

**C O U R S E   S Y L L A B U S**

**MMVR13**

THE 13<sup>TH</sup> ANNUAL  
**MEDICINE MEETS  
VIRTUAL REALITY**  
CONFERENCE



THE  
MAGICAL  
NEXT  
BECOMES  
THE  
MEDICAL  
NOW

**ORGANIZED BY**

**AMA, Inc.** Aligned Management Associates, Inc.

**IN PARTNERSHIP WITH:**

**TATRC** Telemedicine & Advanced Technology Research Center,  
U.S. Army Medical Research & Materiel Command

**DARPA** Defense Advanced Research Projects Agency

**METI** Medical Education Technologies, Inc.

**JANUARY 26-29, 2005**

**THE WESTIN LONG BEACH HOTEL  
LONG BEACH, CALIFORNIA**

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U.S. Food and Drug Administration

**Kirby G. Vosburgh PhD \***

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Harvard Medical School

**Dave Warner MD PhD**

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**Suzanne J. Weghorst MA MS \***

Human Interface Technology Lab,  
University of Washington

**Mark D. Wiederhold MD PhD FACP**

The Virtual Reality Medical Center

\* Abstract Review Committee member

# Conference Information

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## WELCOME

Welcome to the 13th annual Medicine Meets Virtual Reality conference.

The **Magical Next Becomes the Medical Now**: participation and contribution at the forefront of medical progress. At MMVR, the magical scenarios created by visionaries are realized through the relentless daily progress of engineers. Clinicians and educators guide application to patient care and medical training. Every year, conference participants make real what was once “magic.” At MMVR, we not only transform the magical next into the medical now, we turn **vision into proficcy**.™

Once again, the MMVR program again reflects the state of the art for surgical simulation and its supporting technologies, modeling and haptics. Presenters will cover a wide gamut of tools, creating a more realistic and useful virtual patient. Simulation is on the verge of revolutionizing surgical training. We are excited that, after years of promise, its potential to make better surgeons is being realized.

There are also diverse presentations on imaging, robotics, and medical data networking. These technologies are helping providers meet the health needs of an expanding and aging global population. Progress in these areas means that economic stringency can be balanced with improved access to medical resources. Patients, physicians, and payers all benefit.

When warfare and terrorism threaten, advanced technologies offer new tools for safety. The best defense is intelligence networks and rapidly focused medical attention. We are pleased to host many presentations that support defense needs.

Lectures, posters, workshops, panels, exhibits, and informal conversation: these means of sharing new ideas are integral to your educational experience during the next few days. Many people have worked long hours to share here what they’ve learned. We hope you gain many new ideas and experiences from them.

## COURSE DESCRIPTION & OBJECTIVES

MMVR13 is designed as a forum for encouraging and sharing innovative research on information-based tools for clinical care and medical education. The program consists of two general sessions, nine parallel sessions, six panel/workshop activities, one poster session, one exhibitor reception, and one full-day adjunct symposium.

Presentations are chosen with the objective of educating participants on:

- State-of-the-art for surgical simulation and its enabling technologies: haptics, tissue modeling, and simulation
- Emerging tools for clinical diagnosis and therapy: imaging tools, data visualization and fusion techniques, and robotics
- Intelligence networks for medical decision-making and patient care

## TARGET AUDIENCE

MMVR13 is designed to educate and inform:

- Physicians, surgeons, and other healthcare professionals interested in emerging and future tools for diagnosis and therapy
- Educators responsible for training the next generation of doctors and scientists
- Computer technologists designing systems for gathering, processing, and networking medical intelligence
- IT and medical device engineers who develop and market state of the art imaging, simulation, robotics, and communication tools
- Military medicine specialists addressing the challenges of warfare and defense health needs
- Biomedical futurists and investors who need to understand where medicine is headed

## ACKNOWLEDGMENTS

The conference organizers wish to thank our colleagues at TATRC/USAMRC for their extensive participation in the conference. The MMVR educational curriculum continues to benefit from their interest and enthusiasm.

Similarly, we acknowledge our colleagues at DARPA for their significant contribution to the program.

We thank Medical Education Technologies, Inc. (METI) for its generous sponsorship of the Satava Award as well as its assistance with program content.

We are grateful to the Organizing Committee for its ongoing encouragement and guidance. We especially thank committee members who review abstracts and thus contribute an extra portion of energy and critical judgment to MMVR. We give additional thanks to the Proceedings editors for giving us their time and expertise.

Last but certainly not least, we thank to all the researchers who present their work here at MMVR. Their shared magic—the magic of discovery—makes this conference possible.

## EVALUATION

We welcome the input of all conference participants. Please complete your conference evaluation before you leave. We carefully take note of your criticism and suggestions when we create next year’s program. Please take a few minutes to write down your reactions, negative and positive, to the conference.

## DISCLAIMER

The information provided at this conference is intended for general medical education purposes only. All physicians should fully investigate any new product or device before implementing it in their practice. In no event will the conference organizer assume responsibility for any decision made or action taken as a result of the information provided through this activity.

## ORGANIZER CONTACT INFO

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### SATAVA AWARD

The 11TH annual Satava Award will be presented at MMVR13. Established in 1995, the award acknowledges the work of Dr Richard M. Satava, its first recipient. It is presented each year to an individual or research group that demonstrates unique vision and commitment to the improvement of medicine with advanced technology. Past recipients of the award are:

Steve Dawson MD (2004)  
Richard Robb PhD (2003)  
SUMMIT Lab, Stanford University (2002)  
HIT Lab, University of Washington (2001)  
Dave Warner MD PhD (2000)  
Faina Shtern MD (1999)  
Gerhard Buess MD (1998)  
Henry Fuchs PhD (1997)  
Victor Spitzer PhD and Michael Ackerman PhD for the  
Visible Human (1996)  
Richard Satava MD FACS (1995)

Medical Education Technologies, Inc. ([www.meti.com](http://www.meti.com)) is sponsoring the 11th annual Satava Award with a prize of \$2500.

# Presentation Schedule

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## WEDNESDAY, January 26, 2005

8:00am–5:30pm

**PRINCIPAL INVESTIGATORS' REVIEW 2005**  
 Telemedicine & Advanced Technology  
 Research Center  
 US Army Medical Research & Materiel Command  
 (TATRC/USAMRMC)

[Please see separate TATRC agenda for details.]

6:00pm–7:30pm

**TATRC Networking Social**

## THURSDAY MORNING, January 27, 2005

### GENERAL SESSION

8:00 Welcome  
 James D. Westwood and Karen S. Morgan  
*Aligned Management Associates, Inc.*

8:05 Beyond VR: Creating the Augmented Physician  
 Kirby G. Vosburgh PhD  
*CIMIT/Massachusetts Gen Hosp/Harvard Medical Sch*

### **CURRENT ADVANCED INITIATIVES IN THE DoD – THE DARPA PORTFOLIO**

*Moderator:*  
 Richard M. Satava MD FACS

8:25 Introduction  
 Richard M. Satava MD FACS  
*Surgery, Univ Washington; DARPA*

8:30 Intelligent Multimodal Volume Angio CT (IM-VAC)  
 Harvey C. Eisenberg MD  
*HealthView Inc.*

8:45 Virtual Soldier  
 Brian D. Athey PhD  
*Michigan Ctr for Biological Information, Univ Michigan*

9:00 Trauma Pod  
 Pablo Garcia PhD  
*SRI Intl*

9:15 Virtual Autopsy  
 CDR Craig T. Mallak MD JD  
*Off Armed Forces Medical Examiner  
 Armed Forces Inst Pathology*

9:30 Intelli-Cath: Toward Automated Needle-Insertion  
 Systems and Intelligent Catheters  
 Thomas L. Ferrell PhD & François G. Pin PhD  
*Oak Ridge Natl Lab*

9:45 Auto Anesthesia  
 S. Ward Casscells MD & Jodie L. Conyers PhD  
*Univ Texas Health Science Ctr - Houston*

10:00 Break - Exhibits Open

### GENERAL SESSION

*(continued)*

*Moderator:*  
 Kirby G. Vosburgh PhD

10:40 When Does the Magical Next become the Medical  
 Now? A Brief History of NIST Investment in VR  
 Omid Omidvar PhD  
*Advanced Technology Program,  
 Natl Inst Standards and Technology (NIST)*

