UK researchers aim to develop ways to control and charge robots remotely

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Researchers at three top UK universities are developing new ways to simultaneously power and communicate with robots and other digitally connected devices – commonly known as the Internet of Things.

Lancaster University, King's College London and the University of Leeds are working on the £1million SWIFT project, which is the first collaborative UK effort to address the theory and practicalities of simultaneously transferring information and power across wireless networks.

The SWIFT project constitutes a paradigm shift in future wireless networks as it targets fundamental issues regarding the modelling, analysis, and design of wireless communication systems.

Funded by the Engineering and Physical Sciences Research Council (EPSRC), the SWIFT project is supported by leading UK industry partners in the field including Thales, the Mobile VCE, Instrumentel and Lime Microsystems along with prominent international partners from Princeton University and the National University of Singapore.

By bringing together acknowledged experts from information theory, control theory, wireless communications and microwave engineering, this project aims to work out how to wirelessly transfer energy, identify ways networks can be upgraded to enable power transfer to happen, and create a working prototype at the National Facility for Innovative Robotic Systems at Leeds.

Professor Zhiguo Ding, from Lancaster University's School of Computing and Communications, said: "This project is the first interdisciplinary initiative to promote innovation and technology transfer between academia and industry in the UK for one of the most challenging and most important problems in future communication networks."

Professor Ian Robertson, of the University of Leeds' School of Electronic and Electrical Engineering, said: "Wireless power transfer to robots provides many exciting opportunities: In the 1960s, Raytheon demonstrated that a large model helicopter could be remotely powered by a microwave beam and elevated to 50 feet. However, there are many challenges that need to be addressed to make such an approach economical and safe."

Professor Arumugam Nallanathan, from King's College London, said: "This research will bring significant benefits to a range of applications including environmental monitoring, tactical surveillance, intelligent transportation, wireless healthcare, future factories, and smart cities."

Wireless power transfer dates back to the pioneering work of Tesla, who experimentally demonstrated wireless energy transfer (WET) in the late 19th century. Short-range wireless charging of mobile phones and other gadgets is about to become standard practice in consumer electronics thanks to the new "Qi" standard from the Wireless Power Consortium and even electric vehicles can be charged from special units integrated into the road.

Wireless communication systems employ electromagnetic waves in order to transfer information. Up until recently, the information transmission capacity of these signals has been the main focus of research and applications, neglecting their energy content. However, thanks to recent advances in silicon technology, the energy requirements of embedded

systems have been significantly reduced, making electromagnetic waves a potentially useful source of energy.

The project is due to run for three years.

Provided by Lancaster University