Topic: Ring-Coupled Vehicles: Theory and Applications

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Abstract:

Local interaction between many simple autonomous entities, each following some simple rules, often results in complex collective behaviors. Such emergent behaviors arise from a multitude of physical, biological, and social systems. How locally interacting agents lead to collective behaviors is not only a fundamental problem in nature, but also a significant engineering problem, because it provides possibility to solve problems that are beyond the abilities of any individual member, and thus has many applications in swarm robotics, sensor networks, satellite clusters etc.

This talk is going to present my recent work on distributed control of ring-coupled vehicle systems, in which a platoon of vehicles is coupled in a unidirectional ring and each vehicle follows a local projection-based control law. Theoretical analysis will be given on how desired cooperative behaviors emerge through the proposed local interaction laws. Possible applications of ring-coupled vehicle systems to some tasks, such as enclosing a target of interest and seeking a radioactive source, will also be discussed.

Biography:

Ronghao Zheng received the Bachelor degree and Master degree in electrical engineering both from Zhejiang University, China in 2007 and 2010. He worked as a research assistant at Technical University of Munich, Germany in 2010. He is a recipient of the Hong Kong PhD Fellowship and now working toward his PhD degree at the Department of Mechanical and Biomedical Engineering, City University of Hong Kong. His research interests lie in the area of distributed algorithms and control. Most of his recent work deals with coordination of networked mobile robots, and has many applications in automated systems and security.