The Department of Electrical and Computer Engineering Presents

***A DISTINGUISHED SEMINAR***

## PROFESSOR LANG TONG

# ONLINE LEARNING FOR ALGORITHMIC BIDDING

## ABSTRACT

We consider the problem of algorithmic bidding in repeated auctions of goods with unknown clearing prices and value. This problem arises naturally in electricity markets where market participants arbitrage electricity across time or locations. Online advertising is another example where advertisers bid to buy ad spaces online, not knowing the payoffs of such ads buys. In both cases, the price and the value of the goods can be modeled as random variables with unknown joint distributions. A bidder needs to choose what goods to bid and their bidding prices subject to budget constraints. A bidder can be risk-neutral or risk-averse.

In this talk, we present an online learning approach to algorithmic bidding in repeated auctions. Using virtual trading in a two-settlement market as an example, we develop a learning algorithm that maximizes the cumulative return from the bidding strategy under both risk-neutral and risk-averse performance measures. We demonstrate that the proposed strategy outperforms existing machine learning benchmarks and achieves significant profit consistently based on historical data from the NYISO and PJM markets over the eleven-year period between 2006 and 2016.

## BIOGRAPHY

Lang Tong is the Irwin and Joan Jacobs Professor of Engineering and the site director of Power Systems Engineering Research Center (PSERC) at Cornell University. His current research focuses on optimization, signal processing, and machine learning in energy and power systems.  A Fellow of IEEE, he is the 2018 Fulbright Distinguished Chair in Alternative Energy.

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**WCH 205/206**
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