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I. Education

Ph.D.	Systems Engineering	University of Pennsylvania	8/87
B.S.	Engr Science and Mechanics	Georgia Tech	9/79
B.S.	Undesignated (Physics)	Ursinus College	5/79

II. Positions Held

2003–present	Professor and Chairman, Department of Computer Science Rensselaer Polytechnic Institute, Troy NY.
1998–02	Research Scientist, Robotics Center, Sandia National Laboratories, Albuquerque, NM.
1995–00	Associate Professor, Department of Computer Science, Texas A&M University, College Station, TX.
1996–97	Visiting Associate Professor, Department of Electrical and Computer Engineering, Rice University, Houston, TX.
1990–95	Assistant Professor, Department of Computer Science, Texas A&M University, College Station, TX.
1989–89	Summer Faculty Fellow, Artificial Intelligence Group, Jet Propulsion Laboratory, Pasadena, CA.
1988–90	Assistant Professor, Department of Systems and Industrial Engineering, University of Arizona, Tucson AZ.
1987–88	Lecturer, Department of Mechanical Engineering, University of Wollongong, Wollongong, NSW, Australia.
1979–82	Engineer, Fiber Composites Group, Lawrence Livermore National Laboratory, Livermore CA.

III. Research Interests

Robotics: I am generally interested in endowing robots with capabilities to do useful physical work in unstructured environments. Among the problems that arise, I am most interested in those that demand an interdisciplinary attack involving mechanical engineering, optimization, numerical methods, search algorithms, and control theory. More recently my interests have expanded into problems associated with human-robot interaction. An intriguing question is, how can one reasonably model the affective (or emotional) state of a human, couple that model with well-understood models of human and robot dynamics, and then use the resulting model to design controllers that behave with desirable stability and convergence properties, and with a reasonable degree of “human-friendliness.”

IV. Honors and Awards

Best Student Paper, Robotics: Science and Systems	2007
Inducted into Athletic Hall of Fame, Ursinus College	2005
Best Automation Paper, Int'l Conf. on Robotics and Automation	2004
Plenary Speaker, Int'l Conf. on Complementarity Problems	2002
Plank Company Faculty Fellow Award	1998
Center for Teaching Excellence Award	1994
IBM T.J. Watson Research Fellow	1985–1987
University of Pennsylvania Research Fellow	1982–1983
Bell Labs Award: Outstanding senior in Engr. Science and Mechanics	1979

V. Teaching and Student Supervision

A. Courses Taught

Date	Number	Title	Enrol.
2008 Spring	CSCI 6966/4967	Robotics II	
2006 Fall	CSCI 6965/4963	Robotic Manipulation: Analysis and Algorithms	5
2004 Spring	CSCI 6965/4969	Robotic Manipulation: Analysis and Algorithms	12
1998 Spring	CPSC 452	Robotics and Spatial Intelligence	30
1997 Spring	ELEC 436	Fundamentals of Control Systems	30
Fall	ENGR 211	Engineering Principles	90
1996 Spring	CPSC 452	Robotics and Spatial Intelligence	13
Spring	ENGR 109	Intro to Engineering	67
1995 Spring	CPSC 452	Robotics and Spatial Intelligence	20
Fall	CPSC 652	Robot Motion Planning	10
1994 Spring	CPSC 452	Robotics and Spatial Intelligence	26
Spring	CPSC 441	Computer Graphics	45
Fall	CPSC 652	Robotics Programming	5
1993 Spring	CPSC 452	Robotics and Spatial Intelligence	21
Fall	CPSC 652	Robotics Programming	6
1992 Spring	CPSC 452	Robotics and Spatial Intelligence	20
Spring	CPSC 681	Graduate Seminar	33
Fall	CPSC 652	Robotics Programming	6
1991 Spring	CPSC 452	Robotics and Spatial Intelligence	15
Fall	CPSC 652	Robotics Programming	13
1990 Spring	SIE 350	Deterministic Systems	40
Spring	SIE 685	Advanced Topics in Robotics	15
Fall	CPSC 643	Robotics Programming	7
1989 Spring	SIE 350	Deterministic Systems	40
Spring	SIE 685	Advanced Topics in Robotics	10
Fall	SIE 350	Deterministic Systems	40
Fall	SIE 485	Intro to Robotics	15
1988 Spring	SIE 685	Advanced Topics in Robotics	5
Fall	SIE 550	Linear Systems Theory	10
Fall	SIE 485	Intro to Robotics	15
1987 Fall	ME 321	Dynamics of Engineering Systems	37
Fall	Phys 143	Physics for Engineers	192

B. Course Development

2004	New course CSCI 6965/4969	Robotic Manipulation: Analysis and Algorithms
1994	New course CPSC 643	Robot Motion Planning
1989	New course SIE 485	Introduction to Robotics
1988	New course SIE 685	Advanced Topics in Robotics

