Curriculum Vitæ

Steven M. LaValle

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RESEARCH INTERESTS

Robotics, planning algorithms, computational geometry, artificial intelligence, computational biology, computer vision, computer graphics, control theory.

EDUCATION

Ph.D. in Electrical Engineering, University of Illinois (Urbana-Champaign), 1995
Thesis: *A Game-Theoretic Framework for Robot Motion Planning*
M.S. in Electrical Engineering, University of Illinois, 1993
Thesis: *A Bayesian Framework for Considering Probability Distributions of Image Segments and Segmentations*
B.S. (Highest Honors) in Computer Engineering, University of Illinois, 1990
Undergraduate coursework, University of Missouri, 1986-1987

FACULTY POSITIONS HELD

Associate Professor, Dept. of Computer Science, University of Illinois, (2004-present)

Assistant Professor, Dept. of Computer Science, University of Illinois, (2001-2004)

Assistant Professor, Dept. of Computer Science, Iowa State University, (1997-2001)

OTHER RESEARCH EXPERIENCE

Post-Doctoral Researcher, Computer Science Dept., Stanford University (1995-1997)

Research Assistant, Beckman Institute, University of Illinois (1991-1995)

OTHER TEACHING EXPERIENCE

Visiting Professor, Electronics Department, ITESM-CCM (Tec. de Monterrey), Mexico City, Mexico. Taught summer course on motion planning (2000)

Lecturer, Computer Science Department, Stanford University (1997)

Teaching Assistant, Department of Electrical and Computer Engineering, University of Illinois (1988-1991)

AWARDS AND HONORARIES

Research:

- Nominated by NSF Robotics and Human Augmentation program for PECASE (Presidential Early Career Awards for Scientists and Engineers). Selected by CISE as an alternate PECASE winner (top 4 across all computer and information sciences areas), 2000.
- National Science Foundation CAREER Award ($400K), 1999.
- Finalist for Best Journal Paper of the Year Award (with S. Hutchinson), *IEEE Trans. on Robotics and Automation*, "Optimal Motion Planning for Multiple Robots Having Independent Goals," Volume 14, Number 6, pages 912-925, 1998.
- Doctoral dissertation selected by the Dept. of Computer Science to represent the University of Illinois in the ACM Outstanding Dissertation Award competition, 1995.
- Research Graduate Fellow, Beckman Institute, University of Illinois, 1994.
- Distinguished Student Paper Award, "On Considering Uncertainty and Alternatives in Low-Level Vision," Ninth Conference on Uncertainty in Artificial Intelligence, 1993.

Teaching:

- Nominated by Computer Science Dept. for ISU Foundation Award for Early Achievement in Teaching, 2001
- Outstanding teaching award, Dept. of Electrical Engineering, Tec. de Monterrey, Mexico City, 2000 (for a summer course on motion planning).
- Ranked first by students for teaching, Dept. of Computer Science, Iowa State Univ., 1998
- Rated in top 7% by students among faculty instructors in Computer Science Dept., Stanford University, 1997.
- *Daily Illini's* List of Teachers Ranked Excellent by Their Students, Fall 1988, Spring 1989, Fall 1989, Spring 1990, Summer 1990, Fall 1990, Spring 1991.
- Nominated for Oleson Award for Outstanding Teaching, Dept. of Electrical and Computer Engineering, University of Illinois, Spring 1990, Fall 1990, Spring 1991.

Other:

- Mavis Fellowship, College of Engineering, University of Illinois, 1994.
- Amoco Foundation Scholar, Dept. of Electrical and Computer Engineering, University of Illinois, 1989.
- James Scholar, College of Engineering, University of Illinois, 1987-1989.
- St. Louis Scholarship Foundation Award, 1987-1989.

STUDENT ADVISING

- Boris Simov, Ph.D. 2003 (Iowa State, co-advised)
  Thesis: "Pursuit-Evasion Alorithms"
- Peng Cheng, M.S. 2001 (Iowa State), Ph.D. 2005
  Thesis: "Resolution Complete Motion Planning Under Differential Constraints"
- Shai Sachs, M.S. 2003
  Thesis: "Visibility-Based Pursuit-Evasion in an Unknown Planar Environment"
- Prashanth Konkimalla, M.S. 1999 (Iowa State)
  Thesis: "Efficient Computation of Optimal Navigation Functions for Nonholonomic Planning"
- Jeffery Yakey, M.S. 1999 (Iowa State)
  Thesis: "Randomized Path Planning for Linkages with Closed Kinematic Chains"

Current students

- Stephen Lindeman, 5th year Ph.D. student
- Jason O'Kane, 5th year Ph.D. student
- Hamid Chitsaz, 4th year Ph.D. student
- Benjamin Tovar, 4th year Ph.D. student
- Anna Yershova, 4th year Ph.D. student

External Doctoral committees

- Juan-Pablo Gonzalez, Robotics Institute, Carnegie Mellon University, presently serving.
- Aaron Morris, Robotics Institute, Carnegie Mellon University, presently serving.
- James Solberg, Dept. of Mechanical Engineering, Northwestern University, presently serving.
- Leonard Jaillet, LAAS/CNRS, Toulouse, France, 2005.
- Dave Ferguson, Robotics Institute, Carnegie Mellon University, 2006.
- Morten Strandberg, KTH, Sweden (served as Faculty Opponent, October, 2004).
- Juan Cortes, LAAS/CNRS, Toulouse, France, 2003 (served as Rapporteur).
- Prasun Choudhury, Dept. of Mechanical Engineering, Northwestern University, 2004
- Chris Urmson, Robotics Institute, Carnegie Mellon University, 2004.
- Robert Bohlin, Dept. of Industrial Mathematics, Chalmers University, Sweden (served as Faculty Opponent, June, 2002).

