NextMed / MMVR21
The 21st Medicine Meets Virtual Reality Conference
February 19 - 22, 2014
Manhattan Beach Marriott Hotel • Manhattan Beach, California

Preliminary Conference Program

Please note: This preliminary program is subject to change in order to accommodate presenters’ needs, educational objectives, and logistical necessities. Plenary sessions remain under construction. Please check back for updates.

Conference at a Glance

Wednesday Afternoon, February 19

[p 3] 2014 TATRC Military Medical Simulation Public Briefing

Thursday Morning, February 20

[p. 4, 8-9] Poster Session: Rehabilitation & Aging; Psychology & Technology; Networking & Telemedicine; Surgical Simulator Systems; Surgical Simulator Design; Surgical Simulator Validation

[p. 4] Plenary Session *

[p. 4] Exhibits *

Thursday Afternoon

[p. 4] Track A: Rehabilitation & Aging; Psychology & Technology; Integrating Intelligent Tutoring Systems in Virtual World Training/Learning

Thursday Evening

[p. 7] Innovate NextMed *
Friday Morning, February 21

[p. 10, 13-15] Poster Session: Learning & Technology; Simulator Design & Development; Simulator Systems; Information-Guided Therapies; Imaging & Visualization; Robotics; Sensors; Haptics; Modeling

[p. 10] Plenary Session *

[p. 10] Exhibits *

Friday Afternoon

[p. 10] Track A: Imaging & Visualization; Information-Guided Therapies; Robotics; Interfaces; Haptics

[p. 11] Track B: Simulator Validation; Simulator Systems; Learning & Technology

[p. 12] Track C: Novel Approaches to the Study of Medical Skill Decay

[p. 12] Track D: Simulation Development

Friday Evening

[p. 13] Tour of USC’s Institute for Creative Technologies **+

Saturday Morning, February 22

[p. 16] Plenary Session *

Saturday Afternoon

[p. 16] Track A: Optics; Modeling

[p. 16] Track B: The Wide Area Virtual Environment: Lessons Learned

[p. 17] Track C: 3D Printing for Rapid Prototyping

Saturday Afternoon

[p. 17] Closing Mixer *

* Details pending

+ Optional activity; separate registration
### Wednesday, February 19

**Wednesday Afternoon**

**Independently Organized Session**

**2014 TATRC Military Medical Simulation Public Briefing**

1:00 - 5:15 PM

Thomas Talbot, Organizer  
*Telemedicine & Advanced Technology Research Center*

This session is to inform the public of developments within the military medical simulation community, share future planning ideas and engage the research community regarding mechanisms by which they can participate in advancing medical simulation goals within the defense medical community.

This track will conclude with an exciting report and panel from leaders of the three Combat Casualty Training Consortia, which were funded by the Defense Department to determine the value of live animal trauma training and the potential suitability of simulation technology as a replacement. As this $20 million effort concludes, these leaders will share the results of their long anticipated research.

**Presentations:**

### Military Medical Simulation

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Institution</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1:00</td>
<td>Thomas Talbot</td>
<td><em>Telemedicine &amp; Advanced Technology Research Center</em></td>
<td><strong>Military Medical Simulation</strong></td>
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<tr>
<td>1:35</td>
<td>Sheryl Flynn</td>
<td><em>Blue Marble Games</em></td>
<td><strong>ReSET Neurocognitive Assessment Interface</strong></td>
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<tr>
<td>2:00</td>
<td>Kevin Kunkler</td>
<td><em>JPC-1 Medical Training &amp; Health Information Science (MTHIS) Program</em></td>
<td><strong>Future Medical Simulation Research Plans of the Defense Department</strong></td>
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<tr>
<td>3:00</td>
<td>Harvey Magee</td>
<td><em>Telemedicine &amp; Advanced Technology Research Center</em></td>
<td><strong>DoD Funding Opportunities</strong></td>
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<td>3:20</td>
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<tr>
<td>3:30</td>
<td>Robert Sweet</td>
<td><em>University of Minnesota</em></td>
<td><strong>Combat Hemorrhage and Airway Training Research</strong></td>
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<tr>
<td>3:50</td>
<td>Pamela Andreatta</td>
<td><em>University of Minnesota</em></td>
<td><strong>Emergency Medical Skills: Pediatric Intubation &amp; Cholinergic Crisis</strong></td>
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<tr>
<td>4:10</td>
<td>Stephen Barnes</td>
<td><em>University of Missouri</em></td>
<td><strong>Combat Hemorrhage, Airway &amp; Emergency Medical Skills Research</strong></td>
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<td>4:30</td>
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Thursday, February 20

Morning Poster Session & Breakfast
7:30 - 8:30 AM
During the morning poster session, presenters will stand with their posters and share their research with fellow attendees. Continental breakfast will be served.

Thursday posters stay up until the end of the afternoon parallel sessions.

Thursday posters are listed on pages 8 - 9.

Morning Plenary Session
8:30 AM - 12 Noon
The Thursday morning plenary session is under construction. It will feature invited lectures on a range of topics at the forefront of medical technology.

Exhibits Open
Exhibits will open during the mid-morning break. Coffee will be served in the exhibit hall.

Lunch
12 Noon - 1:10 PM
Thursday's lunch will be served in the exhibit hall.

