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AFFILIATIONS

Northwestern Center for Robotics and Biosystems

Northwestern Institute on Complex Systems (NICO)

Northwestern Initiative for Manufacturing Science and Innovation (NIMSI)

POSITIONS

2019-	Director, Center for Robotics and Biosystems
2013-2020	Chair, Mechanical Engineering Department
2010-2013	Codirector, Northwestern Institute on Complex Systems (NICO)
2009-	Professor
2007-2010	Associate Chair, Mechanical Engineering Department
2003-2009	Associate Professor
1997-2003	Assistant Professor Mechanical Engineering Department, Northwestern University
2012-2015	Visiting Faculty, Northeastern University, Shenyang, China
2007	Visiting Faculty, Robotics Institute, Carnegie Mellon University
2007	Visiting Faculty, Control and Dynamical Systems, Caltech
1996-1997	NSF/STA Postdoctoral Fellow Mechanical Engineering Laboratory, AIST-MITI, Tsukuba, Japan
1996-1997	Visiting Lecturer Department of Engineering Systems, University of Tsukuba, Tsukuba, Japan

EDUCATION

1989-1996, Carnegie Mellon University

Ph.D. in Robotics, February 1996

Thesis: *Nonprehensile Robotic Manipulation: Controllability and Planning*

Advisor: Prof. Matthew T. Mason

1985-1989, Princeton University

B.S.E. with honors, Electrical Engineering, June 1989

HONORS

- 2022 George Saridis Leadership Award in Robotics and Automation
- 2021 IEEE Control Systems Magazine Outstanding Paper Award
- 2020 Distinguished Service Award, IEEE Robotics and Automation Society
- 2017 IROS Harashima Award for Innovative Technologies “for pioneering contributions to robotic manipulation”
- IEEE Fellow, 2010, “for contributions to robotic manipulation, motion planning, and control of

- mechanical systems”
- DARPA Institute for Defense Analyses Defense Science Study Group, 2008-9
 - Charles Deering McCormick Professorship of Teaching Excellence, 2007-10 (one of four awarded annually university-wide)
 - Best Technical Paper Award, Int Conf on Climbing and Walking Robots (CLAWAR) 2011
 - Best Automation Paper Award, 2007 IEEE Int Conference on Robotics and Automation
 - Best Student Paper Award (student Tom Vose), 2008 Robotics: Science and Systems
 - 2007 SAE Ralph R. Teetor Educational Award
 - 2001 IEEE Early Academic Career Award in Robotics and Automation
 “This award is intended to recognize a person in the early stage of his or her career (within seven years of being granted his or her highest academic degree) who has made contributions which have had a major impact on the robotics and/or automation fields.”
 - McCormick School of Engineering and Applied Science Teacher of the Year, 1998-1999
 - NSF CAREER Award, 1998
 - Northwestern University June and Donald Brewer Junior Professorship, 1997-1999
 - 1998 NSF New Century Scholars Engineering Education Workshop, Stanford CA
 - Best Paper Award finalist, IEEE International Conference on Robotics and Automation, Nagoya, Japan, May 1995
 - Anton Philips Best Student Paper Award finalist (three times), IEEE International Conference on Robotics and Automation, 1993, 1995, 1997
 - NSF fellow, 1991 Summer Institute in Japan
 - Princeton Charles Caldwell Scholarship for Advanced Education (given to Princeton's top four scholar / athletes continuing for advanced degrees), 1989
 - Richard King Mellon National Merit Scholarship, 1985-89
 - Westinghouse four year scholarship, 1985-89
 - Western PA High School Scholar / Athlete of the Year, 1985 (scholarship 1985-89)

PUBLICATIONS

BOOKS

[B4] Kevin M. Lynch and Frank C. Park. *Modern Robotics: Mechanics, Planning, and Control*. Cambridge University Press, 2017. ISBN 9781107156302. Preprint version available at <http://modernrobotics.org>.

[B3] Kevin M. Lynch, Nicholas Marchuk, and Matthew L. Elwin. *Embedded Computing and Mechatronics with the PIC32 Microcontroller*, Elsevier/Newnes, 2015. Print ISBN 978-0124201651, e-book ISBN 978-0124202351. Information available at <http://nu32.org>.

[B2] Howie Choset, Kevin M. Lynch, Seth Hutchinson, George Kantor, Wolfram Burgard, Lydia Kavraki, and Sebastian Thrun. *Principles of Robot Motion*, MIT Press, 2005. ISBN 0-262-03327-5.

[B1] Bruce R. Donald, Kevin M. Lynch, and Daniela Rus, eds. *Algorithmic and Computational Robotics: New Directions*. A. K. Peters, Natick, MA, 2001. ISBN 1-56881-125-X.

VIDEO SUPPLEMENTS AND SOFTWARE

[V2] Video supplements and software for the book *Modern Robotics: Mechanics, Planning, and Control*: <http://modernrobotics.org>

[V1] Video supplements and software for the book *Embedded Computing and Mechatronics with the PIC32 Microcontroller*: <http://nu32.org>

BOOK REVIEWS

[R1] Jarvis Schultz and Kevin M. Lynch. Robotics, vision, and control: Fundamental algorithms in MATLAB. *IEEE Control Systems Magazine*, 40(1):52-54, February 2020.

JOURNAL PAPERS

[J67] C. R. Lhoste, E. B. Kucuktabak, L. Vianello, L. Amato, M. R. Short, K. M. Lynch, and J. Pons. Deep-learning estimation of weight distribution using joint kinematics for lower-limb exoskeleton control. In press, *IEEE Transactions on Medical Robotics and Bionics*.

[J66] D. J. Lynch, J. L. Pusey, S. W. Gart, P. B. Umbanhowar, and K. M. Lynch. Efficient, responsive, and robust hopping on deformable terrain. In press, *IEEE Transactions on Robotics*.

[J65] E. B. Kucuktabak, J. Pons, K. M. Lynch, and R. Soltani Zarrin. A safety-aware framework for physical human-robot-human interaction with hierarchical constraints. *IEEE Access*, 2024.

[J64] C. L. Liu, I. L. Donato Ridgley, M. L. Elwin, M. Rubenstein, R. A. Freeman, and K. M. Lynch. Self-healing distributed swarm formation control using image moments. *IEEE Robotics and Automation Letters*, 2024.

[J63] E. B. Kucuktabak, Y. Wen, S. Kim, M. Short, D. Ludvig, L. Hargrove, E. Perreault, K. Lynch, and J. Pons. Haptic transparency and interaction force control for a lower-limb exoskeleton. *IEEE Transactions on Robotics*, 40:1842-1859, 2024.

[J62] Matthew R. Short, Daniel Ludvig, E. Baris Kucuktabak, Yue Wen, Lorenzo Vianello, Eric J. Perreault, Levi Hargrove, Kevin Lynch, and Jose Pons. Haptic human-human interaction during an ankle tracking task: effects of virtual connection stiffness. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 31:3864-3873, 2023.

[J61] J. Zachary Woodruff and Kevin M. Lynch. Robotic contact juggling. *IEEE Transactions on Robotics*, 39(3):1964-1981, June 2023.

[J60] Matthew L. Elwin, Billie Strong, Randy A. Freeman, and Kevin M. Lynch. Human-multirobot collaborative mobile manipulation: the Omnid mocobots. *IEEE Robotics and Automation Letters*, December 2022.

[J59] Sangjoon J. Kim, Yue Wen, Daniel Ludvig, E. Baris Kucuktabak, Matthew R. Short, Kevin Lynch, Levi Hargrove, Eric J. Perreault, and Jose L. Pons. Effect of dyadic haptic collaboration on ankle motor learning and task performance. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 31:416-425, 2023.

[J58] E. Baris Kucuktabak, Sangjoon J. Kim, Yue Wen, Kevin Lynch, and Jose L. Pons. Human-machine-human interaction in motor control and rehabilitation: a review. *Journal of NeuroEngineering and Rehabilitation*, 18(183), 2021.

[J57] Nelson Rosa and Kevin M. Lynch. A topological approach to gait generation for biped robots. *IEEE Transactions on Robotics*, 38(2):699-718, April 2022.

[J56] Sangjoon J. Kim, Yue Wen, Emek Baris Kucuktabak, Shaobo Zhan, Kevin Lynch, Levi Hargrove, Eric Perreault, and Jose L. Pons. A framework for dyadic physical interaction studies during ankle motor tasks. *IEEE Robotics and Automation Letters*, 6(4):6876-6883, October 2021.

[J55] Alfonso J. Fernandez, Huan Weng, Paul B. Umbanhowar, and Kevin M. Lynch. Visiflex: A low-cost compliant tactile fingertip for force, torque, and contact sensing. *IEEE Robotics and Automation Letters*, 6(2):3009-3016, April 2021.