C. Student Supervision

- PhD Theses Completed

- [1] W. Son. *A Generalized Interactive Dynamic Simulation for Multi-Rigid-Body Systems*. PhD thesis, Texas A&M University Department of Computer Science, 2001. Position: Research Scientist in South Korea.
- [2] L. Han. *Dexterous Manipulation: Kinematics and Planning*. PhD thesis, Texas A&M University Department of Computer Science, 2000. Position: Assistant Professor of Computer Science, Clark University, Worcester MA.
- [3] S. Sudarsky. *Motion Data Manipulation and Reuse Using B-Splines*. PhD thesis, Texas A&M University Department of Computer Science, 1999. Position: Research Scientist, Siemens Research Labs, Princeton, NJ.
- [4] A. O. Farahat. *The Geometry of Whole-Arm Manipulation*. PhD thesis, Texas A&M University Department of Aerospace Engineering, 1994. Position: Research Scientist, Xerox PARC, Palo Alto, CA.

- PhD Theses in Progress

- N. Nguyen, *Controlling Errors in Multibody Dynamics Simulation*, Department of Computer Science, RPI, expected Fall 2009.
- S.G. Berard, *Manipulation Planning under Uncertainty*, Department of Computer Science, RPI, expected Summer 2008.
- N. Chakraborty, *Fully-Implicit Time-Stepping for Multibody Systems with Unilateral Contact*, Department of Computer Science, RPI, expected Summer 2008. Co-advising with Srinivas Akella.

- Postdoctoral Study Supervision

- Lui Guanfeng, at RPI, 2003–2005. Currently at xraytex.com.
- David E. Stewart, at Texas A&M, 1994–96. Now professor of Math, U. of Iowa.

- Other PhD Student Supervision

- Internal PhD Committee Memberships
 - * Kishor Bhalerao. *Algorithms for Multibody Dynamics with Unilateral Contact*, Department of Mechanical, Aerospace, and Nuclear Engineering, expected 2009. Advisor: Kurt Anderson.
 - * Rafael Quintanilla. *High-Performance Controllers for Nonlinear Dynamical Systems with Large Changes in Operating Conditions*, Department of Electrical, Computer and Systems Engineering, expected 2008. Advisor: John Wen.
 - * Lanshan Han. *The Zeno Problem with Polygonal Friction*, Department of Mathematical Sciences, expected 2008. Advisor: Jong-Shi Pang.
 - * Rudra Mukherjee. *Multibody Dynamics Algorithms for Modeling Biomolecular Systems*, Department of Mechanical, Aerospace, and Nuclear Engineering, expected May, 2007. Advisor: Kurt Anderson.
 - * Y.J. Lim. *Physics-based digital surgery using the point-associated finite field (PAFF) approach*, Department of Mechanical, Aerospace, and Nuclear Engineering, May, 2005. Advisor: Suvranu De.
 - * Prior to 2003, served on several thesis committees in Computer Science and one in Mechanical Engineering at Texas A&M University.

- External PhD Committee Memberships
 - * Devin Balkcom, Robotics Institute, Carnegie Mellon, 2004.
 - * Andrew Miller, Computer Science, Columbia, 2001.
 - * David Austin, Engineering, Australian National, 2000.
 - * Wes Huang, Robotics Institute, Carnegie Mellon, 1997.
 - * Grace Lo, Mathematical Sciences, Johns Hopkins, 1996.
- PhD Student Advising while at Sandia National Labs
 - * Devin Balkcom, Robotics Institute, Carnegie Mellon, Summer 2001.
 - * Andrew Miller, Computer Science, Columbia, Fall 2000.
 - * Lance Hazer, Mechanical Engineering, Berkeley, Summer 1999.
 - * Joel Esposito, Mechanical Engineering, UPenn, Summer 1999.
- Masters Theses
 - [1] W. Son. Dexterous manipulation planning for a planar whole-arm manipulator. Master’s thesis, Texas A&M University Department of Computer Science, May 1996.
 - [2] S.L. Yeap. Dynamic dexterous whole-arm manipulation in the plane. Master’s thesis, Texas A&M University Department of Electrical Engineering, September 1994.
 - [3] R.C. Ram. An implementation of a dexterous manipulator for a two-dimensional low-friction environment. Master’s thesis, Texas A&M University Department of Electrical Engineering, 1993.
 - [4] C.T. Ang. On the computability of contact formations. Master’s thesis, Texas A&M University Department of Computer Science, May 1991.
 - [5] D.C. Zeng. Mechanics of dexterous manipulation. Master’s thesis, Texas A&M University Department of Computer Science, December 1991.
 - [6] J.J. Hunter. Frictionless manipulation planning in the plane. Master’s thesis, Department of Systems and Industrial Engineering, University of Arizona, May 1990.
 - [7] M. Grier. Adaptive control of a robotic finger. Master’s thesis, Department of Electrical Engineering, University of Arizona, May 1989.

