

Xiaobo Tan

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PROFESSIONAL PREPARATION

Tsinghua University, China	Automatic Control	B.E., 1995
Tsinghua University, China	Automatic Control	M.E., 1998
University of Maryland at College Park	Electrical Engineering	Ph.D., 2002
University of Maryland at College Park	Controls	Postdoc, 2002-2004

APPOINTMENTS

2010 - Associate Professor, Department of Electrical & Computer Engineering, MSU
2011 - Associate Professor, Department of Mechanical Engineering, MSU
2004 - 2010 Assistant Professor, Department of Electrical & Computer Engineering, MSU
2002 - 2004 Research Associate, Institute for Systems Research, University of Maryland, College Park
1998 - 2002 Research Assistant, Department of Electrical & Computer Engineering, University of Maryland, College Park

HONORS AND AWARDS

1. Teacher-Scholar Award, Michigan State University, 2010
2. 2008 DSCD Best Mechatronics Paper Award (with Yang Fang), ASME Dynamic Systems and Control Division (DSCD), 2009
3. Faculty Early Career Development Award (CAREER), the National Science Foundation, 2006
4. Best Poster Award (with M. Khbeis), the MEMS Alliance Special Topics Symposium, April 2003
5. Finalist, Best Student Paper Award, the 41st IEEE Conference on Decision and Control, 2002
6. Systems Fellow, Institute for Systems Research, University of Maryland, January 1998 - August 2002
7. Graduate and Undergraduate Scholarships, Tsinghua University: Siemens Prize (1997), Outstanding Automation Graduate Prize (1995), Yu-Chi Ho Scholarship (1994), 12.9 Scholarship (1991 & 1992)

TEACHING

1. EGR 100 (Member of instructional team), *Introduction to Engineering Design* (Fall 2007 - Spring 2011), MSU
2. ECE 313, *Control Systems* (Fall 2004, Fall 2005, Fall 2006, Fall 2007, Spring 2009, Fall 2009, Spring 2011, Spring 2012), MSU
3. ECE 480 (Facilitator), *Senior Design* (Fall 2005, Spring 2006, Spring 2012), MSU
4. ECE 819, *Smart Material Sensors and Actuators* (Fall 2011); also offered as ECE 802-602 (Spring 2008) and ECE 802-603 (Spring 2005, *Smart Sensors and Actuators in Micro and Nanosystems*), MSU [Developed new course]

5. ECE 856, *Adaptive Control* (Fall 2008, Fall 2010); also offered as ECE 960A (Spring 2006), MSU
6. ECE 960C, *Networked and Embedded Control Systems* (Spring 2010); also offered as ECE 802-603 (Spring 2007), MSU [Developed new course]

RESEARCH AND EDUCATIONAL GRANTS

1. PI (at MSU), "Bio-inspired Flow Sensing and Control for Autonomous Underwater Vehicles," Office of Naval Research/University of Maryland, \$180,000, 10/1/2011 - 9/30/2014 (Collaborators: D. Paley, J. S. Humbert from University of Maryland, and S. Coombs from Bowling Green State University)
2. Co-PI, "II-EN: Evolution Park - An Evolutionary Robotics Habitat for the Study of Crawling, Swimming and Flying Creatures," National Science Foundation, \$305,000, 04/01/2011 - 03/31/2013 (PI: P. McKinley; Other Co-PI: J. Boughman)
3. PI, "RAPID: Monitoring of Gulf Oil Spill with Gliding Robotic Fish," National Science Foundation, \$100,000, 09/15/2010 - 08/31/2012
4. Co-PI, "Exploiting Mobility-assisted Collaboration for Adaptive Aquatic Sensor Networks," National Science Foundation, \$360,000, 09/15/2010 - 08/31/2013 (PI: G. Xing)
5. Participant, "BEACON: An NSF Center for the Study of Evolution in Action," National Science Foundation, 08/01/2010 - 07/31/2015 (Collaborators: P. McKinley, J. Boughman)
6. PI, "RI: Small: AquaSWARM: Small Wireless Autonomous Robots for Monitoring of Aquatic Environments," National Science Foundation, \$417,999, 09/01/2009 - 08/31/2012 (Co-PI: E. Litchman)
7. PI, "RET Site on Bio-Inspired Technology and Systems (BITS)," National Science Foundation, \$500,000, 09/01/2009 - 08/31/2012 (Co-PIs: E. Alocilja, A. Kim)
8. PI, "Nonlinear and Adaptive Control of Smart Material-Actuated Systems with Application to Nanopositioning," National Science Foundation, \$216,000, 08/15/2008 - 07/31/2012 (Co-PI: H. K. Khalil)
9. Co-PI, "Development of An Autonomous Robotic Fish-based Sensor to Detect Harmful Algal Blooms (HABs)," Biogeochemistry Environmental Research Initiative (BERI) at MSU, \$10,000, Spring 2009 (PI: E. Litchman)
10. Co-PI, "ORCHID: Harnessing Digital Evolution to Design High-Assurance Adaptive Systems," National Science Foundation, \$600,000, 07/01/2008 - 06/30/2012 (PI: B. H. Cheng; Other Co-PIs: P. K. McKenley, C. A. Ofria)
11. PI, "Highly Maneuverable Robotic Fish Based on Biological Principles and Biomimetic Materials," Office of Naval Research, \$379,748, 06/01/2008 - 12/31/2011
12. Co-PI, "CRI: IAD - A Testbed for Evolving Adaptive and Cooperative Behavior Among Autonomous Systems," National Science Foundation, \$188,110, 05/01/2008 - 04/30/2010 (PI: P. K. McKinley; Other Co-PIs: B. H. Cheng, C. A. Ofria, R. T. Pennock)
13. PI, "Modeling and Control of Self-sensing Artificial Muscles," US Civilian Research & Development Foundation, \$9,400, 01/01/2008 - 12/31/2009
14. PI, "CAREER: Dexterous Biomimetic Micromanipulation Using Artificial Muscles: Modeling, Sensing, and Control," National Science Foundation, \$616,663, 03/01/2006 - 02/29/2012
15. PI, "Integrated Sensory Feedback for Artificial Muscles," Michigan State University Intramural Research Grants Program, \$50,000, 12/15/2005 - 12/31/2007

16. PI, "SGER: A Control-Oriented Model for Ionic Polymer-Metal Composite Actuators," National Science Foundation, \$27,084, 09/15/2005 - 05/31/2006
17. PI, Educational Grant in Optical Science and Engineering, The International Society for Optical Engineering, \$2,000, 08/29/2005 - 08/28/2006

PUBLICATIONS

Books:

- [B-1] K. J. Kim, **X. Tan**, H. R. Choi, D. Pugal, *Biomimetic Robotic Artificial Muscles*, World Scientific Publishing, 2011 (forthcoming)

Journal Papers:

- [J-1] A. Esbrook, **X. Tan**, H. K. Khalil, "An indirect adaptive servocompensator for signals of unknown frequencies with application to nanopositioning," *Automatica*, under review, 2012
- [J-2] R. Dong, **X. Tan**, "Modeling and open-loop control of IPMC actuators under changing ambient temperature," *Smart Materials and Structures*, under review, 2012
- [J-3] Y. Kengne-Fotsing, **X. Tan**, "Bias-dependent impedance and actuation models for ionic polymer-metal composites," *Journal of Applied Physics*, under review, 2011
- [J-4] X. Chen, G. Zhu, X. Yang, D. L.S. Hung, **X. Tan**, "Model-based estimation of flow characteristics using an ionic polymer-metal composite beam," *IEEE/ASME Transactions on Mechatronics*, under review, 2011
- [J-5] A. Esbrook, **X. Tan**, H. K. Khalil, "Control of systems with hysteresis via servocompensation and its application to nanopositioning," *IEEE Transactions on Control Systems Technology*, under review, 2010
- [J-6] A. T. Abdulsadda, **X. Tan**, "An artificial lateral line system using IPMC sensor arrays" (**Invited paper** for special issue on Ionic Polymer-Metal Composites), *International Journal of Smart and Nano Materials*, to appear, 2011
- [J-7] B. Drincic, **X. Tan**, D. Bernstein, "Why are some hysteresis loops shaped like a butterfly?," *Automatica*, vol. 47, no. 12, pp. 2658-2664, 2011
- [J-8] **X. Tan**, "Autonomous robotic fish as mobile sensor platforms: Challenges and potential solutions" (**Invited paper** for special issue on Biomimetics in Ocean Engineering), *Marine Technology Society Journal*, vol. 45, no. 4, pp. 31-40, 2011
- [J-9] Y. Fang, T. J. Pence, **X. Tan**, "Fiber-directed conjugated polymer torsional actuator: Non-linear elasticity modeling and experimental validation," *IEEE/ASME Transactions on Mechatronics*, vol. 16, no. 4, pp. 656-664, 2011
- [J-10] T. Ganley, D. L.S. Hung, G. Zhu, **X. Tan**, "Modeling and inverse compensation of temperature-dependent ionic polymer-metal composite sensor dynamics," *IEEE/ASME Transactions on Mechatronics*, vol. 16, no. 1, pp. 80-89, 2011
- [J-11] **X. Tan**, W. Xi, J. S. Baras, "Decentralized coordination of autonomous swarms using parallel Gibbs sampling," *Automatica*, vol. 46, no. 12, pp. 2068-2076, 2010
- [J-12] S. Shatara, **X. Tan**, "An efficient, time-of-flight-based underwater acoustic ranging system for small robotic fish," *IEEE Journal of Oceanic Engineering*, vol. 35, no. 4, pp. 837-846, 2010

