

COLLEGE OF ENGINEERING

Control Seminar



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Advancements in Modeling, Sensing and Control for High-Resolution Additive Manufacturing



Kira Barton

University of Michigan

Department of Mechanical Engineering

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ABSTRACT: Additive manufacturing (AM) describes a class of processes that perform a layer-by-layer “bottom-up” fabrication approach as opposed to traditional top-down, subtractive fabrication such as milling and lathing. Printing-based AM, and in particular micro-scale AM (μ -AM), has received significant attention in recent years as an enabling technology capable of revolutionizing the way we manufacture electronics, biosensors, and optics in this country. Meso-scale AM is capable of fabricating integrated features beyond what conventional machining can perform at this length scale. However, μ -AM has yet to demonstrate the fabrication of complex 3D structures at the micro-scale that are not fabricable by traditional micromachining. Limiting this step change in manufacturing capabilities is the reliance of μ -AM systems on a process monitoring, regulation, and quality control paradigm that is performed post-process and in an ad hoc manner. In this talk, we discuss some recent developments in process modeling, sensing, and control that aim to break this open-loop paradigm by providing the controls theoretic and process modeling knowledge to develop a robust closed-loop system for measurement and compensatory control.

BIO: Kira Barton is an Assistant Professor in the Department of Mechanical Engineering at the University of Michigan. She received her B.Sc. in Mechanical Engineering from the University of Colorado at Boulder in 2001. She continued her education in mechanical engineering at the University of Illinois at Urbana-Champaign and completed her M.Sc. and Ph.D. degrees in 2006 and 2010, respectively. She held a postdoctoral research position at the University of Illinois from Fall 2010 until Fall 2011, at which point she joined the Mechanical Engineering Department at the University of Michigan at Ann Arbor. Kira conducts research in modeling, sensing, and control for applications in advanced manufacturing and robotics, with a specialization in Iterative Learning Control and micro-additive manufacturing. Kira is the recipient of an NSF CAREER Award in 2014, 2015 SME Outstanding Young Manufacturing Engineer Award, the 2015 University of Illinois, Department of Mechanical Science and Engineering Outstanding Young Alumni Award, and the 2016 University of Michigan, Department of Mechanical Engineering Department Achievement Award.