MS Theses in Progress
none.

- Undergraduate Research Projects or Theses
 - [1] P. Marion. Experiments in whole arm manipulation, Summer 2007.
 - [2] P. Marion. Development of experimental testbed for whole arm manipulation, Spring 2007.
 - [3] P. Marion. User interface for the dvc simulator, Summer 2006.
 - [4] B. Roghani. Haptic interaction in multibody dynamics simulation, May 2005.
 - [5] B. Roghani. Collision detection for multibody dynamics simulation, December 2004.
 - [6] B. Billbrey. Control of an instrumented compliant robotic wrist, May 1993.

Undergraduate Research Projects or Theses in Progress

- C. Shields, *Parameter Identification in Whole-Arm Manipulation*, Fall 2007.

VII. Service

A. University Service

- Alumni Reunion Speaker
 - “Research in the Computer Science Department,” October 2006.
 - “What is IT Anyway?” June 2004
 - “Research in the Computer Science Department,” Fall 2003.

- Hiring
 - Member Athletic Director Search Committee, 2007.
 - Member Head Hockey Coach Search Committee, 2006.
 - Chair IT Constellation Search Committee, 2005. Result: Hired Constellation Professor James Hendler from U Maryland.
 - Member Multi-Scale Computation Constellation Search Committee, 2005.
 - Chair Tetherless Constellation World Search Committee, 2004. Result: Hired Constellation Professor Angel Garcia from Los Alamos Nat'l Labs.
 - Member Dean of Engineering Search Committee, 2004.
 - Member IT Constellation Search Committee, 2003.
- Faculty Athletic Representative to the National Collegiate Athletic Association, 2005–present.
- Evaluator, Doctoral Consortium, Richard Tapia Celebration of Diversity in Computing Conference, Albuquerque, Oct, 2005.
- Co-Host for Paula Simon, Member of RPI's Board of Trustees, "A Career in Information Technology," 2004.
- Co-Host and co-sponsor of David Hans, Manager of IBM Usability Program. Roundtable discussion, "Employee of the Future." Presented Mr. Hans with a Rensselaer Alumni Association Fellows Award, 2004.
- Member of Texas A&M Faculty Senate, 1997–98.

B. School of Science Service

- Member of School of Science Promotion and Tenure Committee, 2003–present.
- Member of Texas A&M Engineering Faculty Advisory Committee to the Dean, 1997–98.

C. Department of Computer Science Service

- Hiring
 - Chair or Member of Faculty Search Committee, 2003–present.
 - Results: Full professors of Computer Science: James Hendler (U Maryland, Semantic Web) 2007. Deborah McGuinness (Stanford, Inference and Knowledge Provenance) 2007.
 - Results: Assistant professors of Computer Science: Sanmay Das (MIT, Machine Learning) 2007; Elliot Anshelevich (Cornell, Theory and Networks) 2006; Barbara Cutler (MIT, graphics) 2005; Volkan Isler (UPenn, robotics and computer vision) 2005; Ana Milanova (Rutgers, software engineering) 2003;
 - Retention: Milanova's second three-year contract renewed.
- Initiated faculty mentoring program
 - All faculty have official mentors. All faculty are expected to help other faculty at a minimum through feedback on grant proposals and resumes to prepare for promotion and tenure. Annual evaluation includes mentoring activities.
 - Results: Improved sense of community and mutual investment among the CS faculty.
- Initiated Computer Science Day (CS Day)
 - Goals: Raise visibility of CS Department, broaden students' educational experience and perspectives of faculty and students.
 - CS Day 2007: The Future of Robotics. Speakers: Daniela Rus (MIT), Vijay Kumar (UPenn), Oussama Khatib (Stanford), Ron Fearing (Berkeley).
 - CS Day 2006: Issues in Geometric Computing. Speakers: Ravi Kannan (Yale), Piotr Indyk (MIT), Herbert Edelsbrunner (Duke), Jean Ponce (Ecole Normale Superior).
- Designed and renovated space for Landgraf Center for Computer Vision, Graphics, and Robotics.
- Initiated Department Research Mixers. Goals: Help students learn about research projects in the Department, improve student presentation skills, strengthen Department's sense of community.
- Initiated CS Department Annual Report. First issue Summer 2007.

- Department service prior to joining RPI is unavailable.

D. Service to Local Communities

- Judge for Texas Best, State High School Robotics Championships 1994–97.
- Volunteer math instructor for advanced students in first and second grade, River Oaks Elementary School, Houston, TX, 1992-1994.
- Volunteer assistant coach for Livermore High School, 1980–1981.

