February, 2024

DR. JOHN BAILLIEUL
Distinguished Professor of Engineering
Departments of Mechanical Engineering,
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Contents

1 Education and Editorial Boards

EDUCATIONAL HISTORY

HARVARD UNIVERSITY - CAMBRIDGE, MA (September, 1971 - August, 1975)
M.S., 1973; Ph.D. 1975 - Applied Mathematics Ph.D. Thesis: "Some Optimization Problems in Geometric Control Theory"

UNIVERSITY OF WATERLOO - WATERLOO, ONTARIO, CANADA (September, 1968 - May, 1969)
M.M. (Master of Mathematics) - 1969

JOHNS HOPKINS UNIVERSITY - BALTIMORE, MD (September 1967 - June 1968)

UNIVERSITY OF MASSACHUSETTS - AMHERST, MA (September, 1963 - June, 1967)
B.A. (Mathematics, Magna Cum Laude) - 1967

EDITORIAL BOARDS

1. Associate Editor for Stability, Nonlinear, and Distributed Systems for *IEEE Transactions on Automatic Control*, January 1, 1984 through December 31, 1985.
2. Associate Editor at Large, *IEEE Trans. on Aut. Control*, 1988, 2001 - 2009.
3. Associate Editor for Technical Notes and Correspondence, *IEEE Trans. on Aut. Control*, January, 1989-June, 1992.
4. Member of Editorial Board for the *International Journal of Bifurcation and Chaos*, 1990-1994.
5. Associate Editor *IEEE Robotics and Automation Society Newsletter*, 1990-1992.
6. Editor in Chief, *IEEE Trans. on Aut. Control*, July 1, 1992 - June 30, 1998.
7. Editorial Board Member, *The Control Handbook*, W.S. Levine, Editor, CRC Press (in cooperation with the IEEE Press), Boca Raton, FL, 1996, 1548 pages.
8. Editorial Board Member, *Proceedings of the IEEE*, January 1, 1998 - December 31, 2006. January, 2020 - present.
9. Editorial Board Member, *Wiley Encyclopedia of Electrical and Electronics Engineering*, J.G. Webster, Editor, 1998.
10. Editorial Board Member, *Robotics and Computer Integrated Manufacturing*, Elsevier January, 1999 - December, 2017.
11. Board of Editors, *Communications in Information and Systems*, January, 2000 - present.
12. Editorial Board Member *CONTROL THEORY Twenty-Five Seminal Papers, (1932 - 1981)*, IEEE Press, January, 2001.
13. Editorial Board Member *Handbook of Networked and Embedded Control Systems*, D. Hristu-Varsakelis & W.S. Levine, Editors, Birkhäuser, Boston, 2005.
14. Editor in Chief, *SIAM Journal on Control and Optimization*, January 1, 2006 - January 10, 2012.
15. Advisory Editor, Journal of Control Theory and Technology (Previous name Journal of Control Theory and Applications), Springer, ISSN: 2095-6983 (print version), ISSN: 2198-0942 (electronic version), January, 2010 - present.

16. Editor at Large, Asian Journal of Control, January 2011 - present.
17. Editor - Survey Papers, *Automatica* June, 2012 - December, 2019.
18. Co-Editor (with Dr. Tariq Samad), Springer *Encyclopedia of Systems and Control* , John Baillieul and Tariq Samad, Eds., August, 2015, 1554 pages, ISBN: 978-1-4471-5057-2 (Print) 978-1-4471-5058-9 (Online).
    Second Edition, 2021, https://link-springer-com.ezproxy.bu.edu/referencework/10.1007/978-3-030-44184-5.
19. Editorial Board Member, *IEEE ACCESS*, Jan. 2013 - December, 2018.
20. Senior Editor, *Proceedings of the IEEE*, January, 2020 - Present, https://proceedingsoftheieee.ieee.org/about/editorial-leadership/senior-editors/.
21. Senior Editor, *IEEE ACCESS*, January, 2020 - present, https://ieeeaccess.ieee.org/editorial-leadership/senior-editors/.

AWARDS AND PROFESSIONAL RECOGNITION

1. IEEE Fellow (1993), IFAC Fellow (2011), SIAM Fellow (2009).
2. IEEE Control Systems Society Distinguished Member Award, 1995.
3. IEEE Control Systems Society Certificate of Appreciation for six years of service as Editor-in-Chief of the *IEEE Transactions on Automatic Control*, 1998.
4. IEEE Third Millennium Medal, 2000.
5. Consultant Professor, Huazhong University of Science and Technology, Wuhan, China, August, 2003 - August, 2005.
6. Selected to deliver a lecture in the Eminent Speaker Series, October 26, 2007, Charles L. Brown Department of Electrical Engineering, University of Virginia
7. Consultant Professor, Shanghai Jiao Tong University, Shanghai, China, January, 2008
8. Inaugural Distinguished Lecturer Series Award, College of Engineering, Boston University, 2008
9. Plenary Lecture, SICE 2008, International Conference on Instrumentation, Control, and Information Technology, Tokyo, Japan, August 20-22, 2008
10. Booz Allen Hamilton Distinguished Colloquium Series in Electrical and Computer Engineering, University of Maryland, April 16, 2010
11. Plenary Lecture at the 2011 Asian Control Conference, Tapei, May 17, 2011
12. 2011 IEEE Control Systems Society Hendrik W. Bode Lecture Prize
13. T.S. Tsien International Outstanding Lecture, Chinese Academy of Sciences, Beijing, China, May 23, 2013
14. Plenary Lecture at the 2013 Chinese Control and Decision Conference (CCDC), Guiyang, Guizhou, China, May 25, 2013
15. 2013 Zaborsky Lectures, Washington University, St. Louis, Sept. 30 - Oct 2.

16. Inaugural Wijesuriya P. Dayawansa Lectures, Texas Tech University, March 10-12, 2014.
17. Plenary Lecture at the Washington University Workshop on Brain Dynamics and Neurocontrol Engineering, 27 Jun 2017, https://sites.wustl.edu/brain/l
18. Plenary lecture at the International Frontier Forum on Control Science, June 4, 2019, Shandong University.

2 Professional Experience

9/2014 - present Distinguished Professor of Engineering, Boston University
9/2008 - present Professor of Mechanical Engineering, Boston University
8/2005 - 9/2005 Visiting Research Professor, Department of Electrical & Computer Engineering, National University of Singapore
7/2004 - 7/2004 NICTA Visiting Researcher, Dept. of Electrical and Electronic Engineering, the University of Melbourne, Melbourne, AU.
9/2001 - present Professor of Electrical and Computer Engineering, Boston University
7/1999 - 9/2007 Chairman, Dept. of Aerospace/Mechanical Engineering, Boston University
9/1994 - 7/1999 Chairman, Department of Manufacturing Engineering, Boston University
9/1993 - 8/1996 Associate Dean for Academic Programs, College of Engineering, Boston University
8/1992 - 6/1993 Chairman *ad interim*, Dept. of Aerospace/Mechanical Engineering, BU
9/1991 - 12/1991 Senior Visiting Scientist, Laboratory for Information and Decision Systems, M.I.T.
7/1990 - 6/1993 Director, Division of Engineering and Applied Science (D.E.A.S.) Boston University
4/1988 - 8/2008 Professor of Manufacturing Engineering Boston University
1/1985 - 8/2008 Professor of Aerospace and Mechanical Engineering, Boston University
10/1983 - 9/1984 Harvard Univ. Vinton Hayes Visiting Scientist and Research Assoc. in Robotics
10/1983 - 12/1984 Scientific Systems, Inc., Director of Basic Research
6/1979 - 1/1985 Scientific Systems, Inc., Senior Mathematician
9/1975 - 5/1980 Georgetown University, Assistant Professor of Mathematics

Memberships in B.U. Centers
Center for Bio-Dynamics (CBD) Founding member
Center for Information and Systems Engineering (CISE) Founding member
Center for Systems Neuroscience (CSN)

3 Some Administrative Achievements at Boston University

- During the period September, 1994 - August, 1999, while I served as Chairman of the Department of Manufacturing Engineering, sponsored research experienced a nearly threefold increase. Industrial monetary contributions increased as well. Similar increases in resource occurred while I served as Chair of AME, 1999-2007.
- As Chair, I actively led faculty searches that culminated in our hiring Christos Cassandras, Dan Cole, Uday Pal, and Yannis Paschailidis in Manufacturing Engineering and Sean Andersson, Kamil Ekinci, Elise Morgan, Tyrone Porter, and Katherine Zhang in Aerospace and Mechanical Engineering.
- I convened an Industrial Advisory Board for The Department of Manufacturing Engineering in 1996. This was the first advisory board to be set up in the Boston University College of Engineering.

- The Department of Manufacturing Engineering was the only one in the College of Engineering to receive a perfect (= no deficiencies) evaluation in the A.B.E.T. accreditation visit of October, 1997.
- Departmental initiative in distance learning: The Masters Degree in Manufacturing Engineering may be obtained entirely via distance learning. This program was designed to serve the needs of part-time students in industry, and by the time I moved to the chairmanship of Aerospace and Mechanical Engineering, the program had graduated 28 M.S. degree students.
- Ronald C. Garriques, whom I appointed to the AME Departmental Advisory Board in 1999 later became a Trustee of Boston University.

