

John T. Wen

Education

B. Eng. Electrical Engineering. Honors Program. 9/76-8/79. McGill University, Montreal, QUE, Canada.
Electrical Engineering. Concentration: Control Systems. 9/79-12/79. University of Toronto, Toronto, ONT, Canada.
M.S. Electrical Engineering. Concentration: Control Systems. 1/80-5/81. University of Illinois, Champaign, IL.
Ph.D Electrical Engineering. Concentration: Control Systems. 1/83-8/85. Rensselaer Polytechnic Institute, Troy, NY.

Professional Experience

7/13-Present Professor and Head, Industrial and Systems Engineering, Rensselaer Polytechnic Institute, Troy, NY.
7/05-12/13 Director, Center for Automation Technologies and Systems, Rensselaer Polytechnic Institute, Troy, NY.
6/09-12/09 Interim Director, Smart Lighting Engineering Research Center, Rensselaer Polytechnic Institute, Troy, NY.
6/96-Present Professor, Electrical, Computer, and Systems Engineering, joint appointment in Mechanical, Aerospace, and Nuclear Engineering, Rensselaer Polytechnic Institute, Troy, NY.
9/91-5/96 Associate Professor, Electrical, Computer, and Systems Engineering, Rensselaer Polytechnic Institute, Troy, NY.
9/88-8/91 Assistant Professor, Electrical, Computer, and Systems Engineering, Rensselaer Polytechnic Institute, Troy, NY.
9/85-8/88 Member of Technical Staff, Jet Propulsion Laboratory, Pasadena, CA.
6/81-12/82 Systems Engineer, Fisher Control Company, Marshalltown, IA.

Honors and Awards

- Eleven NASA Tech Brief Awards from 1986-1988.
- ASEE/NASA Summer Faculty Fellow at Jet Propulsion Laboratory, summer 1993.
- Senior Visiting Scientist, 1997, Japan Society for the Promotion of Science (JSPS).
- Fellow of IEEE, 2001.
- Oversea Assessor, Chinese Academy of Sciences, 2004-2009.
- Best Paper Award, IEEE Conference on Automation Science and Engineering, Shanghai, 2006
- Rensselaer School of Engineering Outstanding Research Award, 2007.
- Innovation in Optomechatronic Research Award, SPIE Symposium on Optomechatronic Technologies, San Diego, 2008.
- Rensselaer School of Engineering Outstanding Team Award, Rensselaer Polytechnic Institute, 2010
- IEEE Control Systems Society Transition to Practice Award, 2003

Professional Societies

- Senior Editor of IEEE Transaction on Automation Science and Engineering, 2013- present.
- Associate Editor of Robotica, 2008-2011.
- Associate Editor of Journal of Optomechatronics, 2007-2012.
- Associate Editor of IEEE Transaction on Robotics and Automation 1994-1998, 2004- 2008
- Program Chair of the Third Annual CIRSSE Conference.
- Publication Chair of 1994 American Control Conference.

- Publication Chair of 1995 Conference on Control Applications.
- General Chair, 2010 IEEE Conference on Automation Science and Engineering (CASE)
- Special Session Chair, 2011 American Control Conference.

Patents and Licensing

- U.S. Patent # 6,325,808, "Robotic system, docking station, and surgical tool for collaborative control in minimally invasive surgery," C.J. Bernard, H. Kang, B.L. Sachs, S.K. Singh, J.T. Wen, December 4, 2001.
- U.S. Patent # 6,796,447, "Crane control system," B.Laundry, G. Liu, G. Montemayor, D. Popa, M. Taylor, J.T. Wen, September 28, 2004.
- U.S. Patent # 7,028,856: "Crane control apparatus and method," B.Laundry, G. Liu, G. Montemayor, D. Popa, M. Taylor, J.T. Wen, April 18, 2006.
- U.S. Patent # 7,253,946: "Microscope with Extended Field of Vision," Y. Bellouard, B. Potsaid, J.T. Wen, August 7, 2007.
- U.S. Patent # 7,345,448: "Adaptive Command Filtering for Servomechanism Control Systems," David Watt, Mehmet Alpay, Mark Unrath, Ben Potsaid, John T. Wen, March 18, 2008.
- U.S. Patent # 7,742,213 (June 22, 2010), China Patent # CN ZL 2005 8 0045412.6 (Jan 27, 2010), "Adaptive Scanning Optical Microscope," Yves Bellouard, Ben Potsaid, John Wen. Licensed to Thorlabs in Nov, 2006.
- U.S. Patent # 8,746,310: "System and method for probe-based high precision spatial orientation control and assembly of parts for microassembly using computer vision," John Wason, John T. Wen, Jason Gorman, Nicholas Dagalakis. June 10, 2014