- [J-13] Z. Chen, S. Shatara, **X. Tan**, “Modeling of biomimetic robotic fish propelled by an ionic polymer-metal composite caudal fin,” *IEEE/ASME Transactions on Mechatronics*, vol. 15, no. 3, pp. 448-459, 2010
- [J-14] Y. Fang, **X. Tan**, “A novel diaphragm micropump actuated by conjugated polymer petals: Fabrication, modeling, and experimental results,” *Sensors and Actuators A: Physical*, vol. 158, pp. 121-131, 2010
- [J-15] Z. Chen, **X. Tan**, “Monolithic fabrication of ionic polymer-metal composite actuators capable of complex deformation,” *Sensors and Actuators A: Physical*, vol. 157, pp. 246-257, 2010
- [J-16] J. Ahrens, **X. Tan**, H. K. Khalil, “Multirate sampled-data output feedback control with application to smart material actuated systems,” *IEEE Transactions on Automatic Control*, vol. 54, no. 11, pp. 2518-2529, 2009
- [J-17] Z. Chen, D. R. Hedgepeth, **X. Tan**, “A Nonlinear, control-oriented model for ionic polymer-metal composite actuators,” *Smart Materials and Structures*, vol. 18, 055008 (9 pp), 2009
- [J-18] **X. Tan**, R. Iyer, “Modeling and control of hysteresis: Introduction to the special section,” *IEEE Control Systems Magazine*, vol. 29, no. 1, pp. 26-29, 2009
- [J-19] R. Iyer, **X. Tan**, “Control of hysteretic systems through inverse compensation: Inversion algorithms, adaptation, and embedded implementation” (**Invited paper** for special section on Modeling and Control of Hysteresis), *IEEE Control Systems Magazine*, vol. 29, no. 1, pp. 83-99, 2009
- [J-20] Y. Fang, T. J. Pence, **X. Tan**, “Nonlinear elastic modeling of differential expansion in trilayer conjugated polymer actuators,” *Smart Materials and Structures*, vol. 17, 065020 (10 pp), 2008
- [J-21] Z. Chen, **X. Tan**, “A Control-oriented and physics-based model for ionic polymer-metal composite actuators,” *IEEE/ASME Transactions on Mechatronics*, vol. 13, no. 5, pp. 519-529, 2008
- [J-22] Y. Fang, **X. Tan**, G. Alici, “Robust adaptive control of conjugated polymer actuators,” *IEEE Transactions on Control Systems Technology*, vol. 16, no. 4, pp. 600-612, 2008
- [J-23] Y. Fang, **X. Tan**, G. Alici, “Redox level-dependent impedance model for conjugated polymer actuators,” *Sensors and Actuators B: Chemical*, vol. 132, pp. 182-190, 2008
- [J-24] Z. Chen, K. Kwon, **X. Tan**, “Integrated IPMC/PVDF sensory actuator and its validation in feedback control,” *Sensors and Actuators A: Physical*, vol. 144, no. 2, pp. 231-241, 2008
- [J-25] Y. Fang, **X. Tan**, Y. Shen, N. Xi, G. Alici, “A scalable model for trilayer conjugated polymer actuators and its experimental validation,” *Materials Science and Engineering C: Biomimetic and Supramolecular Systems*, vol. 28, no. 3, pp. 421-428, 2008
- [J-26] Z. Chen, **X. Tan**, A. Will, C. Ziel, “A dynamic model for ionic polymer-metal composite sensors,” *Smart Materials and Structures*, vol. 16, pp. 1477-1488, 2007
- [J-27] Z. Chen, Y. Shen, N. Xi, **X. Tan**, “Integrated sensing for ionic polymer-metal composite actuators using PVDF thin films” (**Invited paper** for special issue on Electroactive Polymer Materials), *Smart Materials and Structures*, vol. 16, no. 2, pp. S262-S271, 2007
- [J-28] W. Xi, **X. Tan**, J. S. Baras, “Gibbs sampler-based coordination of autonomous swarms,” *Automatica*, vol. 42, no. 7, pp. 1107-1119, 2006
- [J-29] **X. Tan**, A. Modafe, R. Ghodssi, “Measurement and modeling of dynamic rolling friction in linear microball bearings,” *Journal of Dynamic Systems, Measurement and Control*, vol. 128, no. 4, pp. 891-898, 2006

- [J-30] **X. Tan**, “Almost symplectic Runge-Kutta schemes for Hamiltonian systems,” *Journal of Computational Physics*, vol. 203, no. 1, pp. 250-273, 2005
- [J-31] **X. Tan**, J. S. Baras, P. S. Krishnaprasad, “Control of hysteresis in smart actuators with application to micropositioning,” *Systems and Control Letters*, vol. 54, no. 5, pp. 483-492, 2005
- [J-32] R. V. Iyer, **X. Tan**, P. S. Krishnaprasad, “Approximate inversion of the Preisach hysteresis operator with application to control of smart actuators,” *IEEE Transactions on Automatic Control*, vol. 50, no. 6, pp. 798-810, 2005
- [J-33] **X. Tan**, J. S. Baras, “Adaptive identification and control of hysteresis in smart materials,” *IEEE Transactions on Automatic Control*, vol. 50, no. 6, pp. 827-839, 2005
- [J-34] **X. Tan**, J. S. Baras, “Modeling and control of hysteresis in magnetostrictive actuators,” *Automatica*, vol. 40, no. 9, pp. 1469-1480, 2004
- [J-35] P. S. Krishnaprasad, **X. Tan**, “Cayley transforms in micromagnetics,” *Physica B*, vol. 306, pp. 195-199, 2001
- [J-36] **X. Tan**, N. Zhang, L. Tong, Z. Wang, “Fuzzy control of thyristor controlled series compensator in power system transients,” *Fuzzy Sets and Systems*, vol. 110, no. 3, pp. 429-436, 2000
- [J-37] **X. Tan**, L. Tong, N. Zhang, Z. Wang, “Study on multi-objective control of thyristor controlled series compensation,” *Journal of Tsinghua University (Sci & Tech)* (in Chinese), vol. 37, no. 7, pp. 63-66, 1997
- [J-38] N. Zhang, B. Huang, **X. Tan**, “Development of Fuzzy Systems Development Tool FSĐT 1.0,” *Microcomputers and Its Applications* (in Chinese), no.3, pp. 27-28, 1996

Conference Papers:

- [C-1] C. Liu, Z. Fan, K. Seo, **X. Tan**, E. D. Goodman, “Synthesis of Matsuoka-based neuron oscillator models in locomotion control of robots,” submitted to *the 2012 International Joint Conference on Neural Networks*, Brisbane, Australia, 2012
- [C-2] M. Edardar, **X. Tan**, H. K. Khalil, “Sliding-mode tracking control of piezo-actuated nanopositioners,” *Proceedings of the 2012 American Control Conference*, Montreal, Canada, to appear, 2012
- [C-3] A. Esbrook, **X. Tan**, “Harmonic analysis of hysteresis operators with application to control design for systems with hysteresis,” *Proceedings of the 2012 American Control Conference*, Montreal, Canada, to appear, 2012
- [C-4] F. Zhang, **X. Tan**, H. K. Khalil, “Passivity-based controller design for stabilization of underwater gliders,” *Proceedings of the 2012 American Control Conference*, Montreal, Canada, to appear, 2012
- [C-5] Y. Wang, R. Tan, G. Xing, J. Wang, **X. Tan**, “Accuracy-aware aquatic diffusion process profiling using robotic sensor networks,” *Proceedings of the 11th ACM/IEEE Conference on Information Processing in Sensor Networks*, Beijing, China, to appear, 2012 [**Acceptance rate: 15%**]
- [C-6] F. Zhang, J. Thon, C. Thon, **X. Tan**, “Fish-like miniature underwater glider: Design, modeling, and experimental results,” *Proceedings of the 2012 IEEE International Conference on Robotics and Automation*, St. Paul, MN, to appear, 2012
- [C-7] A. T. Abdulsadda, **X. Tan**, “Localization of a moving target using an IPMC-based artificial lateral line,” *Proceedings of the 2012 SPIE International Symposium on Smart Structures/NDE, Bioinspiration, Biomimetics, and Bioreplication II*, to appear, 2012