[J54] Israel Ridgley, Randy Freeman, and Kevin M. Lynch. Private and hot-pluggable distributed averaging. *IEEE Control Systems Letters*, (4)4:988-993, October 2020.

[J53] Jian Shi, Huan Weng, and Kevin M. Lynch. In-hand sliding regrasp with spring-sliding compliance and external constraints. *IEEE Access*, volume 8, pages 88729-88744, April 2020.

[J52] Daniel J. Lynch, Kevin M. Lynch, and Paul B. Umbanhowar. The soft-landing problem: minimizing energy loss by a legged robot impacting yielding terrain. *IEEE Robotics and Automation Letters*, 5(2):3658-3665, April 2020. Published online February 28, 2020. [10.1109/LRA.2020.2977260](https://doi.org/10.1109/LRA.2020.2977260)

[J51] J. Zachary Woodruff, Shufeng Ren, and Kevin M. Lynch. Motion planning and feedback control of rolling bodies. *IEEE Access*, volume 8, pages 31780-31791, February 12, 2020. <https://doi.org/10.1109/ACCESS.2020.2973416>

[J50] Davide Piovesan, Maxim Kolesnikov, Kevin M. Lynch, and Ferdinando A. Mussa-Ivaldi. The concurrent control of motion and contact force in the presence of predictable disturbances. *ASME Journal of Mechanisms and Robotics*, 11(6), December 2019. <https://doi.org/10.1115/1.4044599>.

[J49] Matthew L. Elwin, R. A. Freeman, and Kevin M. Lynch. Distributed environmental monitoring with finite element robots. *IEEE Transactions on Robotics*, 36(2):380-398, April 2020. Published online Sept 26, 2019. <https://doi.org/10.1109/TRO.2019.2936747>.

[J48] Daniel Burbano-Lombana, Randy A. Freeman, and Kevin M. Lynch. Discovering the topology of complex networks via adaptive estimators. *Chaos*, 29. 2019. Published online July 24, 2019. <https://doi.org/10.1063/1.5088657>.

[J47] J. Zachary Woodruff and Kevin M. Lynch. Second-order contact kinematics between three-dimensional rigid bodies. *ASME Journal of Applied Mechanics*, August 2019, <https://doi.org/10.1115/1.4043547>.

[J46] Daniel Burbano-Lombana, Randy Freeman, and Kevin M. Lynch. Distributed inference of the multiplex network topology of complex systems. *IEEE Transactions on Control of Network Systems*, 7(1):278-287, March 2020, <https://doi.org/10.1109/TCNS.2019.2903907>. Published online March 8, 2019.

[J45] Solmaz S. Kia, Bryan Van Scoy, Jorge Cortes, Randy Freeman, Kevin M. Lynch, and Sonia Martinez. Tutorial on dynamic average consensus: the problem, its applications, and the algorithms. *IEEE Control Systems Magazine*, 39(3):40-72, June 2019.

[J44] Ji-Chul Ryu and Kevin M. Lynch. Contact juggling of a disk with a disk-shaped manipulator. *IEEE Access*, October 2018.

[J43] Bryan Van Scoy, Randy Freeman, and Kevin M. Lynch. The fastest known globally convergent first-order method for minimizing strongly convex functions. *IEEE Control Systems Letters*, 2(1):49-54, January 2018 (published online, DOI [10.1109/LCSYS.2017.2722406](https://doi.org/10.1109/LCSYS.2017.2722406)).

- [J42] Matt Elwin, Randy Freeman, and Kevin M. Lynch. Distributed Voronoi neighbor identification from inter-robot distances. *IEEE Robotics and Automation Letters*, 2(3):1320-1327, July 2017.
- [J41] Jian Shi, Zack Woodruff, Paul Umbanhowar, and Kevin M. Lynch. Dynamic in-hand sliding manipulation. *IEEE Transactions on Robotics*, 33(4):778-795, August 2017.
- [J40] Eric Schearer, Yu-Wei Liao, Eric Perreault, Matt Tresch, William Memberg, Robert Kirsch, and Kevin M. Lynch. Semiparametric identification of human arm dynamics for flexible control of a functional electrical stimulation neuroprosthesis. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 24(12):1405-1415, December 2016. 10.1109/TNSRE.2016.2535348.
- [J39] Eric Schearer, Yu-Wei Liao, Eric Perreault, Matt Tresch, William Memberg, Robert Kirsch, and Kevin M. Lynch. Multi-muscle FES force control of the human arm for arbitrary goals. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 22(3):1-10, May 2014.
- [J38] Amir Degani, Andrew Long, Siyuan Feng, H. Benjamin Brown, Robert Gregg, Howie Choset, Matthew T. Mason, and Kevin M. Lynch. Design and open-loop control of the ParkourBot, a dynamic climbing robot. *IEEE Transactions on Robotics*, 30(3):705-718, June 2014.
- [J37] Izaak D. Neveln, Yang Bai, James B. Snyder, Oscar M. Curet, Kevin M. Lynch, and Malcolm A. MacIver. Biomimetic and bio-inspired robotics in electric fish research. *Journal of Experimental Biology*, 216:2501-2514, July 2013.
- [J36] Ji-Chul Ryu, Fabio Ruggiero, and Kevin M. Lynch. Control of nonprehensile rolling manipulation: Balancing a disk on a disk. *IEEE Transactions on Robotics*, 29(5):1152-1161, October 2013.
- [J35] Thomas H. Vose, Matthew H. Turpin, Philip M. Dames, Paul Umbanhowar, and Kevin M. Lynch. Modeling, design, and control of 6-DoF flexure-based parallel mechanisms for vibratory manipulation. *Mechanism and Machine Theory*, 64(113):111-130, June 2013.
- [J34] Evan Baker, Tim Reissman, Fan Zhou, Chen Wang, Kevin Lynch, and Cheng Sun. Micro-stereolithography of three-dimensional polymeric springs for vibration energy harvesting. *Smart Materials Research*, 2012.
- [J33] Thomas H. Vose, Paul Umbanhowar, and Kevin M. Lynch. Sliding manipulation of rigid bodies on a controlled 6-DoF plate. *International Journal of Robotics Research*, 31(7):819-838, June 2012.
- [J32] Robert D. Gregg, Yasin Y. Dhaher, Amir Degani, and Kevin M. Lynch. On the mechanics of functional asymmetry in bipedal walking. *IEEE Transactions on Biomedical Engineering*, 59(5):1310-1318, May 2012.
- [J31] Vikram Chib, Matthew Krutky, Kevin M. Lynch, and Ferdinando Mussa-Ivaldi. The separate neural control of hand movements and contact forces. *Journal of Neuroscience*, 29(12):3939-3947, March 2009.
- [J30] Thomas H. Vose, Paul Umbanhowar, and Kevin M. Lynch. Friction-induced velocity fields for point parts sliding on a rigid oscillated plate. *International Journal of Robotics Research*, 28(8):1020-1039, August 2009.

- [J29] Peng Yang, Randy A. Freeman, Geoffrey J. Gordon, Kevin M. Lynch, Siddhartha S. Srinivasa, and Rahul Sukthankar. Decentralized estimation and control of graph connectivity for mobile sensor networks. *Automatica*, 46(2):390-396, February 2010.
- [J28] Thomas H. Vose, Paul Umbanhowar, and Kevin M. Lynch. Friction-induced lines of attraction and repulsion for parts sliding on an oscillated plate. *IEEE Transactions on Automation Science and Engineering*, 6(4):685-699, October 2009.
- [J27] Todd D. Murphey and Kevin M. Lynch. Case studies in planar part feeding and assembly based on design of limit sets. *International Journal of Robotics Research*, 27(6):693-708, June 2008.
- [J26] James R. Solberg, Kevin M. Lynch, and Malcolm A. MacIver. Active electrolocation for underwater target localization. *International Journal of Robotics Research*, 27(5):529-548, May 2008.
- [J25] Kevin M. Lynch, Ira B. Schwartz, Peng Yang, and Randy A. Freeman. Decentralized environmental modeling by mobile sensor networks. *IEEE Transactions on Robotics*, 24(3):710-724, June 2008.
- [J24] Paul Umbanhowar and Kevin M. Lynch. Optimal vibratory stick-slip transport. *IEEE Transactions on Automation Science and Engineering*, 5(3):537-544, July 2008.
- [J23] Peng Yang, Randy A. Freeman, and Kevin M. Lynch. Multi-agent coordination by decentralized estimation and control. *IEEE Transactions on Automatic Control*, 53(11):2480-2496, December 2008.
- [J22] Eric L. Faulring, Kevin M. Lynch, J. Edward Colgate, and Michael A. Peshkin. Haptic display of constrained dynamic systems via admittance displays. *IEEE Transactions on Robotics*, 23(1):101-111, February 2007.
- [J21] Jay D. Bernheisel and Kevin M. Lynch. Stable transport of assemblies by pushing. *IEEE Transactions on Robotics*, 22(4):740-750, August 2006.
- [J20] Tom Worsnopp, Michael A. Peshkin, Kevin M. Lynch, and J. Edward Colgate. Controlling the apparent inertia of passive human-interactive robots. *ASME Journal of Dynamic Systems, Measurement, and Control*, 128(1):44-52, March 2006.
- [J19] Vikram Chib, James Patton, Kevin M. Lynch, and Ferdinando Mussa-Ivaldi. Haptic identification of surfaces as fields of force. *Journal of Neurophysiology*, 95:1068-1077, February 2006.
- [J18] Peng Pan, Michael A. Peshkin, J. Edward Colgate, and Kevin M. Lynch. Static single-arm force generation with kinematic constraints. *Journal of Neurophysiology*, 93:2752-2765, May 2005.
- [J17] J. Edward Colgate and Kevin M. Lynch. Mechanics and control of swimming: A review. *IEEE Journal of Oceanic Engineering*, 29(3):660-673, July 2004.
- [J16] Stefano Iannitti and Kevin M. Lynch. Minimum control switch motions for the snakeboard: A case study in kinematically controllable underactuated systems. *IEEE Transactions on Robotics*, 20(6):994-1006, December 2004.

