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: Deep learning-enabled video-based motion tracking for human-robot interaction in assembly tasks

First supervisor: Prof. Seán McLoone
Secondary supervisor: Dr. Joost C. Dessing

Contact Details: School of EEECS, Ashby Tower QUB Address
Tele No: 028-90974125
E-Mail: s.mcloone@qub.ac.uk

Research Area

Computer Science, Psychology

Proposal open to other School (indicate area of Interest)

Psychology

Degree linked to CSC (delete as appropriate)

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:

Manufacturing environments of the future will involve humans interacting with robots at close distance. Optimisation of these interactions will require continuous recordings of human movements, to feed into the control algorithms governing the robot movements. Although commercial motion tracking systems are available, these cannot practically be applied in most manufacturing environments, since these are costly and require sensors to be attached to the body at precisely specified positions. Modern computational tools for extracting patterns from image-based may provide a viable alternative. In recent years, machine learning has been used to extract body parts and body postures from images of human or animal bodies. When applied to videos – sequences of images – this method potentially affords extracting 3D body movements without having to attach sensors to the body. This, however, is not yet optimized to afford the aforementioned applications and the current PhD project will address several outstanding challenges in this field. It will for instance focus on improving training data based on video recordings synchronised with state-of-the-art full body motion tracking and appropriating the algorithms to account for motion patterns across frames.

Objectives:
This project is anticipated to provide a tools for 3D movement recording for human-robot interactions during assembly tasks, but it is highly likely the tools will generalize to all situations requiring motion tracking.

Academic Requirements:

A minimum 2.1 honours degree or equivalent in Computer Science, Psychology 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