

# Noah J. Cowan, Ph.D.

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Updated: December 10, 2014

## EDUCATION

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**Ph.D. 2001** Electrical Engineering and Computer Science, University of Michigan, Ann Arbor  
Advisor: Daniel E. Koditschek  
Dissertation: Vision-Based Control via Navigation Functions  
**M.S. 1997** Electrical Engineering and Computer Science University of Michigan, Ann Arbor  
**B.S. 1995** Electrical Engineering, Ohio State University, Columbus

## POSITIONS HELD

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### *Primary Appointments*

- ◇ Johns Hopkins University, Baltimore
  - 2010–present Associate Professor, Department of Mechanical Engineering
  - 2003–2010 Assistant Professor, Department of Mechanical Engineering
- ◇ The University of California, Berkeley
  - 2001–2003 Postdoctoral Fellow, Department of Integrative Biology
  - Advisor: Robert J. Full

### *Other, Secondary, and Visiting Appointments*

- ◇ Johns Hopkins University, Baltimore
  - 2013–present Deputy Directory, Laboratory for Computational Sensing and Robotics (LCSR)
  - 2014–present Secondary Appointment, Department of Neuroscience
  - 2010–present Secondary Appointment, Department of Electrical and Computer Engineering
  - 2004–present Secondary Appointment, Department of Computer Science
  - 2003–present Director, Locomotion in Mechanical and Biological Systems (LIMBS) Laboratory
- ◇ The University of Washington, Seattle
  - 2010-2011 Visiting Scholar, Department of Biology

## AWARDS AND HONORS

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- ◇ **The Dunn Family Award**, conferred for having . . . *an extraordinarily positive impact upon the lives of one or more undergraduate students* . . . Johns Hopkins University, 2014
- ◇ **Scholar Award in Complex Systems Science**, James S. McDonnell Foundation, 2012
- ◇ **Presidential Early Career Award in Science and Engineering (PECASE)**, National Office of Science and Technology Policy, 2010
- ◇ **CAREER Award**, National Science Foundation, 2009
- ◇ **Finalist, Best Paper**, IEEE/RSJ Intelligent Robots and Systems Conference, 2006
- ◇ **William H. Huggins Excellence in Teaching Award**, Johns Hopkins University, 2005
- ◇ **Rackham Doctoral Fellowship**, University of Michigan, 2000–2001
- ◇ **Finalist, Best Student Paper**, IEEE Conference on Decisions and Controls, Sydney, Australia, 2000

## PUBLICATIONS

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### Review Articles

- [R1] N. J. Cowan, M. M. Ankarali, J. P. Dyhr, M. S. Madhav, E. Roth, S. Sefati, S. Sponberg, S. A. Stamper, E. S. Fortune, and T. L. Daniel. Feedback control as a framework for understanding tradeoffs in biology. *Integr Comp Biol* 54(2):223–237, June 2014, <http://icb.oxfordjournals.org/cgi/doi/10.1093/icb/icu050>.
- [R2] E. Roth, S. Sponberg, and N. J. Cowan. A comparative approach to closed-loop computation. *Curr Opin Neurobiol* 25:54–62, April 2014, <http://dx.doi.org/10.1016/j.conb.2013.11.005>.

### Journal Articles (published)

- [J1] J. P. Swensen, M. Lin, A. M. Okamura, and N. J. Cowan. Torsional dynamics of steerable needles: Modeling and fluoroscopic guidance. *IEEE Trans Biomed Eng* 66(11):2707–2717, Nov. 2014.
- [J2] A. Lamperski and N. J. Cowan. Optimal control with noisy time. *IEEE Trans Autom Control*, 2014. Accepted; Preprint available at <http://arxiv.org/abs/1401.0202>.
- [J3] J.-M. Mongeau, A. Demir, C. J. Dallmann, K. Jayaram, N. J. Cowan, and R. J. Full. Mechanical processing via passive dynamic properties of the cockroach antenna can facilitate control during rapid running. *J Exp Biol* 217(18):3333–3345, 2014, <http://jeb.biologists.org/content/early/2014/07/02/jeb.101501.abstract>.
- [J4] M. M. Ankarali, H. T. Şen, A. De, A. M. Okamura, and N. J. Cowan. Haptic feedback enhances rhythmic motor control by reducing variability, not improving convergence rate. *J Neurophysiol* 111(6):1286–1299, 2014, <http://jn.physiology.org/content/111/6/1286>.
- [J5] J.-M. Mongeau, A. Demir, J. Lee, N. J. Cowan, and R. J. Full. Locomotion- and mechanics-mediated tactile sensing: antenna reconfiguration simplifies control during high-speed navigation in cockroaches. *J Exp Biol* 216(24):4530–4541, 2013, <http://jeb.biologists.org/content/216/24/4530.abstract>.
- [J6] A. Rosenberg, D. E. Angelaki, and N. J. Cowan. The visual representation of 3D object orientation in parietal cortex. *J Neurosci* 33(49):19352–19361, 2013, <http://dx.doi.org/10.1523/JNEUROSCI.3174-13.2013>. PMC3850047.
- [J7] S. Sefati, I. D. Neveln, E. Roth, T. Mitchell, J. B. Snyder, M. A. MacIver, E. S. Fortune, and N. J. Cowan. Mutually opposing forces during locomotion can eliminate the tradeoff between maneuverability and stability. *Proc Nat Acad Sci* 110(47):18798–18803, 2013, <http://dx.doi.org/10.1073/pnas.1309300110>. PMC3839770.
- [J8] M. S. Madhav, S. A. Stamper, E. S. Fortune, and N. J. Cowan. Closed-loop stabilization of the jamming avoidance response reveals its locally unstable and globally nonlinear dynamics. *J Exp Biol* 216(22):4272–4284, 2013, <http://dx.doi.org/10.1242/jeb.088922>.
- [J9] J. P. Dyhr, T. L. Daniel, K. A. Morgansen, and N. J. Cowan. Flexible strategies for flight control: an active role for the abdomen. *J Exp Biol* 216(9):1523–1536, 2013, <http://dx.doi.org/10.1242/jeb.077644>.
- [J10] N. J. Cowan, E. J. Chastain, D. A. Vilhena, J. S. Freudenberg, and C. T. Bergstrom. Nodal dynamics, not degree distributions, determine the structural controllability of complex networks. *PLoS ONE* 7(6):e38398, 2012, <http://arxiv.org/abs/1106.2573>. PMC3382243.
- [J11] S. A. Stamper, M. S. Madhav, N. J. Cowan, and E. S. Fortune. Beyond the jamming avoidance response: Weakly electric fish respond to the envelope of social electrosensory signals. *J Exp Biol* 215(23):4196–4207, 2012, <http://dx.doi.org/10.1242/jeb.076513>.
- [J12] S. A. Stamper, E. Roth, N. J. Cowan, and E. S. Fortune. Active sensing via movement shapes spatiotemporal patterns of sensory feedback. *J Exp Biol* 215(9):1567–1574, 2012, <http://dx.doi.org/10.1242/jeb.068007>.