FUNDING

- DARPA, "Sensors, Topology, and Minimalist Planning," R. Ghrist (PI), S. M. LaValle (co-PI), $7.8 Million, October 2006 - October 2010.

- NSF, CISE/IIS, "Expanding the Frontiers of Motion Planning: Feedback, Differential Constraints, and Resolution Completeness," S. M. LaValle (PI), $350,000, May 2006 - April 2009.
- NSF,MSPA-MCS, "Fundamental Geodesic Problems in Computational Topology," J. Erickson (PI), R. Ghrist, (co-PI), and S. M. LaValle (co-PI), $500,000, August 2005 - August 2008.
- Toyota Motor Corporation, Future Projects Division (Tokyo, Japan), "Dynamic Domain RRTs," S. M. LaValle (PI), $98,000, September 2005 - August 2006.
- DARPA, "Topological and Geometric Tools for Systems and Sensors," R. Ghrist (PI), S. M. LaValle (co-PI), $200,516, February 2005 - December 2005.
- NSF, "Making 3D Visibility Practical," S. M. LaValle (PI), J. Erickson (co-PI), J. C. Hart (co-PI), $500,000
- NSF, CISE/CCR, "Geometric and Algorithmic Techniques for Design and Verification of Hybrid Control Systems," E. Frazzoli (PI), S. M. LaValle (co-PI), August 2002 - July 2005, $270,000
- ONR, Robotics Program, "Multiple-Robot Sensor-Based Pursuit Strategies," S. M. LaValle (PI), May 2002 - April 2005, $338,000
- NSF CAREER, "Motion Strategy Algorithms for Geometry-Intensive Applications," May 1999 - April 2003, $400,000
- NSF-CONACyT Collaborative Program, "Solving Visibility-Based Mobile Robotics Tasks Using Minimal Representations," S. M. LaValle (PI), September 2001 - September 2004, $100,000
- NSF, Robotics and Human Augmentation Program, "Algorithmic and Differential-Geometric Trajectory Design," F. Bullo (PI), S. M. LaValle (co-PI), September 2001 - September 2004, $300,000
- Honda Initiation Grant, "Helping Humanoids by Solving Tasks that Combine Complex Motor Skills with Geometric Reasoning," November 1999 - November 2000, $30,000
- NSF, Research Experiences for Undergraduates, July 2000 - June 2001, $10,000
- Iowa State Special Research Initiation Grant, "Integration of Virtual and Physical Worlds Using Mobile Robotics," May 1999 - October 2000, $16,500

PROFESSIONAL ACTIVITIES

Technical Meeting Involvement:

- Area Editor, IEEE Int'l Conf. on Robotics and Automation, 2007
- Technical Program Committee, National Conference on Artificial Intelligence (AAAI), 2007.
- Technical Program Committee, Int'l Workshop on the Algorithmic Foundations of Robotics, 2006
- Technical Program Committee, National Conference on Artificial Intelligence (AAAI), 2006.
- Technical Program Committee, IEEE Int'l Conf. on Robotics and Automation, 2006

- Technical Program Committee, Robotics Science and Systems Conference, 2006
- Technical Program Committee, IEEE Int'l Conf. on Robotics and Automation, 2005
- Technical Program Committee, Robotics Science and Systems Conference, 2005
- Technical Program Committee, IEEE Int'l Symp. on on Assembly and Task Planning, 2003
- Technical Program Committee, IEEE Int'l Conf. on Robotics and Automation, 2002
- Session Chair, "Motion Planning I," IEEE Int'l Conf. on Robotics and Automation, 2002
- Session Chair, "Trajectory Planning I," IEEE Int'l Conf. on Intelligent Robots and Systems, 2001
- Technical Program Committee, IEEE Int'l Conf. on Robotics and Automation, 2001
- Technical Program Committee, IEEE Int'l Conf. on Robotics and Automation, 2000
- Technical Program Committee, Int'l Workshop on the Algorithmic Foundations of Robotics, 2000
- Technical Program Committee, Sixth Intelligent Autonomous Systems Conference, 2000
- Session Chair, Joint EU-US Workshop on Motion Planning, Toulouse, France, 2000
- Symposium Chair, "Motion Planning," IEEE Int'l Conf. on Robotics and Automation, 2000
- Session Chair, "Mobile Robot Motion Planning," IEEE Int'l Conf. on Robotics and Automation, 1999
- Session Chair, "Mobile Robot Systems," IEEE Int'l Conf. on Robotics and Automation, 1999
- Technical Program Committee, IEEE Int'l Conf. on Robotics and Automation, 1999
- Robotics Program Committee, Int'l Joint Conference on Artificial Intelligence, 1999
- Session Chair, "Vision Modeling and Calibration," IEEE Int'l Conf. on Intelligent Robots and Systems, 1998
- Invited Workshop Speaker, Multi-Robot Cooperation: Current Trends and Key Issues, IEEE/RSJ IROS, Grenoble, France, 1997
- Session Chair, "Action Vision for Mobile Robots," IEEE Int'l Conf. on Robotics and Automation, 1997
- Robotics Program Committee, Int'l Joint Conference on Artificial Intelligence, 1997
- Technical Program Committee, National Conference on Artificial Intelligence (AAAI), 1996
- Technical Program Committee, IEEE/SICE/RSJ Int'l Conf. on Multisensor Fusion and Integration, 1996
- National Science Foundation, Panelist for Robotics and Human Augmentation, three times

