

Carmine Senatore

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- Education**
- Ph.D. Engineering Mechanics** 08/2005 - 06/2010
Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, Virginia.
Thesis: "Prediction of mobility, handling, and tractive efficiency of wheeled off-road vehicles"
Advisors: Dr. Shane D. Ross and Dr. Corina Sandu. GPA: 3.89/4.0
- B.S. Mechanical Engineering** 09/2001 - 07/2004
Politecnico di Milano, Milan, Italy.
Graduated in the first session, July 2004, top of class. Equiv. GPA: 4.0/4.0
- Research Interests** Modeling and characterization of vehicle-terrain interaction with application to robotic systems and ground vehicle dynamics. Terramechanics, dynamical systems, control, design, and image processing for efficient vehicle mobility and navigation.
- Experience**
- Research Scientist, MIT, Cambridge, MA** April 2013 to date
- Work with multidisciplinary teams across several institutions on improving our understanding of vehicle-terrain interactions.
 - Development of tactical and strategic tools to support mobility of Mars Science Laboratory (MSL) mission. (Washington University in St. Louis, NASA-JPL).
 - Study the effect of gravity on granular materials (Caltech, NASA-JPL).
 - Improve terramechanics modeling capabilities for lightweight ground vehicles (TARDEC, ARO).
- Postdoctoral Associate, MIT, Cambridge, MA** 06/2010 - 03/2013
- Supported software engineers at Quantum Signal LLC to develop high fidelity computer model simulations for ground vehicles.
 - Analyzed mobility of small wheeled and tracked robots.
 - Designed testbeds and prototypes for off-road wheel and track testing.
- Research Assistant, Virginia Tech, Blacksburg, VA** 08/2007 - 05/2010
- Analyzed mobility and energy efficiency of off-road vehicles.
 - Implemented a novel path-planning algorithm exploiting LCS concept.
 - Developed an algorithm for ridge detection and characterization in digital images.
- Honors & Awards**
- Best conference **paper award**, Ground Vehicle Systems Engineering and Technology Symposium (GVSETS), Troy, MI, 2012.
 - Best conference **paper award**, 9th Asia-Pacific conference of ISTVS Sapporo, Japan, 2010.
- Peer Reviewer**
- Journal of Terramechanics.
 - IEEE Transactions on Robotics.
 - Mechanical Systems and Signal Processing.
- Skills**
- Computer skills:**
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|-----------------|---------------|---------------------|
| Matlab | Catia | Truck/Carsim |
| Mathematica | Solid Edge | Video-Audio editing |
| Minitab | Solid Works | Windows OS |
| C, C++, Fortran | Inventor | MS Office |
| LabView | Abaqus, Femap | Apple MacOS |
- Research/Technical/Communication Skills:**
- Great flexibility from both human and professional point of view.
 - Excellent interpersonal skills.
 - Collecting, organizing, analyzing, communicating, and presenting data/findings.
 - Computer/Electronics hardware expert.

**Selected
Publications**

Senatore, C. and Iagnemma, K., *Analysis of Stress Distributions Under Lightweight Wheeled Vehicles*, Journal of Terramechanics, Volume 51, February 2014, Pages 1-17, ISSN 0022-4898.

Senatore, C., Wulfmeier, M., Vlahinich, I., Andrade, J., and Iagnemma, K., *Design and Implementation of a Particle Image Velocimetry Method for Analysis of Running Gear-Soil Interaction*, Journal of Terramechanics, Volume 50, Issues 56, October/December 2013, Pages 311-326, ISSN 0022-4898.

Zhou, F., Arvidson, R., Bennet, K., Trease, B., Lindemann, R., Iagnemma, K., Senatore, C., and Bellutta, P., *Simulations of Mars Rover Traverses*, Journal of Field Robotics, Volume 31, Issue 1, 2014.

Senatore, C., Jayakumar, P., and Iagnemma, K., *Experimental Study Of Lightweight Tracked Vehicle Performance On Dry Granular Materials*, 7th Americas Regional Conference of the ISTVS, Tampa, FL, USA. November 4-7, 2013.

Senatore, C., Wulfmeier, M., Jayakumar, P., MacLennan, J., and Iagnemma, K., *Investigation of Stress and Failure in Granular Soils For Lightweight Robotic Vehicle Applications*, Proceedings of the Ground Vehicle Systems Engineering and Technology Symposium, 2012

Senatore, C., and Iagnemma, K., *Direct Shear Behavior of Dry, Granular Soils for Low Normal Stress with Application to Lightweight Robotic Vehicle Modelling*, Proceedings of the International Symposium of the International Society of Terrain-Vehicle Systems, 2011

Senatore C. and Sandu C., *Torque distribution influence on tractive efficiency and mobility of off-road wheeled vehicles*, Journal of Terramechanics, Volume 48, Issue 5, October 2011, Pages 372-383

Senatore C. and Sandu C., *Off-road tire modeling and the multi-pass effect for vehicle dynamics simulation*, Journal of Terramechanics, Volume 48, Issue 4, August 2011, Pages 265-276

Senatore C. and Sandu C., *Off-Road Vehicle Mobility and Energy Efficiency Prediction*, 9th Asia-Pacific conference of the ISTVS, Sapporo, Japan September, 2010

Senatore C. and Ross S. D., *Detection and characterization of transport barriers in complex flows via ridge extraction of the finite time Lyapunov exponent field*, International Journal of Numerical Methods in Engineering, 10.1002/nme.3101, Dec 2010

Ross S. D., Tanaka M. L., and Senatore C., *Detecting dynamical boundaries from kinematic data in biomechanics*, Chaos: an Interdisciplinary Journal of Nonlinear Science **20**, 017507, 2010

Senatore C. and Sandu C., *Exit angle influence on energy efficiency of off-road tires*, 11th European Regional Conference of the ISTVS, Bremen, Germany October, 2009

Senatore C. and Ross S. D., *Fuel-efficient navigation in complex flows*, In Proceedings of 2008 American Control Conference, pages 12441248, 2008