- [J13] K. B. Reed, A. Majewicz, V. Kallem, R. Alterovitz, K. Goldberg, N. J. Cowan, and A. M. Okamura. Robot-assisted needle steering. *IEEE Robot Autom Mag* 18(4):35–46, 2011. PMC3460644.
- [J14] E. Roth, K. Zhuang, S. A. Stamper, E. S. Fortune, and N. J. Cowan. Stimulus predictability mediates a switch in locomotor smooth pursuit performance for *Eigenmannia virescens*. *J Exp Biol* 214(7):1170–1180, Apr. 2011, <http://dx.doi.org/10.1242/jeb.048124>.
- [J15] V. Kallem, D. E. Chang, and N. J. Cowan. Task-induced symmetry and reduction with application to needle steering. *IEEE Trans Autom Control* 55(3):664–673, Mar. 2010, <http://dx.doi.org/10.1109/TAC.2009.2039241>. PMC2871331.
- [J16] D. C. Rucker, R. J. Webster III, G. S. Chirikjian, and N. J. Cowan. Equilibrium conformations of concentric-tube continuum robots. *Int J Robot Res* 29:1263–1280, 2010, <http://dx.doi.org/10.1177/0278364910367543>.
- [J17] S. G. Carver, N. J. Cowan, and J. M. Guckenheimer. Lateral stability of the spring-mass hopper suggests a two step control strategy for running. *Chaos* 19(2), 2009, <http://link.aip.org/link/?CHA/19/026106>.
- [J18] S. G. Carver, T. Kiemel, N. J. Cowan, and J. J. Jeka. Optimal motor control may mask sensory dynamics. *Biol Cybern* 101(1):35–42, 2009. PMC2778031.
- [J19] V. Kallem and N. J. Cowan. Image guidance of flexible tip-steerable needles. *IEEE Trans Robot* 25(1):191–196, 2009, <http://dx.doi.org/10.1109/TR0.2008.2010357>. PMC2860577.
- [J20] K. B. Reed, A. M. Okamura, and N. J. Cowan. Modeling and control of needles with torsional friction. *IEEE Trans Biomed Eng* 56(12):2905–2916, Dec. 2009, <http://dx.doi.org/10.1109/TBME.2009.2029240>. PMC2859043.
- [J21] R. J. Webster III, J. M. Romano, and N. J. Cowan. Mechanics of precurved-tube continuum robots. *IEEE Trans Robot* 25(1):67–78, 2009, <http://dx.doi.org/10.1109/TR0.2008.2006868>.
- [J22] S. G. Carver, E. Roth, N. J. Cowan, and E. S. Fortune. Synaptic plasticity can produce and enhance direction selectivity. *PLoS Comp Biol* 4(2), 2008, <http://dx.doi.org/10.1371/journal.pcbi.0040032>. PMC2242823.
- [J23] J. Lee, S. N. Sponberg, O. Y. Loh, A. G. Lamperski, R. J. Full, and N. J. Cowan. Templates and anchors for antenna-based wall following in cockroaches and robots. *IEEE Trans Robot* 24(1):130–143, Feb. 2008.
- [J24] N. J. Cowan. Navigation functions on cross product spaces. *IEEE Trans Autom Control* 52(7):1297–1302, 2007, <http://dx.doi.org/10.1109/TAC.2007.900834>.
- [J25] N. J. Cowan and E. S. Fortune. The critical role of locomotion mechanics in decoding sensory systems. *J Neurosci* 27(5):1123–1128, 2007, <http://dx.doi.org/10.1523/JNEUROSCI.4198-06.2007>.
- [J26] N. J. Cowan, J. Lee, and R. J. Full. Task-level control of rapid wall following in the American cockroach. *J Exp Biol* 209(9):1617–1629, 2006, <http://dx.doi.org/10.1242/jeb.02166>.
- [J27] R. J. Webster III, J. S. Kim, N. J. Cowan, G. S. Chirikjian, and A. M. Okamura. Nonholonomic modeling of needle steering. *Int J Robot Res* 25(5/6):509–526, May 2006, <http://dx.doi.org/10.1177/0278364906065388>.
- [J28] N. J. Cowan and D. E. Chang. Geometric visual servoing. *IEEE Trans Robot* 21(6):1128–1138, Dec. 2005, <http://dx.doi.org/10.1109/TR0.2005.853491>.
- [J29] N. J. Cowan, J. D. Weingarten, and D. E. Koditschek. Visual servoing via navigation functions. *IEEE Trans Robot Automat* 18(4):521–533, 2002, <http://dx.doi.org/10.1109/TRA.2002.802202>.

*Full-Length Refereed Conference Articles*

- [C1] M. M. Ankarali and N. J. Cowan. System identification of rhythmic hybrid dynamical systems via discrete time harmonic transfer functions. *Proc IEEE Int Conf on Decision Control*, December 2014.
- [C2] A. Lamperski and N. J. Cowan. Time-changed linear quadratic regulators. *Proc Euro Control Conf*, July 2013.
- [C3] S. G. Carver, E. S. Fortune, and N. J. Cowan. State-estimation and cooperative control with uncertain time. *Proc Amer Control Conf*, pp. 2990–2995. IEEE, June 2013.
- [C4] A. Demir, M. M. Ankarali, J. P. Dyhr, K. A. Morgansen, T. L. Daniel, and N. J. Cowan. Inertial redirection of thrust forces for flight stabilization. *15th International Conference on Climbing and Walking Robots and the Support Technologies for Mobile Machines (CLAWAR)*, 2012.
- [C5] J. P. Dyhr, N. J. Cowan, D. J. Colmenares, K. A. Morgansen, and T. L. Daniel. Autostabilizing airframe articulation: Animal inspired air vehicle control. *Proc IEEE Int Conf on Decision Control*, 2012.
- [C6] E. Roth, M. B. Reiser, M. H. Dickinson, and N. J. Cowan. A task-level model for optomotor yaw regulation in *Drosophila melanogaster*: A frequency-domain system identification approach. *Proc IEEE Int Conf on Decision Control*, 2012.
- [C7] S. Sefati, I. Neveln, M. A. MacIver, E. S. Fortune, and N. J. Cowan. Counter-propagating waves enhance maneuverability and stability: a bio-inspired strategy for robotic ribbon-fin propulsion. *Proc IEEE Int Conf on Biomed Robot and Biomech*, 2012.
- [C8] J. P. Swensen and N. J. Cowan. An almost global estimator on  $SO(3)$  with measurement on  $S^2$ . *Proc Amer Control Conf*, June 2012.
- [C9] J. P. Swensen and N. J. Cowan. Torsional dynamics compensation enhances robotic control of tip-steerable needles. *Proc IEEE Int Conf Robot Autom*, May 2012.
- [C10] V. Kallem, D. E. Chang, and N. J. Cowan. Observer design for needle steering using task-induced symmetry and reduction. *World Cong Intl Fed Autom Control*, Aug. 2011.
- [C11] A. De, J. Lee, N. Keller, and N. J. Cowan. Toward SLAM on graphs. *Algorithmic Foundations of Robotics VIII*, pp. 631–646. Springer-Verlag, Springer Tracts in Advanced Robotics, 2010.
- [C12] A. Demir, E. W. Samson, and N. J. Cowan. A tunable physical model of arthropod antennae. *Proc IEEE Int Conf Robot Autom*, pp. 3793–3798, May 2010.
- [C13] K. B. Reed, A. M. Okamura, and N. J. Cowan. Controlling a robotically steered needle in the presence of torsional friction. *Proc IEEE Int Conf Robot Autom*, pp. 3476–3481, Apr. 2009. PMC3040793.
- [C14] R. J. Webster III, J. P. Swensen, J. M. Romano, and N. J. Cowan. Closed-form differential kinematics for concentric-tube continuum robots with application to visual servoing. *Experimental Robotics XI*, vol. 54, pp. 485–494, 2009.
- [C15] K. B. Reed, V. Kallem, R. Alterovitz, K. Goldberg, A. M. Okamura, and N. J. Cowan. Integrated planning and image-guided control for planar needle-steering. *Proc IEEE Int Conf on Biomed Robot and Biomech*, pp. 819–824, Oct. 2008. PMC2905598.
- [C16] R. J. Webster III, J. M. Romano, and N. J. Cowan. Kinematics and calibration of active cannulas. *Proc IEEE Int Conf Robot Autom*, pp. 3888–3895, 2008.
- [C17] V. Kallem, D. E. Chang, and N. J. Cowan. Task-induced symmetry and reduction in kinematic systems with application to needle steering. *Proc IEEE/RSJ Int Conf Intell Robots Syst*, pp. 3302–3308, Oct. 2007. PMC2907182.
- [C18] V. Kallem and N. J. Cowan. Image-guided control of flexible bevel-tip needles. *Proc IEEE Int Conf Robot Autom*, pp. 3015–3020, Apr. 2007. PMC3043465.

