JOSEPH SHOER

joseph.shoer@gmail.com
www.josephshoer.com

INTERESTS

Spacecraft dynamics, controls, and technology development. Space exploration. Mission concept design. System architecture.

EDUCATION

2006-2011 **Cornell University**, Ithaca, NY
Ph.D., Aerospace Engineering with minor in Astronomy (2011)
M.S., Aerospace Engineering (2009)
Coursework in dynamic systems, spacecraft dynamics, multivariable controls, and planetary astronomy
Research in spacecraft systems, dynamics, controls, and technologies

2002-2006 **Williams College**, Williamstown, MA
B.A., Physics, Cum Laude with Honors Thesis (2006)
Coursework in classical mechanics, quantum mechanics, optics, and electromagnetic theory

PROFESSIONAL EXPERIENCE

2011-pres **Guidance, Navigation, and Control Engineer**, A Major Commercial Space Systems Company
- Performed many spacecraft dynamics simulations for algorithm development and software qualification
- Conducted stability analyses for spacecraft contingency operations
- Simulated multibody appendage deployment sequence for attitude analysis
- Contributed to analysis and algorithm development for integration of a new sensor system
- Developed MATLAB visualization tools for GNC simulation analysis

2007-2010 **Teaching Assistant,** College of Engineering, Cornell University
- Courses taught: *Feedback Control Systems*, *Applied Systems Engineering*, and *Spacecraft Engineering*

2009 **NASA Student Intern**, Loads and Structural Dynamics Branch (ES6), Johnson Space Center
- Developed multibody dynamics simulation of Lunar Electric Rover Concept 6-wheel suspension system

2003-2006 **Tutor** and **Student Coordinator**, Math/Science Resource Center, Williams College
- Conducted weekly physics tutoring sessions for 5-15 students (2003-2006)
- Organized and coordinated student tutors in math and the sciences (2005-2006)

2004, 2005 **Summer Research Student,** Fiber Laser Lab, Physics Department, Williams College
- Performed laboratory investigations of dynamic behaviors of an all-fiber picosecond pulse laser
- Developed nonlinear numerical simulations of the fiber laser

2001, 2002 **Summer Intern,** High-Energy Astrophysics Division, Harvard-Smithsonian Center for Astrophysics
- Developed code for TRACE satellite image analysis and data processing

SKILLS

Dynamics analysis, control design, numerical simulation, image processing, and graphical modeling. Laboratory experience with class IV lasers, superconductors, magnetic systems, cryogenics, motion capture, system identification, and microgravity flight testing. Programming and scientific computing experience with MATLAB, Simulink, Mathematica, HTML, FORTRAN, Java, Perl, C++, IDL, and LabVIEW. Graphical modeling experience with MATLAB, MSC/ADAMS, SketchUp, and Radiant. Additional computing experience with PhotoShop, GIMP, Word, PowerPoint, Excel, and Visio.

ACTIVITIES AND PROFESSIONAL ORGANIZATIONS

2010-2011 **NASA Student Ambassador**

2007-2011 **American Institute of Aeronautics and Astronautics**
Student Member

1999-2010 **1Lt, Ithaca Composite Squadron, Civil Air Patrol**
Deputy Commander for Cadets and *Aerospace Education Officer*
- Planned and supervised the implementation of Cadet Program activities
- Conducted aerospace education outreach for cadets and senior members
- Rated Aerospace Education Officer (Technician Level) and Cadet Programs Officer (Technician Level)
- Former Cadet Commander and Cadet 2nd Lieutenant, Lt Col Frank Pocher Minute-Man Squadron, MA

AWARDS

2006-2007	**NASA/New York Space Grant Graduate Fellowship**, Cornell University
2006	**Howard P. Stabler Prize in Physics**, Williams College
2002	**Frank G. Brewer Award for Excellence in Aerospace Education**, Northeast Region, Civil Air Patrol
2001	**Major General Billy Mitchell Award**, National Headquarters, Civil Air Patrol

