Robustness of Decision Dynamics in Animal Groups and Human Groups

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Abstract: Assorted multi-agent system models and feedback algorithms have been designed to converge to collective patterns that resemble animal groups such as bird flocks and fish schools. Typically, however, the resemblance is lost when the system models are perturbed: animal group behavior is observed to be highly robust to disturbance and uncertainty even as individuals in the group are assumed to be “minimalists” in their use of feedback. I will describe methodology to investigate the role of directed interconnection topology on robustness of collective decision dynamics in natural systems. I will show how the methodology is being used to evaluate performance of natural groups from observational data in an effort to identify underlying mechanisms of robust behavior. I will also briefly discuss the related problem for humans performing a decision-making task in a social context.

Host: Jr-Shin Li

Bio: Naomi Ehrich Leonard is the Edwin S. Wilsey Professor of Mechanical and Aerospace Engineering and associated faculty member of the Program in Applied and Computational Mathematics at Princeton University. Her research is in nonlinear control and dynamics with current interests in cooperative control for multi-agent systems, mobile sensor networks, adaptive ocean sampling, collective behavior in animal groups and decision dynamics in mixed human/robot teams. She became an IEEE Fellow in 2007 and received a John D. and Catherine T. MacArthur Foundation Fellowship in 2004. She received the B.S.E. degree from Princeton University in 1985 and the M.S. and Ph.D. degrees from the University of Maryland in 1991 and 1994. From 1985 to 1989, she worked as an engineer in the electric power industry.