11:00 Brain and Mind - Therapy and Change  
 Ian Alger MD  
*New York Presbyterian Hosp; Weill Medical Coll of  
 Cornell Univ*

11:20 The Effect of Videogame "Warm-Up" on the  
 Performance of Video-Endoscopic Surgery Tasks  
 James "Butch" Rosser, Jr. MD FACS  
*Advanced Medical Technology Inst,  
 Beth Israel Medical Center*

11:40 Remote Presence Robotics: Multiplying Physician  
 Capabilities  
 Yulun Wang PhD  
*InTouch Health Inc.*

12:00 Break

## THURSDAY MORNING, January 27, 2005

### SESSION B

10:10am–12noon  
**PANEL/WORKSHOP:  
 EMERGING TRENDS IN MEDICAL SIMULATION:  
 IDENTIFYING THE NEEDS OF THE  
 MEDICAL COMMUNITY AND METHODS TO  
 ADDRESS THEM**

*Presenters:*  
 Alan Liu PhD  
*Natl Capital Area Medical Simulation Ctr,  
 Uniformed Services Univ*

Mark Bowyer MD  
*Natl Capital Area Medical Simulation Ctr,  
 Uniformed Services Univ*

Mark W. Scerbo PhD  
*Psychology, Old Dominion Univ*

Dale C. Alverson MD  
*Ctr for Telehealth, Univ New Mexico Sch Medicine*

**THURSDAY AFTERNOON, January 27, 2005**

**SESSION A - HAPTICS**

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*Moderator:*

Roger Phillips PhD

- 1:10 Moderator's Welcome
- 1:15 A Dynamic Friction Model for Haptic Simulation of Needle Insertion  
Yinghui Zhang  
*Computer Science, Univ Hull (UK)*
- 1:30 A Real-Time Haptic Interface for Interventional Radiology Procedures  
Thomas Moix, Dipl-Ing  
*LSRO, Ecole Polytechnique Federal de Lausanne*
- 1:45 In Vivo Force during Arterial Interventional Radiology Needle Puncture Procedures  
Andrew Healey MBChB  
*Royal Liverpool Univ Hosp*
- 2:00 Dynamic Augmented Reality for Haptic Display in Robot-Assisted Surgical Systems  
Takintope Akinbiyi BS  
*Mechanical Engineering, Johns Hopkins Univ*
- 2:15 Stiffness and Texture Perception for Teledermatology  
Christopher Enedah MS  
*Mechanical Engineering, Stanford Univ*
- 2:30 Real-Time Haptic Interface for VR Colonoscopy Simulation  
Dejan Ilic, Dipl-Ing  
*LSRO, Ecole Polytechnique Federal de Lausanne*
- 2:45 Break

**SESSION A - ROBOTICS**

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*Moderator:*

Steve Charles MD

- 3:00 Spherical Mechanism Analysis of a Surgical Robot for Minimally Invasive Surgery - Analytical and Experimental Approaches  
Jacob Rosen PhD  
*Electrical Engineering, Univ Washington*
- 3:15 Improving In Vivo Robot Vision Quality  
Jason Dumpert  
*Mechanical Engineering, Univ Nebraska – Lincoln*
- 3:30 Development of a Navigation Function for an Endoscopic Robot Surgery System  
Asaki Hattori PhD  
*Inst High Dimensional Medical Imaging, Jikei Univ Sch Medicine*

- 3:45 Toward In Vivo Wheeled Mobility  
Mark Rentschler MS  
*Mechanical Engineering, Univ Nebraska – Lincoln*

**SESSION A - VISUALIZATION**

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- 4:00 Development of a 3D Visualization System for Surgical Field Deformation using Geometric Pattern Projection  
Mitsuhiro Hayashibe MS  
*Inst High Dimensional Medical Imaging, Jikei Univ Sch Medicine*
- 4:15 The Use of the Synchrotron to Generate 3D Computer Models of Anatomical Structures  
Eric Herbranson DDS  
*Endodontics, Univ Pacific Sch Dentistry*
- 4:30 Dynamic Visualization of Pelvic Floor Contractility of the Female Derived from Multi-Planar MR Imaging  
Chris Constantinou PhD  
*Urology, Stanford Univ Medical Sch*
- 4:45 Hybrid CT and 3D Scanner Models for Orthognathic Surgery Planning  
Jonas Chapuis MSc  
*Surgical Instruments, ME Muller Research Ctr for Orthopaedic Surgery*
- 5:00 Integration of a Real-time 3D Image-Guided Breast Surgical System based on 2D Ultrasound Machine  
Yan Kang PhD  
*Neurosurgery, Stanford Univ*

5:15 Break

**THURSDAY AFTERNOON, January 27, 2005**

**SESSION B - SIMULATOR TRAINING FUNDAMENTALS**

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*Moderator:*

Randy S. Haluck MD FACS

- 1:10 Moderator's Welcome
- 1:15 Virtual Training Improves Students' Knowledge Structures of Medical Concepts  
Susan M. Stevens  
*Psychology, Univ New Mexico*
- 1:30 The Effect of Knowledge Transfer on the Acquisition of Intracorporeal Suturing Skill  
Paul Lynch MD  
*Advanced Medical Technology Inst, Beth Israel Medical Ctr*
- 1:45 Does Haptic Feedback Enhance Performance in Invasive Image Guided Simulator Training?  
Pär Ström MD  
*Div of Orthopedics, Ctr for Surgical Sciences and Ctr for Advanced Medical Simulation, Karolinska Inst*
- Continued*

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| <p>2:00      Learning to Use a Simulated Angled Laparoscope: How Practice Moderates Individual Differences<br/>Madeleine Keehner PhD<br/><i>Psychology, Univ California, Santa Barbara</i></p> <p><b><u>SESSION B - SIMULATOR DEVELOPMENT TOOLS</u></b></p> <p>2:15      Dynamic Generation of Surgery Specific Simulators - A Feasibility Study<br/>Eric Acosta MS<br/><i>Computer Science, Texas Tech Univ</i></p> <p>2:30      Assessing Surgical Skill Training under Hazardous Conditions in a Virtual Environment<br/>Mark W. Scerbo PhD<br/><i>Psychology, Old Dominion Univ</i></p> <p>2:45      Laparoscopic Task Recognition using Hidden Markov Models<br/>Aristotelis Dosis MSc<br/><i>Surgical Oncology and Technology, Imperial Coll London</i></p> <p>3:00      Simulating Surgical Incisions without Polygon Subdivision<br/>Yogendra Bhasin MSEE<br/><i>Natl Capital Area Medical Simulation Ctr, Uniformed Services Univ</i></p> <p>3:15      Break</p> <p><b><u>SESSION B - SURGICAL MODELING</u></b></p> <p><i>Moderator:</i><br/>Makoto Nonaka MD PhD</p> <p>3:30      A GPU Accelerated Spring Mass System for Surgical Simulation<br/>Jesper Mosegaard MSc<br/><i>Computer Science, Univ Aarhus</i></p> <p>3:45      Enhanced Pre-Computed Finite Element Models for Surgical Simulation<br/>Hualiang Zhong PhD<br/><i>Advanced Imaging Labs, Roberts Research Inst</i></p> <p>4:00      FEM-Based Soft Tissue Destruction Model for Ablation Simulator<br/>Naoto Kume PhD (Cand)<br/><i>Graduate Sch Informatics, Kyoto Univ</i></p> <p>4:15      Tearing of Membranes for Interactive Real-Time Surgical Training<br/>Johannes Grimm<br/><i>ICM-Inst Computational Medicine, Univ Mannheim</i></p> <p>4:30      Development of a Method for Surface and Subsurface Modeling using Force and Position Sensors<br/>Thenkurussi Kesavadas PhD<br/><i>Mechanical and Aerospace Engineering, State Univ New York at Buffalo</i></p> | <p>4:45      Towards Real-Time Interventional Simulation of Balloon Angioplasty and Stenting<br/>Patricia Debergue PhD<br/><i>Industrial Materials Inst, Natl Research Council Canada</i></p> <p>5:00      A Mechanical Contact Model for the Simulation of Obstetric Forceps Delivery in a Virtual/Augmented Environment<br/>Rudy Lapeer PhD<br/><i>Sch Computing Sciences, Univ East Anglia</i></p> <p>5:15      Break</p> <p><b>THURSDAY AFTERNOON, January 27, 2005</b></p> <p><b><u>SESSION C</u></b></p> <p>1:10pm-5:00pm</p> <p><b><u>PANEL - NATIONAL SECURITY AND VIRTUAL REALITY</u></b></p> <p>Presentations:</p> <p>Overview of Virtual Reality and National Security<br/>Joseph Rosen MD<br/><i>Surgery, Dartmouth-Hitchcock Medical Ctr<br/>Thayer Sch Engineering, Dartmouth Coll</i></p> <p>Tele-Immersion and Command and Control for National Security<br/>Jaron Lanier<br/><i>SGL; Intl Computer Science Inst</i></p> <p>Training of First Responders for CBRNE<br/>Joseph Henderson MD<br/><i>Interactive Media Lab, Dartmouth Medical Sch</i></p> <p>Visualization of CBRNE Response Scenarios using Wide Area Virtual Environment (WAVE)<br/>Alan Liu PhD<br/><i>Natl Capital Area Medical Simulation Ctr, Uniformed Services Univ</i></p> <p>Disaster Management at a Distance using Teleoperations and enabling First Responders with Hand-Held Devices<br/>Ronald Merrell MD FACS<br/><i>Medical Informatics and Technology Applications Consortium; Surgery, Virginia Commonwealth Univ</i></p> <p>Point of Care Devices for Disaster Response<br/>Alex Demas<br/><i>Middlebury Coll</i></p> <p>Understanding the Response to 9/11 at the Pentagon and How We Will Respond to Future Medical Disasters<br/>COL James A. Geiling MD FACP<br/><i>Assoc Prof Medicine, White River Junction Veterans Administration Medical Center</i></p> |
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## THURSDAY EVENING POSTERS

