Medicine Meets Virtual Reality: 7

The Convergence of Physical & Informational Technologies: Options for a New Era in Healthcare

January 20 – 23, 1999
San Francisco Marriott Hotel

Jointly Sponsored By:
Stanford University School of Medicine and Aligned Management Associates, Inc.
Conference Information

Course Description & Objectives

MMVR provides a forum for exchanging, developing, and disseminating innovative ideas for interactive computer-based tools in healthcare. These ideas are considered in a context that supports minimally invasive clinical care that is both medically and economically advantageous. The conference also provides companies that create and market these tools the opportunity to demonstrate their products to an informed audience.

MMVR has three primary goals:

- To share clinical data and experience that support the informed use of interactive computer-based tools by physicians and other healthcare providers.
- To nurture an educational partnership with industry to promote improved, low-cost products for clinical care and education.
- To define visionary goals that will guide medicine into a future of (a) improved minimally invasive diagnosis and treatment, (b) significantly enhanced educational methods, (c) expanded communication and research networks for providers and patients, and (d) greater efficiency in delivering optimal patient care.

Upon completion of this course, MMVR participants should be able to:

- Make informed decisions about interactive computer-based tools for clinical use.
- Know the goals, methods, successes, and limitations of products currently available.
- Understand the development process of tools likely to aid healthcare in the near future.

Stanford University School of Medicine designates this continuing medical education activity for up to 36 hours Category 1 credit toward the Physicians' Recognition Award of the American Medical Association and for the Certification Program of the California Medical Association. Physicians should claim only those hours of credit they actually spend in the educational activity.

AMA, Inc. Mission Statement

Aligned Management Associates, Inc., a biomedical communications company, aims to transform medicine through communication. Our mission is to create exceptional opportunities for healthcare providers and supporting biomedical organizations to share medical and scientific experience, technology, ideas, and vision.

Acknowledgement

We express our sincere appreciation to GE Corporate Research & Development and Silicon Graphics Computer Systems for their generous support of this year's conference.

Disclosures

The following speakers receive support from, or may have a financial interest in, one or more organizations, which could be perceived as a real or apparent conflict of interest in the content or the subject of their presentation.

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Grant/Research Support: NIH

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Consultant: Siemens Medical Systems

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Consultant: PhysiTel, Inc.

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Impiva Project #971801003559
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CSPP Research & Service Foundation
San Diego, CA
Conference Schedule

Wednesday, January 20

8:00 – 12 noon  Advanced Biomedical Technology Program

Sponsored by the Yale-NASA Commercial Space Center for Medical Informatics & Technology Applications

Chair: Richard M. Satava MD

Updates from the Yale-NASA Commercial Space Center for Medical Informatics and Technology Applications (CSC/MITA) projects will be presented. These include 3D ultrasound, “Deep Pixels”, design of new home telemedicine kits, the smart teeshirt, virtual endoscopy and others. Focus will be upon those technologies that will be applicable to the International Space Station and Mission to Mars. In addition, final reports and successes from the DARPA projects will be reviewed, and strategies to transition the technologies.

1:00 – 1:15  Welcome & Introduction
Karen S. Morgan, President
Aligned Management Associates, Inc.

Paul G. Yack MD
Center for Research in Cardiovascular Interventions,
Stanford University School of Medicine

1:15 – 3:15  Simulation
Moderator: Ramin Shahidi PhD

1:15
Luis Serra PhD
Kent Ridge Digital Labs
An Interface for Precise and Comfortable 3D Work with Volumetric Medical Datasets

1:25
Cagatay Basdogan PhD
Research Lab of Electronics, MIT
Simulation of Tissue Cutting and Bleeding for Laparoscopic Surgery

1:35
Gary Siebert BSEE
Cybernet Systems Corporation
A Low-Cost, Highly Sensitive Force Feedback Device Applicable to Medical Simulation and Telesurgery

1:45
Corinna E. Lathan PhD
Dept. of Mechanical Engineering, Catholic University of America
Enhancing Visual and Force Feedback to Improve Performance on a Surgical Simulator

1:55
Karl Reinig PhD
Center for Human Simulation, University of Colorado
Gathering Mechanical Properties for Needle Insertion Simulation
Wednesday (cont.)

2:05  
Herve Delingette  
INRIA Projet Epidaure  
Efficient Linear Elastic Models of Soft Tissues for Real-Time  
Surgery Simulation

2:15  
Myron W. Krueger PhD  
Artificial Reality Corp  
Olfactory Stimuli in Virtual Reality For Medical Applications

2:25  
Wei-te Lin MS  
Dept. of Biophysics, Mayo Foundation  
Dynamic Volume Texture Mapping and Model Deformation for Visually  
Realistic Surgical Simulation

2:35  
Daniel J. Blezek BS  
Mayo Graduate School of Medical Sciences  
Haptic Rendering of Isosurfaces Directly from Medical Images

2:45  
Discussion

3:15 – 3:30  
Break

3:30 – 5:30  
Simulation (cont.)  
Moderator: Don Stredney

3:30  
David C. Hon MA  
Designing Simulation for Clinical Validation

3:40  
Joseph L. Tasto MD MS  
HT Medical Systems, Inc.  
Preop™ Endoscopic Simulator: A PC-Based Immersive Training System for  
Bronchoscopy

3:50  
Christopher Sutton BSc MSc  
Virtual Presence Ltd.  
Mist VR - A Case Study in the Development, Evaluation and Marketing of  
a Successful Medical VR Product

4:00  
Anthony G. Gallagher PhD  
School of Psychology, Queen’s University, Belfast  
A Case Control Comparison of Traditional and “Virtual Reality” Training  
in Laparoscopic Skill Acquisition

