

Peng Shi
School of Electrical and Electronic Engineering
University of Adelaide, Australia
[Peng.shi@adelaide.edu.au](mailto: Peng.shi@adelaide.edu.au)

Formation Control and Analysis of Scalable Multi-Agent Systems

Abstract: Multi-agent Systems are systems with characteristics of cooperation and decentralization. Formation control of such systems features predefined formations in order to achieve a desired performance. Typical application examples include robotics, unmanned aerial vehicles (UAVs), and exploration through unknown environments. Agents in such systems are capable of functioning individually and in cooperation, subject to the restriction of their sensors/actuators. As a result, interaction topology, short measurement range and limited communication are some of the intrinsic problems that can affect the formation performance and even make the system unstable. In this talk, the formation control problem for a team of agents with limited sensing range and variable scale will be investigated. The team size is scalable in the way that new agents could join in, and existing ones could leave. A triangle displacement based formation will be introduced. This new topology concept would make the team size scalable, and set an upper bound for the computation burden regardless of the agent team size. Under the limitation of unavailable data communication, agents will have to work independently in an interactive and cooperative manner. A controller will be designed that drives the agents to a partially desired formation; and a coordination protocol will be presented that eliminates the undesired conflicts.