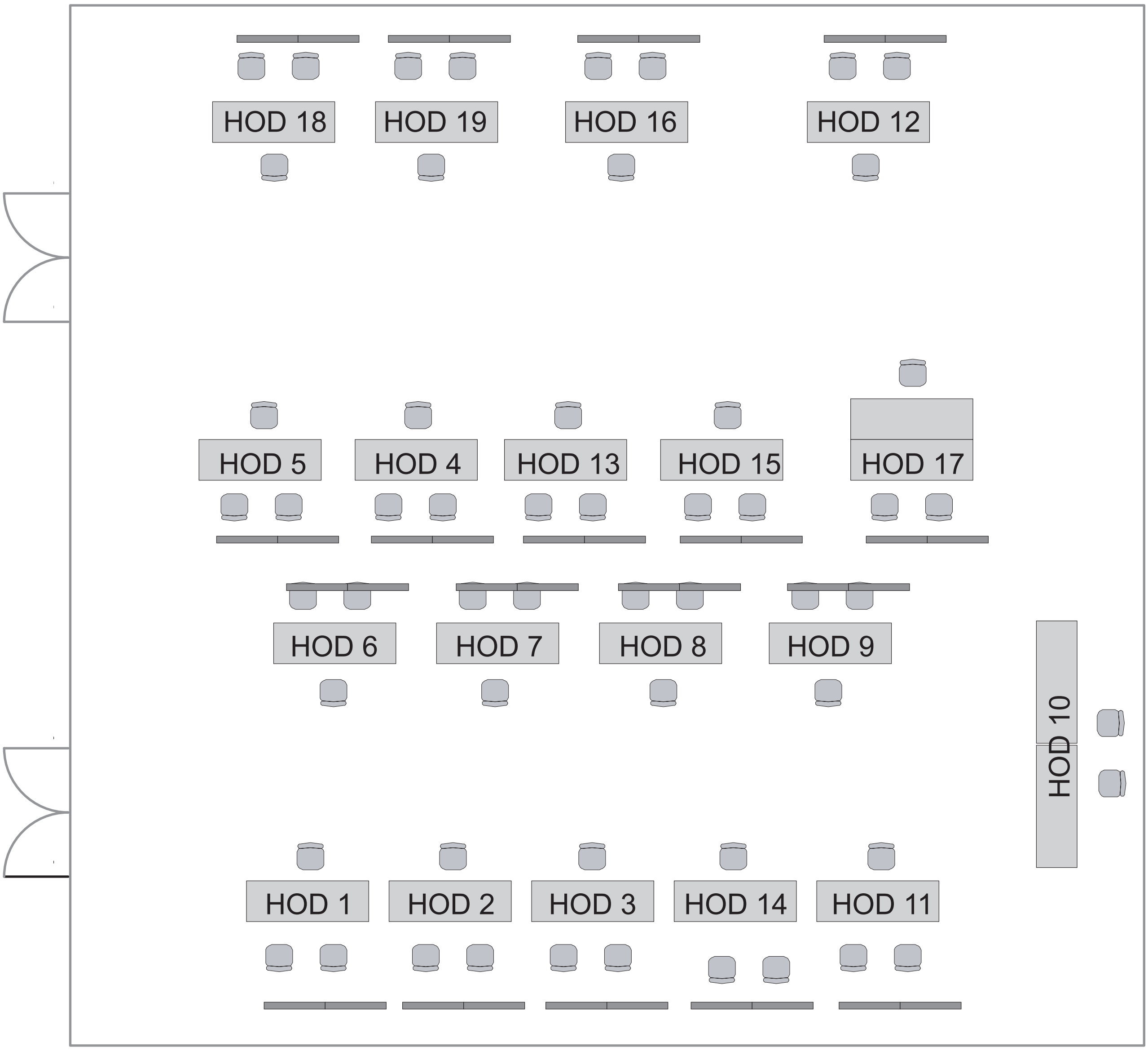
Nagoya Institute of Technology, Japan

Thermal sense is a kind of tactile sense and is very familiar feeling. The purpose of this study is application to the human interface of thermal sense. In order to display the functional information continuously using temperature, it is important to develop the fast response thermal display. In this study, the display which can present consecutive temperature change is developed by using the thin heater and high response thermocouple. We present fast temperature change to the fingertip.



Contact: saka@nitech.ac.jp

Hands-on Demos (Room 202)



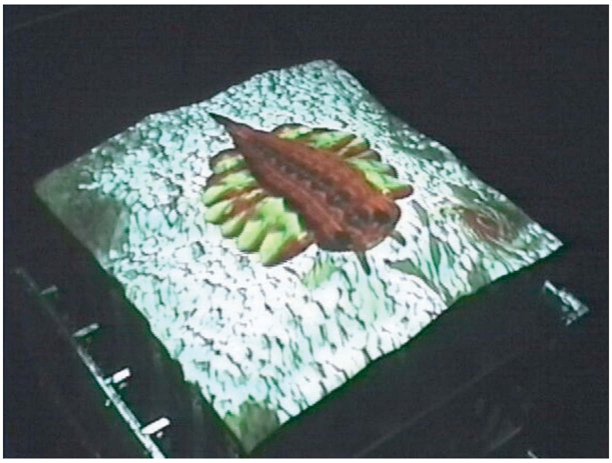
ART01

ANOMALOCARIS

Hiroo Iwata, Hiroaki Yano, Ryota Ishikawa

Graduate School of Systems and Information Engineering,University of Tsukuba,Tsukuba, 305-8573 Japan

"ANOMALOCARIS" is an interactive work which represents virtual creature through haptic and visual sensation. Anomarocari is a name of a crab-like creature that supposed to live during the Cambrian Era. Virtual anomalocaris is displayed using the "FEELEX" technology. The FEELEX employs an elastic surface made of cloth. Actuators are set underneath the surface. Image of the creature is projected on to the surface. A prop of the creature is attached on the top of the 6DOF haptic interface, which moves correspondent with the image of the creature. It pushes up the screen so that the participant can directly touch the image and feels its rigidity. The prop detects force applied by the participant. If he/she pushes the virtual anomorocaris, it gets angry and struggles.



Contact: iwata@kz.tsukuba.ac.jp

ART02

Aesthetic Touch: Haptics in the Visual Arts

Rosalyn Driscoll

Visual/haptic artist, Independent scholar

I have been integrating haptics into my artwork for fifteen years, both in my own creative process and in the viewer's. This way of working allows me to explore the nature of touch; investigate the relationship between sight and touch; expand the aesthetic experience; multiply the sources of meaning; ground the aesthetic experience in the body; and draw attention to perception itself. People who touch my sculptures often feel a stronger connection with the artwork and new awareness of their perceptual processes. Haptic art reveals the subjective dimensions of touch, complementing objective, scientific knowledge and enriching our understanding of haptic phenomena. I have written a manuscript, Whole Body Seeing, which proposes a theoretical basis for aesthetic touch.