Invited Academic Lectures and Industrial Visits:

- Invited Talk, "Planning Algorithms and Information Spaces," CIMAT (Center for Research on Mathematics), Guanajuato, Mexico, December 2007.
- Invited Talk, "Planning Algorithms and Information Spaces," CSAIL, Massachusetts Institute of Technology, November 2007.
- Invited Talk, "Planning Algorithms and Information Spaces," Department of Computer Science, New York University, October 2006.
- Invited Talk, "Planning Algorithms: Past, Present, and Potential Future," Georgia Tech, Inaugural Seminar Series for the Center for Intelligent Robotics, September, 2006.
- Invited Talk, "Information Spaces: Comparing the Power of Mobile Robots" Northwestern University, April 2006.
- Invited Talk, "Information Spaces: They're Everywhere!" University of Zaragoza, Zaragoza, Spain, December 2005.
- Invited Talk, "Information Spaces: They're Everywhere!" Dept. of Computer Science, Washington University October 2005.
- Invited Plenary Lecture, "Information Spaces: They're Everywhere!" IEEE Conference on Robot Motion and Control, Dymaczewo, Poland, July 2005.
- Invited Talk, "Information Spaces: They're Everywhere!" AI/Vision/Robotics Seminar Series, Dept. of Computer Science, UIUC, February 2005.
- Invited presentation, "Dynamic-Domain RRTs," MOVIE Workshop on Motion Planning in Virtual Environments, LAAS/CNRS, Toulouse, France, January 2005.
- Invited Talk, "Information Spaces: They're Everywhere!" Robotics Insitute, Carnegie Mellon University, November 2004.
- Invited presentation, "Optimal Robot Navigation without Measuring Distances," American Mathematical Society Special Session on Mathematical Robotics, Chicago, October 2004.
- Invited Talk, "Solving Mobile Robot Tasks without Localization and Mapping," Fraunhofer Chalmers Centre (FCC), Chalmers University, Gothenburg, Sweden, October, 2004.
- Invited Talk, "Solving Mobile Robot Tasks without Localization and Mapping," Royal Institute of Technology (KTH), Stockholm, Sweden, October, 2004.
- Invited Talk, "Solving Mobile Robot Tasks without Localization and Mapping," Technical University of Wroclaw, Poland, May 2004.
- Invited Talk, "Solving Mobile Robot Tasks without Localization and Mapping," Technical University of Poznan, Poland, April 2004.
- Invited presentation, "Motion Planning Benchmarks," EURON Special Workshop on Benchmarks in Motion Planning, Amsterdam, The Netherlands, March 2004.
- Invited talk, "Solving Mobile Robot Tasks without Localization and Mapping," Laboratoire d'Analyse et d'Architecture des Systemes, Centre National de la Recherche Scientifique (LAAS/CNRS), Toulouse, France, December 2003.
- Invited talk, "Solving Mobile Robot Tasks without Localization and Mapping," GRASP Laboratory, University of Pennsylvania, November 2003

