Art, Science, Technology: Healthcare (r)Evolution™

January 28-31, 1998
San Diego, California

Jointly Sponsored by:
UCSD School of Medicine &
Aligned Management Associates, Inc.

Medicine is Art
Medicine is Supported by Science
Medicine is Enabled by Technology

Program
Medicine Meets Virtual Reality: 6
Art, Science, Technology: Healthcare (r)Evolution™

January 28-31, 1998
San Diego, California

jointly sponsored by
University of California, San Diego School of Medicine
&
Aligned Management Associates, Inc.

Medicine Meets Virtual Reality™ is the 1st international forum
where medicine and interactive technology interface to create the future
of health care. This is the 6th in a series of multi-specialty,
interdisciplinary symposia presenting advances in computing and
communications technologies that hold the promise for the
transformation of medicine.

At MMVR, participants will learn how leading-edge technology will
affect the future of medical and surgical practice by improving
access, quality, and continuity of care, while reducing cost. MMVR is
designed for physicians, surgeons, health care providers, researchers,
developers, educators, and investors interested in the advancement of
minimally invasive, cost-effective health care practices which will
improve clinical outcomes.

The purpose of the meeting is to:
• provide a forum for the dissemination of ideas and information
related to emerging techniques and technologies
• create a multi-specialty, interdisciplinary forum that includes all
health care providers as well as researchers and developers of
technology which may be utilized in health care

Our goal is to:
• present and analyze clinical data and experience
• review and compare various diagnostic and therapeutic modalities
• define and distinguish strategies for care which will result in
optimal outcomes
• develop an educational partnership with Industry that enables
further development of technology and techniques

At the conclusion of MMVR:6, participants will be able to:
• analyze treatment options utilizing new technologies such as
visualization, simulation, and robotics
• describe cost effective means for employing telemedicine technologies
• define the role of biotechnology in improving health care
• describe virtual reality programs for use in educating medical
students, residents, and clinicians
• analyze applications of new technology for improving mental health

Aligned Management Associates, Inc.
P. O. Box 23220 • San Diego CA • 92193
760.751.8841 phone • 760.751.8842 fax
mvr@amainc.com
http://www.amainc.com
ACKNOWLEDGMENT

The Conference Organizers express gratitude to the following sponsors for their contribution and participation in MMVR:6

Ernst & Young has provided sponsorship for the Wednesday evening Reception

GE Corporate Research and Development has provided sponsorship for the Thursday evening Reception

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

DISCLOSURE

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

John R. Adler MD
Accuray, Inc.

David C. Balch MA
HCFA, ORHP, VTEL
Telemedicine Technologies Co.

André Bauer
Integrated Surgical Systems

Richard D. Bucholz MD
Sotamor Danek

Scott L. Delp PhD
NIH, NSF, DARPA
Musculosignographics, Inc.

Ivan Faul
Image Guided Technologies

Antonio Garcia-Ruiz MD
Computer Motion

W. Peter Geis MD
Ethicon Endo-Surgery
Computer Motion, Inc.

John Peifer
CyberCare

Jon S. Rousu
Compass International, Inc.

Susan E. Squires PhD
GVO, Inc.

Erik Viirre MD PhD
National Science Foundation

ACCREDITATION

The University of California, San Diego School of Medicine, is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to sponsor continuing medical education for physicians.

The University of California, San Diego School of Medicine designates this continuing medical activity for 30 hours in Category 1 of the Physician's Recognition Award of the American Medical Association and for the Certification Program of the California Medical Association.
PROGRAM COMMITTEE

Michael J. Ackerman PhD
Office of High Performance Computing & Communications
National Library of Medicine
Bethesda MD
ph 301.402.4100
fax 301.402.4080
ackerman@nlm.nih.gov

Ian Alger MD
New York Hospital / Cornell Med Ctr
New York NY
ph 212.861.3707
fax 212.988.9244
ianalger@aol.com

David C. Balch MA
Ctr for Health Sciences Communication
ECU School of Medicine
Greenville NC
ph 919.816.2466
fax 919.816.2495
dave@sparky.med.ecu.edu

John P. Brennan MD
Obstetrics & Gynecology
SUNY Health Sciences Center
Brooklyn NY
ph 718.935.1340
fax 718.834.1683
jbrennan@panix.com

Steven T. Charles MD
Micro-Dexterity Systems
Memphis TN
ph 800.423.0404
fax 901.761.0727
scharles@worldnet.att.net

Terence M. Davidson MD
Continuing Medical Education
UCSD School of Medicine
La Jolla CA
ph 619.534.3940
fax 619.534.7672
bendavid@adnc.com

Steven L. Dawson MD
Ctr for Innovative Minimally Invasive Therapy
Massachusetts General Hospital
Boston MA
ph 617.724.3815
fax 617.726.3104
dawson@helix.mgh.harvard.edu

Nathaniel I. Durlach
Director, VETREC
Massachusetts Institute of Technology
Cambridge MA
ph 617.253.2534
fax 617.258.7003
durlach@vetrec.mit.edu

Henry Fuchs PhD
University of North Carolina
Dept of Computer Science
Chapel Hill NC
ph 919.962.1911
fax 919.962.1799
fuchs@cs.unc.edu

Walter J. Greenleaf PhD
Greenleaf Medical Systems
Palo Alto CA
ph 415.843.3640
fax 415.843.3645
WalterG@netcom.com; waltergms@aol.com

Helene M. Hoffman PhD
Asst. Dean, Curriculum & Educ.Computing
University of California, San Diego
La Jolla CA
ph 619.534.3656
fax 619.534.1411
hhoffman@ucsd.edu

CDR Shaun B. Jones MD
Biomedical Technology
DARPA
Arlington VA
ph 703.696.4427
fax 703.696.3999
sjones@darpa.mil
Thomas J. Miller MS  
Zeiss Optical Systems, Inc.  
Carl Zeiss, Inc.  
Thornwood NY  
ph 914. 681. 7603  
fax 914. 681. 7485  
tmiller@zeiss.com

