Craig A. Woolsey

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Contact Information:

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Research Interests:

Dr. Woolsey's primary research interest is nonlinear control of mechanical systems, particularly energy-based control methods, and applications to ocean and atmospheric vehicles. Woolsey directs the Nonlinear Systems Lab (www.nsl.aoe.vt.edu), with co-directors Dr. Mazen Farhood and Dr. Cornel Sultan. Woolsey is also co-director, together with Dr. Ella Atkins and Dr. Kevin Kochersberger (Director), of the Virginia Tech site in the Center for Autonomous Air Mobility and Sensing (caams.center), an NSF Industry/University Cooperative Research Center.

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:

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 Employment 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

Professional & University Service:

Associate Editor, *AIAA J. Guidance, Control, and Dynamics* (2023 – present)
AIAA Atmospheric Flight Mechanics TC Member (2017 – present; **Vice-chair**, 2021 – 2023; **Chair**, 2023 – 2025)
IFAC TC 7.2: Marine Systems (2017 – present)
IEEE CSS TC on Manufacturing Automation and Robotic Control (2017 – present)
AUVSI Ridge & Valley Chapter (Member, 2016 – ; Sec., 2016 – 2018; **Pres.**, 2019 – 2021; Treas.., 2022 – 2024)
VT AOE Faculty Advisory Committee (2025 – present)
VT AOE Honorifics Committee (2024 – present)
VT University Promotion & Tenure Committee, College of Engineering Representative (2016 – 2019)
VT AOE Promotion & Tenure Committee (2014 – 2023; **Chair**, 2022 – 2023)
VT AOE Diversity, Equity, & Inclusion Committee (2022 – 2023; **Co-Chair**, 2022 – 2023)
VT AOE Undergraduate Curriculum Committee (2012 – 2022)
VT AOE Dynamics, Control, & Estimation Group (2006 – present; **Chair**, 2006 – 2022)
Director, Virginia Center for Autonomous Systems (2006 – 2014)
VT AOE Assistant Department Head for Graduate Studies (2008 – 2014)
VT AOE Graduate Committee (Member, 2006 – 2019; **Chair**, 2007 – 2014)
Faculty Advisor, VT 3D Printed Aircraft Competition (3DPAC) Team (2020 – present)
Faculty Advisor, VT AUVSI Student Chapter (2018 – 2024)
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, 2007 – present)
Conference Organizing Service:
- International Program Committee Chair: *16th IFAC Conf. Control Appl. in Marine Systems, Robotics and Vehicles*: *CAMS 2025*
- National Organizing Committee Chair (**General Chair**): *15th IFAC Conf. Control Appl. in Marine Systems, Robotics and Vehicles*: *CAMS 2024* (80+ papers; 110 participants; first US meeting of IFAC CAMS)
- Organizing Committee: *AUVSI Ridge & Valley Chapter Fall Symposium* (Annually, 2016 – present)
- Organizing Committee: *18th Int'l. Symposium on Mathematical Theory of Networks & Systems: MTNS 2008*

Conference Editorial Service:
- *14th IFAC Conf. Control Appl. in Marine Systems, Robotics and Vehicles*: *CAMS 2022* (Lyngby, Denmark, 2022)
- *American Control Conference: ACC* (2006-2009, 2013-14, 2021, 2023)
- *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, 2022): *AIAA J. Guidance, Control, & Dynamics*
- Excellence in Review (2012): *IEEE J. Oceanic Engineering*

Honors & Awards:

Virginia Tech College of Engineering Dean's Award for Excellence in Service (2025)
AIAA SciTech Forum Atmospheric Flight Mechanics Best Student Paper Award (Gahan et al, 2023)
AIAA SciTech Forum Atmospheric Flight Mechanics Best Student Paper Award (Hopwood et al, 2022)
AIAA SciTech Forum Atmospheric Flight Mechanics Best Paper Award (McClelland & Woolsey, 2019)
AIAA SciTech Forum Atmospheric Flight Mechanics Best Paper Award (Oullette, Patil, & Woolsey, 2014)
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)
NDS&E (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] "Symmetry-preserving reduced-order wind observers with flight test results," J. W. Hopwood*, B. M. Simmons, and C. A. Woolsey [In review.]
[2] "Generic nonlinear flight dynamic modeling for multirotor aircraft," J. W. Hopwood*, B. M. Simmons, C. A. Woolsey, and J. K. Cooper [In review.]
[3] "Wind estimate uncertainty quantification and sensitivity analysis using generalized polynomial chaos," K. C. Gahan*, J. Hopwood*, and C. A. Woolsey [In review.]
[4] "Adaptive control with magnitude and rate limited observer-based disturbance rejection," Y.-C. Chen and C. A. Woolsey. *Systems and Control Letters* [To appear.]
[5] "Depth dependent added mass computations using impulse motion simulations for shallowly submerged vehicles - Part 1: Accelerating from rest", W. Lambert*, S. Brizzolara, and C. A. Woolsey. *Applied Ocean Research* [To appear.]

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

[6] “Depth dependent added mass computations using impulse motion simulations for shallowly submerged vehicles - Part 2: Accelerating from steady forward velocity”, W. Lambert*, S. Brizzolara, and C. A. Woolsey. *Applied Ocean Research* [To appear.]

