March 27, 2025

The Impact of Input-Output Methods in Structured and Decentralized Control

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ABSTRACT:

Structured and decentralized control system synthesis is known to be in general notoriously difficult. In this talk we overview the input-output approach for designing controllers and show how these methods can be judiciously used to tackle certain types of these problems. In particular, we show how the so called Youla parametrization approach can be used to come up with convex and tractable formulations of optimal performance problems for certain interesting classes of structured and distributed control architectures. These classes, also known as Quadratic Invariant, are associated with a variety of practical applications with multiagent systems. The issue of stable implementation of these architectures is discussed. Finally, we also demonstrate how these input-output methods can be used in the context of Mean Field control to obtain naturally decentralized and selfish solutions that are optimal as the number of agents grows.

BIOGRAPHY:

Professor Petros G. Voulgaris received the Diploma in Mechanical Engineering from the National Technical University, Athens, Greece, in 1986, and the S.M. and Ph.D. degrees in Aeronautics and Astronautics from the Massachusetts Institute of Technology in 1988 and 1991, respectively. He is currently Chair, Founding Aerospace Program Director, and Victor LaMar Lockhart Professor in Mechanical Engineering at University of Nevada, Reno. Before joining UNR in 2020 and since 1991, he has been a faculty with the Department of Aerospace Engineering, University of Illinois at Urbana-Champaign holding also appointments with the Coordinated Science Laboratory, and the department of Electrical and Computer Engineering. His research interests are in the general area of robust and optimal control and coordination of autonomous systems. Dr. Voulgaris is a recipient of several awards including the NSF Research Initiation Award, the ONR Young Investigator Award and the UIUC Xerox Award for research. He has also been a Visiting ADGAS Chair Professor, Mechanical Engineering, Petroleum Institute, Abu Dhabi, UAE and a Visiting Guangbiao Chair at Zhejiang University, China. His research has been supported by several agencies including NSF, ONR, AFOSR, NASA. He is also a Fellow of IEEE.