Energy Efficiency Enhancement for Personalized and Connected Vehicles

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Abstract:

The recent advances on vehicle onboard computation and communication technologies have led the ground transportation into a new era. In particular, the connected and smart mobility technologies such as vehicle-to-vehicle, vehicle-to-infrastructure, and vehicle-to-human communications have offered an unprecedented information richness and availability, which if utilized intelligently may enable substantial improvements on vehicle operational energy efficiency and cleanliness that are of societal importance. Synergistic combinations of physical insights into powertrain and vehicle system characteristics, human factor, computational and communication capabilities, and theories of optimization and control may offer effective means for tackling the transportation energy and emission challenges. This talk introduces a variety of vehicle system estimation and control research activities aiming to clean and efficient ground transportation by leveraging the connected and smart mobility technologies. Innovative syntheses of estimation, optimization, and control theories with physical understanding of vehicle and transportation systems as well as human driver characteristics will be emphasized through examples. Along with the system analytical designs, results will be given to demonstrate the importance and efficacy of the connected and smart mobility technologies for current and future ground vehicles and transportation.

About the distinguished lecturer:

Prof. Junmin Wang joined Ohio State University and founded the Vehicle Systems and Control Laboratory in September 2008. He was early promoted to Associate Professor in September 2013 and then very early promoted to Full Professor in June 2016. He gained five years of full-time industrial research experience at Southwest Research Institute (San Antonio Texas) from 2003 to 2008. Prof. Wang has a wide range of research interests covering control, modeling, estimation, optimization, and diagnosis of dynamical systems, especially for automotive, vehicle, sustainable mobility, human-machine, and cyber-physical system applications. Prof. Wang's main research contributions embrace the development of control and estimation methods that can advance efficiency, cleanliness, and driving safety of conventional, electrified, automated and connected vehicles. Dr. Wang is the author or co-author of more than 260 peer-reviewed publications including 126 journal articles and 11 U.S. patents. He has served or currently serves as a Senior Editor/Editor/Technical Editor/Associate Editor for seven journals and Chair of several technical committees in various professional societies. Prof. Wang is a recipient of the 2017 IEEE Transactions on Fuzzy Systems Outstanding Paper Award, 2015 Ohio State University Harrison Faculty Award for Excellence in Engineering Education, National Science Foundation CAREER Award, Ohio State University Lumley Research Award, and SAE Ralph R. Teetor Educational Award in 2012, as well as the SAE International Vincent Bendix Automotive Electronics Engineering Award and Office of Naval Research Young Investigator Award (ONR-YIP) in 2009. He was elected IEEE Vehicular Technology Society Distinguished Lecturer in 2015, Fellow of the Society of Automotive Engineers (SAE) in 2015, and Fellow of the American Society of Mechanical Engineers (ASME) in 2016. Dr. Wang received the B.E. in Automotive Engineering and his first M.S. in Power Machinery and Engineering from the Tsinghua University, Beijing, China in 1997 and 2000, respectively, his second and third M.S. degrees in Electrical Engineering and Mechanical Engineering from the University of Minnesota, Twin Cities in 2003, and the Ph.D. degree in Mechanical Engineering from the University of Texas at Austin in 2007.