Jannick P. Rolland PhD  
Electrical & Computer Engineering  
University of Central Florida  
Orlando FL  
ph 407. 823. 6870  
fax 407. 823. 6880  
rolland@creol.ucf.edu

Jack W. Moncrief MD FACP  
Moncrief Dialysis Ctr & VidiMedix Inc  
Austin TX  
ph 512. 485. 7872  
fax 512. 485. 7872  
JBMONCRIEF@classic.msn.com

Joseph M. Rosen MD  
Plastic & Reconstructive Surgery  
Dartmouth-Hitchcock Medical Ctr.  
Lebanon NH  
ph 603. 650. 5148  
fax 603. 650. 5809  
Joseph.M.Rosen@Hitchcock.ORG

Morgan W. Nields  
Fischer Imaging  
Denver CO  
ph 303. 452. 6800  
fax 303. 252. 4256  
mnields@fischerimaging.com

Richard M. Satava MD  
Department of Surgery  
Yale University School of Medicine  
New Haven CT  
ph 203. 764. 9178  
fax 203. 764. 9066  
richard.satava@yale.edu

Lutz-P. Nolte PhD  
M. E. Muller Inst. for Biomechanics  
University of Bern  
Bern Switzerland  
ph 41. 31. 632. 8722  
fax 41. 31. 632. 4951  
nolte@mem.unibe.ch

Rainer M.M. Seibel MD  
Inst. of Diagnostic & Interventional Radiology  
University of Witten/Herdecke  
Mulheim a.d. Ruhr Germany  
ph 49. 208. 992. 090  
fax 49. 208. 992. 099  
rmseibel@erols.com; seibel@bwh.harvard.edu

Makoto Nonaka MD PhD  
Foundation for Int'l Scientific Advancement  
La Jolla CA  
ph 619. 452. 5589  
fax 619. 552. 9176  
mdnonaka@internetMCI.com

Ramin Shahidi PhD  
Image Guidance Laboratories / Neurosurgery  
Stanford University Medical Center  
Stanford CA  
ph 415. 498. 7327  
fax 415. 723. 7813  
shahidi@ramin.stanford.edu

Glenn M. Preminger MD  
Division of Urology  
Duke University Medical Center  
Durham NC  
ph 919. 681. 5505  
fax 919. 681. 5507  
PREMI1001@mc.duke.edu

Richard A. Robb PhD  
Biomedical Imaging Resource  
Mayo Foundation/Clinic  
Rochester MN  
ph 507 284 4937  
fax 507 284 1632  
robb.richard@mayo.edu

Faina Shtern MD  
Office of the Secretary/HHS  
US Office on Women's Health  
Washington DC  
ph 202. 690. 7650  
fax 202. 401. 4005  /fshtern@osophs.dhhs.gov

Dr. rer nat Hans B. Sieburg  
In Silico Technologies  
San Diego CA  
ph 619.292.2341  
fax 619.292.2333  
hsieburg@insilico.com
Don Stredney
Ohio Supercomputer Center
Columbus OH
ph 614-292-9248
fax 614-292-7168
don@osc.edu

John P. Verschoor
Advanced Concepts & Technology
Ethicon Endo-Surgery
Cincinnati OH
ph 513 483 3452
fax 513 483 8060
jverscho@eesus.jnj.com

Kirby G. Vosburgh PhD
Research & Development
General Electric
Schenectady NY
ph 518 387 7978
fax 518 387 6170
vosburgh@crd.ge.com

Yulun Wang PhD
Computer Motion, Inc.
Goleta CA
ph 805.968.9600
fax 805.685.9277
ywang@computermotion.com

Dave Warner MD
NPAC, Syracuse University
Syracuse NY
Institute for Interventional Informatics
San Diego CA
ph 619.566.2662
pager 800.950.0849
fax 315.443.1973; 619.566.0020
davew@well.com

Suzanne J. Weghorst
Human Interface Technology Lab University of Washington
Seattle WA
ph 206.543.5075
fax 206.543.5380
weghorst@uwashington.edu

Brenda Wiederhold MBA MS
San Diego CA
ph 619.672.2452
fax 619.672.8560
brendawied@aol.com
PROGRAM

WEDNESDAY, January 28

8:00 am to Noon

Advanced Biomedical Technology Program

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

Chair: Richard M. Satava MD

Principal Investigators of the new Yale-NASA CSC/MITA will present an overview of their investigations. Previous DARPA PI’s will present final progress reports. The focus of the new Yale NASA program will be described, with opportunities for medical support participation for the Space Shuttle, International Space Station, and Mission to Mars. The function of the Center is to accelerate technology transfer, leveraging prior successful programs such as DARPA, US Army Medical Research and Materiel Command, NIH/NCI, ONR, NRL, and NSF, as well as other efforts from NASA Centers.

8:00 Introduction
Richard M. Satava MD
Director, Center for Medical Informatics and Technology
Yale School of Medicine

8:15 Sensate Liner
Eric Lind PhD
Spawar Systems Center, San Diego

8:20 Personnel Status Monitor (PSM)
Peter Kind
Sr. VP and CIO, Sarcos Entertainment

8:25 Microsensors
Thomas L. Ferrell PhD
Photometrics Group, Oak Ridge TN National Laboratory

8:30 3-D Ultrasound
Rik Littlefield
3-D Ultrasound Program Manager
Battelle

8:35 Handheld Ultrasound
Stephen J. Carter MD
Clinical Associate Professor of Radiology
U Washington

8:40 LSTAT
Todd Kneale
Advanced Projects Manager
Northrup Grumman Corporation

8:45 Telesurgery
Kenton R. Kaufman PhD
Co-Director
Biomechanics Laboratory

8:50 Force Sensing Instruments
David L. Brock PhD
President, Brock Rogers Surgical

8:55 Dexterous Manipulator
Steven T. Charles MD
Clinical Professor, Ophthalmology
U of Tennessee