[7] “An invariant extended Kalman filter for wind estimation using a small, fixed-wing uncrewed aerial vehicle,” Z. Ahmed* and C. A. Woolsey. *IEEE Trans. Control Systems Technology* [10.1109/TCST.2025.3564884]

[8] “Performance analysis of three predictors for mitigating input and output time delays,” N. Sakib*, Z. Ahmed*, C. A. Woolsey. *AIAA. J. Aerospace Information Systems.* **22**(2), pp. 59-72, February 2025 [10.2514/1.I011466]

[9] “Model-based wind estimation using an $H\infty$ filter with fixed-wing aircraft flight test results,” K. C. Gahan*, J. Hopwood, and C. A. Woolsey. *AIAA J. Guidance, Control, and Dynamics* [10.2514/1.G007735]

[10] "Evaluation of Doppler wind Lidar for advanced air mobility," A. Medina, Z. Mitchell, T. Willhite, J. W. Hopwood*, C. Pande, S. F. J. De Wekker,, C. A. Woolsey, K. Renshaw, G. Koch. *SPIE Journal of Applied Remote Sensing*. **19**(1), January 2025. [10.1117/1.JRS.19.014509]

[11] “Tutorial review of indirect wind estimation methods using small uncrewed air vehicles,” Z. Ahmed*, M. Halefom*, and C. A. Woolsey. *AIAA. J. Aerospace Information Systems*. **21**(8), pp. 667-683, August 2024. [10.2514/1.I011345]

[12] “Unsteady aerodynamics in model-based wind estimation from small, fixed-wing aircraft motion,” M. Halefom*, J. Hopwood*, and C. A. Woolsey. *AIAA J. Guidance, Control, and Dynamics*. **47**(8), pp. 1556-1568, August 2024 [10.2514/1.G007836]

[13] “A structure-inspired disturbance observer for finite-dimensional mechanical systems,” Y.-C. Chen* and C. A. Woolsey. *IEEE Trans. Control Systems Tech.* **32**(2), pp. 440-455, March 2024 [10.1109/TCST.2023.3327510]

[14] “Spin aerodynamic modeling for a fixed-wing aircraft using flight data,” J. L. Gresham*, B. M. Simmons*, J. W. Hopwood*, and C. A. Woolsey. *AIAA J. Aircraft* **61**(1), pp. 128-139, January 2024 [10.2514/1.C036835]

[15] “Virginia Tech advanced towing carriage,” C. Gilbert, M. Javaherian, C. Woolsey, and M. Shepheard, *Part M: Journal of Engineering for the Maritime Environment* **237**(4), pp. 867-877, November 2023 [10.1177/14750902231166958]

[16] “A study of the wind sensing performance of pusher and puller hexacopter small unmanned aircraft,” J. González -Rocha*, P. Sharma, E. Atkins, and C. A. Woolsey. *AIAA J. Aircraft* **60**(5), pp. 1712-1720, September–October 2023. [10.2514/1.C036792]

[17] “Flight-test system identification techniques and applications for small, low-cost, fixed-wing aircraft,” B. M. Simmons*, J. L. Gresham*, and C. A. Woolsey, *AIAA J. Aircraft* **60**(5), pp. 1503-1521, September–October 2023 [10.2514/1.C037260]

[18] "A free surface corrected lumped parameter model for near-surface horizontal maneuvers of underwater vehicles in waves," W. Lambert*, L. Miller, S. Brizzolara, and C. A. Woolsey, *Ocean Engineering* **278,** June 2023 [10.1016/j.oceaneng.2023.114364]

[19] “Experimental validation of port-Hamiltonian based control of fixed wing unmanned aircraft,” J.-M. Fahmi*, J. Gresham*, and C. A. Woolsey. *AIAA J. Guidance, Control, and Dynamics* **46**(6), pp. 1169-1175, June 2023 [10.2514/1.G007018]

[20] "Nonlinear dynamic modeling for aircraft with unknown mass properties using flight data," B. M. Simmons*, J. L. Gresham*, and C. A. Woolsey. *AIAA J. Aircraft* **60**(3), pp. 968-980, May-June 2023 [10.2514/1.C037259]

[21] "Remote uncorrelated pilot input excitation assessment for unmanned aircraft aerodynamic modeling," J. L. Gresham*, B. M. Simmons*, J.-M. W. Fahmi*, J. W. Hopwood*, and C. A. Woolsey. *AIAA J. Aircraft* **60**(3), pp. 955-967, May–June 2023 [10.2514/1.C036942]

[22] “The effect of a linear free surface boundary condition on the steady-state wave-making of shallowly submerged underwater vehicles,” W. Lambert*, S. Brizzolara, and C. A. Woolsey, *J. Marine Science and Engineering* May 2023. [10.3390/jmse11050981]

[23] “Robust stall spin flight path control with flight test validation,” J. Hopwood*, J. Gresham*, and C. A. Woolsey. *AIAA J. Guidance, Control, and Dynamics* **46**(3), pp. 553-559, March 2023 [10.2514/1.G007016]

[24] “Time delay mitigation in aerial telerobotic operations using heterogeneous stereo vision systems,” N. Sakib*, K. C. Gahan*, and C. A. Woolsey *AIAA. J. Aerospace Information Systems* **20**(9), pp. 526-545, 2023. [10.2514/1.I011204]

[25] “A maneuvering model for an underwater vehicle near a free surface—Part III: Simulation and control under waves,” F. Valentinis, T. Battista*, and C. A. Woolsey. *IEEE J. Oceanic Engineering,* **48**(3), pp. 752-777, 2023. [10.1109/JOE.2023.3234811]

