

Medicine Meets Virtual Reality 15
in vivo, in vitro, in silico: Designing the Next in Medicine

February 6 – 9, 2007
Hyatt Regency Long Beach
Long Beach, California

Program as of February 1, 2007
Presenters, presentations, and schedule are subject to change.

In Educational Partnership With:

TATRC/USAMRMC
www.tatrc.org

METI
www.meti.com

Art Center College of Design
www.artcenter.edu

Biodesign Inst & Decision Theater/ASU
www.biodesign.asu.edu
dt.asu.edu

CIMIT
www.cimit.org

Federation of American Scientists
www.fas.org

NCA Medical Simulation Center
www.simcen.usuhs.mil

SUMMIT
summit.stanford.edu

CONFERENCE AT A GLANCE & INDEX

Tuesday, Feb 6	Page	Thursday Morning, Feb 8, cont.	Page
• TATRC Day at MMVR15* <i>Note: TATRC Agenda posted separately at the MMV15 website.</i>	-	• B) Modeling, Visualization, Stereoscopic Projection	24
		• C) Evolving Challenges in Medical Simulation*	26
Wednesday Morning, Feb 7		• D) 3D Interactive Real-Time Surgical Education*	27
• Posters, Group #1	3	• Exhibits	42
• General Session) Designing the Next in Medicine, ACS Accredited Education Institutes*	8	• The Cyberarium*	38
• Exhibits open	42		
		Thursday Afternoon, Feb 8	
Wednesday Afternoon, Feb 7		• General Session) Art Center College of Design*, Satava Award, Intra-Cellular Surgery*	28
• A) Medical Education & Training	10	• Exhibits close	-
• B) Information Guided Therapy/ IGT—Registration & Navigation	12		
• C) Telesurgery*	14	Friday Morning, Feb 9	
• D) Open Source Software Frameworks*	15	• A) Surgical Simulation—Simulator Design Tools/Simulators in Progress	30
• Exhibits	42	• B) Telemedicine, Networks, Sensors, Robotics, Haptics	32
• The Cyberarium*	38	• C) Behavioral Health & Rehabilitation	34
		Friday Afternoon, Feb 9	
Wednesday Evening, Feb 7		• A) Games for Medicine & Health*	35
• Exhibitor Reception	42	• B) Robotics Tools & Techniques*	36
• HealthGrid.US Alliance*	16		
		Special Activity Descriptions	37
Thursday Morning, Feb 8		Exhibits	42
• Posters, Group #2	17		
• A) Surgical Simulation—Technology & Learning	22		

* = Special activity, organized independently

WEDNESDAY MORNING—POSTER SESSION, GROUP #1

7:15AM - 8:15AM

(Posters are taken down following the afternoon breakout sessions)

Information Guided Therapy

Karl-Hans Englmeier

Inst Med Informatics, GSF [DE]

Multimodal Virtual Bronchoscopy Using PET/CT-Images

Felix George Hamza-Lup

Comp Sci, Armstrong Atlantic State Univ [US]

Comprehensive 3D Visual Simulation for Radiation Therapy/Surgery Planning

Roy Kerckhoffs

Bioengineering, Univ California, San Diego [US]

Ventricular Interaction Maintains RV Function During Right Coronary Artery Occlusion: A Numerical Study with a Multi-Scale Canine Cardiovascular Model

Yoon Hyuk Kim

Advanced Tech, Kyung Hee Univ [KR]

Virtual Biomechanical Evaluation of New Spinal Fixation Device for Dynamic Stabilization

Gyusung Lee

Surgery, Univ Maryland [US]

Registration of 3D Volumes and Echocardiography Images for Training Purposes

Joseph J. Manak

X-Ray Sys & Appl Lab, GE Global Research [US]

Novel Tomographic X-Ray System for Use in Trauma Assessment and Surgical Intervention

Domonique Pavy

R&D, France Telecom [FR]

A Collaborative Virtual Desktop as Decision Support System for Surgical Planning

Rohit Rambani

Comp Sci/Orthopaedics, Univ Hull [UK]

3D Visualization and Open Planning Platform in Virtual Fluoroscopy

Raimundo Sierra

Surgical Planning Lab, Brigham & Women's Hosp [US]

Patient Specific Simulation and Navigation of Ventriculosopic Interventions

Karl V. Steiner

Delaware Biotech Inst, Univ Delaware [US]

A Virtual-Reality Approach for the Treatment of Benign Paroxysmal Positional Vertigo

Medical Education & Training

Fernando Bello

Biosurgery and Surgical Tech, Imperial Coll London [UK]

Development and Evaluation of a Virtual Intensive Therapy Unit—VITU +

Training and Assessment of Procedural Skills in Context Using an Integrated Procedural Performance Instrument (IPPI)

Melissa B. Blum

CIMERC, Drexel Univ [US]

Real-Time Incident Preparedness Simulation (RIPS)

Li Felländer-Tsai

Karolinska Inst; Karolinska Univ Hosp [SE]

Implementing Virtual Worlds for Systematic Training of Prehospital CPR in Medical School

Daniel C. Garza

Orthopaedic Surgery, Stanford Univ [US]

Use of a Virtual Human Performance Laboratory to Improve Integration of Mathematics and Biology in Sports Science Curricula in Sweden and the United States

Vassilios Hurmusiadis

R&D, Primal Pictures Ltd [UK]

Interactive Medical Simulation of the Human Heart

Edmond A. Jonckheere

Elect Eng, Univ Southern California [US]

A Visual Evaluation and Training Tool for Chiropractic Education

Laura L. Kusumoto

Forterra Systems, Inc. [US]

Avatars Alive! The Integration of Physiology Models and Computer Generated Avatars in a Multiplayer Online Simulation

Fuji Lai

Med & Healthcare Sys, Aptima, Inc. [US]

A Simulation-Based Program for Medic Cognitive Skills Training and Evaluation

Jacob Rosen

Elect Eng, Univ Washington [US]

Objective Medical Skill Evaluation: A Comparison of Popular Methods of Pattern Identification

Jonathan C. Silverstein

Surgery, Univ Chicago [US]

Developing Performance Criteria for the e-Pelvis Simulator Using Visual Analytics

John Stone

Instructional Tech, MountainTop Technologies, Inc. [US]

Virtual Medical Trainer for Regional Anesthesia

Bo Sun

Modeling and Simulation, Old Dominion Univ [US]

Medical Student Evaluation Using Augmented Standardized Patients: New Development and Results

Patricia Youngblood
SUMMIT, Stanford Univ Sch Medicine [US]
Assessing Performance in a Virtual Worlds Mass Casualty Simulation

Surgical Simulation—Technology & Learning

Christoph Aschwanden
Telehealth Research Inst, John A. Burns Sch Medicine [US]
A Feasibility Study for the Validation of the Virtual Reality Motor-Skills Trainer

Joerg Beardi
Trauma Surgery, Univ Hosp Mainz, Germany [DE]
Stress Influence on Specialist Performance During Operation on a Laparoscopic VR-Simulator—Impact on Training and Education

Phil Blyth
Anatomy with Radiology, Auckland Med Sch [NZ]
Development and Face Validity of a Virtual Reality Markup Language (VRML) Simulator for Hip Fracture Fixation

Shing-Jye Chen
Univ Nebraska Omaha [US]
Validation of Robotic Surgical Skill Assessment Using Subjective Expert Evaluation

