POSITION DESCRIPTION

Quantum Computing: Applied Algorithm Researcher

Position Level  | B/C
Faculty/Division  | Science
Position Number  | 00095086
Original document creation  | 26/05/2021

Position Summary

The Applied Algorithm Researcher works with world-leading atomic electronics and quantum computing teams at Silicon Quantum Computing Pty Limited (SQC) and the Australian Centre of Excellence for Quantum Computation and Communication Technology (CQC²T or Centre) based at UNSW Sydney.

The Applied Algorithm Researcher works on the realization of quantum algorithms on NISQ computers, to develop and analyse quantum information algorithms and translate them into hardware and software implementation requirements on a silicon-based quantum computer. The research includes the implementation of quantum and quantum-classical hybrid algorithms for solving fundamental and real-world problems.

This position reports to Professor Michelle Simmons and works alongside other staff and students funded by SQC as well as CQC²T. While this role does not have any direct reports, it is expected that they will assist where necessary with the supervision of other team members.

Accountabilities

Level B:

Specific accountabilities for this role include:

- Use simplified versions of quantum algorithms to test the efficacy of the silicon hardware technology.
- Work on the theory of quantum algorithms to better understand the long-term direction of quantum computing, as well as how to fully utilize near-term quantum devices.
• Investigate methods that lead to a quantum advantage on NISQ computers.
• Explore the implementation of algorithms on near-term, small scale atom-based silicon hardware.
• Determine how critical fault-tolerant qubits are for quantum algorithms.
• Make a significant contribution to the field of quantum information.
• Where appropriate, take leadership of research projects.
• Work with a multidisciplinary team of quantum physicists, engineers, technicians, postdoctoral researchers and PhD students to identify early-stage opportunities for algorithm implementation on silicon-based quantum computer devices.
• Cooperate with all health and safety policies and procedures of the university and take all reasonable care to ensure that your actions or omissions do not impact on the health and safety of yourself or others.
• Align with and actively demonstrate the UNSW Values in Action: Our Behaviours and the UNSW Code of Conduct.

Level C:
In addition to the above:
• Assume a significant role in research projects including, where appropriate, leadership of a research team.
• Supervise a program of study of postgraduate students.

Skills and Experience

Level B:
• A Ph.D. in Physics, Computer Science, Mathematics, or a related area.
• Demonstrated outstanding research capabilities developing quantum algorithms and implementing algorithms on quantum computing architectures.
• Experience writing high-performance algorithm implementations, preferably in Python, MATLAB, C/C++, or equivalent. GPU programming experience (CUDA).
• Theoretical background in at least one of: quantum information/simulation, quantum chemistry, QML, or NISQ computing.
• Experience designing and developing models and complex algorithms, both analytical and numerical, for classical and quantum computing.
• Knowledge of proper software development practices, e.g., documentation, testing, design patterns, version control (e.g., git), etc.
• Experience with exploratory data analysis and database management.

Level C:
In addition to the above
• Extensive internationally significant research.
• Demonstrated ability to conduct independent research.
- An excellent research track record in the discipline area as evidenced by conference presentations and publications.
- Significant experience in HDR student supervision.

This Position Description outlines the objectives, desired outcomes, key responsibilities, accountabilities, required skills, experience and desired behaviours required to successfully perform the role.

This template is not intended to limit the scope or accountabilities of the position. Characteristics of the position may be altered in accordance with the changing requirements of the role.