Medicine Meets Virtual Reality: 4
Health Care in the Information Age:
Future Tools for Transforming Medicine
January 17-20, 1996
San Diego, California
Program
ACKNOWLEDGEMENT

The Conference Organizers express gratitude to the following for their contribution and participation in Medicine Meets Virtual Reality: 4

AT&T has provided sponsorship for our Thursday evening Reception in The Bridge

AVS, Inc., has provided a computer for The Bridge

Bay Systems has provided computer equipment for use in The Bridge

Circon has provided telemedicine tools for use in The Bridge

CLI Compression Labs, Inc., has provided teleconferencing equipment

East Carolina University School of Medicine has provided technology and support services to create The Bridge

Ethicon Endo-Surgery and the Society of Gastrointestinal Endoscopic Surgeons have made possible our Invited Lecture by Mr. Alexander Tsitas

HealthInfo has participated in supporting The Bridge

Med Vision, Inc., has provided computers in The Bridge

QD Technology has provided stereo multiplexers

Silicon Graphics Computer Systems has provided several computer systems for use in the Exhibit Hall and by our presenters

Sun Microsystems, Inc. has provided workstations for email and WWW access

United States Surgical Corporation has sponsored the printing of this program

V TEL has provided a teleconferencing system

Virtual Reality South has provided stereo vision systems for use in The Bridge

Welch Allyn, Inc., has provided instrumentation in The Bridge

THANK YOU!
PROGRAM COMMITTEE

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INRIA/Epidaure Project

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MicroDexterity Systems

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Jay H. Sanders MD
Telemed Ctr./Med Coll Georgia

Col. Richard M. Satava MD
Biomed Technology/ARPA

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Faina Shtern MD
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AFIT/Comp.Sci.&Engineering

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Dave Warner MD
Human Performance Inst/LLUMC
& Inst. Interventional Informatics

Suzanne Weghorst
HIT Lab/UWashington

Mark D. Wiederhold MD,PhD
Scripps Clinic & Research Fdn
VIRTUAL REALITY and MENTAL HEALTH
Wednesday, January 17  Hyatt Regency San Diego, Regency A/B, 4th Floor
0845 to 1700

Sponsored by: Virtual Environments and Teleoperator Research Consortium (VETREC)/MIT
                  Laboratory for Biological Informatics and
                  Theoretical Medicine/UCSD

In Cooperation with: American Psychiatric Association

Co-Chairs: Nathaniel I. Durlach, Ian Alger MD

Participants include: Rita Addison MA, Lee Baer PhD, Sandra L. Calvert, PhD, Kalman Glantz PhD, Roger L. Gould MD, Walter J. Greenleaf PhD, Richard Hoier PhD, John Hestenes PhD, Larry F. Hodges PhD, Ralph Lamson PhD, Max M. North PhD, Giuseppe Riva MD, Dr rer nat Hans B. Sieburg, Dorothy C. Strickland PhD, Erik Viire MD, PhD, Suzanne J. Weghorst, Paul Zimmnik DO

The principal focus will be the use of Virtual Reality technology in the diagnosis and treatment of mental disorders. Secondary foci include: the use of VR in providing diagnosis and treatment remotely (teletherapy), the use of VR in basic research on brain function, and the extent to which various types of VR experiences in various types of application domains are likely to result in unanticipated and undesired “side effects”. The conference will include formal presentations as well as discussion involving audience participation with invited panelists.

0845  Introductory Remarks  Ian Alger MD, Nathaniel I. Durlach

0905  Virtual Reality Exposure in the Treatment of Fear of Flying
                  Larry F. Hodges PhD, Barbara O. Rothbaum PhD, Benjamin A. Watson MS,
                  G. Drew Kessler MS, Dan Opdyke PhD

0924  The Use of Virtual Reality Technology in the Treatment of Psychological Disorders
                  Max M. North PhD, Sarah M. North MS, Joseph R. Cable PhD