Jang Ho Cho
Mech Eng, KAIST [KR]
Non-Clinical Evaluation of the KAIST-Ewha Colonoscopy Simulator II

Adam Dubrowski
Surgery, Univ Toronto [CA]
Low Fidelity Simulation of Temporal Bone Drilling Leads to Improved but Sub-Optimal Outcomes

Matthew J. Fiedler
Health, Physical Education and Recreation, Univ Nebraska at Omaha [US]
Virtual Reality for Robotic Laparoscopic Surgical Training

Anthony G. Gallagher
Natl Surgical Training Ctr, Royal Coll Surgeons in Ireland [IE]
The Effects of Excessive Alcohol Consumption on Laparoscopic Performance the Following Day

Erol Gercek
Trauma Surgery, Univ Hosp Mainz [DE]
Development of a Training Program Including Periodical Laparoscopic Training on a Virtual Reality Simulator

Kanav Kahol
Ctr Cognitive Ubiquitous Computing, Arizona State Univ [US]
The Effect of Real-Time Visualization of Skill Level on Surgical Training

Toru Kumagai
Inst Human Sci and Biomed Eng, Natl Inst Advanced Industrial Sci and Tech [JP]
A New Force-Based Objective Assessment of Technical Skills in Endoscopic Sinus Surgery

Doo Yong Lee
Mech Eng, KAIST [KR]
Clinical Evaluation of the KAIST-Ewha Colonoscopy Simulator II

Cindy Lio
Ctr Visualization and Virtual Environments, Univ Kentucky [US]
Measuring Subjective Stress Profiles During MIS Skills Training

Azhar Rafiq
Surgery, Virginia Commonwealth Univ [US]
Real Time Performance Feedback in Virtual Reality-Based Surgical Task Execution

Mark L. Smith
SimET Ctr, Banner Good Samaritan Hosp, Phoenix [US]
Configurable Haptic Training System for Laparoscopy

Isabelle van Herzeele
Biosurgery & Surgical Tech, Imperial Coll London [UK]
Expert Clinician-Based Weighting of Error Scores on a Virtual Reality Endovascular Simulator

John S. Zelek
Sys Design Eng, Univ Waterloo [CA]
Towards an Understanding of Conventional Surgical Haptics Experience for Use in MIS

Visualization

Zhuming Ai
Biomed and Health Info Sci, Univ Illinois at Chicago [US]
Visualization of Large-Scale Confocal Data Using Computer Cluster

Ken W. Brodlie
Sch Computing, Univ Leeds [UK]
Evaluating Enhanced Volume Rendering Visualization of Cerebral Aneurysms

Frida Hernell
Ctr Med Image Sci and Visualization/Visual Info Tech and Applications, Linköpings Univ [SE]
A Blending Technique for Enhanced Depth Perception in Medical X-Ray Vision Applications

Nigel W. John
Sch Comp Sci, Univ Wales Bangor [UK]
Interactive Physically-Based X-Ray Simulation: CPU or GPU?

Eric A. Savitsky
Emergency Medicine, Univ California Los Angeles [US]
Patient-Specific Interactive Image Visualization

Marc Schirski
Virtual Reality Group, RWTH Aachen Univ [DE]
Employing Graphics Hardware for an Interactive Exploration of the Airflow in the Human Nasal Cavity

David B. Stefan
Novaptus Systems, Inc. [US]
White Light Phase Profilometry Imaging: An Overview of Current and Future Medical Applications

Yongming Xie
Comp Sci and Eng, Chinese Univ Hong Kong [HK]
GPU-Friendly Marching Cubes for Visualizing Translucent Isosurfaces

Other Topics

C. Donald Combs
Eastern Virginia Med Sch [US]
Analyzing the MMVR and the MMSD(c) Research Spaces: Understanding Rapid Growth

Gary R. Crane
Info Tech, Southeastern Univ Research Association [US]
Developing Regional Grid Technology Support for TATRC Programs

Nathan Goodman
Inst Sys Biology [US]
GDxBase and Gaggle: Software Frameworks to Enable Analysis and Exploration of Diverse Systems
Biology Datasets by Laboratory Biologists

Mary Kratz
University of Michigan—Ann Arbor [US]
A Research Roadmap for the HealthGrid +
Grid-Enabled High Throughput Virtual Screening Against Neglected and Emerging Diseases

Fuji Lai
Med & Healthcare Sys, Aptima, Inc. [US]
Human Factors Engineering for Designing the Next in Medicine

Mustapha Safinaz
Harrow Sch Comp Sci, Univ Westminster [MY]
Healthcare Stakeholders' Perspective on the Use of Online Medical Record

WEDNESDAY MORNING

General Session—Designing the Next in Medicine

Moderator: Walter J. Greenleaf

8:25 - Karen S. Morgan & James D. Westwood
Aligned Management Associates, Inc. [US]
Welcome & Introduction

8:30 - Rainer M.M. Seibel
Inst Diagnostic & Interventional Radiology, Univ Witten/Herdecke [DE]
Designing the Next in Medicine

8:55 - Patrick C. Cregan
Nepean Hosp, Wentworth Area Health Service [AU]
Simulation and the Quality and Safety Agenda—Realistic Expectations

9:20 - Dave Warner
Biodesign Inst/Decision Theater, Arizona State Univ;
MindTel LLC; Inst Interventional Informatics [US]
Designing the Future: Unnatural Selection in the Emerging Bio-Verse

9:45 Panel Discussion—Designing the Next in Medicine

Additional Panelists:

Walter J. Greenleaf (Moderator)
Greenleaf Medical Systems [US]

Greg T. Mogel
Keck Sch Medicine/Viterbi Sch Eng, Univ Southern California [US]

Carla M. Pugh
Ctr for Adv Surgical Educ, Northwestern Univ [US]

Richard M. Satava
Surgery, Univ Washington [US]

10:15 - Break [Exhibits open]

General Session Continues

10:45 – 12:00

**Panel Discussion—American College of Surgeons (ACS) Accredited Education Institutes:
Where Are We Now? Where Are We Going?**

Panelists:

Kathy Johnson (Chair)

ACS Program for the Accreditation of Education Institutes and Experiential Learning Programs,
Div Education, American Coll Surgeons [US]

Karim Qayumi

Ctr Excellence for Surgical Education and Innovation, Univ British Columbia [CA]

Robert B. Stanley, Jr.

