Position Description

Quantum Computing: Senior Software Engineer

OVERVIEW OF RELEVANT AREA AND POSITION SUMMARY

This position is fully funded by Silicon Quantum Computing Pty Ltd. With confirmed funding to 2023 the company is expanding and seeking dedicated, enthusiastic and technically skilled researchers to join the UNSW Sydney R&D team.

This role is based within the School of Physics at UNSW Sydney (the employer); working alongside the Centre of Excellence for Quantum Computation and Communication Technology, one of Australia’s elite research centres conducting world-leading research in atomic electronics and quantum computing.

The applicant will join the world-leading team of Professor Michelle Simmons, who has an international reputation for developing a radical new technology for building precision single atom qubits in silicon. With the recent demonstration of single atom qubits in natural silicon with world record coherence times and the highest fidelity single shot spin read-out, this group is poised to scale to 10 qubit architectures within the next 4 years. The team is now seeking dynamic and enthusiastic researchers to join them.

Statistics:

- Silicon Quantum Computing Pty Ltd (SQC) is a well-funded Australian company with $83m investment from the Commonwealth Government, the CBA, Telstra, the NSW Government and UNSW Sydney.
- It has a 5 year business plan to build a 10-qubit prototype quantum computer in silicon. The company builds off ~15 years of research in the development of a quantum computer in silicon at the Centre of Excellence, where Australia has established globally unique approach to building qubits using single atoms in silicon.
- SQC has ~40 researchers, technical staff, students and other staff to build the 10-qubit prototype with leading edge research facilities costing in excess of $150 million.
- The company is located at UNSW Sydney, the headquarters of the Centre of Excellence. The Centre also employs more than 220 researchers, technical staff, students and other staff.
- The Centre has 25 international partners, including formal relationships with NASA, IMEC, Quintessence Labs, Omicron Nanotechnology, Defence Science and Technology Organisation, Sandia, Zyvex Laboratories as well as leading University groups at Harvard, Oxford, Cambridge, IQC, Maryland, MIT, Sherbrooke, Tokyo, Max-Planck Institute for Light, University of Wisconsin-Madison, Bristol, Walter Schottky Institute, Purdue University and National University of Singapore.

An opportunity exists for an experienced Senior Software Engineer to work with our world leading atomic electronics and quantum computing team. This position is based with the company Silicon Quantum Computing (SQC) Pty Ltd, co-located with the Centre of Excellence, one of Australia’s elite research centres conducting world-leading research in atomic electronics and quantum computing. Silicon Quantum Computing is an Australian Research and Development company, working hard to make quantum computers a reality.
The company is expanding and seeking an experienced Senior Software Engineer, with a strong background in general purpose programming languages and software architectures, to optimize the software layer that interfaces our low noise, cryogenic measurement instrumentation. This will include the ongoing development, and implementation of architectures to perform software-based data analysis and data handling while interfacing with experimental control hardware such as DACs, ADCs, signal generators etc. Ultimately this role will oversee the front end to interface to third party solutions, designed to execute quantum algorithms. A key function of this role will be to stay up to date with the commercial landscape of quantum computing software and review potential commercial and open source opportunities for partnership or integration.

The role of Quantum Computing: Senior Software Engineer reports to the Director, Silicon Quantum Computing Pty. Ltd; Director, Centre of Excellence for Quantum Computation and Communication Technology and has no direct reports.

**ORGANISATIONAL CHART**
RESPONSIBILITIES

Specific responsibilities for this role include:

- Develop, optimise and implement software architectures to interface with control hardware such as DACs, ADCs, signal generators, etc. whilst performing software-based data handling and analysis.
- Collaborate with hardware engineers to optimise software for measurement, benchmarking and applications.
- Collaborate with quantum computing researchers to develop control software for specific experimental protocols/algorithms.
- Review and assess commercial and open source opportunities for integration and/or collaborative partnerships.
- Write software documentation and manage version control across the company.
- Develop software interfaces to FPGA-based data acquisition and analysis applications.
- Plan and develop the user interface of the quantum computing stack to integrate with third-party quantum software development kits (e.g. QisKit or Azure Quantum).
- Contribute to the development of innovative concepts and ideas for further research.
- Develop automated solutions and pipelines in support of research projects.
- 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.

SELECTION CRITERIA

- Bachelor’s degree in Computer Science, Computer Engineering or related discipline.
- Demonstrated professional experience in software development, especially Python.
- Demonstrated experience in programming for hardware communications, with particular attention to synchronisation of tasks and efficiency of execution time.
- Demonstrated experience in multi-process and/or multi-threaded programming.
- Demonstrated ability to work independently and as part of a team to contribute to overall research and development goals.
- Exceptional interpersonal skills, with a proven record of being able to develop and sustain strategic relationships.
- Strong written and verbal communication skills, including an ability to create documentation and write reports.
- Knowledge of health and safety responsibilities and commitment to attending relevant health and safety training.

DESIRABLE

- Requirements analysis, management, and documentation.
- Digital Signal Processing techniques, with an emphasis on implementation in FPGA technology.
- Real time data processing and analysis for streaming data systems.
- Demonstrated experience as part of complex research and development projects.
- Demonstrated experience with python-based control and measurement frameworks.

**PRE-EMPLOYMENT CHECKS REQUIRED FOR THIS POSITION**

- Criminal record check.
- Verification of qualifications.

An appointment to this position is subject to the approval of Silicon Quantum Computing Pty Ltd (“SQC”). Personal information submitted as part of an application for this position may be disclosed to SQC for the purpose of processing the application.

The role is based at the Centre for Quantum Computation and Communication Technology (CQC2T), UNSW Sydney Kensington Campus.

Silicon Quantum Computing is an equal opportunity employer. We celebrate, support and thrive on inclusivity for the benefit of both employee and company.
ORGANISATIONAL ENVIRONMENT

UNSW is currently implementing a ten-year strategy to 2025 and our ambition for the next decade is nothing less than to establish UNSW as Australia’s global university. We aspire to this in the belief that a great university, which is a global leader in discovery, innovation, impact, education and thought leadership, can make an enormous difference to the lives of people in Australia and around the world.

Following extensive consultation in 2015, we identified three strategic priority areas. Firstly, a drive for academic excellence in research and education. Universities are often classified as ‘research intensive’ or ‘teaching intensive’. UNSW is proud to be an exemplar of both. We are amongst a limited group of universities worldwide capable of delivering research excellence alongside the highest quality education on a large scale. Secondly, a passion for social engagement, which improves lives through advancing equality, diversity, open debate and economic progress. Thirdly, a commitment to achieving global impact through sharing our capability in research and education in the highest quality partnerships with institutions in both developed and emerging societies. We regard the interplay of academic excellence, social engagement and global impact as the hallmarks of a great forward-looking 21st century university.

To achieve this ambition, we are attracting the very best academic and professional staff to play leadership roles in our organisation.

VALUES IN ACTION: OUR UNSW BEHAVIOURS

UNSW recognises the role of employees in driving a high-performance culture. The behavioural expectations for UNSW are below.

- Delivers high performance and demonstrates service excellence.
- Thinks creatively and develops new ways of working. Initiates and embraces change.
- Works effectively within and across teams. Builds relationships with internal and external stakeholders to deliver on outcomes.
- Values individual differences and contributions of all people and promotes inclusion.
- Treats others with dignity and empathy. Communicates with integrity and openness.

It is not the intention of the position description to limit the scope or accountabilities of the position but to highlight the most important aspects of the position. The aspects mentioned above may be altered in accordance with the changing requirements of the role.