Thursday Afternoon, Track A
1:10  Moderator's Welcome

Rehabilitation & Aging
1:15  Zach McKinney
Center for Advanced Surgical and Interventional Technology & Dept of Bioengineering, University of California, Los Angeles
Initial Biomechanical Evaluation of Portable Tactile Biofeedback System for Gait Rehabilitation in Peripheral Neuropathy

1:30  Gregorij Kurillo
Department of Electrical Engineering and Computer Sciences, University of California at Berkeley
Kinect-Based Tele-Medicine Tool for Remote Motion and Function Assessment

1:45  Josh Pickhinke
Nebraska Biomechanics Core Facility, University of Nebraska at Omaha
Varying the Speed of Perceived Self-Motion Affects Postural Control during Locomotion

2:00  Giuseppe Riva
Applied Technology for Neuro-Psychology Lab, Istituto Auxologico Italiano
Virtual Reality as Egocentric Technology for the Assessment of Cognitive Decline in the Elderly

2:15  Howard Rose
Firsthand Technology Inc.
The Metascope: A Low-Cost, High-Immersion VR Display for Pain Control

Psychology & Technology
2:30  J. Galen Buckwalter
Institute for Creative Technologies, University of Southern California
Stress Resilience in Virtual Environments: Preliminary Findings on Allostatic Load
2:45    Andrea Gaggioli
Applied Technology for Neuro-Psychology Lab, Istituto Auxologico Italiano
A Decision Support System for Real-Time Stress Detection During Virtual Reality Exposure

3:00    Albert "Skip" Rizzo
Institute for Creative Technologies, University of Southern California
Expansion of a VR Exposure Therapy System for Combat-Related PTSD to Medics / Corpsman and Persons Following Military Sexual Trauma

3:15    Break

Independently Organized Session

Integrating Intelligent Tutoring Systems (ITS) in Virtual World (VW) Training/Learning

3:30 - 5:00
Parvati Dev, Organizer
Innovation in Learning, Inc.

In this tutorial, we will present the use of Intelligent Tutoring Systems (ITS) technology as an alternative to live facilitator training in well-prescribed situations such as triage of victims in a mass casualty disaster. We will begin by reviewing two well-developed technologies, learning environments simulated in virtual worlds, and natural language-based intelligent tutors used in tightly circumscribed learning contexts, and will show how we have constructed an integrated solution where the intelligent tutor becomes available within the virtual world. The presentation will include the results of preliminary evaluation comparing the use of the virtual world alone with that using the intelligent tutor in the virtual world.

Presenters:

Parvati Dev
Innovation in Learning, Inc.

Keith Shubeck
Department of Psychology, University of Memphis

Mae-Lynn Germany-Shubeck
Department of Psychology, University of Memphis

Xiangen Hu
Department of Psychology, University of Memphis

Thursday Afternoon, Track B

1:10    Moderator's Welcome

Surgical Simulator Design

1:15    Timothy Kelliher
SimQuest Solutions Inc.
Open Surgical Simulation (OSS) - A Community Resource

1:30    Lauren Davis
Center for Education in Medicine, Feinberg School of Medicine, Northwestern University
The Evolution of Design: A Novel Thoracoscopic Diaphragmatic Hernia Repair Simulator

1:45    Zhan Yu
Department of Computer & Information Sciences, University of Delaware
A Real Time Immersive Surgery Training System using RGB-D Sensors

2:00    Bertram Unger
Laboratory for Surgical Modeling, Simulation and Robotics, University of Manitoba
Design and Validation of 3D Printed Complex Bone Models with Internal Anatomic Fidelity for Surgical Training and Rehearsal

Surgical Simulation Metrics

2:15    Timothy Coles
The Australian e-Health Research Centre & Surgical Simulation and Planning Team, CSIRO
Outside Observer, an Enhanced Training Methodology: Bringing Back the Expert's Eye Whilst Training Alone

2:30    David Rojas
The Learning Institute, The Hospital for Sick Children
The Impact of Secondary-Task Type on the Sensitivity of Reaction-Time Based Measurement of Cognitive Load for Novices Learning Surgical Skills using Simulation

2:45    Christopher Roche
Center for Modeling, Simulation and Imaging in Medicine, Rensselaer Polytechnic Institute
Kinematic Measures for Evaluating Surgical Skills in Natural Orifice Translumenal Endoscopic Surgery

3:00    Break

Surgical Simulation Validation

3:15    Ngan Nguyen
Department of Electrical and Computer Engineering, Western University
Realism, Criterion Validity, and Training Capability of Simulated Diagnostic Cerebral Angiography

3:30    Sudanthi Wijewickrema
Department of Otolaryngology, University of Melbourne
A Virtual Reality Temporal Bone Surgery Simulator with Automated Real-Time Feedback for Effective Learning of Surgical Technique

3:45    Lee White
Bioengineering Department, University of Washington
Validation of a Crowd-Sourced Assessment of Technical Skills (C-SATS) with Application to Measuring Warm-Up Benefit in Robotic Surgery
Independently Organized Session

GLSIM: Highly Demanded Full-VR Simulator as an Endoscopic Laser Surgery Curriculum

4:00 - 5:00

Robert M. Sweet, Organizer
Medical School Simulation Programs, University of Minnesota

Yunhe Shen, Organizer
Center for Research in Education and Simulation Technologies, University of Minnesota

This session describes a process by which a VR procedural trainer has successfully been integrated into a comprehensive training program for practicing surgeons prior to doing their first cases. Over 120 of these simulators have been deployed in North America and worldwide for doctors and medical school students’ practice, and dozens of rotating units are routinely used by faculty of urologic surgery in workshops and conferences. These facts show that, at this point, there should be no doubt that full-VR simulators are being volume-produced and are serving as powerful and reliable tools meeting today’s medical training needs.