- [C-8] H. Lei, W. Li, **X. Tan**, “Microfabrication of IPMC cilia for bio-inspired flow sensing,” *Proceedings of the 2012 SPIE International Symposium on Smart Structures/NDE, Electroactive Polymer Actuators and Devices (EAPAD) XIV*, to appear, 2012
- [C-9] C. Lim, H. Lei, **X. Tan**, “A dynamic, physics-based model for base-excited IPMC sensors,” *Proceedings of the 2012 SPIE International Symposium on Smart Structures/NDE, Electroactive Polymer Actuators and Devices (EAPAD) XIV*, to appear, 2012
- [C-10] A. Esbrook, **X. Tan**, H. K. Khalil, “Tracking an unknown two-frequency reference using a frequency estimator-based servocompensator,” *Proceedings of the 50th IEEE Conference on Decision and Control and European Control Conference*, Orlando, FL, pp. 348-353, 2011
- [C-11] J. Wang, F. Alequin-Ramos, **X. Tan**, “Dynamic modeling of robotic fish and its experimental validation” (**Invited**), *Proceedings of the 2011 IEEE/RSJ International Conference on Intelligent Robots and Systems*, San Francisco, CA, pp. 588-594, 2011
- [C-12] X. Chen, G. Zhu, X. Yang, **X. Tan**, “Model-based flow property estimation using an ionic polymer-metal composite beam,” *Proceedings of the 2011 ASME Dynamic Systems and Control Conference*, Paper MoCT3.5 (8 pages), Arlington, VA, 2011
- [C-13] Y. Kengne Fotsing, **X. Tan**, “Bias-dependent impedance model for ionic polymer-metal composite actuators,” (**Invited**), *Proceedings of the ASME 2011 Conference on Smart Materials, Adaptive Structures and Intelligent Systems*, Scottsdale, Arizona, Paper SMASIS2011-5011 (7 pages), 2011
- [C-14] A. T. Abdulsadda, **X. Tan**, “Artificial lateral line-based localization of a dipole source with unknown vibration amplitude and direction,” *Proceedings of the 15th International Conference on Advanced Robotics*, Tallinn, Estonia, pp. 447-452, 2011
- [C-15] A. Esbrook, **X. Tan**, H. K. Khalil, “Regulation under disturbances with multiple harmonics of unknown frequency”, *Proceedings of the 2011 American Control Conference*, San Francisco, CA, pp. 3559-3564, 2011
- [C-16] R. Dong, **X. Tan**, “Open-loop Control of IPMC actuators under varying temperatures,” Y. Bar-Cohen & F. Carpi, editors, *Electroactive Polymer Actuators and Devices (EAPAD) XIII, Proc. of SPIE*, vol. 7976, pp. 79762S: 1-11, 2011
- [C-17] A. T. Abdulsadda, F. Zhang, **X. Tan**, “Localization of source with unknown amplitude using IPMC sensor arrays,” Y. Bar-Cohen & F. Carpi, editors, *Electroactive Polymer Actuators and Devices (EAPAD) XIII, Proc. of SPIE*, vol. 7976, pp. 797627: 1-11, 2011
- [C-18] A. T. Abdulsadda, **X. Tan**, “Underwater source localization using an IPMC-based artificial lateral line,” *Proceedings of the 2011 IEEE International Conference on Robotics and Automation*, Shanghai, China, pp. 2719-2724, 2011
- [C-19] A. Esbrook, **X. Tan**, H. K. Khalil, “A robust adaptive servocompensator for nanopositioning control,” *Proceedings of the 49th IEEE Conference on Decision and Control*, Atlanta, GA, pp. 3688-3693, 2010
- [C-20] D. L.S. Hung, X. Yang, G. Zhu, T. Ganley, **X. Tan**, “Experimental studies on using ionic polymer-metal composite materials for automotive flow sensing applications,” *Proceedings of the 2010 IFAC Symposium on Mechatronic Systems*, Cambridge, MA, pp. 399-404, 2010
- [C-21] T. Ganley, D. L.S. Hung, G. Zhu, **X. Tan**, “Temperature-dependent ionic polymer-metal composite (IPMC) sensing dynamics: Modeling and inverse compensation,” *Proceedings of the 2010 IEEE/ASME International Conference on Advanced Intelligent Mechatronics*, Montreal, Canada, pp. 447-452, 2010

- [C-22] D. L.S. Hung, X. Yang, G. Zhu, T. Ganley, **X. Tan**, “Modeling of ionic polymer-metal composite beam dynamics and its validation using high-speed motion visualization” (**Invited**), *Proceedings of the 2010 IEEE/ASME International Conference on Advanced Intelligent Mechatronics*, Montreal, Canada, pp. 175-180, 2010
- [C-23] A. Hunt, Z. Chen, **X. Tan**, M. Kruusmaa, “Control of an inverted pendulum using an ionic polymer-metal composite actuator” (**Invited**), *Proceedings of the 2010 IEEE/ASME International Conference on Advanced Intelligent Mechatronics*, Montreal, Canada, pp. 163-168, 2010
- [C-24] T. Ganley, D. Hung, G. Zhu, **X. Tan**, “Characterization and modeling of temperature-dependent behavior of ionic polymer-metal composite sensors” (**Invited**), *Proceedings of the 16th US National Congress of Theoretical and Applied Mechanics (USNCTAM)*, State College, PA, Paper USNCTAM2010-675, 2010
- [C-25] T. Pence, H. Demirkoparan, **X. Tan**, Y. Fang, “Swelling induced deformation: The example of torsion,” *Proceedings of the 16th US National Congress of Theoretical and Applied Mechanics (USNCTAM)*, State College, PA, Paper USNCTAM2010-699, 2010
- [C-26] A. Esbrook, M. Guibord, **X. Tan**, H. K. Khalil, “Control of systems with hysteresis via servocompensation and its application to nanopositioning” (**Session Best Paper**), *Proceedings of the 2010 American Control Conference*, Baltimore, MD, pp. 6531-6536, 2010
- [C-27] S. C. Hunley, J. T. Whitman, S. Baek, **X. Tan**, D. Kim, “Incorporating the importance of interdisciplinary understanding in K-12 engineering outreach programs using a biomimetic device,” *Proceedings of the 2010 ASEE Annual Conference & Exposition*, Louisville, Kentucky, Paper AC 2010-603, 2010
- [C-28] **X. Tan**, M. Carpenter, J. Thon, F. Alequin-Ramos, “Analytical modeling and experimental studies of robotic fish turning,” *Proceedings of the 2010 IEEE International Conference on Robotics and Automation*, Anchorage, Alaska, pp. 102-108, 2010
- [C-29] Z. Chen, **X. Tan**, “MEMS-based fabrication of multiple-degree-of-freedom ionic polymer-metal composite actuators,” Y. Bar-Cohen and J. Leng, editors, *Electroactive Polymer Actuators and Devices (EAPAD) 2010, Proc. SPIE*, vol. 7642, pp. 76420X:1-12, 2010
- [C-30] A. Hunt, Z. Chen, **X. Tan**, M. Kruusmaa, “Feedback control of a coupled IPMC (ionic polymer-metal composite) sensor-actuator” (**Invited**), *Proceedings of the 2nd Annual Dynamic Systems and Control Conference (DSCC'09)*, Hollywood, CA, Paper DSCC2009-2700 (7 pp), 2009
- [C-31] Z. Chen, **X. Tan**, “Model-based nonlinear control of ionic polymer-metal composite actuators” (**Invited**), *Proceedings of the 2nd Annual Dynamic Systems and Control Conference (DSCC'09)*, Hollywood, CA, Paper DSCC2009-2611 (8 pp), 2009
- [C-32] S. Shatara, **X. Tan**, “A compensated sliding-window DFT algorithm for fine-grained underwater acoustic ranging,” *Proceedings of the 2009 IEEE/RSJ International Conference on Intelligent Robots and Systems*, St. Louis, MO, pp. 4054-4059, 2009
- [C-33] M. Anton, Z. Chen, M. Kruusmaa, **X. Tan**, “Analytical and computational modeling of robotic fish propelled by soft actuation material-based active joints,” *Proceedings of the 2009 IEEE/RSJ International Conference on Intelligent Robots and Systems*, St. Louis, MO, pp. 2126-2131, 2009
- [C-34] Y. Fang, T. J. Pence, **X. Tan**, “Fiber-reinforced conjugated polymer torsional actuator and its nonlinear elasticity modeling,” *Proceedings of the 2009 IEEE/RSJ International Conference on Intelligent Robots and Systems*, St. Louis, MO, pp. 2892-2897, 2009