Otolaryngology/Head and Neck Surgery, Harborview Med Ctr, Univ Washington [US]

Maria L. Terry

Minimally Invasive Surgery/Surgical Simulation, Univ New Mexico [US]

WEDNESDAY AFTERNOON—SESSION A

Medical Education & Training

Moderator: Patricia Youngblood

1:25 - Moderator's Welcome

1:30 – Fátima Gutierrez

Ctr Telehealth and Cybermedicine Research, Univ New Mexico [US]

The Impact of the Degree of Immersion Upon Learning Performance in Virtual Reality Simulations for Medical Education

1:45 - Olivier M. Lepage

Equine Dept, Ecole Natl Vétérinaire de Lyon [FR]

From Stimulation to Virtual Reality Environments: An Example of Integration into a Traditional Equine Surgery Education Program

2:00 - Sowmya Ramachandran

Software Development, Stottler Henke Associates, Inc. [US]

From Simulations to Automated Tutoring

2:15 - Chang Ha Lee

Natl Capital Area Med Simulation Ctr, Uniformed Services Univ [US]

Towards an Immersive Virtual Environment for Medical Team Training

2:30 - Eileen B. Entin

Aptima, Inc. [US]

Web-Based Teamwork Skills Training for Emergency Medical Teams

2:45 - Derek Alan Gould

Radiology, Royal Liverpool Univ Hosp [UK]

Interventional Radiology Simulation for Training: Development of an Implementation Strategy by a Joint International Simulation Task Force

3:00 - Tianyun Ni

Comp Info and Sci and Eng, Univ Florida [US]

A Haptic-Enabled Toolkit for Illustration of Procedures in Surgery

3:15 - Break

Moderator: Helene M. Hoffman

3:30 - Bruce E. Jarrell

Surgery, Univ Maryland [US]

An Interactive, Cognitive Simulation of Gastroesophageal Reflux Disease

3:45 - Daniel M. Becker

Ctr Humanism in Medicine, Univ Virginia Sch Medicine [US]

Painful Conversations, A Game-Based Simulation: How to Learn to Say What No One Wants to Hear

4:00 - Thomas M. Nosek
Physiology and Biophysics, Case Western Reserve Univ Sch Medicine [US]
Next Generation Computer Assisted Instruction: A Serious Gaming/Immersion Environment For Medical Education

4:15 - Patricia Youngblood
SUMMIT, Stanford Univ Sch Medicine [US]
Virtual Worlds for Teaching the New CPR to High School Students

4:30 - Robert Furberg
RTI Intl [US]
Simulation-Enhanced Triage Training for Iraqi Medical Personnel

4:45 - Dale E. Olsen
SIMmersion, LLC [US]
Virtual Standardized Patients for Training Health Professionals on Biological Agent Exposures

5:00 - Discussion

5:15 - Adjourn

WEDNESDAY AFTERNOON—SESSION B

Information Guided Therapy

Moderator: Richard A. Robb

1:25 - Moderator's Welcome

1:30 - Jennifer A. McDonald

Engineering, Daniel Webster Coll [US]

Ultrasound-Guided, Robotic Cannulation of Central Veins: Mating Medical Imaging, Machine Vision and Haptic Robotics

1:45 - Mathias Hofer

Innovation Ctr Comp Assisted Surgery, Univ Hosp Leipzig [DE]

Surgery on the Lateral Skull Base with the Navigated Controlled Mill Employed for a Mastoidectomy (Pre-Clinical Evaluation)

2:00 - Bernd Hentschel

Virtual Reality Group, RWTH Aachen Univ [DE]

Virtual Reality Based Comparison of Nasal Airflows

2:15 – Robert J. Sclabassi

Neurosurgery, Univ Pittsburgh [US]

Computer Simulation of Corticospinal Activity During Transcranial Electrical Stimulation in Neurosurgery

2:30 - Caroline Villard

LSIIT, Univ Louis Pasteur Strasbourg [FR]

Precise Determination of Regions of Interest for Hepatic RFA Planning

2:45 - John T. Moore

Imaging Research Laboratories, Robarts Research Inst [CA]

2D Ultrasound Augmented by Virtual Tools for Guidance of Interventional Procedures

3:00 - Kirby G. Vosburgh

CIMIT; Brigham & Women's Hosp; Harvard Med Sch [US]

Natural Orifice Transluminal Endoscopic Surgery (NOTES): An Opportunity for Augmented Reality Guidance

3:15 - Break

IGT—Registration & Navigation

Moderator: Jannick P. Rolland

3:30 – Mathias Markert

Micro Tech and Med Device Tech, Technical Univ Munich [DE]

Manual Registration of Ultrasound with CT/Planning Data for Hepatic Surgery

3:45 - Gregory Scott Fischer

Eng Research Ctr Comp Integrated Surgery, Johns Hopkins Univ [US]

Validation System of MR Image Overlay and Other Needle Insertion Techniques

4:00 - Georg Eggers

Oral and Cranio-Maxillofacial Surgery, Heidelberg Univ [DE]

Automated Registration of Intraoperative Computer Tomography Image Data

4:15 - Raj Shekhar

Diagnostic Radiology, Univ Maryland [US]

Development of Continuous CT-Guided Minimally Invasive Surgery

4:30 - Gregory D. Hager

Ctr Comp-Integrated Surgical Sys and Tech, Johns Hopkins Univ [US]

Stereoscopic Video Overlay with Deformable Registration

4:45 - Discussion

5:00 – Adjourn

**WEDNESDAY AFTERNOON—SESSION C
(Special Activity)**

Telesurgery: The Next Frontier in Medicine

1:25 – Chairman’s Welcome

1:30 - Timothy Broderick
Univ Cincinnati Ctr Surgical Innovation [US]
Telesurgery Developments and Demonstrations

2:00 - Mehran Anvari
McMaster Univ [CA]
Experiments and Experiences (NEEMO)

2:30 - Pablo Garcia
SRI Intl [US]
Robotic Telesurgery Systems

3:00 - Break

3:30 - Blake Hannaford
Elect Eng, Univ Washington [US]
Engineering Challenges (HAPsMRT and C-Arm)

4:00 - Gerald R. Moses (Organizer)
Gardner Carton & Douglas [US]
Future Challenges to Telesurgery

4:30 - Discussion

5:15 – Adjourn

**WEDNESDAY AFTERNOON—SESSION D
(Special Activity)**

1:25PM – 5:45PM

Open Source Software Frameworks for Medical Simulation

Presentations:

LeRoy Heinrichs
Stanford University [US]
Introduction

Alan Liu
NCA Med Sim Center, Uniformed Services Univ [US] &
François Faure
INRIA [FR]
Overview of Medical Simulation and Key Challenges

Individual Framework Presentations with Demonstrations:

Kevin Montgomery and Craig Cornelius
Stanford University [US]
SPRING Framework for Building Networked Surgical Simulators
<http://spring.stanford.edu>

Frank Tendick
UC San Francisco; UC Berkeley [US]
GiPSi: An Open Source/Open Architecture Software Development Framework for Surgical Simulation
<http://gipsi.case.edu>

Stephane Cotin, Jeremie Allard & Paul Neumann
CIMIT [US]
SOFA: Development of an Open framework for Medical Simulation
<http://www.sofa-framework.org>

Yoshihiro Kuroda
Med Sci and Bioeng, Osaka Univ [JP]
VRASS Simulation Platform
http://www.kuhp.kyoto-u.ac.jp/~mi/research/vrass/index_en.shtml

François Conti
Stanford Univ; Force Dimension [US]
CHAI 3D: An Open-Source framework for Haptics and Dynamics Simulations
<http://www.chai3d.org>

**WEDNESDAY EVENING
(Special Activity)**

6:30PM – 8:00PM

HealthGrid.US Alliance

Presenters & Organizers:

Mary Kratz
Univ Michigan [US]

Howard Bilofsky
Univ Pennsylvania [US]

Jonathan Silverstein
Univ Chicago [US]

Parvati Dev
Stanford Univ [US]

Jonathan Dugan
Matson Systems [US]

Yannick Legré
CNRS; HealthGrid Assoc [FR]

THURSDAY MORNING—POSTER SESSION, GROUP #2

7:15AM - 8:15AM

(Posters are taken down following the afternoon general session)

Behavioral Health & Rehabilitation

Daniel Goude

Mednet, Inst Biomedicine, Sahlgrenska Academy at Göteborg Univ [SE]