4:10  
Aafia Chaudhry MB ChB  
Center for Minimally Invasive Therapy, Manchester Royal Infirmary  
Quality of Human-Computer Interaction, Learning Rate, Fixed and  
Variable Factors Affecting Performance on a Laparoscopic Simulator,  
MIST VR

4:20  
Michele Ursino PhD  
HT Medical Systems, Inc.  
Cathsim™: The First Low-Cost Intravascular Catheterization Simulator  
on a PC
4:30  W. J. van der Eerden MD  
Dept. of Rehabilitation, University of Amsterdam  
CAREN (Computer Assisted Rehabilitation Environment)

4:40  Erik Viirre MD PhD  
HIT Lab, University of Washington  
Virtual Reality and the Vestibular System: Parameters that Cause Motion  
Sickness and Research with Vertigo Patients

4:50  John M. Kenny MBA  
Applied Research Lab, Pennsylvania State University  
Human Effects Advisory Panel

5:00  Richard A. Robb PhD  
Biomedical Imaging Resource, Mayo Clinic & Foundation  
Real Progress Toward Virtual Medicine: Star Trek Now!

5:15  Discussion

5:30  Adjourn

7:00 – 9:00  Symposium: Incorporating the Needs of the User into the Design of  
Medical VR Systems

Co-Chairs: Jennie Gallimore PhD, Lawrence J. Hettinger PhD, and  
Corinna Lathan PhD

The development of complex human-machine systems is marked by one  
recurrent theme: failure to effectively account for capabilities and limitations of the user early in the system design cycle results in delays, retrofits, additional expense and generally less-than-optimal system performance. We are in a position to learn from the successes and failures of other areas, notably aviation, that have developed very similar technologies. However, what are the unique aspects of the Medical VR user's task(s) that must be incorporated into systems design? The design of the user interface, the nature of the perceptual information presented within a VR environment, and the cognitive "engineering" of informative material presented by means of the virtual environment are all design issues that are critical to the success of any Medical VR system. This interactive, topical symposium is intended to discuss any and all systems design considerations brought to the floor by conference participants, as well as those presented by the co-chairs to stimulate discussion.

This symposium is intended for all MMVR attendees with design issues, questions, or an interest in the area of user interface design for Medical VR systems. An open discussion format will be utilized to encourage a lively and relevant exchange of ideas and concerns. Time will be allocated for a limited number of five-minute presentations for those in the audience who are so inclined.

7:00 – 9:00  The Medified Cyberarium: Pre-Inventing the Future by the Cyberization of Medicine

Coordinator: Dave Warner MD
The Medified Cyberarium—a venue where edge/fringe technologies will be tabletted with demonstrations of “just conjured in the garage” techno-wizardry. Demos of developing technology and conceptual design/art pieces will mix with VCR/TV stations for stimulating interaction between individuals who normally might not interact.

The Cyberarium is about interfacing for cyberizing the act of caring. It is also about healing—from wearable computers to global grids—and will promote:

- new ways of thinking, new tools for working, new methods of healing
- medical communication infrastructures designed to provide medical knowledge on demand
- communication systems which provide an enhanced ability to communicate
- medicine that is more efficient and geographically independent, but also more intelligent
- transforming an entirely new outlook and expectation of the future

A poly-nation site, it will be an opportunity to share/exchange ideas between diverse groups (i.e. med heads and power nerds) in an effort to catalyze a techno-socially optimized future for the medical cyberculture.

Thursday, January 21

8:00 – 12:30 General Session: Women’s Health

Moderators: Wm. LeRoy Heinrichs MD PhD & John S. McDonald MD

8:00 KEYNOTE SPEAKER
Hedvig Hricak MD PhD
Chief, Abdominal Imaging Sect, Dept. of Radiology
University of California, San Francisco
Diagnostic Issues in Women’s Imaging: Use and Misuse of Imaging in Gynecology

8:20 Robyn Birdwell MD
Assistant Professor Radiology
Stanford University School of Medicine
3D Ultrasound Performed with Perspective Volume Rendering: Technique and Potential Clinical Applications

8:35 John S. McDonald MD
Professor of Anesthesiology & Obstetrics/Gynecology
Ohio State University
Imaging of Pelvic Pain
8:50  Jeffrey S. Levy MD  
Medical Director, Education & Technology Initiatives  
University of Pennsylvania Health Services  
Virtual Reality Hysteroscopy

9:05  Wm. LeRoy Heinrichs MD PhD  
SUMMIT & Dept of Gynecology/Obstetrics  
Stanford University School of Medicine  
3D Virtual Pelvic Organ Models as Interactive Multimedia Imbedded Into Information Frames

9:20  Elena Rakhlin MS  
SUMMIT/Stanford University School of Medicine  
Stanford-NASA Biocomputation Center  
A Haptic and Visual Biomechanical Model of the Human Uterus and Associated Neoplastic Lesions

9:35  Louis P. Halamek MD  
Assistant Professor, Dept. of Pediatrics & Dept. of Gynecology/Obstetrics  
Stanford University School of Medicine  
Development of a Simulated Delivery Room

9:50  Discussion

10:20 – 10:40  Break & Exhibits

10:40 – 12:30  Women’s Health (cont.)  
Moderator: Susan Ascher MD

10:40  Theodore S. Feit MD PhD  
Burbank Imaging  
Computer Simulation of Real Time Sonography to Teach Assessment of Subtle Fetal Structures

10:50  Gabor Szekely PhD  
Communications Technology Lab, ETH-Zentrum  
Virtual Reality Based Surgery Simulation for Endoscopic Gynecology

