

The Virginia Modeling, Analysis and Simulation Center (VMASC) of Old Dominion University is hosting the 2016 Modeling, Simulation, & Visualization Student Capstone Conference on April 14. The Capstone Conference features students in Modeling & Simulation (M&S) undergraduates & graduate degree programs and fields from many colleges and/or universities. Students present their research to an audience of fellow students, faculty, judges, and other distinguished guests. For the students, these presentations afford them the opportunity to impart their innovative research to members of the M&S community from academic, industry, and government backgrounds. The Student Capstone Conference offers seven presentation tracks this year. The best paper and the best presentation in each track will receive awards.

MSVE SICC

MODELING. SIMULATION. VISUALIZATION.

10TH ANNUAL STUDENT CAPSTONE CONFERENCE

TRACKS

- INFRASTRUCTURE SECURITY/MILITARY APRIL 14
- GENERAL SCIENCE AND ENGINEERING VMASC
- GAMING AND VIRTUAL REALITY
- AGENT BASED SIMULATION
- EDUCATION & TRAINING
- BUSINESS & INDUSTRY
- MEDICAL SIMULATION
- TRANSPORTATION

2016

SCHEDULE

- 8:00 - 8:30 Registration, Reception, Breakfast
- 8:30 - 8:50 Opening Remarks
- 9:00 - 12:00 Morning Session Presentations
- 12:00 - 1:00 Lunch
- 1:00 - 4:15 Afternoon Session Presentations
- 4:30 - 6:00 Reception, Keynote Speaker, & Awards



WELCOME

KEYNOTE SPEAKER

Old Dominion University Department of Modeling, Simulation and Visualization Engineering (MSVE) and the Virginia Modeling, Analysis and Simulation Center (VMASC) welcome you to the seventh annual Modeling, Simulation & Visualization (MS&V) Student Capstone Conference.

The Conference features student research and student projects that are central to MS&V. Also participating in the conference are faculty and judges who have volunteered their time to impart direct support to their students' research, facilitate the various conference tracks, serve as judges for each of the tracks, and provide overall assistance to this conference.

Appreciating the purpose of the conference and working in a cohesive, collaborative effort will no doubt result in a successful symposium for all involved. Thank you for joining us!

Sincerely,

Dr. Yuzhong Shen
Capstone Conference Chair
YShen@odu.edu

John Shull,
Capstone Conference Vice Chair
JShull@odu.edu



Peter Sforza

is the co-director for the Center for Geospatial Information Technology. Under this role he provides leadership for the center's research and sponsored projects, management and operations. He has a wealth of interdisciplinary experience in the research areas across multiple disciplines at Virginia Tech including a broad range of geospatial research and applications for safety and security, health IT, 3-D, context-neutral data mining and visualization techniques. In his pursuit of this work he has been awarded numerous grants and published in a variety of conferences and journals.

Presentation: Large quantities of geospatial data being generated at a high velocity underly a myriad of disciplines and applications including safety, security, health and visualization. In this talk, I will review a number of interdisciplinary projects I have worked on that leverage a broad range of geospatial data. These projects include the:

- * Development of web mapping applications with Enterprise GIS using Google Earth and ArcGIS Server
- * Coordination of a research team to develop a 3D Blacksburg simulation using lidar, digital photogrammetry, X3D, and available data layers
- * Co-foundation of the Virginia Tech Sustainable Nightscape Research Group, focusing on high resolution nighttime oblique photography and spatial data for safety, security and sustainability applications of the natural and built nighttime environment
- * Development of meteorological data assimilation capability with Enterprise GIS and various partners
- * Collaborative work with the New River Valley Planning District Commission's Green Infrastructure Committee and regional planners



Virginia Tech

STUDENT CAPSTONE CONFERENCE

Room 1102

TRANSPORTATION, BUSINESS & INDUSTRY

Session Chair: Dr. Hong Yang (ODU)
Judges: Dr. Rajesh Paleti (ODU)

