Using Dynamics to Extend Micro-Robot Capabilities

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Abstract: Despite advances in micro- and nano-scale technology, man-made transducers remain limited in many capabilities relative to those of small-scale biological systems. A potential mitigating factor for transducers based on traditional microfabrication processes is that they can achieve very low damping ratios, permitting dynamic amplification of motion far beyond nominal static displacements. This talk will discuss my research group's efforts to leverage lightly damped actuation of small-stroke, high energy density piezoelectric actuators to generate much larger amplitude and/or longer-range motion from MEMS and other small-scale systems. Examples from mobile micro-robot, medical instrument, and general actuator design will be discussed.

Biography: Kenn R. Oldham is an Associate Professor of Mechanical Engineering and the Associate Chair for Undergraduate Education in Mechanical Engineering at the University of Michigan. He received the Ph.D. in Mechanical Engineering from the University of California at Berkeley in 2006 and the B.S. in Mechanical Engineering from Carnegie Mellon University in 2000. His research focuses on the intersection of control systems and micro-scale sensing and actuation. Major research interests include design for controllability, optimal and robust control, system identification and estimation, and novel sensor and actuator design. Applications of Prof. Oldham's research include terrestrial micro-robotics, endoscopic microscopy, and inertial and physiological sensing.