Curriculum Vitae

Matthew T. Mason

https://mtmason.com

Degrees

PhD, Artificial Intelligence, 1982.
Massachusetts Institute of Technology, Cambridge, MA
Dissertation: *Manipulator Grasping and Pushing Operations.*
Advisors: Tomás Lozano-Pérez and Berthold K. P. Horn.

MS, Artificial Intelligence, 1978.
Massachusetts Institute of Technology, Cambridge, MA
Thesis: *Compliance and Force Control for Computer Controlled Manipulators.*
Advisor: Berthold K. P. Horn.

BS, Computer Science, 1976.
Massachusetts Institute of Technology, Cambridge, MA.

Experience

2014–2026. Berkshire Grey.
Chief Scientist and Vice President.

1982 – . Carnegie Mellon University.
Professor Emeritus, Computer Science Department and Robotics Institute, 2021– .
Professor, Computer Science Department and Robotics Institute, 1982–2021.
Chair, Robotics Doctoral Program, 1995–2004.
Director, Robotics Institute, 2004–2014.

July 1994, July 1995. Sandia National Labs.
Research visitor.

Summer, 1978. IBM Thomas J. Watson Research Center.
Research visitor.

Honors

Fellow of the AAAS. 2024.

Fellow of the ACM. 2022.

R&A Prize (IEEE Technical Field Award in Robotics and Automation). 2018.

Pioneer Award, IEEE Robotics and Automation Society. 2009.

Fellow of the Institute of Electrical and Electronics Engineers. 2000.

Fellow of the American Association for Artificial Intelligence. 1992.

System Development Foundation Prize. 1983.

Publications

Books

Matthew T. Mason, *Mechanics of Robotic Manipulation,* MIT Press: Cambridge, MA. 2001.

Pankaj Agarwal, Lydia Kavraki, and Matthew T. Mason, editors. *Robotics: the Algorithmic Perspective: 1998 Workshop on the Algorithmic Foundations of Robotics,* A K Peters: Boston. 1998.

Matthew T. Mason and J. Kenneth Salisbury, *Robot Hands and the Mechanics of Manipulation,* MIT Press: Cambridge, MA. 1985.

J. Michael Brady, John M. Hollerbach, Timothy Johnson, Tomas Lozano-Perez, and Matthew T. Mason, *Robot Motion: Planning and Control,* MIT Press: Cambridge, MA. 1982.

Papers in Refereed Journals

Cheng, Xianyi, Sarvesh Patil, Zeynep Temel, Oliver Kroemer, and Matthew T. Mason. Enhancing Dexterity in Robotic Manipulation via Hierarchical Contact Exploration. *IEEE Robotics and Automation Letters 9*, no.1 pp. 390–397. 2024.

Huang, Eric, Xianyi Cheng, Yuemin Mao, Arnav Gupta, and Matthew T Mason. "Autogenerated manipulation primitives." *The International Journal of Robotics Research 42*, *6.* pp. 433-–458, 2023.

Jiaji Zhou, Yifan Hou, Matthew T. Mason. Pushing revisited: Differential flatness, rajectory planning, and stabilization. *International Journal of Robotics Research,38*:12–13, pp. 1477–1489, 2019.

Pragna Mannam, Alexander V. Volkov, Robert Paolini, Greg Chirikjian, and Matthew T. Mason. Sensorless Pose Determination using Randomized Action Sequences. *Entropy* 21 (2), 2019.

Zhenzhong Jia, Ankit Bhatia, Reuben M Aronson, David Bourne, Matthew T Mason. A survey of automated threaded fastening. *IEEE Transactions on Automation Science and Engineering*:16, 1. Pages 298–310. 2018.

Matthew T. Mason. Toward Robotic Manipulation. *Annual Review of Control, Robotics, and Autonomous Systems:* 1, pages 1–28. 2018.

Jiaji Zhou, Matthew T. Mason, Robert Paolini, and Drew Bagnell. A convex polynomial model for planar sliding mechanics: theory, application, and experimental validation. *The International Journal of Robotics Research*:37, 2–3. Pages 249–265. 2018.

Salah Bazzi, Elie Shammas, Daniel Asmar, and Matthew T. Mason. Motion analysis of two-link nonholonomic swimmers. *Nonlinear Dynamics:* 89, 4. Pages 2739–2751. 2017.

Jiaji Zhou, Robert Paolini, Aaron M. Johnson, J. Andrew Bagnell, and Matthew T. Mason. A probabilistic planning framework for planar grasping under uncertainty. *IEEE Robotics and Automation Letters:* 2, 4. Pages 2111–2118. 2017.

Amir Degani, Andrew W. Long, Siyuan Feng, H. Benjamin Brown, Robert D. 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, pp. 705–718, 2014.

Robert Paolini, Alberto Rodriguez, Siddhartha S. Srinivasa and Matthew T. Mason. A data-driven statistical framework for post-grasp manipulation. *International Journal of Robotics Research,33*:4, pp. 600–615, 2014.

Yan-Bin Jia, Matthew T. Mason and Michael A. Erdmann. Simultaneous impacts: a state transition diagram approach. *International Journal of Robotics Research,32*:1, pp. 84–114, 2013.

Alberto Rodriguez and Matthew T. Mason. Path connectivity of the free space. *IEEE Transactions on Robotics,28*:5, pp. 1177–1180, Oct. 2012.

Ross A. Knepper and Matthew T. Mason. Real-time informed path sampling for motion planning search. *International Journal of Robotics Research, 31*:11, pp. 1231–1250, Nov. 2012.

Alberto Rodriguez, Matthew T. Mason and Steve Ferry. From caging to grasping. *International Journal of Robotics Research, 31*:7, pp. 886–900, Jul. 2012.

Matthew T. Mason. Creation myths: The beginnings of robotics research. *IEEE Robotics & Automation Magazine,19*:2, pp. 72–77, Jun. 2012.

Matthew T. Mason, Alberto Rodriguez, Siddhartha S. Srinivasa and Andres S. Vazquez. Autonomous manipulation with a general-purpose simple hand. *International Journal of Robotics Research, 31*:5, pp. 688–703, May 2012.

Alberto Rodriguez and Matthew T. Mason. Grasp Invariance. *International Journal of Robotics Research, 31*:2, pp. 237–249, 2012.

Ross A. Knepper, Siddhartha S. Srinivasa, and Matthew T. Mason. Toward a deeper understanding of motion alternatives via an equivalence relation on local paths. *International Journal of Robotics Research, 31*:2, pp. 167–186, 2012.

Amir Degani, Howie Choset, and Matthew T. Mason. DTAR—a Dynamic, Tube Ascending Robot. *IEEE Transactions on Robotics*, *27*:2, pp. 360–364, April 2011.

Hamidreza Chitsaz, Steven M. LaValle, Devin J. Balkcom, and Matthew T. Mason. Minimum Wheel-Rotation Paths for Differential-Drive Mobile Robots. *International Journal of Robotics Research, 28*:1, pp. 66–80, January 2009.

Ravi Balasubramanian, Alfred A. Rizzi, and Matthew T. Mason. Legless Locomotion: A Novel Locomotion Technique for Legged Robots. *International Journal of Robotics Research, 27*:5, pp. 575–594, May 2008.

Devin J. Balkcom and Matthew T. Mason. Robotic Origami Folding. *International Journal of Robotics Research, 27*:5, pp. 613–627, May 2008.

Devin J. Balkcom, Paritosh A. Kavathekar and Matthew T. Mason. Time-optimal Trajectories for an Omni-directional Vehicle. *International Journal of Robotics Research, 25*:10, pp. 985–999, October 2006.

Devin J. Balkcom and Matthew T. Mason. Time Optimal Trajectories for Bounded Velocity Differential Drive Vehicles. *International Journal of Robotics Research, 21*:3, pp. 199–218, March 2002.

Srinivas Akella, Wesley Huang, Kevin M. Lynch, and Matthew T. Mason. Parts Feeding on a Conveyor with a One Joint Robot. *Algorithmica* 26: 313–344, 2000.

Srinivas Akella and Matthew T. Mason. Orienting toleranced polygonal parts. *International Journal of Robotics Research*, *19*:12, pp. 1147–1170, December 2000.

Wesley Huang and Matthew T. Mason. Mechanics, planning, and control for tapping. *International Journal of Robotics Research, 19*:10, pp. 883–894, October 2000.

Matthew T. Mason. Progress in Nonprehensile Manipulation. *International Journal of Robotics Research*, *18*:11, pp. 1129–1141, November 1999.

Srinivas Akella and Matthew T. Mason. Using partial sensor information to orient parts. *International Journal of Robotics Research*, *18*:10, pp. 963–997, October 1999.

Kevin M. Lynch and Matthew T. Mason. Dynamic nonprehensile manipulation: Controllability, planning, and experiments. *International Journal of Robotics Research, 18*:1, pp. 64-92, January 1999.