[26] “A maneuvering model for an underwater vehicle near a free surface - Part II: Incorporation of the free surface memory,” T. Battista*, F. Valentinis, and C. A. Woolsey. *IEEE J. Oceanic Engineering,* **48**(3), pp. 740-751, 2023. [10.1109/JOE.2022.3229919]

[27] “Aero-propulsive modeling for propeller aircraft using flight data," B. Simmons*, J. Gresham*, and C. A. Woolsey. *AIAA J. Aircraft* **60**(1), pp. 81-96, 2023. [10.2514/1.C036773]

[28] “Bridge inspection component registration for damage evolution,” E. Bianchi, N. Sakib*, M. Hebdon, and C. A. Woolsey. *Structural Health Monitoring*. **22**(1), pp. 472-495, January 2023. [10.1177/14759217221083647]

[29] “Performance assessment of energy-preserving, adaptive time-step variational integrators,” H. Sharma, J. Borggaard, M. Patil, and C. A. Woolsey. *Comm. Nonlinear Science and Numerical Simulation* . **114**, November 2022 [10.1016/j.cnsns.2022.106646]

[30] “Lift enhancement by a flapped trailing edge at low Reynolds number: A frequency response approach,” H. Shehata*, M. Y. Zakaria, M. Hajj, and C. A. Woolsey. *J. Fluids and Structures*. **110**, April 2022. [10.1016/j.jfluidstructs.2022.103518]

[31] “On closed-loop vibrational control of underactuated mechanical systems,” S. Tahmasian and C. A. Woolsey. *Nonlinear Dynamics*. **108**, pp. 329–347, January 2022. [10.1007/s11071-022-07214-y]

[32] “Port-Hamiltonian flight control of a fixed-wing aircraft,” J.-M. Fahmi* and C. A. Woolsey. *IEEE Trans. Control Systems Technology* **30**(1), pp. 408-415, January 2022. [10.1109/TCST.2021.3059928]

[33] “Parameter computation for a Lagrangian mechanical system model of a submerged vessel moving near a free surface,” S. Jung*, S. Brizzolara, and C. A. Woolsey. *Ocean Engineering*, **230**, June 2021. [10.1016/j.oceaneng.2021.108988]

[34] “Scheduled imaging of multiple threat aircraft using a modified traveling salesman problem,” C. Kang* and C. A. Woolsey *AIAA. J. Aerospace Information Systems*, **18**(7), pp. 476-486, 2021 [10.2514/1.I010871]

[35] “Development of a peripheral-central vision system for small UAS tracking,” C. Kang*, H. Chaudhry, C. A. Woolsey, and K. Kochersberger. *AIAA. J. Aerospace Information Systems*, **18**(9), pp. 645-658, 2021. [10.2514/1.I010909]

[36] “An approach for computing parameters for a Lagrangian nonlinear maneuvering and seakeeping model of submerged vessel motion,” S. Jung*, S. Brizzolara, and C. A. Woolsey. *IEEE J. Oceanic Engineering*, **46**(3), pp. 749 – 764, March 2021. [10.1109/JOE.2021.3052657]

[37] “Model-based path prediction for fixed-wing unmanned aircraft using pose estimates,” C. Kang* and C. A. Woolsey. *Aerospace Science and Technology* 105, October 2020, 106030 [10.1016/j.ast.2020.106030]

[38] “A review of structure-preserving numerical methods for engineering applications,” H. Sharma*, M. Patil, and C. A. Woolsey. *Computer Methods in Applied Mechanics and Engineering* **366**, July 2020, 113067 [10.1016/j.cma.2020.113067]

[39] “Effects of two modeling assumptions on wind reconstruction from longitudinal aircraft motion,” H. McClelland* and C. A. Woolsey *AIAA J. Guidance, Control, and Dynamics* **43**(6), pp. 1069-1081, June 2020 [10.2514/1.G004224]

[40] “Wind profiling in the lower atmosphere from wind-induced perturbations to multirotor UAS,” J. González-Rocha*, S. F. J. De Wekker, S. D. Ross, and C. A. Woolsey *Sensors*, 2020. [10.3390/s20051341]

[41] “A maneuvering model for an underwater vehicle near a free surface - Part I: Motion without memory effects,” T. Battista*, F. Valentinis, and C. Woolsey. *IEEE J. Oceanic Engineering* **45**(1), pp. 212-226, January 2020. [10.1109/JOE.2018.2871650]

[42] “Nonlinear model identification methodology for small, fixed-wing, unmanned aircraft,” B. Simmons*, H. G. McClelland*, and C. A. Woolsey. *AIAA J. Aircraft* **56**(3), pp. 1056-1067, May-June 2019. [10.2514/1.C035160]

[43] "A method for detecting atmospheric Lagrangian coherent structures using a single fixed wing unmanned aircraft system,” P. Nolan, H. G. McClelland*, C. A. Woolsey, S. D. Ross, *Sensors*, 2019. [10.3390/s19071607]

[44] “Sensing wind from quadrotor motion,” J. González-Rocha*, C. A. Woolsey, C. Sultan, and S. F. J. De Wekker. *AIAA J. Guidance, Control, and Dynamics* **42**(4), pp. 836-852, April 2019. [10.2514/1.G003542]

[45] “Nonlinear control of a subscale submarine in emergency ascent,” F. Valentinis and C. A. Woolsey. *Ocean Engineering* **171**, pp. 646-662, January 2019. [10.1016/j.oceaneng.2018.11.029]

