



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
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Decentralized control of nonlinear networked dynamical systems: from Smart Cities to Systems Biology

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Abstract: Networked systems are everywhere. Technological systems are becoming increasingly complex and their output depends on how a multitude of entities coordinate with each other. As individuals we are part of a social network made up of our personal interactions. Networks are also inside us and a network of finely tuned biochemical reactions regulates the vital activities in our bodies. In this talk, we will consider systems where a set of dynamical agents interacts over a graph topology. The study of these *networked dynamical systems*, and their control, will be at the hearth of this talk. Specifically, we will consider systems that, at a first view, might seem to have very little in common like autonomous roving agents, connected vehicles, traffic lights, synthetic cells and individuals' opinions. We will then show how such systems can all be modeled as networked dynamical systems and decentralized control strategies will be presented. All the applications presented in this talk rely on rigorous mathematical results, which have been obtained by using a novel combination of tools from nonlinear dynamics, systems engineering and computer science.

Short Bio: Giovanni Russo is a Research Staff Member in Optimization, Control and Decision Science at IBM Research Ireland, where he is also responsible for the IBM Center of Optimization under Uncertainty. Areas of interest include: decentralized control and optimization of road traffic, connected vehicles and shared economies. Giovanni obtained his Ph.D. from the University of Naples Federico II in 2010. During his Ph.D., his work focused on the stability of nonlinear dynamical systems with applications to networked control. Soon after the end of his Ph.D., motivated by his desire to apply his results to real world problems, Giovanni started to work on automatic transportation systems. From 2012 to 2015 he was the lead system engineer and integrator of the Honolulu Rail Transit Project (HRTTP). The system he designed is the first driverless mass transit railway in the United States. Giovanni is currently a member of the Board of Editors for the IEEE Transactions on Circuits and Systems I for topics related to Control Theory, Networks and Networked Systems.

Venue: Large Conference Room, O'Reilly Institute.

Further Details: <http://www.scss.tcd.ie/doug.leith/seminars.php>