- Invited Plenary Lecture, "'Las Escondidas' and Other Games Robots Play," International Congress of Computational Systems, Tec de Monterrey, Guadalajara Campus, Mexico, October 2003.
- Invited presentation, "Information Spaces in Robotics," Workshop on Topology and Robotics, ETH, Zurich, Switzerland, July 2003.
- Inaugural Seminar, "Fundamental Sampling Issues in Motion Planning," Center for the Foundations of Robotics, Robotics Institute, Carnegie Mellon University, March 2003
- Invited talk, "Deterministic vs. Randomized Motion Planning," Dept. of Computer Science, University of Wisconsin at Milwaukee, April 2002
- Invited talk, "An Overview Motion Planning," Tec de Monterrey, Mexico City, Mexico, June 2001
- Invited talk, "Rapidly-exploring Random Trees and Trajectory Design," Dept. of Computer Science, George Mason University, March 2001
- Invited talk, "Motion Strategy Algorithms for Geometry-Intensive Applications," Dept. of Computer Science, University of Illinois, November 2000
- Invited Plenary Lecture, "Rapidly-exploring Random Trees," National Conference of CONACyT Grantees, Oaxaca, Mexico, July 2000
- Invited talk, "Using Randomization to Blur the Boundary Between Planning and Control," Joint EU-US Workshop on Motion Planning, Toulouse, France, June 2000
- Invited talk, "Randomized Algorithms for Generating Motion Plans and Control Laws," Electrotechnical Laboratory (ETL), Tsukuba, Japan, June 2000
- Invited talk, "Randomized Algorithms for Generating Motion Plans and Control Laws," Department of Mechano-Informatics, University of Tokyo, Japan, June 2000
- Invited talk, "Trajectory Design with Rapidly-Exploring Random Trees," Beckman Institute, University of Illinois, March 2000
- Invited talk, "Rapidly-Exploring Random Trees and Motion Strategy Algorithms," Robotics Institute (VASC), Carnegie Mellon University, November 1999
- Invited talk, "Rapidly-Exploring Random Trees and Motion Strategy Algorithms," Dept. of Computer Science and Engineering, Penn State University, November 1999
- Invited talk, "Rapidly-Exploring Random Trees: A New Tool for Motion Planning," Dept. of Computer Science, Texas A&M University, July 1999
- Invited talk, "Rapidly-Exploring Random Trees and Kinodynamic Planning," Institute National de la Recherche en Informatique et en Automatique (INRIA), Rhone-Alpes, France, March 1999
- Invited talk, "Rapidly-Exploring Random Trees and Kinodynamic Planning," INRIA, Sophia-Antipolis, France, March 1999
- Invited talk, "Visibility-Based Motion Planning," Laboratoire d'Analyse et d'Architecture des Systemes, Centre National de la Recherche Scientifique (LAAS/CNRS), Toulouse, France, September 1997

- Invited talk, "Visibility-Based Motion Planning," Institut Podstawowych Problemów Techniki, Polish Academy of Sciences, Warsaw, Poland, September 1997
- Industrial visit, Pfizer Limited, Sandwich, United Kingdom, June 1997
- Invited talk, "Visually Locating and Monitoring Moving Targets in Cluttered Environments," Dept. of Electrical Engineering & Computer Sciences, UC Berkeley, April 1997
- Invited talk, "Game-Theoretic Motion Planning with Emphasis on Algorithms for Visibility-Based Tasks," Dept. of Computer Science, Iowa State University, March 1997
- Industrial visit, Electricité de France, Paris, France, July, 1996
- Invited talk, "Locating and Monitoring Moving Targets in Cluttered Workspaces," Beckman Institute, University of Illinois, August 1996
- Invited talk, "Locating and Monitoring Moving Targets in Cluttered Workspaces," Robotics Institute (FRC), Carnegie Mellon University, June 1996
- Invited talk, "Target Tracking and Pursuit-Evasion," GRASP Laboratory, University of Pennsylvania, May 1996
- Invited talk, "A Game-Theoretic Framework for Robot Motion Planning," GRASP Laboratory, University of Pennsylvania, May 1996
- Invited talk, "Motion Planning Using Decision-Theoretic Analysis," Dept. of Industrial Engineering and Operations Research, UC Berkeley, February 1996

Community Outreach:

- Participant, NSF Scientists and Engineers in the Schools Program, 2000-2001

Membership: ACM, IEEE

Reviewer: Israel Science Foundation, Netherlands Organisation for Scientific Research, National Research Council, *Algorithmica*, *Int'l Journal of Computational Geometry and Applications*, *Int'l Journal of Robotics Research*, *Information Processing Letters*, *IEEE Trans. on Robotics and Automation*, *IEEE Trans. on Pattern Analysis and Machine Intelligence*, *IEEE Trans. on Industrial Electronics*, *IEEE Trans. on Evolutionary Computation*, *Journal of Robotic Systems*, *ASME Journal of Mechanical Design*, *ASME Journal of Engineering for Industry*, *Int'l Journal of Computer Vision*, *Robotics and Autonomous Systems*, *Constraints*, *Mechatronics*,*Integrated Computer-Aided Engineering*, *Academic Press Signal Processing Journal*, ACM Symposium on Computational Geometry, IEEE Int'l Conference on Robotics and Automation, IEEE Conference on Computer Vision and Pattern Recognition, Int'l Conference on Computer Vision, Int'l Conference on Pattern Recognition, American Control Conference, Workshop on the Algorithmic Foundations of Robotics, Graphics Interface Conference ACM Symposium on Data Structures and Algorithms

PUBLICATIONS

Books

[1] S. M. LaValle. *Planning Algorithms*. Cambridge University Press, Cambridge, U.K., 2006. Also available at http://planning.cs.uiuc.edu/.

Journal Articles

[2] R. Ghrist and S. M. LaValle. Nonpositive curvature and pareto-optimal coordination of robots. *SIAM Journal of Control and Optimization*, 2006. To appear.

[3] B. Simov, G. Slutzki, and S. M. LaValle. Clearing a polygon with two 1-searchers. *International Journal of Computational Geometry and Applications*, 2006. To appear.