Presentations:

Michael R. Kujak
Prostate Health, American Medical Systems

AMS—A Medical Device Company’s Interest in VR Simulation

Robert M. Sweet
Medical School Simulation Programs, University of Minnesota

Backward Design—Not Only a Simulator but a Virtual Trainer with Valid Curriculum

Yunhe Shen
Center for Research in Education and Simulation Technologies, University of Minnesota

Robust Solutions to the Challenges—Needs-Driven R&D

American Medical Systems Officer, TBD

GLSIM Curriculum—Worldwide Greenlight ™ Simulation Sites for Doctors and Students

Thursday Afternoon, Track C

Independently Organized Session

The Federal Medical Simulation and Training Consortium

1:10 - 5:00

Alan Liu, Organizer
National Capital Area Medical Simulation Center, Uniformed Services University of the Health Sciences

The FMSTC is a partnership between nine medical education institutions of the Army, Navy, Air Force, Department of Defense, and the Department of Veteran’s Affairs. The mission of the FMSTC is to enhance the medical education and training mission of its partners. This mission rests on five pillars: Education, Curriculum, Validation, Research & Development, and Strategic Partnerships. The consortium plans to accomplish this through knowledge sharing, collaboration toward common goals, and participation in joint training initiatives.

Collectively, the FMSTC provides simulation-based medical instruction to more than 90% of all military medical healthcare personnel. In this workshop, we present the perspective of each of the military services on medical simulation. The FMSTC's ongoing efforts toward establishing a curriculum training repository, as well as developing technology standards for medical simulation devices will be highlighted.

Presenters will include representatives of:

- The U.S. Air Force Medical Modeling and Simulation Training (AFMMAST) Program Office
- The Central Simulation Committee (CSC-A)
- The Army Medical Department Center and School Department of Emergency Medicine (AMEDDC&S), US Army EMS Programs Office
- The Navy Medicine Central Simulation Committee (CSC-N)
- The TECOM Ground Training Division Medical Programs Office (Marine Corps Health Services)
- The TRICARE Management Activity Patient Safety Program Office (TMA)
- The Medical Education Training Campus (METC)
- The National Capital Area Medical Simulation Center (SimCen), Uniformed Services University of the Health Sciences (USUHS)
Thursday Afternoon, Track D

Independently Organized Session

**Extending Extensible 3D (X3D): from Haptic-Based Medical Training to Clinical Applications**

1:10 - 3:15

Felix G. Hamza-Lup, Organizer
*Computer Science and Information Technology, Armstrong Atlantic State University*

Nicholas F. Polys, Co-Chair
*Advanced Research Computing, Virginia Tech*

Medical applications developed using the open and royalty-free X3D standard range from simulation and training tools for concept/procedure teaching and skill assessment to applications that directly support and improve the clinical stage. MedX3D is an extension to the X3D standard (Web3D, ISO) to support advanced medical visualization functionality and medical data exchange. This focus session will explore X3D applications in the medical field as well as provide information on the current updates and features on the MedX3D standard and the H3D haptics API.

Presentations:

- **Michael Aratow**
  *Medical Informatics, CEP America*
  **A Health IT Perspective on X3D**

- **Nigel John**
  *Wales Research Institute of Visual Computing, Bangor University*
  **X3D in Medical Training & Simulation**

- **Tommy Forsell**
  *SenseGraphics AB*
  **Haptic Rendering with H3D**

- **Nicholas F. Polys**
  *Advanced Research Computing, Virginia Tech*
  **Volume Rendering and Lossless Metadata with X3D**

- **Felix G. Hamza-Lup**
  *Computer Science and Information Technology, Armstrong Atlantic State University*
  **Radiation Therapy Training with X3D**

Thursday Afternoon, Track E

Independently Organized Session

**Share Your Ideas with the Government**

2:30 - 5:00

Harvey Magee, Organizer
*Telemedicine & Advanced Technology Research Center*

This popular session continues as a sounding board where military simulation program folks listen to the public to hear about innovative ideas, research and concepts in the fields of medicine, simulation, education and virtual reality. It is also an opportunity to ask questions about current military simulation research. These discussions are intended for informational purposes only and are not negotiations or offers to the Government.

This session consists of individual ten minute appointments. Appointment slots are limited. Sign up begins during the Wednesday afternoon Military Medical Simulation briefing.