- [C19] V. Kallem, M. Dewan, J. P. Swensen, G. D. Hager, and [N. J. Cowan](#). Kernel-based visual servoing. *Proc IEEE/RSJ Int Conf Intell Robots Syst*, pp. 1975–1980, Oct. 2007.
- [C20] J. Lee, O. Y. Loh, and [N. J. Cowan](#). A hierarchy of neuromechanical and robotic models of antenna-based wall following in cockroaches. *Proc IEEE/RSJ Int Conf Intell Robots Syst*, pp. 3547–3553, Oct. 2007.
- [C21] R. J. Webster III, [N. J. Cowan](#), G. S. Chirikjian, and A. M. Okamura. Nonholonomic models for needle steering. *Experimental Robotics IX*, vol. 21, pp. 35–44, Tracts in Advanced Robotics, June 2006.
- [C22] R. J. Webster III, A. O. Okamura, and [N. J. Cowan](#). Toward active cannulas: Miniature snake-like surgical robots. *Proc IEEE/RSJ Int Conf Intell Robots Syst*, pp. 2857–2863, 2006.
- [C23] A. Lamperski, O. Loh, B. Kutscher, and [N. J. Cowan](#). Dynamical wall-following for a wheeled robot using a passive tactile sensor. *Proc IEEE Int Conf Robot Autom*, pp. 3838–3843, 2005.
- [C24] W. Park, J. S. Kim, Y. Zhou, [N. J. Cowan](#), A. M. Okamura, and G. S. Chirikjian. Diffusion-based motion planning for a nonholonomic flexible needle model. *Proc IEEE Int Conf Robot Autom*, pp. 4600–4605, Apr. 2005.
- [C25] [N. J. Cowan](#). Composing navigation functions on Cartesian products of manifolds with boundary. *Algorithmic Foundations of Robotics VI*, pp. 91–106. Springer, Springer Tracts in Advanced Robotics, 2004.
- [C26] J. Piazzi and [N. J. Cowan](#). Multi-view visual servoing using epipoles. *Proc IEEE/RSJ Int Conf Intell Robots Syst*, vol. 1, pp. 674–679, Oct. 2004.
- [C27] J. Piazzi, D. Prattichizzo, and [N. J. Cowan](#). Auto-epipolar visual servoing. *Proc IEEE/RSJ Int Conf Intell Robots Syst*, vol. 1, pp. 363–368, Sept. 2004.
- [C28] [N. J. Cowan](#), E. J. Ma, M. Cutkosky, and R. J. Full. A biologically inspired passive antenna for steering control of a running robot. *Robotics Research*, pp. 540–550. Springer, Springer Tracts in Advanced Robotics, 2003.
- [C29] [N. J. Cowan](#), O. Shakernia, R. Vidal, and S. Sastry. Vision-based follow-the-leader. *Proc IEEE/RSJ Int Conf Intell Robots Syst*, vol. 2, pp. 1796–1801, Oct. 2003.
- [C30] G. Lawrence, [N. J. Cowan](#), and S. Russell. Efficient gradient estimation for motor control learning. *Proc Conf Uncertainty in Artificial Intelligence*, 2003.
- [C31] [N. J. Cowan](#). Binocular visual servoing with a limited field of view. *Mathematical Theory of Networks and Systems*, Aug. 2002.
- [C32] [N. J. Cowan](#) and D. E. Chang. Toward geometric visual servoing. *Control Problems in Robotics*, vol. 4, pp. 233–248. Springer-Verlag, STAR, Springer Tracts in Advanced Robotics, 2002.
- [C33] [N. J. Cowan](#), J. D. Weingarten, and D. E. Koditschek. Empirical validation of a new visual servoing strategy. *Proc Conf Control Applications*, pp. 1117–1123, 2001.
- [C34] [N. J. Cowan](#), G. A. D. Lopes, and D. E. Koditschek. Rigid body visual servoing using navigation functions. *Proc IEEE Int Conf on Decision Control*, pp. 3920–3926, 2000.
- [C35] [N. J. Cowan](#) and D. E. Koditschek. Planar image based visual servoing as a navigation problem. *Proc IEEE Int Conf Robot Autom*, vol. 1, pp. 611–617, 1999.
- [C36] [N. J. Cowan](#) and D. E. Koditschek. Toward global visual servos and estimators for rigid bodies. *Proc IEEE Int Conf Robot Autom*, vol. 3, pp. 2658–2663, 1998.