0943  Virtual Reality and Body Image: New Perspective for Eating Disorder Treatment
                  Giuseppe Riva MD

1002  Therapeutic Augmented Reality
                  Suzanne J. Weghorst

1021  Clinical Application of Virtual Therapy to Psychiatric Disorders
                  Ralph Lamson PhD

1040  Break
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<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
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</thead>
<tbody>
<tr>
<td>1050</td>
<td>Virtual and Other Realities</td>
<td>Ian Alger MD</td>
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<tr>
<td>1109</td>
<td>Virtual Reality and Psychotherapy: Opportunities and Challenges</td>
<td>Kalman Glantz PhD, Nathaniel I. Durlach, Rosalind C. Barnett PhD, Walter A. Aviles</td>
</tr>
<tr>
<td>1128</td>
<td>Psychology, Functional Brain Imaging, and Virtual Environments</td>
<td>Richard J. Haier PhD</td>
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<tr>
<td>1147</td>
<td>Measurement of Brain Activity in a Virtual Environment</td>
<td>Dorothy C. Strickland PhD</td>
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<tr>
<td>1206</td>
<td>Virtual Reality: A New Way to Design Neuroperceptual Tools</td>
<td>Rita Addison MA</td>
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<tr>
<td>1225</td>
<td>Break</td>
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<tr>
<td>1335</td>
<td>Neurology and Virtual Reality: Effects of VR on the Nervous System of Users</td>
<td>Erik Viitre MD, PhD</td>
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<tr>
<td>1354</td>
<td>The Impact of VR on Young Adults’ Aggressive Behavior and Physiological Arousal</td>
<td>Sandra L. Calvert PhD</td>
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<tr>
<td>1413</td>
<td>A Telephone Interface for Simulated Behavior Therapy of an Anxiety Disorder</td>
<td>Lee Baer PhD</td>
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<td>1432</td>
<td>Behavior Modification in Silico</td>
<td>Dr. rer nat Hans B. Sieburg, Jason Rogers</td>
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<td>1451</td>
<td>The National Consortium of Telepsychiatry</td>
<td>Paul R. Zimnik DO</td>
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<td>1510</td>
<td>Break</td>
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<tr>
<td>1520</td>
<td>Panel Discussion with Audience Participation</td>
<td>Panelists include: Warren Brodey MD, Roger L. Gould MD, Walter J. Greenleaf PhD, John Hestenes PhD</td>
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<td>1700</td>
<td>Adjourn</td>
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UPDATE: ADVANCED BIOMEDICAL TECHNOLOGY PROGRAM

Wednesday, January 17  Hyatt Regency San Diego, Manchester I, 2nd Floor

1300 to 1700

Sponsored by: Advanced Research Projects Agency (ARPA)

Chair: Col. Richard M Satava, MD

Principal Investigators of the Advanced Biomedical Technology Program (ABMT) will present updates on the progress of their contribution to the overall Program effort. The discussion will center on integration of the projects into a seamless, interoperable system focused on military casualty care in the battlefield. Three areas: remote diagnostics, remote therapy, and virtual reality for medical training and simulation will be addressed. The purpose is to identify Program weaknesses, deficiencies, and need for additional efforts.

The ABMT workshop is a working group discussion that will provide participants with an opportunity to learn about leading edge technologies and projects currently underway.

Discussion includes:

1. **Input Devices** - how they will enable virtual environments
   - Sarcos - I-port
   - BDI - haptic interface
   - Artificial Reality - olfaction
   - UCSD - bodysuit
   - NReD - sensate liner
   - SM&E - sensate liner

2. **Displays** - what are the best displays for training in virtual environments
   - SRI - surgical console
   - Dimensional Media - holography
   - HIT Lab - VRD and ubiquitous
   - UCSD - medical education curricula
   - IDA - task analysis

3. **Virtual Environments**
   a) **Virtual cadaver**
      - Musculo-Graphics
      - High Techsplanations
      - Mission Research
      - Ninewells Hospital
   b) **Medical Forces planning and training**
      - Naval Postgraduate School
      - Sandia National Labs
      - U. Pennsylvania
   c) **Virtual prototyping**
      - J&J Ethicon - OR of the Future
      - MIT - OR of the Future
      - Northrup Grumman - LSTAT
      - Foster Miller - MEDFAST
# IMAGING AND VISUALIZATION: NEW TOOLS FOR DIAGNOSIS & THERAPY

**Wednesday, January 17**  Hyatt Regency San Diego, Regency D/E, 4th Floor  
*In Cooperation With:* Society of Cardiovascular & Interventional Radiology  
**Co-chairs:** Giovanna Cassola MD & Steven L. Dawson MD