11:00  Farida Vahora  
Dept. of Computer Science, Texas Tech University  
Virtual Reality & Women’s Health: A Haptics-Guided Breast Biopsy System

11:10  Gordon J. Harris PhD  
Harvard Medical School & Mass General Hospital  
3D-Vizualization of Breast Tumor with Contrast-Enhanced MRI Using Non-Linear Registration and Image Differencing of Fat-Suppressed T1-Weighted Datasets

11:20  Faina Shpirt MD  
US Office on Women’s Health  
Technologic Solutions for Advancement of Diagnosis and Treatment of Breast Cancer: Perspective from the Department of Health and Human Services
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<tr>
<td>11:35</td>
<td>Discussion</td>
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<td>11:55</td>
<td><strong>KEYNOTE SPEAKER</strong>&lt;br&gt;Leonard M. Shlain MD&lt;br&gt;Chief of Laparoscopic Surgery&lt;br&gt;California Pacific Medical Center&lt;br&gt;The Alphabet Versus the Goddess: Hemispheric Lateralization and Its Effects on Communication, History, Gender Relations, and Culture</td>
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<td>12:30 - 1:30</td>
<td>Lunch Break</td>
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<td>1:30 - 5:30</td>
<td><strong>Session A (Visualization &amp; Modeling) &amp; Session B (Telemedicine)</strong></td>
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| 1:30 - 3:15 | **Session A: Visualization**<br>**Moderator:** Richard Robb PhD<br>**1:30** <br>Karl-Hans Engelmeier PhD<br>Institut fuer Medizinische Informatik und Systemforschung<br>A New Hybrid Renderer for Virtual Bronchoscopy<br>**1:40** <br>Steven Senger PhD<br>Dept. of Computer Science, University of Wisconsin La Crosse<br>Designing Segmentation Tools for Use in an Immersive Visualization Environment for Volumetric Data Sets<br>**1:50** <br>Don Stredney<br>Ohio Supercomputer Center<br>Interactive Volume Visualizations for Synchronous and Asynchronous Remote Collaboration<br>**2:00** <br>William E. Lorensen<br>General Electronic Corporation R&D<br>3D Fusion Using the Tissue Lens<br>**2:10** <br>Hiroshi Tanaka MD<br>Dept. of Medical Information, Tokyo Medical & Dental University<br>Building the Three-Dimensional Human Morphological Database Based on a New Data Reduction Technique<br>**2:20** <br>J. Hunter Downs III PhD<br>Neurovisualization Lab/ VNI University of Virginia<br>Assessment of Mild Traumatic Brain Injury with Virtual Reality and Functional Neuroimaging<br>**2:30** <br>Dirk Siebert<br>Dept. of Medical Informatics, University Hospital Benjamin Franklin<br>Virtual 3D Cutting for Bone Segment Extraction in Maxillofacial Surgery Planning<br>**2:40** <br>W. Peter Geis MD FACS<br>Minimally Invasive Services Training Institute, St. Joseph Medical Center<br>Visual Clues in Minimally Invasive Surgery: Use of 2-D Versus 6-D Enhanced Performance of Complex Minimally Invasive Skills
2:50 Discussion

3:15 – 3:30 Break & Exhibits

3:30 – 5:30 Session A: Modeling

Moderator: Woodrow Barfield PhD

3:30 Noaki Suzuki DSc PhD MD
Institute of High Dimensional Medical Imaging,
Jikei University School of Medicine
Analysis of Muscular Dynamics using Flexible 3D Muscle Models

3:40 Jason C. Rubenstein BS
University of Illinois at Chicago
Limitations of Distributed Segmentation for Three-Dimensional Radiological Modeling

3:50 Suvranu De MS
Lab for Human and Machine Haptics, MIT
Thin Walled Models for Haptic and Graphical Rendering of Soft Tissues in Surgical Simulations

4:00 N. J. Avis BSc PhD
Center for Virtual Environments, University of Salford
Anatomical and Physiological Models for Surgical Simulation

4:10 Jeff Berkely MS
HIT Lab, University of Washington
Fast Finite Element Modeling for Surgical Simulation

4:20 Mariano Alcañiz
Universidad Politécnica Valencia
A System for the Simulation and Planning of Orthodontic Treatment Using a Low Cost 3D Laser Scanner for Dental Anatomy Capturing

4:30 Yohan Baillot MS
School of Computer Science, University of Central Florida
Automatic Modeling of the Knee Joint Motion for the VRDA Tool

4:40 Richard C. Ward PhD
Oak Ridge National Lab
The Virtual Human Program

5:00 Discussion

5:30 Adjourn

1:30 – 5:30 Session B: Telemedicine

Moderator: Dave Warner MD
1:30  Diane S. Millman Esq.
      McDermott, Will & Emery
      Coverage and Payment of Telemedicine and Other New Technologies in an Era of Health Care Cost Containment

1:45  David C. Balch MA
      Center for Health Science Communication, East Carolina University School of Medicine
      Implementing Practical and Affordable Telemedicine Models

2:00  Jeff Birnbach
      PhysiTel, Inc.
      Effective Tools and Techniques for Internet-Based Telemedicine

2:15  Richard M. Satava MD
      Dept. of Surgery, Yale University School of Medicine
      Advanced Medical Technologies on Mt. Everest

2:30  Conrad Clyburn MS
      US Army Medical Research & Materiel Command
      New Directions in Defense Telemedicine Technology Research

2:45  Glenn M. Preminger MD
      Division of Urology, Duke University Medical Center
      Digital Image Recording: An Integral Aspect of Video Endoscopy

3:00  Discussion

3:15 – 3:30  Break & Exhibits

3:30 – 5:30  Telemedicine (cont.)