Srinivas Akella and Matthew T. Mason. Posing polygonal objects in the plane by pushing. *International Journal of Robotics Research*, *17*:1, pp. 70–88, January 1998.

Kevin M. Lynch and Matthew T. Mason. Stable pushing: Mechanics, controllability, and planning. *International Journal of Robotics Research*, 15(6): 533–556, December 1996.

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, pp. 174–183, April 1995.

Michael A. Erdmann, Matthew T. Mason, and G. Vanecek. Mechanical Parts Orienting: The Case of a Polyhedron on a Table. *Algorithmica*, *10*:2/3/4, August/Sept/October 1993.

Yu Wang and Matthew T. Mason, Two dimensional rigid body collisions with friction. *Trans ASME; J Applied Mechanics*, *59*:3, pp 635–642, September 1992.

Alan D. Christiansen, Matthew T. Mason, and T. M. Mitchell. Learning reliable manipulation strategies without initial physical models. *Robotics and Autonomous Systems 8*, pp 7–18, 1991.

Michael A. Erdmann and Matthew T. Mason, An Exploration of Sensorless Manipulation. *IEEE Journal of Robotics and Automation*, *4*:4, pp. 369–379, August 1988.

Matthew T. Mason, Mechanics and Planning of Manipulator Pushing Operations. *International Journal of Robotics Research, 5*:3, 1986.

Tomas Lozano-Perez, Matthew T. Mason, and Russell H. Taylor, Automatic Synthesis of Fine-Motion Strategies for Robots. *International Journal of Robotics Research, 3*:1, 1984.

Matthew T. Mason, Compliance and Force Control for Computer-Controlled Manipulators. *IEEE Trans. on Systems, Man, and Cybernetics*, *11*:6, 1981.

Papers at Refereed Conferences

Cheng, Xianyi, Eric Huang, Yifan Hou, and Matthew T. Mason. Contact Mode Guided Motion Planning for Quasidynamic Dexterous Manipulation in 3D. *2022 International Conference on Robotics and Automation (ICRA)*, pp. 2730–2736. 2022.

Gupta, Arnav, Yuemin Mao, Ankit Bhatia, Xianyi Cheng, Jonathan King, Yifan Hou, and Matthew T. Mason. Extrinsic Dexterous Manipulation with a Direct-drive Hand: A Case Study. *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS),* pp. 4660–4667. 2022.

Cheng, Xianyi, Eric Huang, Yifan Hou, and Matthew T. Mason. Contact Mode Guided Sampling-Based Planning for Quasistatic Dexterous Manipulation in 2D. *2021 International Conference on Robotics and Automation (ICRA),* 2021.

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Huang, Eric, Xianyi Cheng, and Matthew T. Mason. Efficient Contact Mode Enumeration in 3D. *In Algorithmic Foundations of Robotics XIV: Proceedings of the Fourteenth Workshop on the Algorithmic Foundations of Robotics,* edited by Steven M LaValle, Ming Lin, Timo Ojala, Dylan Shell, and Jingjin Yu, pp 485–501. 2021.

Wang, Sean J., Ankit Bhatia, Matthew T. Mason, and Aaron M. Johnson. Contact Localization for Transparent Robots using Velocity Constraints. In *Proceedings of Dynamic Walking 2020.* May 2020.

Hou, Y., Zhenzhong Jia, Aaron. Johnson, and Matthew T. Mason. Robust Planar Dynamic Pivoting by Regulating Iner- tial and Grip Forces. In *Algorithmic Foundations of Robotics XII.* Springer Proceedings in Advanced Robotics, edited by K. Goldberg, P. Abbeel, K. Bekris, and L. Miller. 2020.

Hou, Yifan, Zhenzhong Jia, and Matthew T. Mason. Manipulation with Shared Grasping. In *Robotics: Science and Systems (RSS).* 2020.

Li, Siyi, Jiaji Zhou, Zhenzhong Jia, Dit-Yan Yeung, and Matthew T. Mason. Learning Accurate Objectness Instance Segmentation from Photorealistic Rendering for Robotic Manipulation. In *Proceedings of the 2018 International Symposium on Experimental Robotics,* 11:245. Springer, 2020.

Wang, Sean J., Ankit Bhatia, Matthew T. Mason, and Aaron Johnson. Contact Localization using Velocity Constraints. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2020).* 2020.

Zhou, Jiaji, and Matthew T. Mason. Pushing Revisited: Differential Flatness, Trajectory Planning and Stabilization. In *Robotics Research,* edited by Nancy M. Amato, Greg Hager, Shawna Thomas, and Miguel Torres-Torriti, pp. 605–620. Cham: Springer International Publishing, 2020.

Hou, Y., and Matthew T. Mason. Criteria for Maintaining Desired Contacts for Quasi-Static Systems. In *2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS),* 2019.

Hou, Yifan, and Matthew T. Mason. Robust execution of contact-rich motion plans by hybrid force-velocity control. In *2019 International Conference on Robotics and Automation (ICRA),* pp. 1933–1939. 2019.

Xianyi Cheng, Zhenzhong Jia, Matthew T. Mason. Data-Efficient Process Monitoring and Failure Detection for Robust Robotic Screwdriving. *2019 IEEE 15th International Conference on Automation Science and Engineering (CASE)*, pp. 1705–1711. 2019.

Ankit Bhatia, Aaron M. Johnson, and Matthew T. Mason. Direct Drive Hands: Force–Motion Transparency in Gripper Design. *Proceedings of Robotics: Science and Systems (RSS)*, pages 22–26. Freiburg, Germany 2019.

E Huang, Z Jia, MT Mason. Large-Scale Multi–Object Rearrangement. *2019 International Conference on Robotics and Automation (ICRA)*, pp. 211–218. 2019.

Xianyi Cheng, Yifan Hou, and Matthew T. Mason. Manipulation with suction cups using external contacts *International Symposium on Robotics Research (ISRR).* 2019.

Li, S., Zhou, J., Jia, Z., Yeung, D. Y., and Mason, M. T. (2020). Learning accurate objectness instance segmentation from photorealistic rendering for robotic manipulation.*Proceedings of the 2018 International Symposium on Experimental Robotics.* pp. 245-255. 2018

Xianyi Cheng, Zhenzhong Jia, Ankit Bhatia, Reuben M. Aronson, and Matthew T. Mason. Sensor Selection and Stage & Result Classifications for Automated Miniature Screwdriving. *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. Pages 6078-6085. 2018.

Yifan Hou, Zhenzhong Jia, and Matthew T. Mason. Fast planning for 3d any-pose-reorienting using pivoting. *2018 IEEE International Conference on Robotics and Automation (ICRA)*. Pages 1631–1638. 2018.

Yuzuko C Nakamura, Daniel M Troniak, Alberto Rodriguez, and Matthew T. Mason, and Nancy S. Pollard. The complexities of grasping in the wild. *2017 IEEE-RAS 17th International Conference on Humanoid Robotics (Humanoids)*. Pages 233–240. 2017.

Origami Folding Sequence Generation Using Discrete Particle Swarm Optimization. Ha-Duong Bui, Sungmoon Jeong, Nak Young Chong, and Matthew T. Mason *International Conference on Neural Information Processing*, 484-493. 2017.

Eric Huang, Ankit Bhatia, Byron Boots, Matthew Mason. Exact bounds on the contact driven motion of a sliding object, with applications to robotic pulling. *Robotics: Science and systems XIII.* 2017.

Reuben M. Aronson, Ankit Bhatia, Zhenzhong Jia, Mathieu Guillame–Bert, David Bourne, Artur Dubrawski, and Matthew T. Mason. Data-driven classification of screwdriving operations. *International Symposium on Experimental Robotics (ISER).* Pages 244–253. 2016.

Robert Paolini and Matthew T. Mason. Data-driven statistical modeling of a cube regrasp. *Intelligent Robots and Systems (IROS), 2016 IEEE/RSJ International Conference on* pages 2554–2560. December, 2016.

Jiaji Zhou, R. Paolini, J. A. Bagnell and M. T. Mason. A convex polynomial force-motion model for planar sliding: Identification and application. *Robotics and Automation (ICRA), 2016 IEEE International Conference on* pages 372–377. May 2016. (Best Conference Paper award.)

Abdullah Al Redwan Newaz, Sungmoon Jeong, Hosun Lee, Hyejeong Ryu, Nak Young Chong, and Matthew T. Mason. Fast radiation mapping and multiple source localization using topographic contour map and incremental density estimation. *Robotics and Automation (ICRA), 2016 IEEE International Conference on* oages 1515–1521. May, 2016.

Zhiwei Zhang, Alberto Rodriguez and Matthew T. Mason. A novel nonlinear compliant link on simple grippers. *Intelligent Robots and Systems (IROS), 2015 IEEE/RSJ International Conference on* pages 2923–2928. September, 2015.