9:00 Surgical Glove
Wolfgang Daum PhD
President, The Daum Corporation

9:05 Surgical Feedback
Blake Hannaford PhD
Professor, Dept of Elec Engineering
U Washington

9:10 Limb Trauma Simulator
Arthur Y. Wong MBA
COO, MusculoGraphics
9:15 Trauma Simulator
Morten Bro-Nielsen PhD
Senior Scientist, HT Medical Organ

9:20 Virtual Endoscopy
Ron Kikinis MD
Director, Surgical Planning Laboratory

9:25 Haptic Input
Robert Playter PhD
Vice President, Engineering
Boston Dynamics

9:35 Virtual ER
Suzanne Weghorst
HIT Lab, U Washington

9:40 BREAK

Yale - NASA Projects

10:10 Yale - NASA Telemedicine: Educational
Peter Angood MD
Program Manager, Telemedicine at Yale

10:15 Yale - NASA Telemedicine: Clinical
Richard Stahl MD
Associate Chief of Surgery
Yale-New Haven Hospital

10:20 Smart Tee Shirt
Eric Lind PhD
Spawar Systems Center, San Diego

10:25 Astronaut Status Monitor (ASM)
Peter Kind
Sr. VP and CIO, Sarcos Entertainment

10:30 Ring Pulse Oximeter
Thomas L. Ferrell PhD
Photometrics Group, Oak RidgeTN
National Laboratory

10:35 Teleultrasound in Chernobyl
Rik Littlefield
3-D Ultrasound Program Manager,
Batelle

10:40 Ultrasound in Space Healthcare
Stephen J. Carter MD
Clinical Associate Professor of
Radiology, U Washington

10:45 LSTAT for Space ICU and Recovery
Todd Kneale
Advanced Projects Manager
Northrup Grumman Corporation

11:00 Motion Stabilization Telesurgery
Yulun Wang PhD
Computer Motion

11:05 End Effectors for Remote Manipulation
Wolfgang Daum PhD
The Daum Corporation

11:10 Wearable Computer
David R. Carroll PhD
Strategic Electronics Division, Motorola

11:15 Head Mounted Glasses Display
Mark Spitzer MD
The MicroOptical Corporation

11:20 3-D Visualization Lab at Yale
Alexander Tsiaras
CEO, The Anatomical Travelogue

11:25 Automatic 3-D Segmentation
Stephen M. Pizer PhD
Keenan Professor, Computer Science
U North Carolina-Adjunct Professor, Radiology

11:30 3-D Data Properties
John Kerr PhD
Project Manager, Engineering Animation

11:35 3-D Image Fusion
John D. Coleman PhD
Department Head, Department of
Visualization, Fraunhofer

11:40 Discussion

12:10 Adjourn
Symposium on User Interface Design Considerations in Medical VR Systems

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

Numerous challenges face those working to design and implement medical virtual reality (MVR) systems. There are many daunting technical considerations, such as achieving the level of sensory fidelity needed for adequate training in medical simulation systems, and coping with time delay and information transmission problems in telemedical VR systems. However, another area of significant concern that cuts across all MVR domains involves the proper design of the user interface. All MVR systems are intended to have a positive effect on human performance, either by enhancing expert performance or aiding the learning and skills acquisition. An important question for those interested in the design and use of MVR systems involves the determination of principles of effective user-centered design to enhance the probability that a system’s behavioral goals are met. What types of perceptual information must we make available? How must we make them available, in order to optimize human use of MVR systems?

This symposium is intended for all MMVR attendees with design issues, questions, or an interest in the area of user interface design for MVR 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.

Cutting Edge Technologies For Distance Healthcare

Co-Chairs: John P. Brennan MD Assoc. Prof. SUNY Health Sci Ctr, Brooklyn and Jais A. Brennan, President, Virtual Medical Systems, Inc., Brooklyn

Computer and connectivity advances appear daily. Moore’s Law is repealed as too pessimistic, and Internet time feels sluggish. The 20th Century closes, Bill Gates invests in Apple, and HMOs cut reimbursement. Baby boomers turn grey, and poverty, disease and ignorance are with us for the long haul. This workshop provides a survey of what is available now, and what will be, to help implement distance healthcare solutions, issues and problems which need to be addressed, and a look at some inspiring success stories.

Part I: Overview and Progress Report
• Bandwidth: how much is not enough?
• Web solutions: ready or not?
• Video conferencing: so nice to have so many standards to choose from!
• The future: what are we waiting for?

Part II: Demos
• Demonstrations of a number of cutting edge technology and internet solutions which hope to help transform healthcare.
• Live demonstrations utilizing broadband internet connectivity, where anything can (and probably will) happen.

Part III: Discussion
• Workshop participants and a few invited guests offer their input.

A printed syllabus, software, and other resources will be provided to participants with the hope that they will implement what they have seen!
WEDNESDAY, January 28

6:30 pm to 8:30 pm

Heads Up - Blue Sky Ahead
Preparing For The Globalization Of Tele-Medical Knowledge Vending

Co-Chairs: Dave Warner MD and David C. Balch MA

This multi-media presentation will focus on the latest techno-socio-cultural developments affecting the design and deployment of commercially viable tele-medical knowledge delivery systems. The Malaysian Multi-Media Super Corridor will be utilized as a real-world model of the techno-socio-cultural integration to contextualize the discussion.