- [C-35] **X. Tan**, H. K. Khalil, “Two-time-scale averaging of systems involving operators and its application to adaptive control of hysteretic systems,” *Proceedings of the 2009 American Control Conference*, St. Louis, MO, pp. 4476-4481, 2009
- [C-36] Q. Hu, D. R. Hedgepeth, L. Xu, **X. Tan**, “A framework for modeling steady turning of robotic fish,” *Proceedings of the IEEE International Conference on Robotics and Automation*, Kobe, Japan, pp. 2669-2674, 2009
- [C-37] Y. Fang, T. Pence, **X. Tan**, “A large deformation nonlinear model for conjugated polymer actuators,” Y. Bar-Cohen and T. Wallmersperger, editors, *Electroactive Polymer Actuators and Devices (EAPAD) 2009, Proc. of SPIE*, vol. 7287, pp. 72871O:1-11, 2009
- [C-38] Z. Chen, S. Shatarra, **X. Tan**, “Modeling of robotic fish propelled by an ionic polymer-metal composite caudal fin,” Y. Bar-Cohen and T. Wallmersperger, editors, *Electroactive Polymer Actuators and Devices (EAPAD) 2009, Proc. of SPIE*, vol. 7287, pp. 72871M:1-12, 2009
- [C-39] Z. Chen, D. Hedgepeth, **X. Tan**, “Nonlinear capacitance of ionic polymer-metal composites,” Y. Bar-Cohen and T. Wallmersperger, editors, *Electroactive Polymer Actuators and Devices (EAPAD) 2009, Proc. of SPIE*, vol. 7287, pp. 728715:1-12, 2009
- [C-40] Z. Chen, D. Hedgepeth, **X. Tan**, “A nonlinear control-oriented model for ionic polymer-metal composite actuators,” *Proceedings of the 47th IEEE Conference on Decision and Control*, Cancun, Mexico, pp. 1851-1856, 2008
- [C-41] Y. Fang, **X. Tan**, “Design and modeling of a petal-shape, conjugated polymer-actuated micropump,” (**Invited**), (**Best Session Presentation Award and 2008 DSCD Best Paper Award on Mechatronics**), *Proceedings of the 2008 ASME Dynamic Systems and Control Conference*, Ann Arbor, MI, Paper DSCC2008-2278 (8 pp), 2008
- [C-42] **X. Tan**, “Swarming control using parallel Gibbs sampling,” *Proceedings of the 2008 American Control Conference*, Seattle, WA, pp. 3701-3706, 2008
- [C-43] **X. Tan**, O. Bennani, “Fast inverse compensation of Preisach-type hysteresis operators using field-programmable gate arrays,” *Proceedings of the 2008 American Control Conference*, Seattle, WA, pp. 2365-2370, 2008
- [C-44] E. Mbemmo, Z. Chen, S. Shatarra, **X. Tan**, “Modeling of biomimetic robotic fish propelled by an ionic polymer-metal composite actuator,” *Proceedings of the 2008 IEEE International Conference on Robotics and Automation*, Pasadena, CA, pp. 689-694, 2008
- [C-45] S. Shatarra, **X. Tan**, E. Mbemmo, N. Gingery, “Experimental investigation on underwater acoustic ranging for small robotic fish,” *Proceedings of the 2008 IEEE International Conference on Robotics and Automation*, Pasadena, CA, pp. 712-717, 2008
- [C-46] Z. Chen, **X. Tan**, “A scalable dynamic model for ionic polymer-metal composite actuators,” Y. Bar-Cohen, editor, *Electroactive Polymer Actuators and Devices (EAPAD) X, Proceedings of the SPIE*, vol. 6927, pp. 69270I:1-11, 2008
- [C-47] Z. Chen, K. Kwon, **X. Tan**, “Design of integrated IPMC/PVDF sensory actuator and its application to feedback control” (**Invited**), M. Tomizuka, editor, *Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems, Proceedings of the SPIE*, vol. 6932, pp. 69321O:1-12, 2008
- [C-48] Y. Fang, **X. Tan**, G. Alici, “Redox level-dependent impedance model for conjugated polymer actuators,” Y. Bar-Cohen, editor, *Electroactive Polymer Actuators and Devices (EAPAD) X, Proceedings of the SPIE*, vol. 6927, pp. 69270Z:1-10, 2008

- [C-49] Y. Fang, **X. Tan**, A. Temme, G. Alici, “Characterization and modeling of conjugated polymer sensors,” Y. Bar-Cohen, editor, *Electroactive Polymer Actuators and Devices (EAPAD) X, Proceedings of the SPIE*, vol. 6927, pp. 692709:1-9, 2008
- [C-50] Z. Chen, **X. Tan**, “A Control-oriented, physics-based model for ionic polymer-metal composite actuators,” *Proceedings of the 46th IEEE Conference on Decision and Control*, New Orleans, LA, pp. 590-595, 2007
- [C-51] J. Reynolds, **X. Tan**, H. K. Khalil, “Closed-loop analysis of slow adaptation in the control of unknown dynamic hysteretic systems,” *Proceedings of the 46th IEEE Conference on Decision and Control*, New Orleans, LA, pp. 3549-3554, 2007
- [C-52] **X. Tan**, “Self-organization of autonomous swarms via Langevin equation,” *Proceedings of the 46th IEEE Conference on Decision and Control*, New Orleans, LA, pp. 1435-1440, 2007
- [C-53] J. Ahrens, **X. Tan**, H. K. Khalil, “Multirate sampled-data output feedback control of smart material actuated systems” (**Invited**), *Proceedings of the American Control Conference*, New York, NY, pp. 4327-4332, 2007
- [C-54] **X. Tan**, H. K. Khalil, “Control of unknown dynamic hysteretic systems using slow adaptation: Preliminary results,” (**Best Session Presentation Award**), *Proceedings of the American Control Conference*, New York, NY, pp. 3294-3299, 2007
- [C-55] Z. Chen, **X. Tan**, A. Will, C. Ziel, “A dynamic model for ionic polymer-metal composite sensors” (**Invited**), *Proceedings of the World Forum on Smart Materials and Smart Structures Technology*, Chongqin & Nanjing, China, 2007
- [C-56] Y. Fang, **X. Tan**, Y. Shen, N. Xi, G. Alici, “A scalable model for trilayer conjugated polymer actuators and its experimental validation,” Y. Bar-Cohen, editor, *Electroactive Polymer Actuators and Devices (EAPAD) 2007, Proc. of the SPIE*, vol. 6524, pp. 652413:1-10, 2007
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- [C-59] **X. Tan**, D. Kim, N. Usher, D. Laboy, J. Jackson, A. Kapetanovic, J. Rapai, B. Sabadus, X. Zhou, “An autonomous robotic fish for mobile sensing,” *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, Beijing, China, pp. 5424-5429, 2006
- [C-60] Y. Fang, **X. Tan**, “A dynamic JKR model with application to vibrational release in micro-manipulation,” *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, Beijing, China, pp. 1341-1346, 2006
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- [C-62] W. Xi, **X. Tan**, J. S. Baras, “A stochastic algorithm for self-organization of autonomous swarms,” *Proceedings of the 44th IEEE Conference on Decision and Control & European Control Conference*, Seville, Spain, pp. 765-770, 2005

- [C-63] W. Xi, **X. Tan**, J. S. Baras, “Gibbs sampler-based path planning for autonomous vehicles: Convergence analysis,” *Proceedings of the 16th IFAC World Congress*, Prague, Czech Republic, 2005
- [C-64] W. Xi, **X. Tan**, J. S. Baras, “A hybrid scheme for distributed control of autonomous swarms,” *Proceedings of the American Control Conference*, Portland, OR, pp. 3486-3491, 2005
- [C-65] **X. Tan**, A. Modafe, R. Ghodssi, “Modeling of velocity-dependent rolling friction in linear microball bearings,” *Proceedings of World Tribology Congress III*, Washington, DC, Paper WTC2005-64025, 2005
- [C-66] Z. Chen, **X. Tan**, M. Shahinpoor, “Quasi-static positioning of ionic polymer-metal composite (IPMC) actuators,” *Proceedings of the IEEE/ASME International Conference on Advanced Intelligent Mechatronics*, Monterey, CA, pp. 60-65, 2005
- [C-67] **X. Tan**, A. Modafe, R. Ghodssi, “An empirical model for dynamic friction in microfabricated linear microball bearings,” *Proceedings of the American Control Conference*, Portland, OR, pp. 2463-2468, 2005
- [C-68] J. S. Baras, **X. Tan**, “Control of autonomous swarms using Gibbs sampling,” *Proceedings of the 43rd IEEE Conference on Decision and Control*, Atlantis, Paradise Island, Bahamas, pp. 4752-4757, 2004
- [C-69] **X. Tan**, W. Xi, J. S. Baras, “Numerical study on joint quantization and control under block-coding,” *Proceedings of the 43rd IEEE Conference on Decision and Control*, Atlantis, Paradise Island, Bahamas, pp. 4515-4520, 2004
- [C-70] **X. Tan**, A. Modafe, R. Hergert, N. Ghalichechian, B. Shapiro, J. S. Baras, R. Ghodssi, “Vision-based microtribological characterization of linear microball bearings,” *Proceedings of the ASME/STLE International Joint Tribology Conference (Special Symposium on Contact Phenomena in MEMS)*, Long Beach, CA, Paper TRIB2004-64334, 2004
- [C-71] **X. Tan**, J. S. Baras, “Adaptive inverse control of hysteresis in smart materials,” *Proceedings of the IFAC Symposium on Nonlinear Control Systems*, Stuttgart, Germany, pp. 1553-1558, 2004
- [C-72] **X. Tan**, J. S. Baras, “Recursive identification of hysteresis in smart materials,” (**Best Session Presentation Award**), *Proceedings of the American Control Conference*, Boston, MA, pp. 3857-3862, 2004
- [C-73] J. Jou, **X. Tan**, J. S. Baras, “A parallel virtual queue structure for active queue management,” *Proceedings of the 38th Annual Conference on Information Sciences and Systems*, Princeton, NJ, pp. 467-472, 2004
- [C-74] J. S. Baras, **X. Tan**, P. Hovareshti, “Decentralized control of autonomous vehicles,” *Proceedings of the 42nd IEEE Conference on Decision and Control*, Maui, HI, pp. 1532-1537, 2003
- [C-75] J. S. Baras, **X. Tan**, W. Xi, “Jointly optimal quantization, estimation, and control of hidden Markov chains,” *Proceedings of the 42nd IEEE Conference on Decision and Control*, Maui, HI, pp. 1098-1103, 2003
- [C-76] **X. Tan**, J. S. Baras, P. S. Krishnaprasad, “A dynamic model for magnetostrictive hysteresis,” *Proceedings of the American Control Conference*, Denver, CO, pp. 1074-1079, 2003
- [C-77] **X. Tan**, J. S. Baras, “A robust control framework for smart actuators,” *Proceedings of the American Control Conference*, Denver, CO, pp. 4645-4650, 2003
- [C-78] **X. Tan**, J. S. Baras, “Modeling and control of a magnetostrictive actuator,” (**Finalist, Best Student Paper Award**), *Proceedings of the 41st IEEE Conference on Decision and Control*, Las Vegas, NV, pp. 866-872, 2002