Nikhil Chavan-Dafle, Matthew T. Mason, Harald Staab, Greg Rossano, and Alberto Rodriguez. A two-phase gripper to reorient and grasp. *Automation Science and Engineering (CASE), 2015 IEEE International Conference on* pages 1249-–1255. August 2015.

Holladay, Anne, Robert Paolini, and Matthew T. Mason. A General Framework for Open-Loop Pivoting. *Robotics and Automation (ICRA), 2015 IEEE International Conference on,* May 2015.

Weiwei Wan, Matthew T. Mason, R. Fukui, and Y. Kuniyoshi. Improving regrasp algorithms to analyze the utility of work surfaces in a workcell. *Robotics and Automation (ICRA), 2015 IEEE International Conference on,* pages 4326–4333. May 2015.

Nikhil Chavan-Dafle, Alberto Rodriguez, Robert Paolini, Bowei Tang, Siddhartha S. Srinivasa, Michael A. Erdmann, Matthew T. Mason, Ivan Lundberg, Harald Staab and Thomas Fuhlbrigge. Extrinsic dexterity: In-hand manipulation with external forces. *2014 IEEE International Conference on Robotics and Automation (ICRA)*, pages 1578–1585, 2014.

Alberto Rodriguez and Matthew T. Mason. Effector form design for 1dof planar actuation. *2013 IEEE International Conference on Robotics and Automation (ICRA)*, pages 349–356, 2013.

Garth Zeglin, Alberto Rodriguez, and Matthew T. Mason. A simple and compliant force sensing palm for the MLab simple hand. *2013 IEEE International Conference on Robotics and Automation (ICRA)*, pages 2359–2365, 2013.

Robert Paolini, Alberto Rodriguez, Matthew T. Mason, and Siddhartha Srinivasa. A data-driven statistical framework for post-grasp manipulation. *International Symposium of Experimental Robotics*, Jun. 2012.

Alberto Rodriguez, Matthew T. Mason, and Steve Ferry. From caging to grasping. *Proceedings of Robotics: Science and Systems*, Los Angeles, CA, USA, June 2011.

Ross A. Knepper and Matthew T. Mason. Realtime Informed Path Sampling for Motion Planning Search. *International Symposium on Robotics Research*, Flagstaff AZ, 2011.

Ross A. Knepper, Siddhartha Srinivasa, and Matthew T. Mason. An Equivalence Relation for Local Path Sets. *The Ninth International Workshop on the Algorithmic Foundations of Robotics*, December, 2010.

Alberto Rodriguez and Matthew T. Mason. Grasp Invariance. *The Ninth International Workshop on the Algorithmic Foundations of Robotics*, December, 2010.

Alberto Rodriguez, Matthew T. Mason, and Siddhartha Srinivasa. Manipulation Capabilities with Simple Hands. *12th International Symposium on Experimental Robotics (ISER 2010)*, December, 2010.

Amir Degani, Howie Choset, and Matthew T. Mason. "Minimalistic, dynamic, tube climbing robot." *2010 International Conference on Robotics and Automation,* 2010.

Alberto Rodriguez, David Bourne, Matthew T. Mason, Gregory F. Rossano, and JianJun Wang. Failure Detection in Assembly: Force Signature Analysis. *6th IEEE Conference on Automation Science and Engineering (CASE 2010)*, August, 2010.

Ross A. Knepper, Siddhartha Srinivasa, and Matthew T. Mason. Hierarchical Planning Architectures for Mobile Manipulation Tasks in Indoor Environments. *2010 IEEE International Conference on Robotics and Automation*, May, 2010.

Amir Degani, Howie Choset, and Matthew T. Mason. DSAC—Dynamic, Single Actuated Climber: Local Stability and Bifurcations. *International Conference on Robotics and Automation*, 2010.

Matthew T. Mason, Siddhartha S. Srinivasa, and Andres S. Vazquez. Generality and Simple Hands. *International Symposium on Robotics Research*, 2009.

Ross A. Knepper and Matthew T. Mason. Path Diversity Is Only Part of the Problem. *2009 IEEE International Conference on Robotics and Automation*, Kobe Japan, May 12–17, 2009. pp. 3224–3229.

Ross A. Knepper and Matthew T. Mason. Empirical Sampling of Path Sets for Local Area Motion Planning. *International Symposium on Experimental Robotics*, IFRR, July, 2008.

Amir Degani, Amir Shapiro, Howie Choset, Matthew T. Mason. A Dynamic Single Actuator Vertical Climbing Robot. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2007)*. pp. 2901–2906. 2007.

Ravi Balasubramanian, Alfred A. Rizzi, and Matthew T. Mason. Toward Legless Locomotion Control. *IEEE/RSJ International Conference on Intelligent Robots and Systems*, October, 2006.

Devin J. Balkcom, Paritosh A. Kavathekar and Matthew T. Mason. The Minimum-time Trajectories for an Omni-directional Vehicle. *Proceedings, The Seventh International Workshop on the Algorithmic Foundations of Robotics,* New York City, July 16–18, 2006.

Hamidreza Chitsaz, Steven M. Lavalle, Devin J. Balkcom, and Matthew T. Mason. Minimum Wheel-Rotation Paths for Differential-Drive Mobile Robots. *Proceedings of the 2006 IEEE International Conference on Robotics and Automation,* Orlando, FL, May 2006, pp. 1616–1623.

Hamidreza Chitsaz, Steven M. LaValle, Devin J. Balkcom, Matthew T. Mason. An Explicit Characterization of Minimum Wheel-Rotation Paths for Differential-Drives. *Proceedings of 12th IEEE International Conference on Methods and Models in Automation and Robotics (MMAR),* 2006.

Siddhartha Srinivasa, Michael A. Erdmann, and Matthew T. Mason. Using projected dynamics to plan dynamic contact manipulation. *IEEE/RSJ International Conference on Intelligent Robots and Systems*, August, 2005.

Siddhartha Srinivasa, Michael A. Erdmann, and Matthew T. Mason. Control synthesis for dynamic contact manipulation. *IEEE International Conference on Robotics and Automation*, April 2005.

Devin J. Balkcom and Matthew T. Mason. Introducing robotic origami folding. *Proceedings of the 2004 IEEE International Conference on Robotics and Automation.*

Ravi Balasubramanian, Alfred A. Rizzi, and Matthew T. Mason. Legless Locomotion: Models and Experimental Demonstration. *IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 1803–1808, 2004.

Ravi Balasubramanian, Alfred Rizzi, and Matthew Mason. Legless Locomotion for Legged Robots. *Proceedings of the International Conference on Robotics and Intelligent Systems.* October, 2003.

Siddhartha S. Srinivasa, Michael A. Erdmann, and Matthew T. Mason. Bilateral Time-Scaling for Control of Task Freedoms of a Constrained Nonholonomic System *Proceedings of the 2003 IEEE International Conference on Robotics and Automation.*

Siddhartha S. Srinivasa, Christopher Baker, Elisha Sacks, Grigoriy Reshko, Matthew Mason, and Michael Erdmann. Experiments with nonholonomic manipulation. *Proceedings of the 2002 IEEE International Conference on Robotics and Automation.*

Devin J. Balkcom and Matthew T. Mason. Extremal Trajectories for Bounded Velocity Mobile Robots. *Proceedings of the 2002 IEEE International Conference on Robotics and Automation.*

Devin J. Balkcom and Matthew T. Mason. Geometric Construction of Time Optimal Trajectories for Differential Drive Robots. *Algorithmic and Computational Robotics: New Directions,* The Fourth Workshop on the Algorithmic Foundations of Robotics, pp. 377-390, Natick MA, 2001. A. K. Peters.

Devin J. Balkcom and Matthew T. Mason. Time Optimal Trajectories for Bounded Velocity Differential Drive Robots. *Proceedings of the 2000 IEEE International Conference on Robotics and Automation*, pp. 2479–2484, San Francisco CA.

Devin J. Balkcom and Matthew T. Mason. Extremal Trajectories for Bounded Velocity Differential Drive Robots. *Proceedings of the 2000 IEEE International Conference on Robotics and Automation*, pp. 2499–2504, San Francisco CA.

Matthew T. Mason, Dinesh Pai, Daniela Rus, Lee Taylor, Michael A. Erdmann. A Mobile Manipulator. *Proceedings of the 1999 IEEE International Conference on Robotics and Automation,* pp. 2322–2327, Detroit MI.

Matthew T. Mason, Dinesh K. Pai, Daniela Rus, Jon Howell, Lee R. Taylor, and Michael A. Erdmann. Experiments with Desktop Mobile Manipulators. *Proceedings of the Sixth International Symposium on Experimental Robotics,* pp. 37–46, Springer-Verlag, 2000.