[4] A. Yershova and S. M. LaValle. Improving motion planning algorithms by efficient nearest-neighbor searching. *IEEE Transactions on Robotics*, 2006. To appear.

[5] R. Ghrist, J. M. O'Kane, and S. M. LaValle. Computing Pareto Optimal Coordinations on Roadmaps. *The International Journal of Robotics Research*, 24(11):997–1010, 2005.

[6] S. M. LaValle, M. S. Branicky, and S. R. Lindemann. On the relationship between classical grid search and probabilistic roadmaps. *International Journal of Robotics Research*, 23(7/8):673–692, July/August 2004.

[7] S. Sachs, S. Rajko, and S. M. LaValle. Visibility-based pursuit-evasion in an unknown planar environment. *International Journal of Robotics Research*, 23(1):3–26, January 2004.

[8] L. Yang and S. M. LaValle. The sampling-based neighborhood graph: A framework for planning and executing feedback motion strategies. *IEEE Transactions on Robotics and Automation*, 20(3):419–432, June 2004.

[9] S. M. LaValle, B. Simov, and G. Slutzki. An algorithm for searching a polygonal region with a flashlight. *International Journal of Computational Geometry and Applications*, 12(1-2):87–113, 2002.

[10] S. M. LaValle and P. Konkimalla. Algorithms for computing numerical optimal feedback motion strategies. *International Journal of Robotics Research*, 20(9):729–752, September 2001.

[11] P. Cheng, Z. Shen, and S. M. LaValle. RRT-based trajectory design for autonomous automobiles and spacecraft. *Archives of Control Sciences*, 11(3-4):167–194, 2001.

[12] S. M. LaValle and J. Hinrichsen. Visibility-based pursuit-evasion: The case of curved environments. *IEEE Transactions on Robotics and Automation*, 17(2):196–201, April 2001.

[13] J. Yakey, S. M. LaValle, and L. E. Kavraki. Randomized path planning for linkages with closed kinematic chains. *IEEE Transactions on Robotics and Automation*, 17(6):951–958, December 2001.

[14] S. M. LaValle and J. J. Kuffner. Randomized kinodynamic planning. *International Journal of Robotics Research*, 20(5):378–400, May 2001.

[15] S. M. LaValle, P. Finn, L. Kavraki, and J.-C. Latombe. A randomized kinematics-based approach to pharmacophore-constrained conformational search and database screening. *J. Computational Chemistry*, 21(9):731–747, 2000.

[16] S. M. LaValle. Robot motion planning: A game-theoretic foundation. *Algorithmica*, 26(3):430–465, 2000.

[17] L. J. Guibas, J.-C. Latombe, S. M. LaValle, D. Lin, and R. Motwani. Visibility-based pursuit-evasion in a polygonal environment. *International Journal of Computational Geometry and Applications*, 9(5):471–494, 1999.

[18] S. M. LaValle and S. A. Hutchinson. Optimal motion planning for multiple robots having independent goals. *IEEE Trans. on Robotics and Automation*, 14(6):912–925, December 1998.

[19] G. Leavens, A. Baker, V. Honavar, S. M. LaValle, and G. Prabhu. Programming is writing: Why student programs must be carefully evaluated. *Mathematics and Computer Education*, 32(3):284–295, Fall 1998.

[20] S. M. LaValle and S. A. Hutchinson. An objective-based framework for motion planning under sensing and control uncertainties. *International Journal of Robotics Research*, 17(1):19–42, January 1998.

[21] S. M. LaValle and R. Sharma. On motion planning in changing, partially-predictable environments. *International Journal of Robotics Research*, 16(6):775–805, December 1997.

[22] S. M. LaValle, K. J. Moroney, and S. A. Hutchinson. Methods for numerical integration of high-dimensional probability densities with application to statistical image models. *IEEE Transactions on Image Processing*, 6(12):1659–1672, December 1997.

[23] R. Sharma, S. M. LaValle, and S. A. Hutchinson. Optimizing robot motion strategies for assembly with stochastic models of the assembly process. *IEEE Trans. on Robotics and Automation*, 12(2):160–174, April 1996.

[24] S. M. LaValle and S. A. Hutchinson. A framework for constructing probability distributions on the space of segmentations. *Computer Vision and Image Understanding*, 61(2):203–230, March 1995.

[25] S. M. LaValle and S. A. Hutchinson. A Bayesian segmentation methodology for parametric image models. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 17(2):211–218, February 1995.

Journal Articles Under Review

[26] J. M. O'Kane and S. M. LaValle. Localization with limited sensing. *IEEE Transactions on Robotics*, 2006. Conditionally accepted.

[27] B. Tovar, R Murrieta, and S. M. LaValle. Distance-optimal navigation in an unknown environment without sensing distances. *IEEE Transactions on Robotics*, 2007. Under review.

Refereed Book Chapters

[28] S. M. LaValle and M. S. Branicky. On the relationship between classical grid search and probabilistic roadmaps. In J.-D. Boissonat, J. Burdick, K. Y. Goldberg, and S. A. Hutchinson, editors, *Algorithmic Foundations of Robotics*. Springer-Verlag, Berlin, 2003.