4 Thesis Supervision

BOSTON UNIVERSITY - 1st Reader (Major advisor):

"Simulation and Control of a Single-Link Rotating Flexible Beam," Boston University M.S. Thesis, Aerospace/ Mechanical Engineering, by R.P. Fach 3/12/90.

"Stabilization Problems in the Control of Super-Articulated Mechanical Systems," Danbing Seto, Boston University Ph.D. Thesis, Aerospace/Mechanical Engineering, May, 1993.

"Mathematical Methods Problems for Problems of Kinematic Redundancy in Robotics," Daniel P. Martin, Boston University Ph.D. Thesis, Aerospace/Mechanical Engineering, May, 1993.

"Real-time Control of a Super-articulated Mechanical System," Kristi M. Morgansen, Boston University M.S. Thesis, Aerospace/Mechanical Engineering, May 1994.

"Applications of Qualitative Methods in the Nonlinear Control of Superarticulated Mechanical Systems," Steven P. Weibel, Boston University Ph.D. Thesis, January, 1997.

"Interpolation and Optimal Motion Planning for Mechanical Systems," Subramanian Akileswar, Boston University Ph.D. Thesis, December, 1997.

"Control of Boundary Layer Separation Using Pulsed Jet Actuators," Seung Hoon (Matt) Lee, Boston University M.S. Thesis, Aerospace/Mechanical Engineering, September, 1998.

"Studies in the Control of Rotating Stall in a Single-stage Axial Compressor," Huajun Liu, Boston University M.S. Thesis, Aerospace/Mechanical Engineering, January, 1999.

"Analysis and Control of Superarticulated Biped Robots," Geoffrey W. Howell, Boston University Ph.D. Thesis, Aerospace/Mechanical Engineering, September, 1999.

"Communications Issues in Controlled device Arrays," Madhan Kumar Kanagavel, Boston University M.S. Thesis, Aerospace/Mechanical Engineering, May, 2000.

"Real Time Control over Data Networks with Constrained Communication Resources," Dhananjay Vinjamur Raghunathan, Boston University Department of Aerospace/Mechanical Engineering M.S. Thesis, January, 2002.

"Information Patterns in Formation Control of Autonomous Vehicles," Atul A. Suri, Boston University Department of Aerospace/Mechanical Engineering M.S. Thesis, January, 2004.

"Vortex Models for the Control of Stall," Adam C. Smith, Boston University Department of Aerospace/ Mechanical Engineering Ph.D. Thesis, January, 2005.

"The Blind Robot Problem: Heterogeneous, Asynchronous, Distributed Sensors Controlling a Non-holonomic Remote Vehicle," Grace R. Kessenich, Boston University Department of Aerospace/Mechanical Engineering M.S. Thesis, May, 2005.

"Development and Implementation of a High-level Command System and Compact User Interface for Non-holonomic Robots," Hani Michael Sallum, Boston University Department of Aerospace/Mechanical Engineering M.S. Thesis, May, 2005.

"Robust and Efficient Designs for Information Based Control - Operating Near the Data-Rate Limit," Keyong Li, Boston University Department of Aerospace and Mechanical Engineering, Ph.D. Thesis, May, 2005.

"Novel Directions in Human-Robot Interactions – Information in Motion and Human Decision Dynamics in Search Tasks," Dhananjay Vinjamar Raghunathan, Boston University Department of Mechanical Engineering, Ph.D. Thesis, September, 2010.

"Nonlinear Control and Human Decision Embedding for Robotic Reconnaissance," Dimitar Baronov, Boston University Department of Mechanical Engineering, Ph.D. Thesis, November, 2010.

"Rigid Formations and Control of Distributed Groups of Mobile Robots," Lester McCoy, Boston University Department of Mechanical Engineering, Ph.D. Thesis, January, 2011.

"Control Communication Complexity and Communication Protocols for Dance," Hasan Kayhan Özcimder, Boston University Department of Mechanical Engineering, M.S. Thesis, August, 2011.

"Passive Control of Bipedal Robots via Tail Morphology," Jonathan S.T. Raphael, Boston University Department of Mechanical Engineering, M.S. Thesis, August, 2012.

"Trajectory Generation for an Ackermann Vehicle Carrying a Dynamic Load," Benjamin Troxler, Masters Thesis submitted to the Institute for Dynamic Systems and Control, ETH, Zurich, October 2012. Co-supervised with Raffaello Dandrea and Angela Schöllig.

"Autonomous Parafoil Guidance in High Winds," Benjamin Shalom Chiel, Boston University Department of Mechanical Engineering, M.S. Thesis, August, 2013.

"Motion Control Using Optical Flow of Sparse Image Features," J. Paul Seebacher, M.S. Thesis, Division of Systems Engineering, December, 2014. `https://open.bu.edu/handle/2144/15191`

"Communicating Through Motion in Dance and Animal Groups," Hasan Kayhan Özcimder, Department of Mechanical Engineering, Boston University, Ph.D. Thesis, December, 2014.

"Role of Control, Communication, and Markets in Smart Building Operation," Bowen Zhang, Systems Engineering Division, Boston University, Ph.D. Thesis, August, 2015.

"GPS-Denied Multi-Agent Localization and Terrain Classification for Autonomous Parafoil Systems," Benjamin S. Chiel, Boston University Department of Mechanical Engineering PhD Thesis, August, 2016.

"Perceptual Aliasing in Vision Based Robot Navigation," Laura Corvese, Boston University Department of Mechanical Engineering, MS Thesis, December, 2017. `https://open.bu.edu/handle/2144/27453`

"Paradigm and Paradox in Power Networks," Shuai Wang, Boston University Division of Systems Engineering, PhD Thesis, May, 2018. `https://hdl.handle.net/2144/30724`

Other BOSTON UNIVERSITY Thesis Committees:

"Boundary Surfaces of Tool Swept Volumes Using Massively Parallel Data Algorithms," Ph.D. Thesis, Department of Manufacturing Engineering, by Y.T. Yung, 8/1/90

"Attenuation of Elastic Waves Due to Scattering from Spherical Cavities and Elastic Inclusions," Ph.D. Thesis, Aerospace/Mechanical Engineering, by Mark K. Hinders, 3/90.

"Dynamic Estimation of Human Joint Loading During Locomotion," Ph.D. Thesis, Department of Biomed-

ical Engineering, Boston University, by Ge Wu, 5/91.

"The Stability of Sliding Systems with Friction Subject to Varying Normal Stress," Boston University M.S. Thesis, Aerospace/Mechanical Engineering, by Deepak Bapna, May, 1992.

"Design and Analysis of Adaptive Optics Control Systems," Boston University, Ph.D. Thesis, Department of Electrical, Computer, and Systems Engineering, by James Huang, 12/94.

"Automatic Identification of Remote Environments and Calibration of Virtual Models," Boston University M.S. Thesis, Aerospace/Mechanical Engineering, by Timothy M. Schulteis, 1997.

"Compaction of Complex CAD Designs," Boston University M.S. Thesis. Aerospace/Mechanical Engineering, by Rajan Mali, May, 1997.

"Development of Microvalve Arrays for Fluid Flow Control," Nelsimar Vandelli, Boston University Ph.D., May, 1999.

"Automatic Identification of Local Geometric Properties During Teleoperation," Thomas Jean-Emile Debus, M.S. Thesis, Boston University Dept. of Aerospace and Mechanical Engineering, May 2000.

"Aerodynamic Sound Generated by a Wing of Complex Geometry," Trevor Howard Wood, Ph.D. Thesis, Boston University Dept. of Aerospace and Mechanical Engineering, June 2001.

"Modeling by Manipulation—Enhancing Robot Perception through Contact State Estimation," Thomas Debus, Boston University department of Aerospace and Mechanical engineering, Ph.D. Thesis, May, 2005.

"Active Interaction Graphs in Consensus and related Cooperative Control Problems," Boston University Department of Aerospace and Mechanical Engineering, M.S. Thesis, May, 2006.

"Tracking a Single Fluorescent Particle in a Confocal Microscope: Source Localization and Controller Design," Ting Sun, Boston University Department of Mechanical Engineering M.S. Thesis, September, 2008.

"Stochastic Control Approaches for Sensor Management in Search and Exploitation," Boston University Department of Electrical and Computer Engineering, Boston University, Ph.D. Thesis, April 2010.

"Distributed Control and Optimization in Energy Limited Cooperative Systems," Minyi Zhong, Boston University Division of Systems Engineering, Ph.D. Thesis, May, 2010.

"Design and Optimization of a Tracking Confocal Microscope," Zhaolong Shen, Boston University Department of Mechanical Engineering Ph.D. Thesis, March, 2011.

"High-speed Atomic Force Microscopy through Local Raster Scanning," Peter I. Chang, Boston University Department of Mechanical Engineering Ph.D. Thesis, March, 2012.

"Formal Synthesis of Control and Communication Schemes," Yushan Chen, Boston University Department of Electrical and Computer Engineering Ph.D. Thesis, April, 2013.

"Optimal Temporal Logic Control of Autonomous Vehicles," Alphan Ulousoy, Boston University Systems Engineering Division Ph.D. Thesis, December, 2013.

"Formal Verification and Controller Synthesis for Discrete-time Systems, Ebru Aydin Göl, Boston University Systems Engineering Division Ph.D. Thesis, February, 2014.

"Body Swarm Interface (BOSI): Controlling Robotic Swarms Using Human Bio-Signals," Aamodh Suresh,, Boston University Department of Mechanical Engineering, MS Thesis, April, 2016.