- [C-79] **X. Tan**, J. S. Baras, “Optimal control of hysteresis in smart actuators: A viscosity solutions approach,” C. J. Tomlin, M. R. Greenstreet, editors, *the Springer series Lecture Notes in Computer Science (LNCS) Vol. 2289, Proceedings of the 5th International Workshop on Hybrid Systems: Computation and Control*, pp. 451-464, 2002
- [C-80] **X. Tan**, R. Venkataraman, P. S. Krishnaprasad, “Control of hysteresis: Theory and experimental results,” V. S. Rao, editor, *Smart Structures and Materials 2001: Modeling, Signal Processing, and Control in Smart Structures, Proc. of SPIE*, Newport Beach, CA, vol. 4326, pp. 101-112, 2001
- [C-81] **X. Tan**, J. S. Baras, P. S. Krishnaprasad, “Fast evaluation of demagnetizing field in three dimensional micromagnetics using multipole approximation,” V. V. Varadan, editor, *Smart Structures and Materials 2000: Mathematics and Control in Smart Structures, Proc. of SPIE*, Newport Beach, CA, vol. 3984, pp. 195-201, 2000
- [C-82] **X. Tan**, J. S. Baras, P. S. Krishnaprasad, “Computational micromagnetics for magnetostrictive actuators”, V. V. Varadan, editor, *Smart Structures and Materials 2000: Mathematics and Control in Smart Structures, Proc. of SPIE*, Newport Beach, CA, vol. 3984, pp. 162-173, 2000
- [C-83] **X. Tan**, L. Tong, Z. Wang, Z. Yin, D. Zhang, “Characteristics and firing control of thyristor controlled series compensation installations”, *Proceedings of IEEE International Conference on Power System Technology*, Beijing, pp. 672-676, 1998
- [C-84] **X. Tan**, N. Zhang, L. Tong, Z. Wang, “A fuzzy control scheme for thyristor controlled series compensation in transients of power systems,” *Proceedings of IEEE International Conference on Power System Technology*, Beijing, pp. 441-445, 1998
- [C-85] **X. Tan**, N. Zhang, L. Tong, Z. Wang, “A fuzzy control scheme for nonlinear systems and its application to power systems,” *Proceedings of the First IEEE International Conference on Intelligent Processing Systems*, Beijing, pp. 281-285, 1997

Other Conference Presentations:

1. **X. Tan**, “Soft actuation materials capable of complex deformation,” Invited talk at *Workshop on Biologically-Inspired Actuation*, at the *2011 IEEE International Conference on Robotics and Automation*, Shanghai, China, 2011
2. **X. Tan**, “Linking university research to K-12 education,” oral presentation at *the 3rd Annual Internationalizing Michigan Education Conference: Where Globalization Meets School Improvement: Linking and Learning with Schools around the World*, East Lansing, MI, 2009
3. **X. Tan** (presenter), O. Bennani, “Embedded inverse compensation of hysteresis in smart material actuators” (**Invited**), oral presentation at *the 13th International Symposium on Applied Electromagnetics and Mechanics*, East Lansing, MI, 2007
4. Y. Fang, **X. Tan** (presenter), G. Alici, “Robust adaptive control of conjugated polymer actuators” (**Invited**), oral presentation at *the SIAM Conference on Control and Its Applications*, San Francisco, CA, 2007
5. Z. Chen, **X. Tan**, “A dynamic sensing model for ionic polymer metal composites,” poster presentation at *Red Raider Mini-Symposium Series: Mathematical Modeling of Novel Materials and Devices*, Department of Mathematics and Statistics, Texas Tech University, Lubbock, TX, 2006
6. **X. Tan**, “Almost symplectic Runge-Kutta schemes for Hamiltonian systems” (**Invited**), oral presentation at *the 6th SIAM Conference on Control and Its Applications*, New Orleans, LA, 2005

7. **X. Tan**, “Preisach operator-based modeling and control of hysteresis in magnetostrictive actuators” (**Invited**), oral presentation at *the 6th SIAM Conference on Control and Its Applications*, New Orleans, LA, 2005
8. R. V. Iyer (presenter), **X. Tan**, P. S. Krishnaprasad, “Approximate inversion of the Preisach hysteresis operator with application to control of smart actuators,” oral presentation at *the AMS 2005 Spring Central Section Meeting*, Lubbock, TX, 2005
9. M. Khbeis, **X. Tan (presenter)**, G. Metze, R. Ghodssi, “Microfabrication of a pressure sensor array using 3D integration technology”, oral presentation at *the American Vacuum Society’s 50th International Symposium*, Baltimore, MD, 2003
10. M. Khbeis, **X. Tan**, “Microfabrication of a pressure sensor array using 3D integration technology” (poster), (**Best Poster Award**), *MEMS Alliance Special Topics Symposium: Materials and Fabrication Technologies for MEMS and NEMS*, College Park, MD, 2003
11. N. Ghalichechian, M. Khbeis, Z. Ma, S. Moghaddam, **X. Tan**, “A piezoresistive pressure sensor cluster” (poster), *MEMS Alliance Special Topics Symposium: MEMS Technologies in Biotech and Commercial Applications*, The Johns Hopkins University Applied Physics Laboratory, 2002
12. P. S. Krishnaprasad (presenter), **X. Tan**, “Cayley Transforms in Magnetics”, oral presentation at *the 5th SIAM Conference on Control and Its Applications*, San Diego, CA, 2001
13. **X. Tan (presenter)**, J. S. Baras, P. S. Krishnaprasad, “Computational micromagnetics for magnetostrictive actuators”, oral presentation at *the 3rd SIAM Conference on Mathematical Aspects of Materials Science*, Philadelphia, PA, 2000

INVENTIONS

1. **X. Tan**, N. Xi, Z. Chen, Y. Shen, “Integrated actuator sensor structure,” U.S. Patent 7,982,375, issued on July 19, 2011
2. G. Zhu, **X. Tan**, L. D. Hung, “Electroactive polymer-based flow sensor,” U.S. Patent pending, 2010
3. **X. Tan**, “Gliding robotic fish,” Invention disclosure to MSU Technologies (Reference Code TEC2010-0003), 2009
4. **X. Tan**, O. Bennani, “FPGA-based embedded compensation and adaptation of hysteresis in smart material actuators,” Invention disclosure to MSU Office of Intellectual Property (ID# 08-008F), 2007
5. **X. Tan**, D. Kim, “Wireless, mobile sensing platform based on biomimetic robotic fish,” Invention disclosure to MSU Office of Intellectual Property (ID# 07-143F), 2007

INVITED FULL-HOUR TALKS

1. “Toward autonomous robotic fish schools: Challenges and potential solutions,” CSE Lecture Series, Department of Computer Science and Engineering, Michigan State University, East Lansing, MI, April 22, 2011, (Host: Prof. Philip McKinley)
2. “Soft sensing and actuation materials: A systems perspective,” Workshop on Future Directions in Applied Mathematics, Center for Research in Scientific Computation, North Carolina State University, Raleigh, NC, March 10, 2011, (Host: Prof. Ralph Smith)
3. “Conjugated polymer actuators: Modeling, control, and device applications,” Control Theory Seminar Series, Department of Applied Mathematics, University of Waterloo, Canada, October 15, 2010, (Host: Prof. Kirsten Morris)

