IEEE CSS Italy Chapter

Road2CDC Seminar Series

What is the connection between artificial speech and modern mathematics, and how can this be used in system identification and robust control?

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Department of Information Engineering
Aula Magna - Starting time 10:30 – Ending time 11:30

Abstract:
Every 30 ms your mobile telephone computes a solution to the Carathéodory extension problem, a classical mathematical problem that dates back to the beginning of last century. In 1918 Schur presented a complete parameterization of all solutions to this problem, and the one used in speech processing for a "shaping filter" is called the maximum-entropy solution. In theory, one could improve the quality of speech by choosing another solution, but a requirement on the complexity of the shaping filter renders the Schur parameterization useless and completely alters the underlying mathematical problem. We present another approach to shaping speech which provides a paradigm that can also be applied to problems in system identification, robust control, image processing, etc. It allows for smooth tuning to specifications in a class of solutions with bounded complexity. The methodology employed is a combination of nonlinear analysis, geometry and optimization, but the talk will be given on a descriptive and rather nontechnical level.

Anders Lindquist received the Ph.D. degree from KTH Royal Institute of Technology, Sweden, in 1972, honorary doctorate from Technion (Israel Institute of Technology) in 2010, and a doctorate jubilaris from KTH in 2022. He is currently Distinguished Professor at Anhui University, Chair Professor Emeritus at Shanghai Jiao Tong University and Professor Emeritus at KTH. Before that he had a full academic career in the United States, after which in 1983 he was appointed to the Chair of Optimization and Systems at KTH. He is a Member of the Royal Swedish Academy of Engineering Sciences, a Foreign Member of the Chinese Academy of Sciences, a Foreign Member of the Russian Academy of Natural Sciences, and a Member of Academia Europaea (Academy of Europe). He is a Life Fellow of IEEE, a Fellow of SIAM, and a Fellow of IFAC. He received the 2009 Reid Prize in Mathematics from SIAM, and the 2020 IEEE Control Systems Award, the IEEE field award in Systems and Control.

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