E. Service to Research Communities

- Initiated New England Manipulation Symposium (NEMS)
 - Goals: Provide regional venue for students to network and present research results.
 - NEMS May, 2005, Troy NY: 27 attendees from RPI, Rutgers, UMass Amherst, UPenn.
 - NEMS June, 2006, Amherst MA: 61 attendees from Brown, Clark, Columbia, Dartmouth, MIT, RPI, SUNY Buffalo, UMass Amherst, UMass Lowell, UPenn.
 - NEMS June, 2007, Troy NY: 53 faculty, staff, and students from Brown, Columbia, Harvard, MIT, Rochester Inst. of Tech., SUNY Buffalo, UMass Lowell, RPI, UMass Amherst, Union. Attendees also from iRobot, NASA Johnson Space Center, Columbia High School.
- Member of committee to launch new journal, *IEEE Transactions on Automation Science and Engineering*, 2002–2003.
- Editorships
 - Associate Editor, *Robotica*, 2006–present.
 - Associate Editor, *IEEE Transactions on Automation Science and Engineering*, 2003–2004.
 - Associate Editor, *IEEE Transactions on Robotics and Automation*, 1994–1997.
- Conference/Workshop Participation
 - General Chair, Robotics: Science and Systems, 2009.
 - Program Chair, Robotics: Science and Systems, Zurich, June 2008.
 - Invited Panelist
 - * Panel Title: “The Future of Computing, the Internet, and the Law” at the *Inaugural National Institute on Computing and the Law*, sponsored by the Association for Computing Machinery and the American Bar Association, San Francisco, January, 2007.
 - * Panel Title: “Science and Technology Challenges for Robotics” at *Robotics: Science and Systems*, Philadelphia, August, 2006.
 - * *NSF/NASA Workshop on Autonomous Mobile Manipulation*, Houston, TX, March 2005.
 - * *NSF Workshop on Collaborative Research between Mathematicians and Roboticists*, Arlington, VA, May 2000. Author of white paper to announce workshop. Lead-off speaker and poster child for workshop due to track record of collaborations with mathematicians. Co-Author of workshop report.
 - * *Game Developers Conference: Hardcore Technical Seminar*, San Francisco, December 1999.
 - * *ONR/ACM SIGGRAPH Workshop on Simulation and Interactive in Virtual Environments*, Iowa City, July, 1995.
 - * *NSF Workshop on Computational Geometry in Manufacturing*, Courant Institute, New York, April, 1994.
 - Workshop/Special Session Organizing
 - * Panel organizer and moderator, “PhD Student Forum,” *NSF Cyber-Enabled Discovery and Innovations*, Troy, NY, September, 2007.
 - * Co-organizer of mini-symposium on contact dynamics at *ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, “International Conference on Multibody Systems, Nonlinear Dynamics, and Control,” Las Vegas, 2007.

- * Co-organizer of mini-symposium on contact dynamics at *ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, “International Conference on Multibody Systems, Nonlinear Dynamics, and Control,” Long Beach, 2005.
- * Co-organizer of mini-symposium on contact dynamics at *ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, “International Conference on Multibody Systems, Nonlinear Dynamics, and Control,” Chicago, 2003.
- * Workshop and Tutorials Committee member, invited speaker for two special sessions, *IEEE International Conference on Robotics and Automation*, San Francisco, April, 2000.
- * Workshop and Tutorials Committee Member, *IEEE International Conference on Robotics and Automation*, Detroit, May, 1999.
- * Session co-organizer, *IEEE International Conference on Robotics and Automation*, San Diego, May, 1994.
- * Session co-organizer, *IEEE International Conference on Robotics and Automation*, Atlanta, May, 1993.
- Program Committees
 - * Program committee and session chair: Many times for most major robotics conferences from 1990–present. ICRA, IROS, ISATP (now ISAM), WAFR.
 - * Program Committee Area Chair, “Robotics: Science and Systems”, Atlanta, GA, June, 2007.
 - * Program Area Chair and Best Student Paper Award Committee Member, “Robotics: Science and Systems”, Philadelphia, PA, August 2006.
 - * Program committee, “Robotics: Science and Systems”, Cambridge, MA, June, 2005.
 - * Program committee member, *Euromech Colloquium 397: Impacts in Mechanical Systems*, Grenoble, July, 1999.
 - * Program committee member, *Conference of the American Association for Artificial Intelligence*, Palo Alto, March, 1996.
 - * Program committee member, *International Union of Theoretical and Applied Mechanics: Multibody Dynamics*, September, 1998.
- Reviewing
 - NSF Panels
 - * NSF CISE/IIS review panel, 1996, 1998, 1999, 2001, 2003, 2004, 2007.
 - * NSF Engineering/DDM review panel, 1993.
 - NSF Robotics Program, one proposal, 1986.
 - Non-NSF funding agencies: ONR, NSERC (Canada), HKUST (Hong Kong), Laboratory Directed Research and Development (Sandia Nat’l Labs), Sandia University Research Program.
 - Journals: International Journal of Robotics Research, IEEE Transactions on Robotics and Automation, IEEE Transactions on Automation Science and Engineering, IEEE Transactions on Image Processing, IEEE Transactions on Systems, Man, and Cybernetics, Robotica, Algorithmica, ACM Transactions on Graphics, Journal of Dynamic Systems Measurement and Control, Journal of Applied Mechanics, Zeitschrift für Angewandte Mathematik und Mechanik, E-Haptics, Constraints, Control Systems Letters, Journal of Robotic Systems, International Journal of Robotics and Automation, Journal of Mechanical Design, International Journal on Numerical Methods in Engineering.
 - Conferences: reviewer of many papers from all conferences listed above.

