Speaker: Claudio De Persis, Groningen University

Title: Cyber-physical systems and Lyapunov functions

Abstract:
Control design based on energy functions is a powerful method for problems of coordination of network systems, for it leverages physical intuition to build Lyapunov functions which are instrumental in the analysis.

In the presence of a cyber infrastructure, the use of energy as a candidate Lyapunov function is hampered by phenomena such as sampling, delays and data loss.

In this talk, I will present some recent results on the redesign of energy-based Lyapunov functions that permit to take into account these cyber constraints. Within this framework, I will introduce a deterministic set-up to deal with data loss, possibly induced by malware actions such as Denial-of-Service attacks. Some of the results will be illustrated using microgrids as a case study. Along the way, I will point out challenging open problems that are, in my opinion, worth of investigation.

This is joint work with P. Tesi, R. Postoyan and N. Monshizadeh.