

**Title: Automotive Powertrain Control: On-line Learning and Optimization**

**Abstract:** Efficiency is one of the most important issues in automotive powertrain control technology. For modern automotive powertrains such as electrically controller engines and electrified powertrains, on-board optimization of the control strategy in ECU is a feasible and effective way to improving the efficiency. However, the complexity in modeling and uncertainties in practice make it challenging. This talk will present results and experiences in development of automotive powertrain control technology. First, the field of powertrain control, mainly focused on the challenging issues, is briefly overviewed. Then, several case studies will be highlighted that provide solutions to the efficiency optimization by applying on-line learning and optimization techniques, mainly combustion control of IC engine, energy optimization of hybrid electric vehicles, and optimal control under the connected environment. Finally, the talk will be closed with a rough outlook on the control issues in connected EVs and power grid.



**Biography:** Tielong Shen is a Full Professor in control engineering at Sophia University, Tokyo, Japan. He graduated from Northeast Heavy Machinery Institute, 1982, and received his PhD degree in Mechanical Engineering from Sophia University 1992, and joined Sophia University as Assistant Professor with Tenure in April 1992, where he is currently chairing Shen Laboratory. His research interests include control theory and applications in automotive powertrain systems, power systems, and mechanical systems. In 2005, his laboratory founded transient control engine testbench and started long-term academic-industrial collaborative research on advanced engine control technology with Toyota automotive Corporation, Japan. He has served SICE, TCCT of CAA, IFAC and IEEE as Chair/vice-chair including General Chair of SICE&CCC2015, IPC Chair of IFAC AAC2016, IFAC ECoSM2018, etc. He is currently a member of the IEEE Technical Committee on Automotive Control and IFAC Technical Committee on Automotive System Control. He is currently serving as General Chair of SICE Annual Conference 2021, and General Chair of IFAC Conference on ECOSM 2021.