Moderator: David C. Balch MA

3:30  Ruzena Bajcsy PhD
      GRASP Lab, University of Pennsylvania
      Teleimmersion for the Doctor’s Office

3:40  Dwight Holland
      Virginia Tech/University of Virginia
      Some Virtual Reality and Telemedicine Applications Useful for Long-Duration Space Flight from a Systems Engineering Perspective

3:50  Ravi Hariprasad BS
      Scheie Eye Institute, University of Pennsylvania
      An Intelligent, Interactive Augmented Reality Platform for Ophthalmic Telemedicine, Teaching, and Telecollaboration

4:00  Eran Schenker MD
      Israeli Aerospace Medical Institute
      Telemedicine and Virtual Reality in the Distant Operational Care Centre (DOCC)
Thursday (cont.)

4:10  Hamid Reza Abbasi MD  
Klinikum Mannheim, University of Heidelberg  
Telepathology in Neurosurgery

4:20  Deborah P. Birkmire-Peters PhD  
Tripler Army Medical Center  
A Comparison of Hand-Held Otoscopy and Microscopy to Video-Otoscopy

4:30  Terry L. Purkable MS  
A Telementored Trans-Rectal Ultrasound Guided Prostate Biopsy

4:40  Lawrence P. A. Burgess MD  
Tripler Army Medical Center  
Teleproctored Surgery

4:50  Grigore Burdea PhD  
ECE Dept., Rutgers University  
PC-Based Tele-Rehabilitation System with Force Feedback

5:00  Discussion

5:30  Adjourn

7:00 – 9:00  Exhibitors’ Reception

Friday, January 22

8:00 – 10:00  General Session: Education

Moderator: Michael J. Ackerman PhD

8:00  Brian Atney PhD  
Dept. of Anatomy & Cell Biology, University of Michigan Medical School  
A Virtual, Interactive Environment for Anatomy Teaching and Research

8:15  Paul J. Gorman MD  
Penn State Geisinger Health System  
Evaluation of Skill Acquisition Using a Force Feedback, Virtual Reality Based Surgical Trainer

8:30  Helene M. Hoffman PhD  
University of California, San Diego  
Anatomic Visualizer™: Realizing the Vision of a VR-based Learning Environment

8:45  Kevin Montgomery PhD  
Stanford University / NASA Ames Research Center  
Virtual Reality in Microsurgery Training
9:00  Wm. LeRoy Heinrichs MD PhD
      SUMMIT, Stanford University
      Videoendoscopic Suturing: An Example of the “Hidden” Technical
      Curriculum of Surgery

9:15  Simon Smith BSc MBBS FRCS
      Imperial College School of Medicine at St. Mary’s
      Early Experience and Validation Work with Procedicus VA - The
      Prosolvia Virtual Reality Shoulder Arthroscopy Trainer

9:30  Myron W. Krueger PhD
      Artificial Reality Corporation
      “KnowWare”: Virtual Reality Maps for Blind People

9:45  Discussion

10:00 – 10:15  Break & Exhibits

10:15 – 12:00  Education (cont.)

Moderator: Helene M. Hoffman PhD

10:15  Noaki Suzuki DSc PhD MD
      Institute for High Dimensional Medical Imaging,
      Jikei University School of Medicine
      Real-Time Surgical Simulation using Deformable Organ Models and
      Force Feedback System for Both Arms

10:25  Torben Kling-Petersen PhD
      Mednet
      Virtual Reality on the Web: The Potentials of Different Methodologies and
      Visualization Techniques for Scientific Research and Medical Education

10:35  Malcolm Mackinnon MD
      Interactive Health Online
      Onward to the New World of Engaging Interactivity

10:45  Omar S. Bholat MD
      Pennsylvania State Geisinger Health System
      Defining the Role of Haptic Feedback in Minimally Invasive Surgery

10:55  Ramon Berguer MD
      Dept. of Surgery, University of California, Davis
      A Virtual Instrument Ergonomics Workstation to Measure Surgeons’
      Physical Stress

11:05  Avril McCarthy
      University of Sheffield, Royal Hallamshire Hospital
      Virtual Arthroscopy Training: Do the “Virtual Skills” Developed Match the
      Real Skills Required?

11:15  Karl Heinz Höhne PhD
      Institute of Mathematics and Computer Science in Medicine
      University Hospital of Eppendorf
      Interactive Tomographic Volume Exploration Using “Intelligent Movies”
11:25 James K. Hahn PhD  
Dept. of Electrical Engineering and Computer Science,  
George Washington University  
Interventional Radiology Training Environment

11:35 Martin Rydmark MD PhD  
Göteborg University & Mednet  
Laser 3D Scanning for Surface Rendering in Biomedical Research and Education

11:45 Discussion

12:00 – 12:15 Presentation of the Satava Award  
Instituted in 1995 and named for COL Richard M. Satava MD (USA Ret.), this award is given each year to an individual demonstrating unique vision and commitment to the transformation of medicine through communication. Nominees are selected from among those presenting at this conference.

