

Title: Decentralized Global Minimum Sharing: Properties and Applications

Abstract: This lecture deals with the distributed minimum sharing problem: a set of decision-makers compute the minimum of some local quantities of interest in a distributed and decentralized way by exchanging information through a communication network.

We propose an adjustable approximate solution which enjoys several properties of crucial importance in applications. Specific application contexts are illustrated first.

The analysis shows that the proposed solution has good *decentralization* properties, and it is *scalable* in that the number of local variables does not grow with the size or topology of the communication network. Moreover, a global and uniform (both in the initial time and in the initial conditions) asymptotic stability result is provided towards a steady state which can be made arbitrarily close to the sought minimum. Exact asymptotic convergence can be recovered at the price of losing uniformity with respect to the initial time.

Several application contexts are illustrated and a real industrial use case is described in the metal industry sector.



Biography: Thomas Parisini received the Ph.D. degree in Electronic Engineering and Computer Science in 1993 from the University of Genoa. He was with Politecnico di Milano and since 2010 he holds the Chair of Industrial Control and is Director of Research at Imperial College London. He is a Deputy Director of the KIOS Research and Innovation Centre of Excellence, University of Cyprus. Since 2001 he is also Danieli Endowed Chair of Automation Engineering with University of Trieste. In 2009-2012 he was Deputy Rector of University of Trieste. In 2018 he received an *Honorary Doctorate* from University of Aalborg, Denmark. In 2020 he has been appointed as Deputy Chair of the Employment & Education Task Force of the B20-Italy. He authored or co-authored one monography and

more than 350 research papers in archival journals, book chapters, and international conference proceedings. He is a co-recipient of the IFAC Best Application Paper Prize of the Journal of Process Control, Elsevier, for the three-year period 2011-2013 and of the 2004 Outstanding Paper Award of the IEEE Trans. on Neural Networks. He is also a recipient of the 2007 IEEE Distinguished Member Award. In 2016, he was awarded as Principal Investigator at Imperial of the H2020 European Union flagship Teaming Project KIOS Research and Innovation Centre of Excellence led by University of Cyprus. Thomas Parisini serves as 2021-2022 President of the IEEE Control Systems Society and has served as Vice-President for Publications Activities. During 2009-2016 he was the Editor-in-Chief of the IEEE Trans. on Control Systems Technology. Since 2017, he is Editor for Control Applications of Automatica and since 2018 he is the Editor in Chief of the European Journal of Control. Among other activities, he was the Program Chair of the 2008 IEEE Conference on Decision and Control and General Co-Chair of the 2013 IEEE Conference on Decision and Control. Prof. Parisini is a Fellow of the IEEE and of the IFAC.