[46] “Workspace modeling and path planning for truss structure inspection by small UAS,” A. Das* and C. A. Woolsey. *AIAA J. Aerospace Information Systems* **16**(1), pp. 37-51, January 2019. [10.2514/1.I010634]

[47] "Energy-preserving variational integrators for forced Lagrangian systems," H. Sharma*, M. Patil, and C. A. Woolsey. *Communications in Nonlinear Science and Numerical Simulation* **64**, pp. 159-177, November 2018. [10.1016/j.cnsns.2018.04.015]

[48] "On averaging and input optimization of high-frequency mechanical control systems," S. Tahmasian*, D. W. Allen*, and C. A. Woolsey. *J. Vibration and Control* **24**(5), pp. 937-955, May 2018. [10.1177/1077546316655706]

[49] "Flight control of biomimetic air vehicles using vibrational control and averaging," S. Tahmasian* and C. A. Woolsey. *J. Nonlinear Science* **27**(4), pp. 1193–1214, August 2017. [10.1007/s00332-016-9334-5]

[50] "A comparison of three approaches to atmospheric source localization," H. M. Abdelghaffar, C. A. Woolsey, and H. A. Rakha, *AIAA J. Aerospace Information Systems*, 14(1), pp. 40-52, January 2017. [10.2514/1.I010440]

[51] "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.

[52] "Time-optimal path planning for a kinematic car with variable speed," A. Wolek*, E. M. Cliff, and C. A. Woolsey. *AIAA J. Guidance, Control, and Dynamics* **39**(10), pp. 2374-2390, 2016. [10.2514/1.G001317]

[53] "Fuel/time optimal relative trajectories for a satellite near a perturbed, elliptical orbit," A. Rogers*, C. A. Woolsey, J. Black, and R. McGwier. *AIAA J. Spacecraft and Rockets* **53**(5), pp. 811-821, 2016. [10.2514/1.A33365]

[54] "Energy-optimal paths for a glider with speed and load factor controls," A. Wolek*, E. M. Cliff, and C. A. Woolsey. *AIAA J. Guidance, Control, and Dynamics* **39**(2), pp. 397-408, February 2016. [10.2514/1.G001345]

[55] "Geometric control approach to longitudinal stability of flapping flight," H. Taha, C. A. Woolsey, and M. Hajj. *AIAA J. Guidance, Control, and Dynamics* **39**(2), pp. 214-226, February 2016. [10.2514/1.G001345]

[56] "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. *J. the British Interplanetary Society* **68**, pp. 251-264, August 2015.

[57] "Geometric control of a flapping plate," H. E. Taha and C.A. Woolsey. *J. Vibration and Control* **21**(11):2124–2133, August 2015. [10.1177/1077546313506924]

[58] "A control design method for underactuated mechanical systems using high frequency inputs," S. Tahmasian* and C. A. Woolsey. *ASME J. Dynamic Systems, Measurement, and Control* **137**(7), July 2015. [10.1115/1.4029627]

[59] "Feasible Dubins paths in the presence of unknown, unsteady velocity disturbances," A. Wolek* and C. A. Woolsey. *AIAA J. Guidance, Control, and Dynamics* **38**(4), pp. 782-786, April 2015. [10.2514/1.G000629]

[60] "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.) [10.1088/1748-3190/10/1/016002]

[61] "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. [10.1139/juvs-2013-0019]

[62] "Dynamics of underwater gliders in currents," S. Fan* and C. A. Woolsey. *Ocean Engineering* **84**, pp. 249–258, July 2014. [10.1016/j.oceaneng.2014.03.024]

[63] "Stabilization of flapping-wing micro-air vehicles in gust environments," M. Bhatia, M. Patil, C. A. Woolsey, B. Stanford and P. Beran. *AIAA J. Guidance, Control, and Dynamics* **37**(2):592-607, March 2014. [10.2514/1.59875]

[64] "An efficient motion control system for underwater gliders," N. Mahmoudian* and C. Woolsey. *Nonlinear Engineering: Modeling and Application*. Vol. 2, pp. 63-77, 2013. [10.1515/nleng-2012-0011]

[65] "Elements of underwater glider performance and stability," S. Fan* and C. Woolsey. *Marine Technology Society Journal*, **47**(3), pp. 81-98, May/June 2013. [10.1515/nleng-2012-0011]

[66] "Modeling, identification, and control of an unmanned surface vehicle," C. Sonnenburg* and C. A. Woolsey. *J. Field Robotics,* **30**(3), pp. 371-398, May/June 2013. [10.1002/rob.21452]

[67] "Vehicle motion in currents," P. Thomasson and C. A. Woolsey. *IEEE J. Oceanic Engineering,* **38**(2), pp. 226-242, April 2013. [10.1109/JOE.2013.2238054]

[68] "Unmanned aerial vehicle coordination on closed convex paths in wind" L. Techy*, D. Paley, and C. A. Woolsey. *AIAA J. Guidance, Control, and Dynamics*, **33**(6), pp. 1946-1951, November-December 2010. [10.2514/1.47655]

[69] "Backstepping for synchronization of nonlinear dynamical systems," K. Listmann, J. Adamy, and C. A. Woolsey. *Automatisierungstechnik*, pp. 425-434, August 2010.