[29] S. M. LaValle. From dynamic programming to RRTs: Algorithmic design xof feasible trajectories. In A. Bicchi, H. I. Christensen, and D. Prattichizzo, editors, *Control Problems in Robotics*, pages 19–37. Springer-Verlag, Berlin, 2002.

[30] S. M. LaValle and J. J. Kuffner. Rapidly-exploring random trees: Progress and prospects. In B. R. Donald, K. M. Lynch, and D. Rus, editors, *Algorithmic and Computational Robotics: New Directions*, pages 293–308. A K Peters, Wellesley, MA, 2001.

[31] S. M. LaValle. Numerical computation of optimal navigation functions on a simplicial complex. In P. K. Agarwal, L. E. Kavraki, and M. T. Mason, editors, *Robotics: The Algorithmic Perspective*, pages 339–350. A K Peters, Wellesley, MA, 1998.

[32] S. M. LaValle. Robot motion planning: A game-theoretic foundation. In J.-P. Laumond and M. Overmars, editors, *Algorithms for Robotic Motion and Manipulation*, pages 15–29. A K Peters, Wellesley, MA, 1997.

Invited Book Chapters

[33] J. M. O'Kane, B. Tovar, P. Cheng, and S. M. LaValle. Algorithms for planning under uncertainty in prediction and sensing. In *Autonomous Mobile Robots: Sensing, Control, Decision-Making, and Applications*. Marcel Dekker, 2006.

Refereed Conference Papers

[34] S. R. Lindemann, I. I. Hussein, and S. M. LaValle. Real time feedback control for nonholonomic mobile robots with obstacles. In *Proceedings IEEE Conference Decision and Control*, 2006.

[35] J. M. O'Kane and S. M. LaValle. On comparing the power of mobile robots. In *Proc. Robotics: Science and Systems*, 2006.

[36] S. R. Lindemann and S. M. LaValle. Computing smooth feedback plans over cylindrical algebraic decompositions. In *Proc. Robotics: Science and Systems*, 2006.

[37] S. R. Lindemann and S. M. LaValle. A multiresolution approach for motion planning under differential constraints. In *Proceedings IEEE International Conference on Robotics and Automation*, 2006.

[38] H. Chitsaz, S. M. LaValle, D. J. Balkcom, and M. T. Mason. Minimum wheel-rotation paths for differential-drive mobile robots. In *Proceedings IEEE International Conference on Robotics and Automation*, 2006.

[39] B. Tovar, A. Yershova, J. M. O'Kane, and S. M. LaValle. Information spaces for mobile robots. In *Proc. International Workshop on Robot Motion and Control (RoMoCo 2005)*, 2005.

[40] A. Yershova, B. Tovar, R. Ghrist, and S. M. LaValle. Bitbots: Simple robots solving complex tasks. In *AAAI National Conference on Artificial Intelligence*, 2005.

[41] S. R. Lindemann and S. M. LaValle. Smoothly blending vector fields for global robot navigation. In *Proceedings IEEE Conference Decision & Control*, pages 3353–3559, 2005.

[42] J. M. O'Kane and S. M. LaValle. Almost-sensorless localization. In *Proceedings IEEE International Conference on Robotics and Automation*, 2005.

[43] A. Yershova, L. Jaillet, T. Simeon, and S. M. LaValle. Dynamic-domain RRTs: Efficient exploration by controlling the sampling domain. In *Proceedings IEEE International Conference on Robotics and Automation*, 2005.

[44] L. Guilamo, B. Tovar, and S. M. LaValle. Pursuit-evasion in an unknown environment using gap navigation trees. In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2004.

[45] B. Tovar, L. Guilamo, and S. M. LaValle. Gap navigation trees: A minimal representation for visibility-based tasks. In *Proceedings Workshop on Algorithmic Foundations of Robotics*, pages 11–26, 2004.

[46] S. R. Lindemann, A. Yershova, and S. M. LaValle. Incremental grid sampling strategies in robotics. In *Proceedings Workshop on Algorithmic Foundations of Robotics*, pages 297–312, 2004.

[47] S. R. Lindemann and S. M. LaValle. Incremental low-discrepancy lattice methods for motion planning. In *Proceedings IEEE International Conference on Robotics and Automation*, pages 2920–2927, 2003.

[48] B. Tovar, S. M. LaValle, and R. Murrieta. Optimal navigation and object finding without geometric maps or localization. In *Proceedings IEEE International Conference on Robotics and Automation*, pages 464–470, 2003.

[49] P. Cheng, E. Frazzoli, and S. M. LaValle. Exploiting group symmetries to improve precision in kinodynamic and nonholonomic planning. In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2003.

[50] B. Tovar, S. M. LaValle, and R. Murrieta. Locally-optimal navigation in multiply-connected environments without geometric maps. In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2003.

[51] A. Atramentov and S. M. LaValle. Efficient nearest neighbor searching for motion planning. In *Proceedings IEEE International Conference on Robotics and Automation*, pages 632–637, 2002.