12:15 – 1:15 Lunch Break

1:15 – 5:45 Session A (Computer-Assisted Surgery and Diagnostic Tools) & Session B (Robotics, Telepresence, Data Fusion & Informatics, and Internet & Intranet Architectures)

Moderator: Richard M. Satava MD

1:15 Kirby G. Vosburgh PhD  
General Electric Corporation R&D  
Recent Advances in Image-Guided Surgery

1:30 Ramin Shahidi PhD  
Image Guidance Lab/Neurosurgery, Stanford University Medical Center  
Interoperative Volumetric Image Navigation

1:45 Henry Fuchs PhD  
Dept. of Computer Science, University of North Carolina  
Improvemnts in Augmented Visualization for Ultrasound- and Laparoscopic-Based, Minimally Invasive Surgery

2:00 Muriel D. Ross PhD  
Biocomputation Center, NASA Ames Research Center  
New Approaches to Virtual Environment Surgery

2:15 Kevin Montgomery PhD  
Stanford University / NASA Ames Research Center  
A Virtual Environment for Craniofacial Surgical Planning: Virtual Tools and Their Application

2:30 Lutz-P. Nolte PhD  
M. E. Muller Institute of Biomechanics, University of Bern  
Alternative Imaging Means in Computer Assisted Orthopaedic Surgery
2:45 Discussion

3:20 – 3:45 Break & Exhibits

3:45 – 4:25 Session A: Computer-Assisted Surgery (cont.)

Moderator: Lutz-P. Nolte PhD

3:45 Andrew P. King PhD
Dept. of Radiological Science, Guy’s Hospital
Stereo Augmented Reality in the Surgical Microscope

3:55 Eric P. Wilkinson BSE
Image Guidance Lab/Neurosurgery,
Stanford University School of Medicine
An Intraoperative Volume Rendering System for Cerebrovascular Neurosurgery

4:05 William C. Bergman MD
Santa Clara Valley Medical Center
An Improved Stereotactic Technique for Cyst Cannulation

4:15 Young-Ho Chai PhD
Dept. of Mechanical Engineering, Chung-Ang University
Design of a New Haptic Device for the Simulation of Percutaneous Transluminal Coronary Angioplasty (PTCA)

4:25 Roger Phillips PhD
Dept. of Computer Science, University Of hull
A Computer-Assisted Surgical System for Femoral Fracture Fixation

4:35 – 5:45 Session A: Diagnostic Tools

4:35 Dong P. Jang PhD
Dept. of Biomedical Engineering, College of Medicine,
Hanyang University
Virtual Endoscopy Using Surface Rendering and Perspective Volume Rendering

4:50 Bradford Wood MD
Harvard Medical School & Massachusetts General Hospital
Clinical Applications of Virtual Endoscopy from Head to Pelvis

5:05 Dwight Holland
Virginia Tech/University of Virginia
Near-Future Applications of Wearable Computers to Diabetic Control and Several Neurological Conditions

5:20 Discussion

5:45 Adjourn
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<tr>
<th>Time</th>
<th>Session B: Robotics</th>
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<tbody>
<tr>
<td>1:15</td>
<td>Moderator: Glenn M. Preminger MD</td>
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<tr>
<td>1:15</td>
<td>Jacob Rosen PhD</td>
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<tr>
<td></td>
<td>Dept. of Electrical Engineering, University of Washington</td>
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<td>Surgeon-Tool Force/Torque Signatures: Evaluation of Surgical Skills in Minimally Invasive Surgery</td>
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<td>1:25</td>
<td>Matthias Wapler Dipl.-Ing. MS</td>
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<td>Fraunhofer Institute of Manufacturing, Engineering &amp; Automation</td>
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<td>A Voice-Controlled Robotic Assistant For Neuroendoscopy</td>
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<td>1:35</td>
<td>Prof. Eng. Alberto Rovetta</td>
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<td>Telerobotics Lab, Politecnico di Milano</td>
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<td>Tests on Reliability of a Prostate Biopsy Telerobotic System</td>
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<td>1:45</td>
<td>Cameron N. Riviere PhD</td>
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<td>Robotics Institute, Carnegie Mellon University</td>
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<td>3D Position Measurement for Microsurgical Evaluation and Simulation</td>
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<td>Peter Oppenheimer MS</td>
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<td>HIT Lab, University of Washington</td>
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<td>Immersive Surgical Robotic Interfaces</td>
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<td>2:15</td>
<td>Gunter Niemeyer PhD</td>
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<td>Intuitive Surgical, Inc.</td>
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<td>Design and Clinical Experience with Teleoperated Minimally Invasive Surgical Robots</td>
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<td>Philip S. Green MS</td>
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<td>EndoTrack – A Simple, Low-Cost Technology to Enable Solo Laparoscopic Surgery</td>
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<td>Discussion</td>
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**3:00 – 3:20** Break & Exhibits

**3:20 – 4:25** Session B: Telepresence

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<tr>
<th>Time</th>
<th>Session B: Telepresence</th>
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<tr>
<td>3:20</td>
<td>Moderator: Greg T. Mogel MD</td>
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<td>3:20</td>
<td>Richard M. Satava MD</td>
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<td>Dept. of Surgery, Yale University School of Medicine</td>
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<td>Virtual Reality and Telesurgery: An Update</td>
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<td>3:35</td>
<td>Christoph Kaufmann MD MPH</td>
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<td>Surgical Simulation Lab, Uniformed Services University Health Science</td>
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<td>Telepresence Surgery System Enhances Medical Student Surgery Training</td>
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<td>Philip S. Green MS</td>
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<td>Telesurgical Corporation</td>
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<td>EndoPresence – A Low-Cost Technology that Makes Endosurgery Look and Feel More Like Open Surgery</td>
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</table>
3:55  Christine L. MacKenzie PhD  
School of Kinesiology, Simon Fraser University  
Virtual Hand Laboratory Meets Endoscopic Surgery

4:05  J. A. Ibbotson  
School of Kinesiology, Simon Fraser University  
Gaze Patterns in Laparoscopic Surgery

4:15  Caroline Cao MSc  
ETC Lab, University of Toronto  
Hierarchical Decomposition of Laparoscopic Procedures

