**PhD Project Proposal**

School of Electronics, Electrical Engineering and Computer Science

& ECIT Global Research Institute

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| **Proposed Project Title:**  **Failure Prediction based on Data Mining for Energy-Efficient & Dependable Cloud/Edge Ecosystems** |
| **Principal Supervisor: Dr. Georgios Karakonstantis Second Supervisor: Dr. Jesus Martinez-del Rincon** |
| **Keywords:** Machine learning, Failure prediction, Memories, Edge/Cloud Data Centres  **Project Description:**  The explosive growth of generated data by the increasing number of connected devices and the resultant need for more memory capacity is driving the aggressive scaling of memories. However, miniature transistor sizes makes memories prone to failures, which cost data centre operators a lot since many parts need to be discarded to avoid catastrophic system crashes. Our recent work together with Industrial labs, have already started investigating the source and prediction of such failures. However there are many workload dependent and environmental features that may affect the reliable memory operation, which require intelligent investigation.  The aim of this project is to utilize supervised and/or unsupervised learning based methods for building workload aware failure prediction models. Data extracted from state-of-art DDR3, DDR4 and non-volatile memories using a unique experimental thermal testbed that can be attached on real embedded devices and servers, that is already available in our lab, will be used to develop the machine learning models. New data protection schemes as well as power-reliability management policies will be developed and evaluated using various multimedia and artificial intelligence benchmarks.  The PhD studentship will be based at the DSSC Centre 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 utilize our unique experimental infrastructure to extend the work being published recently in IEEE [DSN 2018](https://pure.qub.ac.uk/portal/en/publications/measuring-and-exploiting-guardbands-of-servergrade-armv8-cpu-cores-and-drams(547b2ecd-2123-4436-a140-3287a149c95b).html) and [IOLTS 2018](https://pure.qub.ac.uk/portal/en/publications/dram-characterization-under-relaxed-refresh-period-considering-system-level-effects-within-a-commodity-server(f6dd1aa3-7b4d-4c2b-8377-7df0cbb62f87).html). |
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