

Biosketches of Presenters and Titles of Presentations for Machine-Ground Interaction Consortium (MaGIC) August 2016

Dan Negrut

Title: Introduction

Organization: University of Wisconsin-Madison

Bio: Associate Professor Dan Negrut received his Mechanical Engineering Ph.D. in 1998 from the University of Iowa, working under the supervision of Professor Emeritus Edward J. Haug. He spent six years working for Mechanical Dynamics, Inc., in the ADAMS/Solver group. In 2004 he served as an Adjunct Assistant Professor in the Department of Mathematics at the University of Michigan, Ann Arbor. He spent 2005 as a Visiting Scientist at Argonne National Laboratory in the Mathematics and Computer Science Division. At the end of 2005 Dan joined the Mechanical Engineering faculty at the University of Wisconsin-Madison. His interests are in Computational Science and he leads the Simulation-Based Engineering Lab at Wisconsin. He founded and is the co-director of the Wisconsin Applied Computing Center. The sponsors of this center include the National Science Foundation, NVIDIA Corporation, Microsoft Corporation, US Army, NASA, and several industry partners. Dr. Negrut's projects focus on high performance computing, large scale multibody dynamics, uncertainty quantification, numerical integration methods for dynamic systems, and fluid-solid interaction. Dr. Negrut received in 2009 a National Science Foundation Career Award. Since 2010 he is an NVIDIA CUDA Fellow. Dr. Negrut's lab currently operates the third fastest supercomputer at the University of Wisconsin-Madison.

David Gorsich

Title: Opening Remarks

Organization: U.S. Army TARDEC

Bio: Dr. David J. Gorsich was selected for a Scientific and Professional (ST) position in January 2009 and serves as the Army's Chief Scientist for Ground Vehicle Systems. His current research interests are vehicle dynamics and structural analysis, reliability based design optimization, underbody blast modeling, terrain modeling and spatial statistics.

Prior to his current position, Gorsich served as the U.S. Army Tank Automotive Research, Development and Engineering Center's (TARDEC's) Associate Director, Modeling and Simulation (M&S), from July 2003 to December 2008. He has also served as the Acting Director, Strategic Plans and Programs, and the Team Leader for Robotics and Vehicle Intelligence. He served in various assignments at TARDEC, the Army Materiel Command, the Army Research Laboratory and for the Assistant Secretary of the Army

(Acquisitions, Logistics and Technology). Gorsich previously was an electrical engineer with McGraw Commercial Equipment Corporation in Novi, MI.

Gorsich was named a Society of Automotive Engineers (SAE) Fellow in 2008. He has served on the SAE Technical Standards Board for a 3-year term, been the chair for the SAE International Standards Committee for Ground Vehicle Reliability and also on the SAE Board of Directors. He has received several Commander's Coins, including: U.S. Army Central Command, GEN John Abizad, High Mobility Multipurpose Wheeled Vehicles Safety/Seat Experiments, 2005; Chief of Staff, GEN Peter Schoomaker, TARDEC M&S, 2005; West Virginia National Guard, 2004; U.S. Army TACOM, MG William M. Lenaers, Army-SAE Partnership, 2004; U.S. Army TACOM, MG N. Ross Thompson, Reliability, 2003. Gorsich received the Detroit Federal Executive Board Award in 2001. Gorsich was recognized with the 1997 Army Research, Development and Acquisition Award, "Innovations in Ground Vehicle Signature Research."

Gorsich is recognized in many professional organizations for his research accomplishments. He serves as a scientific liaison with academia and as an adjunct professor and/or advisor at the following universities: Mississippi State University; Oakland University; Wayne State University; Kettering University; University of Michigan, and the University of Michigan Transportation Institute. Gorsich also serves as an Associate Editor for the International Journal of Terramechanics, and on the Editorial Board of the International Journal for Reliability and Safety, and as past Associate Editor for the Journal of Mechanical Design. He is a member of the Massachusetts Institute of Technology (MIT) Chapter of Sigma Xi, the Material Parts and Processes Council of SAE and the Senior Executives Association, ST Chapter.

Gorsich has published more than 150 conference and journal articles including more than 50 peer reviewed journal articles. He has published in the following peer reviewed journals: Transactions of SAE; International Journal of Vehicle Design; Journal of Mechanical Design; Journal of Commercial Vehicles; Contemporary Mathematics; Computational Statistics and Data Analysis; Physical Review D; Society of Automotive Engineers; Journal of Multivariate Analysis; Journal of Electronic Imaging; Optical Engineering; Pattern Recognition Letters; Statistics and Computing; Institute for Electrical and Electronics Engineers Transactions on Pattern Analysis and Machine Intelligence.