4. “Robotic fish: From bio-inspired design to environmental monitoring,” Harvard University, Cambridge, MA, September 13, 2010, (Host: Prof. Robert Wood)
5. “Robotic fish: From bio-inspired design to environmental monitoring,” Institute for Bio-inspired Structure and Surface Engineering, Nanjing University of Aeronautics and Astronautics, Ningjing, China, June 10, 2010, (Host: Prof. Zhendong Dai)
6. “Robotic fish: Bio-inspired design, modeling, and applications,” Engineering Alliance Seminar Series, Georgia Tech, Savannah, GA, March 3, 2010, (Host: Prof. Fumin Zhang)
7. “Electroactive polymers as artificial muscles and sensors: A systems perspective,” Cymer Center for Control Systems and Dynamics, University of California, San Diego, CA, March 13, 2009, (Host: Prof. Raymond de Callafon)
8. “Electroactive polymers as artificial muscles and sensors: A systems perspective,” Department of Mechanical Engineering, Ohio State University, Columbus, OH, January 9, 2009, (Host: Prof. Marcelo Dapino)
9. “Electroactive polymers as artificial muscles and sensors: A systems perspective,” Robotics, Controls and Mechatronics Colloquium, University of Washington, Seattle, WA, October 31, 2008, (Host: Prof. Santosh Devasia)
10. “Adaptive embedded compensation of hysteresis in smart material actuators,” Servo Technology, Western Digital Corporation, Lake Forest, CA, March 11, 2008, (Host: Dr. Wei Xi)
11. “Control of hysteresis nonlinearity in smart material systems,” Control Science Center of Excellence, Air Force Research Laboratory, Wright-Patterson AFB, OH, July 2, 2007, (Host: Dr. Raymond Holsapple) [Joint presentation with Prof. H. K. Khalil]
12. “Electroactive polymers as artificial muscles and sensors: Modeling, control, and robotic applications,” Institute of Modern Agriculture Science and Engineering, Tongji University, Shanghai, China, May 29, 2007, (Host: Prof. Lihong Xu)
13. “Electroactive polymers as artificial muscles and sensors: A control systems perspective,” Department of Civil and Environmental Engineering, University of Michigan, Ann Arbor, MI, December 1, 2006, (Host: Prof. Jerome P. Lynch)
14. “Electroactive polymers as artificial muscles and sensors: A control systems perspective,” Red Raider Mini-Symposium Series (**Outstanding Early-Career Speaker**), Department of Mathematics and Statistics, Texas Tech University, Lubbock, TX, November 10, 2006, (Host: Prof. Ram V. Iyer)
15. “Electroactive polymers as artificial muscles and sensors: A control systems perspective,” Center for Information and Systems Engineering, Boston University, Boston, MA, November 3, 2006, (Host: Prof. Sean Andersson)
16. “Electroactive polymers as artificial muscles and sensors: A control systems perspective,” Department of Mechanical Engineering, Michigan State University, East Lansing, MI, October 24, 2006, (Host: Prof. Patrick Kwon)
17. “Modeling and control of hysteresis in smart materials,” Beijing University of Aeronautics and Astronautics, Beijing, China, October 12, 2006, (Host: Prof. Jianqin Mao)
18. “Electroactive polymers as artificial muscles and sensors: A control systems perspective,” Beijing University of Aeronautics and Astronautics, Beijing, China, October 12, 2006, (Host: Prof. Jianqin Mao)
19. “Modeling and control of smart material actuators,” Mechanical Engineering Department Seminar, University of Nevada, Reno, NV, April 14, 2006, (Host: Prof. Kwang J. Kim)

20. "Modeling and control of hysteresis in smart materials," Center for Advanced Control Technologies Seminar, Cleveland State University, Cleveland, OH, October 28, 2005, (Host: Prof. Zhiqiang Gao)
21. "Modeling and control of hysteresis in smart materials," Applied Mathematics Seminar, Michigan State University, East Lansing, MI, April 7, 2005, (Host: Prof. Keith Promislow)
22. "Almost symplectic Runge-Kutta schemes for Hamiltonian systems," Applied and Interdisciplinary Mathematics Seminar, University of Michigan, Ann Arbor, MI, March 18, 2005, (Hosts: Drs. Anthony Bloch and Melvin Leok)
23. "Modeling and control of hysteresis in smart materials," Control Seminar Series, University of Michigan, Ann Arbor, MI, November 12, 2004, (Host: Prof. James S. Freudenberg)
24. "Modeling and control of hysteresis in smart materials," Small Smart Systems Center, University of Maryland, College Park, MD, February 20, 2004, (Host: Prof. Elizabeth Smela)
25. "Modeling and control of hysteresis in smart materials," Department of Electrical and Computer Engineering, Michigan State University, East Lansing, MI, February 9, 2004, (Host: Prof. Subir Biswas)
26. "Structure-preserving numerical integrators for Hamiltonian systems," ISR Student-Faculty Colloquium, Institute for Systems Research, University of Maryland, College Park, MD, May 13, 2003, (Host: Prof. P. S. Krishnaprasad)

MEDIA COVERAGE OF RESEARCH & EDUCATION

1. "A journey into Evolution Park: A new dimension," *Currents Magazine*, by Laura Seeley, pp. 10-17, 2011-2012 issue
http://www.egr.msu.edu/files_egr/publications/CurrentsMagazine2011-2012.pdf
2. "New robotic fish detect harmful pollutants," *The State News*, by Kelsie Thompson,
http://www.statenews.com/index.php/article/2011/09/new_robotic_fish_detect_harmful_pollutants, September 22, 2011
3. "Synchronized swimming: Patrolling for pollution with robotic fish," *Scientific American* guest blog, by Robin Smith, <http://blogs.scientificamerican.com/guest-blog/2011/09/19/synchronized-swimming-patrolling-for-pollution-with-robotic-fish/>, September 19, 2011
4. "Robofish wonder," *Big Ten Network: MSU Today*, http://www.youtube.com/watch?v=cAE15QK-IEo&feature=player_embedded, November 4 and 12, 2010
5. "MSU pushing robot development," *the State News*, http://www.statenews.com/index.php/article/2010/02/msu_pushing_robot_development, February 4, 2010
6. "Michigan State collaboration spawns robotic fish to monitor water quality," *MSU News*, <http://news.msu.edu/story/7057/>, November 2, 2009

Related coverage:

- "MSU receives grant to develop robot fish," *the State News*, http://www.statenews.com/index.php/article/2009/11/msu_receives_grant_to_develop_robot_fish, November 3, 2009
- "NEMO's new mission: Find toxic algae blooms," *Capital News Service, MSU School of Journalism*, <http://capitalnewsservice.wordpress.com/2009/11/06/nemos-new-mission-find-toxic-algae-blooms/>, November 6, 2009

- “Robotic fish a step forward for zoologists: MSU-developed Tool Monitors Oxygen, Temperature in Water,” *Lansing State Journal*, <http://www.lansingstatejournal.com/apps/pbcs.dll/article?AID=2009912260315>, December 26, 2009
 - Story covered by online media: *US News and World Report*, *Scientific American*, *Science Daily*, *Great Lakes IT Report*, *Great Lakes Echo*, *Science 360 News Service*, and many others.
7. “Grant to expose teachers to research, translate excitement to classroom,” *MSU News*, <http://news.msu.edu/story/6664/>, August 6, 2009

Related coverage:

- “MSU assistant professor develops teacher-training program,” *the State News*, http://www.statenews.com/index.php/article/2009/08/msu_assistant_professor_develops_teacher-training_program, August 10, 2009
 - “MSU gets grant for unique engineering program,” *Great Lakes IT Report*, <http://www.wwj.com/pages/4963659.php>, August 7, 2009
8. “Making waves: Research explores uses for robotic fish,” Cover story on *Networks* (MSU ECE magazine), Winter 2008/2009 issue
9. “Magnet brings toys to class,” *the State News*, http://www.statenews.com/index.php/article/2007/07/magnet_brings_toys_to_class, July 17, 2007
10. “Career plan links teaching, research,” *MSU Today*, Summer 2006 issue

PROFESSIONAL MEMBERSHIP AND SERVICE

1. Professional membership

- Senior Member, IEEE
- Member, ASME
- Secretary, ASME DSCD Technical Committee on Mechatronics, 2011

2. Editorship

- Technical Editor, IEEE/ASME Transactions on Mechatronics, February 1, 2012 - present
- Associate Editor, *Automatica*, April 1, 2008 - present
- Guest Editor (with Drs. M. Kruusmaa, P. Fiorini, R. Madhavan, C. Laschi), Robotics and Autonomous Systems, special issue for selected papers from 15th International Conference on Advanced Robotics, 2011
- Guest Editor (with Dr. R. V. Iyer), IEEE Control Systems Magazine, special section on Modeling and Control of Hysteresis (February 2009 issue)
- Member, ASME Dynamic Systems and Control Division (DSCD) Conference Editorial Board, 2011 -
- Member, IEEE Control Systems Society Conference Editorial Board, 2007 - 2010
- Member, Editorial Board of International Journal of Applied Electromagnetics and Mechanics, for special issue of Proceedings of 13th International Symposium on Applied Electromagnetics and Mechanics (ISEM'2007)