## PATENTS

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1. N. Navab, N. Cowan, B. Fuerst, E. Fortune. System and Method for Bioelectric Localization and Navigation of Interventional Medical Devices, 2013. U.S. patent pending—application number 13/798,637. (JHU ref. C12356)
2. R. J. Webster III, A. M. Okamura, N. J. Cowan, R. H. Taylor. Active cannula for bio-sensing and surgical intervention, 2005. U.S. patent pending—application number 60/736,789. (JHU ref. 4873)
3. R. J. Webster III, A. M. Okamura, N. J. Cowan, G. S. Chirikjian, K. Y. Goldberg, and R. Alterovitz. [Distal bevel-tip needle control device and algorithm](#), 2005. U.S. patent number 7,822,458 (JHU ref. 4690)

## GRANTS AND CONTRACTS

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### Pending

1. **NSF-Sensing, Dynamics, and Controls:** 03/01/2015–02/28/2018  
Title: *Active Sensing Shapes Sensory Feedback for Control*  
Investigators: N. J. Cowan (PI) and Eric S. Fortune (Co-PI)  
Agency: NSF  
Award: \$430,849
2. **NIH-R21:** 01/01/2015–12/31/2016  
Title: *Bioelectric Localization and Navigation for Catheter Interventions*  
Investigators: N. J. Cowan (Co-PI) and Nassir Navab (Co-PI)  
Agency: NIH  
Award: \$450,000
3. **NSF-REU:** 4/1/2015 3/31/2018  
Title: *Research Experience for Undergraduates (REU) Site for Computational Sensing and Medical Robotics (CS&MR)*  
Investigators: R. Etienne-Cummings (PI) and S. Sarma (Co-PI). N. J. Cowan's Role: Senior Personnel.  
Agency: NSF  
Award: \$412,151

### Current

1. **JSFM Scholar Award in Complex Systems Science:** 09/01/2012–8/31/2017  
Title: *Decoding Complex Animal Behavior Via Sparsity*  
Investigators: N. J. Cowan (PI)  
Agency: James S. McDonnell Foundation  
Award: \$450,000
2. **NSF-BCS #1230493:** 8/1/2012–7/31/2015  
Title: *Understanding the Rules for Human Rhythmic Motor Coordination: From Walking to Juggling*  
Investigators: N. J. Cowan (JHU PI), J. Jeka, T. Kiemel (Project PI), N. M. Wereley  
Agency: National Science Foundation  
Award: \$672,413 (To NJC: \$232,079)
3. **ONR N000141110525:** 07/01/2011–06/30/2014  
Title: *Multisensory Integration in MSTd for Navigation and Control*  
Investigators: N. J. Cowan (PI), E. Tytell, C. J. Duffy  
Agency: Office of Naval Research  
Award: \$751,925 (To NJC: \$355,000)

### Completed

1. **NSF-CBET #0941674:** 10/1/2009–9/30/2013  
Title: *Cyber-Enabled Discovery in Neuromechanical Systems*  
Investigators: N. J. Cowan (JHU PI), E. S. Fortune, G. Lauder, M. MacIver (Program PI), N. Patankar  
Agency: National Science Foundation  
Award: \$1,400,000 (To NJC: \$318,000)



2. **NSF-IIS #0845749:** 3/1/2009–2/28/2014  
Title: *PECASE: Sensory Guidance of Locomotion: From Neurons to Newton's Laws*  
Investigators: N. J. Cowan (PI)  
Agency: National Science Foundation  
Award: \$500,000
3. **William R. Kenan, Jr. Fund for Teaching:** 7/1/2011–6/30/2012  
Title: *A Hands-On Introduction to Animal Sensors and Actuators for Engineering Students*  
Investigators: N. J. Cowan  
Agency: William R. Kenan, Jr. Fund  
Award: \$4,800
4. **ONR N000140910531:** 1/31/2009–9/30/2011  
Title: *Kalman Filters in Brain Circuits: Multisensory Control in Weakly Electric Knifefish*  
Investigators: N. J. Cowan (PI) and E. S. Fortune  
Agency: Office of Naval Research  
Award: \$611,132 (To NJC: \$460,352)
5. **NSF-IOS #0817918:** 9/1/2008–8/31/2011  
Title: *Enhancement of Electrosensory Function via Social Interaction*  
Investigators: N. J. Cowan and E. S. Fortune (PI)  
Agency: National Science Foundation  
Award: \$428,408 (To NJC: \$204,900)
6. **NIH-NIBIB R01 #EB006435:** 8/15/2006–5/31/2011  
Title: *Steering Flexible Needles in Soft Tissue*  
Investigators: N. J. Cowan, G. S. Chirikjian, G. Fichtinger, K. Goldberg, A. M. Okamura (PI)  
Agency: National Institutes of Health  
Award: \$2,446,313 (To NJC: \$482,717)
7. **NSF-IIS: REU Extension to #0845749:** 3/1/2009–2/28/2010, \$8,000
8. **NSF-CBET #0651803:** 8/15/2007–7/31/2010  
Title: *Active Cannulas for Bio-Sensing and Surgery*  
Investigators: N. J. Cowan (PI), A. M. Okamura, and R. J. Webster III  
Agency: National Science Foundation  
Award: \$240,000 (To NJC: \$59,411)
9. **NSF-ENG #0748338:** 10/1/2008–9/30/2009  
Title: *Manipulating and Perceiving Simultaneously*  
Investigators: N. J. Cowan, G. D. Hager (PI), and A. M. Okamura  
Agency: National Science Foundation  
Award: \$200,000 (to NJC: \$75,000)
10. **NSF-CBET: REU Extension to #0651803:** 8/15/2007–7/31/2008, \$3,000
11. **WSE/APL Partnership Fund:** 9/1/2006–12/31/2007, \$75,000  
Title: *Ribbon-Finned Propulsion for Dynamic Maneuvers of Underwater Vehicles*
12. **NSF-ENG #0625708:** 10/1/2006–9/30/2007  
Title: *Vision-Based Control of Mechanical Systems via Sampling Kernels*  
Investigators: N. J. Cowan (PI) and G. D. Hager  
Agency: National Science Foundation  
Award: \$64,927 (To NJC: \$32,464)
13. **NSF-IOB #0543985:** 4/01/2006–3/31/2009  
Title: *Multisensory Control of Tracking Behavior in Weakly Electric Fish*  
Investigators: N. J. Cowan (PI) and E. S. Fortune  
Agency: National Science Foundation  
Award: \$486,198 (To NJC: \$228,140)
14. **NSF-IOB: REU Extension to #0543985:** 4/1/2008–3/31/2009, \$6,000
15. **NSF-IOB: REU Extension to #0543985:** 4/1/2006–3/31/2007, \$6,000
16. **NSF-IOB: REU Extension to #0543985:** 4/1/2007–3/31/2008, \$6,000
17. **Subaward to NSF ERC Core Grant #9731478 (Taylor, PI):** 9/1/2006–8/31/2007, To NJC: \$32,616

18. **NIH-NIBIB: R21 #EB003452:** 4/1/04–3/31/2006

Title: *Biomechanical Modeling for Steerable Needles*

Investigators: N. J. Cowan, G. S. Chirikjian, K. Goldberg, A. M. Okamura (PI)

Agency: National Institutes of Health

Award: \$384,323 (To NJC: \$120,000)

## INVITED SEMINARS

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### *Special and Plenary Lectures*