Contact: rd@rosalyndriscoll.com

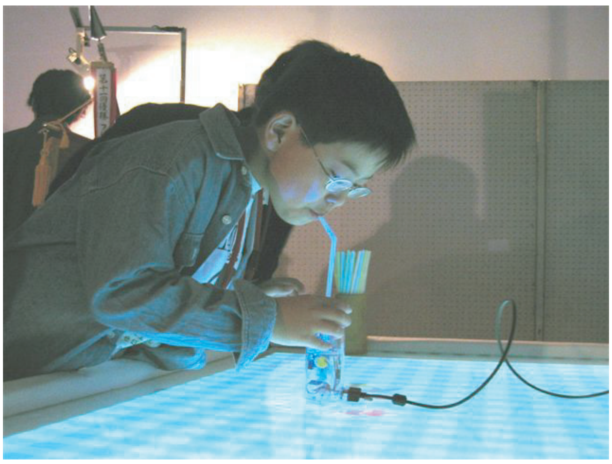
ART03

Conspiratio

Y. Hashimoto, N. Nagaya, M. Kojima, S. Miyajima, J. Ohtaki, A. Yamamoto, T. Mitani and M. Inami

The University of Electro-Communications, Japan

Conspiratio is a novel installation that allows us to virtually experience the sensations of drinking. These sensations are created based on referencing sample data of actual pressure, vibration and sound produced by drinking from an ordinary straw attached to the system. This project of presenting virtual drinking sensations to mouth and lips is the first in the world to have been attempted, and comes with high academic expectations. Moreover, due to the high sensitivity of the mouth and lips when used as a sensor, it is possible to develop many unique interfaces and so this could facilitate an extension of research fields in both interactive arts and entertainment.



Contact: sui@hi.mce.uec.ac.jp

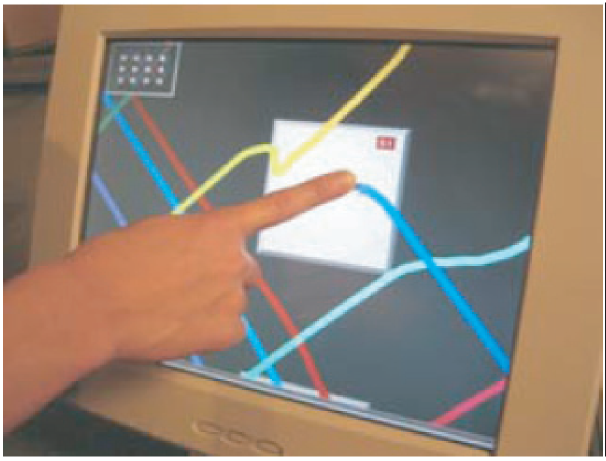
ART04

Haptic-enhanced Drawing

Junji Watanabe, Eisuke Kusachi

PRESTO Japan Science & Technology Agency / NTT Communication Science Laboratories

This exhibition introduces a novel drawing environment that runs on a PC and is implemented with JAVA language. In this environment, the canvas automatically moves and the user can draw pictures while feeling haptic responses. The user can draw pictures even when the canvas is moving. Thus, the moving function can generate unexpected pictures. In addition, haptic interaction with the canvas is achieved without any haptic interface by only changing the speed of canvas movement. Using this environment, all people even children can have enjoyable experiences of drawing, as this environment invites the users to realize the role of haptics in drawing. This type of artwork is therefore a concise way of bringing haptic applications to the fields of art and entertainment.



Contact: watanabe@avg.brl.ntt.co.jp

ART05

Creation of Virtual Creatures with Sense of Existence in the Real World "Kobito -Virtual Brownies-"

T. Aoki(1), H. Mitake(1), K. Asano(1), T. Kuriyama(1), T. Toyama(1), S. Hasegawa(2)(3), M. Sato(1)

(1)Tokyo Institute of Technology
(2)The University of Electro-Communications
(3)Japan Science and Technology Agency, Japan

The goal of "Kobito -Virtual Brownies-" is to provide the illusion that imaginary creatures exist in our real world. There are small creatures like people, called "Kobito". Kobitos are virtual creatures living in our world, but you can't see them with the naked eyes. We can however watch their activities through "the Kobito Window", a device to watch Kobitos. We can't touch Kobitos directly, but we can interact with the Kobitos through real objects. For example, Kobitos can push and pull a real tea caddy on a table. The user also however has the ability to push back Kobitos through the caddy. If you push the Kobitos strongly, they will step back, or sometimes fall down.

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ART06

An accessible bas-relief interpertation of W. A. Bouguereau's painting "Idylle Enfantine"

Ann Cunningham

Sensational Books

A photo of the original painting by Bouguereau is entitled Idylle Enfantine and included in this submission as a pdf. My work is a plaster bas-relief inspired by Bouguereau. The bas-relief is at the Denver Art Museum and used to enhance the visitor's experience for people who are blind, visually impaired, cognitively disabled or simply enjoy accessing art & information tactually.

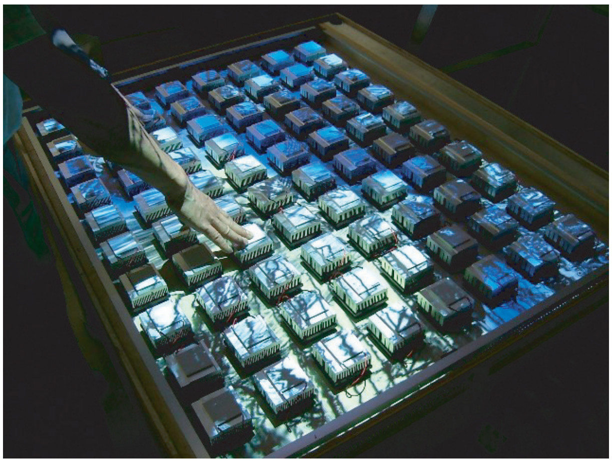
Contact: Ann@SensationalBooks.com

ART07

Thermoesthesia-an interactive thermal sense display

Kumiko KUSHIYAMA and Shinji SASADA

Japan Science and Technology Agency, Japan



"Thermoesthesia" is a new style of interactive artwork with an original thermal sense display. The thermal sense display has been developed to allow users feel the temperature of the visually displayed objects, which is cool or warm, by directly touching the objects.
The primary objective of this work is to enrich the touch expression. "Thermoesthesia" is expected to extend the style of the interactive information access activity in dairy-life that is for ubiquitous information-intensive society.

