

P. S. Krishnaprasad

A. Education

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|---|---------------------------------|--------------|
| Indian Institute of Technology (Bombay) | Mechanical Engineering | B.Tech. 1972 |
| Syracuse University | Systems and Information Science | M.S. 1973 |
| Harvard University | Engineering | Ph.D. 1977 |

B. Appointments

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|--------------|---|
| 1987-present | Professor, Electrical and Computer Engineering, University of Maryland |
| 1988-present | Joint Appointment, Institute for Systems Research, University of Maryland |
| 1982-1987 | Associate Professor, Electrical Engineering, University of Maryland |
| 1980-1982 | Assistant Professor, Electrical Engineering, University of Maryland |
| 1977-1980 | Assistant Professor, Systems Engineering, Case Western Reserve University |
| 1987-present | Director, Intelligent Servosystems Laboratory, University of Maryland |

Short-term visiting:

University of California Berkeley (1984 February, 1985 February, 1986 November); Erasmus University, Rotterdam, (May-June 1981); University of Groningen, Groningen (August 1989); California Institute of Technology, (May 1992, April 2003, August 2004, August 2005)

Long-term visiting:

Cornell University, Mathematical Sciences Institute (Fall 1989)
Princeton University, Mechanical and Aerospace Engineering (Spring 1995)

C. Publications

Most closely related to proposed project:

- (i) A. M. Bloch, P. S. Krishnaprasad, J. E. Marsden and T. S. Ratiu, "The Euler-Poincaré Equations and Double Bracket Dissipation," *Communications in Mathematical Physics*, vol. 175, 1-42, (1996) <https://doi.org/10.1007/BF02101622>
- (ii) E. W. Justh and P. S. Krishnaprasad, "Pattern-Forming Systems for the Control of Large Arrays of Actuators," *Journal of Nonlinear Science*, Vol. 11, 239-277, (2001) <http://dx.doi.org/10.1007/s00332-001-0392-x>
- (iii) E. W. Justh and P. S. Krishnaprasad, "Equilibria and Steering Laws for Planar Formations," *Systems and Control Letters*, **52**(1), 25-38, (2004) <http://dx.doi.org/10.1016/j.sysconle.2003.10.004>
- (iv) E. W. Justh and P. S. Krishnaprasad, "Optimality, Reduction and Collective Motion," *Proceedings of the Royal Society of London A*, **471**(2177), (2015) <https://doi.org/10.1098/rspa.2014.0606>
- (v) M. Mischiati and P. S. Krishnaprasad, "Geometric Decompositions of Collective Motion," *Proceedings of the Royal Society of London A*, **473**(2200), (2017) <https://doi.org/10.1098/rspa.2016.0571>
- (vi) E. W. Justh and P. S. Krishnaprasad, "Enlargement, Geodesics, and Collectives," In: Nielsen F., Barbaresco F. (Eds) *Geometric Science of Information, GSI 2015*. pp. 558-565, Lecture Notes in Computer Science, vol. 9389. Springer, Cham, (2015) https://doi.org/10.1007/978-3-319-25040-3_60

Other significant publications:

- (i) A. M. Bloch, P. S. Krishnaprasad, J. E. Marsden and R. M. Murray, "Nonholonomic Mechanics with Symmetry," *Archive for Rational Mechanics and Analysis*, **136**(1), 21-99, (1997) <https://doi.org/10.1007/BF02199365>
- (ii) V. Manikonda and P. S. Krishnaprasad, "Controllability of a Class of Under-actuated Mechanical Systems with Symmetry," *Automatica*, **38**(11), 1837-1850, (2002) [http://dx.doi.org/10.1016/S0005-1098\(02\)00095-X](http://dx.doi.org/10.1016/S0005-1098(02)00095-X)

(iii) P. S. Krishnaprasad and D. P. Tsakiris, "Oscillations, SE(2)-snakes and Motion Control: A Study of the Roller Racer," *Dynamical Systems*, **16**(4), 347-397, (2001)

<http://dx.doi.org/10.1080/14689360110090424>

(iv) K. S. Galloway, E. W. Justh and P. S. Krishnaprasad, "Symmetry and Reduction in Collectives: Cyclic Pursuit Strategies," *Proceedings of the Royal Society of London A*, **469**(2158), (2013) <http://dx.doi.org/10.1098/rspa.2013.0264>

(v) K. S. Galloway, E. W. Justh and P. S. Krishnaprasad, "Symmetry and Reduction in Collectives: Low-dimensional Cyclic Pursuit," *Proceedings of the Royal Society of London A*, **472**(2194), (2016) <https://doi.org/10.1098/rspa.2016.0465>