Thursday Evening

Networking Social

5:00 - 7:00

Innovate NextMed

Our second annual Innovate NextMed reception will mix rapid-fire presentations with casual conversation. Participants can make new contacts and catch up with friends made at previous conferences. Presentations (optional, of course) will be invited from all attendees in late January.
**Thursday Posters**

**Rehabilitation & Aging**

Jurgen Broeren
*Department of Physiotherapy and Occupational Therapy, Sahlgrenska University Hospital*

Coordinated Healthcare Across the Post-stroke Continuum to Support Community Integration

Malcolm Chan
*Family Practice Health Centre, Women’s College Hospital & Faculty of Medicine, University of Toronto*

Do Not Forget the Oldest Old: Design Principles for the 80+

Troy McDaniel
*Department of Computer Science and Engineering, Arizona State University*

Augmented Motor Learning and Rehabilitation using Vibrotactile Feedback

Susan Truong
*Family Practice Health Centre, Women’s College Hospital & Faculty of Medicine, University of Toronto*

Assessing the Interest in Using Social Networking from the Perspective of Older Adults Aged 80+

Alvaro Uribe Quevedo
*Industrial Engineering, Nueva Granada Military University*

Anthropomorphic Passive Mechanism for Performing Hand Exercises

Sergio Valdivia
*Multimedia Engineering, Nueva Granada Military University*

Serious Game Strategy for Lower Member Rehabilitation

**Psychology & Technology**

Georgina Cárdenas-López
*School of Psychology, National Autonomous University of Mexico*

Virtual Reality for Improving Body Image Disorders and Weight Loss after Gastric Band Surgery: A Case Series

Bruce John
*Institute for Creative Technologies, University of Southern California*

Self-Reported Differences in Personality, Emotion Control, and Presence Between Pre-Military and Non-Military Groups in a Pilot Study using the STress Resilience in Virtual Environments (STRIVE) Program

Andrea Gaggioli
*Applied Technology for Neuro-Psychology Lab, Istituto Auxologico Italiano*

A Virtual Reality Procedure For Assessing Deficit in the Mental Frame Syncing: Feasibility Study

**Networking & Telemedicine**

Ben Boedeker
*University of Nebraska Medical Center*

Development of a Tele ENT Program to Support Distant Military Treatment Facilities for the European Regional Medical Command

Allan Okrainec
*Department of Surgery & Temerty Chang International Center for Telesimulation and Innovation in Medical Education, Toronto Western Hospital & University of Toronto*

Software Based Videoconferencing Software for Use in Telementoring Laparoscopic Surgery

Angelika Peer
*Institute of Automatic Control Engineering, Technische Universität München*

Towards a Remote Medical Diagnostician for Medical Examination

Ali Turabi
*Anesthesia Prep Unit, Post Anesthesia Care Unit, and Pre Procedure Unit, Landstuhl Regional Medical Center, Germany*

Development of a Tele-Anesthesia Preoperative Clinic to Support Distant Military Treatment Facilities for the European Regional Medical Command

Karthik Venkatraman
*University of Texas at Dallas*

Tele-Rehabilitation with a 3D Augmented Virtual Reality and Haptic Devices

**Surgical Simulator Systems**

Ryan Armstrong
*Biomedical Engineering Graduate Program, University of Western Ontario*

Patient-Specific Pipeline to Create Virtual Endoscopic Third Ventriculostomy Scenarios

Lauren Davis
*Center for Education in Medicine, Feinberg School of Medicine, Northwestern University*

A Low-Cost Tissue Replica for Simulation of Thoracoscopic Tracheoesophageal Fistula Repair
Christopher Guerra  
*Aerospace Electronics, Systems Engineering, and Training Division, Southwest Research Institute*  
**Real-Time Passive Tracking for Multi-Touch Medical Modeling and Simulation**

Ellie Hawkinson  
*Center for Education in Medicine, Feinberg School of Medicine, Northwestern University*  
**Design and Development of a Laparoscopic Gastrostomy Tube Placement Simulator**

Ellie Hawkinson  
*Center for Education in Medicine, Feinberg School of Medicine, Northwestern University*  
**Design and Development of a Patient-Specific Surgical Simulator for Pediatric Laparoscopic Procedures**

Nikoo Saber  
*Centre for Image Guided Innovation and Therapeutic Intervention, The Hospital for Sick Children*  
**Development of a Patient-Specific Surgical Simulator for Pediatric Laparoscopic Procedures**

Yasushi Yamauchi  
*Faculty of Science and Engineering, Toyo University*  
**Smart Dry Lab: An Augmented Reality (AR) Based Surgical Training Box**

Peter Weyhrauch  
*Charles River Analytics, Inc.*  
**Tourniquet Master Training for Junctional and Inguinal Hemorrhage Control (TMT)**

**Surgical Simulator Design**

Woojin Ahn  
*Center for Modeling, Simulation and Imaging in Medicine, Rensselaer Polytechnic Institute*  
**Development of a Virtual Reality Simulator for Natural Orifice Transluminal Endoscopic Surgery (NOTES) Cholecystectomy Procedure**

Brian Allen  
*Center for Modeling, Simulation and Imaging in Medicine, Rensselaer Polytechnic Institute*  
**Toward the Development of a Virtual Electrosurgery Training Simulator**

Andrew Dickinson  
*Medical Computing Laboratory, Queen’s University*  
**Overall Wrist Biomechanics Are Conserved By Phenol-Based Embalming**

Toma Kato  
*Haptic Vision Lab, Ritsumeikan University*  
**Evaluation of Haptic Teaching Approaches for Laparoscopic Surgery Training**

