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Challenges in design and development of electric and hybrid electric vehicles

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Concerns over the environment, public health and availability of fossil fuels have forced the establishment of aggressive emissions regulations, such as the U.S. 2020 CAFE standards, and have triggered momentous changes in global automotive strategies. New technologies and products are required to enhance fuel efficiency and reduce harmful emissions, without sacrificing performance, cost-efficiency and safety. Vehicle electrification and hybridization have been increasingly recognized as the most promising road transportation solution to both the global energy crisis and increasingly stringent requirements related to environmental protection and vehicle safety, prompting collaborations among governments, academia, and industrial institutions to search for a solution to reduce vehicle emissions, while reducing the consumption of fossil fuels. However, electrification of automotive systems presents significant design challenges, specifically related to drivetrain systems, chassis design and layout, multidisciplinary power management and optimization, system integration, and vehicle dynamics and control. Electric and hybrid electric vehicles (EVs and HEVs) are complex mechatronic systems; their design requires holistic consideration of vehicle and tire dynamics, powertrain, electric motors and batteries, and control and estimation modules that are integrated through millions of lines of computer code.

Biography

Saber Fallah is a Lecturer (Assistant Professor) at University of Surrey, a past Research Associate and Postdoctoral Research Fellow at the Waterloo Centre for Automotive Research (WatCar), University of Waterloo, and a past Research Assistant at the Concordia Centre for Advanced Vehicle Engineering (CONCAVE), Concordia University. His research interests include vehicle dynamics and control, electric and hybrid electric vehicles, intelligent vehicles, vehicle system design and integration, and vehicle state estimation and prediction. He is a co-author of the book entitled "*Electric and Hybrid Vehicles: A mechatronic approach*", which will be published by John Wiley publication. He also has filed a patent about online estimation of tyre forces. His research outcomes include more than 30 publications in reputed journals and conferences.

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