"Particle Tracking and Inference in Fluorescence Microscopy," Trevor Thomas Ashley, Boston University Department of Mechanical Engineering, Combined MS and PhD Thesis, May 2016.

"A Control Architecture and Human Interface for Agile, Reconfigurable Micro Aerial Vehicle Formations," Dingjiang Zhou, Boston University Department of Mechanical Engineering, PhD Thesis, December, 2016.

"Multi-Agent Persistent Monitoring of a Finite Set of Targets," Xi Yu, Boston University Department of

Mechanical Engineering, PhD Thesis, December, 2017.

"Controller design and implementation on a two-axis dual stage nanopositioner for local circular scanning in high speed atomic force microscopy," Yuhe (Clara) Chang, Boston University Department of Mechanical Engineering, PhD Thesis, May, 2022.

"Robust Localization and Navigation with Linear Programming," Mahroo Bahreinian, Boston University Systems Engineering Division Ph.D. Thesis, September, 2022.

HARVARD UNIVERSITY - 2nd Reader:

"Finite Time Differential Equations," Ph.D. Thesis by V.T. Haimo, 8/84

"Completely Integrable Hamiltonian Systems and Total Least Squares Estimation," Ph.D. Thesis by A.M. Bloch, 9/85.

"Geometrical Analysis of Compliant Mechanisms in Robotics," Ph.D. Thesis by J. Loncaric, 9/85.

"The Optimal Kinematic Design of Mechanisms," Ph.D. Thesis by Frank C. Park. 4/91.

Service on Thesis Committees at INSTITUTIONS OUTSIDE THE U.S.:

"Control of Systems Governed by Partial Differential Equations," Cheng-Shong XU, Second Doctorate, Universite de Metz, FRANCE, January, 1997.

"Modeling and Control of Fluid Flows and Marine Structures," Ole Morten Aamo, Ph.D. Dissertation, Department of Engineering Cybernetics, Norwegian University of Science and Technology, May 31, 2002.

"Quantisation Issues in Feedback Control," Hernan Haimovich, Ph.D. Dissertation, School of Electrical Engineering and Computer Science, The University of Newcastle, Australia, August 30, 2006.

"Sur la géométrie des tansfert orbitaux," Jean-Baptiste Caillau, Mémoire présenté pour l'habilitation à diriger des recherches, Institut National Polytechnique de Toulouse, France, December 1, 2006.

"Multiobjective Kinematic Trajectory Planning: An Application to the Captive Trajectory Simulation (CTS) System," Alexis Guigue, A thesis submitted to the Faculty of Graduate Studies and Research, Ottawa-Carleton Institute for Mechanical and Aerospace Engineering, Department of Mechanical and Aerospace Engineering, Carleton University, Ottawa, Canada, March 8, 2010.

"Cognitive Control in Cognitive Dynamic Systems and Networks," Mehdi Fatemi (Seyed Mehdi Fatemi Boosheri), A thesis submitted to the School of Graduate Studies of McMaster University, Hamilton, Ontario, January 21, 2015.

"Dictionary of Motion Primitives for Vision-Based Navigation Using Optical Flow," Chiara Boretti and Philippe Bich, A Masters Degree Thesis in Mechatronic Engineering, Politecnico di Torino, April, 2021. https://webthesis.biblio.polito.it/17914

5 Selected Service to the Profession

1. Organizer of invited sessions at various IEEE conferences:
   (a) "Geometric Control Theory," Invited session held at the 19th IEEE Conference on Decision and Control - Albuquerque, December 1980.
   (b) "Approximation Methods for Nonlinear Estimation," Invited session at the 20th IEEE Conference on Decision and Control - San Diego, December 1981.

(c) "Critical Point Theory and the Stability of Systems," Invited session at the 21st IEEE Conference on Decision and Control - Orlando, December 1982.

(d) "Advances in Mechanics and the Control of Elastic Structures," (with P.S. Krishnaprasad) Invited session at the 24-th IEEE Conference on Decision and Control - Ft. Lauderdale, December, 1985.

(e) 1986 Invited Session on Mechanical Design and Control at the IEEE Int'l Conference on Robotics and Automation, San Franscisco, CA

(f) 1995 Invited Session on Nonlinear Control of Axial Compressors for Aeroengine Applications, at the 34-th IEEE Conference on Decision and Control, New Orleans, December, 1995.

(g) 2002 Invited Session on Convergence of Communication and Control, 41-st IEEE Conference on Decision and Control, Las Vegas, NV, December, 2002.

(h) 2008 Invited Session on Mixed Robot/Human Team Decision Dynamics, 47-th IEEE Conference on Decision and Control, Cancun, Mexico, December, 2008.

(i) 2012 Invited Session on Information Based Real-Time Energy Management in Networks of Smart Appliances, 51-st IEEE Conference on Decision and Control, Wailea, Maui, December, 2012.

(j) 2012 Invited Session on Animal Inspired Flight Control, 51-st IEEE Conference on Decision and Control, Wailea, Maui, December, 2012.

2. Program Committee Memberships:

(a) 22nd IEEE Conference on Decision and Control, San Antonio, December 1983.

(b) MTNS-85, Seventh International Symposium on the Mathematical Theory of Networks and Systems, Stokholm, Sweden, June 10-14, 1985.

(c) 24th IEEE Conference on Decision and Control, Ft. Lauderdale, 1985.

(d) 25th IEEE Conference on Decision and Control, Athens, Greece, 1986.

(e) 1989 IEEE International Conference on Robotics and Automation, Scottsdale, Arizona.

(f) SIAM Conference on Control in the 90's, May 17-19, 1989, San Francisco.

(g) 4th IEEE International Symposium on Intelligent Control - Albany, N.Y. September, 1989.

(h) Scientific Committee of Conference of the Analysis of Controlled Dynamical Systems, Lyon France, July 3-6, 1990.

(i) 5th IEEE International Symposium on Intelligent Control - Philadelphia September 5-7, 1990.

(j) 4th IFAC Symposium on Robot Control (SY.RO.CO.'94), Capri, Italy, September 19-21, 1994.

(k) Organizing Committee for the Meeting of the SIAM Activities Group for Control and Systems Theory to be held in St. Louis, April 27–29, 1995.

(l) Organizing Committee for the International Conference on Control and Information, to be held in Hong Kong, June 5-9, 1995.

(m) Co-Organizer (with Jan C. Willems) of *Brockettfest, Perspectives in Control*, A Scientific Conference in Honor of Roger W. Brockett, October 23,24, 1998, Cambridge, MA.

(n) Co-Organizer (with B. Noack and A. Banaszuk) *B.U./UTRC Workshop on Control of Flow Separation*, Boston University, October 1, 1999.

(o) Fifth SIAM Conference on Control and its Applications, San Diego, July 10-14, 2001. Minisymposium MS25, "Information and Reliable Control."

(p) 41-st IEEE Conference on Decision and Control, Program Committee, 2002.

(q) Steering Committee of the "Workshop on Control Problems in Robotics and Automation," Cosponsored by the IEEE Control Systems Society and the IEEE Robotics and Automation Society, the Venetian Hotel, Las Vegas, NV, December 14, 2002.

(r) 43-rd IEEE Conference on Decision and Control, Program Committee, 2004.

3. Board of Governors, IEEE Control Systems Society, 1985, 1989, 1992 - 1998, 2000 - 2007.
4. Program Chairman for the 1987 IEEE Conference on Decision and Control, Los Angeles, CA, December 9-11, 1987.
5. ADCOM of IEEE Robotics and Automation Council, Jan. 1987–1988.
6. IEEE Control Systems Society Executive Committee, 1992-1993.
7. Chair, IEEE Transactions Committee (Position carries oversight responsibility for all IEEE Transactions, the flagship publications of the IEEE, 1998 - 2001.
8. Member, IEEE TAB Periodicals Comm., 1998 - 2001.
9. Member, IEEE Publications Board, 1999 - ongoing.
10. Member, IEEE Publications Board Finance Committee, 1999 - 2004.
11. Member, IEEE Publications Board Operations Committee, 1999 - 2004.
12. Vice President for Technical Activities, IEEE, CSS, 2001-2002.
13. Member, IEEE Publications Board, Strategic Planning Committee, 2000,
14. Participation in U.S. Army Research Office Planning Group, January, 2001,
15. Chair, IEEE Publications Board, Strategic Planning Committee, 2001-2002.
16. Vice President for Publications, IEEE, Control Systems Society, 2004.
17. IEEE Publications Board Treasurer, 2004.
18. President, IEEE Control Systems Society, 2006.
19. IEEE Vice President for Publications Services and Products, 2007 - 2008
20. Board of Directors, IEEE, 2007 - 2008
21. Executive Committee, IEEE, 2007 - 2008
22. General Co-Chair, Combined 48^{th} IEEE Conference on Decision and Control & 28^{th} Chinese Control Conference, Shanghai, China, December 16-18, 2009.
23. U.S. Army Research Office Board of Visitors, April, 2008.
24. U.S. Army Research Office Board of Visitors, May, 2010, (Served as Chair of the Board).
25. U.S. Army Research Office Network Science Division Strategy Workshop, September, 2010.
26. Chair, IEEE TAB/PSPB Products and Services Committee, 2013.
27. Member IEEE Products and Services Board Strategic Planning Committee, 2013.
28. IEEE Fellow Evaluation Committee, 2015-2017
29. Vice-Chair, Strategic Planning Committee, IEEE Publication Services and Products Board, 2017.
30. Chair, Strategic Planning, IEEE Publication Services and Products Board, 2018.
31. Co-Chair Joint TAB-PSPB Publishing Strategy Committee, 2019.