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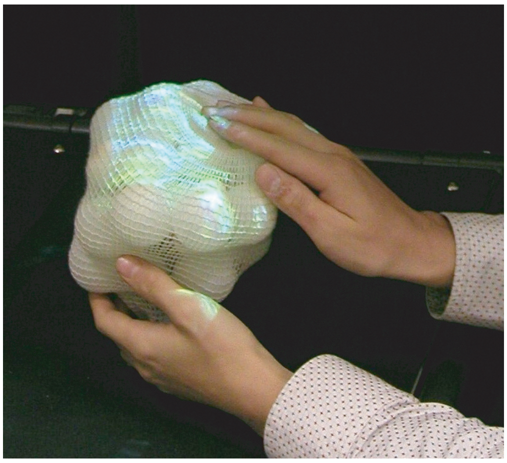
ART08

ELDONIA

Hiroo Iwata, Hiroaki Yano, Yosuke Nakajima

Graduate School of Systems and Information Engineering,University of Tsukuba,Tsukuba, 305-8573 Japan



"ELDONIA" is an interactive work which represents virtual creature through haptic and visual sensation. Eldonia is a name of a soft-tissue creature that supposed to live during the Cambrian Era. Virtual eldonia is displayed using the "Volflex" technology. Volflex is a volumetric haptic display. It is composed of a group of computer-controlled air balloons. The balloons fulfill the interaction surface. They are arranged in a body-centered cubic lattice. A tube is connected to each balloon. Volume of each balloon is controlled by an air cylinder.The tubes are connected each other by springs. This mechanical flexibility enables arbitrary 3D shape of the interaction surface. Each air cylinder is equipped with a pressure sensor that detects force applied by the user. Deformation of the surface occurs according with the data from the sensors.

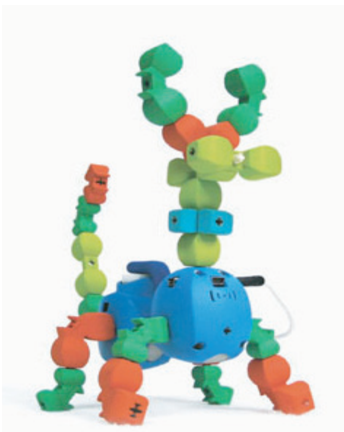
Contact: iwata@kz.tsukuba.ac.jp

ART09

Topobo

Hayes Raffle, Amanda Parkes, Hiroshi ISHII

MIT Meia Lab, Tangible Media Group



Topobo is a 3D constructive assembly system with kinetic memory, the ability to record and playback physical motion. Unique among modeling systems is Topobo's coincident physical input and output behaviors. By snapping together a combination of Passive (static) and Active (motorized) components, people can quickly assemble dynamic biomorphic forms like animals and skeletons with Topobo, animate those forms by pushing, pulling, and twisting them, and observe the system repeatedly play back those motions. For example, a dog can be constructed and then taught to gesture and walk by twisting its body and legs. The dog will then repeat those movements and walk repeatedly. The same way people can learn about static structures playing with building blocks, they can learn about dynamic structures playing with Topobo.