[70] "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. *J. Field Robotics* **27**(3), pp. 335–343, May/June 2010. [10.1002/rob.20335]

[71] "Fast estimation for range identification in the presence of unknown motion parameters," L. Ma*, C. Cao, N. Hovakimyan, C. Woolsey, and W. Dixon. *IMA J. Applied Mathematics*, **75**(2), pp. 165-189, February 2010. [10.1093/imamat/hxq008]

[72] "Approximate analytical turning conditions for underwater gliders and implications for path planning," N. Mahmoudian*, J. Geisbert*, and C. Woolsey. *IEEE J. Oceanic Engineering* **35**(1), pp. 131-143, January 2010. [10.1109/JOE.2009.2039655]

[73] "Minimum-time path planning for unmanned aerial vehicles in steady uniform winds," L. Techy* and C. A. Woolsey. *AIAA J. Guidance, Control, and Dynamics,* **32**(6), pp. 1736-1746, November-December 2009. [10.2514/1.44580]

[74] "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. [10.1016/j.oceaneng.2008.07.010]

[75] "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. [10.1016/j.oceaneng.2008.10.002]

[76] "Global directional control of a slender AUV," H.-Y. Kim* and C. A. Woolsey. *AIAA J. Guidance, Control, and Dynamics* **30**(1), pp. 255-259, January-February 2007. [10.1016/j.oceaneng.2008.07.010]

[77] "Exploring Titan with autonomous, buoyancy-driven gliders," M. Morrow*, C. A. Woolsey, and G. Hagerman. *J. the British Interplanetary Society* **59**(1), pp. 27-34, January 2006.

[78] "Backstepping control of an SMA-actuated robotic arm," M. H. Elahinia, J. Koo, M. Ahmadian, and C. A. Woolsey. *J. Vibration and Control* **11**(3), pp. 407-429, March 2005. [10.1177/1077546305051201]

[79] "Reduced Hamiltonian dynamics for a rigid body/mass particle system," C. Woolsey. *AIAA J. Guidance, Control, and Dynamics* **28**(1), pp. 131-138, January-February 2005. [10.2514/1.5409]

[80] "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 J. Control (Special Issue on Lagrangian and Hamiltonian Methods for Nonlinear Control)* **10**(5), pp. 478-496, Dec. 2004. [10.3166/ejc.10.478-496]

[81] "Stabilizing underwater vehicle motion using internal rotors," C. Woolsey and N. E. Leonard. *Automatica*, **38**(12), pp. 2053-2062, December 2002. [10.1016/S0005-1098(02)00136-X]

[82] "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. [10.1051/cocv:2002045]

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[97] "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.

[98] "Directional stabilization of a fixed-wing aircraft using potential shaping," J.-M. Fahmi* and C. A. Woolsey, *Proc. AIAA AVIATION*, Atlanta, GA, June 2018. [10.2514/6.2018-3620]

[99] "Active flight path control for an induced spin flight termination system," P. Shukla* and C. A. Woolsey, *AIAA SciTech*, Orlando, FL, January 2018. [10.2514/6.2018-0528]

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[105] "Assessing system safety for an urban, tethered UAS," L. E. Hale, C. Denham, R. Mooney, C. A. Woolsey, J. T. Luxhoj, & C. E. Mancini, *AIAA AVIATION*, Washington, DC, June 2016. [10.2514/6.2016-3595]

[106] "Control of an underwater vehicle in irregular waves," T. Battista*, C. A. Woolsey, L. McCue-Weil, and E. Paterson. *Proc. MTS/IEEE OCEANS 2015*, Washington, DC, October 2015. [10.23919/OCEANS.2015.7401967]

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[109] "A geometric control approach for the longitudinal flight stability of hovering insects/FWMAVs," H. Taha, C. A. Woolsey, and M. Hajj, *SciTech 2015*, Orlando FL, January 2015. [10.2514/6.2015-1552]

[110] "Source localization for a turbulent plume model using Bayesian occupancy grid mapping," H. Abdelghaffar, C. A. Woolsey, and H. A. Ali, *SciTech 2015*, Orlando FL, January 2015. [10.2514/6.2015-1071]

[111] "UAV source localization with high latency sensors in turbulent environments," M. Palframan* and C. A. Woolsey , *SciTech 2014*, National Harbor, MD, January 2014. [10.2514/6.2014-0605]

[112] "Longitudinal flight control of flapping wing micro air vehicles," S. Tahmasian*, C. A. Woolsey, and H. Taha, *SciTech 2014*, National Harbor, MD, January 2014. [10.2514/6.2014-1470]

[113] "Flight testing of a subscale aeroservoelastic aircraft ," J. Oullette, M. Patil, and C. A. Woolsey , *SciTech 2014*, National Harbor, MD, January 2014. [10.2514/6.2014-0032] **Award:** 2014 AIAA Atmospheric Flight Mechanics Best Paper

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[115] "Design and evaluation of geometric nonlinearities using 5 meter Joined-Wing SensorCraft flight test article," J. Richards, J. Garnand-Royo*, A. Suleman, R. Canfield, C. A. Woolsey, *Structures, Structural Dynamics, and Materials Conference*, April 8-11, 2013, Boston, MA.

