

Linda G. Bushnell

Department of Electrical Engineering
University of Washington
Seattle, WA 98195-2500
LB2@u.washington.edu

Education

Ph.D. Electrical Engineering, University of California, Berkeley, California, September 1994.
Nonlinear control theory and nonholonomic systems.

MA Mathematics, University of California, Berkeley, California, May 1989. Differential equations and real analysis.

MS Electrical and Computer Engineering, University of Connecticut, Storrs, Connecticut, August 1987. Control and communication systems.

BS Electrical Engineering and Computer Science, The University of Connecticut, Storrs, Connecticut, May 1985. Electrical instrumentation and control systems. Magna Cum Laude.

Professional Experience

University of Washington, Department of Electrical Engineering, Seattle, WA 98195.

Research Assistant Professor, 2003 – present.

Affiliate Assistant Professor, 2000 – 2003.

Founder and Director of Networked Control Systems Laboratory,

Created & taught three-course sequence on autonomous mobile robotics. Supervising undergrad and graduate students; research on networked control systems and multi-agent communication.

U.S. Army Research Office, Research Triangle Park, NC.

Program Manager, 1994 – 2000.

Systems and Control Program, Engineering Sciences Directorate. Managed basic research projects, developed research opportunities and facilitated the transition of technology to DoD Laboratories.

Duke University, Electrical and Computer Engineering Department, Durham, NC.

Adjunct Assistant Professor, 1994 – 2001.

Co-founder of Laboratory for Intelligent and Nonlinear Control. Research on networked control systems; taught undergrad and graduate level controls courses; supervised graduate students and National Research Council Research Fellows.

Honors and Awards

UW Electrical Engineering Chair's Award for service and outreach (2003)

NSF ADVANCE Fellow Award (2002)

UW Women in Science and Engineering (WiSE) Graduate Student Mentor of the Year Award (2002)

Superior Civilian Service Award, USA Government (2000)

IEEE Senior Member (1999)

California Legislative Grant Program Fellowship Award (1989)