Research Grants

- NASA Goddard Flight Research Center (PI: Riccardo Bevilacqua, Co-PI: John Wen) SSCO Technology Development for Robotic Servicing of Orbital Space Assets, 5/1/14-9/30/14, \$166,476.
- Army Research Office (PI: John Wen, Co-PI: Agung Julius) Short Term Innovative Research (STIR), Light-based Circadian Rhythm Modeling and Control, 12/1/13-8/31/14, \$50,000.
- National Science Foundation (PI: Robert Hull, Co-PI: Antoinette Maniatty, John Wen, Dan Lewis) Designing Materials to Revolutionize and Engineer our Future (DMREF), Real Time Control of Grain Growth in Metals, 7/1/2013-6/30/2016, \$1,285,243.
- Office of Naval Research (PI: John Wen, Co-PI: Yoav Peles, Michael Jensen) Systems Level Thermal Management for Multiple High Transient Heat Loads, 2/1/2013-1/31/2016, \$430,233.
- National Science Foundation (PI: Sandipan Mishra, Co-PI: John Wen, Koushik Kar) Human-Mediated Intelligent Control of Building Energy Systems. 9/15/2012-8/14/2016, \$585,000.
- HP Labs (PI: Sandipan Mishra, Co-PI: John Wen) Intelligent Human Centered Building Environment Modeling and Control, 9/1/2012-8/31/2013, \$75,000.
- Vivonics (PI: John Wen, Co-PI: Glenn Saunders) DOD Phase 2 SBIR Control for Tactile and Haptics Enabled Open Surgery Simulation, 1/2/2012-6/30/2013, \$120,000.
- New York State Division for Science, Technology and Innovation (NYSTAR) (PI: John Wen) Center for Automation Technologies and Systems (CATS), 7/1/05-6/30/09 \$1M/year, 7/1/09-6/30/14 \$920,000/year.
- National Science Foundation (PI: Sandipan Mishra, Co-PI: John Wen) High-speed Estimation and Control using Slow-rate Integrative Image Sensors for Adaptive Optics, 9/1/2011- 8/31/2014, \$350,000.
- Boeing (PI: Miki Amitay, Co-PI: John Wen) Active Flow Control, 1/1/10-12/31/11, \$62,256.
- National Science Foundation (PI: Robert Karlicek) Smart Lighting Engineering Research Center, 9/1/09-8/31/14. Approximately \$100,000/year.