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[120] "Guidance and control of an unmanned surface vehicle exhibiting sternward motion" A. Gadre, S. Du, C. Sonnenburg, D. J. Stilwell, and C. A. Woolsey. *Proc. MTS/IEEE OCEANS 2012*, October 14-19, 2012, Virginia Beach, VA. [10.1109/OCEANS.2012.6405021]

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[123] "Design for flight test of a scaled joined wing SensorCraft," J. Richards, T. Aarons*, A. Suleman, R. A. Canfield, C. Woolsey, N. Lindsley, and M. Blair, *Structures, Structural Dynamics, and Materials Conference*, Denver, CO, April 2011. [10.2514/6.2011-2011]

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[126] "Monitoring the spread of a plant pathogen in the lower atmosphere using unmanned aerial vehicles and a buoyancy-controlled weather balloon," L. Techy, D. Schmale, & C. Woolsey, *SAE AeroTech Congress & Exhibition*, Seattle, WA, October 2009. [10.4271/2009-01-3125]

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[134] "Trajectory tracking for high aspect-ratio flying wings," B. Raghavan, M. J. Patil, and C. A. Woolsey, *2008 AIAA Atmospheric Flight Mechanics Conference*, Honolulu, HI, August 2008 (AIAA-2008-6372) [10.2514/6.2008-6372]

[135] "Steady turns and optimal paths for underwater gliders," N. Mahmoudian*, J. Geisbert*, and C. A. Woolsey, *AIAA Guidance, Navigation, and Control Conference*, Hilton Head Island, SC, August 2007 (AIAA-2007-6602) [10.2514/6.2007-6602]

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[145] "Model-based nonlinear control of an SMA-actuated robotic arm: An experimental study," J. Koo, M. H. Elahinia, M. Ahmadian, and C. Woolsey. *Tenth Conference on Nonlinear Vibrations, Stability, and Dynamics of Structures*, July 25-29, 2004, Blacksburg, VA.

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[147] "Assessing conceptual knowledge in an engineering course: Four case studies," M. Allen, W. Devenport, J. Wang, and C. Woolsey. AIAA Paper 2003-949, *Proc. 41st AIAA Aerospace Sciences Meeting*. [10.2514/6.2003-949]

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
61	$23,463,888	$8,744,062

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

[1] **Proposal Title:** Adaptive Guidance for Vehicle Configuration and Environmental Conditions
Principal Investigator: C. Woolsey
Period of Performance: June 1, 2025 – December 31, 2026
Sponsor: The Boeing Company
Amount: $297,075
Woolsey Component: 297,075$ (100%)

[2] **Proposal Title:** Support for N24B-T027: Real-Time In-Flight Aircraft State Estimation: Phase I
Principal Investigator: C. Woolsey
Period of Performance: November 11, 2024 - May 5, 2025
Sponsor: Barron Associates, Inc. (NAVAIR)
Amount: $42,000
Woolsey Component: $42,000 (100%)

[3] **Proposal Title:** AF21B-T003 Restricted SWAP-C Air Direction Sensing to Enable Single Vehicle Chemical Reactive Tracking: Phase II
Principal Investigator: C. Woolsey
Period of Performance: April 19, 2023 –April 18, 2025
Sponsor: Barron Associates, Inc. (AFRL)
Amount: $225,000
Woolsey Component: $225,000 (100%)

[4] **Proposal Title:** A23B-T009 Small Unmanned Aerial System for Surveying the Electromagnetic Spectrum: Phase I
Principal Investigator: C. Woolsey
Period of Performance: October 1, 2023 –March 31, 2024
Sponsor: Sabre Systems, Inc. (NAVAIR)
Amount: $70,000
Woolsey Component: $70,000 (100%)

[5] **Proposal Title:** Bayesian Localization of Multiple Atmospheric Contaminant Sources
Principal Investigator: C. Woolsey
Period of Performance: January 1, 2022 – June 30, 2023
Sponsor: C2IAS
Amount: $46,234
Woolsey Component: $46,234 (100%)

[6] **Proposal Title:** AF21B-T003 Restricted SWAP-C Air Direction Sensing to Enable Single Vehicle Chemical Reactive Tracking: Phase I
Principal Investigator: C. Woolsey
Period of Performance: January 30, 2022 –October 20, 2022
Sponsor: Barron Associates, Inc. (AFRL)

Amount: $30,000
Woolsey Component: $30,000 (100%)

[7] **Proposal Title:** Wind Sensing From UAVs
Principal Investigator: C. Woolsey
Period of Performance: October 21, 2021 to January 31, 2022
Sponsor: NIA (NASA LaRC flowthrough)
Amount: $13,074
Woolsey Component: $13,074 (100%)

[8] **Proposal Title:** Classification Scheme for Multirotor Aircraft
Principal Investigator: C. Woolsey
Period of Performance: February 1, 2021 to July 31, 2021
Sponsor: Perspecta Labs (CCDC Armaments Center)
Amount: $70,000
Woolsey Component: $70,000 (100%)

[9] **Proposal Title:** Real-time Weather Awareness for Enhanced UTM Safety Assurance
Principal Investigator: C. Woolsey
Period of Performance: August 1, 2020 to July 31, 2024
Sponsor: NASA (via Oklahoma State University)
Amount: $600,000
Woolsey Component: $600,000 (100%)

[10] **Proposal Title:** eSPAARO UAS Project for USAF TPS/AF
Principal Investigator: C. Woolsey
Period of Performance: August 16, 2019 to August 15, 2021
Sponsor: USAF Test Pilot School
Amount: $220,000
Woolsey Component: $220,000 (100%)

[11] **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~~ 2022 (No-cost extension)
Sponsor: National Science Foundation
Amount: $1,500,000
Woolsey Component: $375,000 (25%)

[12] **Proposal Title:** Submarine Motion in Waves
Principal Investigator: E. Paterson and C. Woolsey (Lead)
Period of Performance: July 1, 2016 to June 30, ~~2019~~ 2020 (No-cost extension)
Sponsor: Office of Naval Research
Amount: $395,584
Woolsey Component: $197,792 (50%)

[13] **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~~ 2020 (No-cost extension)
Sponsor: National Science Foundation
Amount: $270,000
Woolsey Component: $135,000 (50%)

[14] **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 supersedes 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 through 2020 total $1.7M.*** Funding totals above account only for direct NSF sponsorship.