[52] P. Cheng and S. M. LaValle. Resolution complete rapidly-exploring random trees. In *Proceedings IEEE International Conference on Robotics and Automation*, pages 267–272, 2002.

[53] L. Yang and S. M. LaValle. An improved random neighborhood graph approach. In *Proceedings IEEE International Conference on Robotics and Automation*, pages 254–259, 2002.

[54] B. Simov, S. M. LaValle, and G. Slutzki. A complete pursuit-evasion algorithm for two pursuers using beam detection. In *Proceedings IEEE International Conference on Robotics and Automation*, pages 618–623, 2002.

[55] P. Cheng and S. M. LaValle. Reducing metric sensitivity in randomized trajectory design. In *Proceedings IEEE/RSJ International Conference on Intelligent Robots and Systems*, pages 43–48, 2001.

[56] S. Rajko and S. M. LaValle. A pursuit-evasion bug algorithm. In *Proceedings IEEE International Conference on Robotics and Automation*, pages 1954–1960, 2001.

[57] M. S. Branicky, S. M. LaValle, K. Olson, and L. Yang. Quasi-randomized path planning. In *Proceedings IEEE International Conference on Robotics and Automation*, pages 1481–1487, 2001.

[58] S. M. LaValle, B. Simov, and G. Slutzki. An algorithm for searching a polygonal region with a flashlight. In *Proceedings ACM Annual Symposium on Computational Geometry*, 2000.

[59] B. Simov, G. Slutzki, and S. M. LaValle. Pursuit-evasion using beam detection. In *Proceedings IEEE International Conference on Robotics and Automation*, 2000.

[60] J. J. Kuffner and S. M. LaValle. RRT-connect: An efficient approach to single-query path planning. In *Proceedings IEEE International Conference on Robotics and Automation*, pages 995–1001, 2000.

[61] L. Yang and S. M. LaValle. A framework for planning feedback motion strategies based on a random neighborhood graph. In *Proceedings IEEE International Conference on Robotics and Automation*, pages 544–549, 2000.

[62] S. M. LaValle, P. Finn, L. E. Kavraki, and J.-C. Latombe. Efficient database screening for rational drug design using pharmacophore-constrained conformational search. In *Proceedings RECOMB (Annual International Conference on Molecular Biology)*, pages 250–259, 1999.

[63] S. M. LaValle and J. Hinrichsen. Visibility-based pursuit-evasion: An extension to curved environments. In *Proc. IEEE Int'l Conf. on Robotics and Automation*, pages 1677–1682, 1999.

[64] S. M. LaValle and J. J. Kuffner. Randomized kinodynamic planning. In *Proceedings IEEE International Conference on Robotics and Automation*, pages 473–479, 1999.

[65] S. M. LaValle, J. Yakey, and L. E. Kavraki. A probabilistic roadmap approach for systems with closed kinematic chains. In *Proc. IEEE Int'l Conf. on Robotics and Automation*, pages 1671–1676, 1999.

[66] P. Konkimalla and S. M. LaValle. Efficient computation of optimal navigation functions for nonholonomic planning. In *Proceedings First IEEE International Workshop on Robot Motion and Control*, pages 187–192, 1999.

[67] H. H. González-Baños, L. Guibas, J.-C. Latombe, S. M. LaValle, D. Lin, R. Motwani, and C. Tomasi. Motion planning with visibility constraints: Building autonomous observers. In Y. Shirai and S. Hirose, editors, *Proceedings Eighth International Symposium on Robotics Research*, pages 95–101. Springer-Verlag, Berlin, 1998.

[68] S. M. LaValle, D. Lin, L. J. Guibas, J.-C. Latombe, and R. Motwani. Finding an unpredictable target in a workspace with obstacles. In *Proceedings IEEE International Conference on Robotics and Automation*, pages 737–742, 1997.

[69] S. M. LaValle, H. H. González-Baños, C. Becker, and J.-C. Latombe. Motion strategies for maintaining visibility of a moving target. In *Proceedings IEEE International Conference on Robotics and Automation*, pages 731–736, 1997.

[70] L. J. Guibas, J.-C. Latombe, S. M. LaValle, D. Lin, and R. Motwani. Visibility-based pursuit-evasion in a polygonal environment. In F. Dehne, A. Rau-Chaplin, J.-R. Sack, and R. Tamassia, editors, *WADS '97 Algorithms and Data Structures (Lecture Notes in Computer Science, 1272)*, pages 17–30. Springer-Verlag, Berlin, 1997.

[71] S. M. LaValle and S. A. Hutchinson. Optimal motion planning for multiple robots having independent goals. In *Proceedings IEEE International Conference Robot. & and Autom.*, pages 2847–2852, April 1996.

[72] S. M. LaValle and S. A. Hutchinson. Evaluating motion strategies under nondeterministic or probabilistic uncertainties in sensing and control. In *Proc. IEEE Int'l Conf. Robot. & and Autom.*, pages 3034–3039, April 1996.