Srinivas Akella and Matthew T. Mason. Parts Orienting with Shape Uncertainty. *Proceedings, 1998 IEEE International Conference on Robotics and Automation*, Leuven, Belgium, May 1998.

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Wesley Huang and Matthew T. Mason. Experiments in Impulsive Manipulation. *Proceedings, 1998 IEEE International Conference on Robotics and Automation,* Leuven, Belgium, May 1998.

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Srinivas Akella, Wesley Huang, Kevin M. Lynch, and Matthew T. Mason. Sensorless Parts Orienting with a One-Joint Manipulator. *Proceedings, 1997 IEEE International Conference on Robotics and Automation,* Albuquerque, NM, April 1997.

Wesley H. Huang and Matthew T. Mason. Mechanics for Vibratory Manipulation. *Proceedings, 1997 IEEE International Conference on Robotics and Automation,* Albuquerque, NM, April 1997.

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Matthew T. Mason and Kevin M. Lynch. Dynamic manipulation. *Proceedings, IROS '93—IEEE/RSJ International Workshop on Intelligent Robots and Systems*, July 1993. Yokohama, Japan.

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Kenneth Y. Goldberg, Matthew T. Mason, and Michael Erdmann, Generating Stochastic Plans for a Programmable Parts Feeder. *IEEE International Conference on Robotics and Automation*, Sacramento, Calif. April 1991.

Michael Erdmann, Matthew T. Mason, and George Vanecek, Jr., Mechanical Parts Orienting: The Case of a Polyhedron on a Table. *IEEE International Conference on Robotics and Automation*, Sacramento, Calif. April 1991.

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Matthew T. Mason, Alan D. Christiansen, and Tom Mitchell, Experiments in robot learning. *Proceedings of the Sixth International Workshop on Machine Learning,* Morgan Kaufmann, 1989.

Matthew T. Mason, How to push a block along a wall. Proceedings, NASA Conference on Space Telerobotics, Pasadena, February 1989.

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Yu Wang and Matthew T. Mason, Modeling Impact Dynamics for Robotic Operations. *4th IEEE International Conference on Robotics and Automation,* IEEE Computer Society, Raleigh, NC, 1987.

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Matthew T. Mason, Automatic Planning of Fine Motions: Correctness and Completeness. *IEEE International Conference on Robotics,* IEEE Computer Society, Atlanta, GA, 1984.

Matthew T. Mason, Adaptable Manipulation without Sensors. *Robotics Research and Advanced Applications,* ASME Winter Annual Meeting, Phoenix, Arizona, November 1982.

Patents (excluding over 200 patents with Berkshire Grey)

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Larson, Noble G, John A Purbrick, and Matthew T Mason. Stepping motor control system. US Patent 4,426,608, January 1984.

Papers at Unrefereed Conferences

Paritosh A. Kavathekar, Devin J. Balkcom and Matthew T. Mason. The geometry of time-optimal trajectories for an omnidirectional robot. *Proceedings of the Qualitative Reasoning Workshop*, pp. 1–5, 2006.

Devin J. Balkcom and Matthew T. Mason. Progress in Desktop Robotics. Eleventh Yale Workshop on Adaptive and Learning Systems, New Haven, CT, June 2001.

Srinivas Akella, Wesley H. Huang, Kevin M. Lynch, and Matthew T. Mason. Sensorless Parts Feeding with a One Joint Robot. *Algorithms for Robotic Motion and Manipulation*, (1996 Workshop on the Algorithmic Foundations of Robotics), pp. 229–237, J.-P. Laumond and M. Overmars (editors), A. K. Peters, Wellesley, Massachusetts, July 1997.

Srinivas Akella, Wesley H. Huang, Kevin M. Lynch, and Matthew T. Mason, From Robotic Juggling to Robotic Parts Feeding. *Ninth Yale Workshop on Adaptive and Learning Systems.* New Haven CT, 1996.

Srinivas Akella, Wesley Huang, Kevin M. Lynch, and Matthew T. Mason. Planar manipulation on a conveyor with a one joint robot. *Robotics Research: The Seventh International Symposium,*, pp. 265-276, Munich, Germany, October 1995.

Kevin M. Lynch and Matthew T. Mason. Stable pushing: Mechanics, controllability, and planning. *First Workshop on the Algorithmic Foundations of Robotics*, A. K. Peters, Boston, 1995.

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.

Matthew T. Mason and Kevin M. Lynch. Throwing a club: early results. *Robotics Research: The Sixth International Symposium,* Takeo Kanade and Richard Paul, editors. International Foundation for Robotics Research: Cambridge MA. 1994.

Matthew T. Mason, Srinivas Akella, and Kevin M. Lynch. Recent results in pushing. *Proceedings of NSF Design and Manufacturing Systems Conference*, University of North Carolina at Charlotte, January 6–8, 1993.

Matthew T. Mason, Randall C. Brost, and Kenneth Y. Goldberg. Progress in robotic manipulation. *Proceedings of NSF Design and Manufacturing Systems Conference.* January 8–12, 1990, Tempe, AZ.

Randall C. Brost and Matthew T. Mason, Graphical analysis of planar rigid-body dynamics with multiple frictional contacts. *5th International Symposium on Robotics Research*, August, 1989.

Matthew T. Mason, Compliant sliding of a block along a wall. *First International Symposium on Experimental Robotics,* Montreal, June 19-21, 1989.

Matthew T. Mason, Kenneth Y. Goldberg, and Yu Wang. Progress in Robotic Manipulation. *Advances in Manufacturing Systems Integration and Processes: 15th Conference on Production Research and Technology*. National Science Foundation, January 1989.

Thomas M. Mitchell, Matthew T. Mason, and Alan D. Christiansen. Toward a learning robot. *Proceedings of the Workshop on Representation and Learning in an Autonomous Agent,* Portugal, November 1988.

Russell H. Taylor, Matthew T. Mason, and Kenneth Y. Goldberg. Sensor-based manipulation planning as a game with nature. *Robotics Research: The Fourth International Symposium,* R. C. Bolles and B. Roth, editors. MIT Press, Cambridge, MA. 1988.

Matthew T. Mason, On the Scope of Quasi-Static Pushing. *Robotics Research: the Third International Symposium*, Olivier Faugeras and George Giralt, editors, MIT Press, 1986.

Matthew T. Mason, Mechanics of Pushing. *Robotics Research: the Second International Symposium*, Hideo Hanafusa and Hirochika Inoue, editors, MIT Press, 1985.

Tomas Lozano-Perez, Matthew T. Mason, and Russell H. Taylor, Automatic Synthesis of Fine-Motion Strategies for Robots. *Robotics Research: The First International Symposium,* Michael Brady and Richard P. Paul, editors. MIT Press, 1984.

Other publications

Matthew T. Mason "The Hairball of Human Knowledge." Blog post. `https://mtmason.com/the-hairball-of-human-knowledge/` March 3, 2026.

Matthew T. Mason "A Dilettante's Philosophy of Mind." Blog post. `https://mtmason.com/a-dilettantes-philosophy-of-mind/` February 3, 2026.

Matthew T. Mason "AI and Robotics: Scientific Revolution #3" Blog post. `https://mtmason.com/ai-and-robotics-scientific-revolution-3/` January 5, 2026.

Matthew T. Mason "The next robotics revolution" Blog post. `https://mtmason.com/the-next-robotics-revolution/` December 1, 2025.

Matthew T. Mason "Don't trust smart people!" Blog post. `https://mtmason.com/dont-trust-smart-people/` November 4, 2025.

Matthew T. Mason "Robotic manipulation in clutter." Blog post. `https://mtmason.com/robotic-manipulation-in-clutter/` September 8, 2025.

Matthew T. Mason "Robo exodus." Blog post. `https://mtmason.com/robo-exodus/` August 6, 2025.

Matthew T. Mason "Vacuum grippers versus robot hands." Blog post. `https://mtmason.com/vacuum-grippers-versus-robot-hands/` July 2, 2025.

Matthew T. Mason "Robots are Inside Out." Blog post. `https://mtmason.com/robots-are-inside-out/` June 2, 2025.

Matthew T. Mason "Why Robot Hands Won't Take Over the Warehouse Anytime Soon." Berkshire Grey blog post. `https://www.berkshiregrey.com/resources/blog/why-robot-hands-wont-take-over-the-warehouse-anyt` May 27, 2025.

Matthew T. Mason. "The Heart of Robotic Manipulation." Blog post. `https://mtmason.com/the-heart-of-robotic-manipulation/` May 6, 2025.

Matthew T. Mason. "The Unstable Queen." Blog post. `https://mtmason.com/the-unstable-queen/` April 9, 2025.

Matthew T. Mason. "The Inner Robot." Blog post. `https://mtmason.com/the-inner-robot/` March 6, 2025.

Matthew T. Mason. "Robo Genesis." Blog post. `https://mtmason.com/robo-genesis/` February 3, 2025.

