

Craig A. Woolsey

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Research Interests:

Dr. Woolsey's research interests include nonlinear control theory for mechanical systems, particularly energy-based control methods, and applications to ocean and atmospheric vehicles. Woolsey is the director of the Virginia Tech site in the Center for Unmanned Aircraft Systems (c-uas.org). He co-directs the Nonlinear Systems Laboratory (www.nsl.aoe.vt.edu), with colleagues Dr. Mazen Farhood and Dr. Cornel Sultan. Woolsey is a member of the Autonomy and Robotics faculty at VT (autonomyandrobotics.centers.vt.edu).

Education:

Ph.D. in Mechanical & Aerospace Engineering, Princeton University, January 2001.
M.A. in Mechanical & Aerospace Engineering, Princeton University, June 1997.
B.M.E., Georgia Institute of Technology, March 1995. (Highest Honor, Cooperative Employment Plan)

Professional Experience:

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| Sep. 2014 – present | Professor Aerospace & Ocean Engineering Department Virginia Tech, Blacksburg, VA |
| Sep. 2008 – Aug. 2014 | Associate Professor & Assistant Department Head for Graduate Studies Aerospace & Ocean Engineering Department Virginia Tech, Blacksburg, VA |
| Sep. 2006 – Aug. 2008 | Associate Professor Aerospace & Ocean Engineering Department Virginia Tech, Blacksburg, VA |
| Jan. 2001 – Aug. 2006 | Assistant Professor Aerospace & Ocean Engineering Department Virginia Tech, Blacksburg, VA |
| July 1995 – Dec. 2000 | Graduate Research Assistant and Assistant in Instruction Mechanical & Aerospace Engineering Department Princeton University, Princeton, NJ |
| June 1991 - Sep. 1994 | Student Employee, Cooperative Plan Office of Scientific and Weapons Research (Directorate of Intelligence) & Office of Logistics (Directorate of Administration), Central Intelligence Agency, Washington, D.C. (Clearance Level: Top Secret, Sensitive Compartmented Information) |

Professional Affiliations:

American Institute of Aeronautics and Astronautics (AIAA), Associate Fellow
Institute of Electrical and Electronics Engineers (IEEE), Senior Member
International Federation of Automatic Control (IFAC), Member
Association for Unmanned Vehicle Systems International (AUVSI), Ridge & Valley Chapter, Member & Secretary

Professional & University Service:

AIAA Atmospheric Flight Mechanics Technical Committee Member (2017 – present)
IFAC Technical Committee on Marine Systems: TC 7.2 (2017 – 2020)
AUVSI Ridge & Valley Chapter (Member, 2016 – present; Secretary, 2016 – present)
VT College of Engineering (CoE) Faculty Rep. to University Promotion & Tenure Committee (2016 – 2019)
VT AOE Dynamics & Control Group Leader (2006 – present)
VT AOE Undergraduate Curriculum Committee (2012 – present)
Director, Virginia Center for Autonomous Systems (2006 – 2014)
VT AOE Assistant Department Head for Graduate Studies (2008 – 2014)
VT AOE Graduate Committee (Member, 2006 – present; Chair, 2007 – 2014)
VT CoE Graduate Curriculum Committee (Member, 2006 – present; Chair, 2009 – 2011)
Faculty Co-Advisor, VT Autonomous Underwater Vehicle Team (2002 – 2013)
Faculty Co-Advisor, VT Student Chapter of AIAA (2003 – 2008)
VT ADVANCE Advisory Board (2003 – 2008)
Chair, VT AOE Student Opportunities Committee (2003 – 2007)
Presbyterian Campus Ministry (Board, 2001 – 2007; Endowment Committee Chair, 2007 – present)
Associate Editor, *American Control Conference* (2006, 2007, 2009)
Organizing/Program Committees:
- *American Control Conference* (2008, 2013, 2014)
- *18th International Symposium on Mathematical Theory of Networks & Systems* (Blacksburg, VA, 2008)
- *1st IFAC Workshop on Guidance & Control of Underwater Vehicles* (Newport, South Wales, U.K., 2003)
Reviewer for numerous journals and conferences. Special recognition:
- Excellent Reviewer (2015, 2017): *AIAA J. Guidance, Control, & Dynamics*
- Excellence in Review (2012): *IEEE J. Oceanic Engineering*

Honors & Awards:

National Academy of Sciences, Engineering and Medicine (NAS) Committee to Assess the Risks of Unmanned Aircraft Systems (UAS) Integration (2017-2018)
Virginia Tech College of Engineering Dean's Award for Excellence in Research (2017)
Virginia Tech Student Engineers Council Undergraduate Research Advisor of the Year (2015)
Virginia Tech Master Online Instructor (2013)
Virginia Tech College of Engineering Certificate of Teaching Excellence (2013)
SAE Ralph R. Teetor Educational Award (2008)
NSF Faculty Early Career Development (CAREER) Award (2002—2007)
ONR Young Investigator Program Award (2002—2005)
NASA Institute for Advance Concepts Fellow (2004-2005)
Virginia Tech College of Engineering Faculty Fellow (2003 – 2006)
Virginia Tech College of Engineering Dean's Award: Outstanding New Assistant Professor (2003)

NDSE (Department of Defense) Graduate Fellowship (1995–1998)
NSF Graduate Fellowship (deferred) (1995)
Guggenheim Fellowship (Princeton University) (1995)
Georgia Tech President’s Scholar (1990 – 1995)
Tau Beta Pi Senior Engineering Cup (Georgia Tech) (1995)
College of Engineering Award (Georgia Tech) (1994)
CIA Exceptional Performance Award (1993)

Publications:¹

Journal publications (peer-reviewed):

