

# Personalized Vehicle Control for Energy Efficiency and Driving Safety Enhancements

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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 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 driving safety that are of societal importance. Synergistic combinations of physical insights into vehicle system characteristics, computational and communication capabilities, and theories of optimization and control may offer effective means for tackling the transportation safety and energy challenges. This talk introduces a variety of smart vehicle system estimation and control research activities aiming to safe and efficient ground transportation by leveraging the smart mobility technology. Innovative syntheses of estimation, optimization, and control theories with physical understanding of vehicle and transportation systems for conventional, electrified, connected and automated vehicles will be emphasized through examples. Along with the system analytical designs, experimental and simulation results will be given to demonstrate the importance and efficacy of the smart mobility technologies for current and future ground vehicles and transportation.



**Bio:** Junmin Wang is the Accenture Endowed Professor in Mechanical Engineering at University of Texas at Austin. In 2008, he started his academic career at Ohio State University, where he founded the Vehicle Systems and Control Laboratory, was early promoted to Associate Professor in September 2013 and then very early promoted to Full Professor in June 2016. He also 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, smart and sustainable mobility, human-machine, and cyber-physical system applications. Dr. Wang is the author or co-author of more than 290 peer-reviewed publications including

140 journal articles and 13 U.S. patents. Prof. Wang is a recipient of numerous international and national honors and awards including 2018 IEEE Andrew P. Sage Best Transactions Paper Award, 2017 IEEE Transactions on Fuzzy Systems Outstanding Paper Award, 2012 NSF-CAREER Award, 2011 SAE International Vincent Bendix Automotive Electronics Engineering Award, 2009 ONR-YIP Award. He is an IEEE Vehicular Technology Society Distinguished Lecturer, SAE Fellow, and ASME Fellow as well as a Chang Jiang Scholar Visiting Chair Professor.

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.