Jason Lee  
*Center for Modeling, Simulation and Imaging in Medicine, Rensselaer Polytechnic Institute*  
**Developing Extracorporeal Suturing Simulation in Virtual Basic Laparoscopic Skill Trainer (VBLaST)**

Krzysztof Rechowicz  
*Department of Modeling, Simulation, and Visualization Engineering, Old Dominion University*  
**Developing Clinically Relevant Aspects of the Nuss Procedure Surgical Simulator**

Ganesh Sankaranarayanan  
*Center for Modeling, Simulation and Imaging in Medicine, Rensselaer Polytechnic Institute*  
**A Framework for Providing Cognitive Feedback in Surgical Simulators**

Ravikiran Singapogu  
*Haptic Interaction Lab, Clemson University*  
**Endovascular Seldinger Needle Placement: A Simulator for Examining Haptic Skills**

Pierre-Frédéric Villard  
*LORIA, Lorraine University*  
**Toward a Realistic Simulation of Organ Dissection**

**Surgical Simulator Validation**

Chun-Kai Huang  
*Center for Advanced Surgical Technology, University of Nebraska Medical Center*  
**Virtual Laparoscopic Surgical Skills Practice Using a Multi-Degree of Freedom Joystick**

Chung Hyuk Park  
*Department of Electrical and Computer Engineering, New York Institute of Technology*  
**Supplementing Surgical Training for Medical Students Using a Low-Cost Virtual Reality Simulator**
Friday, February 21

Morning Poster Session & Breakfast
7:30 - 8:30 AM

During the Friday morning poster session, presenters will stand with their posters and share their research with fellow attendees. Continental breakfast will be served.

Friday posters will stay up until the end of the afternoon parallel sessions.

Friday posters are listed on pages 13 - 15.

Morning Plenary Session
8:30 AM - 12 Noon

The Friday morning plenary session is under construction. It will feature invited lectures on a range of topics at the forefront of medical technology. The 19th Satava Award will be presented at the close of the session.

Exhibits Open
Exhibits will open during the mid-morning break. Coffee will be served in the exhibit hall.

Lunch Break
12 Noon - 1:10 PM

Friday lunch is on your own.

Friday Afternoon, Track A
1:10 Moderator's Welcome

Imaging & Visualization
1:15 Nadezhda Radeva
Department of Computer Science, The George Washington University
Visualization of Tissue Removal using Focus + Context Techniques

1:30 Deyu Sun
Biomedical Imaging Resource Lab, Mayo Clinic
Anatomic Surface Reconstruction from Sampled Point Cloud Data and Prior Models

1:45 Anand Santhanam
Department of Radiation Oncology, University of California, Los Angeles
Modeling and Visualizing Cardiovascular Deformations under Normal and Altered Circulatory Conditions

2:00 Shamima Yasmin
Center for Simulation Visualization and Real-time Prediction, University of Texas at San Antonio
A Haptic-enabled Novel Approach to Cardiovascular Visualization

2:15 Mohamed Hefny
School of Computing, Queen's University
A Matrix Lie Group Approach to Statistical Shape Analysis of Bones

2:30 Hadrien Courtecsuisse
Institut Hospitalo-Universitaire, Strasbourg
Constraint-Based Simulation for Non-Rigid Real-Time Registration

Information-Guided Therapies
2:45 Thorsten Brennecke
Institute for Process Control and Robotics, Karlsruhe Institute of Technology
An Ultrasound-Based Navigation System for Minimally Invasive Neck Surgery

3:00 Break
3:15  Hugo Talbot
INRIA
Interactive Planning of Cryotherapy using Physics-Based Simulation

3:30  Naoki Suzuki
Institute for High Dimensional Medical Imaging, The Jikei University School of Medicine
A Concept for Overlay-Type Surgical Navigation System with Organ Modification Functions using Non-Contact Type Surface Measurement

Robotics

3:45  Deanna Glassman
University of Washington School of Medicine
Raven Surgical Robot Training in Preparation for da Vinci Use: a Randomized Prospective Trial

4:00  Gyusung Lee
Department of Surgery, Johns Hopkins University School of Medicine
Physical and Cognitive Ergonomic Workload Assessment with Robotic and Laparoscopic Surgeries

Interfaces

4:15  Stanislas Mauser
Faculty for Informatics, Reutlingen University
Touch-Free Gesture Based Control of Medical Devices and Software Based on the Leap Motion Controller

Haptics

4:30  Jun Wu
Computer Graphics & Visualization Group, Technische Universität München
Real-Time Haptic Cutting of High-Resolution Soft Tissues

4:45  Dirk Fortmeier
Institute of Medical Informatics, University of Lübeck
An Image-Based Multiproxy Palpation Algorithm for Patient-Specific VR-Simulation

5:00  Tobias Pilic
Electrical Engineering and Information Technologies, Innovative Surgical Training Technologies, HTWK Leipzig University of Applied Sciences
Pulsed Ultrasound Approach for the Measuring of Tension and Compression at Nerve Fibre Structures in Surgical Training Simulators

5:15  Adjourn

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Friday Afternoon, Track B

1:10  Moderator's Welcome

Simulator Validation

1:15  John Quarles
Department of Computer Science, University of Texas at San Antonio
Virtual Humans for Inter-Ethnic Variability Training in Sedation and Analgesia