- [1] “Sensing wind from quadrotor motion,” J. González-Rocha*, C. A. Woolsey, C. Sultan, and S. F. J. De Wekker. *AIAA Journal of Guidance, Control, and Dynamics* (To appear.) [DOI: [10.2514/1.G003542](https://doi.org/10.2514/1.G003542)]
- [2] “Nonlinear control of a subscale submarine in emergency ascent,” F. Valentinis and C. A. Woolsey. *Ocean Engineering* (To appear.) [DOI: [10.1016/j.oceaneng.2018.11.029](https://doi.org/10.1016/j.oceaneng.2018.11.029)]
- [3] “Workspace modeling and path planning for truss structure inspection by small UAS,” A. Das* and C. A. Woolsey. *AIAA Journal of Aerospace Information Systems* (To appear.) [DOI: [10.2514/1.I010634](https://doi.org/10.2514/1.I010634)]
- [4] “A maneuvering model for an underwater vehicle near a free surface - Part 1: Motion without memory effects,” T. Battista*, F. Valentinis, and C. Woolsey. *IEEE Journal of Oceanic Engineering*. (To appear.) [DOI: [10.1109/JOE.2018.2871650](https://doi.org/10.1109/JOE.2018.2871650)]
- [5] “Nonlinear model identification methodology for small, fixed-wing, unmanned aircraft,” B. Simmons*, H. G. McClelland*, and C. A. Woolsey. *AIAA Journal of Aircraft* (In press. Available online.) [DOI: [10.2514/1.C035160](https://doi.org/10.2514/1.C035160)]
- [6] “Energy-preserving variational integrators for forced Lagrangian systems,” H. Sharma, M. Patil, and C. A. Woolsey. *Communications in Nonlinear Science and Numerical Simulation* (In press. Available online.) [DOI: [10.1016/j.cnsns.2018.04.015](https://doi.org/10.1016/j.cnsns.2018.04.015)]
- [7] “On averaging and input optimization of high-frequency mechanical control systems,” S. Tahmasian*, D. W. Allen*, and C. A. Woolsey. *Journal of Vibration and Control* **24**(5), pp. 937-955, May 2018. [DOI: [10.1177/1077546316655706](https://doi.org/10.1177/1077546316655706)]
- [8] “Flight control of biomimetic air vehicles using vibrational control and averaging,” S. Tahmasian* and C. A. Woolsey. *Journal of Nonlinear Science* **27**(4), pp. 1193–1214, August 2017. [DOI: [10.1007/s00332-016-9334-5](https://doi.org/10.1007/s00332-016-9334-5)]
- [9] “A comparison of three approaches to atmospheric source localization,” H. M. Abdelghaffar, C. A. Woolsey, and H. A. Rakha, *AIAA Journal of Aerospace Information Systems*, 14(1), pp. 40-52, January 2017. [DOI: [10.2514/1.I010440](https://doi.org/10.2514/1.I010440)]
- [10] “Optimal paths in still air for a sailplane with a quadratic glide polar,” A. Wolek* and C. A. Woolsey. *Technical Soaring* **40**(2), pp. 9-23, April-June 2016.
- [11] “Time-optimal path planning for a kinematic car with variable speed,” A. Wolek*, E. M. Cliff, and C. A. Woolsey. *AIAA Journal of Guidance, Control, and Dynamics* **39**(10), pp. 2374-2390, 2016. [DOI: [10.2514/1.G001317](https://doi.org/10.2514/1.G001317)]
- [12] “Fuel/time optimal relative trajectories for a satellite near a perturbed, elliptical orbit,” A. Rogers*, C. A. Woolsey, J. Black, and R. McGwier. *AIAA Journal of Spacecraft and Rockets* **53**(5), pp. 811-82, 2016. [DOI: [10.2514/1.A33365](https://doi.org/10.2514/1.A33365)]
- [13] “Energy-optimal paths for a glider with speed and load factor controls,” A. Wolek*, E. M. Cliff, and C. A. Woolsey. *AIAA Journal of Guidance, Control, and Dynamics* **39**(2), pp. 397-408, February 2016. [DOI: [10.2514/1.G001345](https://doi.org/10.2514/1.G001345)]

¹The superscript * in an author list denotes an undergraduate, graduate, or postdoctoral research assistant or a visiting scholar advised or co-advised by C. Woolsey.

- [14] “Geometric control approach to longitudinal stability of flapping flight,” H. Taha, C. A. Woolsey, and M. Hajj. *AIAA Journal of Guidance, Control, and Dynamics* **39**(2), pp. 214-226, February 2016. [DOI:[10.2514/1.G001345](https://doi.org/10.2514/1.G001345)]
- [15] “Exploring the oceans of Europa with biologically-inspired underwater vehicles,” D. W. Allen*, M. C. Jones*, L. S. McCue, W. B. Moore, M. Philen, and C. A. Woolsey. *Journal of the British Interplanetary Society* **68**, pp. 251-264, August 2015.
- [16] “Geometric control of a flapping plate,” H. E. Taha and C.A. Woolsey. *J. Vibration and Control* **21**(11):2124–2133, August 2015. [DOI:[10.1177/1077546313506924](https://doi.org/10.1177/1077546313506924)]
- [17] “A control design method for underactuated mechanical systems using high frequency inputs,” S. Tahmasian* and C. A. Woolsey. *ASME Journal of Dynamic Systems, Measurement, and Control* **137**(7), July 2015. [DOI:[10.1115/1.4029627](https://doi.org/10.1115/1.4029627)]
- [18] “Feasible Dubins paths in the presence of unknown, unsteady velocity disturbances,” A. Wolek* and C. A. Woolsey. *AIAA Journal of Guidance, Control, and Dynamics* **38**(4), pp. 782-786, April 2015. [DOI:[10.2514/1.G000629](https://doi.org/10.2514/1.G000629)]
- [19] “The need for higher-order averaging in the stability analysis of hovering, flapping-wing flight”, H. Taha, S. Tahmasian*, C. A. Woolsey, A. Nayfeh, and M. Hajj. *Bioinspiration and Biomimetics* **10**(1), February 2015. (Paper selected as one of the *Bioinspiration & Biomimetics* “Highlights” for 2015.) [DOI:[10.1088/1748-3190/10/1/016002](https://doi.org/10.1088/1748-3190/10/1/016002)]
- [20] “Integration and testing of a surface plasmon resonance sensor with a small unmanned aerial vehicle,” M. Palframan*, H. Gruszewski, D. Schmale, III, and C. A. Woolsey. *J. Unmanned Vehicle Systems* **2**, pp. 103–118, October 2014. [DOI:[10.2514/6.2013-4670](https://doi.org/10.2514/6.2013-4670)]
- [21] “Dynamics of underwater gliders in currents,” S. Fan* and C. A. Woolsey. *Ocean Engineering* **84**, pp. 249–258, July 2014. [DOI:[10.1016/j.oceaneng.2014.03.024](https://doi.org/10.1016/j.oceaneng.2014.03.024)]
- [22] “Stabilization of flapping-wing micro-air vehicles in gust environments,” M. Bhatia, M. Patil, C. A. Woolsey, B. Stanford and P. Beran. *AIAA Journal of Guidance, Control, and Dynamics* **37**(2):592-607, March 2014. [DOI:[10.2514/1.59875](https://doi.org/10.2514/1.59875)]
- [23] “An efficient motion control system for underwater gliders,” N. Mahmoudian* and C. Woolsey. *Nonlinear Engineering: Modeling and Application*. Vol. 2, pp. 63-77, 2013. [DOI:[10.1515/nleng-2012-0011](https://doi.org/10.1515/nleng-2012-0011)]
- [24] “Elements of underwater glider performance and stability,” S. Fan* and C. Woolsey. *Marine Technology Society Journal*, **47**(3), pp. 81-98, May/June 2013. [DOI:[10.1515/nleng-2012-0011](https://doi.org/10.1515/nleng-2012-0011)]
- [25] “Modeling, identification, and control of an unmanned surface vehicle,” C. Sonnenburg* and C. A. Woolsey. *Journal of Field Robotics*, **30**(3), pp. 371-398, May/June 2013. [DOI:[10.1002/rob.21452](https://doi.org/10.1002/rob.21452)]
- [26] “Vehicle motion in currents,” P. Thomasson and C. A. Woolsey. *IEEE Journal of Oceanic Engineering*, **38**(2), pp. 226-242, April 2013. [DOI:[10.1109/JOE.2013.2238054](https://doi.org/10.1109/JOE.2013.2238054)]
- [27] “Unmanned aerial vehicle coordination on closed convex paths in wind” L. Techy*, D. Paley, and C. A. Woolsey. *AIAA Journal of Guidance, Control, and Dynamics*, **33**(6), pp. 1946-1951, November-December 2010. [DOI:[10.2514/1.47655](https://doi.org/10.2514/1.47655)]
- [28] “Backstepping for synchronization of nonlinear dynamical systems,” K. Listmann, J. Adamy, and C. A. Woolsey. *Automatisierungstechnik*, pp. 425-434, August 2010.
- [29] “Coordinated aerobiological sampling of a plant pathogen in the lower atmosphere using two autonomous unmanned aerial vehicles,” L. Techy*, D. Schmale, III, and C. A. Woolsey. *Journal of Field Robotics* **27**(3), pp. 335–343, May/June 2010. [DOI:[10.1002/rob.20335](https://doi.org/10.1002/rob.20335)]
- [30] “Fast estimation for range identification in the presence of unknown motion parameters,” L. Ma*, C. Cao, N. Hovakimyan, C. Woolsey, and W. Dixon. *IMA Journal of Applied Mathematics*, **75**(2), pp. 165-189, February 2010. [DOI:[10.1093/imamat/hxq008](https://doi.org/10.1093/imamat/hxq008)]
- [31] “Approximate analytical turning conditions for underwater gliders and implications for path planning,” N. Mahmoudian*, J. Geisbert*, and C. Woolsey. *IEEE Journal of Oceanic Engineering* **35**(1), pp. 131-143, January 2010. [DOI:[10.1109/JOE.2009.2039655](https://doi.org/10.1109/JOE.2009.2039655)]
- [32] “Minimum-time path planning for unmanned aerial vehicles in steady uniform winds,” L. Techy* and C. A. Woolsey. *AIAA Journal of Guidance, Control, and Dynamics*, **32**(6), pp. 1736-1746, November-December 2009. [DOI:[10.2514/1.44580](https://doi.org/10.2514/1.44580)]
- [33] “Cross-track control of a slender, underactuated AUV using potential shaping,” C. A. Woolsey and L. Techy*. *Ocean Engineering: Special Issue on AUVs* **36**, pp. 82-91, January 2009. [DOI:[10.1016/j.oceaneng.2008.07.010](https://doi.org/10.1016/j.oceaneng.2008.07.010)]

