Spring 2015 Seminar:
EE392n – Intelligent Energy Systems: Big Data

Time: Tuesdays, 4:15-5:05pm
Venue: Main Quad Bldg 60, Room 120 (subject to change, check the class website)
Coordinators: Dimitry Gorinevsky and Dan O'Neill, Consulting Professors
Prerequisites: (helpful but not required) Basic statistics, systems, or control
Website: http://www.stanford.edu/class/e392n/

Course Description

Electrical power industry has about $0.4T/year revenue with $1.4T of assets under management. Historically, most of these assets, technologies, business processes, and government regulation had a slow update period of about 80 years. The rapid changes started in the last decade. In this heavily regulated industry, the push comes from public policy that mandates renewable energy sources (33% for California by 2020). The pull comes from information system technologies that promise to facilitate the transition. Because of the sheer size of the energy systems, they generate huge amounts of data, which makes then the target of Big Data analytics technologies, another current trend. Intelligent analytical processing of energy system data can bring many benefits in dealing with energy supply, demand, distribution, and storage challenges as well as in operation and management of many expensive assets in the energy systems. This intelligence is implemented in computing systems as analytical functions that enable monitoring, management, and optimization. The Big Data analytics that extract value from the physical systems data is at the center of the current Internet of Things (Industrial Internet) boom.

The course will focus on the on-going information systems transformation of the electrical power industry with emphasis on Big Data applications. It will discuss Data Science analytics, computing and communications infrastructure, business drivers, and emerging opportunities in this area. The goal of the course is to present a broad perspective on the evolving role of computing systems in the electrical power industry. Another goal is to help distinguish between the hype and genuine technology trends and opportunities. To do that, the examples and case studies illustrating the class subject will be presented by prominent guest lecturers from leading establishments including electrical utilities, equipment vendors, regulators, and venture capitalists.

The lectures will include:

1. Introduction. Electrical Power and Big Data Analytics: Professors Dan ONeill and Dimitry Gorinevsky
2. Energy and IoT: KPCB's Green Growth Fund
3. Emerging Electricity Distribution Grid Technologies: PG&E Utility
4. Keeping California Power System Stable with over 33% Renewables: CAISO
5. Big Data Analytics in Energy: Siemens
6. Analytics in Industrial Demand Response: EnerNoC
7. Energy and Analytics: GE
8. Future of Smart Grid: former VP for Energy, Google
9. Distributed Energy and Microgrids: NRG Utility