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Automatic
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The Department of Automatic Control & Systems Engineering
is pleased to announce the following seminar:

Optimal switching control: theory and applications

Professor Patrizio Colaneri

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Monday, 14 October 2019 at 15:00
LT14, Mappin Mining Block

Abstract

In the talk we deal with stabilization and control of positive switched systems, a class that emerges in different applications, in classical engineering problems, biochemical processes and social sciences.

In particular we consider the theory of optimal control of positive switched systems. It is shown that under some assumptions one can exploit the convexity of the cost function, thus paving the way to easy numerical solutions. Another fundamental tool is played by the so-called “arg-min” switching theory inherited by co-positive Lyapunov-Metzler inequalities. Such inequalities generate a switching rule capable to stabilize the system and provide an upper bound on the optimal cost. Three control and scheduling problems are illustrated:

- 1) Therapy scheduling for HIV load mitigation,
- 2) Traffic light scheduling in road junctions,
- 3) AIMD based distributed car battery charging in public parking.

Biography

Patrizio Colaneri was born in Palmoli, Italy, in 1956. He received the Laurea degree in Electrical Engineering in 1981 and the Ph.D. degree (Dottorato di Ricerca) in Automatic Control in 1987.

After a few years in industry and at the National Research Council of Italy, he joined the Politecnico di Milano where he is full professor of Automatica and served as head of the Ph.D. school on ICT (2007–2009).

He spent a semester at the Systems Research Center of the University of Maryland (1989) and at the Hamilton Institute of the National University of Ireland (2009).

He also collaborates with the Institute for Design and Control of Mechatronical Systems of Johannes Kepler University in Linz (Austria) since 2000.

Professor Colaneri was the chair of the IFAC Coordinating Committee on Design Methods for six years, the chair of the Technical Committee on Control Design for six years, a member of the Council of EUCA (European Union Control Association) for three years, an Associate Editor of Automatica for six years (certificate of outstanding service), a Subject Editor of the International Journal of Robust and Nonlinear Control for 10 years and a Senior Editor of the IEEE Transactions on Automatic Control for 8 years.

He is at present a member of the Technical Board of IFAC, Italian chair of IFAC NMO, and senior Editor of the IFAC journal Nonlinear Analysis Hybrid.

He was elevated to the degree of IEEE Fellow for contributions on periodic and switching control. He is also a Fellow of IFAC. His main interests are in the area of periodic systems and control, robust filtering and control, and switching control, with applications in railway automation.

He has authored/ co-authored more than 250 papers and seven books, including the following four international monographies: “Control Theory and Design: an RH2 and RHinf viewpoint”, Academic Press 1997, “Periodic Systems: Filtering and Control”, Springer Verlag, 2009, “Positive Markov Jump Linear Systems”, Now Publishing 2015, “Switched Positive Linear Systems”, Now Publishing 2015.