1:30  Dave Taylor
Division of Surgery, Imperial College London
3D Simulation of a Hospital Environment and Ward Round to Augment a Summer School Program for Pre-Medical Students

Simulator Systems

1:45  Anna Galea
Vivonics, Inc.
PATIENT: Physical Anatomical Trainer Instrumented for Education and Non-Subjective Testing

2:00  Li Liu
Dept of Biomedical Engineering, Worcester Polytechnic Institute
Personal Training Simulator for Asynchronous Learning of Obstetric Ultrasound

2:15  Piotr Slawinski
Department of Mechanical and Materials Engineering, University of Nebraska - Lincoln
Intestinal Biomechanics Simulator

2:30  Shujath Syed
Department of Electrical Engineering, University of South Florida
Sensing and Visualization Tools for Objective Assessment and Debriefing of High-Risk Neonatal Resuscitation Training Scenarios

Simulator Design

2:45  Bryan Bergeron
Archetype Technologies, Inc.
Modular Simulator Building Blocks: Physiologic Signaling Requirements

3:00  Break

3:15  Shlomi Laufer
Department of General Surgery & Department of Electrical Engineering and Computer Science, University of Wisconsin - Madison
Multimodality Approach to Classifying Hand Utilization for the Clinical Breast Examination
Learning & Technology

3:30  David Rojas
The Learning Institute, The Hospital for Sick Children
The Effect of Contextual Sound Cues on Visual Fidelity Perception

3:45  Victoria Roach
Corps for Research in Instructional and Perceptual Technologies, Western University
The Path More Travelled: Defining a Gaze-Based Approach to Analyzing Spatial Reasoning

4:00  Bryan Bergeron
Archetype Technologies, Inc.
Application of Learning Record Stores and Other Forms of Electronic Competency Records in Modeling Competency Degradation

4:15  [Remainder of session to be determined]

Friday Afternoon, Track C

Independently Organized Session

Novel Approaches to the Study of Medical Skill Decay

1:10 - 5:15
Ray S. Perez, Organizer
Office of Naval Research
Anna Skinner, Co-Chair
AnthroTronix, Inc.

The session will begin with a brief review, summarizing what we currently know from the research literature on skill decay. This will be followed with each panel member presenting a summary of their research. They will cover approach, procedures/methods, results, and a discussion/conclusion for this research. The discussant will then provide a discussion of the presentations and future research needed for medical training and implications for practice.

Presentations:

Ray S. Perez
Office of Naval Research
Introduction

Peter Weyhrauch & James Niehaus
Charles Rivers Analytics, Inc.
Laparoscopic Surgery Skill Models for Refresher Training

Carla M. Pugh
Department of Surgery, University of Wisconsin
Psycho-Motor and Error Enabled Simulations: Modeling Vulnerable Skills in the Pre-Mastery Phase

Friday Afternoon, Track D

Independently Organized Session

Simulation Development

1:10 – 3:15
Harvey Magee, Organizer
Telemedicine & Advanced Technology Research Center

This session focuses on challenges for developers and creators of simulations. Talks will include detailed discussions of emerging conversational virtual standardized patient technology which has the potential to provide targeted experiential training along with germane constructive feedback. The session will conclude with a panel for surgical simulator development and challenges regarding high fidelity tissue simulation.

Presentations:

1:10  Thomas Talbot & Albert “Skip” Rizzo
USC Institute for Creative Technologies
Virtual Standardized Patients: An Interactive Demonstration for Authoring Conversational Agents for Interview Training

2:00  Julia Campbell
USC Institute for Creative Technologies
Branching Conversations for Simulated Medical Encounters

2:20  Break
2:30  Panel Presentation with:

Robert Hale  
US Army Institute of Surgical Research

Anthony Johnson  
US Army Institute of Surgical Research

E.J. Caterson  
US Army Institute of Surgical Research

Mark Ottensmeyer  
Massachusetts General Hospital

Simulation Challenges in Oculofacial Trauma Surgery

3:15  Adjourn

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**Friday Evening**

**Optional Field Trip**

5:30 - 8:00

**Tour of USC’s Institute for Creative Technologies**

ICT is a pioneering innovator in simulation, graphics, virtual reality, and artificial intelligence. Nurturing collaborations among film and gaming industry artists, social scientists, and computer scientists, its projects focus on improving health and well-being, education, and training. Please visit [http://ict.usc.edu](http://ict.usc.edu) to learn more about its work.

Our visit to their Playa del Rey facility will feature hands-on demonstrations of their current projects, explanatory presentations, and a casual reception.

This tour requires a separate paid registration, which includes transportation and the reception. Space is limited and advance registration is necessary.

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**Friday Posters**

**Learning & Technology**

Bryan Bergeron  
Archetype Technologies, Inc.  
The Confluence of Experiential Databases, MOOCs and The Internet of Things: Promise for Medical Simulation Developers

Johan Creutzfeldt  
CLINTEC, Center for Advanced Medical Simulation and Training, Karolinska Institutet & Karolinska University Hospital  
Using Virtual World Training to Increase Situation Awareness during Cardiopulmonary Resuscitation

Ross Dworkin  
Blue Grotto Technologies, Inc.  
Methods and Techniques for Use of Medbiquitous Standards and Concepts to Facilitate the Functional Integration of Competency, Learning, MOC, and Training Systems

Lars Enochsson  
Department of Surgical Gastroenterology, Karolinska University Hospital  
Gender Specific Differences and Value of Simulator Training in Medical Students?