6 Publications

BOOKS (Edited Volumes):

1. *Essays on Mathematical Robotics*, 1998, (IMA Volumes in Mathematics and Its Applications, v. 104), J. Baillieul, S. Shankar Sastry, & H.J. Sussmann, Eds., Springer-Verlag; ISBN: 0387985964, 372 pages.

2. *Mathematical Control Theory*, 1998, J. Baillieul & J.C. Willems, Eds., Springer-Verlag, ISBN 038983171, 360 pages.

3. *Encyclopedia of Systems and Control* , John Baillieul and Tariq Samad, Eds., Springer, August, 2015, 1554 pages, ISBN: 978-1-4471-5057-2 (Print) 978-1-4471-5058-9 (Online).

4. *Encyclopedia of Systems and Control, 2-nd Edition*, John Baillieul an Tariq Samad, Eds., Springer, 2021, 2469 pages, ISBN: 978-3-030-44183-8 (Print) ISB 978-3-030-44184-5 (eBook) ISBN: 978-3-030-44185-2 (print and electronic bundle) https://doi.org/10.1007/978-3-030-44184-5.

BOOK (Monograph):

1. *Nonholonomic Mechanics and Control*, 2003, by A.M. Bloch, with the collaboration of J. Baillieul, P. Crouch, and J. Marsden, Springer-Verlag, Interdisciplinary Applied Mathematics, ISBN:0-387-95535-6, 483 pages.

2. *Nonholonomic Mechanics and Control, 2-nd Edition*, 2015, by A.M. Bloch, with the collaboration of J. Baillieul, P. Crouch, J. Marsden, and D. Zenkov, Interdisciplinary Applied Mathematics, Volume 24. ISBN 978-1-4939-3016-6, ISBN 978-1-4939-3017-3 (eBook), DOI 10.1007/978-1-4939-3017-3, 582 pages.

PAPERS:

1. "Green's Relations in Some Finite Function Semigroups," Seventh International Symposium on Functional Equations, Aequationes Mathematicae, 4, fasc. 1/2 (1970) 228-229.

2. "Green's Relations in Finite Function Semigroups," Aequationes Mathematicae, 7, fasc. 1 (1972) 22-27.

3. "The Testing of Clinical Judgement and Experimental Computer-Based Measurement of Sequential Problem-Solving Ability," in Computer Diagnosis and Diagnostic Method, Proceedings of 1970 University of Michigan Conference (John Jacques, ed.). Springfield, IL: C.C. Thomas Publisher, 1972, pp. 191-202 (with G.O. Barnett and B.B. Farquhar).

4. "Optimal Control on Lie Groups," Proceedings of the Twelfth Annual Allerton Conference on Circuit and System Theory, (October 2-4, 1974). Sponsored by E.E. Department and the Coordinated Science Laboratory of the University of Illinois, Urbana, pp. 823-833.

5. "Geometric Methods for Nonlinear Optimal Control Problems," J. of Optimization Theory and Applications, 25, 4 (August 1978) 519-548.

6. "Multilinear Optimal Control," Proceedings of Conference on Geometry for the Control Engineer, (NASA-Ames, Summer 1976). Brookline, MA: Math. Sci. Press, 1977.

7. "Systems Theory on Algebraic Varieties," 1977 Conference Information Sciences and Systems. Baltimore, MD: Johns Hopkins University, Department of Electrical Engineering, 1977, p. 307.

8. "The Geometry of Homogeneous Polynomial Dynamical Systems," Nonlinear Analysis: Theory, Methods and Applications, 4, 5 (September 1980) 879-900.

9. "A Controllability Result with an Application to Rigid Body Orientation," 21st Midwest Symposium on Circuits and Systems. Ames, Iowa: Iowa State University, Department of Electrical Engineering, 1978.

10. "Chaotic Motion in Nonlinear Feedback Systems," IEEE Transactions on Circuits and Systems, CAS-27

(1980) 990-997 (with R.W. Brockett and R.B. Washburn).

11. "The Ergodic Theory of Chaotic Feedback Systems," Proceedings of the 19th IEEE Conference on Decision and Control, 1 (1980) 80-82 (with R.W. Brockett).

12. "Estimation Problems with Low Dimensional Filters," Proceedings of the NATO Advanced Study Institute on Stochastic Systems - Les Arcs, 1980. Dordrecht, Holland: D. Reidel Publishing Co., pp. 559-564.

13. "Controllability and Observability of Polynomial Dynamical Systems," Nonlinear Analysis: Theory, Methods and Applications, 5, 5 (April 1981) 543-552.

14. "Pseudo-Randomness in Nonlinear Feedback Systems," Proceedings of the 1981 JACC. Paper FP-5B.

15. "Chaotic Dynamics and Nonlinear Feedback Control," Proceedings of the XVI Banach Center Semester on Optimal Control. Banach Center Publications, Volume 14 (1985), pp. 17-34.

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147. "A Motion Description Language for Robotic Reconnaissance of Unknown Fields," *European J. Control*, Sept.-Dec. 2011,Vol. 17:5-6, pp. 512-525. DOI:10:3166/EJC.17.512-525. (With D. Baronov)

148. "The Control Theory of Motion-Based Communication: Problems in Teaching Robots to Dance," In the 2012 *American Control Conference*, Montreal, June 27-29, pp. 4319-4326. (With K. Özcimder) Download: http://arxiv.org/abs/1109.6037

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150. "Reliable and Efficient Communication through a Controlled Dynamical System," in *Proc. of the 46*$^{\text{th}}$ *Conference on Inf. Sciences and Systems," Princeton University, March 21-23, 2012.*

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152. "Animal-Inspired Agile Flight Using Optical Flow Sensing," in Proceedings of the 51st *IEEE Conference on Decision and Control,* Maui, Hawaii, December 10-13, 2012, pp. 3727-3734. (With K. Sebesta) DOI: 10.1109/CDC.2012.6426163. Available from http://arxiv.org/abs/1203.2816

153. "Stabilizing and Tracking Control of Multiple Pendulum-Cart Systems over a Shared Wireless Network," In *Proceedings of the 31st Chinese Control Conference*, June 25-27, 2012, Hefei, China., pp. 5849 - 5854. (With CHENG Hui, CHEN Yousheng, WONG Wingshing, YANG Qiong, SHEN Lianfeng)

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155. "Optical Flow Sensing and the Inverse Perception Problem for Flying Bats." In Proceedings of the 52nd *IEEE Conference on Decision and Control,* Florence, Italy, December 10-13, 2013, pp. 1608-1615 (with Zhaodan Kong, Kayhan Özcimder, Nathan Fuller, Alison Greco, Diane Theriault, Zheng Wu, Thomas Kunz, Margrit Betke). DOI:10.1109/CDC.2013.6760112 . Available from http://arxiv.org/abs/1303.3072

156. "A Two Level Feedback System to Provide Regulation Reserve." In Proceedings of the 52nd *IEEE Conference on Decision and Control,* Florence, Italy, December 10-13, 2013, pp. 4322-4328. DOI:10.1109/CDC.2013.6760554. (with Bowen Zhang).

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158. "Dancing Robots: The Control Theory of Communication Through Movement," in *Controls and Art: Inquiries at the Intersection of the Subjective and the Objective*, Amy LaViers and Magnus Egerstedt, Eds., pp. 51-72, January, 2014, Springer, ISBN: 978-3-319-03903-9 (Print) 978-3-319-03904-6 (Online).

159. "Perception and Steering Control in Paired Bat Flight," in *Proceedings of IFAC 2014,* Cape Town South Africa, August 25-29, pp. 5276 - 5282. (With Zhaodan Kong, Kayhan Hasan Ozcimder, Nathan Fuller, Diane Theriault, and Margrit Betke). Available from http://arxiv.org/abs/1311.4419.

160. "Communication and Control Protocols for Load Networks in the Smart Grid," in *Proceedings of IFAC 2014*, Cape Town, South Africa, August 25-29, 2014, pp. 11,250-11,256. (with Bowen Zhang).

161. "Optimal Price-Controlled Demand Response with Explicit Modeling of Consumer Preference Dynamics," in Proceedings of the 53rd *IEEE Conference on Decision and Control*, Los Angeles, December, 2014, DOI:10.13140/2.1.3878.6564. (with Bowen Zhang and Michael Caramanis).

162. "Control of Smart Building Dynamic Consumer Preferences for Efficient Regulation Service," in Proceedings of the 53rd *IEEE Conference on Decision and Control*, Los Angeles, December, 2014, pp. 2481 - 2486, DOI:10.1109/CDC.2014.7039767. (with Bowen Zhang and Michael Caramanis). E-print available: http://arxiv.org/abs/1403.4828

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164. "Saliency Based Control in Random Feature Networks," in *Proceedings of the 53*rd *IEEE Conference on Decision and Control*, Los Angeles, December, 2014, pp. 4210-4215 (with Zhaodan Kong). DOI:10.1109/CDC.2014.7040045 E-print available: http://arxiv.org/abs/1403.5462

165. "Understanding bat flight as a model for bio-inspired aircraft designs," In the *Annual Meeting of the Society-for-Integrative-and-Comparative-Biology*, Volume: 55, January 3-7, 2015, West Palm Beach, FL. (With N.W. Fuller, D.H. Theriault, Z. Kong, S. Wang, and M. Betke.