Matthew T. Mason. "The forebot and the buttlebot." Blog post. `https://mtmason.com/forebot-and-buttlebot/` January 2, 2025.

Matthew T. Mason. "The Beetle Roboticists: A Parable." Blog post. `https://mtmason.com/the-beetle-roboticists-a-parable/` November 24, 2024.

Matthew T. Mason. "The Funnest Ideas in Robotics." Blog post. https://mtmason.com/the-funnest-ideas-in-robotics-2/ October 23, 2024.

Bhatia, Ankit, Matthew T Mason, and Aaron M Johnson. "Reacting to contact: Transparency and collision reflex in actuation." arXiv preprint arXiv:2212.03469, 2022.

Mason, Matthew T. "The Secrets of Robotic Picking." Berkshire Grey, 2020.

Foreword. In *Modern Robotics: Mechanics, Planning, and Control.* Kevin M. Lynch and Frank C. Park. Cambridge University Press. May 2017.

Nikhil Chavan Dafle, Alberto Rodriguez, Robert Paolini, Bowei Tang, Siddhartha S. Srinivasa, Michael A. Erdmann, Matthew T. Mason, Ivan Lundberg, Harald Staab and Thomas Fuhlbrigge. Regrasping objects using extrinsic dexterity. *2014 IEEE International Conference on Robotics and Automation (ICRA)*, pages 2560–356, 2014. (Video)

Matthew T. Mason. Creation myths: The beginnings of robotics research. *Robotics and Automation Magazine*, IEEE, 19(2):72 –77, June 2012.

Matthew T. Mason, Eldridge Gravy and the Court Supreme, and the current and past members of the Manipulation Lab. "Manipulation Lab: Do What You Do". Showings:

- YouTube: http://youtu.be/fiGScq8WWFE
- Robot Film Festival. 3LD Art & Technology Center, New York City, NY. July14, 2011.
- Days of Future: Days of Robotics. Center for the Promotion of Science. Belgrade Serbia. September 2012.

Matthew T. Mason, Siddhartha Srinivasa, Andres S. Vazquez, and Alberto Rodriguez Garcia. Generality and simple hands. Tech. report CMU-RI-TR-10-40. Robotics Institute, Carnegie Mellon University. November, 2010

Yu Wang and Matthew T. Mason. Two-dimensional rigid-body collisions with friction: authors' closure. *Trans ASME; J Applied Mechanics v60*, p 566, June 1993.

Matthew T. Mason, Kicking the Sensing Habit. *AI Magazine*, *14*:1, pp. 58–59, Spring 1993.

Michael A. Erdmann and Matthew T. Mason. Planar sliding with dry friction: a review. *The Robotics Review 2.* MIT Press. 1992.

Matthew T. Mason. 1989. Robotic Manipulation: Mechanics and Planning. *Robotics Science*, Michael Brady, editor. MIT Press.

Matthew T. Mason. 1989. Numerical Simulation of Time-Dependent Contact and Friction Problems in Rigid Body Mechanics: A Review. *The Robotics Review 1.* MIT Press.

Kenneth Y. Goldberg and Matthew T. Mason. 1990. A Programmable Parts Feeder. *Annual Research Review*, The Robotics Institute, Carnegie Mellon University.

Invited Lectures

A manipulation journey. Invited talk, CMU Robotics Institute Seminar, October 10, 2025.

Can warehouse robotics inspire great research? ICRA Tech Talk. May 20, 2025.

Contact vs clutter, Vacuum cups vs hands. RSS Workshop on Navigating Contact Dynamics in Robotics. June 25, 2025.

A perspective from industry on hard robot challenges. International Symposium on Robotics Research. December 12, 2024.

Lessons from warehouse robotics: From warehouses to kitchens. ICRA@40. September 23, 2024.

Compared to robots, humans have a long way to go. Workshop on Contrarian Approaches to Robotic Manipulation. The AI Institute. July 30, 2024.

Robotic Manipulation: From the blocks world to the warehouse. Guest lecture, Cornell CS6751. May 7, 2024.

What is the simplest action? IROS Workshop on Leveraging Models for Contact-Rich Manipulation October 1, 2023

Industrial dexterity. Northwestern Center for Robotics and Biosystems. Seminar series: Grand Challenges in Robotics: Dexterity. April 5, 2023.

Manipulation with body + arm, arm + hand, hand + stuff. Manipulation Workshop. Boston Dynamics AI Institute. February 27, 2023.

History of 16741? Guest lecture, 16-741, Carnegie Mellon Robotics Institute November 30, 2022.

Robotics, Manipulation, Logistics. EON: Edge of Now. Palm Springs. October 20, 2022.

Robotics and Warehouse Automation: From Robotics Research to Berkshire Grey. munich_i Hightech Summit. Munich, Germany. July 22, 2022

How should a wheelchair think about distance? Workshop in Honor of Jean-Paul Laumond. Collège de France. Paris. July 11, 2022.
`https://youtu.be/vlxRDpMqQp0?si=6iG5Rwuq27HKBVIA`

Compliant manipulation in e-commerce and warehouse automation. ICRA Workshop on Compliant Manipulation. May 23, 2022.

Robotic manipulation: from Academia to Berkshire Grey RXM Seminar, Air Force Research Laboratory. April 1, 2022.

Robotic manipulation in logistics: From research labs to warehouse automation. Keynote, Georgia Tech IRIM Research Showcase March 31, 2022.

Robotics and Warehouse Automation at Berkshire Grey.

- Georgia Tech IRIM Seminar. February 1, 2022.
  `https://youtu.be/NZnQseqBrMI?si=ZJrN5lva1cirYYj0`
- Robotics Institute Seminar. Carnegie Mellon University November 12, 2021
  `https://youtu.be/Veq7r7pbkYY?si=32gUOn_TGhNlq4WW`

Robotics and Logistics: Berkshire Grey. University of Toronto. November 8, 2021.

The Whole Machine: Robot + Task. IFRR Global Robotics Colloquia. May 13, 2021.

Robotic Manipulation.

- AI4Action. February 13, 2021.
- Beijing Sineva Technology Company and BOE Technology Group. March 26, 2015.
- Distinguished lecture, Computer Science Department, Iowa State University. January 2003.
- Singapore Polytechnic. September 10, 2008.
- MIT Center for Information-Driven Mechanical Systems. Host: Jean-Jacques Slotine. December 7, 1989.
- Canadian Society for the Computational Study of Intelligence, London, Ontario, May, 1984.

To Grasp or Not to Grasp. ICRA Workshop on Shaping the Quality Metric of a Grasp with the Manipulation Task: Grasping as a Sub-action of Object Manipulation. June 5, 2020.

Trying to make a coherent picture out of robotic manipulation. CMU NREC seminar. February 5, 2020

From Carnegie Mellon to Berkshire Grey. IEEE CASE Keynote. August 23, 2019.

Compliance and Transparency. 19th Yale Workshop on Adaptive and Learning Systems. June 12, 2019.

Embracing Failure. ICRA 2019 Keynote. May 21, 2019.
`https://youtu.be/YJisNJ91uR0?si=0bu-b7qjg9cIURAs`

Models of Robotic Manipulation. MIT Robotics Seminar. April 5, 2019.
`https://youtu.be/LfWiBdOc2FI?si=h1cYGTkQrpMMNViA`

From Carnegie Mellon to Berkshire Grey. Keynote address, IEEE CASE, 2019.

Robotic Manipulation: A Broadening View. Georgia Institute of Technology. IRIM Seminar. 2019

"Toward Robotic Manipulation." Robotics Frontiers: Celebrating Pradeep Khosla. UC San Diego. September 22, 2017

Extrinsic Dexterity. Global Tech Alliance Robotic Workshop. Technical University of Munich. May 22, 2016.

Panel discussion, ICRA 2016 Workshop on datasets on manipulation. May 20, 2016.

How to solve robotic manipulation, maybe, eventually. MIT Robocon. February 13, 2016.

Haptic perception, grasping and manipulation with simple robotic grippers. DREAM / CPAR Seminar, UC Berkeley. February 1, 2016.
`https://youtu.be/N4m4GhNDs3o?si=ZuKRmOG3Ymfo283Z`

Robotic Manipulation with Simple Hands.

- Mechanical Engineering Department. Columbia University. October, 2015.
- University of Texas. September 5, 2014.
- Harvard University. Cambridge MA. February 17, 2012.
- Tohoku University. Tohoku, Japan. October 17, 2011.

Locomotion versus Manipulation. NSF Workshop on Locomotion and Manipulation. April, 2015.

Grope and Hope. Dagstuhl Workshop on Multimodal Manipulation Under Uncertainty. October 2015.

Learning to Manipulate. The Seventeenth Yale Workshop on Adaptive and Learning Systems. June, 2015.