VIII. Funding

A. External Funding

- “Fully-Implicit Time Stepping Methods with Integrated Proximity Queries for Accurate Simulation of Multi-Rigid-Body Systems with Intermittent Contact,” *National Science Foundation, CISE, Computing and Communications Foundations*, S. Akella (PI) and J.C. Trinkle (**co-PI, 50%**), 10/07–9/10, \$200k.
- “CRI:IAD Collaborative Research: Research/Education Infrastructure Based on Modular Miniature Robot Teams,” *National Science Foundation, CISE, Computer and Network Systems*, N. Papanikolopoulos (PI), V. Isler, P. Drineas, and J.C. Trinkle (**co-PI, 5%**), 8/07–7/11, \$750k.
- REU Supplement to: “Collaborative Research: Grasp and Manipulation Planning in the Presence of Dynamics and Uncertainty,” *National Science Foundation, CISE, Information and Intelligent Systems*, J.C. Trinkle (**PI, 100%**), 10/05–5/07, \$12k.
- “Collaborative Research: Grasp and Manipulation Planning in the Presence of Dynamics and Uncertainty,” *National Science Foundation, CISE, Information and Intelligent Systems*, J.C. Trinkle (**PI, 40%**), J.S. Pang (RPI) and Vijay Kumar (UPenn), 6/04–5/07, \$585k. Three regular awards given from 247 submissions.
- “MRI: Acquisition of Infrastructure for Research in Grid Computing and Multiscale Systems Computation,” *National Science Foundation*, Mark Shephard (PI), Carlos Varela, Shekhar Garde, Christopher Carothers, J.C. Trinkle (**co-PI, 15%**), \$714k.
- “Differential Algebraic Inequalities and Their Application to Engineering,” *National Science Foundation, Division of Mathematical Sciences, Focused Research Group Program*, J.S. Pang (PI), F Potra, D.E. Stewart, V. Kumar, J.C. Trinkle (**co-PI, 20%**) 8/02–7/05, \$1,050k.
- “Folding and Unfolding Process for Polygonal Linkages, with Applications in Robotics and Biology,” *National Science Foundation/Defense Advanced Research Projects Agency, CARGO program*, L. Guibas (PI), M. Levitt, R.J. Milgram, I. Strienu, P.G. Xavier, J.C. Trinkle (**consultant**), 6/02–5/03, \$100k.
- “Real-Time Multibody Dynamics for Virtual Reality Training Systems with Haptic User Interface,” *Texas Higher Education Coordinating Board*, J.C. Trinkle (**PI, 50%**) and N.M. Amato 1/98–12/99, \$175k.
- “MRI: Training in Virtual and Real Environments,” *National Science Foundation*, R.A. Volz (PI), J. Yen, N.M. Amato, and J.C. Trinkle (**co-PI**), 9/98–8/01, \$91k.
- “Equipment Matching to: MRI: Training in Virtual and Real Environments,” *National Science Foundation*, R.A. Volz (PI), J. Yen, N.M. Amato, J.C. Trinkle (**co-PI**), and J. Wall, 9/98–8/01, \$64k.
- “Manipulation Planning with Contact Under Uncertainty,” *National Science Foundation, CISE, Robotics Program*, J.C. Trinkle (**PI, 43%**) N.M. Amato, and J.S. Pang, 8/97–7/00, \$400k.
- “CISE Postdoc in Real-Time Multibody Dynamics for Virtual Reality Training Systems with Haptic User Interface,” *National Science Foundation, CISE, Robotics Program*, N.M. Amato (PI) and J.C. Trinkle (**co-PI, 50%**), 4/98–3/00, \$66k.
- “REU Supplement to Manipulation Planning with Contact Under Uncertainty,” *National Science Foundation, CISE, Robotics Program*, N.M. Amato and J.C. Trinkle (**co-PI, 50%**), 8/97–7/00, \$10k.
- “AERCam Enhancements (EVA Robot Camera Control),” *NASA Johnson Space Center*, R.A. Volz (PI), and J.C. Trinkle (**co-PI, 50%**) 9/96–6/98, \$68k.
- “Robotics, Automation, and Tele-Operation Program for Safe Handling and Long-Term Storage of Nuclear Components,” *The Amarillo National Resource Center for Plutonium*, J.C. Trinkle (**co-PI 10%**) 6/95–9/99, \$569k.
- “A Two-Stage Geometric Approach to Planning Robotic Tasks Involving Sliding and Rolling Contacts in Uncertain Environments,” *National Science Foundation*, J.C. Trinkle (**PI, 68%**) and P.F. Stiller, 8/93–7/96, \$309k.

