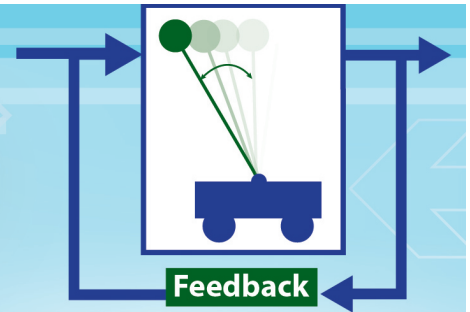


COLLEGE OF ENGINEERING

Control Seminar



Sponsored by: Bosch, Ford, and Toyota

Design, Instrumentation, Modeling, and Control of an Additive Manufacturing System



Sandipan Mishra

Rensselaer Polytechnic Institute
Mechanical, Aerospace, and Nuclear Engineering

Friday, October 9, 2015

3:30 – 4:30 pm • 1500 EECS

ABSTRACT: This seminar will present a snapshot of research activity in the Intelligent Systems, Automation & Control Laboratory at Rensselaer Polytechnic Institute, ranging from intelligent building systems to additive manufacturing and adaptive optics. We will then track the trajectory of how a typical advanced manufacturing process is conceived, designed, modeled, and ultimately controlled in a reliable manner. The first half of the seminar will focus on the instrumentation and design of a 3D printer for fiber-polymer composites. The motivation for the design of such a system stems from printing “synthetic organs” for surgeons to practice patient-specific procedures. Key challenges in the integration of heterogeneous materials onto the same composite part, along with appropriate in-situ metrology will be highlighted. The latter half will investigate the design of feedback control algorithms for inkjet 3D printing for enhancing accuracy and repeatability. A layer-to-layer model of a typical (droplet-based) 3D printing process and a model-based predictive control algorithm that utilizes in-situ height measurements as feedback will be discussed. Finally, experimental validation and demonstration of this system and its capabilities will be presented along with future directions and challenges to wrap up the discussion.

BIO: Sandipan Mishra received his B.Tech. from the Indian Institute of Technology Madras in 2002 and his Ph.D., both in Mechanical Engineering, from the University of California at Berkeley in 2008. Dr. Mishra joined RPI’s faculty in the Mechanical, Aerospace, and Nuclear Engineering Department in Fall 2010. His research interests are in the area of systems and control theory, learning control, nonlinear estimation, and precision mechatronics, as applied to additive manufacturing, smart building systems, unmanned aerial vehicles and adaptive optics. He is the PI of the ISAaC laboratory at RPI, which is supported by grants from government agencies including NSF, the DoD, and DoE, along with industrial partners including Hewlett Packard Labs, Sikorsky Inc, Mathworks Inc., National Instruments, Simmetrix, and Vivonics Inc.