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<tr>
<th>Time</th>
<th>Session Title</th>
<th>Presenter(s)</th>
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<tr>
<td>1300</td>
<td>Welcome and Introduction, Faina Shtern MD</td>
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<tr>
<td>1305</td>
<td>Low-End Interactive Image-Directed Neurosurgery: Update on Rudimentary VR Used in Epilepsy Surgery</td>
<td>Werner K. Doyle MD</td>
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<td>1325</td>
<td>The Virtual Aneurysm: VR in Endovascular Therapy</td>
<td>Michael R. Harrel MD</td>
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<td>1345</td>
<td>Initial Clinical Experience with an Interactive Volume Sonography Visualization System</td>
<td>Thomas R. Nelson PhD</td>
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<td>1405</td>
<td>Applied Virtual Reality for Simulation of Endoscopic Retrograde Cholangio-Pancreatography (ERCP)</td>
<td>John W. Peifer MA</td>
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<tr>
<td>1425</td>
<td>Cranial Base Tumor Visualization through High Performance Computing: An Aide to Diagnosis and Treatment</td>
<td>Gregory J. Wiet MD</td>
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<td>1445</td>
<td>Dexterity Enhancement and Image Guided Therapy: Update on Animal and Clinical Trials</td>
<td>Steven T. Charles MD</td>
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<td>1505</td>
<td>Discussion</td>
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<td>1515</td>
<td>Break</td>
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<tr>
<td>1530</td>
<td>Virtual Environments Technology to Aid Needle Biopsies of the Breast: An Example of Real-Time Data Fusion</td>
<td>Henry Fuchs PhD</td>
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<td>1550</td>
<td>Preliminary Clinical Experience with the Cyberknife: Image-Guided Stereotactic Radiosurgery</td>
<td>John R. Adler Jr, MD</td>
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<td>1610</td>
<td>3D Tomographic Guidance Techniques for Micro Endoscopic Procedures</td>
<td>Dietrich H. W. Grönenmeyer MD</td>
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<td>1630</td>
<td>MRI Approach to the Spinal Canal</td>
<td>Rainer M. M. Seibel MD</td>
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<td>1650</td>
<td>Radiology in the Information Age: Perspectives from the National Cancer Institute</td>
<td>Faina Shtern MD</td>
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<td>1710</td>
<td>Discussion</td>
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<td>1730</td>
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THE BRIDGE
Thursday & Friday, January 18 & 19  Hyatt Regency San Diego, 4th Floor
1000 to 1700

Participating Organizations:
Institute for Interventional Informatics
East Carolina University School of Medicine
Northeastern Parallel Architectures Center/Syracuse University
SUNY Syracuse Health Science Center
San Diego State University College of Sciences
Human Interface Technology Lab/University of Washington
Scripps Memorial Hospital
Human Performance Institute/Loma Linda University Medical Center

Chair:  Dave Warner MD, David C. Balch MA

The Bridge is an intelligent electronic triage site (the telemedicine command center) between the point of need (care portal) and the point of service (DOCKing station). That is... The Bridge is an intelligent, connected, medical communications system devoted to the optimal (geographically-independent) distribution of medical intelligence.

The Bridge at MMVR4 will demonstrate a scaled version of a diverse networked environment which addresses the need for integrated medical communications system. The Bridge will be a real-time physical event featuring the home, the hospital, the rural clinic and other remote facilities with restricted access and their connection to a wide array of health care providers.

The Bridge will be open Thursday and Friday of the conference. A reception will be held in the Bridge Thursday evening, 1830 to 1930.
POSTER/VIDEO PRESENTATIONS
THURSDAY & FRIDAY, January 18 & 19  Hyatt Regency San Diego

Computer Aided Locoregional Assessment of Soft Tissue Sarcoma and 3D Simulator Surgery
C. Di Somma

Tactile Optical Sensor for Use in Minimally Invasive Surgery
Harald Fischer Dipl-Ing

Simplified Access to Medical Resources on the Internet: How to Get Clinicians on the Web
Subhas Gupta MD

Introduction of New Telemedicine Applications into Ophthalmic Practice: Standardized Evaluation of Technology
Subhas Gupta MD

Breast Cancer Lighthouse CD-ROM: Using Personal Stories for Patient and Clinician Education
Carrie Heeter PhD

Computer Simulation of the Birth Process
Yaaxi Liu PhD

Computer-Based Surgical Education: Results of a Study in Denmark
Mikkel Pedersen

A Clinical Field Study in Laparoscopic Application
Cletus vonPichler Dipl-Ing

Project Evolution of a Virtual Reality Microsurgical Simulator
Roberto Puzone MD

DISOS - A Desktop Image Processing System for Computer Assisted Orthopedic Surgery
Cletus vonPichler Dipl-Ing