Game Design in Virtual Reality Systems for Stroke Rehabilitation

Sarah D. Miyahira

Pacific Telehealth & Tech Hui/VA Pacific Islands Health Care System [US]

Immersive Panoramic Video vs Flat-Screen Display: Reactivity to Cue Exposure

Robert Riener

Info Tech and Elect Eng, Automatic Control Lab [CH]

Obstacle Crossing in a Virtual Environment with the Rehabilitation Gait Robot Lokomat

Giuseppe Riva

Applied Tech for Neuro-Psychology Lab, Ist Auxologico Italiano [IT]

Managing Exam Stress Using UMTS Phones: The Advantage of Portable Audio/Video Support

Albert “Skip” Rizzo

Inst Creative Tech, Univ Southern California [US]

Optimal Choice of Virtual Reality Displays for Stroke Rehabilitation

James R. Williams

Hobbs Fire Dept, City of Hobbs, NM [US]

Virtual Reality for Pain Management: Demonstration of EMS Feasibility

Haptics

David C. Ables

Pressure Profile Systems, Inc.; Medical Tactile, Inc. [US]

Quantifying the Sense of Touch with Conformable Capacitive Tactile Sensors +

Development of a Device for Documenting the Clinical Breast Exam Using a Capacitive Tactile Array Sensor

P. Pat Banerjee

MIE, Univ Illinois at Chicago [US]

Virtual Reality and Haptics Interface for Cellular Mechanotransduction Simulation

Heather Carnahan

Surgery, Univ Toronto [CA]

Surface Exploration Using a Surgical Instrument: The Perception of Friction +

A User-Friendly Interface for Surgeons to Create Haptic Effects in Medical Simulation

Dhanannjay S. Deo

Mechanical, Aerospace and Nuclear Eng, Rensselaer Polytechnic Inst [US]

Remote Virtual Surgery: Intermediate Representations for Internet-Aware, Real Time, Scalable Interactions with Physics-Based Deformable Models

Thenkurussi Kesavadas

Mech and Aerospace Eng, SUNY Buffalo [US]

Evaluating Tool-Artery Interaction Force during Endovascular Neurosurgery for Developing Haptic Engine

Rudy J. Lapeer

Sch Computing Sci, Univ East Anglia [UK]

In vitro Skin-Tissue Experiment for Increased Realism in Open Surgery Simulations

W. Bosseau Murray

Simulation Development and Cognitive Sci Lab, Pennsylvania State Univ Coll Medicine [US]

Developing Parameters for Haptic Epidural Needle Insertion Simulation: Clinicians' Perceptions of Texture Rendering by Haptics and Sandpaper

Vasile Nistor

Mech and Aerospace Eng, UCLA Henry Samueli Sch Eng and Applied Sci [US]

Haptic Guidance for Laparoscopic Surgery Immersive Training and Mentoring

Stefan Tuchschnid

Comp Vision Lab, ETH Zurich [CH]

Haptic Interface Module for Hysteroscopy Simulator System

Yasushi Yamauchi

Inst Human Sci & Biomed Eng, Advanced Industrial Sci and Tech [JP]

Can We Remember Stiffness?

Modeling

Oliver Buckley

Informatics, Univ Wales, Bangor [UK]

Efficient Modelling of Soft Tissue Using Particle Systems

Jessica R. Crouch

Comp Sci, Old Dominion Univ [US]

Parametric Eye Models

Vishal Dalmiya

Elect Eng, Univ Texas at Arlington [US]

Determination of Key and Driving Points of a Beam Model for the Simulation of Tissues

Andreas Koepfle

Inst Computational Medicine, Univ Mannheim [DE]

Real-Time Marker-Based Tracking of a Non-Rigid Object

Naoto Kume

Graduate Sch Informatics, Kyoto Univ [JP]

A Proposal of Speculative Operation on Distributed System for FEM-Based Ablation Simulator

Kishalay Kundu

Comp Sci and Elect Eng, Univ Maryland Baltimore County [US]

Tissue Resection Using Delayed Updates in a Tetrahedral Mesh

Bryan C. Lee
ICT Centre, CSIRO [AU]
Progressive Update Approach to Real-Time Cutting of Finite Element Models in Surgical Simulation

Thomas Sangild Sørensen
Ctr Advanced Visualisation and Interaction, Univ Aarhus [DK]
Virtual Open Heart Surgery: Obtaining Models Suitable for Surgical Simulation +
Virtual Open Heart Surgery: Segmentation

Shigeyuki Suzuki
Inst High Dimensional Med Imaging, Jikei Univ Sch Medicine [JP]
Surgery Simulation Using Patient-Specific Models for Laparoscopic Colectomy

Robotics

Nina Halín
Info Tech, Tampere Univ Tech, Pori Unit [FI]
Experiences of Using the EndoAssist-Robot in Surgery

Edmond A. Jonckheere
Elect Eng, Univ Southern California [US]
Magnetically Levitated Nano-Robots: An Application to Visualization of Nerve Cells Injuries

Mitchell J.H. Lum
Elect Eng, Univ Washington [US]
Telesurgery Via Unmanned Aerial Vehicle (UAV) With a Field Deployable Surgical Robot

José Luis Mosso Vázquez
Endoscopy, Clínica A. Pisanty del ISSSTE [MX]
Applications of Computer Assisted Surgery and Medical Robotics at the ISSSTE, México: Preliminary Results

Yoon Hyuk Kim
Mech Eng, Sch Advanced Tech, Kyung Hee Univ [KR]
Computer Aided Planning and Robotic Assisted Execution in Long Bone Fracture Surgery under External Fixation

Surgical Simulation—Simulator Design Tools

Rajesh Aggarwal
Biosurgery & Surgical Tech, Imperial Coll London [UK]
The Development of a Proficiency-Based Training Curriculum on the Lapmentor Virtual Reality Laparoscopic Simulator

Christoph Aschwanden
Telehealth Research Inst, John A. Burns Sch Medicine [US]
Centralized Data Recording for a Distributed Surgical Skills Trainer to Facilitate Automated Proficiency Evaluation

Simon Barriga
ORION Intl Technologies [US]
Automatic Training System for Laser Eye Surgery

Smita De
Bioengineering, Univ Washington [US]
CIELab Color Values of in vivo Normal and Grasped Porcine Liver

Chuan Feng
Elect and Comp Eng, Univ Arizona [US]
Data Fusion in a Laparoscopic Surgery Training Assistive System

Thenkurussi Kesavadas
Mech and Aerospace Eng, State Univ New York at Buffalo [US]
Data Acquisition and Development of a Trocar Insertion Simulator Using Synthetic Tissue Models

Yoshihiro Kuroda
Med Sci and Bioeng, Osaka Univ [JP]
Organ Exclusion Simulation with Multi-Finger Haptic Interaction for Open Surgery Simulator

Christopher D. Lee
Medical Simulation Corporation [US]
Haptic Rendering of Device and Patient Impedances in Catheter-Based Simulation

Vincent Mora
Industrial Materials Inst, Natl Research Council [CA]
Development and Evaluation of Algorithms for Accurate Force Rendering in Neurosurgery Simulation

Andrés A. Navarro Newball
Comp Sci, Pontificia Univ Javeriana Cali [CO]
Development of an Interactive Module to Enhance and Understand 3D Cavity Navigation

Qiang Niu
Mech and Aerospace Eng, Univ Missouri-Rolla [US]
Modeling and Rendering for Development of a Virtual Bone Surgery System