Contact: hayes@media.mit.edu, amanda@media.mit.edu, ishii@media.mit.edu

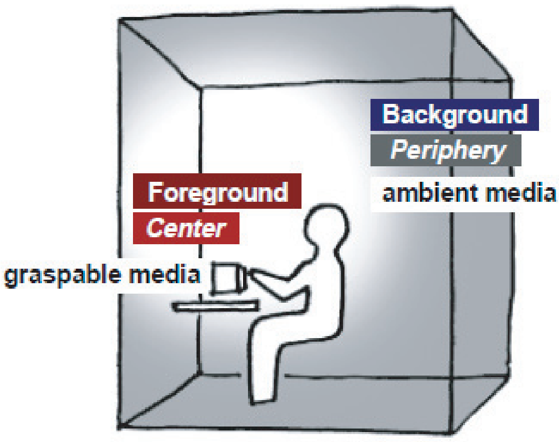
ART10

Tangible Bits video kiosk for Art Gallery

Hiroshi Ishii

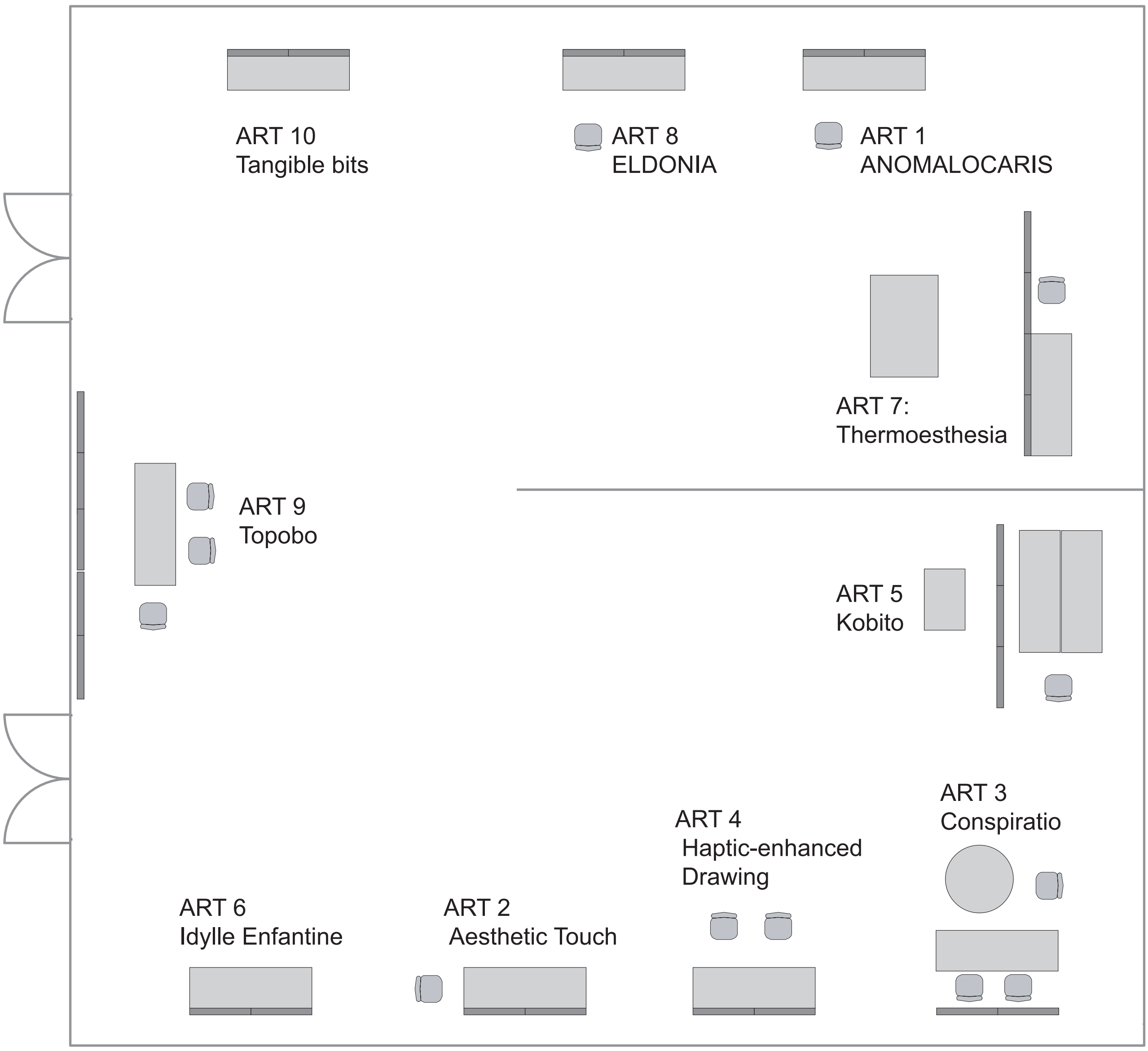
MIT Meia Lab, Tangible Media Group

Tangible Bits is our vision of Human Computer Interaction (HCI) which guides our research in the Tangible Media Group. People have developed sophisticated skills for sensing and manipulating our physical environments. However, most of these skills are not employed by traditional GUI (Graphical User Interface). Tangible Bits seeks to build upon these skills by giving physical form to digital information, seamlessly coupling the dual worlds of bits and atoms.



Contact: ishii@media.mit.edu

Art Gallery (Room 201)



3D incorporated / SensAble Technologies, Inc.

SmartCollision: Real-time interference Penetration Depth calculation engine

SmartCollision achieved high-speed processing of the Penetration Depth calculation of 3D object. It is Collision Detection library of the polygon base(not voxel conversion).
SmartCollision SDK is a high-precision real-time collision detection library which can be used in applications such as Digital Mock-Up(DMU). It delivers a high-precision collision detection functionality and appropriate feedback, by resolving the collision and/or displaying force information.
Demonstration is combination of SmartCollision and Haptic device.
Application "Tsuyoshi" and "Makoto" which uses SmarCollision are demonstrated in the booth. Please experience SmartCollision at this chance.

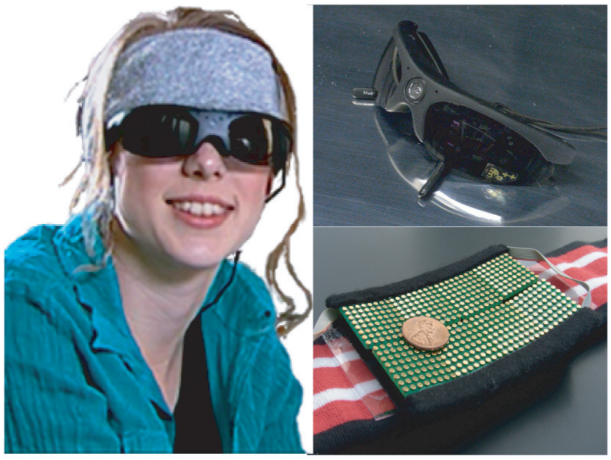
URL: http://www.ddd.co.jp

Contact: info@ddd.co.jp

EyePlusPlus Inc.

Forehead Retina System

The Forehead Retina System -composed of a small camera and 512 electrodes on the forehead- captures the view in front, extracts outlines from the view, and converts the outlines to tactile sensation by electrical stimulation. Forehead skin was chosen for stimulation in consideration of usability. An electrotactile display was used so that the system becomes small and durable. A gel layer was designed to prevent an unpleasant sensation during stimulation. The system primarily aims to enable the visually impaired to "see" the surrounding environment. Through appropriate training program, it could be an artificial retina for visually impaired people without any surgery.



URL: http://www.eyeplus2.com

Contact: info@eyeplus2.com

Force Dimension

High-precision force-feedback interfaces

Force Dimension is a recognized leader in the development and the manufacturing of high precision force-feedback interfaces. In recent years, the haptics technology developed at Force Dimension has been successfully deployed in many fields, including the medical and entertainment industries.

Force Dimension's main product line includes the high-performance OMEGA and DELTA family of haptic devices which are distributed worldwide through a wide range of distribution channels. In addition to its line of standard haptic devices, Force Dimension also provides engineering and service support for research institutions and companies that wish to customize the integration of haptics technology in their applications.

URL: http://www.forcedimension.com

Contact: info@forcedimension.com

Handshake VR Inc.

proSENSE: Virtual Touch Toolbox for rapid prototyping of haptic

Handshake's flagship product, the Handshake proSENSE(R) Virtual Touch Toolbox is a rapid prototyping, development tool for creating dynamic sense-of-touch and touch-over-network applications. The Handshake proSENSE graphical programming environment is built on top of The MathWorks MATLAB(R) and Simulink(R) development platform. The easy-to-use, drag-and-drop environment enables novice users to quickly develop and test designs while being sufficiently sophisticated to provide the expert user with an environment for application development and deployment of new haptic techniques and methodologies. Handshake proSENSE provides a complete hapto-visual development environment which provides developers with the tools to quickly create, intuitively manage, easily modify and readily deploy networked hapto-visual applications. Handshake proSENSE is fully integrated with the MATLAB help browser and provides direct access to a comprehensive library of context sensitive help, including reference pages, manuals, search capabilities and demonstrations.

URL: http://www.handshakevr.com Contact: tim@handshakevr.com

HAPTION

VIRTUOSE 6D35-45 stimulation

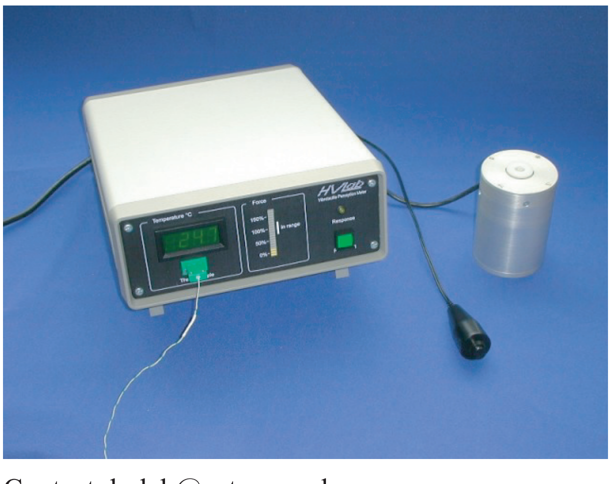
Haptics is a new productivity tool for the industry, very much like CAD and PLM. Using force-feedback, it is possible to simulate on the digital mock-up all operations needed for the new product, as early as the design stage, and without physical prototypes. Assembly/disassembly tasks, maintenance, and all-day use can be tested and rehearsed on a virtual prototype:

ERGONOMIC ANALYSIS
FUNCTIONAL TESTS
ASSEMBLY/DISASSEMBLY
WORKPLACE SIMULATION
OPERATOR TRAINING

URL: http://www.haption.com Contact: contact@haption.com

HVLab

Vibrotactile Perception Meter (VPM) / Thermal Aesthesiometer (TA)



The Vibrotactile Perception Meter (VPM) and Thermal Aesthesiometer (TA) are designed to quantify the sensori-neural performance of the hand and can be used in medical, industrial, research and educational establishments.
The VPM and TA systems consist of an applicator, a control unit and a computer interface card and software. The vibration or thermal stimulus is controlled and measured by a computer. The applicator can be held against any part of the body. An automatic test programme for determining perception thresholds is available.
HVLab Instruments have been developed through research at the University of Southampton's Institute of Sound and Vibration Research, a world-class leader in its field. All the instruments are certified with CE marking.