- 9:00-9:15am Alexis White
Old Dominion University
Ticky Business Simulation
- 9:15-9:30am Amanda Working and Dr. Norou Diawara
Old Dominion University
Methods for Analyzing Attribute-Level Best-Worst Discrete Choice Experiments
- 9:30-9:45am Elizabeth Rasnick
Old Dominion University
A Study of the Impact of Information Blackouts on the Bullwhip Effect of a Supply Chain Using Discrete-Event Simulation
- 9:45-10:00am Zhenyu Wang and Dr. Hong Yang
Old Dominion University
On the Bayesian Priors in Transportation Safety Research
- 10:00-10:15am Nurullah Ayyilmaz
Old Dominion University
The Effects of Using Natural Gas in Light-Duty Vehicle Fleet of the U.S. on Its Energy Dependency and GHG Emissions
- 10:15-10:30am Tyler Alston, Michael Bonds, Ryan Condotta, Richard Garren, Reginald Hayes, Erik Jensen, Jerold Register, Darren Rose, Paul Smith, Spencer Smith, Andrew Sylvia, and Brandon Waddell
Old Dominion University
Agent-Based Software Implementation of the Framework for ADAPT Simulated Testing (FAST)

GAMING & VIRTUAL REALITY

Session Chair: Dr. Yuzhong Shen (ODU)
Judges: Dr. Hector Garcia (VMASC)

- 10:30-10:45pm John Shull and Dr. Yuzhong Shen
Old Dominion University
Visualizing and Reverse Engineering Large Industrial Equipment using Lidar Point Clouds
- 10:45-11:00am Zinat Afrose and Dr. Yuzhong Shen
Old Dominion University
Vector Order Statistic-Based Noise Removal from Point Cloud Data
- 11:00-11:15am Katherine Smith, John Shull, Dr. Tony Dean, Dr. Yuzhong Shen, and Dr. Jennifer Michaeli
Old Dominion University
MAVEN: A Serious Mathematics Game for Veteran Education
- 11:15-11:30am Zelin Zhu, Dr. Yuzhong Shen, Dr. Kevin Moberly, Dr. Avi Santo, and Jeannine Owens
Old Dominion University
Cannonball Trail: A Historical Tourism Mobile App
- 11:30-11:45am Gary Lawson, Vaibhav Sundriyal, Dr. Masha Sosonkina, and Dr. Yuzhong Shen
Old Dominion University
Monitoring Power and Performance of Applications Offloaded to Xeon Phi
- 11:45-12:00pm Shuo Ren, Zelin Zhu, and Dr. Frederic McKenzie
Old Dominion University
Implementation of a 3D Interactive Mobile Application for Engineering Laboratory

Room 2100a

CAPSTONE 2016

GENERAL SCIENCES APPLICATION

Session Chair: Dr. Masha Sosonkina (ODU)
Judges: Dr. Yiannis Papelis (VMASC)

