IET Toronto Local Network Event

Technical Presentation

Date: 20th November 2014

Time: Arrive at MARC at 18:30
Presentation starts at 18:45 for approximately 1hr with Q&A session.

Title: "48V Electrification Systems: An overview of Belt Assisted Started systems"

Speaker: Dr. Sanjaka G. Wirasingha

The "2025 fuel economy requirement" mandates that passenger cars and trucks in the U.S. deliver a fuel economy equivalent of 54.5 miles per gallon (mpg) by 2025. The new fuel-economy standard impacts cars manufactured as early as 2017, requiring automakers to make incremental changes in fuel efficiencies to reach a combined average target of 34.1 mpg within the next five years. The eventual goal for 2025 is to approximately double the efficiency of vehicles on road today.

In order to achieve this goal, auto makers are exploring a multitude of solutions including weight reduction, smaller engines, optimized auxiliary loads and electrification of powertrains. Electrified powertrain systems employ electrical propulsion to offset the fuel consumption in conventional powertrains by fully or partially replacing the ICE with an electric motor drive. The high energy efficiency of the electric traction makes it a highly attracted solution for the design of fuel efficient vehicles. A benefit of electrification is the ability to conserve energy through regenerative braking for added improvement in the fuel economy. This is accomplished by operating an electric machine as a generator to convert the inertial energy of the vehicle during braking into electrical energy and storing it in the battery to be reused for propulsion by the same machine or another traction motor integrated to the system. A belt starter generator (BSG) system will also allow the vehicle to turn the engine off during idle and other non-propulsion events, events with inefficient engine operating points further improving fuel economy and reducing emissions.

A 48V electrification system can be classified as a micro or mini HEV. It is essentially a combination of a high power starter and low power parallel hybrid having the ability to start the engine, provide electric assist, maintain regenerative braking and serve as a generator. In some rare instances, it also drives in EV mode. This presentation will provide a detail overview of the importance of vehicle electrification and the position of 48V BSG systems amongst the many electrification topologies/drivetrains. An overview of a BSG system including functional objectives, topologies, requirements and integration among other topics are provided followed by a detail review of key components of a BSG system. A high level summary of currently available BSG systems is also provided.

The Speaker

Dr. Sanjaka G. Wirasingha received his Ph.D. degree in Electrical Engineering from Illinois Institute of Technology (IIT), Chicago, IL, USA in 2010. His Ph.D. dissertation was under the supervision of Dr. Ali Emadi and titled "System level analysis of PHEVs: classification, electrification, energy efficiency, and control strategies."

Dr. Wirasingha is currently employed as Senior Engineer in the Electrified Power Train Group at the Chrysler Group LLC, Detroit, USA, where he was initially responsible for system requirements, integration and validation of the Power Electronic Sub-System of the Fiat 500e. He is currently responsible for system, design and releasing of 48V electrification components.

Dr. Wirasingha is also an Adjunct Faculty member in the Department of Electrical and Computer Engineering at McMaster University, Hamilton, Ontario, Canada. He is the recipient of numerous awards including the Grand Prize for M.S. Research on the hybridization of a transit bus from India, his M.S. Thesis, 2014 Best Vehicular Electronics Paper Award by IEEE-VTS and the Chrysler Innovation Award.

The Venue

Room: MARC 266

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