Gorsich holds a B.S. in electrical engineering from Lawrence Technological University. He holds an M.S. in applied mathematics from George Washington University and a Ph.D. in applied mathematics from MIT.

Paramsothy Jayakumar

Title: Next Generation NATO Reference Mobility Model

Organization: U.S. Army TARDEC

Bio: Dr. Paramsothy Jayakumar is a Senior Technical Expert in Modeling and Simulation (M&S), SAE Fellow, and a member of the Analytics organization at the U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC) in Warren, Michigan. He received his M.S. and Ph.D.

degrees in structural dynamics from the California Institute of Technology, and B.Sc. Eng. (Hons, First Class) from the University of Peradeniya, Sri Lanka. He began his career with the U.S. Army TARDEC in 2009 following employment with Ford Motor Company and BAE Systems. He has worked in research, development, and engineering of ground vehicle mobility, on- & off-road, and intelligent vehicles. Dr. Jayakumar is the recognized leader in the field of mobility and vehicle dynamics M&S in the DoD and automotive communities.

In addition to his personal accomplishments, Dr. Jayakumar is also an exemplary team builder, bringing together experts from the DoD, NATO, Academia, National Labs, and Industry to advance mobility research and development. He leads the Intelligent Vehicle Dynamics and Control thrust area for the Automotive Research Center, a U.S. Army Center of Excellence for Modeling and Simulation of Ground Vehicles. In that capacity, Dr. Jayakumar developed and successfully implemented a roadmap toward achieving the goal of autonomous mobility through M&S. He also leads a NATO S&T Team to develop the Next-Generation NATO Reference Mobility Model (NRMM) to replace the decades-old empirical model with a physics-based approach thus accommodating new vehicle designs, technologies, and M&S capabilities.

Dr. Jayakumar has written more than 125 technical publications including journal articles and conference papers, and holds two patents. He serves as an Associate Editor of the ASME Journal of Computational and Nonlinear Dynamics, and an Editorial Board Member for the International Journal of Vehicle Performance. His research in terramechanics and vehicle dynamics won the best paper award at the National Defense Industrial Association's Ground Vehicle Systems Engineering and Technology Symposium in 2011 and 2012. He was elected a Fellow of the Society of Automotive Engineers in 2013. He was also instrumental in developing seven SAE standards for tire testing for the purpose of tire modeling for which he received the SAE 2014 James M. Crawford Technical Standards Board Outstanding Achievement Award and Arch T. Colwell Cooperative Engineering Medal. His accomplishments at the U.S. Army TARDEC have been recognized with his competitive appointment in 2015 as the Senior Technical Expert for Analytics. In 2016, Dr. Jayakumar was awarded the Department of Defense Laboratory Scientist of the Quarter Award by Hon. Frank Kendall, Under Secretary of Defense for Acquisition, Technology and Logistics, for outstanding achievement in laboratory science and engineering.

Henry Hodges

Title: Vehicle Dynamics: a Verification and Validation Perspective

Organization: NATC

Bio: Henry Hodges has spent his career working to advance commercial and military vehicle safety, performance, mobility, reliability, and reduced life cycle cost through implementation of technology. He has over 35 years of progressive technical and management experience with commercial, tactical and combat vehicle systems. He has been a Program Manager and design lead for the following organizations and projects: the Marine Corps Advanced Technology Transition Demonstrator, the USMC Logistics Vehicle System Replacement technology demonstrator, autonomous truck application within

the FHWA Westrack program and the Marine Corps Combat Tactical Vehicle Technology Demonstrator. He is currently the owner and founder of the Nevada Automotive Test Center (NATC) which is an independent test and evaluation, research and development facility that focuses on ground vehicle systems. His company has many other well-developed applications as well including vehicle component evaluations and certifications, and weapons systems and ammunition tests.

Tamer Wasfy

Title: Off-road vehicle mobility simulation using coupled flexible multibody dynamics, discrete element method, and smoothed particle hydrodynamics

Organization: Advanced Science and Automation Corp.

