

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: Fault-Tolerant Monitoring and Control in Industrial Internet-of-Things	
Principal Supervisor: Hans Vandierendonck Second Supervisor: Yan Jin (MAE) Contact Details: QUB Address: 16A Malone Road Tele No: +44 (0)28 9097 4654 E-Mail: h.vandierendonck@qub.ac.uk	Research Area Computing Systems Proposal open to other School (indicate area of Interest) Mechanical and Aerospace Engineering, Maths & Physics
Degree linked to CSC	
<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: In order to maintain competitiveness and to meet strong demands for customisation, manufacturers turn to digital transformation. Internet-of-Things technologies enable such transformation. IoT employs a network of sensors to collect critical production data and analyses this data in cloud infrastructures to glean valuable insights on the efficiency of the manufacturing operations, or to control the operations in real-time. Maintaining consistency of data and availability of software services (which may impact the availability of the manufacturing processes they control) is traditionally supported in cloud infrastructures through distributed algorithms like consensus (Paxos). However, scaling such algorithms from cloud scale to IoT scale is extremely challenging.	
Objectives: The goal of this project is to investigate and design consensus algorithms that scale to IoT-scale systems, implemented using edge computing or fog computing architectures. The opportunities that can be leveraged to achieve scalable consensus at an unprecedented scale will be sought in: the architecture of edge/fog computing systems; the industrial applications; and the geographic specifics of the network (non-uniform network latency). The focus of this project will be on distributed fault-tolerant algorithms, their scalability and their application to guarantee correctness of data stored jointly across IoT nodes.	
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