Troy McDaniel  
Department of Computer Science and Engineering, Arizona State University  
Geo-Social Mobile Health Gaming

Marcus Schlickum  
CLINTEC, Karolinska Institute  
The Role of Motivation in Surgical Simulator Training

**Simulator Design & Development**

Wolfgang Fink  
Departments of Electrical & Computer Engineering, and Biomedical Engineering, University of Arizona  
Visual Perception of Intraocular Inclusions from a First-Person Perspective using the simEye 3D Ray Tracing Environment

Thomas Kaltofen  
Research Unit Medical-Informatics, RISC Software GmbH  
Computer-Based Simulation of the Prism Cover Test with the Biomechanical Eye Model SEE-KID

Kevin Kunkler  
Joint Program Committee 1, U.S. Army Medical Research & Materiel Command & University of Maryland School of Medicine  
Military Medical Simulation and Training: A Strategic Plan to Expedite Future Success
Calvin Kwan  
*Department of Surgery, University of Wisconsin - Madison*  
**Validity of a Newly Developed Tri-axial Sensor for Clinical Breast Examination Skills Assessment**

Calvin Kwan  
*Department of Surgery, University of Wisconsin - Madison*  
**Application of a New Adaptable Thyroid Model for Ultrasound and Hands-On Skill Assessment**

Mark Ottensmeyer  
*Simulation Group, Dept of Radiology, Massachusetts General Hospital & Harvard Medical School*  
**Conversion of Stereo Surgical Microscope for Augmented Reality Application in an Eye Trauma Simulator**

**Simulator Systems**

Elvis Chen  
*Robarts Research Institute, Western University*  
**Navigated Simulator for Spinal Needle Interventions**

Calvin Kwan  
*Department of Surgery, University of Wisconsin - Madison*  
**Modification of the Pelvic Examination Simulator for the Developing World**

Anthony LaPorta  
*Rocky Vista University*  
**From Trauma in Austere Environments to Combat or Medical School: How Blended Hyper-Realism in the Real and Virtual Worlds Can Better Prepare Surgeons**

Lisbet Meurling  
*Division of Anaesthesia and Intensive Care & CLINTEC, Karolinska Institutet*  
**High-Fidelity Paediatric Simulation Team Training Makes a Difference: A Case Control Study**

**Information-Guided Therapies**

Manal Alassaf  
*Department of Computer Science, School of Engineering and Applied Science, The George Washington University*  
**Computer-Based Planning System for Mandibular Reconstruction**

Matthew Kramers  
*Biomedical Engineering Graduate Program & Robarts Research Institute, University of Western Ontario*  
**Towards Evaluation of a Mobile Augmented Reality Application for Image Guidance of Neurosurgical Interventions**

Sehyung Park  
*Biomedical Research Institute, Korea Institute of Science and Technology*  
**Automatic Detection of Inferior Alveolar Nerve Canal from Cone-Beam Computed Tomography Images for Dental Surgery Planning**

Naoki Suzuki  
*Institute for High Dimensional Medical Imaging, The Jikei University School of Medicine*  
**Development of AR Surgical Navigation Systems for Multiple Surgical Regions**

**Imaging & Visualization**

Hossein Arabalibeik  
*Research Center for Science and Technology in Medicine, Tehran University of Medical Sciences*  
**A Method for Semi-Automatic Nuchal Translucency Thickness Measurement**

Adrian Johnson  
*Robot Perception and Action Lab, University of South Florida*  
**Unobtrusive Augmentation of Critical Hidden Structures in Laparoscopy**

Ashkan Maccabi  
*Department of Electrical Engineering, University of California, Los Angeles*  
**Ultrasound-Stimulated Vibro-Acoustography for High-Resolution Differentiation of Benign and Malignant Tissue of the Head and Neck**

Arun Nema  
*Center for Modeling, Simulation and Imaging in Medicine, Rensselaer Polytechnic Institute*  
**Monte Carlo Based Simulation for Evaluating Optode Fiber Placement in Prefrontal Cortex Imaging of Motor Skills during Surgical Training**

**Robotics**

James Goldie  
*Vivonics, Inc.*  
**Actively Compliant Parallel End-Effector Mechanism for Medical Interventions**

**Sensors**

Anne-Lise Maag  
*Department of General Surgery, University of Wisconsin - Madison*  
**Sensor-Based Assessment of Cast Placement and Removal**

James Goldie  
*Vivonics, Inc.*  
**Deployable Automated Analgesia Unit (DAAU)**

Rustam Nabiev  
*Department of Clinical Science Intervention and Technology, Karolinska Institutet*  
**ShifoSound System for the Lung Status Remote Monitoring of People Suffering from COPD**
Preliminary Conference Program • November 21, 2013

Pankaj Sharma
Clinical Anatomy, Department of Surgery, Stanford University
Hand Motion Tracking System Using Inertial Measurement Units

Haptics

Seong Pil Byeon
Division of Mechanical Engineering, Korea Advanced Institute of Science and Technology
Cut Surface Generation and Haptic Feedback for Interactive Cutting Simulation

