

UNIVERSITY OF CHICAGO
DEPARTMENT OF COMPUTER SCIENCE
PRESENTS:

**“Self-aware Computing: Combining Learning and Control to Manage Complex,
Dynamic Systems”**



Henry (Hank) Hoffmann
University of Chicago

Abstract:

Modern computing systems must meet multiple---often conflicting---goals; e.g., high-performance and low energy consumption. The current state-of-practice involves ad hoc, heuristic solutions to such system management problems that offer no formally verifiable behavior and must be rewritten or redesigned wholesale as new computing platforms and constraints evolve. In this talk, I will discuss my research on building self-aware computing systems that address computing system goals and constraints in a fundamental way, starting with rigorous mathematical models and ending with real software and hardware implementations that have formally analyzable behavior and can be re-purposed to address new problems as they emerge.

These self-aware systems are distinguished by awareness of user goals and operating environment; they continuously monitor themselves and adapt their behavior and foundational models to ensure the goals are met despite the challenges of complexity (diverse hardware resources to be managed) and dynamics (unpredictable changes in input workload or resource availability). In this talk, I will describe how to build self-aware systems through a combination of learning and control techniques. I will then show how this combination enables new capabilities, like maximizing user experience while guaranteeing an energy budget or meeting latency requirements with minimal energy even with no prior knowledge of the application.

Bio:

Hank Hoffmann has been an Assistant Professor in the Department of Computer Science at the University of Chicago since January 2013 where he leads the Self-aware computing group (or SEEC project) and conducts research on adaptive techniques for power, energy, and performance management in computing systems. He has spent the last 13 years working on multicore architectures and system software in both academia and industry. He completed a PhD in Electrical Engineering and Computer Science at MIT where his research on self-aware computing was named one of the ten "World Changing Ideas" by Scientific American in December 2011. He received his SM degree in Electrical Engineering and Computer Science from MIT in 2003.

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