5:15pm–6:30pm

### POSTER SESSION

Virtual Reality Colonoscopy Simulation: A Compulsory Practice for the Future Colonoscopist?

Gunnar Ahlberg MD  
*Surgery, Karolinska Hosp, Stockholm*

Desktop and Conference Room VR for Physicians  
Zhuming Ai PhD

*Biomedical and Health Information Sciences, Univ Illinois at Chicago*

An Augmented Reality System to Enhance Intraoperative Visualization for Computer Assisted Neurosurgery

Mohammed E. Alam MS  
*Neurosurgery, Wayne State Univ*

Can the Minimally Invasive Surgical Trainer Virtual Reality (MIST-VR) Discriminate between Levels of Surgical Experience?

Dimitrios V. Avgerinos MD  
*Surgery, Tufts-New England Medical Ctr*

Surface Scanning Soft Tissues  
Nick Avis PhD

*Sch Computer Science, Cardiff Univ*

Predicting Cognitive Performance of Deploying Health Teams

Bettina A. Babbitt PhD  
*UsabilityMDx*

Validation of a Bovine Rectal Palpation Simulator for Training Veterinary Students

Sarah Baillie MSc MRCVS  
*Computing Science, Univ Glasgow*

Facial Plastic Surgery Planning using a 3D Surface Deformation Tool

Fernando Bello PhD  
*Surgical Oncology and Technology, Imperial Coll London*

Design of a Hybrid-Virtual, Computer-Assisted Knee Injection Model for Orthopaedic Surgical Simulation

Joseph Benevenia MD  
*Orthopaedics, New Jersey Medical Sch*

3D Real-Time FEM-Based Guide-Wire Simulator for Neuro-Endovascular Surgery

Suraj Bhat MS  
*Mechanical and Aerospace Engineering, State Univ New York at Buffalo*

Tracking Physiological Models by Kalman Filters

Fred Bookstein PhD  
*Univ Michigan*

Validation of SimPL - A Simulator for Diagnostic Peritoneal Lavage Training

Mark Bowyer MD  
*Natl Capital Area Medical Simulation Ctr, Uniformed Services Univ*

A Web-Based Remote Collaborative System for Visualization and Assessment of Semi-Automatic Diagnosis of Liver Cancer from CT Images

Alexandra Branzan Albu PhD  
*Electrical and Computer Engineering, Univ Laval*

3D Video Assisted Thoracoscopic Surgical (VATS) Training Model: Comparison of Error Rates and Task Completion Times using Zero Latency, High Resolution 3D Display vs. 2D Video Display

Derek Brinster MD  
*Surgery, Brigham and Women's Hosp*

A Haptically Enabled Dental Simulator

W. Paul Brown DDS  
*Natl Biocomputation Ctr, Stanford Univ*

Application of a Collaborative Virtual Environment for Learning Molecular Biology

Cesar Bustos MS  
*Virtual Reality Laboratory, Univ Colima*

Heterogeneous Displays for Surgery and Surgical Simulation

Jesus Caban BA  
*Computer Science, Univ Kentucky*

Visualization of Treatment Evolution using Hardware-Accelerated Morphs

Bruno Carvalho PhD  
*Computer Science, Stevens Inst Technology*

Shape Statistics Mumford-Shah Model for Outer Contour Segmentation of the Left Ventricle MR Image

Qiang Chen PhD (Cand)  
*Computer Dept, Nanjing Univ Science and Technology*

Real-time Rendering of Radially Distorted Virtual Scenes for Endoscopic Image Augmentation

Min Si Chen MSc  
*Sch Computing Sciences, Univ East Anglia*

Can 3D Imaging System be Used as a Tool in the Learning Process of the Young Minimal Invasive Surgeon?

Amir Cohen MD  
*Surgery, Chaim Sheba Medical Ctr*

*Continued*



**THURSDAY EVENING POSTERS (Cont.)**

Tracking the Domain: The Medical Modeling and Simulation Database

C. Donald Combs PhD

*Natl Ctr for Collaboration in Medical Modeling and Simulation*

Development of Simulation Technology for Microgravity Emergency Medical Procedures

C. Marsh Cuttino MD

*Emergency Medicine, Virginia Commonwealth Univ Medical Ctr*

Real-Time Interactions with Reconstructed Deformable Organs

Lucio Tommasso De Paolis PhD

*Innovation Engineering, Univ Lecce, Italy*

Structural Flexibility of Laparoscopic Instruments: Implication for the Design of Virtual Reality Simulators

Adam Dubrowski PhD

*Surgery, Univ Toronto*

Intraoperative Augmented Reality: The Surgeon's View

Georg Eggers MD DMD

*Cranio-Maxillofacial Surgery, Heidelberg Univ*

Analytic Simulation of Penetrating Wounds to the Heart

Robert Eisler, Engr.

*Applied Mechanics and Material Sciences Group, ATK Mission Research Corporation*

Haptic Simulation of the Milling Process in Skull Bone Operations - Modeling of Contact Forces

Magnus Eriksson PhD (Cand)

*Mechatronics, Dept of Machine Design, Royal Inst Technology - KTH*

E-Learning Experience: Teaching Model with Undergraduate Surgery Students in a Developing Country

Andres Espinosa-Bode MD

*Medical Education, Univ Colegio Mayor de Nuestra Señora del Rosario*

A Real-Time Ultrasonography Simulator based on CT-Scan Images

Clément Forest PhD

*VIRTUALS, IRCAD*

Modeling Biologic Soft Tissues for Haptic Feedback with a Hybrid Multi-Resolution Method

Antonio Frisoli PhD

*PERCRO (PERceptual ROBotics), Scuola Superiore Sant'Anna*

Face Validity a Full Procedural Virtual Reality Training System with Haptics for Carotid Stenting: The Vascular Interventional System Trainer (VIST) for Carotid Stenting

Anthony Gallagher PhD

*Endosurgery Unit, Emory Univ*

Global Treatment Protocol Course via Advanced Distributive Learning and Deployable Simulation Training for Operational Medical Personnel: Making Training Cost-Effective and Innovative

Roberta S. Gearhardt RN

*JXT Applications Inc.*

Control of Laparoscopic Instrument Motion in an Inanimate Bench Model: Implications for the Training and Evaluation of Technical Skills

David Gonzalez PhD (Cand)