PIXEL: Experiences with the Elements
Claudia Reiche MA

Steroscopic Visualization System for Clinical Angiography
Ryuzo Sekiguchi MD

Battlefield Medicine Education & Training: Transitioning the Human Factors from Reality to Virtual Reality
Annette L. Sobel MD, MS

Human Body Textbook with 3D Illustration
Tomoyuki Umehara

Computational Visualization of Cardiovascular Blood Flow
Takami Yamaguchi MD, PhD

Virtual Computer Monitor For Visually Impaired Users: Project Description and Status
Arthur L. Zwern MBA
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<td>0745</td>
<td>Welcome &amp; Introduction. Col. Richard M. Satava MD</td>
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<td>0800</td>
<td>Usability Testing: Critical to Medical Product Development</td>
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<td></td>
<td>Clarence A. Semple</td>
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<td>0820</td>
<td>Integrated Medical Environments: Magnifying the Healing Power of Information</td>
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<td>Matthew E. Hanson MSAE, MBA</td>
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<td>0840</td>
<td>Virtual Reality: From Training Systems to Designing a Simulator for a Health Care Delivery System</td>
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<td>Joseph M. Rosen MD</td>
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<td>0900</td>
<td>Medical Virtual Reality: The Current Status of the Future</td>
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<td>Col. Richard M. Satava MD</td>
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<td>0920</td>
<td>Discussion</td>
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<td>0930</td>
<td>Break/Exhibits Open</td>
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<td></td>
<td>Surgery: Tools for Minimally Invasive Therapies</td>
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<td>In Cooperation With:</td>
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<td>Society of American Gastrointestinal Endoscopic Surgeons</td>
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<td>Society for Minimally Invasive Therapy</td>
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<td>Moderator: Col. Richard M. Satava MD</td>
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<tr>
<td>1000</td>
<td>Advanced Telepresence Surgery System Development</td>
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<td></td>
<td>Joel F. Jensen MSEE</td>
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<td>1020</td>
<td>Interactive Visual Man-Patient Interface for Semi-Immersive Endoscopic Surgery</td>
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<td>Christophe R. Laurent MD</td>
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<td>1040</td>
<td>Interactive Operation Planning and Control with VIRIM</td>
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<td>Christof Reinhart Dipl-Phys</td>
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<td>1100</td>
<td>3D Computer Assisted Design of Plastic Reconstructive Surgery Procedures</td>
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<td>Edoardo Raposio MD</td>
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<td>1120</td>
<td>SAGES and Ethicon Invited Lecturer: Alexander Tsiaras</td>
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<td>Sponsored by: Society of American Gastrointestinal Endoscopic Surgeons and Ethicon Endo-Surgery, Inc.</td>
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<td>Ethicon ENDO-SURGERY</td>
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<td>1200</td>
<td>Break</td>
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Alexander Tsiaras' photojournalism has graced more than 75 magazine covers internationally, including LIFE, Smithsonian, and the New York Times Magazine. He is also the winner of the "World Press Award". Mr. Tsiaras will be presenting his latest works in art, science, and journalism, including computer generated images of a multi-dimensional fly-through of the entire human body.

Anatomical Travelogue
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<td>1300</td>
<td>Computer Aided Surgery Planning and Virtual Reality at the Mayo Clinic</td>
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<td>Richard A. Robb PhD</td>
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<td>1320</td>
<td>Geometric and Physical Representations Used for a Simulator of Hepatic Surgery</td>
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<td>Herve Delingette PhD</td>
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<td>1340</td>
<td>Virtual Endoscopy of the Head and Neck</td>
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<td>Cdr. Shaun B. Jones MD</td>
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<td>1400</td>
<td>Surgical Simulation in Endoscopic Surgery: The Virtual Reality Flexible Ureteroscopy Simulator</td>
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<td>Glenn M. Preminger MD</td>
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<td>1420</td>
<td>Video Game Performance and Laparoscopic Skill Acquisition in First Year Surgery Residents</td>
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<td>Suzanne J. Weghorst</td>
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<td>1440</td>
<td>Simulation and Modeling of Penetrating Wounds from Small Arms</td>
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<td>Robert Eisler</td>
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<td>1500</td>
<td>Break</td>
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FRIDAY  January 19, 1996  San Diego Convention Center
Third Floor Rooms 6C - 6F