URL: http://www.hvlab.com Contact: hvlab@soton.ac.uk

Immersion Corporation

Tactile Feedback Touchscreen Demonstrator and Integration Kit

TouchSense(R) technology enables touchscreens to generate tactile cues, promoting a more intuitive, engaging, and natural experience for the user.
The Touchscreen Demonstrator, a TouchSense(R)-enabled 8.4-inch LCD touch monitor with example host applications, makes it easy to evaluate the capabilities of Immersion's tactile feedback technology. The Demonstrator is a good way to test and evaluate the use of tactile feedback for your markets and prospects, or to perform user testing or basic research. The product comes ready-to-use with all the components of our offering - actuators, controller, and software - fully integrated. The TouchSense Integration Kit is also available that provides the components, software, and guidelines needed to quickly and easily integrate the system into custom designs.

URL: http://www.immerison.com Contact: sales@immersion.com

Moog FCS

HapticMASTER

MOOG FCS has been a market leader in flight simulation over the past 25 years. The patented force feedback from the aircraft simulation is used in the HapticMASTER, resulting in a 3 degrees of freedom, force controlled haptic interface. It uses the so-called admittance control paradigm. This gives the device unprecedented stiffness, mechanical robustness and stability, including master-slave stability under delays.

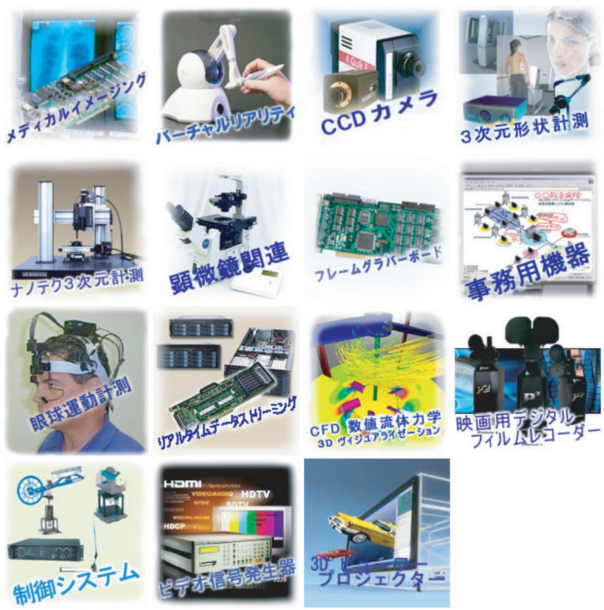
Typical applications of the HapticMASTER are:
Robotic Rehabilitation
Simulation
Autonomous Robots
Master Slave
Haptic Research

URL: http://http://www.moog-fcs.com/robotics Contact: robotics@moog-fcs.com

NIHON BINARY Co., Ltd.

Haptics and Virtual Reality System

NIHON BINARY is one of the leading providers of Haptics and Virtual Reality systems in Japan. Areas of our products are: Medical Imaging, VR, CCD camera, 3D measurement, 3D measurement of nano-scale world, microscope, frame grabber board, eye-motion tracker, realtime data streaming, calculation and visualization of fluid dynamics, digital film recorder for movie, control system, video signal generator, and 3D projector.

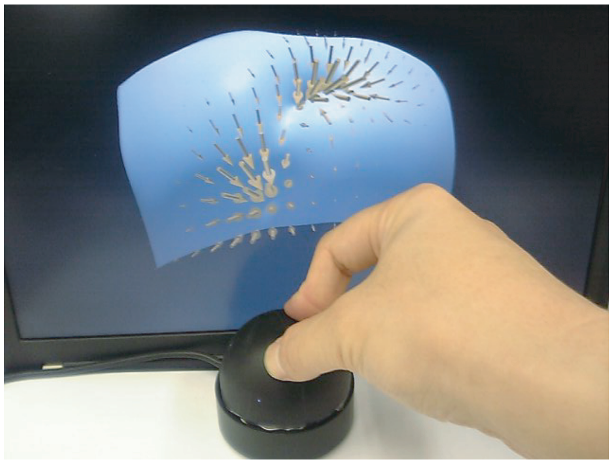


URL: http://www.nihonbinary.co.jp Contact: email@nihonbinary.co.jp

NITTA Corp.

Tactile sensors(GelForce and KINOTEX)

"GelForce" can measure a 3D force vector field over a surface. It consists of a transparent elastic body, blue and red markers inside the elastic body, and a color CCD camera. An applied force on the elastic body results in movements of the markers, which are acquired by the CCD camera. The distribution of force vectors is calculated using this information.
"KINOTEX" is a sensor that measures minute displacements due to forces applied on its surface. It is constructed of plastic fiber embedded in foam. It is sensed by the change in sampled light intensity.



URL: http://www.nitta.co.jp/product/mechasen/sensor/top.html Contact: sensor-info@nitta.co.jp

Protech Design

Haptic Disc

Next generation Haptic controlling device is ready to be embedded in your next product. Select settings, switch tools, jog along movie timelines, skip tracks, shuttle fast forward, modulate frequency, pan pitch, and gain control with this powerful device.

Force Feedback
Powered by Piezo technology, the Haptic Disc is quiet, consumes little energy and is available in various sizes without compromising performance. This thin component with central hole has no central axis, no gears, no springs, no loss of power, no delay, just real time accuracy and direct drive feedback.
Feel the tension as you shuttle, feel the disk click (kachi-kachi, piko-piko) as you select or wobble (kusu-kusu, prun-prun, biyo-n) as you skip tracks. Lay out virtually any effect around 360 degrees.
Enhance your product with this ergonomically designed sensory controller. Software integration and sensory feedback patters are fully programmable. Reinventing the wheel. Roll with it. Scroll with it.

URL: http://www.protechdesign.com Contact: Takahiko Suzuki (protechdesign@mac.com)

Quanser Consulting Inc.