- [34] “Planar flow model identification for improved navigation of small AUVs,” J. Petrich, C. A. Woolsey, and D. J. Stilwell. *Ocean Engineering: Special Issue on AUVs*. **36**, pp. 119-131, January 2009. [DOI:[10.1016/j.oceaneng.2008.10.002](https://doi.org/10.1016/j.oceaneng.2008.10.002)]
- [35] “Global directional control of a slender AUV,” H.-Y. Kim* and C. A. Woolsey. *AIAA Journal of Guidance, Control, and Dynamics* **30**(1), pp. 255-259, January-February 2007. [DOI:[10.1016/j.oceaneng.2008.07.010](https://doi.org/10.1016/j.oceaneng.2008.07.010)]
- [36] “Exploring Titan with autonomous, buoyancy-driven gliders,” M. Morrow*, C. A. Woolsey, and G. Hagerman. *Journal of the British Interplanetary Society* **59**(1), pp. 27-34, January 2006.
- [37] “Backstepping control of an SMA-actuated robotic arm,” M. H. Elahinia, J. Koo, M. Ahmadian, and C. A. Woolsey. *Journal of Vibration and Control* **11**(3), pp. 407-429, March 2005. [DOI:[10.1177/1077546305051201](https://doi.org/10.1177/1077546305051201)]
- [38] “Reduced Hamiltonian dynamics for a rigid body/mass particle system,” C. Woolsey. *AIAA Journal of Guidance, Control, and Dynamics* **28**(1), pp. 131-138, January-February 2005. [DOI:[10.2514/1.5409](https://doi.org/10.2514/1.5409)]
- [39] “Controlled Lagrangian systems with gyroscopic forcing and dissipation,” C. Woolsey, C. K. Reddy*, A. M. Bloch, D. E. Chang, N. E. Leonard, J. E. Marsden. *European Journal of Control (Special Issue on Lagrangian and Hamiltonian Methods for Nonlinear Control)* **10**(5), pp. 478-496, December 2004. [DOI:[10.2514/1.5409](https://doi.org/10.2514/1.5409)]
- [40] “Stabilizing underwater vehicle motion using internal rotors,” C. Woolsey and N. E. Leonard. *Automatica*, **38**(12), pp. 2053-2062, December 2002. [DOI:[10.1016/S0005-1098\(02\)00136-X](https://doi.org/10.1016/S0005-1098(02)00136-X)]
- [41] “The equivalence of controlled Lagrangian and controlled Hamiltonian systems,” D. E. Chang, A. M. Bloch, N. E. Leonard, J. E. Marsden, and C. Woolsey *Control, Optimisation, and Calculus of Variations (Special Issue Dedicated to J. L. Lions)* **8**, pp. 393-422, June 2002. [DOI:[10.1051/cocv:2002045](https://doi.org/10.1051/cocv:2002045)]
- [42] “Transfer functions for acoustic emission transducers using laser interferometry,” L. J. Jacobs and C. Woolsey, *Journal of the Acoustical Society of America*, **94** (6), pp. 3506-3508, December 1993. [DOI:[10.1121/1.407205](https://doi.org/10.1121/1.407205)]

Book chapters and other journal publications:

- [43] “Model-based path planning,” A. Wolek and C. A. Woolsey, *Sensing and Control for Autonomous Vehicles: Applications to Land, Water and Air Vehicles*, T. I. Fossen, K. Y. Pettersen, and H. Nijmeijer, Eds., Springer: Lecture Notes in Control and Information Sciences, pp. 183-206, 2017. [DOI:[10.1007/978-3-319-55372-6_9](https://doi.org/10.1007/978-3-319-55372-6_9)]
- [44] “Design and modeling of a two-stage towed sensor platform: A passively and actively stabilized towfish for experimental ocean science,” E. M. Schuch*, A. C. Linklater*, and C. A. Woolsey. *Sea Technology* **47**(7), pp. 20-23, July 2006. [DOI:[10.1109/OCEANS.2005.1640001](https://doi.org/10.1109/OCEANS.2005.1640001)]
- [45] “Book Review: *Marine Control Systems: Guidance, Navigation, and Control of Ships, Rigs, and Underwater Vehicles* by T. I. Fossen,” C. A. Woolsey. *AIAA Journal of Guidance, Control, and Dynamics* **28**(3), pp. 574-575, May-June 2005. [DOI:[10.2514/1.17190](https://doi.org/10.2514/1.17190)]

