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Special Session
Advanced Control Technologies for Multi-Motor Vehicles

organized by

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Call for Papers

Outline of the Session (Max 250 words)

The term multi-motor vehicle (MMV) is considered in its broad sense, including all types of road vehicles and air vehicles, which are driven by one or more electric motors. The MMVs are expected to improve the safety, energy efficiency, and to create a new mobility revolution thanks to the construction flexibility. However, challenges exist due to the mechanical system complexity, environmental uncertainties, and the limits of energy source as well as sensor capability, etc.

To address the aforementioned challenges, advanced control technologies should be developed to improve MMV control performance and optimize the control allocation. Besides, theoretical studies would be provided to properly analyze and design the MMV system with less computational burden. It is also essential to develop the modeling and simulation methods to capture the real dynamics of MMV and the physical interaction between the motor actuators.

This special session, therefore, aims at providing a research forum for those working on mobility technology, vehicular technology, flying vehicles, and control engineering to exchange their recent findings as well as new ideas, and to discuss future topics and potential collaboration on MMVs. Both theoretical and application-driven studies are warmly welcome for participations.

Topics of the Session: The topic of interests include, but are not limited to

- o Test methods and processes for MMV
- o Motor control and motor drive for MMV

- o Energy management of MMV
- o Advanced motion control of MMV
- o Control theories for MMV
- o Modelling and simulation of MMV
- o Hierarchical decentralized control configuration for MMV
- o State estimation and environment estimation for MMV
- o Vibration suppression for MMV
- o Autonomous control of MMV
- o Integration of wireless power transfer and motion control for MMV
- o Application of Artificial intelligence and Machine learning for MMV
- o Other related topics in MMV

Short Bios of the Special Session Co-Organizers:

Binh-Minh Nguyen received the M.S. and Ph.D. degrees from the University of Tokyo, Tokyo, Japan, in 2012 and 2015, respectively. He is currently an Assistant Professor with the Department of Advanced Energy, The University of Tokyo. His research interests include global control, passivity control, motion control, and their applications in electric vehicles, flying vehicles, and power systems. Dr. Nguyen is an Associate Editor for the Automotive Electronics topic of the IEEE Vehicular Technology Magazine. Since 2024, he has been the member of the Vehicle Power Propulsion Technical Committee of IEEE Vehicular Technology Society.

Sakahisa Nagai received the B.E., M. E., and Ph.D. degrees in electrical and computer engineering from the Department of Electrical and Computer Engineering, Yokohama National University, Kanagawa, Japan, in 2014, 2016, and 2019, respectively. Since 2019, he has been a Assistant Professor and Lecturer with the Graduate School of Frontier Sciences, The University of Tokyo, Kashiwa, Japan. His research interests include sensorless actuation, motion control, wireless power transfer, and power electronics. Dr. Nagai is a member of the IEE of Japan.

Valentin Ivanov received the Ph.D. and D.Sc. degrees in automotive engineering from Belarusian National Technical University, Minsk, Belarus, in 1997 and 2006, respectively, and the Dr.-Ing. habil. degree in automotive engineering from the Technical University of Ilmenau, Ilmenau, Germany, in 2017. From 1995 to 2007, he was consequently an Assistant Professor, an Associated Professor, and a Full Professor with the Department of Automotive Engineering, Belarusian National Technical University. In July 2007, he became an Alexander von Humboldt Fellow, and in July 2008, he became a Marie Curie Fellow with the Technical University of Ilmenau. He was an EU Project Coordinator with the Automotive Engineering Group, Technical University of Ilmenau. He is currently Head of Smart Vehicle Systems, Technical University of Ilmenau. His research interests include vehicle dynamics, electric vehicles, automotive control systems, chassis design, and fuzzy logic. Prof. Ivanov is an Society of Automotive Engineers (SAE) Fellow and a Member of the Society of Automotive Engineers of Japan, the Association of German Engineers, the International Federation of Automatic Control (Technical Committee “Automotive Control”), and the International Society for Terrain-Vehicle Systems.

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