Bio: Tamer Wasfy is the chairman of Advanced Science and Automation Corp. (ASA) and director of the multibody dynamics lab at Indiana University – Purdue University in Indianapolis. He received a Ph.D. in Mechanical Engineering from Columbia University in 1994. He is the software architect of the computational mechanics (DIS) and virtual-reality (IVRESS) software systems which are developed and marketed by ASA and used by industry (including automotive, aerospace, military, mining, and manufacturing industries), government agencies, and academic institutions. DIS is an explicit time integration computational mechanics code which seamlessly integrates multibody dynamics, finite element method, discrete element method, smoothed particle hydrodynamics, molecular dynamics and ray tracing into one solver. Dr. Wasfy authored and co-authored over 100 peer-reviewed publications in the areas of flexible multibody dynamics, finite element modeling of solids and fluids, vehicle dynamics, soft soil vehicle mobility, liquid sloshing, belt-drive dynamics, gear dynamics, tire mechanics/dynamics, visualization of numerical simulation results, engineering applications of virtual-reality, eLearning, and artificial intelligence. He received two ASME best conference paper awards as first author. Dr. Wasfy is a member of ASME, AIAA, SAE and ASEE.

Steve WaiChing Sun

Title: Computational geomechanics for fluid-infiltrating, thermal-sensitive and partially frozen granular materials

Organization: Columbia University

Bio: WaiChing Sun is an assistant professor in the Department of Civil Engineering and Engineering Mechanics at Columbia University. Prior to joining the Columbia faculty, he is a senior member of technical staff at Sandia National Laboratories. Professor Sun works in the fields of theoretical and computational poromechanics with a special emphasis on geomechanical applications. His research includes multiscale modeling porous media, multiscale verification and validation with CT images, digital rock and granular physics, applications of mathematical tools, such as graph theory, Lie algebra for modern engineering problems. He received the Dresden Junior Fellowship in 2016, Army Young Investigator Program Award in 2015, and the Caterpillar Best Paper Prize in 2013. He holds BS degree from UC Davis, MS degrees from Stanford and Princeton and PhD degrees from Northwestern.

Steve Peters

Title: The future of autonomous vehicles is open!

Organization: Open Source Robotics Foundation

Bio: Steven Peters is a Software Engineer at the Open Source Robotics Foundation (OSRF). He contributes to the Gazebo simulator and DRC simulator with a focus on physics simulation. He joined the Open Source Robotics Foundation in November 2012 after completing his dissertation in the MIT Robotic Mobility Group, under the direction of Karl Iagnemma. At MIT, he developed sensing and control techniques for collision avoidance and rollover prevention of passenger vehicles. He has experience with high-fidelity simulation of robot and vehicle dynamics as well as implementation of real-time control algorithms on passenger vehicles and robotic manipulators. He helped create the MIT Energy Map website to visualize energy usage in over 100 buildings on the MIT campus. He was also a member of the UC Davis 2002 and 2003 FutureTruck hybrid electric vehicle design competitions.

Joshua Anderson

Title: Computer simulations on today's massively parallel architectures

Organization: University of Michigan

Bio: Joshua Anderson is a Research Area Specialist Lead in the Glotzer Group at the University of Michigan. Dr. Anderson received his Ph.D. in Condensed Matter Physics from Iowa State University and is the creator and lead developer of HOOMD-blue. He is the 2015 winner of the CoMEF Young Investigator Award for Modeling and Simulation.

John Eylander

Title: Bridging the gaps between weather, mobility, and geospatial intelligence – delivering integrated knowledge-based toolsets supporting weather-informed decision making

Organization: U.S. Army ERDC

Bio: Mr. Eylander is the program manager and technical lead for the Army Science and Technology Objective-Research (STO-R) Army Terrestrial Environmental Modeling and Intelligence System (ARTEMIS) program, a four-year applied research project seeking to bridge capability gaps in geospatial awareness of the dynamic environment at the tactical level. The project focuses on bridging the gap between coarse scale weather products and Army geospatial decision support by integrating weather information with tactical decision aids and delivering the content into geospatial information systems. Prior to joining ERDC, Mr. Eylander was the Chief Technology Officer for the USAF 16th Weather Squadron where he spearheaded the transformation of the Air Force's terrestrial modeling and cloud analysis and forecasting systems through collaborations with NASA's Goddard Space Flight Center, National Center for Atmospheric Research, and NOAA's National Center for Environmental Prediction. Mr. Eylander is a graduate of both the South Dakota School of Mines and Technology in Rapid City,

SD and Valparaiso University in Indiana, where his primary educational interests were in severe thunderstorm forecasting and cloud microphysics and thunderstorm electrification. Mr. Eylander is the chair of the American Meteorological Society Hydrology Committee, co-chair for the AMS Conference on Hydrology, serves as the ERDC representative in the Army Weather-Geospatial Community of Practice, and participates in numerous DOD and national-level working groups for weather and hydrologic research and development.