Technical Reports²

- [1] “Design and Testing of a Pneumatically Propelled Underwater Glider for Shallow Water,” A. Wolek*, T. Gode*, C. A. Woolsey, J. Quenzer and K. A. Morgansen. VaCAS Technical Report No. VaCAS-2015-01.
- [2] “Exploration of Under-ice Regions with Ocean Profiling Agents (EUROPA),” D. W. Allen*, M. Jones*, L. McCue, C. A. Woolsey, and W. B. Moore. VaCAS Technical Report No. VaCAS-2013-01.
- [3] “Vehicle Dynamics in Currents,” C. Woolsey. VaCAS Technical Report No. VaCAS-2011-01.
- [4] “Dynamics and Control of Underwater Gliders II: Motion Planning and Control,” N. Mahmoudian* and C. Woolsey. VaCAS Technical Report No. VaCAS-2010-02.
- [5] “Control-Oriented Planar Motion Modeling of Unmanned Surface Vehicles,” C. Sonnenburg*, A. Gadre, D. Horner, S. Krageland, A. Marcus, D. J. Stilwell, and C. A. Woolsey. VaCAS Technical Report No. VaCAS-2010-01.
- [6] “Long-Baseline Ranging System for Acoustic Underwater Localization of the Seaglider Underwater Glider,” L. Techy, K. A. Morgansen, and C. A. Woolsey. UWAA Technical Report No. UWAATR-2010-0001.
- [7] “Optimal Control of an Undersea Glider in a Symmetric Pull-up,” R. Kraus*, E. Cliff, C. Woolsey, and J. Luby. VaCAS Technical Report No. VaCAS-2008-03.

² VaCAS technical reports available at <https://vtechworks.lib.vt.edu/>

- [8] “Dynamics and Control of Underwater Gliders I: Steady Motions,” N. Mahmoudian*, J. Geisbert*, and C. Woolsey. VaCAS Technical Report No. VaCAS-2007-01.

Conference publications (accepted based on full paper review):

- [1] “Modeling and roadmap generation for truss inspection by small UAS,” A. Das and C. A. Woolsey, *Proc. European Control Conference*, Limmasol, Cyprus, June 2018.
- [2] “Sense and avoid based on computer vision pose estimation for small UAS,” C. Kang*, J. Davis*, C. A. Woolsey, and S. Choi, *Proc. IEEE/RSJ Conference on Intelligent Robots and Systems*, Vancouver, BC, Canada, September 2017. [DOI:[10.1109/IROS.2017.8206188](https://doi.org/10.1109/IROS.2017.8206188)]
- [3] “An energy-Casimir approach to underwater vehicle depth and heading regulation in short crested waves,” T. Battista*, S. Jung*, C. Woolsey, and E. Paterson, *Proc. Conference on Control Technology and Applications*, Kohala Coast, HI, August 2017 (Invited). [DOI:[10.1109/CCTA.2017.8062466](https://doi.org/10.1109/CCTA.2017.8062466)]
- [4] “Underwater vehicle depth and attitude regulation in plane progressive waves,” T. Battista*, C. A. Woolsey, L. McCue-Weil, E. Paterson, and F. Valentinis, *Proc. Conference on Decision and Control*, Kyoto, Japan, December 2015. [DOI:[10.1109/CDC.2015.7402906](https://doi.org/10.1109/CDC.2015.7402906)]
- [5] “Nonlinear tracking of optimal maneuvers in spacecraft formations,” A. Rogers, R. McGwier, and C. A. Woolsey, *Proc. American Control Conference*, Chicago, IL, July 2015. [DOI:[10.1109/ACC.2015.7172258](https://doi.org/10.1109/ACC.2015.7172258)]
- [6] “Underwater vehicle control and estimation in nonuniform currents,” S. Fan and C. A. Woolsey, *Proc. American Control Conference*, pp. 1402-1407, Washington, D.C., June 2013 (Invited Paper). [DOI:[10.1109/ACC.2013.6580032](https://doi.org/10.1109/ACC.2013.6580032)]
- [7] “Control of underactuated nonlinear systems using high frequency input,” S. Tahmasian*, H. Taha, and C. A. Woolsey, *Proc. American Control Conference*, pp. 603-608, Washington, D.C., June 2013 (Invited Paper). [DOI:[10.1109/ACC.2013.6579903](https://doi.org/10.1109/ACC.2013.6579903)]
- [8] “A geometric control approach for optimum maneuverability of flapping wing MAVs near hover,” H. Taha, C. A. Woolsey, and M. Hajj, *Proc. American Control Conference*, pp. 597-602, Washington, D.C., June 2013 (Invited Paper). [DOI:[10.1109/ACC.2013.6579902](https://doi.org/10.1109/ACC.2013.6579902)]
- [9] “Disturbance rejection in Dubins path planning,” A. Wolek* and C. A. Woolsey, *Proc. American Control Conference*, pp. 4873-4878, Montreal, Canada, June 2012. [DOI:[10.1109/ACC.2012.6315582](https://doi.org/10.1109/ACC.2012.6315582)]
- [10] “Control of flapping wing micro-air vehicles using variable stiffness membrane wings,” L. Hale,* M. Patil, and C. A. Woolsey, *Proc. American Control Conference*, pp. 2521-2526, Montreal, Canada, June 2012. [DOI:[10.1109/ACC.2012.6315582](https://doi.org/10.1109/ACC.2012.6315582)]
- [11] “Long-baseline acoustic localization of the *Seaglider* underwater glider,” L. Techy*, K. Morgansen, and C. A. Woolsey, *Proc. American Control Conference*, San Francisco, CA, July 2011. [DOI:[10.1109/ACC.2011.5991416](https://doi.org/10.1109/ACC.2011.5991416)]
- [12] “Pose estimation from visual measurements using epipolar geometry,” M. J. Monda* and C. A. Woolsey, *Proc. 49th IEEE Conference on Decision and Control*, pp. 1633-1638, Atlanta, GA, December 2010. [DOI:[10.1109/CDC.2010.5718182](https://doi.org/10.1109/CDC.2010.5718182)]
- [13] “Planar path planning for flight vehicles in wind with turn rate and acceleration bounds,” L. Techy*, C. A. Woolsey, and K. Morgansen, *International Conference on Robotics & Automation*. Anchorage, AK, May 2010. [DOI:[10.1109/ROBOT.2010.5509862](https://doi.org/10.1109/ROBOT.2010.5509862)]
- [14] “UAV coordination on convex curves in wind: An environmental sampling application,” L. Techy*, D. A. Paley, and C. A. Woolsey, *2009 European Control Conference*, pp. 4967-4972, Budapest, Hungary, August 2009. [DOI:[10.23919/ECC.2009.7075187](https://doi.org/10.23919/ECC.2009.7075187)]
- [15] “Passivity-based coordination of multi-agent systems: A backstepping approach,” K. D. Listmann, C. A. Woolsey and J. Adamy, *2009 European Control Conference*, pp. 2450-2455, Budapest, Hungary, August 2009. [DOI:[10.23919/ECC.2009.7074773](https://doi.org/10.23919/ECC.2009.7074773)]
- [16] “Estimation of an affine motion”, L. Ma*, C. Cao, N. Hovakimyan, C. Woolsey, and G. Hu, *2009 American Control Conference*, pp. 5085 – 5090, St. Louis, MO, June 2009. [DOI:[10.1109/ACC.2009.5160177](https://doi.org/10.1109/ACC.2009.5160177)]
- [17] “Underwater glider motion control,” N. Mahmoudian* and C. A. Woolsey, *Proc. 47th IEEE Conference on Decision and Control*, pp. 552 – 557, Cancun, Mexico, December 2008. [DOI:[10.1109/CDC.2008.4739432](https://doi.org/10.1109/CDC.2008.4739432)]
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- [19] “Optimal control for an underwater glider: Avoiding stall in a symmetric pull-up,” R. J. Kraus*, E. M. Cliff, J. C. Luby, and C. A. Woolsey. *Proc. 18th International Symposium on Mathematical Theory of Networks and Systems*, Blacksburg, VA, August 2008 (Invited paper.)
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- [39] “Effects of modeling assumptions on wind reconstruction during longitudinal flight,” H. McClelland* and C. A. Woolsey, *AIAA SciTech 2019*, San Diego, CA, January 2019.
- [40] “Model-based wind profiling in the lower atmosphere with multirotor UAS,” J. González-Rocha*, C. A. Woolsey, C. Sultan, and S. F. J. De Wekker, *AIAA SciTech 2019*, San Diego, CA, January 2019.
- [41] “Aerodynamic and frequency response of a NACA0012 airfoil undergoing non-sinusoidal pitching waveforms,” H. Shehata*, C. A. Woolsey, M. Zakaria, M. Hajj, *AIAA SciTech 2019*, San Diego, CA, January 2019.
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- [44] “An analytical approximation of a force prediction model for a prolate spheroid moving at a constant forward speed parallel to a calm free surface,” S. Jung, T. Battista, F. Valentinis, S. Brizzolara, E. Paterson, and C. Woolsey, *Proc. 13th Int. Conf. on Hydrodynamics*, Incheon, Korea, September 2018.
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- [46] “Directional stabilization of a fixed-wing aircraft using potential shaping,” J.-M. Fahmi* and C. A. Woolsey, *Proc. AIAA AVIATION*, Atlanta, GA, June 2018. [DOI:[10.2514/6.2018-3620](https://doi.org/10.2514/6.2018-3620)]
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Ph.D. Dissertation: *Energy Shaping and Dissipation: Underwater Vehicle Stabilization Using Internal Rotors*, Craig Woolsey, Princeton University, December 2000. (Doctoral Advisor: Naomi Leonard)