Eta Kappa Nu, Electrical and Computer Engineering Honor Society

Tau Beta Pi, Engineering Honor Society

Citizenship: USA

Journal Publications

1. K. Sampigethaya, M. Li, R. Poovendran, R. Robinson, L. Bushnell & S. Lintelman, "Commercial Airplane Health Data Collection & Distribution Securely," *IEEE Aerospace and Electronic Systems Magazine*, 24:7, pp. 14-20 (July 2009).
2. T. Pham, T. Green, J. Chen, P. Truong, A. Vaidya & L. Bushnell, "A Salinity Sensor System for Estuary Studies," *Applied Math Journal: Networks and Heterogeneous Media*, 4:2, pp. 381 – 392 (June 2009).
3. S. McKennoch, T. Voegtlin & L. Bushnell, "Spike-Timing Error BackProp in Theta Neuron Networks," *Neural Computation*, 21:1, pp. 9-45 (January 2009).
4. K. Sampigethaya, R. Poovendran & L. Bushnell, "Secure Operation, Control and Maintenance of Future eEnabled Airplanes," *Proceedings of the IEEE*, 96:12, pp. 1992-2007 (December 2008).
5. Y. Hong, G. Chen & L. Bushnell, "Distributed Observers Design for Leader-Following Control of Multi-Agent Networks," *Automatica*, 44:3, pp. 846-850 (March 2008).
6. G. Walsh, O. Beldiman & L. Bushnell, "Error encoding algorithms for networked control systems," *Automatica*, Vol. 38:2, pp. 261 – 267 (February 2002). [84 citations, Google Scholar, 9/16/09]
7. G. Walsh, H. Ye & L. Bushnell, "Stability Analysis of Network Control Systems," *IEEE Control Systems Technology*, 10:3, pp. 438-446 (May 2002). [680 citations, Google Scholar, 9/16/09]
8. H. O. Wang, D. S. Chen & L. Bushnell, "Dynamic feedback control of bifurcations," *Journal of Latin American Applied Research*, 31:3, pp. 219 - 225 (2001).
9. H. Ye, G. C. Walsh & L. G. Bushnell, "Real-time mixed-traffic wireless networks," *IEEE Transactions on Industrial Electronics*, 48:5, pp. 883-890 (October 2001). [48 citations, Google Scholar, 9/16/09]
10. G. C. Walsh, O. Beldiman & L. G. Bushnell, "Asymptotic behavior of nonlinear networked control systems," *IEEE Trans. on Automatic Control*, 46:7, pp. 1093-1097 (July 2001). [235 citations, Google Scholar, 9/16/09]
11. J. Li, H. O. Wang, L. Bushnell, Y. Hong & K. Tanaka, "A Fuzzy Logic Approach to Optimal Control of Nonlinear Systems," *International Journal of Fuzzy Systems*, 2:3, pp. 153-163 (September 2000).
12. D. Tilbury, O. Sordalen, L. Bushnell & S. Sastry, "A Multisteering Trailer System: Conversion into Chained Form Using Dynamic Feedback," *IEEE Transactions on Robotics and Automation*, 11:6, pp. 807-818 (December 1995). [53 citations, Google Scholar, 9/16/09]
13. L. G. Bushnell, D. M. Tilbury & S. S. Sastry, "Steering Three-Input Chained Form Nonholonomic Systems: The Fire Truck Example," *International Journal of Robotics Research*, 14: 4, pp. 366-381 (August 1995). [86 citations, Google Scholar, 9/16/09]
14. G. Walsh & L. Bushnell, "Stabilization of Multiple Input Chained Form Control Systems," *Systems and Control Letters*, 25:3, pp. 227-234 (June 1995).

Editorial Publications

1. X. Hu, Y. Hong & L. G. Bushnell, Special Issue on "Collective Behavior and Control of Multi-Agent Systems," *Asian Journal of Control*, 10:2, pp. 129 – 266 (March 2008).
2. D. S. Bernstein & L. G. Bushnell, "The history of control: from idea to technology," Guest Editorial, *IEEE Control Systems Magazine*, 22:2, pp. 21 – 23 (April 2002).
3. L. G. Bushnell, "Networks and Control," Guest Editorial, *IEEE Control Systems Magazine*, 21:1, pp. 22-23 (Feb. 2001). [53 citations, Google Scholar, 9/16/09]
4. L. Bushnell (Ed.) (2001). Special section on networks and control. *IEEE Control Systems Magazine*, 21:1, 22–99. [32 citations, Google Scholar, 9/16/09]

5. D. Abramovitch & L. Bushnell, "Report on the Fuzzy versus Conventional Control Debate," *IEEE Control Systems Magazine*, 19:3, pp. 88-91 (June 1999).
6. L. G. Bushnell, "On the History of Control Research," Guest Editor, *IEEE Control Systems Magazine*, 16:3, pp. 14-16 (June 1996).
7. L. G. Bushnell, "Historical and Fundamental Developments in Control Systems," *IEEE Control Systems Magazine*, 15:3, pp. 90-92 (June 1995).

