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: Information Centric Networking - A New Approach towards Secure and Resilient Industry 4.0 Communications

Principal Supervisor:
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Research Area

Cyber Security / CSIT _____

Proposal open to other School **(indicate area of Interest)**

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Degree linked to ELE

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.

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.

Project Description:

Information Centric Networking (ICN) is a clean slate networking architecture, which represents an innovative alternative to the existing TCP/IP networking orthodoxy. Its goal is to replace traditional host-to-host communication with location-independent data, that can be accessed by a process similar to existing publish and subscribe systems, where data requests based on its content rather than where it is located (i.e. an IP address). ICN is still in the early stages of development and there are a few competing technologies; one of these is called Named Data Networking (NDN) [1].

This PhD project will aim to investigate the use of NDN communications in an Industry 4.0 context. By embracing IoT concepts for networking, edge-computing and cloud technology, Industry 4.0 will see dramatic changes in the networking paradigms adopted in manufacturing in the coming years. This project will explore practical experiments in the usage, efficiency, latency and resilience characteristics of NDN technology for application in Industry 4.0 environments.

[1] https://named-data.net/

Objectives:

- Study research literature on emerging NDN software and platforms, as well as industry information and technical roadmaps regarding Industry 4.0 networking requirements and novel IoT-based architectures.
- Develop use-cases for experimentation to investigate the functionality of NDN technologies in potential future-oriented Industry 4.0 scenarios.
- Explore solutions that allow NDN to be adaptable for Industry 4.0 scenarios where reconfigurable and dynamic manufacturing scenarios are enabled, while assuring resilient and secure networking functionality.

- Develop and execute experiments that demonstrate functionality and security with a focus on IoT-based architectures in an Industry 4.0 context.

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