- Office of Naval Research Multidisciplinary University Research Initiative (MURI) (PI: Michael Jensen, Co-PI: Yoav Pelese, John Wen) System-Level Approach for Multi-Phase, Nanotechnology-Enhanced Cooling of High-Power Microelectronic Systems, 5/07-4/12, \$3.4M.
- Crystal-IS (PI: John Wen, Co-PI: Bill Gressick, Antoinette Maniatty, Sheppard Salon) Process Efficiency Improvements for Aluminum Nitride Semiconductor Crystal Growth, 1/07-6/08, \$250,000
- GE (PI: John Wen) Fiber Alignment for MEMS Fabry-Perot Interferometer, 1/07-4/07, \$30,000.
- Electro-Systems Inc. (PI: John Wen, Co-PI: Michael Jensen) Thermal Error Research, 5/06-4/07, \$60,000.
- Electro-Systems Inc. (PI: Srinivas Akella, Co-PI: John Wen) Quattro Optimization, 7/06-6/07, \$60,000.
- National Institute of Standards and Technology (PI: John Wen) Insertion Tasks in Micro-Assembly, 6/1/06-5/31/07, \$35,000.
- National Science Foundation (PI: Mark Shephard) Multiscale Systems Engineering for Nanocomposites, 9/1/03–8/31/06, approximately \$100,000.
- National Science Foundation (PI: John Wen) Precision Motion Control With Iterative Input Refinement, 5/1/03–4/30/06, \$271,000.
- Electro-Systems Inc. (PI: John Wen) Input Shaping Control for a Galvo Positioning System, Phase I: \$45,000, 8/01-12/01. Phase II: \$45,000, 2/01-10/02. Phase III: \$45,000, 11/02- 7/03, Phase IV: \$45,000, 8/03-5/04, Phase V: \$70,000, 5/04-7/05, Phase VI: \$60,000, 7/05-7/06.
- Proctor & Gamble (PI: John Wen) Modeling and Simulation of the Flexible Standard Converter System, 2/01-6/01, \$60,000.
- National Science Foundation (PI: John Wen) Model Predictive Control for Nonlinear Mechanical Systems, 9/1/98–8/31/01. \$250,000 + REU \$15,000.
- National Science Foundation (PI: John Wen) Analysis, Synthesis, and Control of General Parallel Robotic Systems, 9/1/99–8/31/02. \$200,000 + REU \$10,000.
- Scientific Systems Company Inc.: (PI: John Wen) Model Predictive Control for Nonlinear Satellites, 4/1/98-3/31/00, \$50,000.
- Aluminum Processing Program (PI: Wojciech Misiolek) Process Control in Aluminum Extrusion, Sponsoring companies: Werner, Alcoa, Reynold, Ormet, Kaiser, Exal, Hydro Aluminum, Alumex, Aluminum Shapes, Brazeway, 9/93–8/97, \$50,000/yr.
- National Science Foundation (PI: John Wen) A Global Approach to Kinematic Path Planning, 9/1/94–8/31/97, \$210,600 + REU \$5,000.
- General Electric (PI: John Wen) Spacecraft Orbit Position Estimation, 2/1/94–12/31/94, \$40,000.
- Army Research Office (PI: Kevin Craig) MURI: Interdisciplinary Basic Research in Smart Materials and Structures, 7/1/92–6/30/97, \$2,000,000.
- National Science Foundation (PI: John Wen) Passive Feedback Control with Feedforward Compensation, 12/1/91–11/30/94, \$197,112 + REU \$5,000.
- National Aeronautical and Space Administration (PI: John Wen) Manipulator Flexible Joint Control System Feasibility Study, 7/1/90–6/30/91, \$24,000.
- National Science Foundation (PI: John Wen) A Passivity Based Control Methodology for Distributed Parameter Systems, 9/1/89–2/1/92, \$70,000 + REU \$5,000.
- National Aeronautical and Space Administration (PI: George Saridis) Center of Intelligent Robotic Systems for Space Exploration, 9/1/89–10/31/92, \$5,500,000.
- National Institutes of Standard and Technology, Northeast Manufacturing Technology Center (PI: Gene Simon), Real-Time Control Systems effort, 1/1/89–6/30/90, \$161,379, 7/1/90–12/31/90, \$17,000, 1/1/91–5/30/91, \$10,000.
- National Science Foundation (PI: Joe Chow, Co-PI: John Wen) Real Time Control Applications Laboratory Equipment, 9/1/89–2/1/91, \$65,000.

Recent Publications

Book

- H. Bai, M. Arcak, J.T. Wen, *Cooperative Control: A Systematic Passivity-Based Approach*, Springer-Verlag, 2011.