4:25 - 5:05  **Session B: Data Fusion & Informatics**

4:25  Sundaresan Jayaraman PhD  
School of Textile & Fiber Engineering, Georgia Institute of Technology  
The Wearable Motherboard®: A Flexible Information Infrastructure or “Sensate Liner” for Medical Applications

4:35  Itzhak Aharon  
Computer Aided Diagnostic Lab, Massachusetts General Hospital  
Fusion of MRI Data for Visualization of White Matter Bundles

4:45  Edward Lipson  
Syracuse University & MindTel LLC  
Universal Interfacing System for Interactive Technologies in Telemedicine, Disabilities, Rehabilitation, and Education

5:05 - 5:45  **Session B: Internet & Intranet Architectures**

5:05  Jack W. Moncrief MD FACP  
VidiMedix Corporation  
Technological Advances in Telemedicine – The Introduction of Distributed Healthcare Internet Application (DHNA) Architecture

5:15  Valery I. Nenov PhD PhD Dipl.Ing.  
Dept. of Surgery/Neurosurgery, UCLA School of Medicine  
BRAVO/TeleTrend: A Comprehensive WWW Based Neuromonitoring System for the Neurosurgery ICU

5:30  Discussion

5:45  **Adjourn**

7:00 - 9:00  **Poster Presenters’ Reception**

Hamid Reza Abbasi MD  
Klinikum Mannheim, University of Heidelberg  
Minimal Cost Teleradiology in Neurosurgery and Elements for Immersive VR; VR-Go System, and Sensitive Glove

Mariano Alcanyiz  
Universidad Politecnica Valencia  
Deformation Simulation Algorithms of Elastic Tissues in “Real-Time” Based in Elasticity Theory
Ali Bani-Hashemi PhD
Siemens Corporate Research
Virtual Reality Support for Multi-Mode Visualization

Virginia L. Barker EdD MSNE
Plattsburgh State University New York
CathSim™

William C. Bergman MD
Santa Clara Valley Medical Center
The Use of Mouse Manipulable 3D Models in the Secondary Manipulation of True Holograms for the Evaluation of Circle of Willis Aneurysms

Ashutosh Biswas MD
Dept. of Medicine, All India Institute of Medical Science
Knowledge Base Information System on Infectious Diseases

Adrian Blanarovich
Dept. of Mechanical Engineering, Catholic University of America
Personal Augmentation Devices [PADs]: Exploratory Agents to Enable Tele-Interaction, Evaluation, and Development of Abilities in Persons with Severe Disabilities

Ulrich Bockholt
Fraunhofer Institute for Computer Graphics
Realtime Simulation of Tissue Deformation for the Nasal Endoscopy Simulator (NES)

Joel Brown AB
Stanford University / NASA Ames Research Center
Surgical Simulation System Based on a Mass-Spring Model

Laurence P. Clarke PhD
H. Lee Moffitt Cancer & Research Center & University of South Florida
Digital Mammography: An Adaptive CAD Method for Different Ray Imaging Sensors

Roberto Furlan
Khymeia Ltd.
Two Computerized Systems for Monitoring and Helping Brain Injured Patients

Azucena Garcia-Palacios PhD
Universitat Jaume I
Virtual Reality in the Treatment of Claustrophobia: A Controlled Multiple Baseline Design

John F. Gardner PhD
Pennsylvania State University
Force Feedback for Scale-Spanning Telepresence with Applications to MIS
Orlando Goletti MD
Dept. of Surgery, University of Pisa
Telemedicine on a Little Island: Preliminary Results

Pheng-ann Heng PhD
Chinese University of Hong Kong
Interactive Navigation and Bronchial Tube Tracking in Virtual Bronchoscopy

Michael R. Holtel MD
Tripler Army Medical Center
Telepresence in Otolaryngology

Frank Jargstorff
Fraunhofer Center for Research in Computer Graphics
Preprocessing of CT-Volumes for Extracting Surface Meshes

Daniel B. Karron PhD
Computer Aided Surgery, Inc. (C.A.S.I.)
Tactical Audio for Neurosurgical Navigation: First Clinical Experience

Kee D. Kim MD
Dept. of Neurosurgery, University of California, Davis
New Software Applications for Interchangeable Instrumentation in Spinal Stereotaxis

Masahiro Kobayashi MD
Dept. of Plastic Surgery, Keio University School of Medicine
A New Type of 3D Template in Microtra Otoplasty: Silicone Costal Cartilage Model from Ultrasonography Data

Ralf A. Kockro MD
Institute of Systems Science, National University of Singapore
Planning of Skull Base Surgery in the KRDL Virtual Workbench: Clinical Experiences

Gerald J. Kost MD PhD MS
School of Medicine, University of California, Davis
Knowledge Optimization: Theory and Application to Point-Of-Care Testing

Jack Kushner MD MGA
Futuristic Instruments International
Virtual Reality Technology and Surgical Training with New Transmission Technology

Christophe R. Laurent MD
CASIMIR
An Intuitive VRML-Based Interface for Data-Access and Management in Everyday Desktop Telemedicine Applications

Branko S. Marovic MS
Computer Science Dept., University of California, Los Angeles
Interactive Visualization of 3D Fields and Images on Inexpensive Workstations Using VRML
Sushil K. Meher  
Computer Facility, All India Institute of Medicine Science  
Information System on Laboratories & Operation Theatres

Johannes Mueller MD  
German Heart Institute of Berlin  
Rejection Monitoring after Cardiac Transplantation by an Implantable Multisensor Device

Paula Murgia  
New York University  
The Next Stage: Desktop, Networked VR over the Internet for Treatment of Agoraphobia

Janna Ore Nugent  
Center for Resource Technology, University of Chicago  
Phaco-VR: A Phacoemulsification Simulator for Education and Evaluation