This Presentation Will Address:

Recent developments in the globalization of communication technology
  • improved telecommunication infrastructure
  • decreased cost of international communication
  • increased availability of Web-based technologies

Emerging commercial opportunities of the global communication systems
  • knowledge vending
  • electronic commerce

Preparing for international tele-medical commerce
  • tele-medical service delivery systems
  • new clinic models (i.e. micro hospitals)

Special Attention Will Be Given To:

Designing human in the loop interventional system
  • tele-medical practice suite
Designing delivery systems for global tele-medical practice
  • physician-on-demand services
  • Web-based knowledge delivery systems
  • real-time video systems for "low end"
  • lower cost systems at the "high end"
THURSDAY, January 29

Moderator: Dr. rer nat Hans B. Sieburg

8:00 Welcome & Introduction
Karen S. Morgan, President
Aligned Management Associates, Inc.
San Diego

8:05 Accelerating Technology Transfer: New Relationships for Academia, Industry, and Government
Richard M. Satava MD
Department of Surgery
Yale Univ School of Medicine

8:25 Panel Discussion: Academic Entrepreneurship: Funding for Research & Development of New Healthcare Technologies

Preliminary research and development of healthcare applications for interactive technology have been funded primarily through high-risk government programs such as DARPA. Hardware and software technologies have now matured sufficiently to attract mainstream government, industry, and venture funding. A panel of experts will discuss funding resources and will suggest strategies for successfully bringing medical healthcare technologies to the marketplace.

Chair: Dr. rer nat Hans B. Sieburg
President, In Silico Technologies, Inc.
La Jolla CA

Panelists:
Stephen R. Bochner MD
Portola Valley CA

Richard Hamilton
Oxford Bioscience Partners
Costa Mesa CA

Douglas H. Obenshain
Ernst & Young
San Diego CA

Jeffrey Sollender
Forward Ventures, Inc.
La Jolla CA

9:45 Engineering the Future of Biotechnology
Dr. rer nat Hans B. Sieburg
In Silico Technologies
La Jolla CA

10:00 Break

Moderator: CDR Shaun B. Jones MD

10:30 Medicine Meets Magic
Susan E. Squires PhD
Senior Consultant, GVO, Inc.
Palo Alto CA

11:00 Keynote Presentation: The Long Boom: A Positive View of Healthcare in the Next Century
Peter Schwartz
Partner/Founder
Global Business Network
Emeryville CA

11:45 Presentation of the 1998 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 the 1998 conference.

12:00 Break
Scientific and Clinical Visualization

Moderator: Morgan W. Nields

1:15 Real Virtuality: Validating VR Medical Applications At Mayo Clinic
Richard A. Robb PhD
Biomedical Imaging Resource
Mayo Foundation/ Clinic
Rochester MN

1:30 An Immersive Environment For The Direct Visualization And Segmentation Of Volumetric Data Sets
Steven Seung PhD
Dept Mathematics & Dept Computer Sci
Univ of Wisconsin - La Crosse

1:40 The VR Arthroscopy Training Simulator
Wolfgang Müller Dipl.-Inform.
Fraunhofer-Inst für graphische Datenverarbeitung
Darmstadt Germany

1:50 Interactive vs. Automatic Prostate Needle Biopsy Simulation
Jianchao Zeng PhD
Department of Radiology
Georgetown Univ Medical Center

2:00 Comparative Analysis Of Integrating Visual Representations With Haptic Displays
Don Stredney
Ohio Supercomputer Center

2:15 Applications Of Volumetric Rendering In Clinical Practices
Ramin Shahidi PhD
Image Guidance Lab / Neurosurgery
Stanford Univ Medical Center

2:35 Image Guided Surgery with Real Time CT
Rainer M. M. Seibel MD
Inst. of Diag & Interven Radiology
Univ Witten/Herdecke

2:50 3D Visual Presentation Of Shoulder Joint Motion
Saara Tottermann MD PhD
Dept Radiology, MR Center
Univ Rochester Medical Center

3:05 Keynote Presentation:: Naked to the Bone: Medical Imaging in the Twentieth Century
Bettyann Holtzmann Kevles
Los Angeles CA

3:45 Break

Moderator: Ramin Shahidi PhD

4:00 Virtual Endoscopy For Clinical Neurosciences
Prof. Dr. L.M. Auer
Institute Appl Sci in Medicine
Max Planck Inst Psychiatry

4:10 Precision Needle Biopsies Using Graphics Enhanced Ultrasound Guidance
John D. Coleman
Fraunhofer Ctr Res in Computer Graphics
Providence RI

4:20 Medical Volume Rendering over the WWW Using VRML and Java
Nigel W. John PhD
Silicon Graphics Biomedical
Manchester UK

4:30 DAVIS - A Mobility Aid For The Nightblind
Klaus Loske
CAE Elektronik GmbH
Stolberg Germany

4:40 Visualization And Registration Of Multi-Modal Medical Data-Sets
Matthias M. Wloka
Fraunhofer Ctr Reseach Comp Graphics
Providence RI

4:50 Enhancement Of The Aesop Robotic Surgical Assistant Using A Head Tracker
Charles P. Steiner MS
Cleveland Clinic Foundation

5:30 to 7:00pm RECEPTION
FRIDAY, January 30

Telemedicine: The Global Healthcare Grid

Moderator: Dave Warner MD

8:00 International Surgical Telementoring: Our Initial Experience
Benjamin R. Lee MD
Department of Urology
Johns Hopkins Bayview Med Ctr

8:10 Telemedicine In Prison
Relinda Longan LVN
NEC America Corp Networks Grp
Irvine TX

8:20 Teledialysis: Monitoring of Hemodialysis and Primary Care For End-Stage Renal Disease Patients
Jack W. Moncrief MD
Moncrief Dialysis Ctr & VidiMedix Inc
Austin TX

8:30 Web-Based Segmentation And Display Of 3-Dimensional Radiologic Image Data
Jonathan Silverstein MD
Univ Illinois, Chicago

8:40 ATTRACT: Applications in Telemedicine Taking Rapid Advantage of Cable Television Network Evolution
George Anogianakis MD PhD
BIOTRAST s.a.
Thessaloniki Greece

8:50 Overcoming the Barriers Through Telemedicine Training
David C. Balch MA
Ctr for Hlth Sci Communication
E Carolina Univ Sch Med

9:05 An Improved Mobile Telemammography System
(presented by: Kirby G. Vosburgh PhD)
Aiman Abdel-Malek PhD
GE Corp Res & Devel
Schenectady NY