[73] R. Sharma, S. M. LaValle, and S. A. Hutchinson. Optimizing robot motion strategies for assembly with stochastic models of the assembly process. In *Proc. IEEE Int'l Symp. on Assembly and Task Planning*, pages 341–346, 1995.

[74] S. M. LaValle and R. Sharma. Motion planning in stochastic environments: Theory and modeling issues. In *Proc. IEEE Int'l Conf. on Robotics and Automation*, pages 3057–3062, 1995.

[75] S. M. LaValle and R. Sharma. Motion planning in stochastic environments: Applications and computational issues. In *Proc. IEEE Int'l Conf. on Robotics and Automation*, pages 3063–3068, 1995.

[76] S. M. LaValle and S. A. Hutchinson. An objective-based stochastic framework for manipulation planning. In *Proceedings IEEE/RSJ/GI International Conference on Intelligent Robots and Systems*, pages 1772–1779, September 1994.

[77] S. M. LaValle and R. Sharma. Robot motion planning in a changing, partially predictable environment. In *Proc. IEEE Int'l Symp. on Intelligent Control*, pages 261–266, August 1994.

[78] S. M. LaValle and S. A. Hutchinson. Path selection and coordination of multiple robots via Nash equilibria. In *Proc. 1994 IEEE Int'l Conf. Robot. & and Autom.*, pages 1847–1852, May 1994.

[79] S. M. LaValle and S. A. Hutchinson. Game theory as a unifying structure for a variety of robot tasks. In *Proceedings IEEE International Symposium on Intelligent Control*, pages 429–434, August 1993.

[80] S. M. LaValle and S. A. Hutchinson. On considering uncertainty and alternatives in low-level vision. In *Proc. Ninth Conf. on Uncertainty in Artificial Intelligence*, pages 55–63, July 1993.

[81] K. J. Moroney S. M. LaValle and S. A. Hutchinson. Methods for numerical integration of high-dimensional probability densities with application to statistical image models. In *Proc. 1993 SPIE Conf. on Neural and Stochastic Methods in Image and Signal Processing*, pages 292–303, July 1993.

[82] S. M. LaValle and S. A. Hutchinson. Bayesian region merging probability for parametric image models. In *Proc. 1993 IEEE Conf. on Computer Vision and Pattern Recognition*, pages 778–779, June 1993.

[83] K. J. Moroney S. M. LaValle and S. A. Hutchinson. Agglomerative clustering on range data with a unified probabilistic merging function and termination criterion. In *Proc. 1993 IEEE Conf. on Computer Vision and Pattern Recognition*, pages 798–799, June 1993.

[84] S. M. LaValle and S. A. Hutchinson. Representing probability distributions of image segments and segmentations. In *Proc. IEEE Int'l Conf. on Systems Man and Cybernetics*, pages 1552–1557, October 1992.

Conference Papers Under Review

[85] H. Chitsaz and S. M. LaValle. Minimum wheel-rotation paths for differential drive mobile robots among piecewise smooth obstacles. In *IEEE International Conference on Robotics and Automation*, 2007. Under review.

[86] L. Freda, B. Tovar, and S. M. LaValle. Learning combinatorial information from alignments of landmarks. In *IEEE International Conference on Robotics and Automation*, 2007. Under review.

[87] S. R. Lindemann and S. M. LaValle. Smooth feedback for car-like vehicles in polygonal environments. In *IEEE International Conference on Robotics and Automation*, 2007. Under review.

[88] J. M. O'Kane and S. M. LaValle. Sloppy motors, flaky sensors, and virtual dirt: Comparing imperfect, ill-informed robots. In *IEEE International Conference on Robotics and Automation*, 2007. Under review.

[89] A. Yershova and S. M. LaValle. Planning for closed chains without inverse kinematics. In *IEEE International Conference on Robotics and Automation*, 2007. Under review.

Invited Conference Papers

[90] B. Tovar, A. Yershova, J. M. O'Kane, and S. M. LaValle. Information spaces for mobile robots. In *Proc. International Workshop on Robot Motion and Control (RoMoCo 2005)*, 2005.

[91] P. Cheng, Z. Shen, and S. M. LaValle. Using randomization to find and optimize feasible trajectories for nonlinear systems. In *Proceedings Annual Allerton Conference on Communications, Control, Computing*, pages 926–935, 2000.

[92] S. M. LaValle and S. A. Hutchinson. Considering multiple surface hypotheses in a Bayesian hierarchy. In *Proc. SPIE Conf. on Stochastic Methods in Signal Processing, Image Processing, and Computer Vision*, pages 1–15, 1991.

Refereed Conference Videos

[93] J. J. Kuffner and S. M. LaValle. RRT-connect: An efficient approach to single-query path planning. Appears in Video Proceedings of IEEE Int'l Conf. on Robotics and Automation, 2000.

Technical Reports (Not Published Elsewhere)

[94] B. Tovar, L. Freda, and S. M. LaValle. Mapping and navigation from permutations of landmarks. Technical report, Department of Computer Science, University of Illinois, June 2006.

[95] S. M. LaValle. Rapidly-exploring random trees: A new tool for path planning. TR 98-11, Computer Science Dept., Iowa State University, Oct. 1998.