Thuy M. Pham
Comp Sci and Biomed Eng, Oakland Univ and Univ Connecticut [US]
Virtual Nursing Simulator with Haptic Force-feedback for Oral Hygiene

Klaus Rieger
Inst Computational Medicine, Univ Mannheim [DE]
Development of a Guiding Endoscopy Simulator

Kevin Tuer
Handshake VR, Inc. [CA]
Deployment and Evaluation of a Prototype Laparoscopic Surgery Simulator with Haptics and Telementoring

Telemedicine, Networks & Sensors

Xiao Hu
Neurosurgery, Univ California Los Angeles [US]
Robotic Telepresence in Intensive Care Improves Physician Response Time

Ronald C. Merrell
Surgery, Virginia Commonwealth Univ [US]
International Live Intraoperative Consultation

Robert J. Sclabassi
Neurosurgery, Univ Pittsburgh [US]
Design of the Next-Generation Medical Implants with Communication Channel and Energy Port +
Eye-Gaze Based Video Compression for Telesurgery

Alok Shrivastava
Vattikuti Urology Inst, Henry Ford Health System [US]
Digital Video Archival and Tele-Retrieval (DIV-ART) for Robotic Surgery

Jochen von Spiczak
Radiology, Brigham & Women's Hosp [US]
Device Connectivity for Image-Guided Medical Applications

THURSDAY MORNING—SESSION A

Surgical Simulation—Technology & Learning

Moderator: Carla M. Pugh

8:25 - Moderator's Welcome

8:30 - Kanav Kahol

Ctr Cognitive Ubiquitous Computing, Arizona State Univ [US]
Cognitive Design of Simulation Training

8:45 - W. Bosseau Murray

Simulation Development & Cognitive Sci Lab, Pennsylvania State Univ Coll Medicine [US]
Endotracheal Intubation Training Using Virtual Images: Learning with the Mobile Telementoring
Intubating Video Laryngoscope

9:00 - Mikko J. Rissanen

Graduate Sch Informatics, Kyoto Univ [JP]
A Novel Approach for Training of Surgical Procedures Based on Visualization and Annotation of
Behavioural Parameters in Simulators

9:15 - Elizabeth A. Schmidt

Psychology, Old Dominion Univ [US]
Task Sequencing Effects for Open and Closed Loop Laparoscopic Skills

9:30 - Rajesh Aggarwal

Biosurgery & Surgical Tech, Imperial Coll London [UK]
The Virtual Interventional Suite for Training & Assessment (VISTA): A Pilot Study

9:45 - Gyusung Lee

Surgery, Univ Maryland [US]
MIS Surgical Ergonomics: Future Trends

10:00 - Break

Moderator: Randy S. Haluck

10:15 - Oliver Burgert

Innovation Ctr Comp Assisted Surgery, Univ Leipzig [DE]
Requirement Specification for Surgical Simulation Systems by Use of Surgical Workflows

10:30 - Sayra M. Cristancho

Mech Eng, Univ British Columbia [CA]
Feasibility of Using Interoperatively Acquired Quantitative Kinematic Measures to Monitor Development
of Laparoscopic Skill

10:45 - Ronald C. Merrell

Surgery, Virginia Commonwealth Univ [US]
Event Capture, Registration and Transmission for Critical Clinical Skill Performance

11:00 - Christopher Sewell
Comp Sci, Stanford Univ [US]
Evaluating Drilling and Suctioning Technique in a Mastoidectomy Simulator

11:15 - Stefan Tuchschnid
Comp Vision Lab, ETH Zurich [CH]
Objective Assessment of Surgical Performance in Hysteroscopy Simulation

11:30 - Isabelle van Herzele
Biosurgery & Surgical Tech, Imperial Coll London [UK]
Carotid Artery Stent Procedures: Evidence-Based Virtual Reality Simulation for Training and Assessment of Technical skills

11:45 - Anthony G. Gallagher
Natl Surgical Training Ctr, Royal Coll Surgeons in Ireland [IE]
Simulation Based Objective Assessment of Technical Skills as Part of the Selection of Individuals for Higher Surgical Training in General Surgery at a National Level

12:00 - Adjourn

THURSDAY MORNING—SESSION B

Modeling

Moderator: Michael J. Ackerman

8:25 - Moderator's Welcome

8:30 - Lenka Jerabkova

VR Group, RWTH Aachen Univ [DE]

Stable Cutting Method for Finite Elements Based Virtual Surgery Simulation

8:45 - Denis Laroche

Industrial Materials Inst, Natl Research Council [CA]

In-vivo Validation of a Stent Implantation Numerical Model

9:00 - Venkat Devarajan

Elect Eng, Univ Texas at Arlington [US]

Modeling Isotropic Organs Using Beam Models for the Haptic Simulation of Blunt Dissections

9:15 - Arielle Drummond

Biomed Eng, Carnegie Mellon Univ [US]

Non-Invasive Anatomical Compatibility Study for a Pediatric Ventricular Assist Device

9:30 - Zhuming Ai

Biomed and Health Info Sci, Univ Illinois at Chicago [US]

Cranial Implant Design Using Augmented Reality Immersive System

Visualization

9:45 - Kevin E. Loewke

Mech Eng, Stanford Univ [US]

Real-Time Image Mosaicing for Optical Biopsy

10:00 – James W. Ward

Comp Sci, Univ Hull [UK]

Immersive Visualization with Automated Collision Detection for Radiotherapy Treatment Planning

10:15 – Discussion

10:30 - Break

Stereoscopic Projection

Moderators: Steven Senger & Michael D'Ambra

10:45 - Christoph Aschwanden

Telehealth Research Inst, John A. Burns Sch Medicine [US]

Virtual Reality Environments for Medical Training and Therapy: Surgical Skills Acquisition, Virtual Beach, Virtual Patient and Virtual Nephron

11:00 - John T. Moore
Imaging Research Laboratories, Robarts Research Inst [CA]
A Stereoscopic Environment for Surgical Planning and Guidance

11:15 - Jonathan C. Silverstein
Surgery, Univ Chicago [US]
Immersive Virtual Anatomy Course Using Cluster of Volume Visualization Machines and Passive Stereo

11:30 – Michael D’Ambra
D’Ambra Technologies [US]
The Utility of True 3D Visualization of Cardiac Ultrasound When All Else Fails

11:45 - Discussion

12:00 – Adjourm

**THURSDAY MORNING—SESSION C
(Special Activity)**

Evolving Challenges in Medical Simulation: Immersive Virtual Environments for Large Group Training

8:25 - Alan Liu (Organizer)

National Capital Area Med Sim Center, USUHS [US]

Welcome and Introduction

8:45 - Mark Bowyer [US]

National Capital Area Med Sim Center, USUHS [US]

A Clinical Perspective

9:30 - Claudia Johnston

Texas A&M University-Corpus Christi [US]

The Pulse! Virtual Learning Environment

10:15 - Break

10:30 - Nate Smith

Silver Tree Media, Inc. [US]

Case Study: Rapid Response Sim

11:15 - Alan Liu

National Capital Area Med Sim Center, USUHS [US]

The Wide Area Virtual Environment

11:35 – Discussion

12:00 – Adjourn

**THURSDAY MORNING—SESSION D
(Special Activity)**

8:25AM – 12:00Noon

3D Interactive Real-Time Surgical Education on the Web: Exploring the New Paradigm in the Age of Google™