9:20 A Personal Information Appliance With Telemedicine Data Support For Use In Hospital Environments
Spiro Dembeyiotis
Biomed Eng Lab
Natl Tech Univ Athens

9:35 In-Flight Broadcast Of Vital Signs: Continuous Monitoring Via The Internet
(presented by Kevin Montgomery PhD)
Alex Gandsas MD
North Oakland Med Ctr
Pontiac MI

10:00 Break

Moderator: John P. Brennan MD

10:30 Moving Distribution Of Medical Education And The Delivery Of Medical Intelligence to the World Wide Web
Charles Kesler
Ctr for Hlth Sci Communication
E Carolina Univ Sch Med

10:45 A Patient-Centric Approach To Telemedicine Database Development
John Peifer BS MA
Biomed Interactive Tech Ctr
Georgia Inst Technology

11:00 Secured Medical Imaging Over The Internet
Glenn M. Preminger MD
Div Urology
Duke Univ Med Ctr

11:15 Demonstration Of Surgical Telerobotics And Virtual Telepresence By Internet+ISDN From California to Italy
Prof. Ing. Alberto Rovetta
Laboratorio di Robotica, Milan

11:30 Internet-Based Telemedicine: A Practical Tool?
Peter B. Angood MD
Telemedicine Program Manager
Yale UnivCommercial Space Ctr Med Informatics & Tech App

11:50 The Future of Telemedicine: Opportunities For Expansion In an Era of Managed Care
Diane S. Millman JD
McDermott Will & Emery
Washington DC

12:10 Break

21
Surgery: Tools for Minimally Invasive Therapies

**Moderator:** Richard M. Satava MD

1:30 Virtual Endoscopy Software Application On A PC  
**Majeid M. Alyassin PhD**  
GE Corp Res & Devel  
Schenectady NY

1:45 Audio-Guided Blind Biopsy Needle Placement  
(presented by **Daniel B. Karron PhD**)

**Kristen Wegner**  
Computer Aided Surgery, Inc.  
New York

2:00 Telepresence Interface with Applications to Microsurgery and Surgical Simulation  
**John W. Hill PhD**  
AdvTech Division  
SRI International

2:15 Computer-Assisted Image-Guided Surgery Using The Regulus™ Navigator  
**Jon S. Rouss**  
COMPASS Intl  
Rochester MN

2:30 Collaborative And Interactive System For Total Joint Replacement Surgery For The Temporomandibular Joint  
**Monica J. Maurer**  
Fraunhofer Ctr Reseach Comp Graphics  
Providence RI

2:45 Using Video See-through Head-Mounted Displays for More Natural Visualization and Manipulation in Laparoscopic Surgery  
**Henry Fuchs PhD**  
Dept Computer Science  
Univ North Carolina

3:00 VIRGY: A Virtual Reality And Force Feedback Based Endoscopic Surgery Simulator  
**Charles Baur**  
Swiss Fed Inst Technology

3:15 VR Simulation Of Abdominal Trauma Surgery  
**Morten Bro-Nielsen PhD**  
HT Medical, Inc.  
Rockville MD

3:30 Break

**Moderator:** Glenn M. Preminger MD

4:00 Validation Of Virtual Reality To Teach And Assess Psychomotor Skills In Laparoscopic Surgery: Results From Randomised Controlled Studies Using The MIST VR Laparoscopic Simulator  
**Nick Taffinder MA FRCS**  
Minimal Access Surgical Unit  
Imperial Coll Med, London

4:15 3D And 4D Atlas Systems of Living Human Body Structure  
**Naoki Suzuki**  
School of Medicine  
Jikei Univ, Tokyo

4:30 CT-Based 3D-Planning For Dental Implantology  
**Wolfram Stein**  
Dept of Oral & Maxillofacial Surg  
Univ Heidelberg

4:45 Experience with MR-Guided Therapy  
**Kirby G. Vosburgh PhD**  
GE Corp Res & Devel  
Schenectady NY

5:00 Brain Surgery Simulation Systems Using VR Technique And Improvement Of Presence  
**Hiroshi Tanaka PhD**  
Medical Research Inst  
Tokyo Med & Dental Univ

5:15 Volumetric Image Navigation Via A Surgical Endoscope  
**Ramin Shahidi PhD**  
Image Guidance Lab / Neurosurgery  
Stanford Univ Medical Center
SATURDAY, January 31
Session A

Virtual Reality and Mental Health

In Cooperation with the
American Psychiatric Association

Co-Chairs: Ian Alger MD and Brenda Wiederhold MBA MS

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 type of VR experiences in different 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. A discussion of the use of VR and augmented reality treatment for individuals with a variety of mental disorders.

Ian Alger is a psychiatrist and Training Analyst at New York Medical College, Clinical Professor of Psychiatry at New York Hospital-Cornell Medical Center, and currently on the Residency Training Faculty at New York Hospital-Cornell Medical College. He is a Fellow of the APA and Past President of the American Academy of Psychoanalysis. Dr. Alger has done pioneering work in the use of video playback for psychiatric treatment and is the Multimedia Consultant to the American Psychiatric Association's Psychiatric Services. Brenda Wiederhold is a PhD candidate in Clinical Health Psychology at California School of Professional Psychology and Director of the Center for Advanced Multimedia Psychotherapy, where she uses integrated models of therapy to treat psychophysiological and psychological disorders. She is certified in both biofeedback and neurofeedback by the Biofeedback Certification Institute of America and serves on the Editorial Board of CyberPsychology and Behavior journal.