166. Springer *Encyclopedia of Systems and Control* , John Baillieul and Tariq Samad, Eds., August, 2015, 1554 pages, ISBN: 978-1-4471-5057-2 (Print) 978-1-4471-5058-9 (Online).

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169. "Control Challenges in Microgrids and the Role of Energy Efficient Buildings," *PROCEEDINGS of the IEEE*, 104:4, pp. 692-696, April, 2016. (With M. Caramanis and M. Ilić). DOI: 10.1109/JPROC.2016.2532241

170. "Perceptual Modalities Guiding Bat Flight in a Native Habitat," *Scientific Reports - Nature*, **6**, Article number: 27252 (2016). http://www.nature.com/articles/srep27252, (With Zhaodan Kong, Nathan Fuller, Shuai Wang, Kayhan Ozcimder, Erin Gillam, Diane Theriault, and Margrit Betke).

171. "Optimal Provision of Regulation Service Reserves Under Dynamic Energy Service Preferences," (16 pp.), Under review by the *IEEE Trans. Automatic Control*. (With Bowen Zhang and M. Caramanis).

172. "Kirchhoff-Braess Phenomena in DC Electric Networks," In *Proceedings of the 2016 IEEE Conference on Decision and Control*, Las Vegas, December 12-14, pp: 3286 - 3293, DOI: 10.1109/CDC.2016.7798763. (With Shuai Wang)

173. "The First IEEE Workshop on The Future of Research Curation and Research Reproducibility," Washington, DC, November 5,6, 2016, 93 pages. Published online at http://www.ieee.org/researchreproducibility. (With Larry Hall, José M.F. Moura, Sheila Hemami, Gianluca Setti, Michael B. Forster, IEEE Gerry Grenier, Fran Zappulla, and John Keaton. Douglas McCormick and Kenneth Moore, Workshop Rappoerteurs.)

174. "A Novel Decomposition for Control of DC Circuits and Grid Models with Heterogeneous Energy Sources," In *Proceedings of the 2018 American Control Conference* (ACC), Milwaukee, WI, June 27-19. (With Shuai Wang)

175. "Visual GPS-denied Multi-Agent Localization & Terrain Classification," In *Proceedings of the 2018 IEEE Aerospace Conference*, 12 pages, Big Sky, Montana, Mar. 3 - 10. https://ieeexplore.ieee.org/document/8396392 DOI:10.1109/AERO.2018.8396392 (With Benjamin S. Chiel)

176. "Reflections on the Future of Research Curation and Research Reproducibility," *Proceedings of the IEEE*, V.106:5, May, 2018, pp. 779 - 783. DOI:10.1109/JPROC.2018.2816618 (With G. Grenier and G. Setti)

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180. "Paradigm and Paradox in Topology Control of Power Grids," In *Proceedings of the 2018 IEEE Conference on Decision and Control*, Miami Beach, FL, USA, December 17-19, 2018, pp. 4863 - 4868. DOI: 10.1109/CDC.2018.8618888

181. "A Fast Decomposition Method for Power Grid Topology Control," Submitted to the *IEEE Transactions on Automatic Control*. 2018. (With Shuai Wang)

182. "Orthogonality and Duality Relations in Mixed Source DC Circuits," Submitted to the *IEEE Transactions on Circuits and Systems* I, 2018. (With Shuai Wang)

183. "Perceiving Artistic Expression: A Formal Exploration of Performance Art Salsa," *IEEE Access*, V. 6, 19 September 2018, pp. 61867 - 61875, DOI:10.1109/ACCESS.2018.2871003. (With K. Özcimder, Z. Kong, and S. Wang)

184. "Perceptual Control with Large Feature and Actuator Networks," Appearing in the 2019 *IEEE Conference on Decision and Control*, Nice, France, December 11-13, 2019, pp. 3819-3826, doi:10.1109/CDC40024.2019.9029615. Also available from https://arxiv.org/abs/1903.10259.

185. "Visual Navigation with a 2-pixel Camera—Possibilities and Limitations," In *Proceedings of the 21st IFAC World Congress* in Berlin, Germany, July 12-17, 2020. Also available from http://arxiv.org/abs/2103.00285.

186. "Neuromimetic Control — A Linear Model Paradigm," in the *IEEE Conference on Decision and Control*, Autstin, TX, December 13-15, 2021, pp. 2709-2716, DOI: 10.1109/CDC45484.2021.9683392. Also available from https://arxiv.org/abs/2104.12926. (With Zexin Sun)

187. "Visual Navigation Using Sparse Optical Flow and Time-to-Transit," In proceedings of the 2022 *IEEE Conference on Robotics and Automation (ICRA)," Philadelphia, PA, USA, May (ICRA), May 23-27, pp. 9397-9403 (with C. Boretti, P. Bich, Yanyu Zhang).*

188. "Neuromimetic Linear Systems — Resilience and Learning," in proceedings of the *61st IEEE Conference on Decision and Control*, Dec. 6-9, 2022, in Cancún, Mexico, 2022, pp. 7388-7394. Also available in extended form from http://arxiv.org/abs/2205.05013. (With Zexin Sun)

189. "On the complexity of linear systems: an approach via rate distortion theory and emulating systems," 2023 *American Control Conference* (ACC), San Diego, CA, USA, 2023, pp. 2800-2805, doi: 10.23919/ACC55779.2023.10155927. Also available from https://arxiv.org/abs/2306.02435. (With E. Wendel and J. Hollmann)

190. "Monocular Visual Navigation with Deep Neural Network-based Time-to-Transit Estimation," Submitted to *International Conference on Intelligent Robots and Systems—IROS* 2023. (with Ola Ghattas, Chiara Boretti, Philippe Bich, Roberto Tron)

191. "Model Predictive Control for Neuromimetic Quantized Systems." *IFAC-PapersOnLine* 56, no. 2 (2023): 5469-5474. Also available at http://arxiv.org/abs/2212.09887.

192. "Steering a Linear System at the Minimum Information Rate: Quantifying Redundancy via Covariance Assignment Theory," 2023 in *Proceedings of the* 62nd *IEEE Conference on Decision and Control* (CDC), Singapore, Singapore, 2023, pp. 4930-4935, doi: 10.1109/CDC49753.2023.10383610. (With E. Wendel and J. Hollmann)

193. "Emulation Learning for Neuromimetic Systems," 2023 in *Proceedings of the* 62nd *IEEE Conference on Decision and Control* (CDC), Singapore, Singapore, 2023, pp. 8292-8299, doi: 10.1109/CDC49753.2023.10383542.

194. "Synthesis of Infinite-Dimensional Observers for Infinite-Dimensional Vibrating Systems," under review by the *SIAM Journal on Control and Optimization.* (With Cheng-Zhong Xu, Xueru FAN, Chunhai Kou)

195. "Koopman-based Deep Learning for Nonlinear System Estimation," Submitted to the 2024, 63rd *IEEE Conference on Decision and Control* (CDC), Milan, Italy. (With Zexin Sun and Mingyu Chen)

NONTECHNICAL WRITING:

1. "Editorial: Farewell and Hail," *IEEE Trans. on Automatic Control*, V. 37, No. 8, August, 1992, p. 1090.

2. "Editorial," *IEEE Trans. Automat. Contr.*, vol. 43, pp. 759 - 762, June 1998.

3. "The Control Systems Society TAB," Available online `http://www.ieeecss.org/TAB/history.html`

4. "The Aerospace Program at Boston University—and the Origins of the College of Engineering,ÕÕ in *Aerospace Engineering Education During the First Century of Flight*, published by the AIAA, Reston, VA, 2004, pp. 591-603.

5. "Officer's communique - volunteers needed!" *IEEE Control Systems Magazine*, V. 25, No. 2, April, 2005, pp. 89-91.

6. "President's message - A challenging year ahead," *IEEE Control Systems Magazine*, Vol. 26, Issue 1, Feb. 2006, pp. 10 - 12, Digital Object Identifier 10.1109MCS.2006.1580144.

7. "President's message - Spring Thoughts from Late Autumn," *IEEE Control Systems Magazine*, Vol. 26, Issue 2, Apr., 2006, pp. 10-12.

8. "President's message - Coding, Chaos, and a New Archival Technical Publication," *IEEE Control Systems Magazine*, Vol. 26, Issue 3, June, 2006, pp. 10-14, 40.

9. "President's message - Thoughts on Governance," *IEEE Control Systems Magazine*, Vol. 26, Issue 4, August, 2006, pp. 10-12.

10. "President's message - Exquisite Technology and Enduring Technology," *IEEE Control Systems Magazine*, Vol. 26, Issue 5, October, 2006, pp. 10-14.

11. "President's message - Reflections: the Past Year, the History of the Field, and China 2009." *IEEE Control Systems Magazine*, Vol. 26, Issue 6, December, 2006, pp. 10-12,
Digital Object Identifier 10.1109/MCS.2006.252807.

12. "CDC/CCC 2009—A Shanghai Journey," *IEEE Control Systems Magazine*, Vol. 29, Issue 3, June, 2009, pp. 119-130. Available for download:
`http://www.ieeecss.org/CAB/conferences/cdc2009/ShanghaiJourneyFinal.pdf`.