- “Quasistatic Models and Algorithm Design for Dexterous Manipulation Planning,” *Texas Higher Education Coordinating Board, Texas Advanced Research Project*, J.C. Trinkle (**PI, 50%**) and P.F. Stiller, 1/94–12/95, \$161k.
- “Distributed Robotics Systems Integration with Fault-Tolerance in Space Operations,” *Texas Higher Education Coordinating Board, Texas Advanced Technology Program*, R.A. Volz (PI), J.C. Trinkle (**co-PI, 30%**), and L.J. Everett, 1/94–12/95, \$96k.
- “Distributed Robotics Systems Integration with Fault-Tolerance,” *Texas Higher Education Coordinating Board, Texas Advanced Technology Program*, R.A. Volz (PI), J.C. Trinkle (**co-PI, 30%**) and L.J. Everett, 1/92–8/94, \$124k.
- “NSF Small-Scale Infrastructure Award,” *National Science Foundation*, L. Bhuyan, U. Pooch (PI), and R.A. Volz, J.C. Trinkle (**co-PI, 5%**), 1992–1994 \$750k.
- Various grants with the Universities’ Space Automation and Robotics Consortium, R.A. Volz (PI), J.C. Trinkle (**co-PI, 30%**) and L.J. Everett (co-PI), 6/90–present, \$191k.
- “A New Method for the Analysis of the Quasistatic Motion of Systems of Bodies in Contact,” *National Science Foundation Research Initiation Award*, J.C. Trinkle (**PI, 100%**), 6/89–11/92, \$70k.

B. Proposals pending

- “Abstractions and Algorithms for Manipulation Tasks with Uncertainty,” *National Science Foundation, CISE/IIS, Robust Intelligence program*, Vijay Kumar (PI), Jeff Trinkle (**co-PI, 47%**), and Jong-Shi Pang \$900k.
- “From Internet to Robotics: The Next Transformative Technology,” *Visioning proposal to the Computing Community Consortium of the Computing Research Association.*, Henrik Christensen (PI), Georgia Tech (PI); Oliver Brock, UMASS Amherst; Ken Goldberg, UC Berkeley; John Hollerbach, U of Utah; Seth Hutchinson, UIUC; Leslie Kaelbling, MIT; Vijay Kumar, UPenn; Matt Mason, CMU; Gaurav Sukhatme, USC; Sebastian Thrun, Stanford; Jeff Trinkle (**co-PI, 3%**), \$186k.

IX. Publications

A. Books, Monographs

- [1] J.C. Trinkle and D. Prattichizzo. Grasping. In B. Siciliano and O. Khatib, editors, *Handbook of Robotics*. Springer-Verlag, 2007. in press.
- [2] K.T. Egan, S. Berard, and J.C. Trinkle. Sensorless acquisition of multiple contact points between planar parts. In B. Federico and J.K. Salisbury, editors, *Tracts in Advanced Robotics: Multi-Point Interaction with Real and Virtual Objects*, volume 18, pages 113–130. Springer-Verlag, October 2005.
- [3] G.F. Liu, J.C. Trinkle, and R.J. Milgram. Toward complete path planning for planar 3r-manipulators among point obstacles. In M. Erdmann, D. Hsu, M. Overmars, and F. van der Stappen, editors, *Tracts in Advanced Robotics*, volume 17, pages 329–344. Springer-Verlag, October 2005.
- [4] D.E. Stewart and J.C. Trinkle. Dynamics, friction, and complementarity problems. In M.C. Ferris and J.S. Pang, editors, *Complementarity and Variational Problems*, pages 425–439. SIAM, 1997.
- [5] A.O. Farahat, P.F. Stiller, and J.C. Trinkle. On the algebraic geometry of contact formation cells for systems of polygons. In K. Goldberg, D. Halperin, J.C. Latombe, and R. Wilson, editors, *Proceedings, Workshop on Algorithmic Foundations of Robotics*, pages 477–494. A.K. Peters, Boston, MA, 1995.

B. Refereed Journal Articles

- [1] E. Meisner, V.I. Isler, and J.C. Trinkle. Designing controllers for human-robot interaction. *Autonomous Robots: Special Issue on Socially Assistive Robotics*. in press.

