

Postgraduate Studentships Queen's Doctoral Training Programme on Secure Connected Intelligent Design and Manufacturing

School of Electronics, Electrical Engineering and Computer Science

PhD Studentship 2020/21

Proposed Project Title: DTP: ML-Driven Millimetre-wave Industrial Wireless	
Principal Supervisor: Professor Simon Cotton Contact Details: ECIT GRI, Queen's Island, Belfast Tele No: +44 (0)28 9097 1877 E-Mail: simon.cotton@qub.ac.uk	Research Area Wireless Communications <hr/> Proposal open to other School (indicate area of Interest) <hr/>
Degree linked to ELE	
<p>This project is part of the Queen's Doctoral Training Programme in Secure Connected Intelligent Design and Manufacturing. Many of today's industrial approaches require transformative changes to ensure long term societal, economic and environmental resilience and sustainability. PhD projects in this programme explore the potential of emerging digital technologies, such as artificial intelligence, robotics, and the Internet of Things, to transform the way we design, manufacture and operate products and services.</p> <p>The programme offers a bespoke research and training programme that aims to develop students into cross-disciplinary, industry-conscious thinkers and leaders who will influence the roadmaps of future advanced manufacturing technologies and their applications. They will have a balanced understanding of ICT (security, communications and data analytics) in the context of their application to Advanced Manufacturing and High Value Design.</p>	
Project Description: <p>With Industry 4.0 beginning to see widespread adoption around the globe, researchers are already beginning to turn their attention to developing the next generation of industrial technologies. Part of this evolution will see even greater connectivity of cyber-physical systems with the real and virtual worlds leading to data exchange on an unprecedented scale. For example, this may take the form of machine-to-machine (M2M) communication, machine-to-person (M2P) communication or machine type communication used to connect industrial devices to 5G infrastructure.</p> <p>With wireless spectrum in the sub-6 GHz region already oversubscribed, many of these applications will move to operate at millimetre-wave (mmWave) frequencies (between 30 and 300 GHz). Unfortunately, at present, very little is known about the behaviour of the mmWave channel within industrial settings. This knowledge is not only essential for robust wireless systems design but also understanding the limitations of the channel in relation to service delivery.</p> <p>The aim of this PhD study will be to develop an understanding of the mmWave channel for industrial wireless communications through simulation and experimentation. Building upon this knowledge, novel machine learning (ML) / artificial intelligence (AI) algorithms will be developed to help assist with smart, context aware decision making at the physical (PHY) and medium access control (MAC) layers for industrial applications.</p> <p>Throughout the course of the study, the PhD student will have the opportunity to work with a multi-disciplinary team of experts in the areas of wireless communications, intelligent systems and manufacturing. Additionally, they will develop knowledge / skills in the areas of industrial wireless, digital manufacturing, ML and AI, and MATLAB as well as having the opportunity to attend top national and international conferences.</p>	

Objectives:

The main objectives of this research are:

- To investigate emerging wireless technologies for industrial applications.
- Perform measurements to characterise the mmWave channel with industrial settings.
- Develop novel ML / AI algorithms to assist with smart, context aware decision making at the PHY and MAC layers.
- To disseminate research findings at top national and international conferences, and publish in leading IEEE journals.

Academic Requirements:

A minimum 2.1 honours degree or equivalent in Computer Science or Electrical and Electronic Engineering or relevant degree is required.

GENERAL INFORMATION

This 3.5 year PhD studentship, potentially funded by the Department for Employment and Learning (DfE), commences on 1 October 2020.

Eligibility for both fees and maintenance (approximately £15,000) depends on the applicants being either an ordinary UK resident or those EU residents who have lived permanently in the UK for the 3 years immediately preceding the start of the studentship. Non UK residents who hold EU residency may also apply but if successful may receive fees only.

Applicants should apply electronically through the Queen's online application portal at: <https://dap.qub.ac.uk/portal/>

Further information available at: <https://www.qub.ac.uk/schools/eeecs/Research/PhDStudy/>

Closing date for applications: 15 March 2020