- Associate Editor, ISA Conference Editorial Board for American Control Conference (ACC'2005, 2006)
3. Chair of conferences
- Program Chair, the 15th International Conference on Advanced Robotics (ICAR' 2011)
4. Conference program committees and organizing committees
- Focused Session Chair, 2010 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM'2010)
 - Program committee member, World Congress on Intelligent Control and Automation (WCICA'10, WCICA'12)
 - Program committee member, the 6th International Conference on Informatics in Control, Automation and Robotics (ICINCO'09)
 - Local Arrangement Chair, IEEE Nanotechnology Materials and Devices Conference (NMDC'09)
 - Organizing committee member and co-chair for poster sessions, 2009 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'2009)
 - International program committee member, 2009 International Symposium on Intelligent Control (ISIC'2009)
 - Program committee member, American Control Conference (ACC'2008, ACC'2010)
 - International program committee member, ASME/IEEE International Conference on Mechatronic and Embedded Systems and Applications (MESA'2007, MESA'2008, MESA'2010)
 - Organizing committee member and co-chair for poster sessions, IEEE International Conference on Robotics and Biomimetics (ROBIO'2008)
 - Organizing committee member, International Symposium on Applied Electromagnetics and Mechanics (ISEM'2007)
 - Program committee member, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'2006)
 - Organizing committee member & Co-chair for local arrangements and awards, IEEE International Conference on Electro/Information Technology (EIT'2006)
 - Program committee member, IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM'2005, AIM'2007, AIM'2011)
5. Conference panels, workshops, and special sessions
- Panelist, panel "Mechatronics for Bio-Systems and Health Care," IEEE/ASME International Conference on Advanced Intelligent Mechatronics, Montreal, Canada, 2010
 - Organizer, invited session on "Electroactive Polymer Actuators and Sensors," IEEE/ASME International Conference on Advanced Intelligent Mechatronics, Montreal, Canada, 2010
 - Co-organizer (with Dr. Maurizio Porfiri), invited session on "Ionic Polymer-Metal Composite (IPMC) Sensors and Actuators," 2nd Annual ASME Dynamic Systems and Control Conference, Hollywood, CA, 2009
 - Organizer, invited session on "Smart Materials", International Symposium on Applied Electromagnetics and Mechanics, East Lansing, MI, 2007
 - Organizer (with Dr. Kwang J. Kim), invited session on "Electroactive Polymer Sensors and Actuators", World Forum on Smart Materials and Smart Structures Technology, Chongqin & Nanjing, China, 2007

- Organizer (with Dr. Ram V. Iyer), special session on “Modeling, Analysis and Control of Systems with Hysteresis”, American Control Conference, New York, NY, 2007
- Invited instructor, tutorial on “Electro-Active Polymer Actuators and Sensors in Robotics”, IEEE/RSJ International Conference on Intelligent Robots and Systems, Beijing, China, 2006
- Panelist, NSF/ARO/AACC session “Early Career Development”, American Control Conference, Minneapolis, MN, 2006

6. Conference session chair/co-chair

- The 15th International Conference on Advanced Robotics, Tallinn, Estonia (2011, Session WeB2)
- IEEE International Conference on Robotics and Automation, Shanghai, China (2011, Sessions WeA107, WeP111)
- IEEE/ASME International Conference on Advanced Intelligent Mechatronics, Montreal, Canada (2010, Session WeA5)
- IEEE/RSJ International Conference on Intelligent Robots and Systems, St. Louis, MO (2009, Sessions MoIIT6, TuIT2, TuIIT13)
- American Control Conference, St. Louis, MO (2009, Session FrA18)
- IEEE International Conference on Robotics and Automation, Kobe, Japan (2009, Session FrC11)
- 16th SPIE Annual International Symposium on Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring: Electroactive Polymer Actuators and Devices (EAPAD XI), San Diego, CA (2009, Session 8)
- American Control Conference, Seattle, WA (2008, Session WeC03)
- International Symposium on Applied Electromagnetics and Mechanics, East Lansing, MI (2007, Session M-PM-2)
- American Control Conference, New York, NY (2007, Session FrA03)
- World Forum on Smart Materials and Smart Structures Technology, Chongqing & Nanjing, China (2007, Session S27)
- IEEE/RSJ International Conference on Intelligent Robots and Systems, Beijing, China (2006, Session FP1-13)
- Nanomedicine Conference, East Lansing, MI (2006, Hot Topic Session in Symposium II)
- American Control Conference, Portland, OR (2005, Session FrA03)
- American Control Conference, Denver, CO (2003, Session FM11)
- Third SIAM Conference on Mathematical Aspects of Materials Science, Philadelphia, PA (2000, Session CP11)

7. Reviewer for government agencies

- Panelist, NSF, 2004; 2006 (twice); 2008; 2009 (four times); 2010 (twice); 2011 (twice);
- Reviewer, Army Research Office, 2010
- Mail reviewer, NSF, 2005, 2011
- Reviewer, NASA, 2010, 2011

8. Reviewer for archival journals

- ASME Journal of Dynamic Systems, Measurement and Control
- Automatica
- Chaos: An Interdisciplinary Journal of Nonlinear Science
- Continuum Mechanics and Thermodynamics
- Discrete and Continuous Dynamical Systems
- IEEE Control Systems Magazine
- IEEE Signal Processing Letters
- IEEE Transactions on Automatic Control
- IEEE Transactions on Control Systems Technology
- IEEE Transactions on Industrial Electronics
- IEEE Transactions on Magnetics
- IEEE/ASME Transactions on Mechatronics
- IEEE Transactions on Neural Networks
- IEEE Transactions on Robotics
- IEEE Transactions on Systems, Man, and Cybernetics C
- International Journal for Numerical Analysis and Modeling
- International Journal on Mechatronics
- International Journal of Control
- International Journal of Modelling and Simulation
- International Journal of Smart and Nano Materials
- Journal of Applied Physics
- Journal of Computational and Applied Mathematics
- Journal of Fluids and Structures
- Journal of Intelligent Material Systems and Structures
- Journal of Magnetism and Magnetic Materials
- Journal of Vacuum Science and Technology A
- Journal of Zhejiang University Science A
- Materials Science and Engineering: C
- Optimal Control, Applications and Methods
- Physica B
- Polymer International
- Sensors and Actuators A: Physical
- SIAM Journal on Applied Mathematics
- Smart Materials and Structures

9. Reviewer for publishers

- Princeton University Press, 2010
- Pan Stanford Publishing, Singapore, 2008

- McGraw-Hill Companies, 2007
- Springer, 2006

10. Reviewer for conferences

- American Control Conference (ACC 2004, 2005, 2007 - 2012)
- ASME Dynamic Systems and Control Conference (DSCC 2009, 2010)
- European Control Conference (ECC 2007, 2009)
- IEEE Conference on Control Applications (CCA 2004, 2006)
- IEEE Conference on Decision and Control (CDC 2004 - 2007, 2011)
- IEEE Conference on Robotics and Automation (ICRA 2008, 2011-2012)
- IEEE International Conference on Electro/Information Technology (EIT 2006)
- IEEE International Conference on Networks (ICON 2004)
- IEEE International Conference on Robotics and Biomimetics (ROBIO 2008)
- IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM 2005, AIM 2007, AIM 2011)
- IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications (MESA 2008)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2006, 2008, 2010, 2011)
- IFAC Symposium on Mechatronic Systems (2010)
- IFAC Workshop on Fractional Derivatives and Applications (FDA 2010)
- IFAC World Congress (2005, 2008, 2011)
- The 1st International Conference on Applied Bionics and Biomechanics (ICABB 2010)
- Joint International Symposium on Intelligent Control & 13th Mediterranean Conference on Control and Automation (ISIC-MED 2005)
- The 8th World Congress on Intelligent Control and Automation (WCICA 2010)

ADVISING

1. Ph.D. student advisees:

- Sanaz Behbahani, Ph.D. program, August 2011 - present. Topic: robotic fish.
- Jun Zhang, Ph.D. program, August 2011 - present. Topic: Modeling and control of smart materials.
- Ahmad Abdulsadda, Ph.D. program, February 2010 - present. Topic: Artificial lateral line systems.
- Feitian Wang, Ph.D. program, August 2009 - present. Topic: Modeling and control of robotic fish and their schools.
- Jianxun Wang, Ph.D. program, August 2009 - present. Topic: Modeling and control of underwater robots.
- Hong Lei, Ph.D. program, August 2009 - present. Topic: Ionic polymer-metal composite cilia as micro sensors and actuators.

