AU7036: Introduction to Multi-agent Systems

Spring 2024

Instructor Information

1. Instructors:
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Lectures:
Week 1-8: Tuesdays and Fridays, 10:00am-11:40am
Week 9-16: Tuesdays, 10:00am-11:40am

Prerequisites:
Familiarity with linear algebra, graph theory, linear and nonlinear control systems. However, the course will mostly be self-contained.

Main References:
Books:

- Francesco Bullo, *Lectures on Network Systems*, Kindle Direct Publishing, version 1.6, Sep 1, 2022.
- Wei Ren, Yongcan Cao. *Distributed Coordination of Multi-agent Networks: Emergent Problems, Models, and Issues*, Springer London, 2011.
- Wei Ren, Randal W. Beard. *Distributed Consensus in Multi-vehicle Cooperative Control: Theory and Applications*, Springer London, 2008.
- Fei Chen, Wei Ren. *Distributed Average Tracking in Multi-agent Systems*, Springer Cham, 2020.

Relevant resources

- UCSB ME/ECE 269: https://www.youtube.com/playlist?list=PL7bpQ3f3TaeMsueY06FCmbNIEOOY-Ri2_

Objectives: Students are expected to understand and get familiar with

- Basic concepts in networked systems
- Perron–Frobenius theory, algebraic graph theory and discrete-time averaging systems
- Lyapunov stability theory and continuous-time averaging systems
- Selected advanced topics in distributed algorithms

Requirements and grading:
There will be 6 homework problem sets. The students are expected to give a final presentation on related topics. The grading will be based on homework (40%), the final presentation (30%) and the final report (30%).