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Center for Systems and Control

Private Models and Distributed Control of Networked Systems

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Abstract: Designing controllers to make networked systems autonomous is perhaps the most dominant problem in systems engineering. Distributed control, which is already a challenging task, is only part of the problem. In this talk, I will present recently developed theory and algorithms for synthesizing optimal distributed controllers via convex programming. The theory uses the notion of “locality" in a manner that ensures the synthesis complexity grows gracefully with the number of states in the network model. Recent robust extensions will also be presented. The remainder of the talk will focus on privacy and how it interacts with this notion of locality. In particular, we are concerned with how to build models from data that, for example may contain sensitive information. We present a framework based on aggregation and differential privacy that will encourage information owners to contribute their data while ensuring certain privacy guarantees. It will be shown how the topology of the network and the sensitivity of a specific linear program influence the achievable privacy levels.

Bio: James Anderson is a Senior Postdoctoral Scholar in the Department of Computing and Mathematical Sciences at the California institute of Technology. He obtained a DPhil (PhD) in Engineering Science from the University of Oxford, UK and the BSc and MSc degrees in Systems Engineering from the University of Reading UK. Prior to Caltech he held a Junior Research Fellowship in Engineering Science at the University of Oxford and St John's College where he was based in the Control Group. His research interests include distributed control, convex optimization, and privacy preserving computation with applications in autonomy and cyber-physical systems - specifically power grids.

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