Externally Sponsored Research:

Summary of External Research Funding

| Number of Projects | Total Amount | Woolsey Component |
|--------------------|---------------|-------------------|
| 46 | \$ 17,085,971 | \$5,605,989 |

Projects directed by C. Woolsey (reverse chronological order by end date)

- [1] **Proposal Title:** FW-HTF: First Person View and Augmented Reality for Airborne Embodied Intelligent Cognitive Assistants
Principal Investigator: J. Gabbard, M. Hebdon, P. Tokekar, and C. Woolsey (Lead)
Period of Performance: September 1, 2018 to August 31, 2021
Sponsor: National Science Foundation
Amount: \$1,500,000
Woolsey Component: \$375,000 (25%)
- [2] **Proposal Title:** Submarine Motion in Waves
Principal Investigator: E. Paterson and C. Woolsey (Lead)
Period of Performance: July 1, 2016 to June 30, 2019
Sponsor: Office of Naval Research
Amount: \$395,584
Woolsey Component: \$197,792 (50%)
- [3] **Proposal Title:** Collaborative Research: Unsteady Hydrodynamics and Geometric Control of Pisciform Locomotion
Principal Investigator: M. Hajj and C. Woolsey (Lead)
Period of Performance: September 1, 2016 to August 31, 2019
Sponsor: National Science Foundation
Amount: \$270,000
Woolsey Component: \$135,000 (50%)
- [4] **Proposal Title:** I/UCRC: Center for UAS Phase II Site: Virginia Tech
Principal Investigator: K. Kochersberger and C. Woolsey (Lead)
Period of Performance: March 1, 2017 to February 2022
Sponsor: National Science Foundation
Amount: \$500,000
Woolsey Component*: \$250,000 (50%)
Note: Virginia Tech Site within an existing NSF I/UCRC established by BYU and CU-Boulder. This Phase II site supercedes a Phase I site which ended with the original Phase I grant to BYU and CU-Boulder. Funds from NSF are supplemented by membership fees from industry/government members of the C-UAS. Industry membership fees of \$44,000/Year per member support a varying roster of investigators and projects. Member fee contributions range from \$200,000 to \$300,000 annually, but funding totals reported here **do not account for member-sponsored research tasks**.
- [5] **Proposal Title:** VT Site Addition to the Center for UAS
Principal Investigator: K. Kochersberger and C. Woolsey (Lead)
Period of Performance: September 1, 2015 to August 31, 2020 2018
Sponsor: National Science Foundation
Amount: ~~\$324,996~~ \$130,000
Woolsey Component*: ~~\$162,498~~ \$65,000 (50%)

Note: Phase I industry membership fees of \$40,000/Year per member supported a varying roster of investigators and projects. Member fee contributions range from \$200,000 to \$300,000 annually, but funding totals reported here *do not account for member-sponsored research tasks*.