Mirage F3D-35 Haptic System

Quanser's Mirage F3D-35 Haptic System is a high-force human interface for haptics research and application. This system features three high force-feedback axes and three high-resolution position axes with removable stylus, and integrated linear current amplifiers for instantaneous, yet ultra-sensitive force delivery performance.
Quanser is a premier ultra-high transparency and high-quality manufacturer of haptics devices and related interfaces for universities, research organizations, companies and governments worldwide. Our combination of commercial off-the-shelf (COTS) products and custom original equipment manufacturer (OEM) capabilities guarantee a successful long-term relationship with our customers.
Since 1990, Quanser has supplied equipment and turn-key solutions to over 1000 institutions and departments, and includes a growing network of specialized representatives covering more than 35 countries worldwide for local, knowledgeable, personal support for our customers.

URL: http://www.quanser.com Contact: sales@quanser.com

Reachin Technologies

Reachin API & Reachin Display - The enabling technology for rapid implementation of sophisticated high fidelity haptics in 2D and 3D applications.

Reachin API is a modern development platform that enables rapid implementation of sophisticated high-fidelity, high-performance haptic enabled applications. The Reachin API provides the most comprehensive and feature rich library of features and functions available on the market and embeds not only state-of-the-art haptic features, but also a complete set of classes, nodes and interfaces for managing and synchronizing the haptics, graphics as well as the audio aspects of advanced 2D and 3D applications. In combination with the Reachin Display, our customers enjoy a truly unique and remarkable environment with deep precise 3D graphics along with a co-located haptic environment for optimal precision and accuracy.

URL: http://www.reachin.se/

Contact: For sales enquiries: sales@reachin.se
For further information: info@reachin.se

SensAble Technologies Inc.

Software & devices that add the sense of touch to the digital world

SensAble Technologies is a privately-held company headquartered in Woburn, Massachusetts that provides software and devices that add the sense of touch to the digital world, including 3D touch-enabled modeling systems and the PHANTOM(R) line of haptic devices and OpenHaptics(TM) toolkit. SensAble modeling systems are used for product design, medical and dental modeling, digital content creation, and fine arts. The PHANTOM force-feedback devices, which enable users to touch and manipulate virtual objects, and the developer toolkit, are used for simulation and training, robotics, and third-party development. In addition to off-the-shelf solutions, SensAble offers contract development to OEMs for new and customized software applications and haptic devices. SensAble maintains headquarters in the United States and a sales office in Japan. SensAble products are available through direct and reseller channels.

URL: http://www.sensable.com

Contact: sales@sensable.com

SenseGraphics AB

SenseGraphics H3D API, SenseGraphics Immersive Workbench solutions

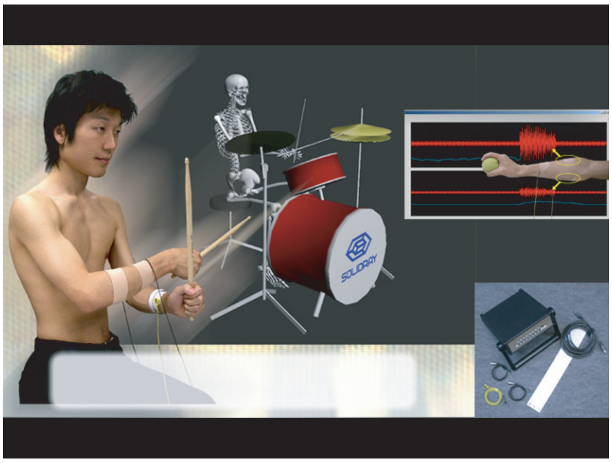
Kick start your development with SenseGraphics H3D API!
H3D API Offers programmers and non-programmers the ideal environment in which to develop with haptics and 3D visualisation; from simply importing 3D models to building advanced simulators. H3D API is Open source and commercial available. WorldHaptics pre-launch of H3D API version 2.0 includes new haptics, browser functionality and a new license version for academics wanting to keep their source code closed!
Volumetric Haptic ToolKit (VHTK) is a software development H3D API toolkit for exploration of scientific data. VHTK is preloaded with functionality for development of geo-science and medical applications.
SenseGraphics develops state of the art Immersive Workbenches for all available haptic and 3D visualisation technologies.Come to our exhibition to find out more and try our Immersive Workbench solutions!

URL: www.SenseGraphics.com Join our community at www.H3D.org

Contact: info@SenseGraphics.com

Solidray Co., Ltd.

Muscle Talk



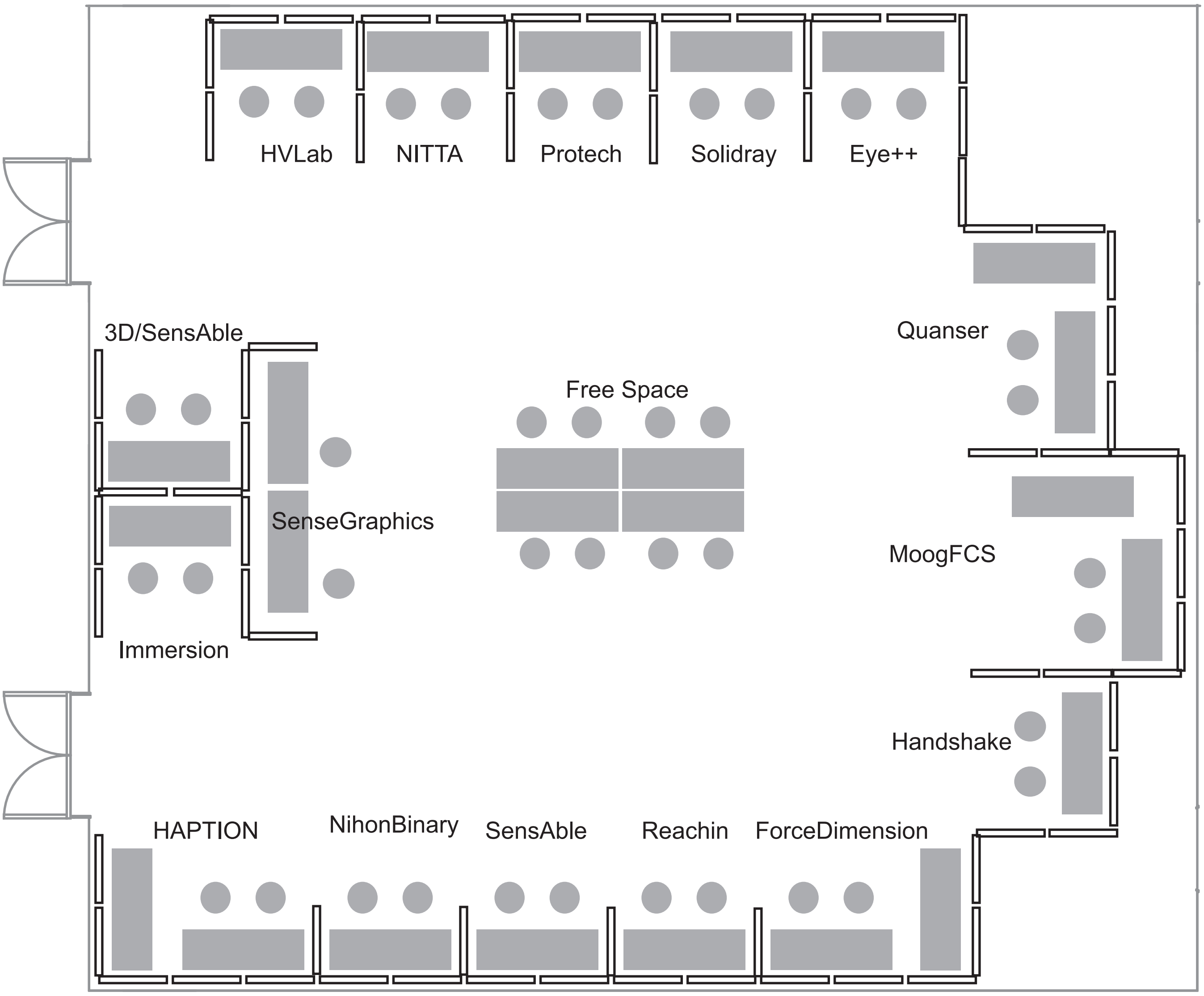
"Muscle Talk" is a new haptic interface using electromyography (EMG). By measuring muscle signal (a few hundred μV - a few mV) with electrodes on skin, the user's motion is recognized. Features of the "Muscle Talk" are as follows:

1. Low cost, compared to EMG amplifier for medical use.
2. No need to apply clinical gel (ordinary used to lower the electrical impedance of the skin).
3. Precise measurement by pairing two electrodes for one sensor.
4. Short time calibration.

The system can be used as a component for our VR space simulator "Omega Space".

URL: http://www.solidray.co.jp/ Contact: pro@solidray.co.jp

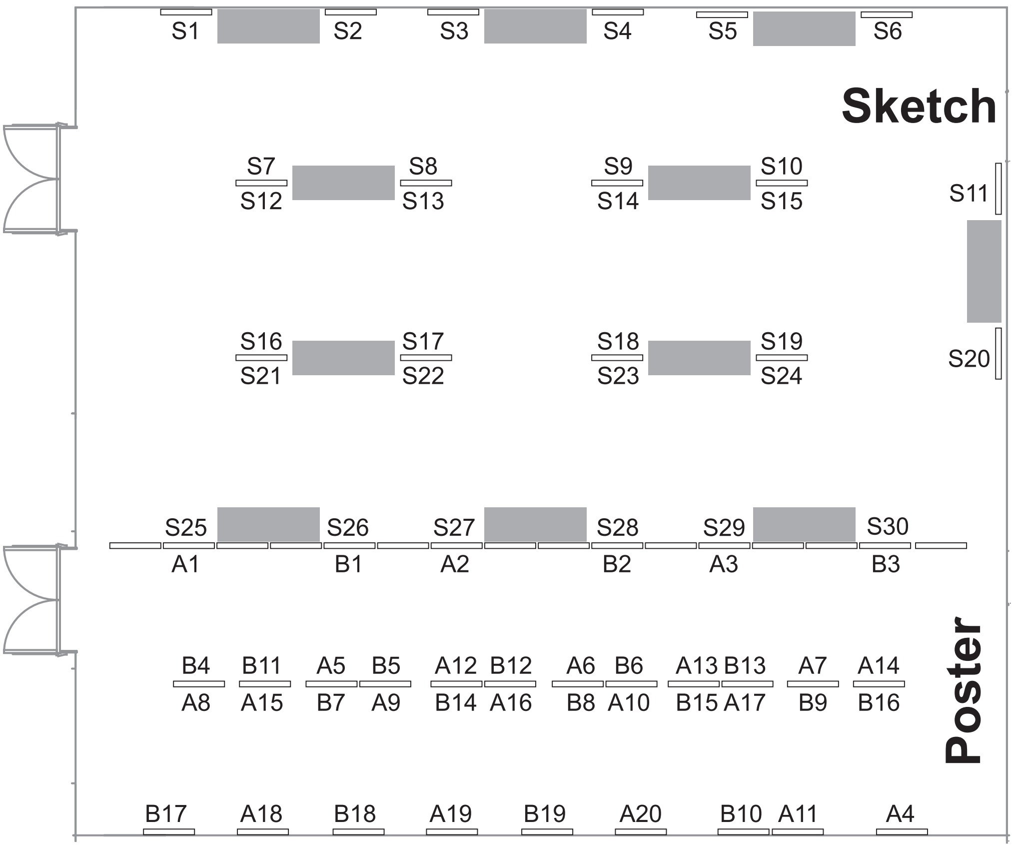
Company Exhibits (Room 102)



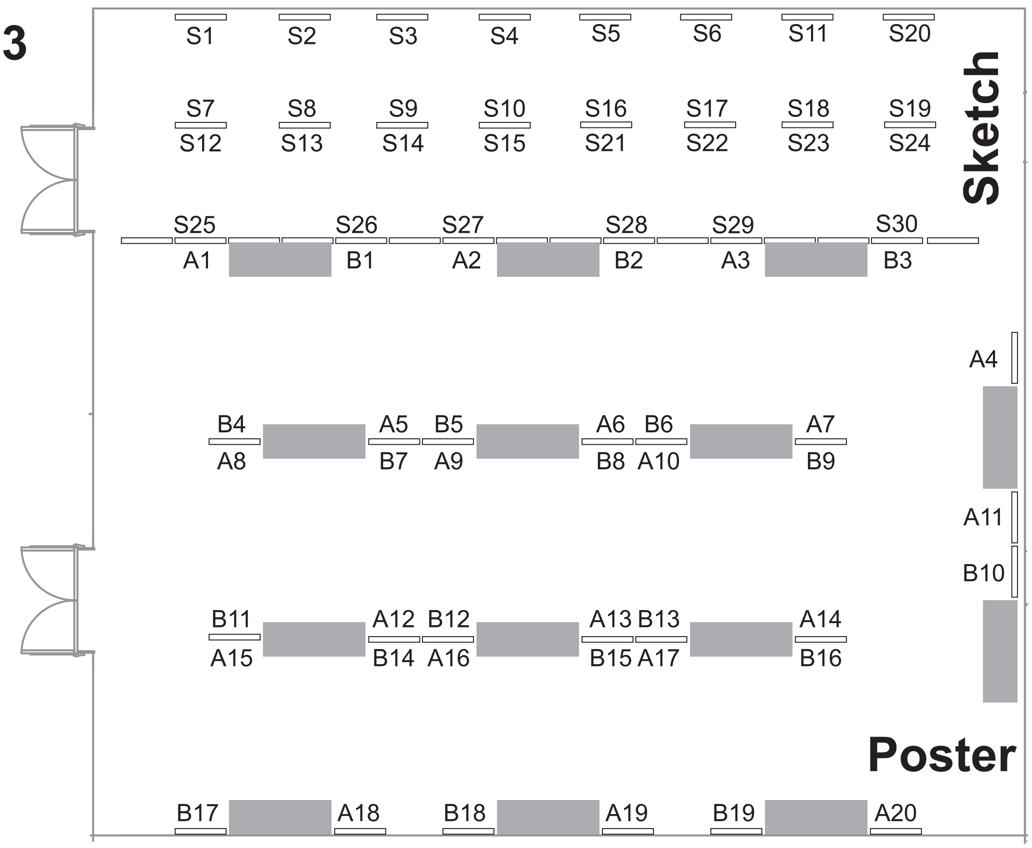
Poster Paper / Sketch (Room 101)