*Kinesiology, Univ Waterloo*

Interactive Real-Time Simulation of an Endoscopic Polyp Removal

Johannes Grimm

*ICM-Inst Computational Medicine, Univ Mannheim*

VR Headset-Based eICU

Curt Grob BS

*Advanced Technologies Laboratory, VRSurgeon Inc.*

Determining the Efficacy of an Immersive Trainer for Arthroscopy Skills

Hope S. Hanner-Bailey MS

*Psychology, Old Dominion Univ*

Dynamic Data Collection Platform using VR Training Software and Inanimate Simulator

Brett M. Harnett BS

*Ctr for Surgical Innovation, Univ Cincinnati*

Using an Approximation to the Euclidean Skeleton for Faster Collision Detection and Tissue Deformations in Surgical Simulators

Matthew Harris

*Computer Science, Millersville Univ*

Surgical Robot Setup Simulation with Consistent Kinematics and Haptics for Abdominal Surgery

Mitsuhiro Hayashibe MS

*Inst High Dimensional Medical Imaging, Jikei Univ Sch Medicine*

Collaborative Biomedical Data Exploration in Distributed Virtual Environments

Zhiyu He PhD

*Ctr for Visualization and Interactive Systems (CVIS), California Inst Telecommunications and Information Technology (Cal-[IT]2); Univ California, Irvine*

*Continued*

**THURSDAY EVENING POSTERS (Cont.)**

An Augmented Reality System to Evaluate the Effects of Monocular Visual Feedback Delay on Telesurgical Task Performance

Barry Herman MSE (Cand)  
*Computer Science, Johns Hopkins Univ; Walter Reed Army Medical Ctr*

The Use of CD-ROM Patient Education Modules to Assist in Accomplishing Informed Consent for Minimally Invasive Procedures: An Initial Evaluation

Bjorn Herman  
*Beth Israel Medical Ctr*

Image Analysis for Preoperative Planning in Neck Surgery

Ilka Hertel  
*ORL, Innovation Ctr Computer Assisted Surgery (ICCAS)*

3D Finite-Element Quantification of Echocardiogram Data: A Study in Pediatric Heart Disease

Don Hilbelink PhD  
*Anatomy, Univ South Florida*

The Virtual Pediatric Standardized Patient Application: Evaluation Findings

Robert Hubal PhD  
*Technology Assisted Learning Div, RTI Intl*

A Networked Haptic Virtual Environment for Teaching Temporal Bone Surgery

Matthew Hutchins PhD  
*ICT Centre, CSIRO Australia*

A Cyber Infrastructure to Support Physics Based Organ Geometries for Surgical Planning

Thomas J. Impelluso PhD  
*Mechanical Engineering, San Diego State Univ*

Adaptive Soft Tissue Deformation for a Virtual Reality Surgical Trainer

Lenka Jerabkova, Dipl-Ing  
*Virtual Reality, Ctr for Computing and Communication, RWTH Aachen Univ*

Simulation of Color Deficiency in Virtual Reality

Bei Jin MS  
*Biomedical and Health Information Sciences, Univ Illinois at Chicago*

ChiroSensor - An Array of Non-Invasive sEMG Electrodes

Edmond Jonckheere PhD  
*Electrical Engineering & Mathematics, Univ Southern California*

Visualization of Surgical 3D Information with Projector-Based Augmented Reality

Lüder Alexander Kahrs, Dipl-Phys  
*Inst Process Control and Robotics, Univ Karlsruhe(TH)*

Fullscale Simulation in Interventional Cardiology

Erhard Kaiser MD  
*Medical Department, Cardiology, Johannes Gutenberg Univ Mainz*

The Haptic Kymograph: A Diagnostic Tele-Haptic Device for Sensation of Vital Signs

Thenkurussi Kesavadas PhD  
*Mechanical and Aerospace Engineering, State Univ New York at Buffalo*

A Realistic Dental Simulation via Haptic Interface

Laehyun Kim PhD  
*System Research Div, Korea Inst Science and Technology*

International Telemedicine using Next Generation Internet Technologies and Digital Video Transport System

Young-Woo Kim MD PhD  
*Ctr for Gastric Cancer, Natl Cancer Ctr*

Aligning Expectations in Strategic Alliances for Disruptive Technology

Sharon Klein JD  
*Pepper Hamilton LLP*

A Study of Displaying Video Images for the Manipulation of Forceps under Video Images

Soichi Kono BSE  
*Information Science and Electrical Engineering, Kyushu Univ*

Innate Tremor Measurements Predict Laparoscopic Performance

James R. Korndorffer, Jr MD  
*Surgery, Tulane Health Sciences Ctr*

A CT-Based System to Calculate Range of Motion of the Hip Joint and to Simulate the Femoroacetabular Reshaping

Monika Kubiak-Langer PhD (Cand)  
*ME Müller Research Ctr for Orthopaedic Surgery, Inst Surgical Technology and Biomechanics, Univ Bern*

The VREST Learning Environment

Eduard E. Kunst PhD  
*Kunst & van Leerdam Medical Technology bv*

MVL: Medical VR Simulation Library

Yoshihiro Kuroda MS  
*Graduate Sch Informatics, Kyoto Univ*

Instant Electronic Patient Data Input during Emergency Response in a Major Disaster Setting

Christophe Laurent MD  
*Emergency Medicine, Monica General Hosp*

*Continued*

**THURSDAY EVENING POSTERS (Cont.)**

Haptic Device for Colonoscopy Training Simulator  
 Doo Yong Lee PhD  
*Mechanical Engineering, Korea Advanced Inst Science and Technology*

In PACS System, Breast Cancer Diagnosis using Ultrasound Image  
 Jeanhyoun Lee PhD  
*Development, Marotech Inc.*

Predicting the Cognitive Readiness of Deploying Health Teams  
 Joseph B. Lyons MS  
*JXT Applications Inc.*

Laparoscopy Surgery Simulation and Training with Telementoring  
 Ramesh Makam DNB  
*Laparoscopy, Bangalore Endoscopic Surgery Training Inst and Research Centre*

Low Cost Telemedicine Delivery in a Military and Veteran Environment  
 Ann Martin  
*Univ Queensland; Centre for Military and Veterans Health*

Real-time Visualization of Cross-sectional Data in 3D  
 Terrence Mayes BS  
*Concept Exploration Laboratory, NASA/JSC, Barrios Inc.*

LapSim: A Learning Environment for Both Experts and Novices  
 James J. McGinty MD  
*Surgery, St. Luke's-Roosevelt Hosp Ctr*

Representing the Holomer on Digital Media: Challenges and Opportunities for Data Representation and Compression  
 Thomas G. Menten PhD  
*Crowley Davis Research*

Clinical Information from Telemedicine on the Field of Oriental Traditional Medicine  
 Iwane Mitsui MD  
*Alternative Medicine, Mitsui Medical Clinic*

Use of Virtual Environments and VR Technology in Behavioral Health: Is the Bang Worth the Bucks?  
 Sarah Miyahira PhD  
*Intramural Research, Pacific Telehealth & Technology Hui*

From Puma of Unimation 6000 Robot to Tonatiuh Robot  
 José Luis Mosso MD  
*ISSSTE / IMSS / CONACY*

Interactive 3D Region Extraction of Volume Data Using Deformable Boundary Object  
 Megumi Nakao PhD  
*Medical Informatics, Kyoto Univ Hosp*

Virtual Surgical Telesimulations in Otolaryngology  
 Andrés A. Navarro Newball MSc  
*Computer Science, Univ Javeriana, Cali*

Evaluation of 3D Airway Imaging of Obstructive Sleep Apnea with Cone-Beam Computed Tomography  
 Takumi Ogawa PhD  
*Orofacial Pain/Oral Medicine Div of Diagnostic Science, Sch Dentistry, Univ Southern California*

A Deformer-Based Surgical Simulator Program for Cleft Lip and Palate Surgery  
 Aaron Olikier MS  
*Inst Reconstructive Plastic Surgery, New York Univ Medical Ctr*

PC Simulated Patients for Training Difficult Diagnosis and Treatment Protocols  
 Dale Olsen PhD  
*SIMmersion LLC*

Multi-Sensory Surgical Support System Incorporating Tactile, Visual and Auditory Perception Modalities  
 Sadao Omata PhD  
*NEWCAT Inst, Nihon Univ*

A Web Service-Based Computational Environment for Biomedical Computing  
 Line Pouchard  
*Computer Science and Mathematics Div, Oak Ridge Natl Laboratory*