Peter Pachatz  
CADMED  
CADMED

Savannah Partridge BS  
Dept. of Radiology, University of California, San Francisco  
Semi-Automated Analysis for MRI of Breast Tumors

Leslie J. Peters PhD  
Tripler Army Medical Center  
Telemedicine Applications in Hearing Conservation

P.E. Quinlan DO  
Dept. of Psychiatry, University of Michigan  
A Model for the Development of World Wide Web Sites for Academic Medical Institutions

Claudia Reiche MA, dipl. VK  
Dept. of Literary & Media Science, University of Hamburg  
Feminism is Digital: On Self-Organizing Female Identities on the Net

Giuseppe Riva PhD  
Applied Technology for Neuro-Psychology Lab, Centro Aux. Italiano  
The Ergonomics of Virtual Reality: Human Factors in Developing Clinical-Oriented Virtual Environments

Prof. Eng. Alberto Rovetta  
Telerobotics Lab, Politecnico di Milano  
Test Results on Parkinson's Disease with Virtual Reality Support in New Equipment

Daniel J. Scott MD  
SW Center for Minimally Invasive Surgery, University of Texas SW Medical Center  
A Model for Intense Laparoscopic Skills Training May Prove to Enhance Operative Performance of Surgery Residents
Kevin P. Sherman MA FRCS
Castle Hill Hospital
A Portable Virtual Environment Knee Arthroscopy Training System with Objective Scoring of Performance

Mika Sinanan MD
Center for Video Endoscopic Surgery (CVES)
Virtual Reality Laparoscopic Port Site Simulator

Michael Stephanides MD
Stanford University / NASA Ames Research Center
A New Computerized Diagnostic and Surgical Planning Tool for the Surgery of the Wrist

Bharti Temkin PhD
Dept. of Computer Science, Texas Tech University
Development of Haptic Virtual Environment

Ching Shiw Tseng PhD
Dept. of Mechanical Engineering, National Central University
Development of a Robotic Navigation System for Neurosurgery

J.W. "Hans" van der Slikke MD PhD
De Heel Hospital
"Heel Wide Web": Patient Information and Education Presented in a Hospital Intranet

Warren J. Viant BSc
Dept. of Computer Science, University of Hull
A Technique for Very High Accuracy Image Intensifier Calibration

Gerrit Voss, Dipl. Inform.
Fraunhofer Institute for Computer Graphics
Virtual Cutting of Anatomical Structures

John A. Waterworth PhD
Dept. of Informatics, Umea University
The State of the State of the Art: VR in Surgery is not yet Reality

Irving N. Weinberg MD PhD
PEM Technologies Inc.
Preliminary Studies of Radiotracer Localization of Cancers for Guidance of Minimally Invasive Breast Cancer Procedures

Kochoi Wong MD
Stanford University / NASA Ames Research Center
Interplast Cleft Lip and Palate Instructional CD-ROM

Jihwan Woo
Dept. of Biomedical Engineering, Hanyang University
The Correction of Magnetic Resonance (MR) Images Distortion with Phantom Studies

Bradford Wood MD
Harvard Medical School & Massachusetts General Hospital
Virtual Endoscopy of the Entire Gastrointestinal System
Michael A. Woodbury Sr. MD
Puerto Rico Institute of Psychiatry
Virtual Space, Virtual Reality and the Soul

Jianchao Zeng PhD
ISIS Center, Georgetown University Medical Center
Prostate Biopsy Schemes: 3D Visualization-Based Evaluation

Saturday, January 23

8:00 – 5:45  VR and Mental Health Symposium
Endorsed by the American Psychiatric Association

8:00  Welcome & Introduction

Chair: Brenda Wiederhold MBA MS
Moderators: Albert A. “Skip” Rizzo PhD & Giuseppe Riva PhD

8:10  Albert A. “Skip” Rizzo PhD
Alzheimer’s Disease Research Center, University Southern California
Virtual Environments for Targeting Cognitive Processes: An Overview of
Projects at the University of Southern California Virtual Environments Lab

8:25  Peter Larson MA
Fuller Graduate School of Psychology
Gender Issues in the Application of a Virtual Environment Spatial
Rotation Project

8:40  Benjamin Watson PhD
Dept. of Computing Science, University of Alberta
Virtual Reality for Assessing the Driving Ability of Persons who have
Suffered Head Injury

8:55  Andy B. Dobrzeniecki PhD
3D Lab, Panum Institute
Virtual Environment for Cognitive Assessment and Rehabilitation of Stroke

9:10  Donna Cunningham MA
Virtual Rehabilitation Works, Inc.
Virtual Reality Promotes Visual and Cognitive Function in Rehabilitation

9:25  Morris Steffin MD
Quantitative Video Analysis of Complex Epileptic Seizures during
Videotelemetry: Increasing the Reliability of EEG Correlation and
Behavioral Autocorrelation

9:40  Discussion

9:55 – 10:05  Break
10:05 – 12:05 VR and Mental Health Symposium (cont.)

Moderators: Brenda Wiederhold MBA MS and Larry Hodges PhD

10:05 Brenda Wiederhold MBA MS
Center for Advancement of Multimedia Psychotherapy, CSPP Research & Service Foundation
Clinical Observations during VR Therapy for Specific Phobias

10:20 Larry F. Hodges PhD
GVU Center, College of Computing, Georgia Tech University
Virtual Vietnam: A Virtual Environment for the Treatment of Vietnam War Veterans with Post-Traumatic Stress Disorder

10:35 Alex H. Bullinger MD
Dept. of Psychiatry, University of Basel
Virtual Reality In Claustrophobia and Acrophobia

10:50 Mark D. Wiederhold MD PhD
Scripps Clinic and Research Foundation
Medical & Psychological Issues in VR Therapy

11:05 Margherita Baruffi MS
Applied Technology Neuro-Psychology Lab, Centro Aux Italiano
VREPAR 2 Project: VR in Eating Disorders

11:20 Conxa Perpiñá PhD
Universidad de Valencia
Body Image and Virtual Reality in Eating Disorders: Exposure by Virtual Reality is More Effective than the Classical Body Image Treatment?