- [2] J.S. Pang, V. Kumar, and J.C. Trinkle. On a continuous-time quasistatic frictional contact model with local compliance. *International Journal for Numerical Methods in Engineering*. in press.
- [3] N. Shvalb, L.G. Liu, M. Shoham, and J.C. Trinkle. Motion planning for a class of planar closed-chain manipulators. *International Journal of Robotics Research*, 26(5):457–474, May 2007.
- [4] F.R. Potra, M. Anitescu, B. Gavrea, and J.C. Trinkle. Linearly implicit trapezoidal method for integrating stiff multibody dynamics with contact, joints, and friction. *International Journal for Numerical Methods in Engineering*, 66(7):1079–1124, December 2005.
- [5] J.F. Jones, D.M. Kozłowski, and J.C. Trinkle. Microscale force-fit insertion. *Journal of Mechatronics*, 2(2–3):185–200, 2004.
- [6] W. Son, K. Kim, N.M. Amato, and J.C. Trinkle. A generalized framework for interactive dynamic simulation for multi-rigid-bodies. *IEEE Transactions on Systems, Man, and Cybernetics*, 34(2):912–924, April 2004.
- [7] R.J. Milgram and J.C. Trinkle. The geometry of configuration spaces of closed chains in two and three dimensions. *Homology, Homotopy, and Applications*, 6(1):237–267, 2004.
- [8] D. Balkcom and J.C. Trinkle. Computing wrench cones for planar rigid body contact tasks. *International Journal of Robotics Research*, 21(12):1053–1066, 2002.
- [9] J.C. Trinkle and R.J. Milgram. Complete path planning for closed kinematic chains with spherical joints. *International Journal of Robotics Research*, 21(9):773–789, 2002.
- [10] J.C. Trinkle, J.A. Tzitzouris, and J.S. Pang. Dynamic multi-rigid-body systems with concurrent distributed contacts: Theory and examples. *Philosophical Transactions: Mathematical, Physical, and Engineering Sciences*, 359(1789):2575–2593, December 2001.
- [11] L. Han, J.C. Trinkle, and Z. Li. Grasp analysis as linear matrix inequality problems. *IEEE Transactions on Robotics and Automation*, 16(6):663–674, 2000.
- [12] J.S. Pang and J.C. Trinkle. Stability characterizations of rigid body contact problems with coulomb friction. *Zeitschrift für Angewandte Mathematik und Mechanik*, 80(10):643–663, 2000.
- [13] J.C. Trinkle, J.S. Pang, S. Sudarsky, and G. Lo. On dynamic multi-rigid-body contact problems with coulomb friction. *Zeitschrift für Angewandte Mathematik und Mechanik*, 77(4):267–279, 1997.
- [14] J.S. Pang and J.C. Trinkle. Complementarity formulations and existence of solutions of dynamic multi-rigid-body contact problems with coulomb friction. *Mathematical Programming*, 73:199–226, 1996.
- [15] J.S. Pang, J.C. Trinkle, and G. Lo. A complementarity approach to a quasistatic rigid body motion problem. *Journal of Computational Optimization and Applications*, 5(2):139–154, March 1996.
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E. Abstracts and Posters

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- [2] B. Nguyen and J.C. Trinkle. Sources of error in multibody simulations with intermittent contact. In *International Conference Continuous Optimization*, August 2007. (abstract and presentation by Nguyen).
- [3] A family of models for manipulation planning and design. *International Conference Complementarity Problems*, Stanford, CA, August 2005. (abstract and presentation).
- [4] Time-stepping methods for rigid body dynamics. *International Conference Complementarity Problems*, Cambridge, UK, July 2002. (abstract and **plenary lecture**).
- [5] J.C. Trinkle and R.J. Milgram. Complete path planning for closed kinematic chains. In *Proceedings, Workshop on Intelligent Human Augmentation and Virtual Environments*, pages D–30, D–60, E–28, E–29, October 2002. (abstract and poster presentation).
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- [7] J.C. Trinkle. Designing fixture loading strategies. In *International Conference on Scientific Computation and Differential Equations*, July 2001. (abstract and presentation).

- [8] J.S. Pang, J.C. Trinkle, and G. Lo. A complementarity approach to a quasistatic rigid body motion problem. In *Proceedings, 15th International Symposium on Mathematical Programming*, August 1994. (abstract and presentation).
- [9] J. D. Wolter and J.C. Trinkle. Automatic selection of fixture points for frictionless assemblies. In *NSF Workshop on Computational Geometry in Manufacturing*, February 1994. (abstract and presentation).