13. "CDC/CCC 2009—Conference Report," *IEEE Control Systems Magazine*, Vol. 30, Issue 6, December, 2010, pp. 114 - 121, Digital Object Identifier: 10.1109/MCS.2010.939124.

14. "Perspective on E-Print Servers and Traditional Publishing," *IEEE Control Systems Magazine*, Vol. 31, Issue 3, June, 2011, DOI: 10.1109/MCS.2011.940731.

15. Cómo hacer volar a los robots como si fueran murciélagos, *El Pais*, 21 SEP, 2016.
`http://elpais.com/elpais/2016/09/06/ciencia/1473158227_000461.html`

7 History of Sponsored Research

Dr. Baillieul has enjoyed research funding from a variety of sources at levels between $100K and $1M per year every year since 1979. Sources of support have included NSF, ONR, AFOSR, ARO, DARPA, the U.S. Department of Energy, Digital Equipment Corporation, Northrop Corporation, United Technologies Corporation, and Motorola. Current grants are:

7.1 Current research

"Neuro-Autonomy: Neuroscience-Inspired Perception, Navigation, and Spatial Awareness for Autonomous Robots," MURI FY 2019 Topic 6. Co-PI's: Y. Paschalidis (P.I.), M. Betke, M. Hasselmo, C. Stern, R. Tron, J. Leonard (MIT), N. Roy (MIT); ONR Grant Number N00014-19-1-2571. Funded amount: $7,499,998. Period of Performance: 02 Sep 2019 to 01 Sep 2024.

"Neuro-Autonomy: Neuroscience-Inspired Perception, Navigation and Spatial Awareness for Autonomous Robots," DURIP Award, Co-PI's: Y. Paschalidis (co-P.I.), R. Tron (P.I.), ONR Grant Number N00014-21-1-2844. Funded amount: $497,047.28. Period of Performance: 08/17/2021 through 08/16/2023.

7.2 Recent grants

1. "Workshop: Engineering Research Communication 2020- Data and software curation and the relationship to reproducible research," NSF Grant Number ECCS-1641014, Funded amount: $100,000. Period of performance: August 1, 2016 through July 31, 2018.

2. "Decentralized Perception from Online Learning and Semantic Understanding," U.S. Office of Naval Research through Harvard University, Grant Number N00014-17-1-2075. Funded amount: $439,564.00. Period of performance: January 1, 2017 through Dec. 31, 2020.

3. "Topological Methods for Design and Control of Adaptive Stochastic Complex Systems to Meet the Challenges of Resilient Urban Infrastructure," DARPA Grant Number HR0011-16-C-0115, Collaboration with subawardees Vahid Tarokh, Harvard University and John Harer, Geometric Data Analytics, Inc. (North Carolina). Funded Amount: $744,915.00, Period of Performance: August 1, 2016 through Dec. 31, 2016.

7.3 MURI's on which Baillieul was either institutional or overall PI

1. ARO (MURI with Harvard and the University of Maryland, Harvard was prime): DAAG55-97-1-0114 "The Design and Control of Smart Structures." Grant Period: May 1, 1997 - August 31, 2003. Boston University award amount: $1,606,091.

2. ARO MURI entitled "Networked Communicating Control Systems," (Grant number DAAD19-01-1-0465) awarded to Boston University (prime) with subcontracting participation by Harvard University, the University of Illinois, and the University of Maryland. Grant period: May 1, 2001 - December 31, 2006. Five year total (incl. subcontracts): $5,000,000.

3. "Behavioral Dynamics in the Cooperative Control of Mixed Human/Robotic Teams," MURI Topic 16, FY 2007 ONR BAA 06-028. Grant award number FA9550-07-1-0528. $1.5M/year for a four university consortium (BU prime, Princeton, UCSB, Washington). Period of performance: May 1, 2007 - April 30, 2012.

4. "AIRFOILS: Animal Inspired Flight with Outer and Inner Loop Strategies," MURI FY 10 Topic 8, Award Number N00014-10-1-0952. Collaboration with Calin Belta, Margrit Betke, Tom Kunz, Yannis Pascahlidis, and colleagues from the University of Washington, Seattle (Prime), the University of Maryland, and the University of North Carolina. Funded Amount: $7,500,000/ (B.U. Portion: $3,127,730.00) Period of Performance: September 1, 2010 through January 31, 2016.

7.4 Other recent grants

1. NSF ITR Grant No. DMI-0330171, "Sensors and Sensor Networks: A Control and Optimization Science Base for Sensor Networks in Adverse and Stochastic Environments," Grant period: Sept. 1, 2003 - August 31, 2009, Five year total (incl. subcontract to UMass, Amherst): $2,487,459. (Team includes C.G. Cassandras, P.I., Baillieul, Castañon, Paschalidis, B.U. Co-P.I.'s)

2. "EFRI-SEED Framework for Advanced Sustainable Building Design. Smart Micro-grid Enabled Buildings Interacting with Utility-Side-of-the-Meter Electricity Markets," NSF Grant Number EFRI-1038230. Collaboration with Michael Caramanis (Boston University), Leslie K. Norford (MIT), and John Fer-

nandez (MIT). Funded amount: $1,986,606. Period of performance: August 15, 2010 through July 31, 2014.

3. Army Research Office STIR Grant No. , "Devices and Control Strategies for *ad hoc* Optical Communications Networks," Grant Period: July 1, 2005 - December 31, 2005. Total funding $50,000. (Joint research with T.G. Bifano).

7.5 Selected past grants

1. DURIP Grant $262,034.00 in equipment to support "Research on Swarms of Communicating Mobile Agents." Grant period: May 1, 2002 - April 30, 2003.
2. "Student Travel Support for the 2009 IEEE Conference on Decision and Control," NSF, Award Number: 0970028. Funded amount: $15,000. Period of performance: December 1, 2009 - November 30, 2010.
3. "Stochastic Methods of Dynamic Security Assessment for Electric Energy Systems," U.S. Dept. of Energy, Contract No. DE-AC01079ET29361. Sept. 1979 - Dec. 1982. $503,740.
4. "Control Theory and Electrical Networks: Towards an Understanding of Energy Efficient Power Conversion Networks," U.S. Dept. of Energy Contract No. DE-FG05-79-ER-10018. Aug. 1979 - Dec. 1981. $69,024.
5. Research and Development of a Methodology for Industry Functional Modeling," U.S. Dept. of Energy, Contract No. DE-AC01-80RA50260. Aug. 1980 - Dec. 1983. $319,425.
6. "Studies in Large Scale Systems Theory," U.S. Dept. of Energy, COntract DE-AC01-80RA50421, Sept. 1980 - Dec. 1983. $300,716.
7. "Chaotic Dynamics in Feedback Control Systems," U.S. Dept. of Energy, Contract No. AC05-80ER10778, Sept. 1980 -Apr. 1983.
8. "Kinematically Redundant Robot Manipulators," U.S. Air Force, AFWAL/MLTC Contract No. F33615-83-5115. Oct. 1983 - Mar. 1984. $59,000.
9. "Kinematically Redundant Robot Manipulators—Phase II," U.S. Air Force, AFWAL/MLTC Contract No. F33615-84-5131. Sept. 1984 - Feb. 1987. $430,582
10. "The Control Theory of Flexible and Articulated Spacecraft," U.S. Air Force, AFOSR Grant No. AFOSR-85-0144, Apr. 1985 - Apr. 1987, $99,074.
11. "The Nonlinear Control Theory of Complex Mechanical Systems," Continuing funding, U.S. Air Force, AFOSR Grant No. AFOSR-85-0144, Apr. 1987 - Mar. 1990, $382,546.
12. "The Nonlinear Control Theory of Complex Mechanical Systems," U.S. Air Force, AFOSR: F49620-96-1-0059, 6/1/90 - 2/28/1998. Various increments totaling $602,884.

8 Recent Presentations of Research

8.1 Distinguished Lecture Series and Plenary Talks

1. "Foundational Aspects of Connectionist Control Theory," Invited webinar for the Robotics and Control group at Michigan State University, September 4, 2020.
2. "Neuro-inspired Control," Plenary lecture at the International Frontier Forum on Control Science, June 4, 2019, Shandong University.

3. "Neuro-inspired Control," Qufu Normal University, June 2, 2019, Qufu, China.

4. "Research Reproducibility in Control and Systems Engineering," Presentation invited by the National Academies of Science, Engineering, and Medicine, 12 Dec 2017, http://sites.nationalacademies.org/DBASSE/BBCSS/DBASSE_184240

5. "Actionable Perception: Thoughts on bio-inspired sensory-motor-behavior control," Washington University Workshop on Brain Dynamics and Neurocontrol Engineering, 27 Jun 2017, https://sites.wustl.edu/brain/

6. Invited Mini-course on Advanced Methods in Nonlinear Control, 10-th Summer School on Geometry, Mechanics and Control, Miraflores, Madrid (Spain) June 19-24, 2016.

   - Lecture 1: "Video Data and the Inverse Perception Problem in Animal Flight Behaviors,"
   - Lecture 2: "Bio-Inspired Flight Control – What we learn from bats and birds,"
   - Lecture 3: "Topological Data Analytics,"
   - Lecture 4: "Topological Aspects of Optimal Information Acquisition."

