



*Networked Control Systems Laboratory
Center of Excellence DEWS
Department of Electrical Engineering
and Computer Science*



*European Embedded
Control Institute*

EECI SEMINAR

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Constructing Lyapunov-Krasovskii functionals for Integral Input-to-State Stability of Time Delay Networks

Abstract: Module approaches are widely used in diverse areas of science to analyze and build large-scale and complex systems. The distinct advantage of the module-based analysis and design is that we can deduce the overall behavior of complex systems from independent observations of simple modules decoupled to each other. Its superiority to intensive simulation and numerical approximation is that the module approaches can provide us with qualitative information as well as quantitative information, which is quite useful for the purpose of design and understanding the complex systems. In this talk, we pursue such a philosophy for networks of nonlinear time-delay dynamical systems by making use of the notion of integral input-to-state stability (iISS). We allow time-delays to reside in both subsystems and interconnection channels, and the time-delays may be both discrete and distributed. No assumption is made on the interconnection topology of the network. This talk presents the first solution to the challenging problem and shows how to construct Lyapunov-Krasovskii functionals establishing the stability of iISS time-delay networks.

HIROSHI ITO received the Ph.D degree in Electrical Engineering from Keio University, Yokohama, Japan in 1995. From 1994 to 1995, he was a research fellow of the Japan Society for the Promotion of Science (JSPS). He is currently an Associate Professor at the Department of Systems Innovation and Informatics, Kyushu Institute of Technology, Japan. He held visiting positions at Northwestern University and University of California, San Diego during an eleven months period in 1998-1999. His main research interests include stability of nonlinear systems, theory of robustness, multi-rate sampled-data control, asynchronous systems and large-scale dynamical systems with emphasis on applications to biological and communication networks. He received the Pioneer Award of Control Division of The Society of Instrument and Control Engineers (SICE) in 2008. He is also the recipients of other several awards in the SICE activities. He has served as an Associate Editor of IEEE Transactions on Automatic Control, and been on the IEEE CSS Conference Editorial Board. He is a Senior Member of the IEEE.

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AULA I30, FACOLTÀ DI INGEGNERIA OPTIMES**

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