- [6] **Proposal Title:** Planning Grant: I/UCRC Center for UAS Site Addition
Principal Investigator: K. Kochersberger and C. Woolsey (Lead)
Period of Performance: February 10, 2015 to February 29, 2016
Sponsor: National Science Foundation
Amount: \$10,000
Woolsey Component: \$5000 (50%)
- [7] **Proposal Title:** Motion Prediction & Control for Submarines in High Sea States: The Virginia Tech Component of an International Collaboration
Principal Investigator: L. McCue-Weil, E. Paterson, and C. Woolsey (Lead)
Period of Performance: June 1, 2014 to May 31, 2017
Sponsor: Office of Naval Research
Amount: \$590,229
Woolsey Component: \$200,668 (34%)
Note: Project coordinated with investigators at DSTO and Queensland University of Technology
- [8] **Proposal Title:** Hybrid UA/UV: Support for Barron Associates Paterson, and C. Woolsey (Lead)
Principal Investigator: E. Paterson, D. Stilwell, and C. Woolsey (Lead)
Period of Performance: July 1, 2016 to January 31, 2017
Sponsor: Barron Associates (Office of Naval Research SBIR Flow-through)
Amount: \$24,000
Woolsey Component: \$8,000 (34%)
- [9] **Proposal Title:** Bioloocomotion Analysis and Design Using Geometric Control and Averaging Methods
Principal Investigator: M. Hajj and C. Woolsey (Lead)
Period of Performance: September 1, 2014 to August 31, 2016
Sponsor: National Science Foundation
Amount: \$350,000
Woolsey Component: \$175,000 (50%)
- [10] **Proposal Title:** Underwater Gliders in Significant Currents
Principal Investigator: C. Woolsey
Period of Performance: December 26, 2012 to October 31, 2014
Sponsor: Office of Naval Research
Amount: \$194,975
- [11] **Proposal Title:** Ultra-Efficient Transport Aircraft
Principal Investigator: C. Woolsey
Period of Performance: August 10, 2012 to August 9, 2014
Sponsor: National Institute of Aerospace
Amount: \$71,837
Note: Project coordinated with Mr. M. D. Guynn (NASA Langley Research Center)
- [12] **Proposal Title:** Autonomous Systems Technology, Economics, & Policy Survey
Principal Investigator: T. Campbell, J. Greene, J. Shand, and C. Woolsey (Lead)
Period of Performance: October 1, 2013 to May 14, 2014
Sponsor: Virginia Department of Aviation
Amount: \$139,798
Woolsey Component: \$90,958 (65%)
- [13] **Proposal Title:** Additional Support for Impact/Sikorsky ASPEC Program
Principal Investigator: C. Woolsey
Period of Performance: January 1, 2013 to July 31, 2013
Sponsor: Sikorsky, formerly Impact Technologies (NUWC-Newport flowthrough)

Amount: \$56,657
Woolsey Component: \$19,263 (34%)

- [14] **Proposal Title:** Support for “A Propulsion-Enabled Control System for Precise Submarine Maneuvering”
Principal Investigators: W. Neu, D. Stilwell, and C. Woolsey (Lead)
Period of Performance: April 1, 2011 to January 30, 2013
Sponsor: Impact Technologies (NUWC-Newport flowthrough)
Amount: \$180,000
Woolsey Component: \$60,000 (33%)
- [15] **Proposal Title:** Efficient Motion Control for Undersea Gliders: Experimental Implementation and Assessment
Principal Investigator: C. Woolsey
Period of Performance: January 1, 2011 to December 31, 2012
Sponsor: Office of Naval Research
Amount: \$209,929
Note: Project coordinated with Dr. K. Morgansen (U. Washington)
- [16] **Proposal Title:** Marine and Hydrokinetic Technology: Support for THOR, LLC
Principal Investigators: C. Woolsey
Period of Performance: January 1, 2011 to December 31, 2011
Sponsor: Turner Hunt Ocean Renewable (DOE flowthrough)
Amount: \$60,213
- [17] **Proposal Title:** Efficient Motion Control for Undersea Gliders: Implementation and Assessment Using *Seaglider*
Principal Investigators: E. Cliff and C. Woolsey (Lead)
Period of Performance: September 1, 2009 to December 31, 2010
Sponsor: Office of Naval Research
Amount: \$55,039
Woolsey Component: \$27,520 (50%)
Note: Project coordinated with Dr. K. Morgansen (U. Washington)
- [18] **Proposal Title:** UAV Flying Qualities Criteria Development and Evaluation
Principal Investigators: W. Durham and C. Woolsey (Lead)
Period of Performance: July 1, 2008 to September 30, 2010
Sponsor: Naval Air Warfare Center (NAVAIR)
Amount: \$166,450
Woolsey Component: \$83,225 (50%)
- [19] **Proposal Title:** Evidence Based Approach to Improved Small UAV Reliability
Principal Investigators: J. Marchman and C. Woolsey (Lead)
Period of Performance: July 1, 2008 to December 10, 2009
Sponsor: Naval Air Warfare Center (NAVAIR)
Amount: \$134,673
Woolsey Component: \$67,337 (50%)
- [20] **Proposal Title:** Motion Planning for Underwater Gliders
Principal Investigators: E. Cliff and C. Woolsey (Lead)
Period of Performance: October 1, 2007 to September 30, 2009
Sponsor: Office of Naval Research
Amount: \$213,044
Woolsey Component: \$174,696 (82%)
- [21] **Proposal Title:** In-Flight Data Collection Using a N~ASK Transponder
Principal Investigators: C. Woolsey
Period of Performance: January 1, 2009 to August 15, 2009
Sponsor: N~ASK, Inc.
Amount: \$33,928

Woolsey Component: \$33,928 (100%)

- [22] **Proposal Title:** Internally actuated lateral-directional maneuvering for a blended wing-body underwater glider
Principal Investigators: C. Woolsey
Period of Performance: May 15, 2005 to December 31, 2007
Sponsor: Office of Naval Research
Amount: \$259,688
Woolsey Component: \$259,688 (100%)
- [23] **Proposal Title:** CAREER: Internal shape control for ocean and atmospheric vehicles (NSF Faculty Early Career Development Award)
Principal Investigators: C. Woolsey
Period of Performance: May 1, 2002 to April 30, 2007
Sponsor: National Science Foundation
Amount: \$381,000
Woolsey Component: \$381,000 (100%)
- [24] **Proposal Title:** Fleet applications of AUVs: A technology development roadmap
Principal Investigators: W. Neu, D. Stilwell, and C. Woolsey (Lead)
Period of Performance: May 15, 2006 to December 31, 2006
Sponsor: Office of Naval Research
Amount: \$27,694
Woolsey Component: \$9416 (34%)
- [25] **Proposal Title:** Heterogeneous teams of autonomous vehicles: Advanced sensing and control
Principal Investigators: D. Hong, N. Hovakimyan, M. Johnson, C. Reinholtz, D. Stilwell, A. Wicks, C. Woolsey (Lead), C. Wyatt
Period of Performance: July 1, 2005 to June 30, 2006
Sponsor: Office of Naval Research
Amount: \$1,050,000
Woolsey Component: \$180,712 (17%)
Note: Project coordinated with investigators at Naval Postgraduate School
- [26] **Proposal Title:** Collaborative Research: A two-stage towing system for swath-mapping ocean turbulence
Principal Investigator: C. Woolsey
Period of Performance: August 16, 2002 to August 15, 2005
Sponsor: National Science Foundation
Amount: \$217,936
Woolsey Component: \$217,936 (100%)
Note: Project coordinated with Dr. A. Gargett (Old Dominion U.)
- [27] **Proposal Title:** Real-time flow-field estimation for cooperative autonomous underwater vehicle mission planning (Supplement to YIP Award to support collaboration with a U.S. Navy laboratory.)
Principal Investigators: C. Woolsey
Period of Performance: June 1, 2004 to June 30, 2005
Sponsor: Office of Naval Research
Amount: \$50,000
Woolsey Component: \$50,000 (100%)
- [28] **Proposal Title:** Low velocity attitude control for underwater vehicles using internal actuators (ONR Young Investigator Program Award)
Principal Investigators:
Period of Performance: May 1, 2002 to April 30, 2005
Sponsor: Office of Naval Research
Amount: \$300,000
Woolsey Component: \$300,000 (100%)