Surgical Task Execution in Microgravity  
 Azhar Rafiq MD MBA  
*Surgery, Medical Informatics and Technology Applications Consortium*

Smart Catheter Vascular Access Training Concepts  
 Robert C. Read MBA  
*Clinical Applications Div, TATRC, USMRMC*

A Wireless Vital Signs System for Combat Casualties  
 Peter Rhee MD MPH FACS  
*Navy Trauma Training Ctr, LA County Hosp & Univ Southern California*

3D Model for Haptic Rendering of Blood-Tissue Interaction  
 Sugeng Rianto MD  
*Medical Imaging, Curtin Univ Technology*

A Novel Drill Set for the Enhancement and Assessment for Robotic Surgical Performance  
 Charles Ro MD  
*Surgery, St. Luke's-Roosevelt Hosp Ctr*

*Continued*

**THURSDAY EVENING POSTERS (Cont.)**

Advanced Modeling and Visualization of  
Cardiothoracic Electrical Fields

Frank B. Sachse, Dr-Ing

*Nora Eccles Harrison*

*Cardiovascular Research and Training Inst, Univ Utah*

COCOON: Building Knowledge Driven and  
Dynamically Networked Communities within  
European Healthcare Systems

Alberto Savoldelli

*Management Engineering, Politecnico of Milan*

Visualizing Volumetric Data Sets using a Wireless  
Handheld Computer

Steven Senger PhD

*Computer Science, Univ Wisconsin - La Crosse*

Affordable Virtual Environments: Building a Virtual  
Beach for Clinical Use

Andrei Sherstyuk PhD

*Telehealth Research Inst, Univ Hawaii*

Analysis of Masticatory Condition using the  
4D Muscle Model for a Patient with a  
Square Mandible

Yuhko Shigeta DDS DSc

*Fixed Prosthodontics, Tsurumi Univ Sch Dental Medicine*

Automated Renderer for Visible Human and  
Volumetric Scan Segmentations

Jonathan Silverstein MD

*Surgery, Univ Chicago*

Assessment of Brain Activities in Immersive  
Environments

Jeff Singleton

*CSIS, Kennesaw State Univ*

Monitor Height Affects Surgeons' Stress Level and  
Performance on Minimally Invasive Surgery Tasks

Warren Smith PhD

*Electrical and Electronic Engineering,*

*California State Univ, Sacramento*

The Physiology and Pharmacology of Growing  
Old, as Shown in Body Simulation

N. Ty Smith MD

*Univ California, San Diego*

Instrumentation and Software of an EIT System

Manuchehr Soleimani PhD

*SUBQVIEW Inc.*

Electrical Resistance Tomography of a Two  
Phase Material

Manuchehr Soleimani PhD

*SUBQVIEW Inc.*

A Web-Based Virtual 3D World for Team Training  
in Trauma Management

Sakti Srivastava MBBS MS

*SUMMIT, Stanford Univ Sch Medicine*

An Automatic Robust Meshing Algorithm for Soft  
Tissue Modeling

Gunther Sudra, Dipl Wi-Ing

*Computer Science - IRF, Univ Karlsruhe (TH)*

Emotional and Performance Attributes of a VR  
Game: A Study of Children

Evan Suma

*Mathematics and Computer Science, Ithaca Coll*

Development of a Virtual Surgery System using  
Volume Data

Takahiro Takimoto BS

*Graduate Sch Science and Engineering, Waseda Univ*

Haptic Interaction and Visualization of Elastic  
Deformation

Farnoosh Tavakkoli Attar MEng

*Canadian Surgical Technologies and Advanced*

*Robotics (CSTAR) and Electrical and Computer*

*Engineering, Univ Western Ontario*

Haptic Laparoscopic Skills Trainer with Practical  
User Evaluation Metrics

Bharti Temkin PhD

*Computer Science, Texas Tech Univ*

Segmenting Deformable Surface Models using  
Haptic Feedback

Praveen Thiagarajan PhD

*Electrical and Computer Engineering, Univ Delaware*

Parametric Model of the Scala Tympani for  
Haptic-Rendered Cochlear Implantation

Catherine Todd BEE

*Sch Electrical, Computer and Telecommunications*

*Engineering, Univ Wollongong*

Image Analysis-Based Approach for Localization  
of Endoscopic Tools

Oliver Tonet PhD

*CRIM - Centre for Research in Microengineering,*

*Scuola Superiore Sant'Anna*

Tangible Interfaces for Facilitating Collaborative  
Medical Visualizations

Brygg Ullmer PhD

*Visualization, Zuse Inst Berlin (ZIB)*

Simulation-Based Training for Laparoscopic  
Intracorporeal Suturing in Medical Students: Can  
We Predict Their Performance?

Kent R. Van Sickle MD

*Surgery, Emory Univ*

*Continued*

**THURSDAY EVENING POSTERS (Cont.)**

- Simulating the Curvilinear Capsulorhexis Cataract Procedure on the EYESI System  
 Roger Webster PhD  
*Computer Science, Millersville Univ*
- Validation/Dissemination of Temporal Bone Dissection Simulation  
 Gregory Wiet MD  
*Otolaryngology, Children's Hosp-Columbus*
- Virtual Surgical Planning and CAD/CAM in the Treatment of Cranial Defects  
 John Winder PhD  
*Applied Medical Sciences & Sports Studies, Univ Ulster*
- CAD Generated Mold for Preoperative Implant Fabrication in Cranioplasty  
 Joerg Wulf MD  
*Anatomy, Univ Luebeck*
- Effect of Binocular Stereopsis on Surgical Manipulation Performance and Fatigue when using a Stereoscopic Endoscope  
 Yasushi Yamauchi PhD  
*Inst Human Science & Biomedical Engineering, AIST*
- Cardiac Magnetic Resonance Images Automatic Segmentation based on MRF Models and Clustering incorporating a Shape Function + Cardiac MR Image Segmentation and Left Ventricle Surface Reconstruction based on Level Set Method  
 Jianjie You MS  
*Computer Dept, Nanjing Univ Science and Technology*

**THURSDAY EVENING January 27, 2005**

6:30 – 7:30 PM

**EXHIBITOR RECEPTION**

**FRIDAY MORNING, January 28, 2005**

**SESSION A - INFORMATION-GUIDED THERAPIES**

*Moderator:*  
 Ramin Shahidi PhD

- 8:00 Moderator's Welcome
- 8:05 Image Guided Surgery: Recent Trends  
 Kirby G. Vosburgh PhD  
*CIMIT/Massachusetts General Hosp/Harvard Medical Sch*
- 8:20 Tumor Detection through Optical Tomography Methods in a 3D Depth Extraction Endoscope  
 Henry Fuchs PhD  
*Computer Science, Univ of North Carolina*
- 8:35 Estimation of Dislocation after Total Hip Arthroplasty by 4D Hip Motion Analysis  
 Yoshito Otake MS  
*Inst High Dimensional Medical Imaging, Jikei Univ Sch Medicine*
- 8:50 vizDrive: A Novel Hand-Immersed Paradigm for Interactive Medical Image Acquisition  
 Rakesh Mullick PhD  
*Imaging Technologies, GE Global Research Ctr*
- 9:05 The Mini-Screen: An Innovative Device for Computer-Assisted Surgery Systems  
 Benoit Mansoux PhD (Cand)  
*IHM Team, CLIPS-IMAG*
- 9:20 First Clinical Tests with the Augmented Reality System INPRES  
 Gunther Sudra, Dipl Wi-Ing  
*Computer Science - IRF, Univ Karlsruhe (TH)*
- 9:35 Construction of a High-Tech Operating Room for Image-Guided Surgery using VR  
 Naoki Suzuki PhD  
*Inst High Dimensional Medical Imaging, Jikei Univ Sch Medicine*
- 9:50 Break