8:00 Welcome & Introduction
Brenda K. Wiederhold MBA MS

8:05 Keynote Presentation
Telemedicine Over Thirty Years — A Personal Adventure
Ian Alger MD

8:35 Physiological Monitoring During VR Therapy for Anxiety Disorders
Brenda Wiederhold MBA MS

8:45 Bedside Wellness: Development Of A Virtual Forest Rehabilitation System
Mieko Ohsuga
Psychophysiological Information Team
Mitsubishi AdvTech R&D Ctr
Hyogo Japan

9:00 The Virtual Reality Mental Rotation/Spatial Skills Project
Albert A. Rizzo PhD
Alzheimer's Res Ctr
Univ Southern Calif

9:15 A VR Tool For Developing Spatial Skills In Children
Joan McComas PhD
Physiotherapy Prog
Univ Ottawa

9:30 BIVRS - VR For Psychological Assessment
Giuseppe Riva PhD
Appl Tech for Psychology Lab
Inst Auxologico Italiano,Verbania

9:45 Cognitive Behavioral Therapy Of Claustrophobia Using A 3D VR System
Alex H.Bullinger MD
Dept of Clin Psychi
Univ Basel

10:00 Break

10:15 The Comprehensive Clinician's Desktop
Waguih William Ishak MD
NYU Med Ctr

10:30 Strategies Of Exploration Of Virtual Environments In Healthy and Neurologically Impaired Adults
Dario Alpini
Sci Inst S. Maria Nascente
Don Gnocchi Foundation
Milan Italy
10:45 Virtual Flow
Mark Riva
The Flow Network
Chicago IL

11:00 Virtual Reality For Cognitive Rehabilitation: An Overview Of Projects, Developments And Results Of 3 Years Of Activity
Luigi Pugnetti
Sci Inst S. Maria Nascente
Don Gnocchi Foundation
Milan Italy

11:15 Comparing Virtual and Real Worlds for Acrophobia Treatment
Milton P. Huang MD
Dept Psychiatry
Univ Michigan

11:30 Discussion Period

12:00 Break

1:30 A Software System For Psychiatric And Medical Diagnosis Via Exploring Personal Myth In Virtual Environments
McCagie Brooks Rogers MA
The Mythseeker Inst
Eagle Rock CA

1:45 A New Project For Rehabilitation And Psychomotor Disease Analysis With Virtual Reality Support
Prof. Eng. Alberto Rovetta
Laboratorio di Robotica
Milan Italy

2:00 Rule-Based Neural Network Analysis
Mark D. Wiederhold MD PhD
Scripps Clin & Res Fdn
La Jolla CA

2:15 On-Line Quantitative Video Analysis Of Movement Disorders In The Construction Of Computer Assisted Therapeutic/Assistive Environments
Morris Steffin MD
Scottsdale AZ

2:30 Neuropsychological Assessment Of Topographical Orientation And Concept Formation By Virtual Reality Environments
Godehard Weniger
Dept Psychiatry
Univ Göttingen

2:45 Virtual Reality Techniques In The Treatment Of Impotence And Premature Ejaculation
Gabriele Optale MD
Assoc for Sexology Research
Venezia-Marghera Italy

3:00 Personal Stories Within Virtual Environments: Embodiments Of A Model For Cancer Patient Information Software
Darcy Drew Greene MFA
Sch Journalism
Michigan St Univ

3:15 Sexuality And The Internet: Surfing Into The New Millennium
Al Cooper PhD FAACS
Stanford Univ

3:30 Break

3:45 VR For Burn Pain Control During Wound Care
Hunter Hoffman PhD
Research Scientist
HIT Lab
Univ Washington

4:00 Visceral: Non-Invasive Endoscopic Virtual Reality Biofeedback
Alan T. Pope PhD
Crew/Vehicle Integration Branch
NASA Langley Res Ctr
Hampton VA

4:15 The Experience of Learning Through Virtual Reality
Anita Menfi RN MEd
New York Hosp/Cornell Med Ctr

4:30 The Construction of Tridimensional Representation of Body and External Reality in Man: The Greatest Achievement of Evolution To Date - Implications for Virtual Reality
Michael A. Woodbury Sr. MD
Family Inst Mental Health
Miramar PR

4:45 Virtual Reality Therapy: An Effective Treatment For The Fear Of Public Speaking
Max M. North PhD
Human-Computer Interaction Group
VR Technology Lab, Atlanta

5:00 Discussion Period
SATURDAY, January 31
Session B

Robotics: Art, Science, Technology

Co-Chairs: Lutz-P. Nolte PhD and Faina Shtern MD

8:00 Surgical Navigation Techniques
Lutz-P. Nolte PhD
M. E. Müller Institute for Biomechanics
Univ Bern, Switzerland

8:15 Planning and Surgical Simulation
Scott Delp
Northwestern Univ
 Evanston IL

8:30 Neurosurgery
Richard Bucholz MD
St. Louis Univ
St. Louis MO

8:45 Ophthalmology
Steven T. Charles MD
Micro-Dexterity Systems
Memphis TN

9:00 Orthopedic Surgery
Andre Bauer
BG Trauma Clinic Frankfurt
Frankfurt, Germany

9:15 Endoscopic Surgery
Gerhard Buess
Universitatsklinik Tubingen

9:30 Radiosurgery
John R. Adler MD
Stanford Univ Medical Center
Stanford CA

9:45 Telepresence Surgery
Jon C. Bowersox MD
Stanford Univ
Stanford CA

10:00 Discussion

10:15 Break

Moderator: Walter J. Greenleaf PhD

10:30 Robot-Assisted Microneurosurgical Procedures: Comparative Dexterity Experiments
Prof. Dr. L.M. Auer
Institute of Applied Sciences in Medicine
Max Planck Institute of Psychiatry, Munich

10:45 Is Laparoscopic Surgical Dexterity Enhanced by the use of "Master-Slave" Robotic Technology?
Antonio Garcia-Ruiz MD
Minimally Invasive Surgery Center
The Cleveland Clinic Foundation

11:00 Review Of Orthopaedic Manipulator Arms
Ken Hurst MSc PhD
Hull Royal Infirmary
Hull UK

11:15 Integration Of Two Robotically-Controlled Video Views And Two Instrument-Enhancement Robotic Arms In Microvascular Minimally Invasive Surgery
W. Peter Geis MD
Minimally Invasive Surgical Training Institute
St. Joseph MedCtr, Baltimore

