## Title and Abstracts of Two Lectures

### Lecture 1

**Title:** Distributed Dynamic Average Consensus Algorithms and Their Applications in the State-of-Charge Balancing of Networked Battery Systems

**Abstract:** The *dynamic average consensus* problem concerns a network of agents, each associated with a time-varying signal, that seek to track the average of these signals using fully distributed algorithms over a communication network. This problem arises in numerous applications, including distributed estimation, formation control, and sensor fusion. Many distributed algorithms have been constructed that achieve consensus precisely at the average of the signals or around it, depending on the properties of the signals. In this lecture, we discuss various distributed algorithms and their properties, including their accuracy and robustness. These theoretical results are demonstrated through their applications to the state-of-charge balancing problem of a networked battery system.

### Lecture 2

**Title:** Oscillator Ising Machines: Dynamic Properties and Application as Associative Memory

**Abstract:** *Oscillator Ising machines (OIMs)* have recently emerged as promising alternative computing architectures for efficiently solving large-scale combinatorial optimization problems, many of which are NP-hard. Many experimental OIM prototypes show a common phenomenon wherein phases of coupled oscillators bifurcate and converge to either 0 or $\pi$ if the effect of sub-harmonic injection locking is sufficiently strong. As a dynamic system, this phenomenon is equivalent to the asymptotic stability property of an equilibrium point of the OIM. In this lecture, we will discuss the dynamic properties of OIMs from a control-theoretic point of view and explore an application of all-to-all connected OIMs as associative memory.