- [J15] Jay D. Bernheisel and Kevin M. Lynch. Stable transport of assemblies: Pushing stacked parts. *IEEE Transactions on Automation Science and Engineering*, 1(2):163-168, October 2004.
- [J14] Kevin M. Lynch, Michael Northrop, and Peng Pan. Stable limit sets in a dynamic parts feeder. *IEEE Transactions on Robotics and Automation*, 18(4):608-615, August 2002.
- [J13] Kevin M. Lynch. Optimal control of the thrusted skate. *Automatica*, 39(1):173-176, January 2003.
- [J12] Prasun Choudhury and Kevin M. Lynch. Rolling manipulation with a single control. *International Journal of Robotics Research*, 21(5-6):475-487, May-June 2002.
- [J11] Kevin M. Lynch, Caizhen Liu, Allan Sorensen, Michael Peshkin, J. Edward Colgate, Tanya Tickel, David Hannon, and Kerry Shiels. Motion guides for assisted manipulation. *International Journal of Robotics Research*, 21(1):27-43, January 2002.
- [J10] Francesco Bullo and Kevin M. Lynch. Kinematic controllability and decoupled trajectory planning for underactuated mechanical systems. *IEEE Transactions on Robotics and Automation*, 17(4):402-412, August 2001.
- [J9] Kevin M. Lynch and Craig K. Black. Recurrence, controllability, and stabilization of juggling. *IEEE Transactions on Robotics and Automation*, 17(2):113-124, April 2001.
- [J8] Kevin M. Lynch, Naoji Shiroma, Hirohiko Arai, and Kazuo Tanie. Collision-free trajectory planning for a 3-DOF robot with a passive joint. *International Journal of Robotics Research*, 19(12):1171-1184, December 2000.
- [J7] Srinivas Akella, Wesley H. Huang, Kevin M. Lynch, and Matthew T. Mason. Parts feeding on a conveyor with a one joint robot. *Algorithmica*, 26(3):313-344, March-April 2000.
- [J6] Kevin M. Lynch. Inexpensive conveyor-based parts feeding. *Assembly Automation*, 19(3):209-215, 1999.
- [J5] Kevin M. Lynch. Controllability of a planar body with unilateral thrusters. *IEEE Transactions on Automatic Control*, 44(6):1206-1211, June 1999.
- [J4] Kevin M. Lynch. Locally controllable manipulation by stable pushing. *IEEE Transactions on Robotics and Automation*, 15(2):318-327, April 1999.
- [J3] Kevin M. Lynch and Matthew T. Mason. Dynamic nonprehensile manipulation: Controllability, planning, and experiments. *International Journal of Robotics Research*, 18(1):64-92, January 1999.
- [J2] Kevin M. Lynch and Matthew T. Mason. Stable pushing: Mechanics, controllability, and planning. *International Journal of Robotics Research*, 15(6): 533-556, December 1996.
- [J1] Kevin M. Lynch and Matthew T. Mason. Pulling by pushing, slip with infinite friction, and perfectly rough surfaces. *International Journal of Robotics Research*, 14(2): 174-183, April 1995.

BOOK CHAPTERS

- [CH10] Kevin M. Lynch. Underactuated robots. In *Encyclopedia of Systems and Control*, J. Baillieul and T. Samad, eds., Springer-Verlag, 2014.

[CH9] M. Hwang, M. L. Elwin, P. Yang, R. A. Freeman, and K. M. Lynch. Experimental validation of multi-agent coordination by decentralized estimation and control. In *Networking Humans, Robots, and Environments*, N. Y. Chong, ed., Bentham Publishing, 2013.

[CH8] Kevin M. Lynch, Anthony M. Bloch, Sergey V. Drakunov, Mahmut Reyhanoglu, and Dmitry Zenkov. Control of nonholonomic and underactuated systems. Chapter 42 in *The Control Handbook*, W. Levine, ed., Taylor and Francis, 2011.

[CH7] Imin Kao, Kevin M. Lynch, and Joel W. Burdick. Contact modeling and manipulation. Chapter 27 in *Handbook of Robotics*, B. Siciliano and O. Khatib, eds., Springer-Verlag, 2008.

[CH6] Kevin M. Lynch and Todd D. Murphey. Control of nonprehensile manipulation. Chapter in *Control Problems in Robotics and Automation*, A. Bicchi and H. Christensen, eds., Springer-Verlag, 2003.

[CH5] Prasun Choudhury and Kevin M. Lynch. Trajectory planning for kinematically controllable underactuated mechanical systems. *Algorithmic Foundations of Robotics*, J.-D. Boissonnat, J. W. Burdick, K. Y. Goldberg, and S. Hutchinson, eds., Springer-Verlag, 2003.

[CH4] Kevin M. Lynch and Michael A. Peshkin. Linear and rotational sensors. In *The Mechatronics Handbook*, R. Bishop, ed., CRC Press, 2002.

[CH3] Kevin M. Lynch. Issues in nonprehensile manipulation. In *Robotics: The Algorithmic Perspective*, P. Agarwal, L. Kavraki, and M. T. Mason, eds., pp. 237-250, A. K. Peters, Boston, MA, 1998.

[CH2] Srinivas Akella, Wesley H. Huang, Kevin M. Lynch, and Matthew T. Mason. Sensorless parts feeding with a one joint robot. In *Algorithms for Robotic Motion and Manipulation*, J.-P. Laumond and M. Overmars, eds., pp. 229-238, A.K. Peters, Boston, MA, 1996.

[CH1] Kevin M. Lynch and Matthew T. Mason. Stable pushing: Mechanics, controllability, and planning. In *Algorithmic Foundations of Robotics*, K. Y. Goldberg, D. Halperin, J.-C. Latombe, and R. Wilson, eds., pp. 239-262, A.K. Peters, Boston, MA, 1995.

REFEREED CONFERENCE PUBLICATIONS

[C103] E. B. Kucuktabak, M. Short, L. Vianello, C. Lhoste, K. Lynch, and J. Pons. Exoskeleton-mediated physical teacher-student interaction for gait training: a pilot study. *International Conference on Neurorehabilitation*, November 2024.

[C102] C. Lhoste, E. B. Kucuktabak, L. Vianello, L. Amato, M. Short, K. Lynch, and J. Pons. Deep-learning estimation of weight distribution using joint kinematics for lower-limb exoskeleton control. *IEEE BioRob*, September 2024.

[C101] L. Vianello, E. B. Kucuktabak, M. Short, C. Lhoste, L. Amato, K. Lynch, and J. Pons. Exoskeleton-mediated physical human-human interaction for a sit-to-stand rehabilitation task. *IEEE Int Conf Robotics and Automation (ICRA)* 2024. **Best medical robotics paper.**

[C100] E. B. Kucuktabak, Y. Wen, M. Short, E. Demirbas, K. Lynch, and J. Pons. Virtual physical coupling of two lower-limb exoskeletons. *IEEE Int Conf on Rehabilitation Robotics (ICORR)*, 2023.

[C99] Israel Donato Ridgley, Randy Freeman, and Kevin M. Lynch. Self-healing first-order distributed optimization. *IEEE Conference on Decision and Control*, December 2021.