[15] **Proposal Title:** I/UCRC: Center for UAS Phase I Site
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***.

[16] **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%)

[17] **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

[18] **Proposal Title:** Hybrid UA/UV: Support for Barron Associates
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%)

[19] **Proposal Title:** Biolocomotion 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%)

[20] **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

[21] **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)

[22] **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%)

[23] **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%)

[24] **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%)

[25] **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)

[26] **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

[27] **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)

[28] **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%)

[29] **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%)

[30] **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%)

[31] **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%)

[32] **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%)

[33] **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%)

[34] **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%)

[35] **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

[36] **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.)

[37] **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%)

[38] **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%)

[39] **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)

[40] **Proposal Title:**
Principal Investigator: K. Schroeder (Lead) and C. Woolsey
Period of Performance: September 2024 to May 2026
Sponsor: Astra Navigation
Amount: $460,210
Woolsey Component*: $125,527 (27%)

[41] **Proposal Title:** I/UCRC: Center for Autonomous Air Mobility and Sensing: Virginia Tech
Principal Investigator: K. Kochersberger (Lead) and C. Woolsey
Period of Performance: March 2022 to February 2027
Sponsor: National Science Foundation
Amount: $506,628
Woolsey Component*: $253,314 (50%)
Note: Virginia Tech Site within a 6-university NSF Phase I I/UCRC. Funds from NSF are supplemented by membership fees from industry/government members of the C-UAS. Industry membership fees of $50,000/Year per member support a varying roster of investigators and projects. The funding amounts shown above account only for direct NSF sponsorship.

[42] **Proposal Title:** Identification and validation of a Lagrangian nonlinear maneuvering and seakeeping model
Principal Investigator: S. Brizzolara (PI) and C. Woolsey
Period of Performance: June 1, 2020 to May 31, 2023
Sponsor: Office of Naval Research
Amount: $577,637
Woolsey Component: $288,818 (50%)

[43] **Proposal Title:** Omniscient Planning and Control Environment for the Naval Enterprise
Principal Investigator: D. Stilwell (PI), E. Paterson, M. Farhood, and C. Woolsey
Period of Performance: June 25, 2018 to ~~September 30, 2020~~ December 31, 2022 (No-cost extension)
Sponsor: Office of Naval Research
Amount: $3,000,000
Woolsey Component: $750,000 (25%)

[44] **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, 2018 to June 14, 2019
Sponsor: Office of Naval Research
Amount: $620,057
Woolsey Component: $310,028 (50%)

[45] **Proposal Title:** Structure-preserving numerical methods for engineering applications
Principal Investigators: M. Patil (Lead) and C. Woolsey
Period of Performance: July 1, 2018 to July 31, 2020
Sponsor: Office of Naval Research
Amount: $220,059
Woolsey Component: $110,030 (50%)

[46] **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

[47] **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%)

[48] **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%)

[49] **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%)

[50] **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%)

[51] **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

[52] **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

[53] **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%)

[54] **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%)

[55] **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%)

[56] **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

[57] **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%)

[58] **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

[59] **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%)

[60] **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

[61] **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 4224/5224G: Atmospheric & Ocean Vehicle Model Identification
AOE 4804: Special Topics in Dynamics, Control, and Estimation: Ethics and Autonomy
AOE 4984 (Special Topics): Navigation and Guidance
AOE 5774: 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)

Advising:

Post-Doctoral Scholars

Complete:

Ahmed Hussein	Co-advised with Dr. M. Hajj
Hye-Young Kim	Co-advised with Dr. C. Hall
C. Konda Reddy	Co-advised with Dr. N. Hovakimyan
Lili Ma	Co-advised with Dr. N. Hovakimyan
Sevak Tahmasian	Sole Advisor

Doctoral Scholars

Current:

Ian Willebeek-LeMair (Ph.D. A.E. expected 2027)	Sole Advisor
Mohamed Zakaria (Ph.D. A.E. expected 2025)	Co-Advisor (with Dr. S. Ross)

Complete:

Jeremy Hopwood (Ph.D. A.E., 2025)	Sole Advisor
Chris Gahan (Ph.D. A.E., 2024)	Sole Advisor
Zakia Ahmed (Ph.D. M.E., 2024)	Sole Advisor

[3] The teaching requirement in Virginia Tech's Department of Aerospace & Ocean Engineering is 3 courses per year.