- ◇ Keynote Speaker, *International Conference on Advanced Robotics*, Istanbul, Turkey, 2015 (planned).
- ◇ “Tandem Talk” with Volker Dür, *International Symposium on Adaptive Motion of Animals and Machines*, Darmstadt, Germany, 2013
- ◇ Invited Speaker, *Dynamic Walking Conference*, Pensacola, FL, 2012.
- ◇ Invited Speaker, *EU-US Frontiers of Engineering Workshop*, sponsored by the NAE and Euro-CASE, Cambridge, England, 2010
- ◇ Early Career Spotlight Lecture, *Robotics: Science and Systems Conference*, Atlanta, GA, 2007
- ◇ Plenary Lecture, *International Consortium on Biomimetic Technology for Vibrissal Active Touch (BIOTACT)*, Garmisch, Germany, 2010

### *Colloquia and Other Invited Talks*

- ◇ *Biotechnology Seminar Series*, University of Nebraska, Lincoln, 2015 (planned).
- ◇ *Rehabilitation Science Research Seminar*, University of Maryland School of Medicine, Baltimore, 2014 (planned).
- ◇ *Neuroscience Retreat*, Johns Hopkins University, Baltimore, 2014.
- ◇ *Applied Dynamics Seminar Series*, University of Maryland, College Park, 2014.
- ◇ *Joint seminar for CiBER-IGERT and the Control Theory Seminar Series*, University of California, Berkeley, CA, 2014.
- ◇ *Neuroscience Seminar Series*, Baylor College of Medicine, Houston, TX, 2013
- ◇ *Biorobotics Seminar Series*, Arizona State University, Tempe, AZ, 2013
- ◇ *Coordinated Science Lab*, University of Illinois, Champaign, IL, 2013
- ◇ *Engineering Seminar*, Howard Community College, Laurel, MD, 2013
- ◇ *Robotics Seminar*, University of Maryland, College Park, MD, 2012
- ◇ *Biology Seminar*, University of Washington, Seattle, WA, 2011
- ◇ *Psychology Seminar*, University of Washington, Seattle, WA, 2011
- ◇ *Civil Engineering Seminar Series*, Johns Hopkins University, Baltimore, MD, 2010
- ◇ *Robotics and Intelligent Machines (RIM) Seminar Series*, Georgia Institute of Technology, Atlanta, GA, 2009
- ◇ *Laboratory for Computational Sensing and Robotics (LCSR) Seminar Series*, Johns Hopkins University, Baltimore, MD, 2009
- ◇ *Machines and Organisms Seminar Series*, Cornell University, Ithaca, NY, 2008
- ◇ *Theoretical and Applied Mechanics Seminar Series*, Cornell University, Ithaca, NY, 2008
- ◇ *Computer Science and Artificial Intelligence Lab Colloquium*, MIT, Cambridge, MA, 2008
- ◇ *Control Systems Seminar Series*, University of Michigan, Ann Arbor, 2007
- ◇ *Mechanical & Aerospace Eng. Seminar Series*, George Washington University, Washington, DC, 2007
- ◇ *Johns Hopkins Student Research Group*, [Johns Hopkins University](#), Baltimore, MD, 2007
- ◇ *Active Sensation Workshop*, Computational Systems Neuroscience Meeting, Park City, UT, 2007
- ◇ *Electrical Engineering Seminar Series*, Harvard University, Cambridge, MA, 2006
- ◇ *Biomedical Engineering Seminar Series*, Northwestern University, Evanston, IL, 2006
- ◇ *GRASP Laboratory Seminar Series*, University of Pennsylvania, Philadelphia, 2004
- ◇ *Mechanical Engineering Seminar Series*, Ohio State University, Columbus, 2004
- ◇ *Control Systems Seminar Series*, University of Washington, Seattle, 2003



- ◇ *Mechanical Engineering Seminar Series*, Johns Hopkins University, Baltimore, MD, 2003
- ◇ *Computer Vision Seminar Series*, University of California at Berkeley, 2002
- ◇ *Mechanical Engineering Seminar Series*, Johns Hopkins University, Baltimore, MD, 2001
- ◇ *Electrical Engineering Symposium*, Ohio State University, Columbus 2001

#### Invited Talks at Symposia, Workshops, Tutorials, and Conferences

- ◇ *Workshop on Distributed Sensing, Actuation, and Control*, University of Maryland, College Park, MD, 2014.
- ◇ *Dynamics Days*, Georgia Institute of Technology, Atlanta, GA, 2014
- ◇ *Grand Challenges in Organismal Biology: Walking the Tightrope between Stability and Change*, Symposium at the Society for Integrative and Comparative Biology (SICB) Annual Meeting, Austin, TX, 2014
- ◇ *AMS sectional meeting*, Temple University, 2013.
- ◇ *Grand Challenges in Organismal Biology: Walking the Tightrope between Stability and Change*, Cold Spring Harbor, NY, 2013
- ◇ *Yale Workshop on Adaptive and Learning Systems*, Yale, New Haven, Connecticut, 2013
- ◇ *Winter Workshop on Locomotion*, Princeton, Princeton, New Jersey, 2012
- ◇ *Yale Workshop on Adaptive and Learning Systems*, Yale, New Haven, Connecticut, 2008
- ◇ *Workshop on the Neuromechanics of Locomotion*, Mathematical Biosciences Institute, Ohio State University, Columbus, 2008
- ◇ *Needle Steering Workshop, Medical Image Computing and Computer Assisted Intervention (MICCAI)*, 2008
- ◇ *Tutorial on Computer-Integrated Surgery & Interventional Robotics, IEEE International Conference on Robotics and Automation (ICRA)*, Rome, Italy, 2007
- ◇ *Forty-Fifth Annual Allerton Conference on Communication, Control, and Computing*, Urbana, IL, 2007
- ◇ *Neuromorphic Engineering Workshop*, Telluride, Colorado, 2005
- ◇ *Control of Robotic Systems for Manipulation and Cooperation*, Bertinoro, Italy, 2003
- ◇ *Control Workshop*, Ohio State University, Columbus, 2000
- ◇ *Industrial Partners of Computer Science (IPoCSE) Symposium*, Ann Arbor, MI, 2000

#### Other Invited Presentations

- ◇ Presenter, i2Camp STEM Summer Camp, Baltimore, MD, 2014
- ◇ Presenter, Science Day, School of the Cathedral of Mary Our Queen, Baltimore, MD 2014
- ◇ Presenter / Panelist, *Specific Aims 101*, Sponsored by the Homewood Postdoctoral Association, Johns Hopkins University, Baltimore, MD, 2014
- ◇ *Meyerhoff Scholars Bridge Program*, University of Maryland Baltimore County, Johns Hopkins University, Baltimore, MD, 2009, 2014
- ◇ Presenter / Panelist, *Writing a Successful NSF Proposal*, Sponsored by the Homewood Postdoctoral Association, Johns Hopkins University, Baltimore, MD, 2010

## ADVISING AND MENTORING

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#### Current Ph.D. Students

- ◇ Ravi Jayakumar, Ph.D. Expected 2018
- ◇ Erin Sutton, Ph.D. expected 2017
- ◇ Robert Nickl, Ph.D. expected 2016
- ◇ Mert Ankarali, Ph.D. expected 2015
- ◇ Alican Demir, Ph.D. expected 2014

#### Current Postdoctoral Fellows

- ◇ Sarah Stamper, Ph.D., 2012–present.