- 9:30-9:45am Sabbir Khan,¹ Balint Joo,² Dr. Desh Ranjan,¹ and Dr. Mohammad Zubair¹
Old Dominion University,¹ and Jefferson Lab²
Implementation of Wilson Dslash Kernel from Lattice QCD acting on Multiple Vectors using Kokkos Library
- 9:45-10:00am Murat Bakirci
Old Dominion University
FEM Simulation of Electroosmotic Flow through Polymer Nanopores
- 10:00-10:15am Hao Ji,¹ Erich O'saben,² Rohit Lambi,¹ and Dr. Yaohange Li¹
Old Dominion University,¹ and George Mason University²
Matrix Completion Based Model V2.0: Predicting the Winning Probabilities of March Madness Matches
- 10:15-10:30am Wessam Elhefnawy,¹ Li Chen,² and Dr. Yaohange Li¹
Old Dominion University,¹ and University of District of Columbia²
Weighted Path Spectral Clustering for Image Segmentation
- 10:30-10:45am Felicia Grey
Old Dominion University
Does the WTO's Dispute Settlement Body Temper Defection Between Trading Partners with Asymmetric Interests?
- 10:45-11:00am Erik Jensen,¹ Dr. Mayank Tyagi,² and Dr. Zhi Shang²
Old Dominion University,¹ Louisiana State University²
Fluid Flow through Porous Media Simulation Scalability with OpenFOAM and MPI
- 11:00-11:15am Pai Song and Dr. Yan Peng
Old Dominion University
A Second Order Accurate Scheme for Poisson Problems with Interface Jump Conditions
- 11:15-11:30am Kamesh Arumugam, Dr. Mohammad Zubair, Dr. Desh Ranjan, Dr. Balsa Terzic, and Dr. Alexander Godunov
Old Dominion University
High-Fidelity Simulations of Long-Term Particle Tracking on GPU's
- 11:30-11:45am Evan Coleman and Dr. Masha Sosonkina
Old Dominion University
A Comparison and Analysis of Soft-Fault Error Models using FGMRES



VMASC



MSVE

The Virginia Modeling, Analysis and Simulation Center (VMASC) is a university-wide multidisciplinary research center that emphasizes modeling, simulation, and visualization (MS&V) research, development and education.

VMASC is one of the world's leading research centers for computer modeling, simulation, and visualization. The mission of the Center is to conduct collaborative MS&V research and development, provide expertise to government agencies and industry, and to promote Old Dominion University, Hampton Roads and Virginia as a center of MS&V activities. Working with more than one hundred industry, government, and academic members, VMASC furthers the development and applications of modeling, simulation and visualization as enterprise decision-making tools to promote economic, business, and academic development. Annually, the Center conducts approximately \$10M in funded research.

Old Dominion University is a state-assisted institution and one of only four Virginia schools in the Carnegie Research Universities (high research activity) category. The University offers a complete range of Modeling & Simulation degree options from Bachelor's to Ph.D.

The Hampton Roads region is home to the Joint and Coalition Training (JCW), the US Army's Training and Doctrine Command, the Military Transportation Management Command, NATO Allied Command Transformation, the Armed Forces Staff College, the U.S. Navy's Commander Operational Test and Evaluation Force, the Naval Sea Systems Command, and the Space and Naval Warfare Center. In addition, the Department of Energy's Jefferson Lab, NASA-Langley Research Center and numerous regional industries are important users of MS&V technology. The economic value of MS&V-related business activity in Hampton Roads is estimated to be over \$500M.

VMASC concentrates on eight core modeling and simulation applied research areas:

- Transportation
- Homeland Security and Military Defense
- Virtual Environments
- Social Sciences
- Medicine & Health Care
- Game-based Learning
- M&S Interoperability
- System Sciences

VMASC relocated to its new facility located at 1030 University Boulevard, Suffolk, VA on September 24, 2007. The Center also maintains an additional location on the main ODU campus in the Engineering and Computational Sciences building.

The Suffolk facility includes a multi-purpose computer laboratory with both Windows-based and Linux-based workstations for computer simulation development, labs dedicated to transportation, computational science, game-based learning, and a virtual simulator lab supporting live, virtual, and constructive simulation integration.

The main VMASC facility primarily supports military, defense and homeland security, social science, medical, computational science, and enterprise engineering research efforts plus administrative and program support. The facility on campus consists of approximately 6,000 square feet of lab space including two general-purpose labs, a visualization lab, a human factors lab, and a 74-seat virtual reality theater supporting both research and teaching requirements. This facility primarily supports the Center's visualization and medical research and development. It also serves as the on-campus presence for VMASC with linkages to the other departments throughout the university.