TELEcommunications + MEDICINE = Expanding Horizons for Healthcare
In Cooperation With:
Advanced Research Projects Agency
Institute for Interventional Informatics
Institute for Telemedicine, Center for the New West
Pacific Bell Health Care Market Group

Moderator:  Jack Moncrief MD

0800  The Hyper Hospital: VR-Mediated Networked Medical Care System
Takami Yamaguchi MD,PhD

0820  Recent Advances in Telemedicine: An Asynchronous Network,
Virtual Reality Tools, and the DOCKing Station
David C. Balch MA and Dave Warner MD

0840  Remote Access to Neurosurgical ICU Physiological Data Using the WWW
Valeriya Nenov PhD

0900  Primary Care and Hemodialysis Monitoring Through Telemedicine
Jack W. Moncrief MD

0920  Medical Emergency Aid Through Telematics
George Anogianakis PhD

0940  The Cybermensch Simulation Server for the Planning of Clinical Trials 2.0
Dr rer nat Hans B. Steburg

1000  Break

Moderator:  Jay Sanders MD

1030  Enhanced Surgical Conference System with VR
Hiroshi Oyama MD

1050  Remote Guided Surgical Navigation in ENT Surgery
Michael Truppe MD

1110  Health care in Correctional Institutions: A Telemedicine Case Study
Robert M. Brecht PhD

1130  Keynote Address: Col. Fred Goergering MS, MBA
U.S. Army Medical Research & Material Command
Targeting the Mission: Saving Lives Through Telemedicine

1200  Break

1215  West Managed Health Care Congress Plenary Address - SDCC 6B
Nicholas Negroponte, founder of MIT Media Lab, senior columnist Wired Magazine, author, Being Digital
MMVR:A delegates are invited to attend this one hour session during the lunch break

**As the telecommunications and entertainment industries are restructured in the wake of telecom reform, they are positioning themselves to play a central role in the transformation of health care delivery systems through information and communications technologies.**

*These expert panelists will explore how technology will affect systems and applications, and create emerging markets for telemedicine.*

**Discussants:** Leslie A. Sandberg PhD, Vice President Health Care Market Group, Pacific Bell
Daniel R. Sudnick PhD, Director Health Informatics & Telemedicine Systems, AT&T
Stuart Wolf PhD, Vice President Health Services, AND/TCI Interactive

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<th>Time</th>
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| 1330  | **1996 Satava Award**  
Presented by: Walter J. Greenleaf PhD and Samuel G. Varnado PhD  
Instituted in 1995 and named for Col. Richard M. Satava MD, this award will be given each year to an individual demonstrating unique vision and commitment to the transformation of medicine through communication. Nominees will be selected from among those presenting at the 1996 conference. |
| 1440  | **Toward Virtual Teleconferencing for Telemedical Applications**  
Henry Fuchs PhD |
| 1500  | **Telemedicine and Security: Confidentiality, Integrity, and Availability**  
Penny Jennett PhD |
| 1520  | **The Risk Factors Determining the Survivability of Telemedicine**  
Jay H. Sanders MD |
| 1540  | **The Vestibular System and VR: User Effects, Dizzy Patient Rehabilitation and Telemedicine Consultations**  
Erik Vilfre MD PhD |
| 1600  | **Telemedicine and the Electronic Medical Record: The Perfect Couple**  
Howard Belsberg MD |
| 1620  | **Transcontinental Teleradiology System: Superspecialists Serving the Community**  
Zoran L. Barbaric MD |
| 1640  | **Remote Obstetric Care by Telepresence**  
John P. Brennan MD |
| 1700  | **Telesprocting Laparoscopic Operations with Off-the-Shelf Technology**  
Donna R. Luttmann RN, BSN |
| 1720  | **Complex Task Performance in Cyberspace: Surgical Procedures in a Telepresence Environment**  
Jon C. Bowersox MD, PhD |
| 1740  | **Discussion** |
| 1800  | **Adjourn** |
SATURDAY January 20, 1996 Hyatt Regency San Diego

