

PROMOTION RECOMMENDATION  
The University of Michigan  
College of Engineering

Kenn R. Oldham, assistant professor of mechanical engineering, Department of Mechanical Engineering, College of Engineering, is recommended for promotion to associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.

Academic Degrees:

Ph.D. 2006 University of California at Berkeley, Mechanical Engineering, Berkeley, CA  
B.S. 2000 Carnegie Mellon University, Mechanical Engineering, Pittsburgh, PA

Professional Record:

2007 – present Assistant Professor, Department of Mechanical Engineering, University of Michigan  
2006 – 2007 Post-doctoral Researcher, Oak Ridge Associated Laboratories/U.S. Army Research Laboratory

Summary of Evaluation:

Teaching: Professor Oldham is an effective teacher and advisor. Since joining Michigan, he has taught two core undergraduate courses, ME360 (Dynamic Systems) and ME395 (Lab I), and two graduate courses, ME561 (Digital Control Systems) and ME553 (MEMS). Student comments show that he is a very effective teacher – capable of attracting students' interests and being very helpful and caring. Professor Oldham is very active in advising students at all levels. His advisees include six Ph.D. students (three have graduated), and four master students. Student comments testify that Professor Oldham is an excellent mentor, who has earned their gratitude and respect. His mentorship is also demonstrated through the publications that he co-authored with his graduate students.

Research: Professor Oldham's main research field is in control systems and mechatronics, with focused interests in the design, analysis and control of micro-scale systems. He has developed a strong research program at the University of Michigan, well-funded by various agencies, such as ARO, NSF, NIH, and DARPA. Professor Oldham's Ph.D. thesis is on MEMS applications to computer disk drives. Since joining Michigan, he has expanded his overall vision and thus his current work here is substantially different from his Ph.D. research. He has pursued research in developing low-power control algorithms that address the fundamental challenge of minimizing energy usage across components of servo control systems at the micro scale. Professor Oldham was the first to recognize and to respond with appropriate servo control algorithms to the fact that conventional piezoelectric control strategies may not be efficient at the micro scale. He has 13 journal papers published or accepted for publication. Many of the journals that he publishes in are top journals in his field. He has received various research awards, such as the prestigious DARPA Young Faculty Award and NSF CAREER Award, showing that his research quality and potential is well recognized by his peers. External reviewers praise him for the innovation, quality and impact of his work. Professor Oldham has developed a strong research record at Michigan and is showing outstanding potential.

Recent and Significant Publications:

B. Edamana and K.R. Oldham, "A Near-Optimal Sensor Scheduling Strategy for an On-Off Controller with an Expensive Sensor," *IEEE/ASME Transactions on Mechatronics* (accepted, 2012).

- J.H. Ryou and K. Oldham, "Dynamic Contact Modeling and Parameter Identification for a Piezoelectric Actuator," *Journal of Micromechanics and Microengineering* (accepted, 2012).
- C.H. Rhee, J.S. Pulskamp, R.G. Polcawich and K.R. Oldham, "Multi-Degree-of-Freedom Thin-Film PZT Actuated Micro-Robotic Leg," *IEEE Journal of Microelectromechanical Systems* (accepted, 2012).
- B. Hahn and K. Oldham, "A Model-Free On-Off Iterative Adaptive Controller Based on Stochastic Approximation," *IEEE Transactions on Control Systems Technology*, 20(1), 196-204 (2012).
- B. Hahn and K. Oldham, "On-Off Iterative Adaptive Controller for Low-Power Micro-robotic Step Regulation," *Asian Journal of Control*, 14(3) 624-640 (2012).
- B. Edamana and K. Oldham, "Optimal Low-Power Piezoelectric Actuator Control with Charge Recovery for a Micro-Robotic Leg," *IEEE/ASME Transactions on Mechatronics*, accepted (2011).
- J. F. Domke, C.-H. Rhee, Z. Liu, T.D. Wang and K.R. Oldham, "Amplifying Transmission and Compact Suspension for a Low-Profile, Large Displacement Piezoelectric Actuator," *Journal of Micromechanics and Microengineering*, 21(6) 067004 (2011).
- B. Edamana, B. Hahn and K. Oldham, "Modeling and Optimal Low-Power On-Off Control of Thin-Film Piezoelectric Actuators," *IEEE/ASME Transactions on Mechatronics*, 16(5) 884-896 (2011).
- Z. Qiu, J.S. Pulskamp, X. Lin, C.-H. Rhee, T. Wang, R.G. Polcawich and K. Oldham, "Large Displacement Vertical Translational Actuator Based on Piezoelectric Thin-Films," *Journal of Micromechanics and Microsystem Engineering*, 20(7) 075016 (2010).
- K. Oldham, J. Pulskamp, R. Polcawich and M. Dubey, "Thin-film Piezoelectric Lateral Actuators with Extended Stroke," *IEEE Journal of Microelectromechanical Systems*, 17(4), 890-899 (2008).
- K. Oldham, J. Pulskamp, R. Polcawich, P. Ranade and M. Dubey, "Thin-Film Piezoelectric Actuators for Bio-Inspired Micro-Robotic Applications," *Integrated Ferroelectrics*, 95(1), 54-65 (2008).

