

**MACHINE-GROUND INTERACTION CONSORTIUM (MAGIC)
2015 FALL MEETING (5TH EDITION)
DECEMBER 8-9, 2015**

SIMULATION-BASED ENGINEERING LAB (SBEL) @ UW-MADISON

Dan Negrut

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NVIDIA CUDA Fellow
Simulation-Based Engineering Lab
University of Wisconsin-Madison

Event General Info [<http://outreach.sbel.wisc.edu/Consortium>]

- December 2015 Sponsor:
 - NVIDIA, of Santa Clara, CA: <http://www.nvidia.com/>
- December 2015 participants, listed alphabetically [35 organizations]
 - Altair, Caterpillar, DLR (German Aerospace Center), Dynamic Simulation Technologies, Energid, Fraunhofer Institute for Industrial Mathematics - Kaiserslautern University, Georgia Tech, Harley Davidson, HR Wallingford Ltd., Indiana University-Purdue University Indianapolis, Intuitive Machines, John Deere, Johns Hopkins University, Marquette University, MIT, MSC.Software, NATC, NVIDIA, Oshkosh Corporation, Progeneric, Rescale, Siemens, Simertis Gmbh, SimLab Soft, SmartUQ, Statoil, TU Darmstadt, University of Aarhus, University of Iowa, University of Wisconsin-Madison, US Army Coastal and Hydraulics Lab, US Army ERDC, US Army TARDEC, US Marine Corps, US Navy
- May 2015
 - US Army TARDEC, US Army ERDC, Caterpillar, P&H Mining, MSC.Software, Simertis Gmbh, BAE Systems, Harley-Davidson Corporation, Oshkosh Corporation, Red Cedar Technology, Arctic Cat, Eaton Corporation, John Deere, Trek Bicycles, Energid, Dynamic Simulation Technologies, Mevea (Finland), SimLab Soft (Jordan), Progeneric, University of Wisconsin-Madison, University of Iowa, University of Parma, University of Aarhus, University of Illinois at Chicago, Georgia Tech, Indiana University-Purdue University Indianapolis
- December 2014 participants
 - US Army TARDEC, US Army ERDC, Japan Department of Defense, Jet Propulsion Laboratory (NASA), Japan Aerospace Exploration Agency, Caterpillar, P&H Mining, MSC.Software, Simertis Gmbh, BAE Systems, Nevada Automotive Test Center, Harley-Davidson Corporation, Oshkosh Corporation, FunctionBay, Eaton Corporation, John Deere, Trek Bicycles, Dynamic Simulation Technologies, University of Wisconsin-Madison, University of Iowa, Georgia Tech University, University of Parma, Politecnico di Milano, University of Aarhus
- May 2014 participants
 - MSC.Software, BAE Systems, Harley Davidson, US Army TARDEC, Oshkosh Corporation, StatOil (Norway), Open Source Robotics Foundation, Charles River Analytics, Eaton Corporation, SimLab Soft (Jordan), University of Iowa, University of Parma (Italy)
- May 2013 participants
 - 3M, Altair, Boeing, Caterpillar, Cooper Industries, GlaxoSmithKline, Jenike and Johanson, LMS International, MathWorks, MCS.Software, Motionport, Nvidia, Oshkosh Corporation, Parc (Xerox), Proctor & Gamble, Progeneric, Simertis, US Army TARDEC

Machine-Ground Interaction Consortium Meeting

- Purpose:
 - Learn from each other
 - Learn some unexpected things
 - Get better at what we are doing
- Purpose of the meeting allows for a non-competitive attribute of this event
- Idea marketplace, forum of discussion
 - Modeling and Simulation (focus primarily on vehicle mobility & terramechanics)
 - Advanced computing

- What inspired us to organize this special event in this special place?
- No brainer – Madison known for similar inspiring events...

MEMORIAL DAY WEEKEND, MAY 27-30 : MADISON, WI

COMING SOON.



Couldn't join us in 2015 or want to relive the great memories? [Check it out!](#)

05 19 10 05 28
MONTHS DAYS HOURS MINUTES SECONDS

SPONSORSHIP OPPORTUNITIES



FACEBOOK

World's Largest Brat Fest
shared a page.
December 3 at 6:07am

WOW!! Madison's very own local recording artist Betsy Ezell releases her brand new original singles today on her Facebook page. You have to give this a listen.