Presenters:

Gerry Higgins (Organizer)
Fed of American Scientists [US]
Human Simulation at the Bleeding Edge

Richard Bell
American Board of Surgery [US]
Resident Education: The Next Generation

Kevin Montgomery
Natl Biocomputation Ctr, Stanford Univ [US]
Virtual Activity Simulation Tool (VAST)—VR for Astronauts

Vidar Sørhus
SimSurgery AS [NO]
Integration of Simulation in the Virtual Classroom

Jonathan C. Silverstein
Surgery, Univ Chicago [US]
Distributed Medical Visualization

Brian Athey
Univ Michigan [US]
Multi-scale Anatomical Modeling

Azhar Rafiq
Surgery, Virginia Commonwealth Univ [US]
Application of Real-Time Telemedicine Techniques for Surgical Education

THURSDAY AFTERNOON

General Session

Moderator: Kirby G. Vosburgh

1:25 - Moderator's Welcome

1:30 - Naoki Suzuki

Inst High Dimensional Med Imaging, Jikei Univ Sch Medicine [JP]

Development of a Surgical Robot System for Endovascular Surgery with Augmented Reality Function

Art Center College of Design: New Collaborative Paradigms Between Design Education, New Medical Technologies, and Public Health

1:50 - Mariana Amatullo (Moderator)

International Initiatives/Designmatters, Art Center College of Design [US]

Designmatters: Design Leadership and Global Public Health Advocacy

2:10 - Martin Smith

Product Design, Art Center College of Design [US]

Product Design Innovation in the Medical Industries: An Overview of the Funded Educational Program at Art Center College of Design

2:30 - Dario Antonioni

Environmental Design, Art Center College of Design [US]

Health Anywhere 2016: A Design Collaboration with General Electric Healthcare to Deliver New Imaging Technologies to Africa

2:50 - Discussion

3:10 - Presentation of the 13th Annual Satava Award

Presenter: Richard A. Robb

3:30 – Break [Exhibits close following break]

General Session Continues

Intra-Cellular Surgery: A New Frontier?

Moderators: Richard M. Satava & Jaydev Desai

3:50 - Richard M. Satava

Surgery, Univ Washington [US]

Introduction and Need for Intra-Cellular Surgery

4:10 - Jaydev P. Desai

Mech Eng, Univ Maryland, College Park [US]

MEMS/Mechanical Effectors for Intra-Cellular Surgery

4:30 - Yu Sun
Biomed Eng & Mech Eng, Univ Toronto [CA]
MEMS and Microrobotics for Intra-Cellular Surgery

4:50 - Discussion

5:10 - Adjourn

FRIDAY MORNING—SESSION A

Surgical Simulation—Simulator Design Tools

Moderator: David M. Hananel

7:55 - Moderator's Welcome

8:00 - Jeremie Allard
Simulation Group, CIMIT [US]
SOFA - An Open Source Framework for Medical Simulation

8:15 - Jing Qin
Comp Sci and Eng, Chinese Univ Hong Kong [HK]
An Adaptive Framework Using Cluster-Based Hybrid Architecture for Enhancing Collaboration in Surgical Simulation

8:30 - Eric J. Acosta
Natl Capital Area Med Simulation Ctr, Uniformed Services Univ [US]
Burrhole Simulation for an Intracranial Hematoma Simulator

8:45 - Stefan Daenzer
Natl Biocomputation Ctr, Stanford Univ [US]
Real-Time Smoke and Bleeding Simulation in Virtual Surgery

9:00 - Dhanannjay S. Deo
Mech Aerospace and Nuclear Eng, Rensselaer Polytechnic Inst [US]
Physics-Based Stereoscopic Suturing Simulation with Force Feedback and Continuous Multipoint Interactions for Training on the da Vinci(r) Surgical System

9:15 - Yoshihiro Kuroda
Med Sci and Bioeng, Osaka Univ [JP]
Semi-Automatic Development of Optimized Surgical Simulator with Surgical Manuals

9:30 - Christopher Sewell
Comp Sci, Stanford Univ [US]
Validating Metrics for a Mastoidectomy Simulator

9:45 - Carl A. Nelson
Mech Eng/Surgery, Univ Nebraska [US]
Design Methodology for a Novel Multifunction Laparoscopic Tool: Engineering for Surgeons' Needs

10:00 - Discussion

10:15 - Break

Surgical Simulation—Simulators in Progress

Moderator: Robert M. Sweet

10:30 - Clément Forest
IRCAD/EITS [FR]
Ultrasound and Needle Insertion Simulators Built on Real Patient-Based Data

10:45 - Rainer Leuschke
Elect Eng, Univ Washington [US]
Low Cost Eye Surgery Simulator with Skill Assessment Component

11:00 - John Hu
Med Robotics and Sys, Energid Technologies [US]
Localized Virtual Patient Model for Regional Anesthesia Simulation Training System

11:15 - Scott W. Gunther
Mech Eng, Univ Washington [US]
The Red DRAGON: A Multi-Modality System for Training in Minimally Invasive Surgery

11:30 - Bruce D. Anderson
Simulation Inc. [US]
Integrated Lower Extremity Trauma Simulator

11:45 - Discussion

12:00 – Adjourn

FRIDAY MORNING—SESSION B

Telemedicine, Networks & Sensors

Moderator: David C. Balch

7:55 - Moderator's Welcome

8:00 - Amy C. Lehman
Mech Eng, Univ Nebraska - Lincoln [US]
In vivo Robotics During the NEEMO 9 Mission

8:15 - Robert J. Sclabassi
Neurosurgery, Univ Pittsburgh [US]
An Overview of 3D Video Transmission and Display Technologies for Telemedicine Applications

8:30 - Donald R. Olson
Neurological Surgery, Oregon Health & Sci Univ [US]
Brain Blast Injury: Treatment with Electrical Stimulation

Robotics

8:45 - Pablo E. Garcia
Eng Sys Div, SRI Intl [US]
Development of a Trauma Pod System

9:00 - Brett M. Harnett
Surgery/CSI, Univ Cincinnati [US]
Small Unmanned Aerial Vehicle as a Network Access Point for Tele-Robotic Surgical Intervention in the Battlefield

9:15 - Amy C. Lehman
Mech Eng, Univ Nebraska - Lincoln [US]
Surgery with Cooperative Robots

9:30 - Timothy Broderick
Univ Cincinnati Ctr Surgical Innovation [US]
NEEMO 9: Evaluating the Impact of 2 Second Time Delay in Telementoring and Telerobotic Surgery

9:45 - Ozanan R. Meireles
Surgery, Johns Hopkins Univ [US]
Effects of Visual Feedback Delay on Surgical Task Performance During Telerobotic Surgery

10:00 - Break

Haptics

Moderator: Suzanne J. Weghorst

10:15 - Sunipa Saha
Biomed Eng, Johns Hopkins Univ [US]
Force Sensing in Robot-Assisted Surgery: Which Degrees of Freedom are Most Important?