Peer-Reviewed Conference Publications

1. L. Bushnell, "Salinity Sensors for Hydrology Analysis and Control," *Irrigation Channels and Related Problems Workshop*, Maiori, Italy (October 2008).
2. T. -T. Pham, T. Green, J. Chen, P. Truong, A. Vaidya & L. Bushnell, "A Salinity Sensor System for Estuaries," *IEEE MTS/OCEAN*, pp. 1-6 (September 2008).
3. R. Poovendran, L. Bushnell, K. Sampigethaya, M. Li, R. Robinson & S. Lintelman, "Security of Wireless Sensor Network Enabled Health Monitoring for Commercial Airplanes," *26th Congress of International Council of the Aeronautical Sciences (AIAA ICAS)* (September 2008).
4. K. Sampigethaya, R. Poovendran & L. Bushnell, "Security of Future eEnabled Aircraft Ad hoc Networks," *8th AIAA Aviation Technology, Integration and Operations (AIAA ATIO) Conference* (September 2008).
5. K. Sampigethaya, R. Poovendran & L. Bushnell, "Challenges to Security eEnabled Aircraft Ad hoc Networks," *Air Transport Research Society (ATRS) Conference* (July 2008).
6. K. Sampigethaya, M. Li, R. Poovendran, R. Robinson, L. Bushnell & S. Lintelman, "Secure Wireless Collection and Distribution of Commercial Airplane Health Data," *IEEE/AIAA 26th Digital Avionics Systems Conference* (October 2007).
7. T.-T. Pham, D. Burnett, L. Handugan, D. Frashure, J. Chen & L. Bushnell, "A Low Cost, Data-Logging Salinity Sensor," *IEEE MTS/OCEAN*, pp. 1-5 (September 2007).
8. S. McKennoch, P. Sundaradevan, and L. Bushnell, "Theta Neuron Networks: Robustness to Noise in Embedded Applications," *International Joint Conference on Neural Networks (IJCNN)* (August 2007).
9. S. McKennoch, D. Liu and L. G. Bushnell, "Fast Modifications of the SpikeProp Algorithm," *IEEE World Congress on Computational Intelligence (WCCI)* (July 2006).
10. S. McKennoch, S. Hoyt and L. G. Bushnell, "A Study of Group Size and Communication in an Evolving Fuzzy-Controlled Population," *Proceedings IEEE International Conference on Fuzzy Systems*, pp. 895 – 900, vol.2 (July 2004).
11. L. G. Bushnell and A. Crick, "Control Education via Autonomous Robotics," *Proceedings 42nd IEEE Conference on Decision and Control* (December 2003).
12. S. Hoyt, D. St. John, D. Wilson and L. G. Bushnell, "A Tree Tour with Radio Frequency Identification (RFID) and a Personal Digital Assistant (PDA)," *Proceedings IEEE Industrial Electronics Conference (IECON)* (November 2003).
13. S. McKennoch, J.-M. McNew and L. G. Bushnell, "A Biologically-Inspired Platform for the Evolution of Communication in Multi-Agent Systems," *Proceedings IEEE International Symposium on Intelligent Control (ISIC)* (October 2003).
14. H. O. Wang, Y. Hong and L. G. Bushnell, "Nonsmooth bifurcation control: from fractional power control to trumpet bifurcation," *Proceedings 40th IEEE Conference on Decision and Control* (December 2001).
15. O. Beldiman, L. G. Bushnell, G. C. Walsh, H. O. Wang and Y. Hong, "Perturbations in Networked Control Systems," *Proceedings ASME-IMECE DSCD* (November 2001).
16. Y. Gu, H. O. Wang, K. Tanaka and L. G. Bushnell, "Fuzzy control of nonlinear time-delay systems: stability and design issues," *Proceedings American Control Conference* (June 2001). [27 citations, Google Scholar, 9/16/09]