*Previous Ph.D. Students*

- ◇ Manu Madhav, Ph.D., March 2014.  
“Nonlinear processing of sensory interference drives social behavior in weakly electric fish.” Currently a postdoctoral associate at the Mind Brain Institute, Johns Hopkins University.
- ◇ Shahin Safeti, Ph.D., July 2014.  
“Modeling Complex Biological and Mechanical Movements: Application to Animal Locomotion and Gesture Classification in Robotic Surgery.” Currently a postdoctoral associate with the Center for Imaging Science, Johns Hopkins University.
- ◇ Eatai Roth, Ph.D. July 2012.  
“Task-Level Models for Image-Stabilization Behaviors in Animals”. Currently a postdoctoral associate in Biology at the University of Washington.
- ◇ Robert J. Webster III, Ph.D. December 2007 (Co-advised with Prof. Allison Okamura).  
“Design and Mechanics of Continuum Robots for Surgery”. Currently an assistant professor in mechanical engineering at Vanderbilt University. Dr. Webster Received the Dick Volz Best US PhD Thesis in Robotics and Automation in 2011.
- ◇ Vinutha Kallem, Ph.D. July 2008.  
“Vision-Based Control on Lie Groups with Application to Needle Steering”. Currently with SRI.
- ◇ Jusuk Lee, Ph.D. January 2009.  
“Identifying Feedback Control Strategies of Running Cockroaches and Humans”. Currently an Engineer with the Mechatronics & Manufacturing Technology Center, Samsung Electronics.
- ◇ John Swensen, Ph.D. December 2011.  
“Torsional Dynamics and Rotational Estimation of Tip-steerable Needles.” Currently a postdoc at Yale University.

*Previous M.S. Thesis Students*

- ◇ Landon Unninayar, M.S. 2004. Now a mechanical engineer at iRobot corporation.
- ◇ Brett Kutscher, M.S. 2004. Now a software engineer at General Dynamics Robotic Systems.
- ◇ Aican Demir, M.S. 2009. Now a Ph.D. student in Dr. Cowan’s laboratory.
- ◇ Avik De, M.S. 2010. Now a Ph.D. student at the University of Pennsylvania.
- ◇ Eva Siehmann, M.S. 2013; performed her thesis research at Johns Hopkins under Dr. Cowan’s supervision. Thesis was awarded at Westphalian University of Applied Sciences, Gelsenkirchen. Eva recieved the Lorenz-Wegen award for best thesis at her university for her work done at JHU.

*Previous Postdoctoral Fellows and Research Scientists*

- ◇ Andrew Lamperski, Ph.D., 2012. Currently an Assistant Professor of Electrical and Computer Engineering, University of Minnesota.
- ◇ Eric Tytell, Ph.D., Assistant Research Scientist in Mechanical Engineering (co-mentored with Prof. Eric Fortune), 2010-2012.  
Currently an Assistant Professor of Biology at the Tufts.
- ◇ Sean Carver, Ph.D. (co-supervised with Prof. Eric Fortune), 2006–2009 (as postdoc) and 2010-2013 (as Assistant Research Scientist).  
Currently a Professorial Lecturer in Mathematics at American University.
- ◇ Kyle Reed, Ph.D. (co-supervised with Prof. Allison Okamura), 2007–2009.  
Currently an Assistant Professor of Mechanical Engineering at the University of South Florida.
- ◇ Terence Mitchell, Ph.D. (co-supervised with Prof. Eric Fortune), 2009-2011. Now an Assistant Professor of Anatomy at Campbell University School of Osteopathic Medicine.
- ◇ Erion Plaku, Ph.D. (co-supervised with Profs. Allison Okamura and Greg Hager), 2008–2010  
Currently an Assistant Professor of Electrical Engineering and Computer Science at Catholic University of America.
- ◇ Jacopo Piazzi, Ph.D. 2003.

### *Undergraduate and High School Students*

Advised at least 30 undergraduate researchers including several students with NSF REU's (9), Howard Hughes Fellowships (2), and Provost Undergraduate Research Awards (6). Many of these undergraduates have coauthored conference and journal papers. Advised 5 high school students, in cooperation with two local programs, the Ingenuity Project at Baltimore Polytechnic Institute (4), and the Women in Science and Engineering program with Garrison Forest school (6). Two of these high school students have co-authored peer-reviewed conference papers.

### *Dissertation Committees*

- ◊ At [Johns Hopkins University](#): Yu Zhou (2004), Jin Seob Kim (2005), James Kinsey (2006), Aris Skliros (2007), Yan Liu (2007), Maneesh Dewan (2007), Wooram Park (2008), Kiju Lee (2008), Stephen Martin (2008), Sarah Webster (2010), Georgios Kaloutsakis (2010), Matthew Moses (2011), Michael Kutzer (2012), Sarah Stamper (2012), Jean Michelle Mongeau (UC Berkeley external member, 2013), Giancarlo Troni (2013), Christopher McFarland (2013).
- ◊ At other institutions: Jean-Michele Mongeau (University of California, Berkeley; 2013), David Logan (University of Maryland, College Park; 2014).

## INSTRUCTION AND CURRICULUM DEVELOPMENT

### *The University of Washington, 2011*

- ◊ **(unregistered course)** *Feedback Control of Mechanical Systems for Biologists* (new course)
  - *Semester taught (attendees)*: Spring 2011 ( $\approx$ 15 students, postdocs, and faculty)
  - *Course description*: Weekly lectures, practice problems, and sample code provide a theoretically rigorous, experimentally motivated introduction to feedback control of mechanical systems. The course emphasizes the art of applying control theoretic concepts to biology, drawing on recent literature as well as numerous examples from on going work at Johns Hopkins and the University of Washington.

