Driving the technology behind fuel-efficient electric cars

July 13 2016, by Emma Lowry

Credit: University of Nottingham

An £830K research project to speed up the shift from fossil-fuel reliant to greener, quieter and cheaper electric vehicles, using low carbon propulsion technologies, is being run at The University of Nottingham.

The research, led by an EPSRC Challenge Network in Automotive Power Electronics, aims to support innovation in electrically-powered drive trains to benefit the entire UK automotive supply chain.

This important early-stage research will help to develop power electronics, a key enabling technology for all hybrid-electric and electric vehicles for application in the automotive sector.

Accelerating adoption of energy-efficient technologies

The results will yield direct environmental and economic benefits, ensuring that the UK automotive supply chain is well-positioned to grow its share of the global market.

"Timely application of power electronics will enable and accelerate the development and adoption of energy-efficient and environmentally-friendly technologies," said Director of the Challenge Network, Professor Mark Johnson, from the Faculty of Engineering at Nottingham.

"This is critical as manufacturers race to meet higher fuel-efficiency standards and cut the cost of in-car electrics, which currently make up 45 per cent of costs in modern hybrid cars.

"The EPSRC Challenge Network in Automotive Power Electronics will bring together the academic and industrial communities to identify and address the long-term challenges in the design and manufacture of automotive electrical-power conversion and conditioning systems."

In the longer term manufacturers of power electronic modules and systems stand to gain benefits through expanded material and processing knowledge, an extended capability in high reliability packaging and integration and greater understanding of automotive system requirements.

Benefits to other engineering sectors

In addition, the Challenge Network findings will reap significant benefits in other areas. Professor Johnson, also Director of the EPSRC Centre for Power Electronics, said: "In aerospace and rail transport, for example, integrated power electronics will permit weight reduction and yield improved safety and reliability.

In the energy sector, major opportunities are apparent in power quality control, in the renewable energy system market, in the emerging "smart grid", and in the consumer appliances sector."

Researchers working in fields such as thermo-fluids, mechanical engineering, advanced manufacturing, physics and materials science, will be encouraged to participate in the themed workshops. They will also be invited to attend sandpits, an annual conference on power electronics, roadmap events and feasibility studies with the explicit aim of building collaborative links that can be exploited to generate additional research funding addressing the long-term technical challenges.

UK strength in power electronics

"UK-based technology and manufacturing capability is currently very strong in the power electronics sector. It is arguably one of the few areas in the electronics industry where the UK is internationally competitive across the whole supply chain from power device die, packaging and power modules to converters and drive systems," said Jon Clare, Deputy Director of the Challenge Network and Professor of Power Electronics at the University of Nottingham.

"The Network Challenge will provide improved design methodologies, life tests and standards that will facilitate the design and product qualification process resulting in shorter time to market. This means automotive system providers will benefit from early access to enhanced integration technologies and design methodology giving them a competitive advantage."

Provided by University of Nottingham