SESSION A Healthcare: The Market for Emerging Technologies

Moderator: Ben Delaney

0800 A Glimpse at the Surgery of the Next Century
S. Morry Blumentfeld PhD

0820 Next Generation Computer Architectures for Medical Visualization/Simulation
John Flynn PhD

0840 Rehabilitation and Disability Solutions
Walter J. Greenleaf PhD

0900 Initial Validation on Ixion Interactive Virtual Reality Medical Simulators
David Hon

0920 The Role of Computer Based Simulation for Training Surgeons
Kevin McGovern

0940 Discussion

1000 Break

Moderator: Glenn M. Preminger MD

1020 Telesis Virtual Environment Toolkit for Simulation-Based Surgical Education
Dwight Meglan PhD

1040 Volume Rendering of Visible Human Data for an Anatomical Virtual Environment
John Kerr PhD

1100 Virtual Reality Hysteroscopy: New Horizons in Training for Gynecologic Surgeons
Jeffrey S. Levy MD

1120 Integrated Medical Environments and the Virtual Reality Patient
Bettina A. Babbitt PhD

1140 Discussion

1200 Break

Moderator: Helene M. Hoffman PhD

1300 Virtual Reality Simulation of Endoscopic Surgery
Louis Rosenberg

1320 Virtual Design Prototyping Applied to Medical Facilities
Paul G. Breen

1340 A Virtual Reality Interface to an Intelligent Dental Care System
Jens Herder Dipl-Inform

1400 Digital Dentistry: Virtual Reality in Orthodontics
Michael D. Snow BDSc

1420 Virtual Planning of Oral Implant Surgery
Kris Verstreken MD MSEE

1440 Discussion

1450 Adjourn

SESSION B Technology: The Tools to Make it Work

Moderator: Erik Viirre MD PhD

0800 Simultaneous Planning and Execution in Cranio-Maxillofacial Surgery
Petra Bohner Dipl-Inform

0820 Patient Specific Anatomic Models - Geometric Surface Generation
From 3D Medical Images Using a Specified Polygonal Budget
Bruce M. Cameron MS
0840 Ultra Wide Band Holographic 3D Ultrasonic Imaging of Breast and Liver Phantoms  
David M. Sheen PhD

0900 Robotic Arm Enhancement to Accommodate Improved Efficiency  
and Decreased Resource Utilization in Complex Minimally Invasive Surgical Procedures  
W. Peter Geis MD

0920 Surface EMG for the Control of Anthropomorphic Teleoperator Fingers  
Narendra P. Reddy PhD

0940 Discussion

1000 Break

Moderator: Walter J. Greenleaf PhD

1020 Surgical Simulation of Facial Paralysis  
Tatsuya Konno

1040 Virtual Reality Volumetric Display Techniques for 3D Medical Ultrasound  
Rik Littlefield MS

1100 ARTEMIS - An Advanced Robotic Telemanipulator for Minimally Invasive Surgery  
Bernhard Neilsus Dipl-Ing

1120 The Influence of LCD Shutter Glasses on Spatial Perception in Stereoscopic Visualization  
Cletus vonPichler Dipl-Ing

1140 Discussion

1200 Break

Moderator: Don Stredney

1300 Using Human Factor Analysis and VR Simulation Techniques for the Optimization of the Surgical Worksystem  
Cletus vonPichler Dipl-Ing

1320 Real Time Visually and Haptically Accurate Surgical Simulation  
Karl D. Reinig PhD

1340 Light Directed Laparoscopy: A New Approach to Intelligent Control  
Guenther Schaller MD

1400 Progress in the Development of a Telerobotic Capability for Dexterity-Enhanced Microsurgeries  
Hari Das PhD

1420 An Intelligent System with EMG Based Joint Angle Estimation for Telemanipulation  
Srikanth Suryanarayanan MS

1440 Discussion

1450 Break

Moderator: Col. Richard M. Satava MD

1510 A Ray-traced Texture Mapping for Enhanced Virtuality in Image-Guided Surgery  
Pierre Jannin

1530 High Resolution Ultrasound Imaging for Battlefield Applications  
Alan K. Morimoto PhD

1550 Force Feedback for a Virtual Reality Based Minimally Invasive Surgery Simulator  
Roger Baumann DiplIng

1610 Respiratory Mechanics: Integrating Anatomy and Physiology in 3D  
Dimitri Metaxas PhD

1630 Expert Surgical Assistant: An Intelligent Virtual Environment with Multimodal Input  
Mark Billinghurst MPhil

1650 Discussion

1700 Adjourn
MMVR:5

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