10:30 - Wm. LeRoy Heinrichs
SUMMIT, Stanford Univ Sch Medicine [US]
A Simple Durometer for Quantifying the 'Haptic Memory' of Surgeons

10:45 - Matthew Birtwisle
Sch Computing, Univ Leeds [UK]
A 6-DOF Gravity Compensation Scheme for a Phantom Premium Using a Neural Network

11:00 - Marilyn J. Powers
Engineering, MPB Communications, Inc. [CA]
Surgical Scissors Extension Adds the 7th Axis of Force Feedback to the Freedom 6S

11:15 - Chih-Hung Aaron King
Ctr Advanced Surgical and Interventional Tech, Univ California Los Angeles [US]
A Pneumatic Haptic Feedback Actuator Array for Robotic Surgery or Simulation

11:30 - Jesper Mosegaard
Comp Sci, Univ Aarhus [DK]
Smooth Haptic Interaction from Discontinuous Simulation Data

11:45 - Jing Ren
Engineering, Univ Ontario Inst Tech [CA]
Haptics-Constrained Motion for Surgical Interventions

12:00 - Adjourn

FRIDAY MORNING—SESSION C

Behavioral Health & Rehabilitation

Moderators: Mark D. Wiederhold & Giuseppe Riva

7:55 – Moderators' Welcome

8:00 – Melba C. Stetz

US Army Aeromedical Research Lab, Ft Rucker, AL [US]

Flight Medics' Virtual Reality Training to Enhance Performance under Combat Stress

8:20 - Giuseppe Riva

Applied Tech Neuro-Psychology Lab, Ist Auxologico Italiano [IT]

Cellular Phones for Reducing Battlefield Stress: Rationale and a Preliminary Research

8:40 - Dennis Patrick Wood

Virtual Reality Med Ctr [US]

Combat Related Post Traumatic Stress Disorder: A Case Report Using Virtual Reality Exposure Therapy with Physiological Monitoring

9:00 - Steve W. Cole

Research, HopeLab [US]

The Re-Mission Videogame for Cancer: Impact on Psychological Well-Being and Treatment Adherence

9:20 - José Luis Mosso Vázquez

Endoscopy, Clínica A. Pisanty del ISSSTE [MX]

Cybertherapy New Applications for Discomfort Reductions in Surgical Care Unit of Heart, Neonatology Care Unit, Transplant Kidney Care Unit and Delivery Room and Cesarean Surgery

9:40 Discussion

10:00 Break

10:20 - Hunter G. Hoffman

VR Research Ctr, Univ Washington [US]

Analgesic Effects of Opioids and Immersive Virtual Reality Distraction: Evidence from Subjective Pain Ratings and fMRI Brain Scans

10:40 – Albert “Skip” Rizzo

Inst Creative Tech, Univ Southern California [US]

VR Enhanced Upper Extremity Motor Training for Post-Stroke Rehabilitation: Task Design, Clinical Experiment and Visualization on Performance and Progress

11:00 - Giuseppe Riva

Applied Tech Neuro-Psychology Lab, Ist Auxologico Italiano [IT]

NeuroVR: An Open-Source Virtual Reality Tool for Research and Therapy

11:20 – Discussion

12:00 - Adjourn

**FRIDAY AFTERNOON—SESSION A
(Special Activity)**

1:30PM—3:30PM

Games for Medicine and Health

Presentations:

Parvati Dev (Organizer)
SUMMIT, Stanford University [US]
The Virtual Hospital—A Framework for What’s Happening

Wm. LeRoy Heinrichs (Organizer)
SUMMIT, Stanford University [US]
Virtual Emergency Department—A Team Training Environment

Laura L. Kusumoto
Forterra Systems, Inc. [US]
Avatars Alive—Physiological Models for Virtual Patients

Patti Hamilton
Texas Woman’s University [US]
SBAR for Nursing—The Patient ‘Hand-off’ at Shift-Change

Claudia Johnston
Texas A&M University-Corpus Christi [US]
Pulse! – Training for First Responders to Mass Casualties

Patricia Youngblood (Organizer)
SUMMIT, Stanford University [US]
Team Performance Assessment—Going Beyond the Individual

Pamela M. Kato
Stanford Hosp; The Game Rx [US]
Developing Games for Patients with Chronic Illnesses

J. Harvey Magee
TATRC / USAMRMC [US]
Where Ought We Be Going?

**FRIDAY AFTERNOON—SESSION B
(Special Activity)**

1:30PM—3:30PM

Robotics Tools & Techniques

Presenter:

Bryan Bergeron (Organizer)
Harvard Med Sch; Archetype Technologies, Inc. [US]

SPECIAL ACTIVITY DESCRIPTIONS

Wednesday Morning—General Session

American College of Surgeons (ACS) Accredited Education Institutes: Where Are We Now? Where Are We Going?

David Hananel, Organizer

This panel is an update on the American College of Surgeons Accredited Education Institutes. In past years, we heard from the Director of the Education Division of the ACS, Dr. Ajit Sachdeva, about the concept of having a series of training centers across the nation that would meet specific criteria in support of surgical education. This concept has now become reality – the first seven centers are operational.

The ACS states: “The vision of the ACS Accredited Education Institutes is to create a network of ACS-approved regional Education Institutes that offer practicing surgeons, surgical residents, medical students, and members of the surgical team a spectrum of educational opportunities including those that address acquisition and maintenance of skills; and focus on new procedures and emerging technologies.”

Representatives of the College and several Education Institutes will discuss the approval process and the reasons why these Institutes chose to become part of this innovative program.

Wednesday Afternoon—Session C

Telesurgery: The Next Frontier in Medicine

Gerald Moses, Organizer

Experts in the development and practice of telesurgery will present advances in technology that support telesurgery, will review research efforts to construct and refine telerobotic surgery systems, and will report current and proposed collaborative projects to validate telesurgery systems and the progression toward animal trials.

Wednesday Afternoon—Session D

Open Source Frameworks for Medical Simulation

Stephane Cotin, Organizer

This workshop discusses several design strategies for the development of an open source framework for the Medical Simulation community. These frameworks should be generic, platform-independent, public domain, open source, and extendible. They also attempt to provide a common established set of programming interfaces between components which take into account known algorithms, their future directions, dependences and required exchange information between different components. Discussion will focus more on simulation components to enable tissue deformation, collision detection with response, numerical integration methods, multiprocessing, and haptics. It is critical that such frameworks do not degrade a simulator’s interactive run-time performance. As an end result, these frameworks should foster collaboration among research groups, simplify the developmental time for simulators, reduce production costs, and provide a means to share components through a common interface.

The workshop will begin with a introduction to the main challenges of designing a computer-based simulation system, and will be followed by presentations of five different software frameworks currently being developed by the research community. Each presentation will discuss the main objectives of the framework, its structural organization, the main advantages of the approach, and will be illustrated with various videos or live demonstrations of applications in the area of Medical Simulation. The workshop will finish with a panel session with all of the framework developers. If there is time remaining, hands-on demonstrations of some of the systems will be available.

Wednesday & Thursday, February 7 & 8

The Cyberarium

Dave Warner, Organizer

The Cyberarium returns to MMVR this year as an emergent space that seeks to influence the design of the future and exploit the past. It will be a pan-disciplinary place to share ideas and demo both new and old technologies. Most of all, it will be a place where the diverse social networks represented at MMVR can mix, match, and mash up with creative impunity.

The Cyberarium will start as a free form space with bandwidth, power and very little adult supervision. Join us as we continue to develop new methods of thinking, learning, exploring, and growing. Bring your insight and an open mind.

The Cyberarium will serve as the basis of designing an intelligent migration into the next future of medicine and healthcare.