Hit the listen tab if you are a "Generous Soul!"

~ Proverbs 11:25-26

Betsy Ezell

TWITTER

Brat Fest @BratFest
USA USA USA! #USAw/PN #WomensWorldCup #OneNationOneTeam

Metcalfe's Market @MetcalfesMarket
Final #'s are in... @BratFest was able to donate a total of \$127,372 to local charities this year! Thank you, Madison! pic.twitter.com/jM2ZAMwu8

Retweeted by Brat Fest

INSTAGRAM

140 people follow bratfestofficial

SPOTIFY

Alive Romantic Rebel
Brat Fest Mondays

1	Alive Romantic Rebel	3:23
2	Believe Romantic Rebel	3:25
3	Disappear Romantic Rebel	3:17
4	Nothing Left to Say Romantic Rebel	3:48
5	Lie (feat. Brendon Sm... Romantic Rebel	3:55



This list will be useful if you have an interest in academic research, but are not sure which colleges and universities will provide the best opportunities for your specific career path. This ranking informs readers about not only the top schools for research investment, but also the schools that contribute the most funding to research in specific fields.

[Learn about our methodology](#)

2014 R&D Expenses:
\$1,169,779

RANK	SCHOOL	LOCATION	TUITION	
1	Johns Hopkins University	Baltimore, MD	\$45,470 annually	+
2	University of Michigan - Ann Arbor	Ann Arbor, MI	\$13,142 in state; \$40,392 out of state	+
3	University of Wisconsin - Madison	Madison, WI	\$10,403 in state; \$26,653 out of state	+
4	University of Washington	Seattle, WA	\$12,397 in state; \$31,971 out of state	+
5	University of California - San Diego	La Jolla, CA	\$13,271 in state; \$36,149 out of state	+
6	University of California-San Francisco	San Francisco, CA	N/A	+
7	Duke University	Durham, NC	\$45,376 annually	+
8	University of California - Los Angeles	Los Angeles, CA	\$12,697 in state; \$35,575 out of state	+
9	Stanford University	Stanford, CA	\$43,683 annually	+
10	Columbia University in the City of New York	New York, NY	\$49,138 annually	+
11	University of North Carolina at Chapel Hill	Chapel Hill, NC	\$8,340 in state; \$30,122 out of state	+
12	University of Pittsburgh	Pittsburgh, PA	\$17,100 in state; \$27,106	+
13	University of Pennsylvania	Philadelphia, PA	\$45,890 annually	+
14	University of Minnesota - Twin Cities	Minneapolis, MN	\$13,555 in state; \$19,805 out of state	+
15	Massachusetts Institute of Technology	Cambridge, MA	\$43,498 annually	+
16	Cornell University	Ithaca, NY	\$45,358 out of state	+
17	Harvard University	Cambridge, MA	\$42,292 annually	+

"Vision without execution is hallucination."
--Thomas A. Edison

Execution of the Fall 2015 Meeting

- Tuesday, December 8: Invited talks, modeling and simulation issues
 - Consortium's bread and butter: terramechanics , uncertainty quantification, tire modeling and simulation, etc.
 - Advanced computing component: cloud computing (Rescale) & GPU computing (NVIDIA)
 - This meeting's "coming from the left field" theme: Fluid-Solid Interaction (Intuitive Machines, Johns Hopkins, Statoil, Harley Davidson)

- Wednesday, December 9: Multibody Dynamics focus + Chrono focus
 - News from commercial solution providers (ADAMS & Altair)
 - Chrono status update
 - Chrono tutorial (in the afternoon)

Schedule, Tuesday

Dec. 8, 2015

07:30-08:00 Guest check in

08:00-08:15 Introductions, Logistics and Goals of the Meeting, Dan Negrut, UW-Madison

08:15-08:45 "Teramechanics in Planetary Exploration: Soil Modeling - From Real-time to High Precision" - Fabian Buse, German Aerospace Center (DLR)

08:45-09:15 "Research Challenges for Off-Road Vehicle Dynamics" - Emily Horn, John Deere