11:30 Planning And Simulation Of Medical Robot Tasks
(Presented by Catherina R. Burghart)
Jörg Raczkowski
Inst. Real-Time Comp Sys & Robotics
Univ Karlsruhe

11:45 The Impact of Computers and Robotics in Minimally-Invasive Surgery
(Presented by Moji Ghodoussi PhD)
Yulun Wang PhD
Computer Motion Inc.
Goleta CA

12:00 Motion Feedback As A Navigation Aid In Robot-Assisted Neurosurgery
Matthias Wapler Dipl-Ing. MS
Fraunhofer-Inst Produktionstechnik und Automatisierung
Stuttgart

12:15 A System For Robot-Assisted Maxillofacial Surgery
Dipl-Inform Catherina R. Burghart
Inst. Real-Time Comp Sys & Robotics
Univ Karlsruhe

12:30 Break
SATURDAY, January 31

Session B

Technology: Tooling Up For the Future of Healthcare

Moderator: Don Stredney

1:30 Virtual Surgery Simulator Using Deformable Organ Models And Force Feedback System
Naoki Suzuki
School of Medicine
Jikei Univ, Tokyo

1:45 3D-Brain 2.0: Narrowing The Gap Between Personal Computers And High End Workstations
Torben Kling-Petersen PhD
Mednet, Göteborg

2:00 The Virtual Instrumentation (VI) Laboratory Facilitates Customized On-Site Ergonomic Analysis Of Minimally Invasive Surgery
Warren D. Smith PhD
Biomedical Engineering Program
Calif State Univ Sacramento

2:15 A Non-Intrusive Display Technique For Providing Real-Time Data Within A Surgeon’s Critical Area Of Interest
James Parsons
Institute for Simulation & Training
University of Central Florida
Orlando FL

2:30 The Virtual Retinal Display: A New Technology for Virtual Reality and Augmented Vision in Medicine
Erik Viirre MD PhD
HIT Lab
Univ Washington

2:45 A Sensitive Liner For Biomedical Monitoring Applications
Eric J. Lind MD
SPAWAR Sys Ctr
San Diego

3:00 Break

Moderator: Richard A. Robb PhD

3:15 Computerized Endoscopic Surgical Grasper
Blake Hannaford PhD
Depts Elec Eng & Surg
Univ Washington

3:30 Haptic Communication For Remote Ultrasound Diagnosis
Gabriel Gruener
Dept Mech Eng
Univ Colorado Boulder

3:45 Development Of The Force-Feedback Model For An Epidural Needle Insertion Simulator
Leslie Hiemenz
Ohio Supercomputer Center

4:00 A New Imaging Paradigm For Medical Applications
James L. Fergason BS
Visual Environments of California, Inc.
Menlo Park CA

4:15 A Theoretical Comparison Of 2-Camera and 3-Camera Optical Localizers with Active or Passive Instrumentation
Ivan Faul
Image Guided Technologies, Inc.
Boulder CO

4:45 Force Interactions In Laparoscopic Simulations: Haptic Rendering Of Soft Tissues
Cagatay Basdogan
Department of Mechanical Engineering and Res Lab/Electronics
MIT
SATURDAY, January 31
Session C

Education: Transformation of Communication

Moderator: Helene M. Hoffman PhD

1:30 Faster Proprioceptive Automation To The 'Fulcrum Effect' For Laparoscopic Novices With Mist VR Training
Anthony G. Gallagher PhD
Sch Psychology
Belfast  UK

1:40 Training Environment For Inferior Vena Caval Filter Placement
James K. Hahn PhD
Dept of Electrical Engineering and Computer Science
George Washington Univ

1:50 Ultra Trainer: A Training System For Medical Ultrasound Examination
(presented by Matthias Wapler Dipl.-Ing. MS)
Jan Stallkamp Dipl.-Ing.
Fraunhofer Inst Mfg Eng & Automation
Stuttgart

2:00 A Virtual Reality Training System For Field Triage And Stabilization Of Head Trauma Patients
Annette L. Sobel MD MS
Sys Assess & Res Ctr VR and IS Group
Sandia National Labs

2:10 A Commercially Viable Virtual Reality Knee Arthroscopy Training System
Avril D. McCarthy
Dept Med Physics & Clin Eng
Univ Sheffield

2:20 Virtual Medical Trainer (VMET): Patient Assessment and Trauma Care Simulator
Paul N. Kizakevich MS PE
Res Triangle Inst

2:30 Virtual Environments For Training Critical Skills In Laparoscopic Surgery
Michael Downes
Dept Elec Eng & Comp Sci
Univ Calif, Berkeley

2:40 Formative Design Of A Virtual Learning Environment
Parvati Dev PhD
Stanford Univ

2:50 A National Center For Biocomputation: In Search of a Patient-Specific Interactive Virtual Surgery Workbench
Muriel D. Ross PhD
NASA Ames Biocomp Ctr

3:00 Break

Moderator: Michael J. Ackerman PhD

3:30 The Virtual Jaw: A 3D Simulation For Computer-Assisted Surgery And Education
Tim Weingärtner
Univ Karlsruhe

3:45 Validity of the Madigan ESS Simulator
Suzanne J. Weghorst
HIT Lab
Univ Washington

4:00 Assessing a VR-Based Learning Environment for Anatomy Education
Helene M. Hoffman PhD
Curric & Educ.Comp
Univ Calif, San Diego

4:15 The Classified Visible Human
Victor Spitzer PhD
Dept Cellular & Structural Biol
Univ Colorado Hlth Sci Ctr

4:30 A Novel Laparoscopic Training Device
S. Vincent Grasso DO
Dept of Endoscopic & Laparoscopic Surg
Yale Univ Sch Med

4:45 Clinical Advantages Of Editable Real-Time Volume Rendering In A Medical Virtual Environment: VolMed
Hiroshi Oyama MD
National Cancer Center, Tokyo

5:00 The Virtual Temporal Bone
Theodore Mason MD
Eye & Ear Infirmary
Univ Illinois, Chicago
Poster Presentations