Wednesday Evening

HealthGrid.US Alliance

Mary Kratz, Howard Bilofsky, Jonathan Silverstein, Parvati Dev, Jonathan Dugan, and Yannick Legré, Organizers

The HealthGrid is an emerging international community of individuals from the public and private domain who are actively exploring the beneficial impact of grid technologies on healthcare provision and research. The HealthGrid.US Alliance provides a forum for US organizations who:

- Deploy advanced computational environments for biomedical informatics research such as in-silico docking methods
- Implement security and access services to enable sharing of datasets across virtual organizations
- Utilize collaborative tools to provide medical education
- Configure and curate knowledge environments to enhance healthcare via translational research methods

Grid technologies emerged from specific needs in the particle physics research community for high-end computing intensive applications, and from the availability of high performance networks. The term "grid" rapidly evolved toward a concept of ubiquitous and transparent computing to support a wide variety of applications, and it builds on the well-known metaphor of the pervasive "electricity grid". Biomedical scientists today need access to these new information technology capabilities and sophisticated tools in order to realize the benefits of new models for scientific discovery at the frontier of knowledge.

This session will provide an introduction to this emerging cyberinfrastructure to enable computation, data, collaboration and knowledge environments. Implementation of virtual organizations across the biomedical community will be presented. Please join the session and discover the benefits of the HealthGrid.US Alliance.

Thursday Morning—Session C

Evolving Challenges in Medical Simulation: Immersive Virtual Environments for Large Group Training

Alan Liu, Organizer

Simulation has become an accepted part of medical training. Students practice and acquire skills in a structured, uniform, and risk-free learning environment. Formal studies have demonstrated that simulation training aids the development of clinical skills. Recent technical advances have significantly improved the realism and capabilities of modern simulators. The upsurge of interest has led to the commercial development of simulators that support a wide range of different procedures.

Current trainers focus on single-person instruction, but complex medical treatment almost invariably requires team effort. Medical simulation has yet to adequately address the unique challenges of team training and mass-casualty management. In this workshop, we examine the issues involved in training healthcare providers where complex, dynamic interactions between team members and groups of patients are the norm. The need for team-oriented simulation is motivated from a clinical perspective. A survey of current state-of-the-art is presented. The workshop will showcase three initiatives to develop the next-generation of immersive virtual environments for medical training. Open research questions and future directions are discussed. The workshop will conclude with an open forum for discussion.

Thursday Morning—Session D

3D Interactive Real-time Surgical Education on the Web: Exploring the New Paradigm in the Age of Google™

Gerry Higgins, Organizer

There have been significant technology advancements that have made possible real-time interaction with complex, three-dimensional (3D) models of anatomy, physiology and pathology on the internet. These include both laparoscopic and open surgical interventions such as cutting, suturing, tissue deformation and organ behaviors with accurate physical properties. The goal of this workshop is to bring together experts from the surgical curriculum developers and experts in the new interactive 3D web-based modeling and simulation domains to establish a new paradigm for collaboration and delivery to almost any environment.

Thursday Afternoon—General Session

Art Center College of Design: New Collaborative Paradigms Between Design Education, New Medical Technologies, and Health

Mariana Amatullo, Organizer

This plenary session provides an overview of the synergies between design innovation and new medical technologies as well as public health communication. The growing consciousness that design should be harnessed to meet a wide range of societal needs is epitomized within Designmatters at Art Center College of Design, an institutional initiative that weaves rigorous aesthetic values and business acumen with a broad social and humanitarian agenda for positive change. Through Designmatters and Art Center's long-established Funded Educational Program—which brokers educational collaborations with leading industries—students and faculty develop design-based explorations that have a profound impact in the community at large. The outcomes yield a varied portfolio where issues of ethics, empathy and humanism stand front and center. Along with key examples of the GE Healthcare collaboration, the presentation underlines the unique opportunity for design to become a vital partner with the medical industry in pursuit of innovation.

Friday Afternoon—Session A

Game-Based Learning

Parvati Dev, Patricia Youngblood, and LeRoy Heinrichs, Organizers

An emerging trend in healthcare training is using videogame and related technologies to create web-based, 3D Virtual World environments that allow users to play the role of healthcare professionals or patients. The mode of engagement is with a computer station and a head-set; healthcare professionals interact in real-time with virtual patients and their colleagues, or patients interact with their diseases, all represented by avatars. We use the Virtual Hospital as a framework to link the many activities of Simulation and Game-based Learning.

Friday Afternoon—Session B

Robotics Tools and Techniques

Bryan Bergeron, Organizer

This session provides an overview of the technologies, tools, and best practices of robotics development. Topics discussed include:

- Sensors – An introduction to the range of sensors available for robotics sensing applications, from omnidirectional vision to pressure; How to select sensor for specific applications; Understanding specifications; Simple and advanced sensor fusion.
- Actuators – Mechanical effectors available for robotics, from servos to linear actuators.
- Microcontrollers & Microprocessors – Capabilities and limitations of common microcontrollers; When to use microprocessors; Selecting microcontrollers and microprocessors.
- Software Development – Options for microcontroller and microprocessor software development; Operating systems for microprocessor development; Architectures for robotics systems.
- Communications – Intra-and inter-robot communications, from controller area networks (CANs) to multi-node MESH networks.

- Materials – Overview of the materials available for robot construction, from graphite to aluminum; review of strength, magnetic properties, EMI shielding capabilities.
- User Interface – User interface options, from haptics to voice recognition.
- Resources – Where to find components, tools, and more information.

After attending the session, attendees will be able to:

- Understand the components common to all robotics development projects
- Understand the issues related to component selection and application
- Know where to turn for additional information

EXHIBITS**EXHIBITS SCHEDULE****Wednesday, February 7**

10:15AM — 10:45AM Exhibits open. Break in exhibit ballroom

[Exhibits closed during lunch break.]

3:00PM — 3:30PM Break in exhibit ballroom
 4:30PM Exhibits close for reception set-up
 5:30PM — 6:30PM EXHIBITOR RECEPTION

Thursday, February 8

10:00AM — 10:45AM Exhibits re-open. Break in exhibit ballroom

[Exhibits closed during lunch break.]

3:30PM — 3:50PM Break in exhibit ballroom
 4:00PM Exhibits close and dismantle

EXHIBITORS**Booths**

3D Image Tek
www.3DImageTek.com

B-Line Medical
www.BLineMedical.com

CFD Research Corporation
www.CFDRC.com

Claron Technology, Inc.
www.ClaronTech.com

D'Ambra Technologies
www.DAmbraTec.com

Force Dimension
www.ForceDimension.com

Handshake VR, Inc.
www.HandshakeVR.com

Hypercosm Medical LLOC
www.Hypercosm.com

Pacific Telehealth & Technology Hui
www.PacificHui.org

PhoeniX Technologies, Inc.
www.PTIPhoeniX.com

SensAble Technologies
www.SensAble.com

SenseGraphics AB
www.SenseGraphics.com

TATRC
www.TATRC.org

TrueVision Systems
www.TrueVisionSys.com

Wolters Kluwer Health –
Lippincott Williams & Wilkins
www.WoltersKluwer.com

Table Tops

Art Center College of Design
www.ArtCenter.edu

Society for Simulation in Healthcare
www.SSIH.org

Fundamentals of Laparoscopic
Surgery – SAGES
www.SAGES.org

CIMIT
www.CIMIT.org

Endotracheal Intubation Training using Virtual
Images:
www.medccat.org