[C98] J. Fong, E. B. Kucuktabak, V. Crocher, Y. Tan, K. M. Lynch, J. Pons, and D. Oetomo. CANopen robot controller (CORC): An open software stack for human-robot interaction development. *International Symposium on Wearable Robotics (WeRob)*, October 2020.

[C97] Daniel J. Lynch, Kevin M. Lynch, and Paul B. Umbanhowar. The soft-landing problem: minimizing energy loss by a legged robot impacting yielding terrain. *IEEE International Conference on Robotics and Automation (ICRA)*, June 2020.

[C96] Israel Ridgley, Randy Freeman, and Kevin M. Lynch. Simple, private, and accurate distributed averaging. *Allerton Conference on Communication, Control, and Computing*, September 2019.

[C95] Daniel Burbano-Lombana, Jemin George, Randy Freeman, and Kevin M. Lynch. Inferring private information in wireless sensor networks. *IEEE International Conference on Acoustics, Speech, and Signal Processing*, Brighton, UK, May 2019.

[C94] Daniel Burbano-Lombana, Randy Freeman, and Kevin M. Lynch. A distributed adaptive observer for leader-follower networks. *American Control Conference*, Philadelphia, PA, July 2019.

[C93] Daniel Burbano-Lombana, Randy Freeman, and Kevin M. Lynch. Inferring the network topology of interconnected nonlinear units with diffusive couplings. *American Control Conference*, Milwaukee, WI, June 2018.

[C92] Jemin George, Matthew L. Elwin, Randy Freeman, and Kevin M. Lynch. Distributed fault detection and accommodation in dynamic average consensus. *American Control Conference*, Milwaukee, WI, June 2018.

[C91] Bryan Van Scoy, Randy Freeman, and Kevin M. Lynch. The fastest known globally convergent first-order method for minimizing strongly convex functions. *IEEE Conference on Decision and Control*, Melbourne, Australia, December 2017.

[C90] Jemin George, Randy Freeman, and Kevin M. Lynch. Robust dynamic average consensus algorithm for signals with bounded derivatives. *American Control Conference*, Seattle, WA, May 2017.

[C89] Zack Woodruff and Kevin M. Lynch. Planning and control for dynamic, nonprehensile, and hybrid manipulation tasks. *IEEE International Conference on Robotics and Automation*, Singapore, May 2017.

[C88] Bryan Van Scoy, Randy Freeman, and Kevin M. Lynch. Feedforward estimators for the distributed average tracking of bandlimited signals in discrete time with switching graph topology. *IEEE Conference on Decision and Control*, Las Vegas, NV, December 2016.

[C87] Matthew Elwin, Randy Freeman, and Kevin M. Lynch. Environmental estimation with distributed finite element agents. *IEEE Conference on Decision and Control*, Las Vegas, NV, December 2016.

[C86] Bryan Van Scoy, Randy Freeman, and Kevin M. Lynch. Design of robust dynamic average consensus estimators. *IEEE Conference on Decision and Control*, Osaka, Japan, December 2015.

[C85] Jian Shi, Zack Woodruff, Paul Umbanhowar, and Kevin M. Lynch. Dynamic in-hand sliding manipulation. *IEEE/RSJ Int Conf on Intelligent Robots and Systems*, Hamburg, Germany, September 2015.

[C84] Bryan Van Scoy, Randy Freeman, and Kevin M. Lynch. A fast robust nonlinear dynamic average consensus estimator in discrete time. *IFAC Workshop on Distributed Estimation and Control in Networked Systems*, Philadelphia, PA, September 2015.

[C83] Bryan Van Scoy, Randy Freeman, and Kevin M. Lynch. Exploiting memory in dynamic average consensus. *53rd Annual Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 2015.

[C82] Eric M. Scheerer, Yu-Wei Liao, Eric J. Perreault, Matthew C. Tresch, William D. Memberg, Robert F. Kirsch, and Kevin M. Lynch. Evaluation of a semi-parametric model for high-dimensional FES control. *IEEE EMBS Conference on Neural Engineering*, Montpellier, France, April 2015.

[C81] Bryan Van Scoy, Randy Freeman, and Kevin M. Lynch. Robustly optimal dynamic average consensus. *American Control Conference*, Chicago, IL, July 2015.

[C80] Eric M. Scheerer, Yu-Wei Liao, Eric J. Perreault, Matthew C. Tresch, William D. Memberg, Robert F. Kirsch, and Kevin M. Lynch. Identifying inverse human arm dynamics using a robotic testbed. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2014)*, Chicago, IL, September 2014.

[C79] Matthew Elwin, Randy Freeman, and Kevin M. Lynch. Worst-case optimal average consensus estimators for robot swarms. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2014)*, Chicago, IL, September 2014.

[C78] Yu-Wei Liao, Eric Scheerer, Eric J. Perreault, Matthew C. Tresch, and Kevin M. Lynch. Multi-muscle FES control of the human arm for interaction tasks---stabilizing with muscle cocontraction and postural adjustment: a simulation study. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2014)*, Chicago, IL, September 2014.

[C77] Nelson Rosa Jr. and Kevin M. Lynch. Extending equilibria to periodic orbits for walkers using continuation methods. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2014)*, Chicago, IL, September 2014.

[C76] Bryan Van Scoy, Randy A. Freeman, and Kevin M. Lynch. Asymptotic mean ergodicity of average consensus estimators. *American Control Conference*, Portland, OR, June 2014.

[C75] Matthew L. Elwin, Randy Freeman, and Kevin M. Lynch. A systematic design process for internal model average consensus estimators. *IEEE Conference on Decision and Control*, Florence, Italy, December 2013.

[C74] Nelson Rosa and Kevin M. Lynch. The passive dynamics of walking and brachiating robots: results on the topology and stability of passive gaits. *Int Conf on Climbing and Walking Robots (CLAWAR)*, Sydney, Australia, July 2013.

[C73] Yu-Wei Liao, Eric Scheerer, Xiao Hu, Eric Perreault, Matthew Tresch, and Kevin M. Lynch. Modeling open-loop stability of a human arm driven by a functional electrical stimulation neuroprosthesis. *IEEE Engineering in Medicine and Biology Conference*, Osaka, Japan, July 2013.

- [C72] Nelson Rosa and Kevin M. Lynch. Open-loop stability of time-based vs. event-based switching in locomotion. *Dynamic Walking 2013*, Pittsburgh, PA, June 2013.
- [C71] Eric Scheerer, Yu-Wei Liao, Matt Tresch, Eric Perreault, and Kevin M. Lynch. Optimal sampling of recruitment curves for functional electrical stimulation control. *IEEE Engineering in Medicine and Biology Conference*, San Francisco, CA, August 2012.
- [C70] Thomas H. Vose, Paul Umbanhowar, and Kevin M. Lynch. Manipulation with vibratory velocity fields on a tilted plate. *IEEE Int Conf on Automation Science and Engineering (CASE)*, Seoul, Korea, 2012.
- [C69] Andrew W. Long, Amir Degani, and Kevin M. Lynch. Feedback control experiments with the ParkourBot. *Int Conf on Climbing and Walking Robots (CLAWAR)*, Baltimore, MD, 2012.
- [C68] Paul Umbanhowar, Thomas H. Vose, Atsushi Mitani, Shinichi Hirai, and Kevin M. Lynch. The effect of anisotropic friction on vibratory velocity fields. *IEEE International Conference on Robotics and Automation*, St. Paul, MN, May 2012.
- [C67] Eric M. Scheerer, Yu-Wei Liao, Eric J. Perreault, Matthew C. Tresch, William D. Memberg, Robert F. Kirsch, and Kevin M. Lynch. System identification for 3D force control of a human arm prosthesis using functional electrical stimulation. *IEEE International Conference on Robotics and Automation*, St. Paul, MN, May 2012.
- [C66] Ji-Chul Ryu, Fabio Ruggiero, and Kevin M. Lynch. Control of nonprehensile rolling manipulation: balancing a disk on a disk. *IEEE International Conference on Robotics and Automation*, St. Paul, MN, May 2012.
- [C65] Nelson Rosa, Jr., Adam Barber, Robert D. Gregg, and Kevin M. Lynch. Stable open-loop brachiation on a vertical wall. *IEEE International Conference on Robotics and Automation*, St. Paul, MN, May 2012.
- [C64] Andrew W. Long, Robert Gregg, and Kevin M. Lynch. The simplest parkour model: experimental validation and stability analysis. *Int Conf on Climbing and Walking Robots (CLAWAR)*, Paris, France, September 2011. **(Best Technical Paper Award)**
- [C63] Maxim Kolesnikov, Davide Piovesan, Kevin M. Lynch, and Sandro Mussa-Ivaldi. On force regulation strategies in predictable environments. *Int Conf of the IEEE Engineering in Medicine and Biology Society (EMBC)*, Boston, MA, Aug-Sept, 2011.
- [C62] Robert Gregg, Yasin Dhaher, and Kevin M. Lynch. Functional asymmetry in a five-link 3D bipedal walker. *Int Conf of the IEEE Engineering in Medicine and Biology Society (EMBC)*, Boston, MA, Aug-Sept, 2011.
- [C61] Andrew W. Long, Todd D. Murphey, and Kevin M. Lynch. Optimal motion planning for a class of hybrid dynamical systems with impacts. *IEEE International Conference on Robotics and Automation*, Shanghai, China, May 2011.
- [C60] Amir Degani, H. Benjamin Brown, Kevin M. Lynch, Howie Choset, and Matthew T. Mason. The ParkourBot -- A dynamic BowLeg climbing robot. *IEEE International Conference on Robotics and Automation*, Shanghai, China, May 2011.
- [C59] Thomas H. Vose, Paul Umbanhowar, and Kevin M. Lynch. Sliding manipulation of rigid bodies on a controlled 6-dof plate. *Robotics: Science and Systems Conference*, June 2011.