7. IEEE Control Systems Society Distinguished Lecture: "Information Based Control and Control Communication Complexity," Villanova University, October 25, 2016.

8. IEEE Control Systems Society Distinguished Lecture: "Perceptual Cues and Motion Control in Feature Networks, Concordia University, January 26, 2015.

9. Inaugural Wijesuriya P. Dayawansa Lectures, Texas Tech University, March 10-12, 2014.

   - Lecture 1: Perception-Enabled Control—A new paradigm for biomimetics and machine autonomy
   - Lecture 2: Control Designs that Enhance Perception by Climbing Information Gradients
   - Lecture 3: The Standard Parts Problem and Quantization in Optimal Control

10. 2013 Zaborsky Lectures, Washington University, St. Louis, Sept. 30 - Oct 2.

    - Lecture 1: Perception-Enabled Control—A new paradigm for biomimetics and machine autonomy
    - Lecture 2: Control Designs that Enhance Perception by Climbing Information Gradients
    - Lecture 3: The Standard Parts Problem and Quantization in Optimal Control

11. "Control Designs that Enhance Perception by Climbing Information Gradients," T.S. Tsien International Outstanding Lecture, Chinese Academy of Sciences, Beijing, China, May 23, 2013

12. "Perception-Enabled Control—A new paradigm for biomimetics and machine autonomy," Plenary Lecture, Chinese Control and Decision Conference (CCDC), Guiyang, Guizhou, China, May 25, 2013.

13. "Fifty Years of Information Based Control Theory," The 23-rd IEEE Control Systems Society Hendrik W. Bode Lecture, Orlando, Florida, December 15, 2011.

14. "Information Based Control and Control Communication Complexity," Plenary Lecture, 8-th Asian Control Conference, Kaohsiung, Taiwan, May 17, 2011.

15. "Decision Making in Search, Surveillance, and Reconnaissance," Booz, Allen, Hamilton Distinguished Colloquium in Electrical and Computer Engineering, University of Maryland, Friday, April 16, 2010, 2:00pm.

16. "The Psychology of Human-Robot Interaction," Plenary Lecture to be given at the SICE Annual Conference 2008, to be held at the Univ. of Electro-Communications (UEC), Chofu, Tokyo, Japan on August 20-22, 2008. (SICE=Society of Instrumentation and Control Engineers).

17. "Control Theory, Networks, and Life Itself," Boston University College of Engineering 2008 Distinguished Lecture, Wednesday, March 5, 2008, Life Sciences and Engineering Building.

18. "The Evolving Applications of Control Theory to Devices, Networks and Life Itself," Friday, October 26th, 2007, Thornton Hall, E-316, Charles Brown Department of Electrical Engineering, University of Virginia.

8.2 Other Invited Talks

1. "Physics, Communications Theory, and the Intelligent Control of Mechatronic Systems," Plenary Lecture, October 28, 1998, JCIS (Joint Conference on Information Systems), Duke University, October 23-28, 1998.

2. "Physics, Communications Theory, and the Intelligent Control of Mechatronic Systems," Invited address to the Boston Section of the IEEE Control Systems Society, November 18, 1999.

3. "Averaging Second-order Control Systems: Spatial Invariance," December 3, 1998, Case-Western Reserve University, Electrical Engineering and Computer Science.

4. "Scale Dependence in the Oscillatory Control of Micromechanisms," at the 1998 IEEE Conf. on Decision & Control, December 16-18, Tampa, FL.

5. "Bifurcations and Stabilization of the Vertically Forced n–pendulum as n Approaches Infinity," at the 1998 IEEE Conf. on Decision & Control, December 16-18, Tampa, FL.

6. "Physics, Communications Theory, and the Intelligent Control of Intelligent Machines," Invited hour lecture at the TITech COE Super Mechano-Systems Workshop '99, Tokyo Institute of Technology, February 4-5, 1999.

7. "A Control Design which Respects Characteristic Length Scales in Smart Systems and Smart Structures," SPIE 6-th International Symposium on Smart Structures and Smart Materials, Newport Beach, CA, March 1, 1999.

8. "Averaging Second-order Control Systems: Spatial Invariance," Boston University Department of Electrical and computer engineering Colloquium Series, April 7, 1999.

9. "Feedback Designs for Controlling Device Arrays with Communication Bandwidth Contraints," 4-th ARO Workshop on Smart Structures, Penn State University, August 16-18, 1999.

10. "Matching Conditions and Geometric Invariants for Second-Order Control Systems," 1999 IEEE Conf. on Decision and Control, Phoenix AZ, December 8, 1999.

11. "Scale Invariance in Oscillatory Control of Second-order Nonlinear Systems," LIDS Seminar, MIT, March 7, 2000.

12. "Kinematic Asymmetries and the Control of Lagrangian Systems with Oscillatory Inputs," IFAC Lagrangian and Hamiltonian Methods for Nonlinear Control Workshop, Princeton, March 16, 2000.

13. "Control of Boundary Flow Using Pulsed Air Injection," Flow Control Working Group Meeting, Wright-Patterson AFB, May 11, 2000.

14. "Overview of smart control of fluid dynamics," Harvard University, Agency Review of the Multiuniversity Center for Dynamics and Control of Smart Structures, October 24, 2000.

15. "Information and signal processing for small-scale devices," Harvard University, Agency Review of the Multiuniversity Center for Dynamics and Control of Smart Structures, October 24, 2000.

16. "Information and Communication Requirements for Intelligent Control," ARO/ANU Workshop on Intelligent Systems, The Australian National University, Canberra, Australia, December 8, 2000.

17. "Averaging Methods for Force Controlled and Acceleration Controlled Lagrangian Systems," *The 2000 IEEE Conference on Decision and Control*, Sydney, Australia, December 12, 2000.

18. "Oscillation Mediated Control of Second-order Systems," Invited Plenary Talk at Dynamics Days, Chapel Hill, NC, January 3-6, 2001.

19. "Business Models for Publishers of Technical Research—we live in exciting times!" One hour talk presented to the IEEE Panel of Technical Editors (all editors of all IEEE publications—transactions, Magazines, etc.), Panel of Editors Meeting, San Diego, March 31, 2001.

20. "The Role of Analysis in the Age of Computers," Invited talk at SIAM National Meeting, July 9, 2001, Town and Country Hotel and Resort, San Diego.

21. "The Center for Communicating Networked Control Systems—Overview and Research Plan," Address to Kick-off Meeting for the new Boston University research Center for Communicating Networked Control Systems, B.U. Photonics Center, July 30, 2001.

22. "Information Theory of Reliable Control," Address to Kick-off Meeting for the new Boston University research Center for Communicating Networked Control Systems, B.U. Photonics Center, July 31, 2001.

23. "Vortex Models for the Control of Boundary Flows," Keynote talk at the Sixth U.S. National Congress on Computational Mechanics, Hyatt Regency Dearborn, Dearborn Michigan, August 3, 2001.

24. "Information-based Control Theory," Workshop on Stochastic Theory and Control, University of Kansas, October 18-20, 2001.

25. "Information-based Control of Physical Systems," Department of Engineering Cybernetics, Norwegian Univ. of Sci. and Technology, May 30, 2002.

26. "Hard and Soft Real-Time Communications for Control of Networked Systems," IFAC'02 Workshop on "Advanced Hybrid Systems Theory for the Control of Networked Systems," Barcelona, Spain, July 14, 2002.

27. "Information in Coordinated Motions of Autonomous Vehicles," Mathematical Theory of Networks and Systems (MTNS 2002), University of Notre Dame, August 15, 2002.

28. "Highly Structured Models and the Nonlinear Control of a MEMS Actuator," NSF Workshop on Future Directions on Nonlinear Control of Mechanical Systems, University of Illinois at Urbana-Champagne, October 5, 2002.

29. "Intelligent Control - From State Models to Hybrid Systems," Keynote Address, Control of Nonlinear Systems—A Symposium in Honor of N. Harris McClamroch, University of Michigan, October 18, 2002.

30. "Oscillation-Mediated Control of Lagrangian and Hamiltonian Systems —with applications to micro-scale devices," Mechanical Engineering Seminar, Worcester Polytechnic Institute, October 25, 2002.

31. "The Management of Information in Coordinated Motion Control," GRASP Lab Seminar, University of Pennsylvania, March 6, 2003.

32. "Control Methods for Very Small-Scale Devices," Invited Lecture, *Society for Experimental Mechanics Annual Conf. and Exposition*, Charlotte, NC, June-2-4, 2003.

33. "Real-Time Data-Structures for Feedback Control of Complex Systems," Block Island Workshop on Cooperative Control, June 10,11, 2003.

34. "Information Sciences and their Role in Engineering at B.U.," Colloquium talk given at the Institute of Automation, Shanghai Jiao Tong University, August 9, 2003.

35. "Intelligent Nonlinear Control," Keynote/Plenary Lecture at the 22-nd Chinese Control Conference, August 11, 2003, Three Gorges University, Ychang, P.R. China.

36. "Information Sciences and their Role in Engineering at B.U.," Colloquium talk given at the Huazhong University, Wuhan, China, August 12, 2003.

37. "Engineering at Boston University," Presentation given at Tsinghua University, Beijing, China, August 15, 2003.

38. "Information Based Control of Nonlinear Systems," NSF Workshop on Future Directions in Nonlinear Control of Mechanical Systems, Coordinated Science Laboratory, University of Illinois at Urbana-Champaign, October 4, 2003.

