Control of Distributed Systems

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Private: Course Introduction

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This course will cover recent research in the mathematics of multi-agent systems, with an emphasis on problems of distributed control design. We will focus on the following questions:

- How can groups of UAVs effectively maintain formations?
- How can sensor networks make reliable inferences from data?
- What are good algorithms to enable teams of robots to perform complex tasks?
- Which optimization problems can be solved cooperatively by multi-agent systems?
- How do we stabilize large scale distributed systems? For example, can we avoid traffic jams by replacing human drivers with self-driving cars, or are they inevitable given the volume of cars that need to be on the road?

We will be focusing on the fundamental mathematics underlying distributed systems with an emphasis on basic tools with cross-cutting applicability.

The first couple of months of the course will be dedicated to formation control; coverage; consensus; Markov chain mixing times; distributed optimization; and rigidity theory.

After that, we will study a selection from: algebraic graph theory, distributed algorithms, communication complexity, nonlinear Perron-Frobenius theory.

Grades will be assigned on the basis of presentations. Each student registered in the course will present on a paper chosen from a list provided by the instructor. Presentations should be about 30-35 minutes long.
Comments are closed.