VIII Invited Lectures

- [1] Robotics now and then. *Inaugural National Institute on Computing and the Law*, San Francisco, CA, January 2007. Sponsored by the Association for Computing Machinery and the American Bar Association.
- [2] A family of models for manipulation planning and design. *International Conference Complementarity Problems*, Stanford, CA, August 2005.
- [3] A family of rigid body models: connections between quasistatic and dynamic multibody systems. *First Siconos/daVinci Meeting*, Grenoble, France, July 2005.
- [4] Sensorless acquisition of multiple contact points between planar parts. *Multipoint Interaction Workshop*, New Orleans, LA, April 2004.
- [5] Open problems in automation science and engineering. *Kick-off Workshop for IEEE Transaction on Automation Science and Engineering*, Las Vegas, NV, October 2003.
- [6] Exact motion planning for 2r-manipulators in the plane. *Robotics Institute Colloquium, Carnegie Mellon University*, Pittsburgh, PA, October 2003.
- [7] Complete motion planning for spatial polygonal circles. *Workshop on Topology and Robotics, Eidgenossische Technische Hochschule (ETH), Zurich, Switzerland*, June 2003.
- [8] Multi-body dynamics: Theory and applications. *Department of Mathematics, RPI*, Troy, NY, April 2003.
- [9] Time-stepping methods for rigid body dynamics. *International Conference Complementarity Problems*, Cambridge, UK, July 2002. **plenary lecture**.
- [10] Complete motion planning for planar polygonal chains. *Department of Mathematics, Stanford University*, Stanford, CA, May 2002.
- [11] Complete motion planning for planar polygonal chains. *Department of Computer Science, University of North Carolina*, Chapel Hill, NC, May 2002.
- [12] Recent results in constrained mechanical systems: Connections to computational biology. *Computational Sciences Department, Sandia National Labs*, Livermore, CA, May 2002.
- [13] Implications of rigid body dynamics on fixture loading and design. *Department of Mechanical Engineering, Northwestern University*, Chicago, IL, March 2002.
- [14] Motion planning for planar n-bar mechanisms with revolute joints. *Department of Computer Science, RPI*, Troy, NY, November 2001.
- [15] Designing fixture loading strategies. Vancouver, BC, Canada, July 2001.
- [16] Stability characterizations of rigid body contact problems with coulomb friction. *First SIAM Conference on Computational Science and Engineering*, Washington, D.C., September 2000.
- [17] Remote autonomous dexterity. *DOE Review of CESAR Research Programs, Oak Ridge National Labs*, Oakridge, TN, September 2000.
- [18] Stability of rigid body systems. *Department of Computer and Information Sciences, University of Pennsylvania*, Philadelphia, PA, June 2000.
- [19] Experience from my collaborations with mathematicians. *NSF Workshop on Collaborative Research between Mathematicians and Roboticians*, Arlington, VA, May 2000.
- [20] A new time-stepping scheme for rigid body dynamics with coulomb friction and collisions. *Department of Mechanical Engineering, Johns Hopkins University*, Baltimore, MD, March 2000.

- [21] Planning dexterous manipulation in the plane. *Department of Computer Science, Columbia University*, New York, NY, March 2000.
- [22] Rigid body dynamics as a complementarity system. *Game Developers' Conference: Hard Core Technical Seminar*, San Francisco, CA, December 1999.
- [23] Mathematical complementarity in rigid body dynamics. *General Robotics and Active Sensory Perception Laboratory, University of Pennsylvania*, Philadelphia, PA, June 1998.
- [24] Mathematical complementarity in rigid body dynamics. *Workshop on New Directions in Simulation of Multibody Systems*, Leuven, Belgium, May 1998.
- [25] Closure properties of grasps and fixtures. *Workshop on Grasping and Fixturing*, Leuven, Belgium, May 1998.
- [26] Optimal path planning and control for in-orbit inspection of space structures. *Johnson Space Center*, Houston, TX, June 1997.
- [27] Existence and uniqueness of solutions in multi-rigid-body contact problems. *Intelligent Systems and Robotics Center, Sandia National Labs*, Albuquerque, NM, January 1996.
- [28] Complementarity formulations of multi-rigid-body contact problems. *Robotics Institute Seminar Series, Carnegie Mellon University*, Pittsburgh, PA, July 1995.
- [29] Dynamic multi-rigid-body systems with concurrent distributed contacts. *First Workshop on Simulation and Interaction in Virtual Environments*, Iowa City, IA, July 1995.
- [30] A complementarity approach to a quasistatic rigid body motion problem. *Proceedings, 15th International Symposium on Mathematical Programming*, Ann Arbor, MI, August 1994.
- [31] Automatic selection of fixture points for frictionless assemblies. *NSF Workshop on Computational Geometry in Manufacturing, Courant Institute*, New York, NY, February 1994.
- [32] Planning dexterous manipulation of slippery objects by robotic hands. *Schlumberger*, Houston, TX, April 1993.
- [33] Manipulation planning. *NASA Johnson Space Center*, Houston, TX, December 1991.
- [34] Planning dexterous manipulation of slippery objects by robotic hands. *Department of Electrical and Computer Engineering, Rice University*, Houston, TX, November 1991.
- [35] In-hand reorientation of slippery objects. *NASA Johnson Space Center*, Houston, TX, December 1990.
- [36] Stability of subassemblies. *Jet Propulsion Laboratory*, Pasadena, CA, August 1989.
- [37] Mechanics and planning of multi-fingered manipulation tasks. *University of Arizona*, Tucson, AZ, April 1989.
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IX References

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