The MSVE Department

Engineering and Computational Sciences Building on the Old Dominion University Norfolk Campus. In addition to the department and faculty offices, this facility also houses several instructional and research laboratories, a virtual reality theater, and a four-walled C.A.V.E. (Cave Automatic Virtual Environment). A significant resource to the department is the Virginia Modeling, Analysis and Simulation Center located adjacent to the University's Tri-Cities Higher Education Center in Suffolk, Virginia. VMASC occupies a two-story 60,000 square foot building designed to support state-of-the-art research in modeling, simulation and visualization. Some of the center's facilities are used in the department's educational programs; in addition, VMASC researchers teach courses and mentor students in the department's academic programs.



STUDENT CAPSTONE CONFERENCE

Room 1102

EDUCATION & TRAINING

Session Chair: Dr. Roland Mielke (ODU)
Judges: Dr. Ross Gore (VMASC)

- 1:00-1:15pm Levi Warvel,¹ Dr. Mark Scerbo,¹ Jessica Burgess MD,² and Rebecca Britt MD²
Old Dominion University¹ & Eastern Virginia Medical School²
Mental Workload and Expertise in Simulated Colonoscopy
- 1:15-1:30pm Connor Schwalm, Patrick Heaney, and Dr. Tony Dean
Old Dominion University
Stern2STEM: Integration of a Feedforward Control Mechanism for Educational Game Development
- 1:30-1:45pm Tayyaba Batool and Dr. Ginger Watson
Old Dominion University
Evaluation of Excelets as an Instructional Modeling Tool
- 1:45-2:00pm Joshua Stubbs, Dr. Ginger Watson, and Peter Baker
Old Dominion University
Perceived Fidelity, Workload, and Cognitive Load of Pre-Service Teachers using TeachLivE
- 2:00-2:15pm Arwa Mashat and Dr. Ginger Watson
Old Dominion University
The Challenges of Translating Simulations from an Instructional Design View
- 2:15-2:30pm Lauren Welsch and Dr. Johanna Hoch
Old Dominion University
Interprofessional Education with Didactic TeamSTEPPS[®] and Medical Simulation: A Systematic Review

AGENT BASED MODELING

Session Chair: Dr. Jim Leathrum (ODU)
Judges: Dr. Saikou Diallo (VMASC)

- 2:30-2:45pm Joshua Hastey
Old Dominion University
Shifting Power and Incomplete Information: A Bayesian Game Analysis of U.S.-China Relations
- 2:45-3:00pm Joanne Fish
Old Dominion University
Maritime Piracy: An Agent Based Model to Explore Scio-Political and Socio-Economic Variables
- 3:00-3:15pm John Shull
Old Dominion University
An Agent_Zero Approach for Chicago Police Complaints
- 3:15-3:30pm Erika Gamarra
Old Dominion University
Modeling Street Robbery with Routine Activity Theory of Crime: an Agent Based Modeling and Simulation approach
- 3:30-3:45pm J.R. Reiling
Old Dominion University
Influence Wars: Modeling Information Campaigns

Room 2100a

CAPSTONE 2016

INFRASTRUCTURE SECURITY / MILITARY

Session Chair: Dr. Bharat Madan (ODU)
Judges: Dr. Barry Ezell (VMASC)

- 1:00-1:15pm Omer Keskin
Old Dominion University, Turkish Military Academy
How Cyber Attacks Effect Power Generation Systems: A Monte Carlo Simulation Case
- 1:15-1:30pm Daniel Brill, Andrew Dinh, Dr. Yaohang Li, and Dr. Wu He
Old Dominion University
Malware Sequence Alignment
- 1:30-1:45pm Jonathan McLeroy, Jacob Geist, John Lake, Daniel Bleyl, and Alexander MacCalman
United States Military Academy, West Point - Department of Systems Engineering
Small Arms Ammunition Configuration and Lethality Service Verification and Analysis
- 1:45-2:00pm Karthik Navuluri, and Dr. Ravi Mukkamala
Old Dominion University
Effect of Threat Modeling on Identity Management System Design
- 2:00-2:15pm J.R. Reiling
Old Dominion University
Exploring Prisoner's Dilemma and Cooperation: The Combat Dilemma