Manipulation in Service Robotics. World Robotics and Intelligent Equipment Industry Conference. Chengdu, China. December, 2014.

Simple Effectors in Manufacturing Automation. World Robotics and Intelligent Equipment Industry Conference. Chengdu, China. December, 2014.

How to Keep Thinking. Robotics Institute Meta Seminar. October 20, 2014.

The Simple Hands Project. Workshop on Advanced Robotics PLUS. Technical University of Munich. October 6, 2014.

What is manipulation? IROS Plenary lecture. Chicago. September 15, 2014.

Much and Much. IROS Workshop on Robot Manipulation: What has been achieved and what remains to be done? September 14, 2014.

Grasping, Regrasping, and Not Grasping Universty of Pisa. Pisa, Italy. July 14, 2014.

What is manipulation? Intension, Extension and Ostension. University of Pennsylvania. July 1, 2014.

Current work in manipulation. Ensa Marrakech. Morrocco. June 14, 2014.

Tales from the Blocks World. MAC 50. (Celebration of 50th birthday of MIT Project Mac.) Boston. May 28, 2014.

Manipulation research and automated manufacturing. Workshop on Future Directions in Robotics. University of Minnesota. MnDRIVE. April 17, 2014.

Manipulation: 1. what is manipulation? 2. throwing to yourself. IMA Workshop on Topological Systems: Communication, Sensing, and Actuation. Institute for Mathematics and Its Applications. University of Minnesota. March 6, 2014.

robotics: minimalism. SMART Workshop on Robotics. Singapore. December 20 2013.

Manufacturing Re-emerging. ISRR Forum: Emerging Applications in Robotics. Singapore. 16 December 2013.

Scientific Opportunities in Robotics. National University of Singapore. December 15, 2013.

Harnessing Human Manipulation. NRI Workshop on Cloud Robotics: Challenges and Opportunities. Philadelphia. February 27, 2013.

Robotics, Manipulation, Uncertainty. Symposium on Robotics: Science and Technology. Collège de France. Paris, France. June 12, 2012.
`https://youtu.be/HAfMtopYT1g?si=QTizIwU3mNi-AzPP`

What the Robot's Hand Tells the Robot's Brain. Second Workshop on Robotics and Neuroscience. University of Siena, Italy. May 9, 2012.

What I Learned from Rod. Celebrating the academic work of Rodney Brooks. Massachusetts Institute of Technology. Cambridge MA. March 9, 2012.

Generality and Simple Hands.

- LAAS-CNRS. Toulouse, France. February 18, 2011.
- University of North Carolina, Charlotte. College of Computing and Informatics' Distinguished Lecture Series. January 28, 2011.
  `https://youtu.be/9i6kTRyFAxY?si=hxG0cWuawmLwkOdG`
- University of Maryland. April 30, 2010.
- University of British Columbia. Vancouver, BC, Canada. March 10, 2010.
- Carnegie Mellon, Center for the Foundation of Robotics. Pittsburgh PA. November 3, 2009.
- Technion Autonomous Systems Program. Haifa, Israel. June 29, 2009.
- Jet Propulsion Laboratory. Pasadena CA. May 26, 2009.
- Willow Garage. May 28, 2009.

Mechanics of pushing and dragging. Boston Dynamics. October 20, 2010.

Foundations of Manipulation and Grasping. Summer School on Robot Grasping. September 27, 2010.

Automation and Robotics. Plenary lecture, IEEE International Conference on Robotics and Automation. May 4, 2010.

Simplicity, Generality, Robotics. Schloss Dagstuhl Seminar on Cognition, Control and Learning for Robot Manipulation in Human Environments. Wadern, Germany. August 20, 2009.

Robotics and Manipulation. Global Conference on Educational Robotics. Leesburg, VA. July 5, 2009.

Exploring Robotic Manipulation.

- Hanyang University, Ansan Campus. June 5, 2009.
- National University of Singapore. September 11, 2008.

Human centered research at the Robotics Institute. International Distinguished Scholars Symposia on Seven Future Technologies: Current and Future Vision of Human-Centered Robot Fusion Technology. Hanyang University, Korea. June 4, 2009.

Sampling path space for mobile robot local planning. Institute for Infocomm Research (I2R), Singapore. September 9, 2008.

Current topics in robotics and computer vision. GRASP Symposium. University of Pennsylvania. April 16, 2008.

Exploring manipulation. The XXV Alexander Graham Christie Lecture. Johns Hopkins University. March 27, 2008.

Elements of caging. Center for the Foundations of Robotics Seminar. Carnegie Mellon. January 31, 2007.

Some background on uncertainty in robotic manipulation. DARPA SToMP kickoff meeting. Boulder CO. September 26, 2006.

Robotics: Past, Present and Future. Keynote speaker, 25th anniversary of the Naval Center for Applied Research in Artificial Intelligence. September 19, 2006.

Very fast and very slow motions of mobile robots. Workshop on Topology and Robotics. July 14, 2006. ETH, Zurich.

The subjective nature of straight lines: shortest paths for mobile robots.

- Georgia Tech Robotics and Intelligent Machines Seminar Series. November 1, 2006.
- MITRE Corporation. September 15, 2005.
- NASA Ames Research Center. October 4, 2005.
- MIT CSAIL Colloquium. November 8, 2005.

Robotics: Machines and Ideas. Keynote Address, RoboNexus 2005.

Research at the Robotics Institute.

- DARPA Business Conference, April 23, 2008.
- Intel Distinguished Lecture, October 12, 2005.

Invitation to Robotics.

- The Ellis School. October 17, 2005.
- Oklahoma School of Science and Mathematics. February 23, 2005.

Robotics Programs: Lessons Learned. Keynote presentation, Georgia Institute of Technology Robotics Initiative. November 7, 2003.

Robotics: Machines and Ideas.

- SAC Museum and Peter Kiewit Institute, University of Nebraska. April 2002.
- Academy for Lifelong Learning. Carnegie Mellon. May 2002.
- Elderhostel. Carnegie Mellon. June 2001; June 2002; June 2003.

Manipulation Sampler. Entertainment Technology Center. Carnegie Mellon University. March 28, 2002.

Desktop Robotics. EECS Departmental Seminar. Case Western Reserve University. December 6, 2001.

Robotics in Self-Assembly. DSRC/DARPA Workshop on Self-Assembly in Manufacturing. December 6, 2000.

Automated Manufacturing and Robotic Juggling.

- Keynote address, International Conference on Industrial Technology. Bangkok, Thailand. December 12, 2002.
- University of Oklahoma (Computer Science Department). March 29, 2001.
- Purdue University. September 25, 2001.
- University of Pennsylvania (GRASP Lab). November 10, 2000.
- University of Michigan (Mechanical Engineering Department). October 13, 2000.
- Arthur Schoffstall Lectures in Computer Science and Engineering, Rensselaer Polytechnic Institute (Computer Science Department). March 23, 2000.
- Pennsylvania State University (Computer Science Department). September 1998.

A Mobile Manipulator. IEEE ICRA Workshop on Mobile Micro-Robots. April 2000.

Education with and about robots. Seminar on Robot Education. Carnegie Mellon University (Robotics Institute). June 2000.

Robotics Education. Mechatronics at the Crossroads of Education and Industry : The Research Center Experience. Panel session at IEEE Int Conf Robotics and Automation. April 2000.

Manipulation and Mobility.

- Arthur Schoffstall Lectures in Computer Science and Engineering. Rensselaer Polytechnic Institute (Computer Science Department). March 24, 2000.
- University of Michigan (Computer Science Department). August 1999.

How to Be Smart. Carnegie Mellon University, Associate Provost for Academic Projects. September 1999, September 2000.

Mobile Manipulation. Australia National University. March 1999.

Manipulation and Intelligence. VUB Brussels AI Lab. May 1998.

Manipulation without sensing, grasping, or understanding. Mechanical Engineering Department Seminar. April 1997.

Robotic Manipulation: Parts feeding and juggling. Dartmouth Computer Science Department Seminar. May 1995.

Dynamic manipulation applied to parts orienting. Presented at IEEE ICRA Workshop on Geometric Algorithms for Manufacturing. May 2, 1993.

Dynamic manipulation. Invited talk. International Conference on Intelligent Autonomous Systems (IAS-3). February 18, 1993. Pittsburgh PA.

Juggling and parts feeding.

- Robotics Seminar, Carnegie Mellon. December 4, 1992.
- Engineering Colloquium, University of California at Berkeley. October, 1992.
- EE Department Colloquium, University of Illinois at Urbana-Champaign. October 8, 1992.

Roots and Directions in Motion Planning. June 15–17, 1992. NSF Workshop on Geometric Uncertainty in Motion Planning.

Kicking the sensing habit. AAAI Fall Symposium, Sensory Aspects of Robotic Intelligence. Fall 1991.

Mechanics and manipulation: graphical methods. Invited seminar at Sandia National Labs. July 11, 1991.