Mekonen Halefom (Ph.D. A.E., 2024)	Sole Advisor
Nazmus Sakib (Ph.D. A.E., 2024)	Sole Advisor
Ying-Chun Chen (Ph.D., A.E. 2023)	Sole Advisor
Liam Lambert (Ph.D. A.E., 2023)	Secondary Advisor (with Dr. S. Brizzolara)
Ben Simmons (Ph.D. A.E., 2023)	Primary Advisor (with Dr. E. Morelli)
Jean-Michel Fahmi (Ph.D. A.E., 2022)	Sole Advisor
James Gresham (Ph.D. A.E., 2022)	Sole Advisor
Emmanuel Skamangas (Ph.D. A.E., 2021)	Secondary Advisor (with Dr. J. Black)
Javier González-Rocha (Ph.D. A.E., 2020)	Primary Advisor (with Dr. C. Sultan)
Seyong Jung (Ph.D. A.E., 2020)	Primary Advisor (with Dr. S. Brizzolara)
Changkoo Kang (Ph.D. A.E., 2020)	Sole Advisor
Harsh Sharma (Ph.D. A.E., 2020)	Secondary Advisor (with Dr. M. Patil)
Hisham Shehata (Ph.D. E.S.M., 2020)	Secondary Advisor (with Dr. M. Hajj)
Hunter McClelland (Ph.D. A.E., 2019)	Sole Advisor
Tom Battista (Ph.D. A.E., 2018)	Primary Advisor (with Dr. F. Valentinis)
Jacob Bean (PhD. A.E., 2018)	Secondary Advisor (with Dr. C. Fuller)
David Allen (Ph.D. A.E., 2016)	Sole Advisor
Andrew Rogers (Ph.D. A.E., 2016)	Primary Advisor (with Dr. R. McGwier)
Sevak Tahmasian (Ph.D. E.S.M., 2015)	Sole Advisor
Artur Wolek (Ph.D. A.E., 2015)	Sole Advisor
Brad Atkins (Ph.D. A.E., 2014)	Sole Advisor
Christian Sonnenburg (Ph.D. A.E., 2012)	Primary Advisor (with Dr. D. Stilwell)
Chris Cotting (Ph.D. A.E., 2010)	Primary Advisor (with Dr. W. Durham)
Robert Kraus (Ph.D. A.E., 2010)	Primary Advisor (with Dr. E. Cliff)
Amanda Young Dippold (Ph.D. A.E., 2009)	Secondary Advisor (with Dr. N. Hovakimyan)
Nina Mahmoudian (Ph.D. A.E., 2009)	Sole Advisor
Laszlo Techy (Ph.D. A.E., 2009)	Primary Advisor (with Dr. D. Schmale, III)
Chevva Konda Reddy (Ph.D. E.S.M., 2005)	Primary Advisor (with Dr. A. Nayfeh)

Master of Science Scholars (Thesis Option)

Current:

Matthew Andreini (M.S. A.E., expected 2028)	Primary Advisor (with Dr. C. Karlgaard)
Garrett Asper (M.S. A.E., expected 2026)	Sole Advisor
Patrick Corrigan (M.S. A.E., expected 2025)	Sole Advisor
Basile Fages (M.S. A.E. expected 2027)	Sole Advisor
Mitchell Farah (M.S. A.E. expected 2026)	Sole Advisor
Vishal Gautam (M.S. A.E., expected 2026)	Sole Advisor
Abhishek Jeyaprakas (M.S. A.E., expected 2026)	Sole Advisor
Mark Pinkleton (M.S. A.E., expected 2027)	Sole Advisor
Samuel Widman (M.S. A.E., expected 2025)	Sole Advisor

Complete:

Zakia Ahmed (M.S. M.E., 2022)	Sole Advisor
Ryan Fisher (M.S. A.E., 2022)	Sole Advisor
Kendy Edmonds (M.S. A.E., 2021)	Primary Advisor (with Mr. John Coggin)
Khanh Nguyen (M.S. A.E., 2021)	Sole Advisor
Kushal Patel (M.S. E.C.E., 2021)	Sole Advisor
Alberto Post (M.S. A.E., 2021)	Sole Advisor
Mekonen Halefom (M.S. A.E., 2020)	Sole Advisor
Griffin Hyde (M.S. A.E., 2019)	Sole Advisor
Meghan Burns (M.S. A.E., 2018)	Sole Advisor
Ben Simmons (M.S. A.E., 2018)	Sole Advisor
Chang Koo Kang (M.S. A.E., 2017)	Primary Advisor (with Dr. S. Choi)
Poorva Shukla (M.S. E.S.M., 2017)	Sole Advisor
Chris Kevorkian (M.S. A.E., 2016)	Sole Advisor
Tejaswi Gode (M.S. E.E., 2015)	Sole Advisor
David Allen (M.S. A.E., 2014)	Primary Advisor (with Dr. L. McCue-Weil)
Kevin Antcliff (M.S. A.E., 2014)	Secondary Advisor (with Mr. Mark Guynn)

Jeffrey Garnand-Royo (M.S. A.E., 2013)	Secondary Advisor (with Dr. R. Canfield)
Mark Palframan (M.S. A.E., 2013)	Primary Advisor (with Dr. D. Schmale)
Genevieve Petsopoulos (M.S. A.E., 2024)	Sole Advisor
Justin Murtha (M.S. A.E., 2009)	Sole Advisor
Jesse Geisbert (M.S. O.E., 2007)	Sole Advisor
Chris Schultz (M.S. A.E., 2006)	Sole Advisor
Amy Linklater (M.S. A.E., 2005)	Sole Advisor
Michael Morrow (M.S. A.E., 2005)	Sole Advisor
Chris Nickell (M.S. A.E., 2005)	Sole Advisor
Eric Schuch (M.S. A.E., 2004)	Sole Advisor