17. Y. Hong, H. O. Wang and L. G. Bushnell, "Adaptive finite-time control of nonlinear systems," *Proceedings American Control Conference* (June 2001).
18. Y. Gu, H. O. Wang, Y. Hong and L. G. Bushnell, "A Predictive Congestion Control Algorithm for High Speed Communication Networks," *Proceedings American Control Conference* (June 2001).
19. Y. Hong, G. Yang, L. G. Bushnell and H. O. Wang "Global finite-time stabilization: From state feedback to output feedback," *Proceedings 39th IEEE Conference on Decision and Control*, pp.2908 – 2913, vol.3 (December 2000).
20. H. O. Wang, D. S. Chen and L. G. Bushnell, "Dynamic feedback control of bifurcations," *Proceedings 39th IEEE Conference on Decision and Control*, pp. 1619 – 1624, vol.2 (December 2000).
21. H. Ye, G. Walsh and L. Bushnell, "Wireless Local Area Networks in the Manufacturing Industry," *Proceedings American Control Conference* (June 2000). [21 citations, Google Scholar, 9/16/09]
22. O. Beldiman, L. Bushnell and G. Walsh, "Predictors for Networked Control Systems," *Proceedings American Control Conference* (June 2000). [53 citations, Google Scholar, 9/16/09]
23. G. Walsh, O. Beldiman and L. Bushnell, "Error encoding algorithms for networked control systems," *Proceedings 38th IEEE Conference on Decision and Control* (December 1999).
24. G. Walsh, O. Beldiman and L. Bushnell, "Asymptotic Behavior of Networked Control Systems," *Proceedings 1999 IEEE Conference on Control Applications* (August 1999).
25. G. Walsh, H. Ye and L. Bushnell, "Stability Analysis of Network Control Systems," *Proceedings American Control Conference* (June 1999).
26. O. Beldiman and L. Bushnell, "Stability, linearization and control of switched systems," *Proceedings American Control Conference* (June 1999). [16 citations, Google Scholar, 9/16/09]
27. O. Beldiman, H. O. Wang and L. Bushnell, "Trajectory Generation of High-Rise/High-Speed Elevators," *Proceedings American Control Conference* (June 1998).
28. L. Bushnell, O. Beldiman and G. Walsh, "An Equivalence Between a Control Network and a Switched Hybrid System," *Springer-Verlag Lecture Notes on Computer Science, International Workshop on Hybrid Systems: Computation and Control* (April 1998).
29. H. O. Wang, D. Chen and L. Bushnell, "Control of Bifurcations and Chaos in Heart Rhythms," *Proceedings of the 36th IEEE Conference on Decision and Control* (December 1997).
30. L. G. Bushnell, "An Obstacle Avoidance Algorithm for a Car Pulling Trailers with Off-Axle Hitching," *Proceedings of the 34th IEEE Conference on Decision and Control* (December 1995).
31. L. Bushnell, B. Mirtich, A. Sahai and M. Secor, "Off-Tracking Bounds for a Car Pulling Trailers with Kingpin Hitching," *Proceedings of the 33rd IEEE Conference on Decision and Control*, pp. 2944-2949 (December 1994). [19 citations, Google Scholar, 9/16/09]
32. L. Bushnell, D. Tilbury, and S. Sastry, "Extended Goursat Normal Forms with Applications to Nonholonomic Motion Planning," *Proceedings of the 32nd IEEE Conference on Decision and Control*, pp. 3447-3452 (December 1993). [20 citations, Google Scholar, 9/16/09]
33. G. Walsh and L. Bushnell, "Stabilization of Multiple Input Chained Form Control Systems," *Proceedings of the 32nd IEEE Conference on Decision and Control* (December 1993). [62 citations, Google Scholar, 9/16/09]
34. L. G. Bushnell, V. P. Srinivasan and L. T. Nguyen, "Systems Integration of the VLSI-PLM Chip," *Proceedings of the First International Conference on Systems Integration*, April 1990.
35. L. G. Bushnell, D. Serfaty and D. L. Kleinman, "Human Information Fusion in a Team," *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics* (October 1987).

36. L. G. Bushnell, D. Serfaty and D. L. Kleinman, "Human Information Processing in Distributed Command and Control," *Proceedings of the JDL Command and Control Research Symposium* (June 1987).
37. D. Serfaty, D. L. Kleinman and L. G. Bushnell, "Empirical Investigation of Human Functions in Distributed C3 Systems," *Proceedings of the Ninth MIT/ONR Workshop on C3 Systems* (June 1986).