- Alex Esbrook (Co-advisor: Dr. Hassan Khalil), Ph.D. program, Spring 2009 - present. Topic: Control of hysteretic systems with application to nanopositioning.
 - Zheng Chen, Ph.D., January 2005 - August 2009. Dissertation: *Ionic Polymer-Metal Composite Artificial Muscles and Sensors: A Control Systems Perspective*. Currently with University of Virginia (Research Associate).
 - Yang Fang, Ph.D., August 2005 - August 2009. Dissertation: *Conjugated Polymer Actuators and Sensors: Modeling, Control, and Applications*. Currently with Western Digital Corporation.
 - Jeff Ahrens (Principal advisor: Dr. Hassan Khalil), Ph.D., January 2005 - December 2006. Dissertation: *Design and Performance Tradeoffs of High-Gain Observers with Applications to Smart Material Actuated Systems*. Currently with Sullivan Park Research Center, Corning Incorporated.
2. M.S. student advisees
- Freddie Alequin-Ramos, M.S., August 2011.
 - Dawn Hedgepeth, M.S., August 2010. Currently with Lockheed Martin.
 - Stephan Shatara, M.S., August 2006 - December 2008. Thesis: *Development of Small Biomimetic Robotic Fish with Onboard Fine-Grained Localization*. Currently with Motorola.
 - Nathan Usher, M.S., January 2006 - August 2007. Thesis: *Digital Low-Level Radio Frequency Control and Microphonics Mitigation of Superconducting Cavities*. Currently with the National Superconducting Cyclotron Laboratory at Michigan State University.
3. Postdoctoral advisees
- Dr. Mart Anton, August 2008 - June 2009. Topic: Computational fluid dynamics (CFD) modeling of robotic fish.
4. Exchange student advisees
- Yannick Fotsing, University of Kaiserslautern, Germany, January 2011 - July 2011. Master's thesis: *Modeling and Control of Nonlinear Behavior of IPMC Actuators*.
 - Stephan Henneberger, University of Kaiserslautern, Germany, August 2007 - February 2008. Study thesis: *A Sliding Discrete Fourier Transform (SDFT)-based Localization System for Small Fish Robots*.
 - Ernest Mbemmo, University of Kaiserslautern, Germany, January 2007 - September 2007. Master's thesis: *Design and Modeling of Biomimetic Robotic Fish Propelled by an IPMC*.
 - Alex Will, University of Kaiserslautern, Germany, May 2006 - September 2006. Study thesis: *Dynamic Sensing Model for Ionic Polymer Metal Composites*.
5. Undergraduate advisees
- Usienemfon Adia-nimuwa, August 2011 - present. Topic: Robotic fish.
 - Cody Thon, August 2011 - present. Topic: Design and development of robotic fish.
 - ChaiYong Lim, May 2011 - present. Topic: Modeling of ionic polymer-metal composite sensors.
 - Osama En-Nasr, May 2011 - present. Topic: Embedded systems for robotic fish.

- Bin Tian, May 2011 - present. Topic: Human-robotic fish interaction.
- Stephen England, November 2010 - May 2011. Topic: Embedded systems for robotic fish.
- Felix Adisaputra, May 2010 - August 2010. Topic: Graphical User Interface for robotic fish.
- Michael Carpenter, May 2009 - October 2009. Topic: Robotic fish.
- Matt Guibord, May 2009 - August 2009 . Topic: Nanopositioning control.
- Thomas Ganley, May 2009 - February 2010. Topic: Ionic polymer-metal composite sensors.
- Alex Esbrook, May 2008 - December 2008. Topic: Collaborative control of multi-agent systems.
- Chris Gliniecki, May 2008 - December 2008. Topic: Robotic fish.
- Andrew Temme, October 2006 - April 2008. Topic: Electroactive polymer sensors.
- Ki-Yong Kwon, August 2006 - December 2007. Topic: Integrated sensory feedback for ionic polymer-metal composite actuators.
- Nate Gingery, May 2007 - August 2007. Topic: Localization of robotic fish.
- Omar Bennani, January 2006 - December 2007. Topic: Embedded control of hysteretic systems.
- Bryan Thomas, August 2006 - April 2007. Topic: Localization of robotic fish.
- Roy Dong, August 2006 - April 2007, Topic: Robotic fish educational kit; January 2010 - present, Topic: Modeling and control of ionic polymer-metal composite actuators.
- Daniel Laboy, August 2005 - December 2006. Topic: Electroactive polymer-based robots.
- Jason Malinak, May 2005 - March 2006. Topic: Integrated sensory feedback for ionic polymer-metal composite actuators.
- Christopher Ziel, May 2005 - March 2006. Topic: Electroactive polymer sensors.

6. Teacher advisees

- John Thon (Holt Junior High School, Holt, MI), May 2008 - present. Topic: Research on robotic fish and related curriculum development.

7. High-school student advisees

- Cody Thon (Holt High School, Holt, MI), September 2009 - July 2011. Topic: Robotic fish.

8. Member of thesis committees

- Brendan Vidmar (Advisor: Dr. Steve Shaw/ME), Ph.D. Program, Fall 2011 -
- Ki-Yong Kwon (Advisor: Dr. Wen Li/ECE), Ph.D. Program, Fall 2011 -
- Adam Jensen (Advisor: Dr. Betty Cheng/CSE), Ph.D. Program, Fall 2011 -
- Tony Clark (Advisor: Dr. Philip McKinley/CSE), Ph.D. Program, Spring 2011 -
- Erick Nieves (Advisor: Dr. Ning Xi/ECE), Ph.D. Program, Summer 2010 -
- Jianguo Zhao (Advisor: Dr. Ning Xi/ECE), Ph.D. Program, Summer 2010 -
- Andres Ramirez (Advisor: Dr. Betty Cheng/CSE), Ph.D. Program, Fall 2009 -

- Muatazbellah M. Abdelsalam (Advisor: Dr. Hassan K. Khalil/ECE, Ph.D. Program, Spring 2010 -
- Chi Zhang (Advisor: Dr. Ning Xi/ECE), Ph.D., 2012
- Stephen Pace (Advisor: Dr. Guoming Zhu/ME), Ph.D., 2011
- Yunfei Xu (Advisor: Dr. Jongeun Choi/ME), Ph.D., 2011
- Alexis Ball (Advisor: Dr. Hassan K. Khalil/ECE), Ph.D., 2011
- Shahid Nazrulla (Advisor: Dr. Hassan K. Khalil/ECE), Ph.D., 2010
- Hua Deng (Advisor: Dr. Thomas Pence/ME), Ph.D., 2009
- Attaullah Memon (Advisor: Dr. Hassan K. Khalil/ECE), Ph.D., 2009
- Li Sun (Advisor: Dr. Patrick Kwon/ME), Ph.D., 2009
- Rachel Bou Serhal (Advisor: Dr. Hassan K. Khalil/ECE), M.S., 2011
- Erin Bosch (Advisor: Dr. Randy Showerman/Department of Community, Agriculture, Recreation and Resource Studies), M.S., 2011
- John Gregory (Advisor: Dr. Ning Xi/ECE), M.S., 2010
- Rui Zhang (Advisor: Dr. Ning Xi/ECE), M.S., 2010
- James Reynolds (Advisor: Dr. Hassan K. Khalil/ECE), M.S., 2007
- Luma Vasiljevic (Advisor: Dr. Hassan K. Khalil/ECE), M.S., 2007
- Tarik H. Kandil (Advisor: Dr. Hassan K. Khalil/ECE), M.S., 2005

UNIVERSITY/COLLEGE/DEPARTMENT SERVICE

1. University committees (MSU)

- All-University Awards Committee, Fall 2010
- University Jurisdictional Appeals Panel, 2010
- University Appeals Board, March 2007 - February 2009

2. Departmental committees

- Awards Committee, Fall 2010 -
- Advisory Committee of ECE Department (Member: Fall 2008 - Spring 2010; Chair: Fall 2011 -)
- ECE Seminar Series Coordinator, Fall 2006 - Spring 2008
- Graduate Studies Committee, Fall 2005 - Spring 2006
- Graduate Admissions Recruiting & Financial Aids Committee (GARFAC) (Member: Fall 2005 - Spring 2006, Fall 2009 - Spring 2010; Chair: Fall 2010 -)

3. Ad hoc committees/services

- Search Committee for Director for the Engineering Residential Experience and Cornerstone Engineering Program, College of Engineering, Michigan State University, 2011
- ECE Department Research Task Force, Fall 2010 -
- Search Committee for BEACON Center Education Director, Michigan State University, 2010
- Connector Faculty for engineering freshmen, 2009 - 2011

- The ECE Department Strategic Planning Committee, 2009
- College of Engineering Web Design Committee, 2007
- Search Committee for Recruitment and Retention Coordinator, Diversity Programs Office, College of Engineering, Michigan State University, 2005 - 2006
- Faculty Advisor, Undergraduate Research Program, Diversity Programs Office, Michigan State University, 2005

4. Outreach and community service

- Held a 5-hour Frontiers in Sciences workshop for the graduate program for science teachers, offered by the MSU College of Natural Resources, Division of Science and Mathematics Education, March 26, 2011
- Represented NSF (with 14 other teams) at the first US Science and Engineering Expo and presented exhibit “Swimming with Robotic Fish”, October 23-24, 2010
- Director, NSF-funded Research Experiences for Teachers (RET) Site on Bio-Inspired Technology and Systems (BITS), MSU, September 2009 -
- Representing MSU in advocating for national science funding at the 14th Annual Coalition for National Science Funding (CNSF) Exhibition and Reception, Capitol Hill, June 25, 2008
- Conducting interactive lectures and lab tours for various outreach programs: Detroit-Area Pre-College Engineering Program (DAPCEP) (2005, 2006, 2009), WIMS for Teens Program (2005 - 2009), Women in Engineering Program (2006 -2009), Grandparents University Program (2007 - 2009), High School Engineering Institute (2008)
- Engineering faculty representative, Career Day at Chippewa Middle School Okemos, MI, 2006, 2007
- Smart Microsystems Lab is a designated Engineering Tour stop for prospective students and their parents (2008 -)

CONSULTING SERVICE

1. Lear Corporation, 2005