09:15-09:30 Coffee Break

09:30-10:00 "Uncertainty Quantification: what it is and why it is important to Machine Ground-Interaction" - Peter Qian, SmartUQ

10:00-10:30 "Advances in the Continuum Representations of Granular Material Dynamics" - Prof. Ken Kamrin, MIT

10:30-10:45 Coffee Break

10:45-11:30 "Simulation Based Vehicle Engineering-Including the Vehicle's Environment" - Klaus Dressler, Fraunhofer Institute for Industrial Mathematics, Kaiserslautern

11:30-12:30 Lunch (catered, brownbag)

12:30-13:00 "NVIDIA, Advancing HPC computing through GPU acceleration" - Bill Veenhuis, NVIDIA

13:00-13:30 "Roadmap and Lessons Learned on HPC Cloud Deployments" - Tony Spagnuolo, VP, Rescale

13:30-14:15 "Recent Advances in NATO Reference Mobility Model" - Dr. Paramsothy Jayakumar, US Army TARDEC

14:15-15:45 Networking Break/Poster Session/Coffee Break

15:45-16:15 "Floating Objects with Water Waves with GPUSH and Chrono" - Tony Dalrumple, Johns Hopkins University

16:15-16:45 "Application of a Tightly Integrated system-of-Systems Modeling Framework to Complex Subsea Blowout Capping Operations" - Steve Fitzgerald, Intuitive Machines

16:45-17:15 Poster Session/Networking/Coffee Break

17:15-17:45 "Frontiers of High-Fidelity Mechanical simulations in the Energy Industry" - Ivan Metrikin, Statoil, Norway

17:45-18:15 "Rider Aerodynamic Comfort Development at Harley-Davidson" - Rob Brummond, Snr. Prj. Engineer, Harley Davidson Motor Company

18:15-18:45 Wrap-up discussion, planning of next MaGIC event

19:00-21:00 Dinner + Cash bar: Brocach Irish Pub on Monroe Street, Madison, WI

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Schedule, Wednesday, December 9

(Location: Tong Auditorium 1003 ECB, Engineering Centers Building)

08:00-08:30 "Co-Simulation and Solver Coupling: An efficient Way to Simulate Multiphysical Systems" - Prof. B. Schweizer, Darmstadt University, Germany

08:30-09:00 "Multibody Simulation with Altair/MotionSolve" - Rajiv Rampalli, VP of Software Development, Altair

09:00-09:30 "A MSC Adams-Marc-EDEM Cosimulation Framework" - Jose Ortiz, MSC.Software

09:30-10:00 Networking Break

10:00-12:00 High level overview of Project Chrono

"Recent Developments in Chrono and Chrono::Vehicle" - Dr. Radu Serban, University of Wisconsin-Madison

"Granular Dynamics in Chrono" - Prof. Jonathan Fleischmann, Marquette University

"Flexible Multibody Dynamics in Chrono using ANCF" - Antonio Recuero, University of Wisconsin-Madison

"Chrono-FSI: support for fluid solid interaction in chrono" - Arman Pazouki, University of Wisconsin-Madison

"The Path to Massively Parallel Computing in Chrono" - Dan Negrut, University of Wisconsin-Madison

12:00-13:00 Lunch (catered)

13:00-17:00 Chrono::Vehicle Tutorial - Dr. Radu Serban & PhD Candidates Daniel Melanz and Mike Taylor

17:00 → Pizza (served here) and beer (served elsewhere)

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Next MaGIC Meeting: ~~May~~ 2016

- Co-organized w/ US Army Tank, Automotive, Research and Eng. Development Center (TARDEC)
 - Where:
 - Novi Suburban Collection Showplace (suburbs of Detroit, MI)
 - When:
 - August 3: MaGIC talks
 - August 4: attend the Ground Vehicle Systems Engineering and Technology Symposium (GVSETS)
 - GVSETS takes place between August 2-4.
- Logistics
 - Registration fee for the two-day MaGIC event is \$200 (includes access to GVSETS)
 - Receptions and networking opportunities scheduled for the evenings of Aug.3 and Aug 4, 2016
 - There will be a limit of 75 MaGIC participants owing to room-size constraints and the fact that MaGIC takes place at the same time/location GVSETS does

Next MaGIC Meeting: August 2016

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