INVITED TALKS AND APPEARANCES

16 Nov 2012	**Gyroscopes and Spacecraft Controls** Delaware Valley Amateur Astronomers; co-speaker
8 Feb 2012	**Science in Science Fiction** Global Physics Department; colloquium speaker
9 Jun 2009	**Known Universe, episode 3: Construction Zone** BASE Productions for the National Geographic Channel; technical consulting and guest appearance
10 Apr 2009	**Flux-Pinned Modular Spacecraft and Engineering After Williams** Williams College Department of Physics; colloquium speaker

PUBLICATIONS

- Shoer, J. and Peck, M., **"Flux-Pinned Interfaces for the Assembly, Manipulation, and Reconfiguration of Modular Space Systems**," *Journal of the Astronautical Sciences*, vol. 57, no. 3, 2011.
- Shoer, J., Wilson, W., Jones, L., Knobel, M., and Peck, M., "**Microgravity Demonstrations of Flux Pinning for Station-Keeping and Reconfiguration of CubeSat-Sized Spacecraft**," *Journal of Spacecraft and Rockets*, vol. 47, no. 6, 2010.
- Shoer, J. and Peck, M., **"Reconfigurable Spacecraft as Kinematic Mechanisms**," *Journal of Spacecraft and Rockets*, vol. 46, no. 2. 2009.
- Shoer, J. and Peck, M., "**Stiffness of a Flux-Pinned Virtual Structure for Modular Spacecraft**," *Journal of the British Interplanetary Society*, vol. 62, no. 2. 2009.

CONFERENCE PROCEEDINGS

- Betts, B. *et al.*, "**Microrovers for Assisting Humans on the Moon and Elsewhere: Microrover Catalog, Requirements, and General Design Conclusions**," *AIAA SPACE 2011 Conference & Exposition*. 2011.
- Shoer, J. and Peck, M., "**Simulation of Multibody Spacecraft Reconfiguration through Sequential Dynamic Equilibria**," *AIAA Guidance, Navigation, and Control Conference*. 2010.
- Wilson, W., Jones, L., Shoer, J., and Knobel, M., "**Results of Flux-Pinning Modular Spacecraft Demonstration in Microgravity,**" *AIAA Region I Young Professional, Student, and Education Conference*. 2009.
- Shoer, J. and Peck, M., "**Sequences of Passively Stable Dynamic Equilibria for Hybrid Control of Reconfigurable Spacecraft**," *AIAA Guidance, Navigation, and Control Conference*. 2009.
- Wilson, W., Shoer, J., and Peck, M., "**Demonstration of a Magnetic Locking Flux-Pinned Revolute Joint for Use on CubeSat-Standard Spacecraft**," *AIAA Guidance, Navigation, and Control Conference*, 2009.
- Shoer, J., "**Flux-Pinned Interfaces for the Assembly, Manipulation, and Reconfiguration of Modular Space Systems**," *AIAA Guidance, Navigation, and Control Conference and Exhibit*, 2008.
- Shoer, J. and Peck, M., "**A Flux Pinned Magnet-Superconductor Pair for Close-Proximity Station Keeping and Self-Assembly of Spacecraft**," *AIAA Guidance, Navigation, and Control Conference.* 2007.
- Reeves, K.K. *et al.*, "**New Observations of Oscillating Coronal Loops**," *Eos Trans. AGU,* 82(47), Fall Meeting Supplement, Abstract SH11A-0704. 2001.

THESIS AND DISSERTATION

- Shoer, Joseph. "**Dynamics of Reconfigurable Multibody Space Systems Connected by Magnetic Flux Pinning**." Dissertation, Cornell University. 2011.
- Shoer, Joseph. "**Simulation of a Passively Modelocked All-Fiber Laser with Nonlinear Optical Loop Mirror**." Thesis, Williams College. 2006.

OTHER MEDIA

- Shoer, Joseph. "**The Physics of Space Battles**." Gizmodo, 19 Dec 2009. <http://gizmodo.com/5426453/the-physics-of-space-battles>