Manipulation: Mechanics and Planning. NSF/LaSER Distinguished Lecture Series in Robotics and Artificial Intelligence. Louisiana State University. October 19, 1990.

Series of lectures on the mechanics of manipulation, Course on Geometric Modeling and Robotics. Fibonacci Institute for the Foundations of Computer Science. Trento, Italy. June 25 – July 20, 1990.

Robotics Seminar, CMU. February, 1990.

Sensor based motion planning

- Fujitsu Laboratories Ltd, Kawasaki, Japan, August 1989.
- Yokogawa Electric Corporation, Tokyo, Japan, August 1989.
- Mitsubishi Heavy Industries, Ltd., Advanced Technology Research Center, Yokohama, Japan, August 1989.
- Mitsubishi Electric Corporation, Kamakura Works, Japan, August 1989.
- IBM Research, Tokyo Research Laboratory, Japan, August 1989.

Sensor based motion planning with uncertainty. IEEE ICRA Workshop on Task Strategy Generation and Skill Acquisition for Advanced Manipulation. May 15, 1989.

Interactions of Autonomy and Dexterity. NASA Conference on Space Telerobotics, Pasadena. February, 1989.

Robotic manipulation: mechanics and planning.

- Jet Propulsion Laboratory. February, 1989.
- Bell Labs, Holmdel. February, 1988.
- IBM Yorktown Heights. February, 1988.
- Yale University. February, 1988.
- Harvard University. January, 1988.
- MIT Artificial Intelligence Lab. January, 1988.
- Rensellaer Polytechnic Institute. January, 1988.
- Cornell Computer Science Department. January, 1988.

Uncertainty and Planning. Workshop on Automatic Robot Programming, Cambridge, Massachusetts, April, 1987.

Task Planning. Workshop on Robotics, ACM Fall Joint Computer Conference, November, 1986.

Mechanics of Grasping. Workshop on Robot Hands, Dubrovnik, Yugoslavia, September 1986.

Grasp Planning. Geometric Reasoning - An International Workshop, Oxford University, June 1986.

Laboratoire d'Automatique et d'Analyse des Systemes, Toulouse, France, June 1986.

Lord Corporation, May, 1986.

Manipulation and Planning. Workshop on Robotics and Automation, NASA/Johnson Space Center, Houston, January 1986.

Fine motion planning: correctness and completeness.

- University of Pennsylvania, December, 1985.
- SIAM Conference on Geometric Modeling and Robotics, Albany, NY, 1985.
- California Institute of Technology, May, 1985.
- Cornell University, September, 1984.

Mechanics of Manipulation. USA-Spain Joint Seminar on Sensors and Robotic Control, Madrid, October 1985.

Procedures for Fine Motion Planning and Control. SIAM Conference on Geometric Modeling and Robotics, Albany, NY, 1985.

Manipulation and Planning. Workshop on Intelligent Robots: Achievements and Issues, SRI International, November 1984.

A Formal Framework for Fine Motion Planning. Mini Symposium on Robot Motion Algorithms, IBM Thomas J. Watson Research Center, Yorktown Heights, New York, June 1983.

Pushing and grasping. "The Design and Control of Dexterous Hands", sponsored by Defense Advanced Research Projects Agency, MIT Artificial Intelligence Laboratory. November 5–6, 1981.

Professional activities

Editorial Boards

- Editorial Committee, Annual Review of Control, Robotics, and Autonomous Systems, 2015–2021. Associate Editor, 2018–2021.
- Editorial Board, International Journal of Robotics Research, 1998–2005.
- Technical editor: IEEE Journal Robotics and Automation, 1989–1992.
- Board of editors, Robotics Review, MIT Press, 1988–1992.
- North American Editor, Butterworths Series in Computer Automation, 1988–1994.

Program and steering committees

- Scientific Advisory Board, Human AugmentatioN via Dexterity Engineering Research Center (HAND ERC), 2025
- Organizing Committee, Berlin Summit on Robotics, 2022–2024.
- Advisory Board, International Journal of Robotics Research, 2005– .
- Advisory Board. Robotics: Science and Systems (RSS). 2006–2017.
- Steering Committee / Advisory Committee, Workshop on the Algorithmic Foundations of Robotics. 2009–.

- Steering committee, IEEE RAS Technical Committee on Algorithms for Planning and Control Newsletter. 2008.
- Robotics and Automation Liaison Committee. IEEE Robotics and Automation Society. 2007.
- International Advisory Committee, The 6th Joint Conference on AI and Robotics. Qazvin, Iran. 2015, 2016, 2017.
- Advisory Board, Northwestern University MS in Robotics. 2014.
- Advisory Committee, Hong Kong University of Science and Technology (HKUST) Robotics Institute. 2014, 2017 – 2019.
- Senior Program Committee, IROS 2014.
- Program committee, International Symposium on Experimental Robotics. 2014.
- Contributor, Robot Radar: Informed reflection on robotics in the media. (`http://www.robotradar.org/`) 2012.
- Advisory Board, IEEE Transactions on Automation Science and Engineering. 2012.
- Board Member, International Foundation for Robotics Research (IFRR), 2012–
- Advisory Board, Intel Labs Pittsburgh. 2009.
- Carnegie Science Center Catalyst Committee. 2008–2011.
- At large member, Technical Activities Board, IEEE Robotics and Automation Society, 2008–2010.
- RoboBusiness Advisory Council, 2008, 2009, 2012.
- Scientific advisory board, Georgia Tech Robotics and Intelligent Machines, 2007.
- Steering committee, Robot250. 2007 - 2008.
- Program Committee. World Premier International Research Center (WPI) Initiative; Ministry of Education, Culture, Sports, Science and Technology (MEXT); Japan. 2007–2015.
- Planning committee. Cornerstones Symposium '07: Ideal City of the 21st Century. Spring, 2007.
- Advisory board, Global Connection's PA Tourism project. 2007.
- Advisory Board. RoboBusiness 2006.
- Senior Program Committee. EUROS-06. 2006
- Organizing Committee, NSF Robotics and Computer Vision PI Workshop. October 2003.
- International Steering Committee, Workshop on Control Problems Review of Review of in Robotics and Automation. 2002.
- International Advisory Committee for the IEEE International Conference on Industrial Technology, 2002.
- IEEE International Workshop on Intelligent Robots and Systems (IROS), 1991, 1992, 1994.
- AAAI Fall Symposium on "Sensory Aspects of Robotic Intelligence", 1991.
- National Conference on Artificial Intelligence, 1986 and 1987. Robotics area chair, 1991. Robotics and vision area chair, 1994.
- International Joint Conference on Artificial Intelligence, 1987.
- IEEE International Conference on Robotics and Automation, 1987, 1988, 1989, 1990, 1991, 1993, 1999, 2002, 2003, 2004.

Workshops

- Co-organizer. RSS 2013 Workshop on Common Platforms in Robotic Manipulation. Jul 13, 2013.
- Plenary speaker, RSS 2013 Workshop on Interactive Perception. Jul 13, 2013.

- SpongFest: International Workshop on Recent Developments In Robotics and Control, University of Texas, Dallas. Nov 30, 2012.
- IROS Workshop on Grasping: Models and Algorithms. San Francisco, CA. September, 2011.
- Berlin Summit on Robotics. Berlin Germany. July 20–24, 2011.
- IEEE ICRA Workshop on Manipulation Under Uncertainty. May, 2011.
- IEEE ICRA Workshop on Mobile Manipulation: Integrating Perception and Manipulation. May, 2011.
- RSS Workshop on grasping. June 27, 2010.
- Schloss Dagstuhl Seminar on Cognition, Control and Learning for Robot Manipulation in Human Environments. August 16–21, 2009.
- Co-organizer. CRA/CCC workshop on Emerging Technologies and Trends in Robotics. August, 2008.
- Cyber-Physical Systems (CPS) Summit. April 25, 2008.
- IEEE ICRA Workshop on Algorithmic Automation. May 19, 2008.
- Smart Assembly Systems. NIST. October 3–4, 2006.
- Language for Intelligent Machines (LIMES) Workshop. Army Research Office. July 19–21, 2006.
- Co-organizer. Workshop on Science and Technology Challenges for Robotics. Robotics Science and Systems. August 16, 2006.
- Workshop on Mathematics and Robotics. NSF Division of Mathematical Sciences. May 15, 16, and 17, 2000.
- Co-organized Third Workshop on the Algorithmic Foundations of Robotics. March 5–7, 1998.
- NSF IRIS Manufacturing Research Planning Meeting. June 7-8, 1993.
- Co-organized IEEE ICRA Workshop on Geometric Algorithms for Manufacturing. May, 1993.
- Co-organized NSF Workshop on Geometric Uncertainty in Motion Planning. June 15–17, 1992.
- Workshop on expanding access to Japanese robotics research and development; Office of Japan Affairs; National Research Council. May 1, 1992.
- Workshop on Experimental Computer Science, organized by Barbara Liskov. October, 1991.
- AAAI Fall Symposium, Sensory Aspects of Robotic Intelligence. Fall 1991.
- Co-organizer, IEEE ICRA workshop on Task Strategy Generation and Skill Acquisition for Advanced Manipulation. May 15, 1989.
- Workshop on Automatic Robot Programming, Cambridge, Massachusetts, April, 1987.
- Workshop at ACM Fall Joint Computer Conference, November, 1986.
- Workshop on Robot Hands, Dubrovnik, Yugoslavia, September 1986.
- Geometric Reasoning - An International Workshop, Oxford University, June 1986.
- Workshop on Robotics and Automation, NASA/Johnson Space Center, Houston, January 1986.
- USA-Spain Joint Seminar on Sensors and Robotic Control, Madrid, October 1985.
- Workshop on Intelligent Robots: Achievements and Issues, SRI International, November 1984.
- Workshop on the Design and Control of Dexterous Hands, sponsored by Defense Advanced Research Projects Agency, MIT Artificial Intelligence Laboratory. November 5–6, 1981.