11:35 Mayer Max MS
Vice President Gore's National Reinvention Initiative
Children with Disabilities Reach Into Virtual Reality with Robotic Wands in a Partnership Model for Government and Medical Research

11:50 Discussion

12:05 – 1:30 Break

1:30 – 3:25 VR & Mental Health (cont.)

1:30 Welcome & Introduction

Chair: Ian Alger MD
Moderators: Norman Alessi MD & Hiroshi Oyama MD

1:40 Milton Huang MD
Psychiatric Informatics Program, University of Michigan Health System
Presence as an Emotional Experience

1:55 Azucena Garcia-Palacios PhD
Universitat Jaume I
Psychological Variables and Reality Judgment in Virtual Environments: The Role of Absorption and Dissociation
2:10  Joachim Bergner MD  
Dept. of Psychiatry, University of Basel  
Virtual Reality, Cybersickness and Optical Cues

2:25  Hunter Hoffman PhD  
HIT Lab, University of Washington  
VR Monitoring: Distinguishing Memories of Real from Virtual Events

2:40  Azucena Garcia-Palacios PhD  
Universitat Jaume I  
Differences on Presence and Reality Judgment Using a High Impact Workstation and PC Workstation

2:55  Jaime Sánchez PhD  
Dept. of Computer Science, University of Chile  
Virtual Environment Interaction through 3D Audio by Blind Children

3:10  Discussion

3:25 – 3:35  Break

3:35 – 5:30  VR & Mental Health (cont.)

Moderators: Ian Alger MD & Milton Huang MD

3:35  Norman Alessi MD  
Dept. of Psychiatry, University of Michigan Health Systems  
The Use of an Information Architecture Modeling Tool in the Development of a Disease Management System

3:50  Gabriele Optale MD  
Associate for Research in Sexology, Venice  
PET Supports the Hypothesized Existence of a Male Sexual Brain Algorithm which may Respond to Treatment Combining Psychotherapy with Virtual Reality

4:05  Hiroshi Oyama MD  
National Cancer Center Hosp  
Evaluation of the Psycho-oncological Effectiveness of the Bedside Wellness System

4:20  Susan M. Schneider PhD  
Case Western Reserve University  
Effect of Virtual Reality on Symptom Distress in Children Receiving Cancer Chemotherapy

4:35  Hunter Hoffman PhD  
HIT Lab, University of Washington  
VR for Adjunctive Analgesia During Burn Wound Care and Physical Therapy

4:50  Kenneth Nemire PhD  
Interface Technologies Corporation
Preventing Teen Smoking with Virtual Reality

5:05 Discussion

5:30 Adjourn

8:30 – 5:45 MMVR @ Stanford University

8:30 Continental Breakfast
Pre-registrants pick up materials at Registration Tables

9:00 Welcome & Program Overview
Paul Yock MD

9:10 KEYNOTE LECTURE
Jim Clark PhD (Founder Silicon Graphics & Netscape; Chairman, Healtheon)

9:40 Panel: Real Doctors Meet Virtual Reality
Ajit Shah PhD - Moderator
Gary Glazer MD
Thomas Krummel MD
Richard Popp MD
Stephen Schendel MD
Christopher Zarins MD

10:25 – 10:45 Coffee Break

10:45 PROJECT REPORTS: I

W. LeRoy Heinrichs MD PhD - Moderator

Simulation and Virtual Reality -
The Next Paradigm in Surgical Education
Thomas Krummel MD

11:00 Predictive Medicine: Computational Techniques for Therapeutic Decision Making
Charles Taylor PhD

11:15 Intra-Operative Volumetric Image Navigation
Ramin Shahidi PhD

11:30 Virtual Reality Applications in Rehabilitation
Machiel van der Loos PhD

11:45 Surgical Simulations: Musculoskeletal Modeling to Image Guided Surgery
Scott Delp PhD
12:00 - 1:00 Lunch Panel: Real Business Meets Virtual Reality

John Adler MD - Moderator
Paul Brown
Volpe Brown
Russell Hirsch MD
Mayfield
John Hossack PhD
Acuson Laboratories
Fred Kitson PhD
HP Laboratories
William Lorensen
GE Corp. R & D
Fred Moll MD
Intuitive Surgical

*Lunch panel planned as a “working lunch”

1:00 PROJECT REPORTS: II

Paul Yock MD - Moderator

A Third Computer Revolution? Virtual Reality and the New Medical Devices Industry
Timothy Lenoir PhD

1:15 Diagnostic Radiology in 3 Dimensions
Sandy Napel PhD

1:30 Real Patients Meet Virtual Reality: Applications in Reconstructive Surgery
Michael Stephanides MD

1:45 SUMMIT - Medical Education In Virtual Environments
Parvati Dev PhD

2:00 Crew Resource Management Training in Healthcare
Using Realistic Simulation
David Gaba MD

2:15 Functional Medical Imaging: Musculoskeletal Applications
Thomas Andriacchi PhD

2:30 – 2:45 Break & Move to Workshops

2:45 – 5:45 Small Group Workshops

Participants rotate through selected demonstration stations corresponding to Project Reports.

*A workshop schedule will be included with registration confirmation materials and the final program.