- [C58] Robert D. Gregg, Amir Degani, Yasin Dhaher, and Kevin M. Lynch. The basic mechanics of bipedal walking lead to asymmetric behavior. *International Conference on Rehabilitation Robotics*, Zurich, Switzerland, June-July 2011.
- [C57] He Bai, Randy A. Freeman, and Kevin M. Lynch. Distributed Kalman filtering using the internal model average consensus estimator. *American Control Conference*, San Francisco, CA, June-July 2011.
- [C56] Fabio Morbidi, Randy A. Freeman, and Kevin M. Lynch. Estimation and control of UAV swarms for distributed monitoring tasks. *American Control Conference*, San Francisco, CA, June-July 2011.
- [C55] He Bai, Randy A. Freeman, and Kevin M. Lynch. Robust dynamic average consensus of time-varying inputs. *IEEE Conference on Decision and Control*, Atlanta, GA, December 2010.
- [C54] Randy A. Freeman, Thomas R. Nelson, and Kevin M. Lynch. A complete characterization of a class of robust linear average consensus protocols. *American Control Conference*, Baltimore, MD, June-July 2010.
- [C53] Thomas H. Vose, Paul Umbanhowar, and Kevin M. Lynch. Toward the set of frictional velocity fields generable by 6-degree-of-freedom oscillatory motion of a rigid plate. *IEEE International Conference on Robotics and Automation*, Anchorage, AK, May 2010.
- [C52] Michael Epstein, Kevin M. Lynch, Karl Johansson, and Richard M. Murray. Using hierarchical decomposition to speed up average consensus. *International Federation of Automatic Control (IFAC) World Congress*, Seoul, Korea, July 2008.
- [C51] Thomas H. Vose, Paul Umbanhowar, and Kevin M. Lynch. Friction-induced velocity fields for parts sliding on a rigid oscillated plate. *2008 Robotics: Science and Systems*, Zurich, Switzerland, June 2008. (**Best Student Paper Award**, the only conference award)
- [C50] Peng Yang, Randy Freeman, Geoffrey J. Gordon, Kevin M. Lynch, Siddhartha Srinivasa, and Rahul Sukthankar. Decentralized estimation and control of graph connectivity in mobile sensor networks. *American Control Conference*, Seattle, WA, June 2008.
- [C49] Thomas H. Vose, Paul Umbanhowar, and Kevin M. Lynch. Vibration-induced frictional force fields on a rigid plate. *IEEE International Conference on Robotics and Automation*, Rome, Italy, April 2007. (**Best Automation Paper Award**)
- [C48] James Solberg, Kevin M. Lynch, and Malcolm A. MacIver. Robotic electrolocation: Active underwater target localization with electric fields. *IEEE International Conference on Robotics and Automation*, Rome, Italy, April 2007.
- [C47] Peng Yang, Kevin M. Lynch, and Randy A. Freeman. Distributed cooperative active sensing using consensus filters. *IEEE International Conference on Robotics and Automation*, Rome, Italy, April 2007.
- [C46] Peng Yang, Randy A. Freeman, and Kevin M. Lynch. A general stability condition for multi-agent coordination by coupled estimation and control. *American Control Conference*, New York, NY, July 2007.
- [C45] Randy A. Freeman, Peng Yang, and Kevin M. Lynch. Stability and convergence properties of dynamic average consensus estimators. *IEEE Conference on Decision and Control*, San Diego, CA, December 2006.

- [C44] Heeseon Hwang, Kevin M. Lynch, and Youngil Youm. Locomotion via impact switching between decoupling vector fields. *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Beijing, China, October 2006.
- [C43] Randy A. Freeman, Peng Yang, and Kevin M. Lynch. Distributed estimation and control of swarm formation statistics. *American Control Conference*, Minneapolis, MN, June 2006.
- [C42] Peng Yang, Randy A. Freeman, and Kevin M. Lynch. Optimal information propagation in sensor networks. *IEEE International Conference on Robotics and Automation*, Orlando, FL, May 2006.
- [C41] Peng Pan, Kevin M. Lynch, Michael Peshkin, J. Edward Colgate. Human interaction with passive assistive robots. *International Conference on Rehabilitation Robotics*, June 2005.
- [C40] Jay D. Bernheisel and Kevin M. Lynch. Stable pushing of assemblies. *IEEE International Conference on Robotics and Automation*, Barcelona, Spain, April 2005.
- [C39] Eric Faulring, Kevin M. Lynch, J. Edward Colgate, and Michael A. Peshkin. Haptic interaction with constrained dynamic systems. *IEEE International Conference on Robotics and Automation*, Barcelona, Spain, April 2005.
- [C38] Vikram S. Chib, James L. Patton, Kevin M. Lynch, and Sandro Mussa-Ivaldi. The effect of stiffness and curvature on the haptic discrimination of surfaces. *First Joint EuroHaptics Conference on Haptic Interfaces for Virtual Environments and Teleoperator Systems*, Pisa, Italy, March 2005.
- [C37] Vikram S. Chib, James L. Patton, Kevin M. Lynch, and Sandro Mussa-Ivaldi. Haptic discrimination of perturbing fields and object boundaries. *International Symposium on Haptic Interfaces for Virtual Environments and Teleoperator Systems*, pp. 375-82, Chicago, IL, March 2004.
- [C36] Todd D. Murphey, David Choi, Jay Bernheisel, and Kevin M. Lynch. Experiments in the use of stable limit sets for parts handling. *International Conference on MEMS, NANO, and Smart Systems (ICMENS)*, Banff, Alberta, Canada, August 2004.
- [C35] Prasun Choudhury, Benjamin Stephens, and Kevin M. Lynch. Inverse kinematics-based motion planning for underactuated systems. *IEEE International Conference on Robotics and Automation*, New Orleans, LA, April 2004.
- [C34] Tom Worsnopp, J. Edward Colgate, Michael Peshkin, and Kevin M. Lynch. Controlling the apparent inertia of passive human-interactive robots. *IEEE International Conference on Robotics and Automation*, New Orleans, LA, April 2004.
- [C33] Peng Pan, J. Edward Colgate, Michael Peshkin, and Kevin M. Lynch. Static single-arm force generation with kinematic constraints. *IEEE International Conference on Robotics and Automation*, New Orleans, LA, April 2004.
- [C32] J. Edward Colgate and Kevin M. Lynch. Control problems solved by a fish's body and brain: A review. *13th Annual Symposium on Unmanned Untethered Submersible Technology*, Durham, NH, August 2003.