10:10 AM – 12 Noon

**PANEL WORKSHOP - MEDICAL MEMETICS MODULATING THE MODERN MEDICAL MIND**

**FRIDAY MORNING, January 28, 2005**

|      |  |       |   |
|------|--|-------|---|
|      |  | 9:40  | Simulation for Teaching Decision Making in Medicine: The Next Step<br>Bruce E. Jarrell MD<br><i>Surgery, Univ Maryland</i>  |
|      | <b>SESSION B -<br/>SIMULATION APPLIED: VR TO OR<br/>A REVIEW OF PROJECTS IN SURGICAL<br/>SIMULATION</b>  |       |   |
|      | <i>Moderator</i><br>Gerry Moses PhD  | 9:50  | Proficiency-Based Training on Simulators: Implications for Definition and Measurement of Competency<br>Anthony G. Gallagher PhD<br><i>Endosurgery Unit, Emory Univ</i>  |
| 8:00 | Welcome and Introduction<br>Gerald R. Moses PhD<br><i>TATRC/USAMRMC</i>  | 10:00 | Break<br><br><i>Moderator:</i><br>Gerry Moses PhD   |
|      | <b>Part One: Validation Studies</b>  |       |   |
| 8:10 | VR to OR for Laparoscopic Cholecystectomy<br>David McClusky III MD<br><i>Surgery, Emory Univ</i>   | 10:15 | Simulation Augmented Decision Support in the Operating Room: The Next Step<br>Dwight Meglan PhD<br><i>SimQuest International LLC</i>  |
| 8:20 | VR to OR for Flexible Ureteroscopy and Laser Lithotripsy<br>Kenneth Ogan MD<br><i>Urology, Emory Univ</i>  | 10:25 | Haptic/VR-Enabled Patient-Specific Surgical Planning in Cardiac MIS: Prospects and Progress<br>Glenn A. Myers PhD<br><i>Immersion Medical Inc.</i>  |
| 8:30 | Proficiency-Based Simulation-Based Training for Suturing and Knot Tying in Nissen Fundoplication<br>Matt Ritter MD<br><i>Natl Capital Area Medical Simulation Ctr, Uniformed Services Univ</i> | 10:35 | VR to OR for Camera Navigation<br>Neal Seymour MD FACS<br><i>Baystate Health System</i>   |
| 8:40 | VR to OR for Endoscopic Sinus Surgery<br>Marvin Fried MD FACS<br><i>Montefiore Medical Ctr; Albert Einstein Coll Medicine</i>  | 10:45 | High Stakes Assessment Using Simulation - An Australian Experience<br>Patrick C. Cregan FRACS<br><i>Nepean Hosp, Wentworth Area Health Service</i>  |
| 8:50 | VR to OR for CATH Lab for Carotid Angiography<br>Christopher U. Cates MD<br><i>Cardiology, Emory Univ</i>  | 10:55 | VR to OR Training for Intracorporeal Suturing<br>Daniel J. Scott MD<br><i>Surgery, Tulane Univ Sch Medicine</i>   |
| 9:00 | VR to OR: A Multicenter Trial for L.C.<br>Anthony G. Gallagher PhD<br><i>Endosurgery Unit, Emory Univ</i>  | 11:05 | <b>Part Two: Panel Discussion</b><br><br><i>Panelists:</i><br><br>Gerald R. Moses PhD<br><i>TATRC/USAMRMC</i><br><br>Gerald B. Healy MD<br><i>Children's Hosp/Harvard Univ</i><br><br>Richard M. Satava<br><i>Surgery, Univ Washington; DARPA</i><br><br>Steven L. Dawson MD<br><i>CIMIT/Massachusetts Gen Hosp/Harvard Medical Sch</i><br><br>Suzanne J. Weghorst MA MS<br><i>HIT Lab, Univ Washington</i> |
| 9:10 | Intravenous Catheter Insertion by 91W Army Medics: Simulation Training and Assessment<br>Howard R. Champion MD<br><i>SimQuest International</i>  |       |   |
| 9:20 | Simulation for Training and Assessment of BNOA Airway Management<br>Matt Ritter MD<br><i>Natl Capital Area Medical Simulation Ctr, Uniformed Services Univ</i>                                 |       |   |
| 9:30 | Preliminary Results of the Carotid Stenting VR Simulation Training Program<br>Christopher U. Cates MD<br><i>Cardiology, Emory Univ</i>   | 12:00 | Break   |

**FRIDAY MORNING, January 28, 2005**

**SESSION C -  
TISSUE & SYSTEM MODELING**

*Moderator:*

Richard A. Robb PhD

8:00 Moderator's Welcome

8:05 Implicit Anatomical Modeling

Jim Miller PhD

*GE Global Research*

8:20 A Biologically Derived Computational Approach to Tissue Modeling

Tim Andersen PhD

*Computer Science, Boise State Univ*

8:35 Creating Models from Segmented Medical Images

William Lorensen MS

*GE Global Research*

8:50 Soft Tissue Deformation using a Nonlinear Hierarchical Finite Element Model with Real-Time Online Refinement

Alessandro Faraci MS

*Surgical Oncology and Technology, Imperial Coll London*

9:05 Multiple Contact Approach to Collision Modeling in Surgical Simulation

Bhautik Joshi ME

*BioMedIA Lab, ICT Centre, CSIRO*

9:20 Improved Virtual Surgical Cutting based on Physical Experiments

Suvranu De PhD

*Mechanical, Aerospace and Nuclear Engineering, Rensselaer Polytechnic Inst*

9:35 Haptic Inguinal Herniorrhaphy Simulation with a Robust and Fast Collision Detection Algorithm

Venkat Devarajan PhD

*Electrical Engineering, Univ Texas at Arlington*

9:50 Dynamic Medical 3D Imaging at the Arctic Region Supercomputing Ctr

Boris R. Bracio PhD

*Ctr for Nanosensor Technology, Univ Alaska Fairbanks*

10:05 Break

*Moderator:*

Don Stredney

10:20 Virtual Multiscale Model of Human Lung Injury from Explosion Blasts

Andrzej Przekwas PhD

*Computational Medicine and Biology Div, CFD Research Corp*

10:35 Computational Simulation of Penetrating Trauma in Biological Soft Tissues using the Material Point Method

Irina Ionescu PhD

*Scientific, Computing and Imaging Inst, Bioengineering, Univ Utah*

10:50 3D Electromechanical Model of Porcine Heart with Penetrating Wound Injury

Taras Usyk PhD

*Bioengineering, UC San Diego*

11:05 The Cardiac Morphometric Markup: A Template for Experimental Cardiology

Fred Bookstein PhD

*Univ Michigan*

11:20 Amending Dynamic Physiological Models to Represent Pathophysiological States

Daniel L. Cook MD PhD

*Physiology & Biophysics, Univ Washington*

11:35 A Highly Integrated Physiology (HIP) Cardiovascular/Respiratory Model Used to Simulate Cardiac Injury

Maxwell Neal BS

*Bioengineering, Univ Washington*

11:50 Predictive Biosimulation and Virtual Patients in Pharmaceutical R&D

Alex Bangs MS

*Entelos Inc.*

12:05 Break

**FRIDAY AFTERNOON, January 28, 2005**

**GENERAL SESSION**

*Moderator:*

Helene M. Hoffman PhD

1:10 Moderator's Welcome

1:15 Poster Bullet Presentations

1:45 Magical Arts of Body Representation

Joyce Cutler-Shaw MFA

*Artist-In-Residence/Visiting Scholar, Sch of Medicine, UC San Diego*

2:05 The Medical Now Becomes the Artifact of the Future: On Building the National Medical Collections

Adrianne Noe PhD

*Natl Museum of Health and Medicine; Armed Forces Inst Pathology*

*Continued*

**FRIDAY AFTERNOON, GENERAL SESSION (Cont.)**

- 2:15 Presentation of the 11th Annual Satava Award
- 2:45 Break
- Moderator:*  
Richard M. Satava MD FACS
- NEXTMED: SYNTHESIZING HUMANS**
- 3:00 Introduction  
Richard M. Satava MD FACS  
*Surgery, Univ Washington; DARPA*
- 3:10 Restoring Sight with Artificial Vision  
James D. Weiland PhD  
*Doheny Retina Institute; Univ Southern California*
- 3:35 New Horizons for Orthotic and Prosthetic Technology: Merging Body and Machine  
Hugh M. Herr PhD  
*Herr Inst Human Rehabilitation; AI Lab, MIT; Harvard Med Sch*
- 4:00 Replacing Damaged Brain Regions with Biomimetic Microelectronic Neural Prostheses to Restore Cognitive Function  
Theodore W. Berger PhD  
*Biomedical Engineering, Univ Southern California*
- 4:25 Altermune: Chemically Programmable Immunity  
Kary B. Mullis PhD  
*Nobel Laureate in Chemistry, 1993*
- 4:50 Discussion
- 5:00 Adjourn