Archival Journals

- D.T. Pollock, Z. Yang, J.T. wen, Y. Peles, M.K. Jensen, “Model-Based Control of Vapor Compression Cycles Transient Heat-Flux Removal,” *International Journal of Heat and Mass Transfer*, to appear in 2014.
- D. Kruse, J.T. Wen, R.J. Radke, “Sensor-Based Dual-Arm Tele-Robotic System,” *IEEE Transaction on Automation Science and Engineering*, to appear in 2014.
- S. Afshari, S. Mishra, A. Julius, F. Lizarralde, J.D. Wason, J.T. Wen “Modeling and Control of Color Tunable Lighting Systems Energy and Buildings,” *Energy and Buildings*, 68(A), Jan, 2014, pp. 242-253.
- J. Tani, S. Mishra, J.T. Wen, “Identification of Fast-rate Systems using Slow- rate Image Sensor Measurements,” *IEEE/ASME Transactions on Mechatronics*, 19(4), Aug. 2014, pp.1343,1351.
- J. Catano, F. Lizarralde, T. Zhang, J.T. Wen, M.K. Jensen, Y. Peles, “Vapor Compression Refrigeration Cycle for Electronics Cooling – Part II: Gain- Scheduling Control for Critical Heat Flux Avoidance,” *International Journal of Heat and Mass Transfer*, 66, Nov 2013, pp. 911-921.
- J. Catano, T. Zhang, J.T. Wen, M.K. Jensen, Y. Peles, “Vapor Compression Refrigeration Cycle for Electronics Cooling – Part I: Dynamic Modeling and Experimental Validation,” *International Journal of Heat and Mass Transfer*, 66, Nov 2013, pp. 922-929.
- Z. Schilling, E. Frank, V. Magidson, J. Wason, J. Loncarek, K. Boyer, J. Wen, A. Khodjakov, “Predictive-focus illumination for reducing photodamage in live-cell microscopy,” *Journal of Microscopy*, pp. 160-167, 246(2), May, 2012.
- J.D. Wason, J.T. Wen, J.J. Gorman, N.G. Dagalakis, “Automated Multi-Probe Microassembly using Vision Feedback,” 28(5), pp.1090-1103, 2012.
- T. Zhang, J.T. Wen, A. Julius, Y. Peles, M.K. Jensen, “Stability Analysis and Maldistribution Control of Two-Phase Flow in Parallel Evaporating Channels,” *International Journal of Heat and Mass Transfer*, 54(25-26), Dec, 2011, pp. 5298– 5305.
- T. Zhang, J.T. Wen, Y. Peles, J.E. Catano, R. Zhou, M.K. Jensen, “Two-Phase Refrigerant Flow Instability Analysis and Active Control in Transient Electronics Cooling Systems,” *International Journal of Multiphase Flow*, 37(1), Jan, 2011, pp.84-97.
- R. Zhou, T. Zhang, J. Catano, J.T. Wen, G.J. Michna, Y. Peles, M.K. Jensen, “The Steady-State Modeling and Optimization of a Refrigeration System for High Heat Flux Removal,” *Applied Thermal Engineering*, 30(16), November 2010, pp. 2347-2356.
- C. Scott, B. Potsaid, John T. Wen, “Wide Field Scanning Telescope using MEMS Deformable Mirrors,” *International Journal on Optomechatronics*, 4(3), Sep, 2010, pp. 285-305.
- H. Bai, J.T. Wen, "Cooperative Load Transport: A Formation Control Perspective," *IEEE Transactions on Robotics*, 26(4), August, 2010, pp. 742-749.
- T.J. Zhang, Y. Peles, J.T. Wen, T. Tong, J.Y. Chang, R. Prasher, M. Jensen, “Analysis and Active Control of Pressure-Drop Flow Instabilities in Boiling Microchannel Systems,” *International Journal on Heat and Mass Transfer*, 53(11-12), May, 2010, pp. 2347-2360.
- L.I. Rivera, B. Potsaid, J.T. Wen, “Image Tracking of Multiple *C. Elegans* Worms Using Adaptive Scanning Optical Microscope (ASOM),” *International Journal on Optomechatronics*, 4(1), March, 2010, pp. 1-21.

- N. Chakraborty, S. Akella, J. T. Wen, "Coverage of a Planar Point Set with Multiple Robots subject to Geometric Constraints," *IEEE Transaction on Automation Science and Engineering*, 7(1), Jan, 2010, pp. 111-122.
- T. Tong, T.J. Zhang, J.Y. Chang, Y. Peles, R. Prasher, M. Jensen, J. Wen, P. Phelan "Ledinegg instability in microchannels," *International Journal on Heat and Mass Transfer*, 52 (25-26), December, 2009, pp.5661-5674.
- B. Potsaid, F. Finger, J.T. Wen, "Automation of Challenging Spatial-Temporal Biomedical Observations with the Adaptive Scanning Optical Microscope (ASOM)," *IEEE Transaction on Automation Science and Engineering*, 6(3), July, 2009, pp.525-535.
- H. Bai, M. Arcak and J.T. Wen, "Adaptive motion coordination: using relative velocity information to track a reference velocity," *Automatica*, 45, 2009, pp.1020-1025.
- H. Bai, M. Arcak, J.T. Wen, "Rigid Body Attitude Coordination without Inertial Frame Information," *Automatica*, 44, 2008, pp. 3170-3175.
- H. Bai, M. Arcak, J.T. Wen, "An Adaptive Design for Reference Velocity Recovery in Motion Coordination," *Systems & Control Letters*, 57(8), August, 2008, pp.602-610.
- B. Potsaid and J.T. Wen, "Adaptive Scanning Optical Microscope (ASOM): large field of view and high resolution imaging using a MEMS deformable mirror," *Journal of Micro/Nanolithography, MEMS, and MOEMS (JM3)*, Special Issue on Silicon-Based MOEMS and Their Applications, 7(2), Apr-Jun, 2008.
- B. Potsaid and J.T. Wen, "Design of Adaptive Optics Based Systems Using High Fidelity MEMS Deformable Mirror Models", *International Journal of Optomechatronics*, 2(2), June 2008, pp. 104-125.
- T. Alpcan, X. Fan, T. Basar, M. Arcak, J.T. Wen, "Power Control for Multicell CDMA Wireless Networks: a Team Optimization Approach," *Wireless Networks*, 14(5), pp.647-657, October 2008.