- [C31] Stefano Iannitti and Kevin M. Lynch. Exact minimum control switch motion planning for the snakeboard. *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Las Vegas, NV, October 2003.
- [C30] Jay D. Bernheisel and Kevin M. Lynch. Stable transport of assemblies — Pushing stacked parts. *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Las Vegas, NV, October 2003.
- [C29] Francesco Bullo, Andrew D. Lewis, and Kevin M. Lynch. Controllable kinematic reductions for mechanical systems: Concepts, computational tools, and examples. *2002 International Symposium on Mathematical Theory of Networks and Systems*, Notre Dame, IN, August 2002.
- [C28] Tanya Tickel, David Hannon, Kevin M. Lynch, Michael A. Peshkin, and J. Edward Colgate. Kinematic constraints for assisted single-arm manipulation. *IEEE International Conference on Robotics and Automation*, Washington, D.C., May 2002.
- [C27] Kevin M. Lynch, Michael Northrop, and Peng Pan. Stable limit set behavior in a dynamic parts feeder. *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Maui, HI, November 2001.
- [C26] Prasun Choudhury and Kevin M. Lynch. Rolling manipulation with a single control. *Conference on Control Applications*, Mexico City, Mexico, September 2001.
- [C25] Francesco Bullo and Kevin M. Lynch. Kinematic controllability and decoupled trajectory planning for underactuated mechanical systems. *IEEE International Conference on Robotics and Automation*, Seoul, Korea, May 2001.
- [C24] Allan Sorensen, Caizhen Liu, Songho M. Kim, Kevin M. Lynch, and Michael A. Peshkin. Experiments in ergonomic robot-guided manipulation. *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Takamatsu, Japan, November 2000.
- [C23] Kevin M. Lynch and Craig K. Black. Controllability and stabilizability of single input planar juggling. *38th Allerton Conference on Communication, Control, and Computing*, Monticello, IL, October 2000.
- [C22] Kevin M. Lynch and Caizhen Liu. Designing motion guides for ergonomic collaborative manipulation. *IEEE International Conference on Robotics and Automation*, San Francisco, CA, April 2000.
- [C21] Prasun Choudhury and Kevin M. Lynch. Controllability of single input rolling manipulation. *IEEE International Conference on Robotics and Automation*, San Francisco, CA, April 2000.
- [C20] Kevin M. Lynch and Craig K. Black. Control of underactuated manipulation by real-time nonlinear optimization. *1999 International Symposium on Robotics Research*, Snowbird, UT, October 1999.
- [C19] Kevin M. Lynch. Toppling manipulation. *1999 IEEE International Conference on Robotics and Automation*, Detroit, MI, May 1999.
- [C18] Craig K. Black and Kevin M. Lynch. Planning and control for planar batting and hopping. *36th Annual Allerton Conference on Communication, Control, and Computing*, Monticello, IL, September 1998.

- [C17] Kevin M. Lynch, Naoji Shiroma, Hirohiko Arai, and Kazuo Tanie. Motion planning for a 3-DOF robot with a passive joint. *1998 IEEE International Conference on Robotics and Automation*, pp. 1958-1963, Leuven, Belgium, May 1998.
- [C16] Kevin M. Lynch, Naoji Shiroma, Hirohiko Arai, and Kazuo Tanie. The roles of shape and motion in dynamic manipulation: The butterfly example. *1998 IEEE International Conference on Robotics and Automation*, pp. 927-932, Leuven, Belgium, May 1998.
- [C15] Kevin M. Lynch. Locally controllable polygons by stable pushing. *1997 IEEE International Conference on Robotics and Automation*, Albuquerque, NM, April 1997.
- [C14] Kevin M. Lynch and Matthew T. Mason. Dynamic manipulation with a one joint robot. *1997 IEEE International Conference on Robotics and Automation*, Albuquerque, NM, April 1997. **(Best Student Paper Award finalist)**
- [C13] Srinivas Akella, Wesley H. Huang, Kevin M. Lynch, and Matthew T. Mason. Sensorless parts orienting with a one joint manipulator. *1997 IEEE International Conference on Robotics and Automation*, Albuquerque, NM, April 1997.
- [C12] Kevin M. Lynch and Matthew T. Mason. Dynamic underactuated nonprehensile manipulation. *1996 IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 889-896, Osaka, Japan, November 1996.
- [C11] Srinivas Akella, Wesley H. Huang, Kevin M. Lynch, and Matthew T. Mason. From robotic juggling to robotic parts feeding. *Yale Workshop on Adaptive and Learning Systems*, New Haven, CT, June 1996.
- [C10] Srinivas Akella, Wesley H. Huang, Kevin M. Lynch, and Matthew T. Mason. Planar manipulation on a conveyor with a one joint robot. *Seventh International Symposium on Robotics Research*, pp. 265-276, Munich, Germany, October 1995.
- [C9] Kevin M. Lynch and Matthew T. Mason. Controllability of pushing. *IEEE/RSJ International Conference on Robotics and Automation*, pp. 112-119, Nagoya, Japan, May 1995. **(Best Paper and Best Student Paper Award finalist)**
- [C8] Matthew T. Mason and Kevin M. Lynch. Dynamic robotic manipulation: Progress and plans. *Eighth Yale Workshop on Adaptive and Learning Systems*, New Haven, CT, June 1994.
- [C7] Matthew T. Mason and Kevin M. Lynch. Throwing a club: Early results. *Sixth International Symposium on Robotics Research*, Hidden Valley, PA, October 1993.
- [C6] Kevin M. Lynch. Planning pushing paths. *International Conference on Advanced Mechatronics*, pp. 451-456, Tokyo, Japan, August 1993.
- [C5] Matthew T. Mason and Kevin M. Lynch. Dynamic manipulation. *IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 152-159, Yokohama, Japan, July 1993.
- [C4] Kevin M. Lynch. Estimating the friction parameters of pushed objects. *IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 186-193, Yokohama, Japan, July 1993.
- [C3] Kevin M. Lynch and Matthew T. Mason. Pulling by pushing, slip with infinite friction, and perfectly rough surfaces. *IEEE International Conference on Robotics and Automation*, v. 1, pp. 745-751, Atlanta, GA, May 1993. **(Best Student Paper Award finalist)**

[C2] Kevin M. Lynch, Hitoshi Maekawa, and Kazuo Tanie. Manipulation and active sensing by pushing using tactile feedback. *IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 416-421, Raleigh, NC, July 1992.

[C1] Kevin M. Lynch. The mechanics of fine manipulation by pushing. *IEEE International Conference on Robotics and Automation*, pp. 2269-2276, Nice, France, May 1992.

PREPRINTS

ABSTRACTS, POSTERS, AND OTHER PUBLICATIONS (2010 AND EARLIER)

[A8] Max Kolesnikov, Maura Casadio, Kevin M. Lynch, and Sandro Mussa-Ivaldi. Investigating control strategies in force regulation tasks. *Neuroscience*, November 2010.

[A7] Vikram S. Chib, Matthew A. Krutky, Kevin M. Lynch, and Sandro Mussa-Ivaldi. The nervous system independently controls motions and forces. *Advances in Computational Motor Control Workshop*, Atlanta, GA, October 2006.

[A6] Peng Pan, Kevin Lynch, Michael Peshkin, J. Edward Colgate, and Mitra Hartmann. Static single-arm force generation with kinematic constraints. *Neuroscience*, San Diego, CA, October 2004.

[A5] Vikram Chib, James Patton, Kevin Lynch, and F. Mussa-Ivaldi. Interaction with surfaces of varying stiffness and curvature. *Neural Control of Movement*, Sitges, Spain, March 2004.

[A4] Vikram Chib, James Patton, Kevin Lynch, and F. Mussa-Ivaldi. The effect of stiffness and curvature on surface interaction. *Neuroscience*, New Orleans, LA, November 2003.

[A3] Vikram Chib, James Patton, Kevin Lynch, and F. Mussa-Ivaldi. Surface stiffness threshold detection through haptic feedback. *Neuroscience*, New Orleans, LA, November 2003.

[A2] Peng Pan, Kevin Lynch, Michael Peshkin, and J. Edward Colgate. Static single-arm force generation with kinematic constraints. *Neural Control of Movement*, Santa Barbara, CA, April 2003.

[A1] Vikram Chib, James Patton, Kevin Lynch, and F. Mussa-Ivaldi. Haptic discrimination of fields and surfaces. *Neural Control of Movement*, Santa Barbara, CA, April 2003.

PATENTS AND DISCLOSURES

US patent application US20240181627A1, December 1, 2023: Method and system for multirobot collaborative mobile manipulation. M. Elwin, B. Strong, R. Freeman, and K. Lynch.

[P3] US 9,795,966. Non-contact droplet manipulation apparatus and method. P. Umbanhowar and K. Lynch, October 24, 2017.

[P2] US 8,348,047. Parts Manipulation Method and Apparatus. K. M. Lynch and P. Umbanhowar, January 8, 2013. Licensed to Asyrl, manufacturer of equipment for industrial automation, January 2015.

[P1] US 8,230,990. Parts Manipulation Method and Apparatus, K. M. Lynch and P. Umbanhowar, July 31, 2012. Licensed to Asyrl, manufacturer of equipment for industrial automation, January 2015.