Other professional activities

- RSS Test of Time committee, 2019 —.

- Chair, Best Paper Prize committee, Workshop on the Algorithmic Foundations of Robotics, 2016.
- Chair, RSS Early Career Spotlight committee, 2016.
- Co-chair, Pioneer in Robotics and Automation Award Nominating Committee, 2012.
- Awards Evaluation Panel, IEEE Robotics and Automation Society, 2010.
- Co-organizer, A Roadmap for US Robotics: From Internet to Robotics. Sponsored by the Computing Community Consortium and the Computing Research Association. Delivered to the Congressional Caucus on Robotics, May 21, 2009.
- SERC Distinguished Visitor, Singapore, 2008.
- Co-director, Robot Hall of Fame, 2007–2012.
- Jury, Robot Hall of Fame, 2006– .
- Fellow Nomination Committee, IEEE Robotics and Automation Society, 2006, 2008, 2010.
- National Research Council review panel, Robotic Access and Human Planetary Landing Systems, June 3, 2005.
- Visiting member, Technology Review Board, MITRE Corporation. 2002.
- Design Review Board, Skywalker project. Carnegie Mellon University, 1999.
- Chair of IEEE Robotics and Automation Society technical committee on Manipulation, Member of Technical Activities Board. 1993.
- April, 1990. Panelist, Panel Discussion on Robotics Education, IEEE ICRA.

University and department service

University search committee, Vice President for Research, 2014.

Advisory Committee, Office of Sponsored Projects, Office of Research Integrity and Compliance, 2013–2016.

University Research Review Committee, 2007 – 2010.

SCS Dean Search Committee, 2003 – 2004.

Curriculum committee for Qatar campus, 2003.

SCS Undergraduate Program Curriculum Committee (chair), 2003.

CS Department's Performance Review Committee (chair), 2003.

Dean's Performance Review Committee, 2001.

SCS Promotions and Governance Committee (chair), 2000 – 2001.

Faculty Senate (ex officio), 2000 – 2002.

Faculty Chair for the School of Computer Science, 2000 – 2002.

RI space committee. 1999 – 2003.

SCS College Council. 1999 – 2014.

Faculty Senate (appointed by President Cohon), 1998 – 1999.

Director, Robotics Education Lab, 1997 – 2001.

Robotics Minor committee for CIT, 1997.

CMU/ETL collaboration program, 1996.

Newell and Simon Hall building committee for SCS, 1999.

CS PPC committee, to revise PhD curriculum, 1998–1999.

SCS Microsoft Fellowship committee, 1998, 1999.

SCS Self-Assessment committee, 1998.

Ryan Award committee, 1995, 1996, 1997.

SCS Dean's Kitchen Kabinet, 1995 – 1998.

Ad hoc university committee to review Conflict of Interest Policy, 1995.

Simon Prize committee. Chair 1994, 1995; member 1996.

University Research Council, 1993 – 1996.

Robotics Institute hiring committee, chair 1993, 1994, 1996; member 1989, 1990.

Organized first Emigration Course for Computer Science Department. Spring 1993.

Secretary, Dec5 Corporation. 1992 – 2002.

Computer Science Doctoral Review Committee. 1992 – 1994.

Robotics PhD Program Committee. 1991 – 1996.

Robotics PhD Program Education Committee. 1991.

SCS Immigration Course. 1991.

University Faculty Policy Committee. 1988.

Undergraduate program sequence subcommittee, Physics Department. 1988.

Admissions committee, Computer Science Department. 1988 – 1990.

Courses taught

16-597. Designing Tabletop Robots. 2003.

Robotics section of Andrew's Leap. 1992–2003.

15-883; 16-741. Mechanics of Manipulation. 1987–2021.

15-384. Robotic Manipulation. 1986–2003.

15-212. Fundamental Structures of Computer Science II. 1985, 1986.

18-858. Robotics. 1983, 1984.

15-880C. Robotics reading and discussion seminar. 1985–1990.

Popular media appearances and references

How should a wheelchair think about distance? Workshop in Honor of Jean-Paul Laumond. Collège de France. Paris. July 11, 2022.
https://youtu.be/vlxRDpMqQp0?si=6iG5Rwuq27HKBVIA

Robotics and Warehouse Automation at Berkshire Grey. Georgia Tech IRIM Seminar. February 1, 2022.
https://youtu.be/NZnQseqBrMI?si=ZJrN5lva1cirYYj0

Robotics and Warehouse Automation at Berkshire Grey. Robotics Institute Seminar. Carnegie Mellon University November 12, 2021
https://youtu.be/Veq7r7pbkYY?si=32gUOn_TGhNlq4WW

"Robots still suck. It's all they can do to stand up – never mind rise up." *The Register.* July 7, 2021.

Embracing Failure. ICRA 2019 Keynote. May 21, 2019.
https://youtu.be/YJisNJ91uR0?si=0bu-b7qjg9cIURAs

Models of Robotic Manipulation. MIT Robotics Seminar. April 5, 2019.
https://youtu.be/LfWiBdOc2FI?si=h1cYGTkQrpMMNViA

"Robotic Manipulation". A podcast interview. Peggy Smedley Podcast. 1/22/2019
https://peggysmedleyshow.com/012219-robotic-manipulation

Haptic perception, grasping and manipulation with simple robotic grippers. DREAM / CPAR Seminar, UC Berkeley. February 1, 2016.
https://youtu.be/N4m4GhNDs3o?si=ZuKRmOG3Ymfo283Z

Robotics, Manipulation, Uncertainty. Symposium on Robotics: Science and Technology. Collège de France. Paris, France. June 12, 2012.
https://youtu.be/HAfMtopYT1g?si=QTizIwU3mNi-AzPP

University of North Carolina, Charlotte. College of Computing and Informatics' Distinguished Lecture Series. January 28, 2011.
https://youtu.be/9i6kTRyFAxY?si=hxG0cWuawmLwkOdG

Matthew T. Mason, Eldridge Gravy and the Court Supreme, and the current and past members of the Manipulation Lab. "Manipulation Lab: Do What You Do". Showings:

- YouTube: http://youtu.be/fiGScq8WWFE
- Robot Film Festival. 3LD Art & Technology Center, New York City, NY. July14, 2011.
- Days of Future: Days of Robotics. Center for the Promotion of Science. Belgrade Serbia. September 2012.

"Vidéo: Le zapping des robots manipulateurs." *Semageek.pdf* 1/6/2010 Videos and accompanying text descriptions of the mobipulator video and "Manipulation Lab: Do What You Do"

"Origami next frontier in robotics." *CNN.com International Edition.* 5/24/2004.

"Robot learns origami" *MSNBC News / Technology & Science* 5/24/2004

"Robot makes origami – millions rejoice!" by Lance Ulanoff, Sync. *Extreme Robots.* 6/14/2004

"CMU grad student develops origami-making robot" by Byron Spice *Pittsburgh Post-Gazette.* 5/24/2004

"Carnegie Mellon names new dean for Robotics Institute" by Byron Spice. *Pittsburgh Post-Gazette.* 6/11/2004

"Robotic Legs Could Produce Super Troops" By Michelle Locke, *Yahoo! News*, 3/10/2004

PhD students supervised

Randy C. Brost

Michael (Yu) Wang

Kenneth Y. Goldberg

Alan D. Christiansen

Srinivas Akella

Kevin Lynch

Wesley H. Huang

Garth Zeglin

Devin Balkcom

Siddhartha Srinivasa

Ravi Balasubramanian

Amir Degani

Ross Knepper

Robbie Paolini

Alberto Rodriguez

Jiaji Zhou

Ankit Bhatia

Eric Huang

Yifan Hou

Xianyi Cheng