[29] **Proposal Title:** A self-sustaining, boundary-layer-adapted system for terrain exploration and environmental sampling
Principal Investigators: G. Hagerman, C. Woolsey (Lead)
Period of Performance: October 1, 2004 to March 31, 2005
Sponsor: NASA Institute for Advanced Concepts
Amount: \$69,513
Woolsey Component: \$47,424 (66%)

Projects directed by collaborators (reverse chronological order by end date)

[30] **Proposal Title:** Advanced towing carriage and instrumentation for the study of small vessels in waves
Principal Investigator: C. Gilbert (PI) and C. Woolsey
Period of Performance: June 15, 20168 to June 14, 2019
Sponsor: Office of Naval Research
Amount: \$620,057
Woolsey Component: \$310,028 (50%)

[31] **Proposal Title:** Hazards SEES: Uncovering the hidden skeleton of environmental flows: Advanced Lagrangian methods for hazards prediction, mitigation and response*
Principal Investigator: S. Ross (Sub-Award PI), D. Schmale, III (Key Person), and C. Woolsey (Key Person)
Period of Performance: September 1, 2015 to August 31, 2019
Sponsor: National Science Foundation
Amount: \$514,192
Woolsey Component: \$128,117 (25%)
*Note: Virginia Tech component of \$3M award to Thomas Peacock (PI) and Co-PI's Pierre Lermusiaux, Shane Ross, Irina Rypina, and Shawn Shadden

[32] **Proposal Title:** Virginia Tech Airworthiness Center
Principal Investigators: R. Canfield (PI) M. Farhood, K. Lowe, L. McCue, C. Sultan, and C. Woolsey
Period of Performance: January 15, 2015 to June 2, 2016
Sponsor: NAVAIR
Amount: \$519,950
Woolsey Component: \$83,192 (16%)

[33] **Proposal Title:** UAS in the NAS
Principal Investigators: R. Mooney (PI) and C. Woolsey
Period of Performance: January 15, 2015 to December 31, 2015
Sponsor: Northrop Grumman – Information Systems
Amount: \$95,000
Woolsey Component: \$47,500 (50%)

[34] **Proposal Title:** THOR: Tactical Hazardous Operations Robot (Phase 1)
Principal Investigators: D. Hong and C. Woolsey
Period of Performance: October 1, 2012 to December 21, 2013
Sponsor: DARPA
Amount: \$2,999,968
Woolsey Component: \$60,000 (2%)

[35] **Proposal Title:** AFRL-VT Collaborative Center On Multidisciplinary Analysis And Design Of Future Aerospace Vehicles
Principal Investigators: R. Batra, R. Canfield, M. Hajj, R. Kapania (Lead), W. Mason, M. Patil, D. Tafti, L. Watson, and C. Woolsey
Period of Performance: December 22, 2008 to December 21, 2013
Sponsor: Air Force Research Laboratory, WPAFB
Amount: \$1,595,028
Woolsey Component: \$79,751 (5%)

[36] **Proposal Title:** Exploration of Under-ice Regions with Ocean Profiling Agents (EUROPA)

Principal Investigators: L. McCue (Lead) and C. Woolsey
Period of Performance: August 15, 2012 to August 14, 2013
Sponsor: National Institute for Aerospace (NIAC flowthrough)
Amount: \$53,977
Woolsey Component: \$21,590 (40%)
Note: Project coordinated with investigators at Naval Postgraduate School

[37] **Proposal Title:** Sensing and Autonomy for Riverine Vessels
Principal Investigators: D. Stilwell (Lead) and C. Woolsey
Period of Performance: January 1, 2012 to September 30, 2012
Sponsor: Office of Naval Research
Amount: \$119,493
Woolsey Component: \$29,873 (25%)
Note: Project coordinated with investigators at Naval Postgraduate School

[38] **Proposal Title:** Sensing and Autonomy for Riverine Vessels
Principal Investigators: M. Patil (Lead) and C. Woolsey
Period of Performance: June 1, 2011 to December 31, 2011
Sponsor: Office of Naval Research
Amount: \$60,000
Woolsey Component: \$27,000 (45%)

[39] **Proposal Title:** A Hardware Testbed for Distributed Learning, Estimation and Approximation Theory with Sensor Vehicle Networks
Principal Investigators: A. Kurdila (Lead), A. Leonessa, D. Stilwell, C. Woolsey
Period of Performance: June 15, 2010 to June 14, 2011
Sponsor: Army Research Office
Amount: \$441,970
Woolsey Component: \$110,493 (25%)

[40] **Proposal Title:** Enhanced Riverine Drifter
Principal Investigators: P. Diplas, D. Stilwell (Lead), and C. Woolsey
Period of Performance: July 1, 2010 to April 30, 2011
Sponsor: Barron Associates (ONR flowthrough)
Amount: \$49,966
Woolsey Component: \$16,655 (25%)

[41] **Proposal Title:** Autonomous USV Navigation in Riverine Environments
Principal Investigators: D. Stilwell (Lead) and C. Woolsey
Period of Performance: September 1, 2009 to December 31, 2010
Sponsor: Office of Naval Research
Amount: \$259,969
Woolsey Component: \$129,985 (50%)
Note: Project coordinated with investigators at Naval Postgraduate School

[42] **Proposal Title:** Experimental Scale Underwater Glider
Principal Investigators: L. McCue-Weil (Lead) and C. Woolsey
Period of Performance: May 6, 2010 to September 30, 2010
Sponsor: University of Michigan (Naval Engineering Education Consortium)
Amount: \$69,348
Woolsey Component: \$34,674 (50%)

[43] **Proposal Title:** USV Autonomy in Riverine Environments
Principal Investigators: D. Stilwell (Lead) and C. Woolsey
Period of Performance: May 1, 2008 to December 31, 2009
Sponsor: Office of Naval Research
Amount: \$381,757
Woolsey Component: \$190,879 (50%)

Note: Project coordinated with investigators at Naval Postgraduate School

[44] **Proposal Title:** Design and Prototype Development of a Flight Vehicle for Large Event Surveillance

Principal Investigators: J. Marchman (Lead) and C. Woolsey

Period of Performance: August 1, 2007 to October 31, 2009

Sponsor: Virginia Space Grant Consortium (flow-through from NAVAIR)

Amount: \$143,533

Woolsey Component: \$71,767 (50%)

[45] **Proposal Title:** Coordinated sensing and control for surveillance and tracking by heterogeneous autonomous vehicle teams.