(vi) Y. Huang and P. S. Krishnaprasad, "Sub-Riemannian geometry and finite-time thermodynamics Part 1: The stochastic oscillator," *Discrete and Continuous Dynamical Systems Series S*, online (2019), 26 pages, <http://dx.doi.org/10.3934/dcdss.2020072>

D. Synergistic Activities (some recent examples)

Leadership in MURI Centers (ARO-MURI 1997 on Dynamics and Control of Smart Structures, ONR-MURI 1997 on Auditory and Acoustics Research, ARO-MURI 2001 on Communicating Networked Control Systems, ONR-MURI 2007 on Nonlinear Dynamics in Networked Sensors, ARO-MURI 2013 on Information Engines – Nanoscale Control, Computing, and Information Out of the Equilibrium); Collaboration with biologists (studying the barn-owl, the FM bat *Eptesicus fuscus*, dragonflies), and analog VLSI specialists, on the integration of auditory signal processing for feedback control (of robots); Guided undergraduate research – NSF-REU and MERIT/RITE programs in topics including integration of auditory processing and GPS system principles in motion control, studies of collective behavior in robotics, and processing of biological flight data; Organized: tutorial workshops at American Control Conference (2000, 2015), IEEE Conference on Decision and Control (1998, 2003, 2008, 2014, 2016), and Quantum Control Summer School (2005); Delivered *Munich Mathematical Colloquium lecture* (October 2006) and IEEE Control Systems Society's *Hendrik W. Bode prize lecture* (December 2007).

E. Collaborators & Other Affiliations

S. Andersson (Boston U), B. Azimi-Sadjadi (IAI), J. Baillieul (Boston U), A.M. Bloch (U of Michigan), R. W. Brockett (Harvard), G. Kantor (Carnegie-Mellon), P. R. Kumar (U of Illinois), V. Manikonda (IAI), J. E. Marsden (Caltech), R. Murray (Caltech), A. J. Newman (JHU/APL), D. P. Tsakiris (FORTH at Crete), R. Venkataraman (Texas Tech), M. A. Vorontsov (Army Research Lab), F. Zhang (Georgia Tech), J. Crutchfield (UC Davis), M. DeWeese and G. Crooks (UC Berkeley), E. Justh (NRL), and at the University of Maryland: S. Antman, J. Baras, R. Barua, C. Berenstein, S. Bhattacharyya, C. Chiu, J. Crutchfield, M. DeWeese, K. Ghose, S. K. Gupta, A. Handzel, T. Horiuchi, D. Hristu-Varsakelis, C. Jarzynski, C. Moss, P. Narayan, D. Nau, T. Murphy, G. Rubloff, J.Z. Simon, S. Shamma, Y. Shoukry, X. Tan. Workshop organized: at UCLA with A. Bertozzi, I. Schwartz and D. Grunbaum.

Graduate Advisors

(1) Roger W. Brockett, Harvard University (Ph.D. Advisor); (2) Kishan G. Mehrotra, Syracuse University (M.S. Advisor)

Graduate Advisees (Ph.D. students) - Mohamed El-Sayed (1980), Amr Khadr (1981), David Rohler (1982), Jae-Hong Han, (1986), Narasingharao Sreenath (1987), Thomas Posbergh (1988), Li-Sheng Wang (1990), Yagyensh Pati (1992), Rui Yang (1992), Naomi Leonard (1994), Yakup Ozkazanc (1994), Dimitrios Tsakiris (1995), Andrew Girard (1997), Vikram Manikonda (1997), Herbert Struemper (1997), Eric Justh (1998), Ram Iyer (1999), George Kantor (1999), Andrew Newman (1999), Babak Azimi-Sadjadi (2001), Xiaobo Tan (2002), Sean Andersson (2003), Fumin Zhang (2004), Arash Komae (2008), Bijan Afsari (2009), Kevin Galloway (2011),

Matteo Mischiati (2011), Biswadip Dey (2015), Yunlong Huang (2017), Udit Halder (2019), Vidya Raju (2019). **Postdoctoral Advisees** (with current affiliation) – J. Loncaric (Los Alamos), G. Walsh (Leica Geosystems HDS), E. W. Justh (Naval Research Lab), R. V. Iyer (Texas Tech), D. Hristu-Varsakelis (University of Thessaloniki), A. Handzel (Astra Zeneca), A. Komae (Southern Illinois U), B. Afsari (Johns Hopkins University), Y. Huang (Ford Motors).