The sketch and poster paper presentations will be held in a large room. To ensure that there is a sufficient space for the presentations, the layout will be changed between Day 1 and Days 2 and 3

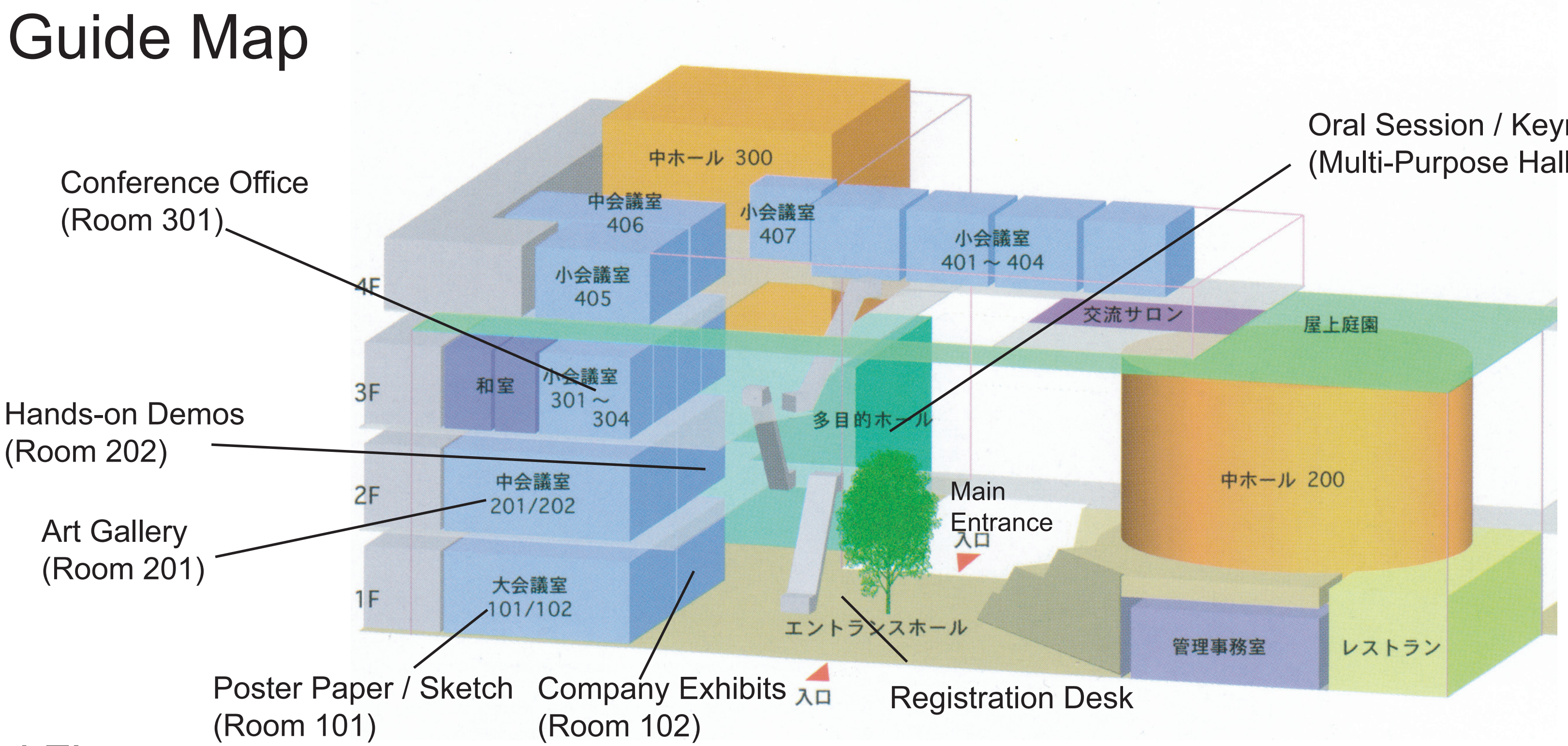
Day 1



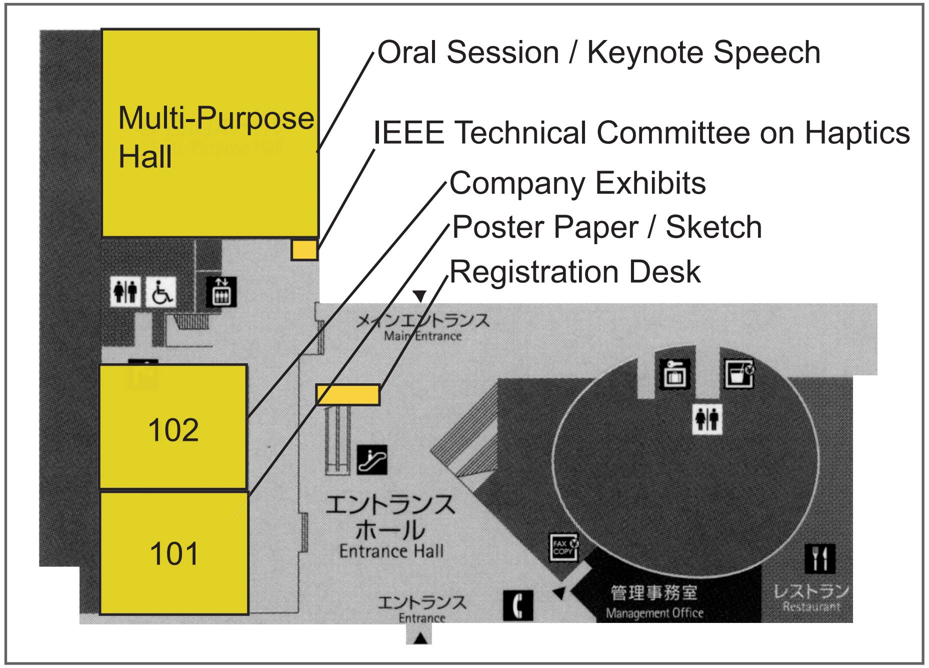
Days 2,3



Venue Guide Map



Ground Floor



2nd Floor