Doctoral Students

1. Pierre Sicard, Trajectory Tracking of Flexible Joint Manipulators with Passivity Based Controller, June, 1993.
2. Xin Chen, Passivity Based Stability Analysis and Controller Synthesis for Distributed Parameter Systems with Unbounded Input/Output Operators. November 1993.
3. Wei-Ying Cheng, A Class of Neural Controllers with Application to Robot Tracking Control. November 1993.
4. Adam Divelbiss, Nonholonomic Motion Planning in the Presence of Obstacles. November 1993.
5. Sanjeev Seereeram, A Path Space Approach to Path Planning for Redundant Manipulators. November 1993.
6. Steve Cummings, Direct Model Reference Adaptive Control Utilizing Nominal Model Information. April 1995.
7. Gongming Shu, Thermomechanical Modeling and Analysis of Flexible Structures with Shape Memory Alloy Actuators, August 1996. (Co-advised with Dimitri Lagoudas) (MANE)
8. Declan Hughes, Piezoceramic and Shape Memory Alloy Hysteresis Modeling and Compensation, February 1997.
9. Padma Akella, Modeling, Analysis, and Control of Flexible and Smart Structures. October 1997.
10. Carrie Dickinson, Feedback Compensation of Shape Memory Alloy Hysteresis, November 1997.
11. Dan Popa, Path Planning and Feedback Stabilization of Nonholonomic Control Systems, April, 1998.
12. Fernando Lizarralde, Stabilization of Nonlinear Affine Control Systems using a Newton-Type Method, University of Rio de Janero, September 1998. (Co-Advised with Liu Hsu)
13. Brian Tibbetts, Modeling and Control of Aluminum Extrusion Process. September 1999.
14. John O'Brien. Feasible Solutions to Unstable Singularity in Parallel Robots June, 2001.
15. Sooyong Jung. Nonlinear Model Predictive Control: Stability, Robustness and Real-time

- Implementation, April, 2002. (MANE)
16. Hyosig Kang. Robotic Assisted Suturing in Minimally Invasive Surgery, May, 2002. (MANE)
 17. Byoung Hun Kang. Parallel Mechanisms with Flexure Joints: Analysis, Design, and Control, Aug. 2004. (MANE)
 18. Gustavo Montemayor. Multiple Manipulator Control with Distributed Information, Sensing, and Actuation Feb. 2005.
 19. Ben Potsaid. Expanding the Field of View in Optical Microscopy: a Multi-disciplinary Approach Aug. 2005 (MANE)
 20. Rafael Quintanilla. Iterative Learning Control for High Performance Motion Systems Dec. 2007
 21. Josh Hurst. Transport Coefficient Computation based on Input/Output Reduced Order Models, Nov. 2008. (MANE)
 22. He Bai. Passivity-Based Motion Coordination of Multi-Agent Systems: Theory and Experiments, May 2009 (jointly supervised with Murat Arca).
 23. Rongliang Zhou. Model Based Thermal Management Through Heat Injection and Removal, Nov 2010
 24. Xiaoqing Ge. Reduced Order Modeling and Active Flow Control of an Inlet Duct, April 2011.
 25. Juan Catano. Dynamic Modeling and Advanced Control of Vapor Compression Cycles for Electronics Cooling, September 2011. (MANE)
 26. John Wason. Visually-Guided Multi-Probe Microassembly of Spatial Micro- electromechanical Systems, December 2011. (MANE)
 27. Nanhu Chen. Modeling and Control of a Class of Nonlinear Opto-Mechatronic Systems with the Linear Parameter Varying Representation. November 2012. (MANE)
 28. Jiayang Zhang. Circadian Rhythm Modeling, Estimation and Control based on Dynamic Lighting, August 2013 (jointly supervised with Agung Julius).