**PhD Project Proposal**

School of Electronics, Electrical Engineering and Computer Science

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| **Proposed Project Title:** Quantum Acceleration for High Performance Data Processing |
| **Principal Supervisor:** John McAllister |
| **Project Description:**  Digital data processing devices pervade our everyday lives, their ubiquity driven by 50 years of Moore’s Law. Moore’s Law is now at an end, yet the demands of ever more complex data processing applications continues relentlessly. This presents a major problem for designers of embedded data processing technologies everywhere, from mobile communications through video and image processing to large-scale data processing applications.  Recent advances in quantum computing technologies promise a resolution to this issue, enabling low cost, ultra-low power supercomputing. However, adopting quantum computing techniques requires a radical reworking of the fundamental operations upon which these fields are founded: algebra, statistical analysis, machine learning and many many others. Early results in this area are highly encouraging but are a ‘drop in the ocean’.  This project addresses this technological shortcoming, developing parallel algorithms/architectures to power quantum computing for next-generation data processing.  **Objectives:**   1. To study quantum computing techniques and algorithms for data processing 2. Analyse the suitability of existing algorithms for quantum computing platforms. 3. Devise novel parallel algorithms/architecture for 2 and quantify the improvement over conventional techniques. 4. Present initial results in international data processing forums. 5. Publish findings in IEEE journals. |
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