39. "The Center for Networked Control Systems—Overview and Research Status," Introductory Lecture at the 2003 Review workshop of the MURI funded B.U. Center for Networked Control Systems, October 20, 2003.

40. "Real-time Information Management for Coordinated Motion Control," 2003 Review workshop of the MURI funded B.U. Center for Networked Control Systems, October 20, 2003.

41. "Robust Quantization for Digital Finite Communication Bandwidth (DFCB) Control," *The 2003 IEEE Conference on Decision and Control*, Maui, Hawaii, Deccember, talk given by my Ph.D. Student Keyong Li.

42. "Information Patterns and Hedging Brockett's Theorem in Controlling Vehicle Formations," *The 2003 IEEE Conference on Decision and Control*, Maui, Hawaii, December. (With Atul Suri.)

43. "Vortex Models for the Control of Stall," *The 2003 IEEE Conference on Decision and Control*, Maui, Hawaii, December, talk given by my Ph.D. student A.C. Smith.

44. "Geometry, Information, and Ad Hoc Networks of Mobile Agents," Yale University, Communications and Networking Seminar, March 24, 2004.

45. "Information Based Control of Networks of Mobile Agents," Colloquium Talk at the University of Connecticut, March 26, 2004.

46. "The Center for Communicating Networked Control Systems," Talk given at the Weapons Technology Analysis Branch, Aberdeen Proving Grounds, Maryland, May 18, 2004.

47. "Data-rate Problems in Feedback Stabilization of Drift-free Nonlinear Control Systems," invited talk at the 2004 Symposium on the Mathematical Theory of Networks and Systems (MTNS), Katholieke Universiteit Leuven, Belgium, July 9, 2004.

48. "Robust Quantization for Control with Time-Varying Feedback Communication Constraints." invited talk at the 2004 Asian Control Conference, Melbourne, Australia, July 23, 2004,

49. "Data-rate Requirements for Nonlinear Feedback Control," invited talk at the 6-th IFAC NOLCOS 2004 - Symposium on Nonlinear Control Systems, Stuttgart, September 1-3, 2004.

50. "Risk Engineering and the Design of Reliable Networked Control Systems," Workshop on Intelligent Control and Its Applications to Robotics, August 15, 2005, Department of Electrical & Computer Engineering, National University of Singapore.

51. Above lecture also delivered as a colloquium talk at the Division of Control and Instrumentation, EEE, Nanyang Technological University, September 2, 2005.

52. Above lecture also delivered at the RECSYS Workshop on Networked Embedded Systems, EPFL, Lausanne, Switzerland, December 5, 2005.

53. "Source Coding for Guaranteed Performance of Control Systems with Time-Varying Feedback Channel Capacity," Colloquium Lecture, Dept. of Information Engineering, Univ. di Padova, Padova, IT, December 7, 2005.

54. "Structured and Stochastic Rules for Motions of Groups of Robotic Agents," Hour lecture at the workshop entitled "Swarming by Nature and by Design," Feb. 27-Mar. 3, 2006 at the Institute for Pure and Applied Mathematics (IPAM), UCLA.

55. "Source Coding for Guaranteed Performance of Control Systems with Time-Varying Feedback Channel Capacity," CNLS Workshop on Challenges and Opportunities in Distributed Sensor Networks, Los Alamos, March 10, 2006.

56. "Risk-Sensitive Control of Complex Decentralized Systems," Mechanical and Aerospace Department Seminar, Princeton University, April 14, 2006.

57. "Source Coding for Guaranteed Performance of Control Systems with Time-Varying Feedback Channel Capacity," Chinese University of Hong Kong, Department of Information Engineering Seminar, July 17, 2006.

58. "Rethinking Control Engineering in a Networked World," Keynote hour talk at the Opening Ceremony of the Center for Systems & Control at Xiamen University, Xiamen, China, July 27, 2006.

59. "Regular Quantization for Communication-Constrained Feedback Channels," University of Michigan Combined Control Systems Seminar, October 13, 2006.

60. "Control of Networked Devices," Department Seminar, Department of Mechanical and Aerospace Engineering, University of Florida, Jan. 16, 2007.

61. "Information-Based Control: New paradigms and principles," Department Seminar, Department of Aerospace Engineering, University of Illinois, April 12, 2007.

62. "Network Science - More basic than computer science," Keynote Address (Conference attendance = 750), Sixth IEEE International Conference on Control and Automation, Baiyun International Convention Center, Guangzhou, China, May 30, 2007.

63. "Theory and Practice of Control," Plenary Panel Session, IEEE Multi-Conference on Systems and Control, Singapore, October 3, 2007.

64. "Toward a Theory of Protocols for Communication Through Action," Princeton University, Behavioral Dynamics in the Cooperative Control of Mixed Human/Robotic Teams, MURI Kickoff Meeting, September 13, 2007.

65. "The Combinatorial Graph Theory of Structured Formations," Invited talk at the 46-th IEEE Conference on Decision and Control, New Orleans, December 13, 2007.

66. "Decision Making in Search, Surveillance, and Reconnaissance," Seminaire, June 15, 2010, Laboratoire des Signaux & Systèmes, Université Paris-Sud 11, Gif-sur-Yvette, France.

67. "Random Differentiable Structures and Games of Search, Surveillance, and Reconnaissance," Hour talk in the Workshop on Geometric Methods in control and robotics that takes place at La Cristalera, Miraflores de la Sierra, Madrid, Spain, October, 4-6, 2010

68. "Decision Dynamics in Mixed Teams of Humans and Robots - toward a control theory of planning, perception, and reaction," Dynamics and Control Program review, AFOSR, Holiday Inn Arlington, VA, August 6, 2012.

69. "Optimization of Motion-Mediated Communication—a brief lecture dedicated to the memory of Ulf Jönsson, KTH, Stockholm Sweden, August 27, 2012.

70. "Animal-Inspired Agile Flight Using Optical Flow Sensing," Tuesday, December 11, at the 51-st IEEE Conference on Decision and Control, Maui, Hawaii, December 10-13, 2012

71. "The Perceptual Basis of Animal flight Control," Office of Naval Research Program Review: AIRFOILS MURI, Arlington VA, April 24, 2013.

72. "Control Designs that Enhance Perception by Climbing Information Gradients," Invited lecture at the State Key Lab for Synthetic Automation for Process Industries, Northeastern University of China, Shenyang, China, May 20, 2013.

73. "Control Designs that Enhance Perception by Climbing Information Gradients," Invited lecture at the College of Information Engineering, Shenzhen University, May 28, 2013.

74. "The Perceptual Basis of Machine Autonomy," Lecture delivered at the AFOSR Meeting on Future Directions in Control Theory, June 19,2013, Basic Research Innovation Collaboration Center (BRICC), Arlington, VA.

9 Technical Reports

1. Control Theory and Electrical Networks: Towards an Understand of Energy Efficient Power Conversion Networks - Final Report: DOE contract DE-FG05-79-ER-10018. Scientific Systems, Inc., December 1981, 93 pp.

2. Investigation of the Power System Long-Term Dynamic Stabil Problem: Qualitative Methods in Power System Stability - Final Report: DOE Contract DE-AC01-78ET2917. Scientific Systems, Inc., January 1982, 87 pp.

3. Stochastic Methods of Dynamic Security Assessment for Elect Energy Systems – Final Report: DOE Contract DE-AC01-79ET29361. Scientific Systems, Inc., December 1982, 104 pp.

4. Chaotic Dynamics in Feedback Control Systems – Final Report: Contract DE-AC05-80ER10778. Scientific Systems, Inc., April 1983, 45 pp.

5. Research and Development of a Methodology for Industry Functional Modeling – Final Report: DOE Contract DE-AC01-80RA50260. Scientific Systems, Inc., April 1984, 69 pp.

6. Studies in Nonlinear Large Scale Systems Theory – Final Report DOE Contract DE-AC01-80RA50421. Scientific Systems, Inc., April, 1984, 71 pp.

7. Kinematically Redundant Robot Manipulators – Final Report: Air Force AFWAL/MLTC Contract F33615-83-C-5115. Scientific Systems, Inc. June 1984, 57 pp.

8. Advanced Programming and Control Techniques for Complex Mechanical Systems – Final Report: U.S. Air Force Grant AFOSR-86-0273. Boston University, October 30, 1987, 4 pp.

9. Chaotic Dynamics in Nonlinear Feedback Systems – Final Report: DOE Contract DE-AC02-83ER13059. Scientific Systems, Inc., February, 1989, 24 pp.

10. The Active Control of Rotating Chains and Shafts – Final Report: NSF Grant ECS-8805770. Boston University, May 18, 1990, 45 pp.

11. Sensor Based Control of Robotic Mechanisms – Final Report: U.S. Air Force Grant AFOSR-89-0135. Boston University, August 15, 1990, 14 pp.

12. The Nonlinear Control Theory of Complex Mechanical Systems – Final Report: U.S. Air Force Grant AFOSR-85-0144. Boston University, October 15, 1990, 57 pp.

13. Motion Planning and Energy Management in Autonomous Vehicles–Final Report: U.S. Air Force Grant (AFOSR) F49620-94-1-0414.

14. The Control and Dynamics of Smart Structures–Final Report for ARO/MURI Grant No. DAAG-55-97-1-0114.