MEDICAL SIMULATION

Session Chair: Dr. Andrea Parodi (VMASC)
Judges: Dr. Michel Audette (ODU)

- 2:15-2:30pm Andrew Schluchter
Old Dominion University
Ontology-Based Automated Segmentation and Registration of Medical Imaging Data
- 2:30-2:45pm Ashlee Edwards
Old Dominion University
Outbreak: Investigating Oncolytic Virus Dynamics Via Epidemiology
- 2:45-3:00pm Andrew Hinton and Jeffrey Johnson
Old Dominion University
Immunotherapy and the Th1/Th2 Paradigm - A System Dynamics Approach
- 3:00-3:15pm Lucas Potter and Dr. Michel Audette
Old Dominion University
Personalizable Musculoskeletal Models in OpenSim for Gait Analysis and Surgical Planning
- 3:15-3:30pm Emily Hartley,¹ Dr. Matthew Hoch,¹ and Dr. Michelle Boling²
Old Dominion University,¹ University of North Florida²
A Model to Predict Ankle Sprain Injury Occurrence
- 3:30-3:45pm Fotis Drakopoulos,¹ Michael Weissberger,² Kathryn Holloway MD,³ Dr. Nikos Chrisochoides¹
Old Dominion University,¹ VCU School of Medicine,² McGuire VAMC³
Biomechanical Deformable Registration for Deep Brain Stimulation.
- 3:45-4:00pm Jing Xu and Dr. Andrey Chernikov
Old Dominion University
Fidelity and Quality Improvement of Curvilinear Image Meshing on Medical Images

THE GENE NEWMAN AWARD FOR EXCELLENCE IN MODELING & SIMULATION



Eugene G. Newman

In recognition of his efforts in advancing the M&S field in Hampton Roads, the Gene Newman Award for Excellence in Modeling and Simulation Research was established in 2006. It has been awarded annually since then to the best paper at the Modeling, Simulation and Visualization Student Capstone Conference.

Newman's professional career included positions with Western Electric Co., Baxter Laboratories and more than 40 years of federal service, including 37 years in various engineering assignments with the Naval Sea Systems Command, the Naval Systems Engineering Center and the Naval Electronics Systems Engineering Center, as well as the Electronic Warfare, Communications Security and Fleet Communications Department, which he headed. In 1994, he helped establish and serve as the technical director for the Joint Training, Analysis and Simulation Center and the Deputy CIO of the U.S. Joint Forces Command until his retirement in 2002.

Among many outstanding, meritorious and superior civilian service awards in his lifetime, Newman received the Department of Defense Medal for Distinguished Civilian Service in 2001 for his "extraordinary sense of purpose and leadership" in his role in Joint Forces Command, as well as a commendation from the president of the United States.

An engineer himself, Newman initiated the development of solid-state amplifiers and integral power supply traveling wave tubes, originated the concept of providing remote technical assistance to ships at sea using data link with computer analysis software, and initiated the concept of distributed interactive process development for activities with online data entry and real-time processing and retrieval.

He is survived by his wife of 22 years, Bettina R. Newman, a son and two daughters.

"Without him, we would not be here. Gene Newman was the person who really had the vision to establish VMASC and modeling and simulation in this area. He was the most significant player in M&S for ODU, Hampton Roads and the Department of Defense. He will truly be missed"

- *Dr. John Sokolowski VMASC Executive Director*

"It is very rare to meet someone as visionary as Mr. Newman. It's thanks to him that Hampton Roads is one of the few cradles of modeling and simulation in the world with tremendous economic impact. Mr. Newman will always remain a special leader for the engineering college of ODU"

- *Dr. Oktay Baysal Frank Batten College Dean*

"Gene Newman was a visionary; he sensed that modeling and simulation could become an important part of the region's economy. What we see today in Hampton Roads in modeling and simulation often reflects early choices and decisions made by him"

- *Dr. James V. Koch President Emeritus at ODU*
