**PhD Project Proposal**

School of Electronics, Electrical Engineering and Computer Science

& ECIT Global Research Institute

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| **Proposed Project Title:**  **In-Time and In-Space Sharing of FPGA Resources in Cloud/Edge Ecosystems** |
| **Principal Supervisor: Dr. Georgios Karakonstantis** |
| **Keywords:**  **Project Description:**  There has been an increased interest, recently, to integrate Field Programmable Gate Arrays (FPGAs) in data centres and share them across heterogeneous tasks and multiple users. However, their architecture and programming environment requires a different resource sharing model when compared to software programmable accelerators. In fact, the constraints arising from their architecture and programming attributes have limited current models on sharing FPGAs mainly in-time with only one user or task taking access to each FPGA. However, by trying to share the FPGA resources in-space in addition to in-time opens up new opportunities in utilizing the available resources which may have been under-utilised by any user in the traditional sharing model.  This project aims at investigating task scheduling schemes that maximize the sharing of FPGA resources, while meeting throughput and/or power budgets. During the project OpenCL high-level programming model will be used to map and characterize in terms of resources, power and execution various available benchmarks under potential in-place and in-time sharing scenarios. Based on the experimental data appropriate task scheduling policies will then be developed to direct the sharing of FPGA resources under a set of given constraints.  The PhD studentship will be based at the Data-Science and Scalable Computing Centre (DSSC) of the Queen’s Global Research Institute of Electronics, Communications and Information Technology (ECIT).  The PhD student will join a prolific team of PhD students and Research Fellows and extend our work published recently in well-known conferences, such as [FPL 2018](https://pure.qub.ac.uk/portal/en/publications/facilitating-easier-access-to-fpgas-in-the-heterogeneous-cloud-ecosystems(d2d4a3ac-0568-4fc6-afa4-9a53c4134045).html) and [ARC 2018](https://pure.qub.ac.uk/portal/en/publications/exploring-functional-acceleration-of-opencl-on-fpgas-and-gpus-through-platformindependent-optimizations(f6dd9cd6-5b16-4877-9579-d1fbd0cd8e90).html). |
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