### *Johns Hopkins University, 2003–present*

Key: EN.530=Mechanical Engineering

- ◊ **Robotics Minor** (Co-Developed with Greg Hager, Minor Advisor from 2010–present)
  - The Robotics Minor at Johns Hopkins is a multidisciplinary minor that emphasizes an interdisciplinary curriculum focused on three core technical areas: 1) Robot kinematics and dynamics; 2) Systems theory, signal processing, control; 3) Computation and sensing.
  - The minor incorporates courses from Mechanical Engineering, Electrical and Computer Engineering, Computer Science, and Biomedical Engineering, and Applied Math and Statistics.
  - The minor is open to all undergraduates at Johns Hopkins and is offered by the faculty of the [Laboratory for Computational Sensing and Robotics \(LCSR\)](#).
  - The minor was approved by the Academic Council in Spring 2010.
- ◊ **EN.530.485** *Physics and Feedback in Living Systems* (new course)
  - *Semesters taught (enrollment)*: Fall 2013 (24 expected)
  - *Course description*: The complex mechanisms of living systems cannot be reduced to a set of base pairs: genes are only one part of mystery of life. Rather, organisms must develop, move, interact, and function in their natural environment, and thus are constrained by the laws of physics. For example, during locomotion an animal must accelerate according to Newton's laws by applying forces between itself and the environment. Beyond physical principles alone, biological systems extensively use feedback to enhance stability and facilitate adaptation in the presence of a changing world. This course examines the critical roles that physical principles and feedback mechanisms play in life, with special emphasis on animal locomotion and its control.
- ◊ **EN.530.420** *Robot Sensors and Actuators*
  - *Semesters taught (enrollment)*: Fall 2012 (64)

- *Course description*: Introduction to modeling and hands-on use of actuators and sensors including DC brush motors, stepper motors, position sensors (such as encoders, synchros, resolvers), and sonar sensing. Integration of these sensors and actuators into mechatronic systems using microcontrollers, including digital I/O, analog/digital conversion.
- *Final Project*: Implemented an ambitious course final project involving Molecular gastronomy in collaboration with Chef Jerry Pellegrino. See full video here:  
<http://www.youtube.com/watch?v=X6XBoEyC8HY>
- ◇ **EN.530.241: *Electronics and Instrumentation*** (redeveloped course)
  - *Semesters taught (enrollment)*: Fall 2004 (26), Fall 2005 (38), Fall 2006 (29), Spring 2007 (34), Spring 2008 (28)
  - *Course description*: Undergraduate, laboratory-based introduction to basic analog electronics and instrumentation with emphasis on basic electronic devices and techniques relevant to mechanical engineering.
  - *Modification*: Interdisciplinary labs and examples are drawn from biology, specifically instrumentation for weakly electric knifefish. The final project is to develop a field-ready instrumentation amplifier for measuring electric signals in weakly electric knifefish.
- ◇ **EN.530.343: *Design and Analysis of Dynamic Systems*** (existing course)
  - *Semester taught (enrollment)*: Spring 2009 (39), Spring 2010 (38)
  - *Course description*: Modeling and analysis of damped and undamped, forced and free vibrations in single and multiple degree-of-freedom linear dynamical systems. Introduction to stability and control of linear dynamical systems.
- ◇ **EN.530.616: *Introduction to Linear Dynamical Systems*** (redeveloped course)
  - *Semesters taught (enrollment)*: Spring 2007 with René Vidal (15), Fall 2008 (18), Fall 2009 (8)
  - *Course description*: A beginning graduate course in linear systems theory.
  - *Modification*: Course emphasizes a linear-algebraic perspective on linear systems theory.
- ◇ **EN.530.646 *Introduction to Robotics*** (redeveloped course)
  - *Semesters taught (enrollment)*: Spring 2005 (14), Fall 2008 (13), Fall 2012 (18)
  - *Course description*: A beginning graduate course that provides an introduction to the mathematical and physical principles used in robotics.
  - *Modification*: Course emphasizes a Lie-group-theoretic approach to robotics.
- ◇ **EN.530.676: *Locomotion in Mechanical and Biological Systems*** (new course)
  - *Semesters taught (enrollment)*: Spring 2004 (21), Spring 2006 (6), Fall 2011 (12)
  - *Course description*: Graduate course on mechanics and control in locomotion. Topics include modeling (e.g. Lagrangian mechanics, gray-box modeling), dynamical systems theory (nonholonomic systems, piecewise holonomy, Poincaré analysis, and Floquet theory), design (control synthesis, mechanical design), and data analysis from real animal locomotor control experiments.
- ◇ **EN.530.677: *Feedback Control of Walking and Running*** (new course)
  - *Semester taught (enrollment)*: Spring 2008 (7)
  - *Course description*: Graduate course on the modeling, control, and adaptation of human and robotic bipedal walking and running. Topics include basic manifold theory, Hamiltonian and Lagrangian mechanics, impacts and conservation of momentum, limit cycles and Poincaré analysis, hybrid zero dynamics. The course culminates in a formal treatment of feedback control of walking and running for robotics as well as recent models of human locomotor control being developed by my laboratory.
- ◇ **EN.530.649: *Adaptive Systems and System Identification*** (new course)
  - *Semester taught (enrollment)*: Spring 2012 (15)
  - *Course description*: This course covers several fundamental approaches system identification, including spectral, prediction error, subspace, and “online” (adaptive) identification methods. The emphasis will be on LTI systems, but some time will be devoted to system identification for classes of nonlinear dynamical systems, such as those that are linear in parameters. Prerequisites: 580.616/530.616, Introduction to Linear Dynamical Systems.

*Guest Lectures at Johns Hopkins University, 2003–present*

Key: EN.613=Computer Science; AS.200=Psychological and Brain Sciences

- ◇ **EN.600.436: *Algorithms for Sensor-Based Robotics*** (guest lecture)
  - *Semester of guest lecture (attendance):* Fall 2004 (30), Fall 2012 (30)
  - *Description:* Lecture on Navigation Functions as a method for robot motion planning.
- ◇ **AS.200.613: *Fundamentals of Psychological & Brain Sciences*** (guest lecture)
  - *Semester of guest lecture (attendance):* Fall 2012 (20)
  - *Description:* Lecture introducing the concept of dynamical systems to graduate students in the Psychological and Brain Sciences department assuming little or no prior background in this area.

*The University of Michigan, 1995–1997, Graduate Student Instructor*

- ◇ **EECS 215 *Introduction to Electronic Circuits*** (1995). Laboratory instructor for introductory undergraduate Electrical Engineering circuits lab.
- ◇ **EECS 460: *Control Systems Analysis and Design*** (1996). Session instructor for introductory course in classical control systems theory and design.
- ◇ **EECS 463: *Modern Control Systems Design Lab*** (1997). Laboratory instructor for advanced undergraduate team-based laboratory course in control systems design.
- ◇ **Co-developed EECS 461: *Embedded Control Systems*** (1999-2000). Co-developed this new course with J. Freudenberg and B. Gillespie. A team-based laboratory course that teaches the integration of real-time software and hardware systems, mechanical design, and systems theory. Course received [writeup in Mathworks newsletter](#).

*Specialty Courses, Short Courses, etc*

- ◇ **The Math, Science, Robotics, and Practice of Juggling.**
  - *Semester taught (enrollment):* Fall 2014 (13)
  - *Course description:* Three week course taught as part of the [Odyssey](#) program at [Johns Hopkins University](#). In this hands-on course, students learn about the math, science, and engineering of juggling, as well as learn the craft of juggling itself.

