Time & Location: April 5, 2013 at 1:00 PM in HEC 450
Title: DISTRIBUTED EXTREMUM SEEKING AND COOPERATIVE CONTROL FOR MOBILE COOPERATIVE COMMUNICATION SYSTEMS

In this thesis, a distributed extremum seeking and cooperative control algorithm is designed for mobile agents to disperse themselves optimally in maintaining communication quality and maximizing their coverage. The networked mobile agents locally form a virtual multiple-input multiple-output (MIMO) communication system, and they cooperatively communicate among them by using the decode and forward cooperative communication technique. The outage probability is used as the measure of communication quality, and it can be estimated real-time. A general performance index balancing outage probability and spatial dispersion is chosen for the overall system. The extremum seeking control approach is used to estimate and optimize the value of the performance index, and the cooperative formation control is applied to move the mobile agents to achieve the optimal solution by using only the locally-available information. Through the integration of cooperative communication and cooperative control, network connectivity and coverage of the mobile agents are much improved when compared to either non-cooperative communication approaches or other existing control results. Analytical analysis is carried out to demonstrate the performance and robustness of the proposal methodology, and simulation is done to illustrate its effectiveness.

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Approved for distribution by Prof. Zhihua Qu, Committee Chair, on March 12, 2013.

The public is welcome to attend.