Professional Society Activities

Professional Society Offices/Committees:

Secretary-Administrator, IEEE Control Systems Society, 2001 – 2007.

Member, Executive Committee, IEEE Control Systems Society, 2001 – 2007.

Member, Board of Governors, IEEE Control Systems Society, 1999 – 2007.

Chairperson, IEEE Control Systems Society History Standing Committee, 1997 - 2000.

Editorial Board Positions:

Guest Co-Editor, special issue of Asian Journal of Control, "Collective Behavior and Control of Multi-Agent Systems," March 2008.

Associate Editor, *IEEE Control Systems Magazine*, January 1999 - December 2002.

Guest Co-Editor, special issue of *IEEE Control Systems Magazine*, "History of Control," April 2002.

Guest Editor, special issue of *IEEE Control Systems Magazine*, "Networks and Control," Feb. 2001.

Guest Editor, special issue of *IEEE Control Systems Magazine* "On the History of Control Research," June 1996.

Conference Operating Committee Positions:

Program Chair, American Control Conference, New York, NY, July 2007.

Publicity Chair, American Control Conference, Portland, OR, June 2005.

Publicity Chair, International Conference on Advanced Robotics, Seattle, WA, July 2005.

Vice-Chair for Invited Sessions, Conference on Control Applications CCA/ISIC, Mexico, 2001.

Vice-Chair for Invited Sessions, IEEE Conference on Decision and Control, Sydney, Australia, December 2000.

Vice-Chair for Publications, American Control Conference, San Diego, CA, June 1999.

Vice-Chair for Invited Sessions, American Control Conference, Philadelphia, PA, June 1998.

Conference Technical Program Committees:

American Control Conference, 2000-2001, 2003-2007.

IEEE International Symposium on Intelligent Control, 2003-2004.

IEEE Conference on Decision and Control, 1998.

Mentoring Activities

Panelist, "Professional Development Panel for Women Faculty: Pathways and Checkpoints," American Society for Engineering Education (ASEE) Annual Conference & Exposition, Portland, Oregon, 2005.

Panelist, "Pathways to success in industry and government women in control: challenges, opportunities, and rewards," IEEE Conference on Decision and Control, 2004.

Graduate and Postgraduate-Scholar Advisees

Current Ph.D. and M.S. Students

Tamara Bonaci (Ph.D., expected 2014)

Nguyen Quoc Nghi (M.S., expected 2010)

Current Undergraduate Researchers

Robby Conner
Bahman Shirinzadeh
Jesse Cork

Completed Ph.D. Students (2 Ph.D.)

Sam McKennoch, Ph.D. 2007
“On Leveraging the Dynamical Properties of Nonlinear Spiking Neurons”
University of Washington. Now at INRIA (Nice, France).
Octavian Beldiman, Ph.D. 2001
“Networked Control Systems”
Duke University. Now at Mitsubishi Electric Company.

Completed M.S. Students (6 M.S.)

Thanh-Tung Pham, M.S. 2008
Salinity Sensor Systems for Estuaries
University of Washington. Now at BE Meyers.
Preethi Sundaradevan, M.S. 2008
Control and DSP
University of Washington. Now at Cisco.
David Burnett, M.S. 2007
“Underwater Sensors”
University of Washington. Now at Sandia Labs.
Sean Hoyt, M.S. 2005
“A Khepera Robot Infrared Communications and Peer Localization Turret”
University of Washington. Now at SeanHoyt.com.
Mark Yamagishi, M.S. 2004
“Social Rules for Reactive Formation Switching”
University of Washington. Now at Tektronix.
Octavian Beldiman, M.S. 1998
“Control Networks”
Duke University. Now at Mitsubishi Electric Company.

Completed Post-Graduate Scholars (2 Postdocs)

Yiguang Hong, Chinese Academy of Science (NRC Research Fellow 2000 - 2001, Duke University)
David Niemann, (NRC Research Fellow 1998 - 1999, Duke University)