Unplugging the Electric Car: Wireless Charging of Electric Cars with Extremely High Efficiency and Misalignment Tolerance

Prof. Chris Mi
University of Michigan

Sep. 20, 2013, 5-6PM, ENG LG06

ABSTRACT

Electric vehicles and plug-in hybrid electric vehicles (PEVs) have attracted worldwide attentions because their capabilities to displace petroleum usage and improve energy and environment sustainability. One of the key constraints for the mass market penetration of PEV is the inconvenience and safety concerns associated with charging. Wireless charging using Wireless Power Transfer (WPT) Technology, as an alternative to plug-in charging and battery-swapping, can provide the convenience and safety requirements. Recently, we have realized an EV battery wireless charger at 8kW with a 30 cm distance, a DC-to-battery efficiency of 97%, and a misalignment of up to 60cm, using magnetic-resonance technology. This breakthrough will have strong impact on PEVs and a variety of other applications, including consumer electronics, home appliances, medical implant devices, and some industry applications. This seminar will focus on the key technical challenges of WPT, including coil design, system analysis using analytical methods, simulations of the WPT system; resonant topologies suitable for various applications, and power electronics circuits associated with WPT. The presentation will be mostly focused on high power applications in the kilowatts and tens of kilowatts range but other wireless power transfer technologies and applications of WPT, as well as environment safety, will be briefly discussed.

BIOGRAPHY

Dr. Chris Mi is a fellow of IEEE and a distinguished lecturer of the IEEE Vehicular Technology Society. He is Professor of Electrical and Computer Engineering at the University of Michigan, Dearborn, and the Director of the DOE funded GATE Center for Electric Drive Transportation. He received the B.S. and M.S. degrees from Northwestern Polytechnical University, Xi’an, China, and the Ph.D. degree from the University of Toronto, Toronto, Canada, all in electrical engineering. Previously he was an Electrical Engineer with General Electric Canada Inc. He was the President and the Chief Technical Officer of 1Power Solutions, Inc. from 2008 to 2011. His research interests are in electric and hybrid vehicles. He has taught tutorials and seminars on the subject of HEVs/PHEVs for the Society of Automotive Engineers (SAE), the IEEE, workshops sponsored by the National Science Foundation (NSF), and the National Society of Professional Engineers. He has delivered courses to major automotive OEMs and suppliers, including GM, Ford, Chrysler, Honda, Hyundai, Tyco Electronics, A&D Technology, Johnson Controls, Quantum Technology, Delphi, and the European Ph.D School. He has offered tutorials in many countries, including the U.S., China, Korea, Singapore, Italy, France, and Mexico. He has published more than 100 articles and delivered 30 invited talks and keynote speeches. He has also served as a panelist in major IEEE and SAE conferences.