Service: Professor Oldham has been a great citizen. He has been the co-organizer for the Michigan Control Seminar series, a College wide seminar series. He has also been involved in co-organizing the Mechanical Engineering (ME) departmental seminars, and has been a member on the ME Honors and Awards Committee and Faculty Search Committee. Externally, Professor Oldham is quite active in the American Society of Mechanical Engineer's Dynamic Systems and Control Division, where he serves on the Conference Editorial Board, as liaison to the American Control Conference, and as a member of the Technical Committee on Mechatronics. Since 2008, he also has been a member of the American Society for Engineering Education. In addition, Professor Oldham has served as a reviewer to various journals and NSF.

External Reviewers:

Reviewer A: "Dr. Oldham's work places him at the forefront of those addressing this critical problem."

Reviewer B: "I am not aware of anyone else in the controls community who has had as much success with micro-robots. Moreover, the methods he has developed are sufficiently generalized that they can be applied to other actuation systems...Dr. Oldham is an emerging leader in the micro-robotics area, and certainly one of the top Assistant Professors in this area. He has already demonstrated that he can be an excellent scholar, and has been able to successfully integrate theoretical and applied research."

Reviewer C: "...his work on the iterative adaptive controller is highly innovative...Prof. Oldham has excellent expertise in control theory and implementation, and has led pioneering efforts to apply control theory to piezoelectric microactuators."

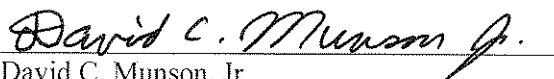
Reviewer D: "He has a strong publication record in top journals based on a research program in an important area (millimeter-scale robotics and MEMS) that combines top notch design and fabrication with applications of control theory and optimization...Power consumption remains the biggest impediment to use of millimeter-scale robots, and Kenn has made important contributions in this

area...Kenn's work on making endoscope-compatible confocal and multi-photon microscopes could significantly change clinical practice."

Reviewer E: "Dr. Oldham is publishing this research in top journals in the field, including IEEE Transactions on Control Systems Technology and the IEEE/ASME Transactions on Mechatronics...Dr. Oldham has made lasting, important and valuable contributions to the research community with his work on combining modern control theory with MEMS fabrication and modeling in order to advance the field of microelectromechanical systems."

Reviewer F: "Dr. Oldham won both the DARPA Young Faculty Award and the NSF CAREER award. This speaks well for his recognition at those organizations and indicates that he is near the top of his peer group in that regard."

Summary of Recommendation: In summary, Professor Oldham is a great asset to the University of Michigan. He has built a strong research record with outstanding potential. He is an effective teacher and an excellent advisor, and a great citizen in terms of service. It is with the support of the College of Engineering Executive Committee that I recommend Kenn R. Oldham for promotion to associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.



David C. Munson, Jr.

Robert J. Vlasic Dean of Engineering  
College of Engineering

May 2013