CONTROL, COOPERATION AND OPTIMIZATION IN MULTI-AGENT SYSTEMS

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The rapid pace of innovation in the areas of control, computation, and communication is leading the way for the class of networked multi-agent systems that are characterized by their complex interconnections, diversity of components, and the interactions with the physical world and possibly humans. These systems offer a vision of increased automation and benefit for society from environmental, economic, and social perspectives. Examples of such systems include automated transportation networks, distributed power generation ("smart-grids"), groups of autonomous vehicles, or interacting groups of robots, to name just a few. These growing application areas with their challenging performance specifications do require a solid theoretical foundation in order to understand, influence, design and optimize the dynamical behavior of these complex systems.

In this presentation we will give an introductory overview over the field of complex networked systems discussing issues of consensus, synchronization, formation control, clustering and distributed optimization. We will demonstrate the basic concepts, explore systems theoretical properties and will comment on the state of the art, opportunities and limitations of this emerging research area.

References

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