Principal Investigators: N. Hovakimyan, A. Kurdila, M. Roan, C. Reinholtz, D. Stilwell (Lead), A. Wicks, C. Woolsey, C. Wyatt

Period of Performance: October 1, 2006 to September 30, 2007

Sponsor: Office of Naval Research

Amount: \$1,417,500

Woolsey Component: \$226,000 (16%)

Note: Project coordinated with investigators at Naval Postgraduate School

[46] **Proposal Title:** Adaptive sampling in dynamic environments using AUVs

Principal Investigators: D. Stilwell (Lead), C. Woolsey

Period of Performance: May 30, 2005 to May 29, 2006

Sponsor: Office of Naval Research

Amount: \$479,750

Woolsey Component: \$86,969 (18%)

Note: Project coordinated with investigators at Tulane University

Courses Taught:³

AOE 3034: System Dynamics and Control

AOE 3104: Aircraft Performance

AOE 3134: Air Vehicle Dynamics

AOE 3234: Ocean Vehicle Dynamics

AOE 4004: State-Space Control

AOE 4984: Navigation and Guidance

AOE 4984 / SPIA 5984: Ethics and Autonomous Systems (Co-taught with Prof. Sara Jordan)

AOE 5774/ECE 5774/ME 5574: Nonlinear Systems Theory

AOE 6744: Linear Control Theory

AOE 5984 (Special Topics): Real-time Control (Co-taught with Prof. Chris Hall)

AOE 6984 (Special Topics): Geometric Control Theory (Co-taught with Prof. Andy Kurdila)

AOE 6984 (Special Topics): System Identification

Advising:

Post-Doctoral Scholars

Complete:

Dr. Hye-Young Kim

Co-advised with Dr. C. Hall

Dr. C. Konda Reddy

Co-advised with Dr. N. Hovakimyan

Dr. Lili Ma

Co-advised with Dr. N. Hovakimyan

Dr. Sevak Tahmasian

Graduate Research Assistants (Ph.D. Candidates)

Complete:

David Allen (Ph.D. A.E., 2016)

Sole Advisor

Brad Atkins (Ph.D. A.E., 2014)

Sole Advisor

Tom Battista (Ph.D. A.E., 2018)

Primary Advisor (with Dr. F. Valentinis)

³ The teaching requirement in the Crofton Department is three courses per year.

Jacob Bean (PhD. A.E., 2018)
Chris Cotting (Ph.D. A.E., 2010)
Amanda Young Dippold (Ph.D. A.E., 2009)
Robert Kraus (Ph.D. A.E., 2010)
Nina Mahmoudian (Ph.D. A.E., 2009)
Chevva Konda Reddy (Ph.D. E.S.M., 2005)
Andrew Rogers (Ph.D. A.E., 2016)
Christian Sonnenburg (Ph.D. A.E., 2012)
Sevak Tahmasian (Ph.D. E.S.M., May 2015)
Laszlo Techy (Ph.D. A.E., 2009)
Artur Wolek (Ph.D. A.E., May 2015)

Secondary Advisor (with Dr. C. Fuller)
Primary Advisor (with Dr. W. Durham)
Secondary Advisor (with Dr. N. Hovakimyan)
Primary Advisor (with Dr. E. Cliff)
Sole Advisor
Primary Advisor (with Dr. A. Nayfeh)
Primary Advisor (with Dr. R. McGwier)
Primary Advisor (with Dr. D. Stilwell)
Sole Advisor
Primary Advisor (with Dr. D. Schmale, III)
Sole Advisor

Current:

Ying-Chun Chen (Ph.D. A.E. expected 2022)
Jean-Michel Fahmi (Ph.D. A.E. expected 2019)
Changkoo Kang (Ph.D. A.E., expected 2020)
Javier González-Rocha (Ph.D. A.E. expected 2019)
Seyong Jung (Ph.D. A.E. expected 2019)
Hunter McClelland (Ph.D. A.E. expected 2019)
Nazmus Sakib (Ph.D. A.E. expected 2022)

Sole Advisor
Primary Advisor (with Dr. M. Farhood)
Sole Advisor
Primary Advisor (with Dr. C. Sultan)
Secondary Advisor (with Dr. S. Brizzolara)
Sole Advisor
Sole Advisor

Graduate Research Assistants (M.S. Candidates, Thesis Option)

Complete:

David Allen (M.S. A.E., 2014)
Kevin Antcliff (M.S. A.E., 2014)
Meghan Burns (M.S. A.E., 2018)
Jeffrey Garnand-Royo (M.S. A.E., 2013)
Jesse Geisbert (M.S. O.E., 2007)
Tejaswi Gode (M.S. E.E., 2015)
Chang Koo Kang (M.S. A.E., 2017)
Chris Kevorkian (M.S. A.E., 2016)
Amy Linklater (M.S. A.E., 2005)
Michael Morrow (M.S. A.E., 2005)
Justin Murtha (M.S. A.E., 2009)
Chris Nickell (M.S. A.E., 2005)
Mark Palframan (M.S. A.E., 2013)
Eric Schuch (M.S. A.E., 2004)
Chris Schultz (M.S. A.E., 2006)
Poorva Shukla (M.S. E.S.M., 2017)
Ben Simmons (M.S. A.E., 2018)

Primary Advisor (with Dr. L. McCue-Weil)
Secondary Advisor (with Mr. Mark Guynn)
Sole Advisor
Secondary Advisor (with Dr. R. Canfield)
Sole Advisor
Sole Advisor
Primary Advisor (with Dr. S. Choi)
Sole Advisor
Sole Advisor
Sole Advisor
Sole Advisor
Sole Advisor
Sole Advisor
Sole Advisor
Sole Advisor
Sole Advisor
Sole Advisor
Primary Advisor (with Dr. D. Schmale)
Sole Advisor
Sole Advisor
Sole Advisor
Sole Advisor

Current:

Mekonen Halefom (M.S. A.E., expected 2019)
Brady Reisch (M.S. A.E., expected 2019)
Adam Zelenka (M.S. A.E., expected 2019)

Sole Advisor
Sole Advisor
Sole Advisor