**FRIDAY AFTERNOON, January 28, 2005**

**SESSION B**

- 1:10 – 4:30 PM
- PANEL - INTEROPERABILITY STANDARDS FOR MEDICAL MODELING AND SIMULATION: THE NEED, CHALLENGES AND OPPORTUNITIES**
- Presentations:
- So, You Wanna Make a Real Standard?  
Sandy Ressler  
*Web3D Board of Directors; Natl Institute of Standards and Technology (NIST)*
- Spring: A Case Study of an Open-Source Surgical Simulation Platform  
Kevin Montgomery PhD  
*Natl Biocomputation Ctr, Stanford Univ*

First Steps Towards the Development of an Open Framework for Medical Simulation

Stephane Cotin PhD  
*Simulation Group, CIMIT*

GiPSi: An Open Source/Open Architecture Software Development Framework for Surgical Simulation

Cenk Cavusoglu PhD  
*Electrical Engineering and Computer Sciences, Case Western Reserve Univ*

Making a Case for Simulation Standards

Rick Severinghaus MS  
*Dynamic Animation Systems; Simulation Interoperability Standards Organization*

Building a Medical Modeling and Simulation Paradigm: What Belongs Where and Why!

Lou Keller PhD  
*AGR Concepts LLC*

Ontologies of Anatomy and Physiology - Basis for Causal Modeling Standards

Daniel L. Cook MD PhD  
*Physiology & Biophysics/ Structural Informatics Group, Univ Washington*

**SATURDAY MORNING, January 29, 2005**

**SESSION A - EDUCATION & TRAINING**

*Moderator:*

Helene M. Hoffman PhD

- 8:00 Moderator's Welcome
- 8:05 The Visible Human and Digital Anatomy Learning Initiative  
Parvati Dev PhD  
*SUMMIT, Stanford Univ Medical Sch*
- 8:20 Immersive Visualization for Radiotherapy Treatment Training  
Roger Phillips PhD  
*Computer Science, Univ Hull (UK)*
- 8:35 Emphatic, Interactive Volume Rendering to Support Variance in User Expertise  
Don Stredney  
*Interface Lab, OSC - Ohio Supercomputer Ctr*
- 8:50 Physiologic and Chemical Simulations of Cyanide and Sarin Toxicity and Therapy  
N. Ty Smith MD  
*Univ California, San Diego*

*Continued*



**SATURDAY MORNING, SESSION A (Cont.)**

9:05 Add-On Features in the Simulation of Nerve Gas Casualties: Enhancement of Medical Preparedness for Chemical Warfare Casualties  
Amir Vardi MD  
*Israel Medical Simulation Ctr*

9:20 Developing a Simulation-Based Training Program for Medical First Responders  
Fuji Lai  
*Aptima Inc.*

9:35 Triage Simulator for Emergency Preparedness Training  
Paul Kizakevich MS PE  
*Technology Assisted Learning, RTI Intl*

9:50 Validation of a Web-Based VR Simulation for Training Trauma Teams  
Patricia Youngblood PhD  
*SUMMIT, Stanford Univ Sch Medicine*

10:05 Break  
  
*Moderator:*  
Brenda K. Wiederhold PhD MBA BCIA

**SESSION A - MENTAL HEALTH**

10:20 Welcome  
Brenda K. Wiederhold PhD MBA BCIA  
*Virtual Reality Medical Ctr*

10:25 Luring Patients' Minds Away from their Bodies during Painful Procedures  
Hunter Hoffman PhD  
*Univ Washington*

10:40 VR and the Internet for Eating Disorders and Obesity  
Giuseppe Riva PhD  
*Ist Auxologico Italiano*

10:55 Virtual Reality Testing of Multi-Modal Integration in Schizophrenic Patients  
Anna Sorkin PhD (Cand)  
*Interdisciplinary Ctr for Neural Computation, Hebrew Univ*

11:10 Military Mental Health Applications  
Mark D. Wiederhold MD PhD FACP  
*Virtual Reality Medical Ctr*

11:25 Design and Development of a VR Therapy Application for Iraq War Veterans with PTSD  
Albert "Skip" Rizzo PhD  
*Inst Creative Technologies, Univ Southern California*

11:40 Cognitive Flexibility (Physical and Mental Rehabilitation)  
Walter J. Greenleaf PhD  
*Greenleaf Medical Systems*

11:55 VR Exposure in Anxiety Disorders Treatment  
Brenda Wiederhold PhD MBA BCIA  
*Virtual Reality Medical Ctr*

12:10 Break

**SATURDAY MORNING, January 29, 2005**

**SESSION B -  
MEDICAL SIMULATION – A GLIMPSE OF THE  
NEXT GENERATION**

[From Publish or Perish to Collaborate or Perish]

*Moderator:*  
David M. Hananel

8:00 Systems Integration: Issues and Challenges  
Jay Anton  
*Government Systems and Engineering, Medical Education Technologies, Inc.*

8:15 Simulators and the Medical School Curriculum: Assessing Student Needs  
Carla Pugh MD PhD  
*Surgery, Northwestern Univ*

8:30 Quantitative Procedural Skill Analysis via Vector Quantization and Hidden Markov Modeling  
Jacob Rosen PhD  
*Electrical Engineering, Univ Washington*

8:45 Objective Quantification of Proficiency in Robotic Laparoscopy with Bimanual Inanimate Tasks  
Kenji Narazaki BS  
*Sch HPER, Univ Nebraska at Omaha*

9:00 Fuzzy Classification: Towards Evaluating Performance on a Surgical Simulator  
Jeffrey Huang  
*Sch Engineering Science, Simon Fraser Univ*

9:15 Using an Ontology of Human Anatomy to Inform Reasoning with Geometric Models  
Daniel Rubin MD  
*Stanford Medical Informatics, Stanford Univ*

9:30 Quantifying Risky Behavior in Surgical Simulation  
Christopher Sewell PhD (Cand)  
*AI Lab, Stanford Univ*

9:45 Improving the Visual Realism of Virtual Surgery  
Suvranu De PhD  
*Mechanical, Aerospace, and Nuclear Engineering, Rensselaer Polytechnic Inst*

10:00 Break  
  
*Continued*

**SATURDAY MORNING, SESSION B (Cont.)**

|       |  |       |   |
|-------|--|-------|---|
|       |  | 9:15  | VR Training in Interventional Radiology:<br>The US Experience<br>Steven L. Dawson MD<br><i>CIMIT/Massachusetts Gen Hosp/Harvard Medical Sch</i> |
|       | <i>Moderator:</i><br>Suzanne J. Weghorst MA MS   |       |   |
| 10:15 | A Vision-Based Surgical Tool Tracking Approach<br>for Untethered Surgery Simulation and<br>Training System<br>John C. Hu PhD<br><i>Energid Technologies</i>              | 10:00 | Break   |
|       |  | 10:30 | <b>Academic and Commercial Projects:<br/>Work in Progress Presentations</b>   |
| 10:30 | Smart Tutor: A Pilot Study of a Novel Adaptive<br>Simulation Environment<br>Thai Pham MD<br><i>Surgery, Penn State Coll Medicine</i>                                     |       | Andrew Healey MBChB<br><i>Royal Liverpool Univ Hosp</i>   |
|       |  |       | Andrew Bulpitt PhD<br><i>Leeds Sch Computing</i>  |
| 10:45 | BrainTrain: Brain Simulator for Medical VR<br>Application<br>Bundit Panchaphongsaphak MEng MSc<br><i>Automatic Control Lab, Swiss Federal Inst Technology<br/>(ETHZ)</i> |       | Roger Phillips PhD<br><i>Univ Hull (UK)</i>   |
|       |  |       | William E. Lewandowski MS<br><i>Immersion Medical Inc.</i>  |
| 11:00 | <b>Discussion - Developers' Forum</b>  | 11:30 | <b>Round Table Discussion</b>   |
|       | <i>Chair:</i><br>David M. Hananel<br><i>Surgical Prog, Medical Education Technologies, Inc.</i>  |       | Nigel John PhD, Chair<br>Derek A. Gould<br>Steven L. Dawson MD<br>William E. Lewandowski MS<br>Roger Phillips PhD                               |
|       | <i>Panelists:</i><br>Randy S. Haluck MD FACS<br><i>Surgery, Penn State Coll of Medicine</i>  |       |   |
|       | Jan Sigurd Røtnes MD PhD<br><i>SimSurgery AS</i>   | 12:00 | Break   |
| 12:00 | Break  |       |   |