CONFERENCE AND WORKSHOP ORGANIZATION

- Program co-chair, 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems, Macau, China
- Program co-chair, 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems, Madrid, Spain
- Session organizer, ASME ME/MET Department Heads Forum, ASME IMECE 2016
- Session organizer, ASME ME/MET Department Heads Forum, ASME IMECE 2015
- General Chair, 2014 IEEE/RSJ International Conference on Intelligent Robots and Systems, Chicago
- Senior Program Committee, 2013 IEEE/RSJ International Conference on Intelligent Robots and Systems, Tokyo, Japan
- Program Committee, ANTS 2012 (International Conference on Swarm Intelligence)
- Awards Co-chair, 2012 IEEE Int Conf Robotics and Automation
- Senior Program Committee, 2011 IEEE/RSJ International Conference on Intelligent Robots and Systems, San Francisco
- Workshop Chair, 2010 Robotics: Science and Systems Conference
- Program Committee, 2010 IEEE Workshops on Advanced Robotics and its Social Implications (ARSO), South Korea
- Program Committee, 2009 IEEE Workshops on Advanced Robotics and its Social Implications (ARSO), Tokyo, Japan
- Program co-chair for the Americas, 2009 IEEE Int Conf Robotics and Automation
- Co-organizer, NSF US-Japan Workshop on Robotics for Safety, Security, and Society, San Francisco, CA, August 2008
- Program Committee, 2008 Workshop on the Algorithmic Foundations of Robotics
- Area Chair, 2008 Robotics: Science and Systems Conference
- Program co-chair, 2006 IEEE International Conference on Robotics and Automation
- Area Chair, 2005 Robotics: Science and Systems Conference
- Advisory Committee, 2005 International Conference on Rehabilitation Robotics (ICORR)
- Program committee, 2005 IEEE International Conference on Robotics and Automation, Barcelona, Spain
- Program committee, 2005 International Symposium on Assembly and Task Planning, Montreal, Canada
- Program committee, 2004 IEEE/RSJ International Conference on Intelligent Robots and Systems, Sendai, Japan
- Program committee, 2004 IEEE International Conference on Robotics and Automation, New Orleans, LA
- Program committee, 2002 IEEE International Conference on Robotics and Automation, Washington D.C.
- Program committee, 2001 IEEE/RSJ International Conference on Intelligent Robots and Systems, Hawaii
- Invited session organizer, 2001 Conference on Control Applications, Mexico City, Mexico
- Program co-chair, 2000 Workshop on the Algorithmic Foundations of Robotics
- Program committee, 2000 World Automation Conference, Maui, Hawaii
- Program committee, IEEE International Conference on Robotics and Automation 2000, San Francisco, CA
- Workshop and Tutorials Review Committee, 2000 IEEE International Conference on Robotics and Automation
- Founder, Midwest Mechanical Motion Meeting
- Program committee, 1999 International Conference on Advanced Robotics, Tokyo, Japan
- Program committee, 1999 International Joint Conference on Artificial Intelligence
- Program committee, 1997 International Joint Conference on Artificial Intelligence

JOURNAL AND CONFERENCE EDITING

- Editor-in-Chief, *IEEE Transactions on Robotics*, 2018-2023
- Editor-in-Chief, IEEE International Conference on Robotics and Automation Conference Editorial Board, 2018
- Senior Editor, *IEEE Robotics and Automation Letters*, 2015-17
- Editorial Board, *Annual Reviews in Control*, 2014-19
- Senior Editor, *IEEE Transactions on Automation Science and Engineering*, 2011-2015
- Senior Editor, 2009 Special Issue on Rehabilitation Robotics, *IEEE Transactions on Robotics*
- Senior Editor, *IEEE Transactions on Robotics*, 2005-11
- Associate Editor, *IEEE Transactions on Robotics*, 2004-5
- Associate Editor, *IEEE Transactions on Robotics and Automation*, 2002-2004
- Guest editor, *International Journal of Robotics Research* special issue, 2002

OTHER PROFESSIONAL ACTIVITIES

- Chair, IEEE Robotics and Automation Society Awards Nomination Committee, 2024
- Illinois Tech ME Dept Program Review, 2023
- Chair of ASME ME Department Head Executive Committee (MEDHEC), 2018-19 (Secretary 2016-17, Vice Chair 2017-18)
- Elected member of ASME Department Head Executive Committee (MEDHEC), 2014-2016
- Academic Leadership Program, Big Ten Academic Alliance (formerly CIC), 2013-14
- External advisor, Project 111, Northeastern University, Shenyang, China, 2012-2015
- Advisor, Chicago Museum of Science and Industry "Robot Revolution" exhibit, 2012-2015
- Parliamentarian (Executive Committee), IEEE Robotics and Automation Society, 2013-2017
- Chair, IEEE Robotics and Automation Society Steering Committee for Technical Programs, 2012-13
- Chair, IEEE Robotics and Automation Society Early Career Award Evaluation Panel, 2012-13
- Secretary (Executive Committee and Administrative Committee), IEEE Robotics and Automation Society, 2010-11
- Member of the DARPA Institute for Defense Analyses Defense Science Study Group, 2008-9
- Kellogg Business and Leadership for Scientists and Engineers Executive Course, 2007-8
- Elected member of IEEE Robotics and Automation Society Administrative Committee, 2006-8
- Secretary, IEEE Robotics and Automation Society, 2004-2005
- Secretary, IEEE Robotics and Automation Long Range Planning Committee, 2002-2003
- 2004 IEEE Robotics and Automation Society Early Career Award Committee
- Various technical and legal consulting
- Reviewer for several funding agencies: NSF, NASA, US Department of State Russian Nonproliferation Office, Research Grants Council of Hong Kong, Netherlands Organization for Scientific Research, State of Indiana 21st Century Fund, Austrian Competence Centre Programme, European Commission
- Reviewer for many journals (*IEEE Transactions on Robotics and Automation*; *IEEE Transactions on Automatic Control*; *IEEE Transactions on Systems, Man, and Cybernetics*; *International Journal of Robotics Research*; *Journal of Robotic Systems*; *International Journal of Robotics and Automation*; *Journal of the Franklin Institute*; *International Journal of Control*; *SIAM Journal on Control and Optimization*; *Systems and Control Letters*; *ASME Journal of Engineering Materials and Technology*; *ASME Journal of Dynamic Systems, Measurement, and Control*; *ASME Journal of Mechanical Design*; *IEEE Transactions on Control Systems Technology*; *Automatica*; *Robotica*; *Journal of Nonlinear Science*; others), MIT Press, Wiley and Sons, McGraw-Hill, Oxford Press, and conferences (IEEE ICRA, IROS, IJCAI, CDC, IMECE, ACC, ICORR, others)
- Carnegie Mellon Japanese Science, Technology, and Manufacturing Program
- Participant, 1992 University of Pittsburgh Workshop on US Human Resource Needs in Japanese Science, Technology, and Manufacturing

- Co-winner, 1994 Carnegie Mellon School of Computer Science programming contest

EDUCATIONAL INITIATIVES

- Created the educational “gameschooling” game *Fossil Canyon* with the Field Museum of Chicago, published 2022, <https://www.polymathplay.com>
- Initiated two-quarter design sequence ME/ECE 495 Robot Design Studio in 2018
- Created the YouTube site <https://www.youtube.com/NorthwesternRobotics> for educational and research robotics videos (over 31k subscribers and 2.7M views)
- Developed six online courses for the Coursera MOOC specialization “Modern Robotics,” at <https://www.coursera.org/specializations/modernrobotics>. The courses are being taken by thousands of learners around the world.
- Developed approximately 100 short videos and led the development of a freely-distributed software library to accompany the textbook *Modern Robotics: Mechanics, Planning, and Control*, Cambridge University Press, 2017. Information at <http://modernrobotics.org>.
- Developed approximately 80 short videos on microcontrollers and mechatronics to support ME 333 Introduction to Mechatronics and our book *Embedded Computing and Mechatronics with the PIC32 Microcontroller*. Information at <http://nu32.org>.
- Developed new course, ME 333 Introduction to Mechatronics (first taught Winter 2000)
Course description: Introduction to microprocessor-controlled electromechanical systems. Interfacing sensors and actuators to computers, electrical and mechanical prototyping, dissection of a commercial product. Final team project.
- Developed new course, ME 449 Robotic Manipulation (first taught as ME D95, Fall 1998)
Course description: Mechanics of robotic manipulation, computer representations and algorithms for manipulation planning, applications to industrial automation, parts feeding, grasping, fixturing, and assembly.
- Developed new course, ME 450 Geometry in Robotics (first taught as ME 495, Spring 2001)
Course description: Application of tools from differential geometry and Lie groups to problems in dynamics, controllability, and motion planning for mechanical systems, particularly with non-Euclidean configuration spaces.
- Developed new course, ME 495 Motion Planning and Control Under Uncertainty, Spring 2006
Course description: Classical techniques from stochastic optimal control theory including Kalman filtering and linear quadratic Gaussian problems; recent computational techniques in Bayesian inference and Markov decision processes; applications to control of robot systems under sensor and actuator uncertainty.
- Developed new course, ME 495 Nonlinear Control, Fall 2010
- Developed the Mechatronics Design Laboratory, open 24/7 for classes and student design projects, part of Northwestern's Ford Motor Company Engineering Design Center. Also led the development of the supporting mechatronics design wiki page, http://hades.mech.northwestern.edu/index.php/Main_Page (or google “mechatronics wiki”).

