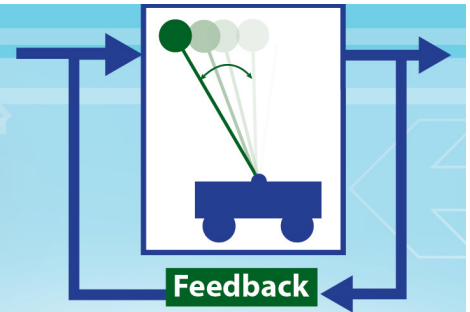


COLLEGE OF ENGINEERING

# Control Seminar



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## Optimal Scheduling and Control of Distributed Energy Storage to Provide Power



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Department of Electrical Engineering  
and Computer Science

**Friday, September 23, 2016**

**3:30 - 4:30 pm • 1500 EECS**

**ABSTRACT:** Small-scale, distributed energy storage exists throughout the power system and is used for a variety of purposes including powering electric vehicles and electronics, providing backup capacity, and improving power quality. Most storage is under-utilized, i.e., idle or only partially used most of the time. We are developing optimization and control algorithms to use this untapped resource to help balance intermittent renewable energy production from wind farms and solar photovoltaics. To schedule distributed storage, we propose an algorithm based on stochastic dual dynamic programming. To control distributed storage in a way that balances tracking performance and battery lifetimes, we develop several approaches based on i) model predictive control using linearized system models, and ii) nonlinear control techniques such as sliding mode control. The over-arching aim of the research is to develop algorithmic approaches to improve the economics of storage and the ability of the grid to accommodate more wind and solar power.

**BIO:** Johanna L. Mathieu is an assistant professor in the Department of Electrical Engineering and Computer Science at the University of Michigan. She received her Ph.D. and M.S. from the University of California at Berkeley and her B.S. from MIT. She was a postdoctoral research at ETH Zurich in 2012-2013. Her research focuses on ways to reduce the environmental impact, cost, and inefficiency of electric power systems via new operational and control strategies.