THURSDAY

A PC-Based Surgical Simulator For Laparoscopic Surgery
Ching Shiow Tseng PhD
Dept Mech Eng
National Central Univ, Taiwan

Knowledge-Based Segmentation
Dipl.-Inform Catherina R. Burghart
Inst. Real-Time Comp Sys & Robotics
Univ Karlsruhe

Use Of Stereoscopic Visualisation Of The Optic Nerve Head In Diagnosing Glaucoma
Christopher Sutton
Virtual Presence, London

CWHATUC: A Visual Acuity Simulator
Brian A. Barsky PhD
EECS Comp Sci Div
Univ Calif, Berkeley

Generating Finite Element Models From Volumetric Medical Images
(presented by: Catherina Burghart )
Hartwig A. Grabowski
Real-Time Computer Systems and Robotics
University of Karlsruhe
Karlsruhe Germany

Complete Software System For 3D Surface Modeling Anatomy From 2D Surfaces
Thomas McCracken MS
Visible Productions, Inc.
Fort Collins CO

CAVE - The Artificial Simulation Environment For Interactive Applications In Medicine
Peter Pachatz
Cadmed Pachatz
Graz Austria

Intramedullary Nails
Kevin P. Sherman MA FRCS
Hull Royal Infirmary
Hull UK

A Framework For The Evaluation Of Drilling Using Computer Assisted Orthopaedic Systems
Kevin P. Sherman MA FRCS
Hull Royal Infirmary
Hull UK

An Arthroscopic Simulator Based On The Visible Human Dataset ™
Karl D. Reinig PhD
Ctr for Human Sim
Univ Colorado Med Sch

Starlight: An Example Of A New Class Of Information System For Data Mining And Visualization With Medical Applications
Bruce Rex
Pacific NW Nat'l Lab

Advanced 3D Visualization, Including VR, Distributed By PCs In Brain Research, Clinical Radiology and Education
Martin Rydmark MD PhD
Mednet, Göteborg Univ

Interactive, Computer-Assisted Neurosurgical Planning Using 3D Manifold Surfaces
John Stewart
Div Neurosurg
Med Coll Virginia
FRIDAY

Intranet Health Clinic
George Anogianakis MD PhD
Biotrast S.A.
Thessaloniki, Greece

MERMAID
George Anogianakis MD PhD

Application Of Image Guided Surgery To Spinal Screw Fixation
Orin Bloch
Div Neurosurgery
UCLA Sch Med

Telemedicine in Antarctica
Gianluca Camillieri MD
Dept Telemed, Natl Council Res, PNRA
Rome, Italy

Geometric Considerations In Minimally Invasive Access To Coronary Artery Surgery
W. Peter Geis MD
MIST Inst, St. Jos Med Ctr
Baltimore

Computer In The O. R. For Quality Control: Intraoperative Data Acquisition Model For Laparoscopy
Volker R. Jacobs MD PhD
Fayette AL

Integrating Virtual Reality Technology Into Surgical Training
Jack Kushner MD MGA
Futuristic Instruments Int'l

Trans-Telephonic Electro-Cardiographic Monitoring (TTEM) - First Indian Experience
H.S. Rissam MD
Dept Telecardiology
Escorts Heart Inst & Res Ctre
New Delhi, India

Digital Image Applications In Reconstructive Microsurgery
William W. Shaw MD
Div Plastic & ReconstrSurg
UCLA Sch Med

Automated Medical Image Storage And Retrieval Over The World Wide Web
John Stewart
Div Neurosurgery
Med Coll Virginia

Enhanced Surgical Navigation Using Intraoperative Ultrasound
Charles P. Steiner MS
Cleveland Clinic Fdn
SATURDAY

Videoconferencing As A Medical Educational Tool
First Experience In An Argentinean Public Hospital
Rodolfo Altrud MD
Santojanni Gen Hosp
Buenos Aires

Modeling Of Knee Joint Motion For The VRDA Tool
Yohan Baillot MS
CREOL, Univ Central Florida
Orlando

A Window on Regional Cerebral Blood Flow via
Voluntary Hand Activity Using a Whole Hand
Input in a Virtual Environment
Michael Geoffrey Edwards MSc
Cog Sci Compu Sci Dept
Univ Melbourne

The Impact Of Technical Parameters On Binocular
Depth Perception Using Stereoscopic 3D-Video-
Endoscopic-Systems
Dipl.-Ing Sven Fischer
Helmholtz-Inst Biomed Eng
Aachen Univ Technology

Information Frames: A New Multimedia Approach
To Web-Based Learning Of Biology And Medicine
Wm. Leroy Heinrichs MD PhD
Dept Gyn & Obstet
Stanford Univ Med Media & IT

Building A Virtual Invasive Patient On A Budget
Torgeir Hovden MSc
Norwegian Univ Science & Tech /
Computas AS
Sandvika Norway

New Ultra-Small Displays For Medical
Instrumentation
Glen G. Kephart BS BA
Kopin Corp
Taunton MA

Development And Evaluation Of A Spine Biopsy
Simulator
Corinna E. Latham PhD
ISIS, Catholic Univ
Washington DC

Virtual Reality Simulation Of The
Ophthalmoscopic Examination
Daren Lee MS
Compu Sci Dept
Univ Calif, Los Angeles

Implications Of 3D Visualization For Medical
Education
Celina Imielinska PhD
Stevens Inst of Technology
Hoboken NJ

Virtual Reality Intubation Simulation
Michael W. Prewitt PhD RRT
Dept Cardiopulmonary & Diag Sci
Univ Missouri, Columbia

Simulation Technology In Surgical Education: Can
We Assess Manipulative Skills And What Does It
Mean To The Learner
C. Daniel Smith MD
Emory Univ Sch Med

Modern Cosmology and the Origin of Our Three
Dimensionality
Michael A. Woodbury Sr. MD
Family Inst Mental Health
Miramar PR