SELECTED INVITED TALKS

- ICRA@40, Rotterdam, Netherlands, September 2024
- Texas A&M, September 2024
- Georgia Tech, January 2024
- Purdue University, September 2023
- Boston Dynamics AI Institute, February 2023
- University of Minnesota Robotics Institute, December 2022
- Pennsylvania State University, September 2022
- University of Illinois, September 2022
- Plenary, IEEE International Conference on Advanced Robotics and Mechatronics, Guilin, China, July 2022
- University of Pennsylvania, April 2022
- New Advances in Tactile Sensation, Interactive Perception, Control, and Learning, workshop at IROS 2021, September 2021
- Carnegie Mellon University, October 2020
- Plenary, Ubiquitous Robotics Conference, June 2020
- University of Notre Dame, April 2019
- Massachusetts Institute of Technology, December 2018
- University of Texas Dallas, October 2018
- Illinois Institute of Technology, March 2018
- University of Utah, ME Distinguished Lecture, December 2017
- Case Western Reserve University, April 2017
- University of Pittsburgh, March 2017
- Plenary, IEEE International Conference on Mechatronics and Automation, Harbin, China, August 2016
- Colorado State University, April 2016
- University of California Irvine, March 2016
- Purdue University, February 2016
- Northwestern University Physics Colloquium, January 2016
- World Robot Conference keynote, Beijing, China, November 2015
- Foundations of Intelligent Sensing, Action and Learning (FISAL), Philadelphia, PA, Oct 2015
- Boston Dynamics (Google), June 2015
- University of California, San Diego, June 2015
- University of Michigan, March 2015
- University of Michigan, December 2014
- NSF Workshop on Motion Planning, October 2013
- Osaka University, June 2013
- Chicago Museum of Science and Industry, April 2013
- University of Illinois Urbana Champaign, February 2013
- University of Delaware, September 2012
- Plenary, IEEE International Conference on Automation Science and Engineering, Seoul, Korea, August 2012
- Plenary, IEEE International Conference on Information and Automation, Shenyang, China, June 2012
- Georgia Institute of Technology, April 2012
- Chicago Museum of Science and Industry, Education Staff, March 2012
- Workshop on Contact Modeling and Simulation, RSS 2011, June 2011
- Institute of Automation, Chinese Academy of Sciences, Beijing, May 2011
- Beijing Institute of Technology, May 2011
- Tianjin University, May 2011
- Hebei University of Technology, May 2011
- Georgia Institute of Technology, May 2011
- Northwestern Institute on Complex Systems, October 2010
- JAIST LRC Summer School on Robotics, Kanazawa, Japan, August 2010
- University of Illinois Urbana-Champaign, February 2010

- Nagoya University, Nagoya, Japan, May 2009
- Ritsumeikan University, Kyoto, Japan, May 2009
- Minta Martin Distinguished Lecturer, Aerospace Engineering, University of Maryland, April 2009
- Cornell University, April 2009
- University of Siena, Siena, Italy, March 2009
- University of Pisa, Pisa, Italy, March 2009
- University of Rome “La Sapienza,” Rome, Italy, March 2009
- Distinguished Lecturer, University of California San Diego, Winter School of the Institute of Nonlinear Science, San Diego, CA, January 2009
- Carnegie Mellon University Center for Foundations of Robotics, November 2008
- ICRA 2008 Workshop on Contact Models for Manipulation and Locomotion, Pasadena, CA, May 2008
- Mathematical Biosciences Institute, Ohio State University, January 2008
- California Institute of Technology, June 2007
- University of California, Berkeley, May 2007
- University of California, Los Angeles, May 2007
- University of California, Santa Barbara, May 2007
- University of Southern California, April 2007
- Jet Propulsion Lab, April 2007
- University of Maryland, September 2006
- Carnegie Mellon University, March 2006
- AMS Workshop on Mathematical Problems in Robotics, Northwestern U., October 2004
- University of Pennsylvania, December 2003
- Stanford University, November 2003
- Japan Advanced Institute of Science and Technology, September 2003
- Intelligent Systems Institute, AIST, Tsukuba, Japan, September 2003
- University of Iowa, April 2003
- University of Michigan Control Seminar, April 2003
- Johns Hopkins University, March 2003
- Conference on Decision and Control Workshop on Control Problems in Robotics and Automation, Las Vegas, NV, December 2002
- Future Directions in Nonlinear Control of Mechanical Systems, NSF-ONR Workshop at UIUC, October 2002
- Mathematical Theory of Networks and Systems Special Session on Dynamics and Control of Mechanical Systems, August 2002 (presented by Andrew Lewis)
- Belgian Royal Academy of Sciences, Brussels, Belgium, July 2002
- University of Liege, Liege, Belgium, July 2002
- National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan, July 2001
- Advanced Science Institute, New Frontiers in Intelligent Robotics, Tokyo, Japan, July 2001
- Carnegie Mellon University, Pittsburgh, PA, December 2000
- Allerton Conference on Communication, Control, and Computing, Special Session on Motion Planning, Monticello, IL, October 2000
- Special Session on Nonholonomy on Purpose, International Conference on Intelligent Robot Systems, Takamatsu, Japan, October 2000
- Tutorial on Sensing and Actuation Toward the 21st Century, International Conference on Intelligent Robot Systems, Takamatsu, Japan, October 2000
- US-EU Workshop on Key Research Issues and Opportunities in Motion Planning, Toulouse, France, June 2000
- University of Michigan Dept. of Electrical Engineering and Computer Science, Ann Arbor, MI, May 2000
- IEEE International Conference on Robotics and Automation, Special Session on Grasping and Contact, San Francisco, CA, May 2000
- Ninth International Symposium on Robotics Research, Snowbird, UT, October 1999

- Stanford Workshop on Motion Support for Virtual Prototyping, Stanford, CA, May 1999
- Allerton Conference on Communication, Control, and Computing, Special Session on Control Issues in Locomotion, Monticello, IL, September 1998
- University of Illinois at Urbana-Champaign, Beckman Institute, Artificial Intelligence Seminar, Urbana-Champaign, IL, September 1998
- University of Tokyo Department of Mechano-informatics, Tokyo, Japan, August 1997
- University of Minnesota Computer Science Department, Minneapolis, MN, May 1997
- University of California Irvine Mechanical Engineering Department, Irvine, CA, May 1997
- Stanford University Computer Science Department, Stanford, CA, April 1997
- Vanderbilt University Computer Science Department, Nashville, TN, April 1997
- Westinghouse Science and Technology Center, Pittsburgh, PA, January 1997
- University of Pennsylvania GRASP Lab, Philadelphia, PA, January 1997
- Boston University Department of Manufacturing Engineering, Boston, MA, January 1997
- IEEE Robotics and Automation Society, Tokyo chapter meeting, Tsukuba, Japan, September 1996
- SONY Production Systems Design Department, Tokyo, Japan, September 1996
- Workshop on the Algorithmic Foundations of Robotics (WAFR), San Francisco, CA, February 1994
- University of Tokyo Department of Mathematical Engineering and Information Physics, Tokyo, Japan, January 1994
- Kawasaki Heavy Industries, Japan, January 1994
- International Conference on Advanced Mechatronics, Tokyo, Japan, August 1993

SERVICE TO NORTHWESTERN

- Northwestern Faculty Committee on Athletics and Recreation (CAR), 2021-
- Program Review: Department of Athletics and Recreation (2020-21), Computer Science (2023)
- Provost's Advisory Council on Women Faculty, 2016-21
- Faculty Senate, 2010-13
- Technological Institute Engineering Life Science building committee, 2008-
- ME ABET reaccreditation coordinator, 2003-6
- ME undergraduate NCA accreditation coordinator, 2003-4
- Updated ME grad school catalog, 1998; undergrad catalog, 2000
- Faculty advisor, Pi Tau Sigma, 1998-2007
- Faculty advisor, Theta Tau, 2001-2
- Undergraduate curriculum committee, 1998-
- Mechanical Engineering information session for freshmen, Spring (annually)
- Departmental representative, New Student Week information panel, 1999
- Chairman of the undergraduate curriculum committee, 1999-2000
- MC for "Evening with McCormick," New Student Week, periodically 1999-
- Dean's Scholar Advisor, 2000, 2004
- McCormick Teacher of the Year committee, 1999- 2002
- ME space committee, 2000
- Ford Engineering Design Studio planning subcommittee, 2001
- Day at Northwestern/Preview NU (prospectives) design contest, periodically 1999-
- McCormick Identity (image) Committee, 2002-3