## PROFESSIONAL ACTIVITIES

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*Special Courses Taken*

- ◇ Neural Systems and Behavior, Marine Biological Laboratory, Woods Hole, MA, 2010

*Advisory Committees*

- ◇ Scientific Advisor to the International Consortium on Biomimetic Technology for Vibrissal Active Touch (BIOTACT), 2009-2010

*International Program Chairs*

- ◇ General Co-Chair: 15th [International Conference on Climbing and Walking Robots \(CLAWAR\)](#), 2012
- ◇ Area Chair: Robotics: Science and Systems (RSS) Conference, 2012

*Technical Reviews and Program Committees*

- ◇ Journal reviews (partial list):
  - Biological Letters
  - Experimental Brain Research
  - IEEE Transactions journals: Robotics, Automation Science and Engineering, Oceanic Engineering, Automatic Control, Biomedical Circuits and Systems
  - Journal of Experimental Biology
  - PLoS Biology, PLoS Computational Biology, and PLoS ONE
  - Proceedings of the Royal Society B: Biological Sciences
  - Science
  - Proceedings of the National Academy of Science (PNAS)

◇ Conference and Workshop Program Committees

- Living Machines: 2012, 2013
- Robotics: Science and Systems (RSS) Program Committee: 2005, 2009, 2011, 2013
- Workshop on the Algorithmic Foundations in Robotics (WAFR), 2008
- Workshop on Dynamic Vision at European Conference on Computer Vision (ECCV), 2005, 2006, 2007
- International Conference on Robotics and Automation (ICRA), 2006, 2008, 2010
- International Conference on Advanced Robotics (ICAR), 2007
- Fast Motions in Robotics and Biomechanics, 2005
- Intelligent Robots and Systems (IROS), 2005
- Robot Motion and Control (RoMoCo), 2005, 2009, 2011

◇ Grant Reviews:

- NSF College Of Reviewers, 2013–present
- NSF Panelist (2004, 2007, 2009, 2010, 2012) and ad hoc reviewer
- Canada Foundation for Innovation (2012) ad hoc reviewer

*Workshops and Tutorials*

- ◇ Co-Organizer (with Xinyan Deng and Soon-Jo Chung) Bio-Inspired Robotics Workshop, Robot Science and Systems (RSS) 2012
- ◇ Organizer, Ribbon-Fin Propulsion Workshop I, Johns Hopkins University, March 23-24, 2007
- ◇ Co-Organizer (with Hong Zhang) Vision-based Control of Mobile Robots, *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Las Vegas, NV, October 2003

*Professional Memberships*

- ◇ Senior Member, IEEE
- ◇ Society for Integrative and Comparative Biology (SICB)
- ◇ Society for Neuroscience (SfN)

## SERVICE AND OUTREACH

*Fostering Research in the Baltimore Area*

2013–2014	STEM Achievement in Baltimore Elementary Schools (SABES), Team Lader
2006–present	Faculty Mentor, Baltimore Ingenuity Project
2005–present	Faculty Mentor, Women in Science and Engineering Program
2011–2013	Faculty Mentor, Minority Access to Research Careers (MARC) program
2013	Judge, 20th Annual Undergraduate and Graduate Research Symposium, Morgan State University

*Johns Hopkins University, Department of Mechanical Engineering (ME)*

2011–present	Chair, Graduate Recruiting Committee
2013–present	Member, ME Web / ME News Letter Committee
2013–present	Member, Grad Program, Affairs + MEGA Committee
2013	Bio Faculty Search Committee, Mechanical Engineering
2012	Bio Faculty Search Committee, Mechanical Engineering
2011–2012	Member, Grad Program and Affairs Committee
2005–2010	Web/Publicity Committee
2003–present	Advisor, Tau Alpha Chapter of Pi Tau Sigma
2003–2010	Computing Facilities Committee (Chair: 2004–2006, 2008–2009)
Fall 2004	Chair, ME Seminar Series



*Johns Hopkins University, G.W.C. Whiting School of Engineering (WSE)*

2013–present	Deputy Director, LCSR (director of academic programs)
2010–present	WSE IT Faculty Advisory Committee
2010–2012	Program Coordinator, Robotics Minor
2012	Faculty Search Committee, <a href="#">Laboratory for Computational Sensing and Robotics (LCSR)</a>
2007–2010	WSE Communications Committee
2009	Reviewer, Student Initiatives Fund
2009	Faculty Advisor, Shaffer Hall Lobby Working Group
2008	Selection Committee, Vredenburg Scholarship
2005	Selection Committee, Westgate Scholarship

*Johns Hopkins University*

2014–present	Member, JHU Library Advisory Committee (LAC).
2011–present	Member, <a href="#">Homewood Academic Computing Advisory Committee (HAC)</a> .
2010–present	Faculty Advisor, Homewood Postdoctoral Association
2011–2013	PI Partner, Financial Reporting Project
2009	Grant Preparation, Submission, and Award Faculty Working Group
2010	PI Partner, Best Environment for Research and Scholarship (BERS)

*The University of Michigan*


2000–2001	Mentor, Systems Division Mentorship Program
1996–2000	Staff mentor, <a href="#">University of Michigan Mentorship Program</a>
1998–1999	EECS Department Representative, <a href="#">ASEE Student Chapter</a>

*The Ohio State University*

1992–1995	Active Member Eta Kappa Nu, Gamma Chapter at Ohio State University (President: 1994–1995; Vice President: 1993–1994)
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## RECENT PRESS

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2014	Press for Ankarali et al, 2014, J. Neurophysiol. <ul style="list-style-type: none"> <li>◊ “No Clowning Around: Juggling Study May Shed Light on How Our Senses Help Us Run”</li> </ul>
2013	Press for Dyhr et al, 2013, J. Exp. Biol. <ul style="list-style-type: none"> <li>◊ “Footage reveals how insects use their bodies to hover”, BBC News, <i>Science and Environment</i>.</li> <li>◊ “The Abdomen: The Secret to Stabilising Flight”, Highlighted in <i>Inside JEB</i>.</li> <li>◊ <a href="#">Roboticians discover the secret of insect flight, and it's not wings</a>, io9.com</li> </ul>
2012–2013	Several pieces produced on a class project based on high-tech cooking for course 530.420, Robot Sensors and Actuators: <ul style="list-style-type: none"> <li>◊ “A quest for the perfect piece of toast”, JHU Magazine.</li> <li>◊ “Johns Hopkins Students Engineer the Perfect Toast”, Baltimore Fish Bowl.</li> <li>◊ “Engineering students get deliciously inventive”, Hopkins Gazette</li> <li>◊ Associated Youtube video: <a href="http://www.youtube.com/watch?v=X6XBoEyC8HY">http://www.youtube.com/watch?v=X6XBoEyC8HY</a></li> </ul>
2012	“Bio Bots”, Johns Hopkins Engineering Magazine 
2012	“Hammer Flip”, Provosts Project on Innovation. Associated youtube video: <a href="http://www.youtube.com/watch?v=XNGRgCXfKk4">http://www.youtube.com/watch?v=XNGRgCXfKk4</a>
2012	Science Nation video: <a href="http://www.youtube.com/watch?v=3LsBse8WKm4">http://www.youtube.com/watch?v=3LsBse8WKm4</a> , produced to showcase the collaborative work of Noah Cowan and Eric Fortune.