

Activity Report for the CSS TC on Control of Networked Systems (Older name: TC on Networks and Communication Systems)

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There has been an increasing volume of research on networks within the CSS community. This research is not confined to work on traditional communication networks, but also extends to a broader set of networks including other technological networks such as transportation and energy networks, social, economic, and financial networks, and biological networks.

During CDC 2012 in Hawaii, there have been many sessions focusing on networks. These include multiple sessions on dynamics on networks, game theory (as applied to networked systems), networked systems: sensing, scheduling, estimation and control over networks, communication networks, agents and autonomous systems, traffic flow modeling, cooperative control of autonomous vehicles, distributed optimization and control, sensor networks, electrical power systems and energy systems.

Our TC hosted a lunch meeting inviting all Working Group Chairs and several key members of the CSS community with significant research activities in the networks area. The meeting was well attended and several topics were discussed, including future activities and publications within the CSS community that could serve as a good venue for networks related research. The committee also discussed a proposal to change the name of the TC. The committee chairs decided to adopt the new name “TC on Control of Networked Systems”, which is a better representation for the scope of the TC and also emphasizes the link with the new IEEE journal on the same topic.

We next outline some additional activities with which TC members are involved and in many cases responsible for organizing.

Ozdaglar is the area co-editor (together with David Gamarnik) of a new area “Games, Decisions and Networks” within the journal *Operations Research*. Jadbabaie is an associate editor for this area.

Ozdaglar is one of the editors (together with Eddie Anderson, David Gamarnik, and Anton Kleywegt) of a special issue on “Information and Decisions in Social and Economic Networks”, which will be published in the journal *Operations Research*.

Tatikonda is an invited speaker at the LCCC focus period on Information and Control in Networks, in the workshop held on Oct 17-19, 2012, organized by the Linnaeus excellence center LCCC (www.lccc.lth.se) at Lund University, Sweden. The workshop is the culmination of a five week focus period (Oct 1 - Nov 2) devoted to Information and Control in Networks.

Marbach is a co-organizer of BIRS Banff workshop on "Asymptotics of Large-Scale Interacting Networks," February 24 to March 1, 2013, in Banff, Canada. Ozdaglar is a speaker in this workshop.

The focus of the workshop is interacting networks where agents infer and act on local viewpoints, with global consequences. Of particular interest are scenarios where either the number of agents, or the size of the inference problem, is large and the system behavior can be characterized by an asymptotic analysis. Interacting networks with these properties arise in several contexts such as biological networks, financial and economic networks, social networks, and energy and communication networks. The aim of the workshop is to bring together leading researchers in this area to discuss recent results and open problems and to explore new mathematical techniques and models to study these problems. In addition, the workshop will give some outstanding junior researchers an opportunity to present their own research and become engaged in this field.

Marbach was/is on the TPC for Infocom 2011,2012,2013, for ACM MobiHoc 2012, and ACM Conext 2012.

Tatikonda is on the TPC for ISIT 2013, NecSys 2013, and ISIT 2014.

Jadbabaie and Ozdaglar are recipients of a 2012 Multidisciplinary University Research Initiative (MURI) Award for their project "Evolution of Cultural Norms and Dynamics of Socio-Political Change". The project will include collaborations with researchers at Cornell, MIT, Stanford and Georgia Tech. It will draw on network science, game theory, economics and political science to design an analytical framework for analysis and prediction of various socio-political phenomena including political change, social norms, cultural dynamics, and societal transformations.

Jadbabaie is the co-director of the "Singh Program on Market & Social Systems Engineering", which is a new undergraduate program at UPenn that focuses on the study of networked interactions, including the interplay of technology, algorithms, economics, and sociology. (see <http://www.mkse.upenn.edu/>)

Jadbabaie is named the Alfred Fidler Moore Professor in Network Science in the Department of Electrical and Systems Engineering, effective July 1, 2013.

Ozdaglar is the recipient of the inaugural Steven and Renee Finn Innovation Fellowship for her research push into new areas of great potential.

Ozdaglar is a plenary speaker at the Game Theory and Human Behavior Symposium 2013, USC, and SIAM Conference on Control and Its Applications 2013.

Ozdaglar was the organizer of multiple sessions on “Games in Networks” and “Distributed Optimization and Control” in CDC 2012.

Ozdaglar is a co-organizer of the Interdisciplinary Workshop on Information and Decision in Social Networks II, together with Sandy Pentland, Devavrat Shah, and John Tsitsiklis, November 12-13, 2012.

Recent technological and mathematical developments have opened the possibility to considerably improve our understanding of how information flows and decisions are made in large social networks. In this workshop, we bring together researchers from different communities working on information propagation and decision making in social networks to investigate both rigorous models that highlight capabilities and limitations of such networks as well as empirical and simulations studies of how people exchange information, influence each other, make decisions and develop social interactions.