Saurabh Dargar
Center for Modeling, Simulation and Imaging in Medicine, Rensselaer Polytechnic Institute
A Decoupled 2 DOF Force Feedback Mechanism for the Virtual Transluminal Endoscopic Surgical Trainer (VTEST)

Rozaliya Gabidullina
Laboratory of Mechanoreceptor Diagnosis, Lomonosov Moscow State University
Haptic Devices in Endoscopy

Byron Perez-Gutierrez
VR Center & Davinci Research Group, Nueva Granada Military University
Liver Biomechanical Model for Virtual Palpation

Stefan Suwelack
Humanoids and Intelligence Systems Lab, Institute for Anthropomatics, Karlsruhe Institute of Technology
Towards Open-Source, Low-Cost Haptics for Surgery Simulation

David Velandia
Multimedia Engineering, Nueva Granada Military University
Human Eye Haptics-Based Multimedia Modeling

Tansel Halic
Computer Science Department, University of Central Arkansas
pWeb - A High Performance Parallel Computing Framework for Web Browser-Based Medical Simulation

Heinz Lemke
University of Southern California & International Foundation of CARS
3D++ Visualisation of MEBN Graphs and Real Time Interaction with Screen Representations of Patient Models (PIXIE II)

John Moore
Robarts Imaging, Western University
Real-time Simulation of Transesophageal Echocardiography

Nobuhiko Mukai
Tokyo City University
Particle Based Simulation of the Aortic Valve by Considering Heart’s Pulsation

Tuan Trung Nguyen
Division of Mechanical Engineering, Korea Advanced Institute of Science & Technology
A Hybrid Contact Model for Cannulation Simulation of ERCP
Saturday, February 22

Morning Plenary Session
8:30 AM - 12 Noon

The Saturday morning plenary session is under construction. It will feature invited lectures on a range of topics at the forefront of medical technology.

Lunch Break
12 Noon - 1:10 PM

Saturday lunch is on your own.

Saturday Afternoon, Track A
1:10 Moderator's Welcome

Optics
1:15 Jannick Rolland
Center for Visual Science and Biomedical Engineering, University of Rochester
Pushing the Envelope of 3D Optical Imaging For Resolution and Speed

Modeling
1:30 Alexandre Bilger
SHACRA Team, INRIA
Computation and Visualization of Risk Assessment in Deep Brain Stimulation Planning

1:45 John Neylon
Department of Radiation Oncology, University of California, Los Angeles
Simulating High-Resolution Bio-Mechanical Head and Neck Model using a Multi-GPU Framework

2:00 Stefan Suwelack
Humanoids and Intelligence Systems Lab, Institute for Anthropomatics, Karlsruhe Institute of Technology
The Medical Simulation Markup Language - Simplifying the Biomechanical Modeling Workflow

2:15 Igor Peterlik
Institut Hospitalo-Universitaire, Strasbourg
Complete Real-Time Liver Model Including Glisson's Capsule, Vascularization and Parenchyma

2:30 Myeongjin Kim
Division of Mechanical Engineering, Korea Advanced Institute of Science and Technology
Multi-Rate Contact Resolution for an Explicit Meshless Deformable Model

2:45 Brian Jo
Salisbury Biorobotics Lab, Stanford University
Using Total Lagrangian Implicit Dynamics FEM to Model the Airway

3:00 Anand Santhanam
Department of Radiation Oncology, University of California, Los Angeles
Cardiovascular Blood Flow Analysis under Normal and Open Injury Conditions

3:15 Adjourn

Saturday Afternoon, Track B

Independently Organized Session

The Wide Area Virtual Environment - Lessons Learned
1:10 - 5:15

Alan Liu, Organizer
National Capital Area Medical Simulation Center, Uniformed Services University of the Health Sciences

The Wide Area Virtual Environment (WAVE) is the world’s largest immersive virtual reality theater. It encompasses 1,000 sq. ft. of usable training area. The WAVE blends virtual reality, live patient actors, human patient simulators, and part task trainers to provide an unprecedented realism. The WAVE supports medical teams training continuously over a period of up to four days to simulate the rigors of military field medicine. In this workshop, We describe the purpose, design, implementation, and use of the WAVE. Our experience with providing training support for both graduate medical education as well as the 579th medical group will be highlighted.
Saturday Afternoon, Track C

Independently Organized Session

3D Printing for Rapid Prototyping

1:10 - 3:15

Bryan Bergeron, Organizer
Archetype Technologies, Inc.

Additive manufacturing, such as 3D printing, is a game-changer when it comes to rapid prototyping, especially when the design and printing are done in-house. The goals of this workshop are to introduce participants to 3D printing, in the context of the required prototype durability, size, resolution, and cost. Participants will learn whether in-house 3D printing or design is appropriate for them or is part of a multi-part prototyping process. This workshop will cover:

- Basics of 3D printing
- Purchase and upkeep costs for affordable models
- Printing material properties, cost, and selection
- Print times, resolution, color, and durability
- Post-printing processing
- Software tools and file standards
- Online libraries and open source files
- 3D image capture tools
- High-end printer features and characteristics

Closing Mixer

Our final break will give people a one more opportunity to connect with others, share enthusiasms, and say goodbye.