Andrew Jones

Title: Satellite/Model Data Assimilation for understanding Terrain and Soil Parameters

Organization: Colorado State University

Bio: Dr. Andrew Jones is a CSU Senior Research Scientist, and a CIRA Fellow, and is an Assistant Director for the Innovation Center for Sustainable Agriculture (ICSA) at CSU. In the past, he served as the Deputy Dir. of the DoD Center for Geosciences / Atmospheric Research (CG/AR) at CSU, as well serving as the Project Leader for the: CG/AR Hydrometeorology, and Environmental Modeling and Assimilation Research Groups. He has more than 20 years of scientific management experience. Dr. Jones received the B.S. in Physics (minor in Mathematics), summa cum laude with University Honors, at Eastern Illinois Univ.; and M.S. and Ph.D. in Atmospheric Science, at Colorado State Univ. He is an Editor of the American Meteorological Society's (AMS) leading applications journal, the J. of Applied Meteorology and Climatology, and a Senior Editor of the American Phytopathological Society's (APS) newest journal, the Phytobiome Journal. He has more than 480 publications, reports, and presentations in the areas of satellite data assimilation, soil moisture applications, multisensor satellite data merger and verification techniques, satellite spatial filters, and radar/satellite/model intercomparison studies.

Steve Reinhardt

Title: Delivering the Engineering Value of D-Wave's Quantum Computer

Organization: D-Wave Systems, Inc.

Abstract: Since their market introduction in 2010, D-Wave quantum computers have rapidly progressed in capability and performance such that current users expect them to deliver compelling performance compared to classical systems in the next few years. While much internal work remains to move the D-Wave system from a curiosity to a workhorse system, it is also time for leading-edge technical organizations to begin considering what high-value problems they will target for quantum execution. This talk will briefly describe the D-Wave system itself then focus on the types of problems for which it delivers differentiated performance (focusing esp. on optimization and machine learning), the programming tools available for subject-matter experts to use the system, and opportunities for early engagement with the system.

Bio: Steve Reinhardt has led and participated in teams driving significant innovations in high-end computing and analytics, from shared- and distributed-memory systems (Cray T3E, SGI Altix UV) and

programming mechanisms (Cray Autotasking, ISC's Star-P) to graph-analytic interfaces for subject-matter experts (Knowledge Discovery Toolbox, YarcData's Urika). He currently works at D-Wave Systems, mapping customer problems to the D-Wave system and developing tools to make that easier and more effective.

Mark J. Andrews

Title: Lessons Learned When Quantifying Simulation Uncertainties

Organization: SmartUQ LLC

Bio: Dr. Mark J. Andrews is the SmartUQ UQ Technology Steward. Previously he spent 15 years at Caterpillar where he worked as a Senior Research Engineer, Engineering Specialist in Corporate Reliability, and Senior Engineering Specialist in Virtual Product Development. He has also worked for Sandia National Laboratory and the US Dept. of Energy's Technical Development Leadership Program. Mark has a Ph.D. and M.S. in Mechanical Engineering from the New Mexico State University, as well as a BS in Mechanical Engineering from the University of New Mexico.

Benjamin Peherstorfer

Title: Safe and efficient data-driven model reduction for critical engineering applications

Organization: MIT

Bio: Benjamin Peherstorfer is postdoctoral associate at the Department of Aeronautics and Astronautics at the Massachusetts Institute of Technology since 2014. He received B.S., M.S., and Ph.D. degrees in computer science from the Technische Universitaet Muenchen (Munich, Germany) in 2008, 2010, and 2013, respectively. His research focuses on data analysis methods for data- and compute-intensive scientific computing applications, including model reduction, machine learning, and high-performance computing.

Radu Serban

Title: Project Chrono: An Integrated Software Solution for Ground Vehicle Mobility

Organization: University of Wisconsin-Madison

Bio: Radu Serban is an Associate Scientist in the Department of Mechanical Engineering at the University of Wisconsin - Madison. His areas of expertise are in computational dynamics and computational science, multibody dynamics, sensitivity analysis, and mathematical software. He is one of the main architects and developers of the Chrono multi-physics software package. Radu holds a Ph.D. in Mechanical Engineering from the University of Iowa (1998). Before joining the University of Wisconsin, Radu worked as a Senior Computational Scientist at Xulu Entertainment, a Silicon Valley startup (2008-2012), as Computational Scientist in the Center for Applied Scientific Computing at the Lawrence Livermore National Laboratory (2001-2008), and as a postgraduate researcher at the University of California, Santa Barbara (1998-2001).