**SATURDAY MORNING, January 29, 2005**

|                   |  |
|-------------------|--|
| 8:00 AM - 12 Noon |  |
|                   | <b>SESSION C<br/>WORKSHOP: VR INTERVENTIONAL<br/>RADIOLOGY TRAINING</b>  |
| 8:00              | Introduction and Training Issues<br>Derek A. Gould<br><i>Royal Liverpool Univ Hosp</i>                         |
| 8:30              | Medical Applications of Virtual Environments<br>Nigel W John PhD<br><i>Sch Informatics, Univ Wales, Bangor</i> |
| 8:50              | Medical Applications of Virtual Environments<br>Fernando Bello PhD<br><i>Imperial Coll London</i>              |

**SATURDAY AFTERNOON, JANUARY 29, 2005**

|      |  |
|------|--|
|      | <b>SESSION A -<br/>TELEMEDICINE / INTELLIGENCE NETWORKS</b>  |
|      | <i>Moderator:</i><br>Michael J. Ackerman PhD   |
| 1:10 | Moderator's Welcome  |
| 1:15 | The ViCCU Project - Achieving Virtual Presence<br>using Ultrabroadband Internet in a Critical Clinical<br>Application using Novel Soft and Hardware -<br>Initial Results<br>Patrick C. Cregan FRACS<br><i>Nepean Hosp, Wentworth Area Health Service</i>         |
| 1:30 | The Use of Low Bandwidth and High Bandwidth<br>Telemedical Applications to Accomplish Mass Pre-<br>Participation Cardio-Pulmonary Screening in Athletes<br>James "Butch" Rosser, Jr. MD FACS<br><i>Advanced Medical Technology Inst, Beth Israel Medical Ctr</i> |
| 1:45 | Application Level QoS Control for<br>Telemedicine System<br>Masato Mori PhD<br><i>Medical Informatics, Kyoto Univ Hosp</i>   |
|      | <i>Continued</i>   |

**SATURDAY AFTERNOON, SESSION A (Cont.)**

- 2:00 Remote Console for Virtual Telerehabilitation  
 Jeffrey A. Lewis  
*Physical Therapy, UMDNJ*
- 2:15 Crew Medical Interface System (CMIS): VR and  
 Medicine Integrated for Medical Care on Long-  
 Duration Spaceflight  
 Kevin Montgomery PhD  
*Natl Biocomputation Ctr, Stanford Univ*
- 2:30 Challenges of Presenting High Dimensional Data  
 to Aid in Triage in the Virtual Soldier Project  
 Andrew Boyd MD  
*Psychiatry, Univ Michigan*
- 2:45 Knowledge-Based Anatomical Dynamic Scene  
 Generation in XJ3D  
 Wayne V. Warren BA  
*Biomedical and Health Informatics, Univ Washington*
- 3:00 Break  
  
*Moderator:*  
 Patrick C. Cregan FRACS
- 3:15 Grid Enabled Remote Visualization of  
 Medical Datasets  
 Nick Avis PhD  
*Sch Computer Science, Cardiff Univ*
- 3:30 Distributed Radiological Visualization using  
 Access Grid  
 Jonathan Silverstein MD  
*Surgery, Univ Chicago*
- 3:45 Linking Human Anatomy to Knowledgebases: A  
 Visual Front End for Electronic Medical Records  
 Richard Ward PhD  
*Computational Sciences and Engineering,  
 Oak Ridge Natl Lab*
- 4:00 A Middleware-Based Computing Architecture for  
 Virtual Medicine  
 Line C. Pouchard  
*Computer Science and Mathematics Div,  
 Oak Ridge Natl Lab*
- 4:15 Multimedia Digital Surgical Record: Toward  
 Comprehensive, Layered Data Archives  
 Azhar Rafiq MD MBA  
*Surgery, Medical Informatics and  
 Technology Applications Consortium*
- 4:30 Adjourn

**SATURDAY AFTERNOON, JANUARY 29, 2005**

**SESSION B - MEDICAL SIMULATORS**

- Moderator:*  
 Patricia Youngblood PhD
- 1:10 Moderator's Welcome
- 1:15 A Prototype of Ventricular Shunt Insertion Simulator  
 Bundit Panchaphongsaphak MEng MSc  
*Automatic Control Lab,  
 Swiss Federal Inst Technology (ETHZ)*
- 1:30 A New Platform for Laparoscopic Training and  
 Education  
 Jan Sigurd Røtnes MD PhD  
*SimSurgery AS*
- 1:45 Tele-Surgical Simulation System for Training in  
 the Use of da Vinci Surgery  
 Shigeyuki Suzuki MS  
*Inst High Dimensional Medical Imaging,  
 Jikei Univ Sch of Medicine*
- 2:00 An Interactive Simulation Environment for  
 Craniofacial Surgical Procedures  
 Daniel Morris PhD (Cand)  
*Computer Science, Stanford Univ*
- 2:15 A Haptic-Enabled Simulator for Cricothyroidotomy  
 Alan Liu PhD  
*Natl Capital Area Medical Simulation Ctr,  
 Uniformed Services Univ*
- 2:30 New Approaches to Computer-Based  
 Interventional Neuroradiology Training  
 Xunlei Wu PhD  
*The Simulation Group, CIMIT MGH, Harvard Univ*
- 2:45 Break  
  
*Moderator:*  
 Randy S. Haluck MD FACS
- SESSION B - SIMULATOR VALIDATION**
- 3:00 Break Criterion-Referenced Test Development - A  
 Systems Approach for Using Medical Simulators  
 in the Development of Scientifically Valid, Legally  
 Defensible Tests  
 William E. Lewandowski MS  
*Immersion Medical Inc.*
- 3:15 Teaching Intravenous Cannulation to Medical  
 Students: Comparative Analysis of Two Simulators  
 and Two Traditional Educational Approaches  
 Mark Bowyer MD  
*Natl Capital Area Medical Simulation Ctr,  
 Uniformed Services Univ*

*Continued*

**SATURDAY AFTERNOON, SESSION B (Cont.)**

- 3:30      Role of Virtual Reality in Precision Laparoscopic Surgery Training  
Ramesh Makam DNB  
*Laparoscopy, Bangalore Endoscopic Surgery Training Inst and Research Centre VR2OR:*
- 3:45      The Paradigm Shift in Training for Procedural-Based Medicine  
Anthony Gallagher PhD  
*Endosurgery Unit, Emory Univ*
- 4:00      Adjourn

Dissemination of Educational and Certification Curriculum

Jeffrey M. Taekman MD  
*Educational Technology/ Human Simulation and Patient Safety Ctr/Anesthesiology, Duke University Medical Ctr*

Use Cases for MedX3D: Clinical and Business Implications

Michael Aratow MD  
*PureSense Environmental Inc.; NASA/Ames Research Center*

Distributed, Networked Surgical Simulation: Real-Time Rendering of Geometry and Haptics using the Spring Platform

Kevin Montgomery PhD  
*Natl Biocomputation Ctr, Stanford Univ*

**SATURDAY AFTERNOON, JANUARY 29, 2005**

**SESSION C**

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1:10 – 4:30 PM

**PANEL -  
USE AND VALUE OF AN OPEN 3D STANDARD FOR MEDICAL APPLICATIONS: IMPACT, PLANS AND PROGRESS OF THE MEDICAL WORKING GROUP OF THE WEB3D CONSORTIUM**

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Presentations:

Standards Consortia: The Good, Bad and Ugly  
Sandy Ressler  
*Web3D Board of Directors;  
Natl Institute of Standards and Technology (NIST)*

TATRC's Interest in Imaging and M&S Standards – Why You Should be Interested, Too  
Kenneth C. Curley MD  
*TATRC/USAMRMC;  
Emergency Medicine/Biomedical Informatics, USUHS*

Procedures Training - Is It Possible using Web3D?

Nigel John PhD  
*Sch Informatics, Univ Wales, Bangor*

Towards Open Source, Standardized Resources for Digital Anatomy

James F. Brinkley MD PhD  
*Computer Science and Engineering,  
Univ Washington*