Position Description

Research Associate

Position Number: 00074559 *Position Title: Research Associate* *Date Written: February 2020*	*Faculty / Division: Faculty of Engineering* *School / Unit: School of Electrical Engineering and Telecommunications* *Position Level: Level A*

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.

Please refer to the UNSW Behavioural Indicators for the expectations of your career level (level A).

Demonstrates Excellence	Delivers high performance and demonstrates service excellence.
Drives Innovation	Thinks creatively and develops new ways of working. Initiates and embraces change.
Builds Collaboration	Works effectively within and across teams. Builds relationships with internal and external stakeholders to deliver on outcomes.

Values in Action
Our UNSW Behaviours



Values individual differences and contributions of all people and promotes inclusion.



Treats others with dignity and empathy. Communicates with integrity and openness.

OVERVIEW OF RELEVANT AREA AND POSITION SUMMARY

The School of Electrical Engineering and Telecommunications has a vibrant research culture reflected in the achievements of its academic staff, and is currently rated as a level 5 ERA School ("Well above world standard") in each of the 2010, 2012 and 2015 Excellence in Research Australia evaluations. The School enjoys a world-leading reputation for research excellence, with six IEEE Fellows among our 44 academic staff. According to the Shanghai Jiaotong 2016 rankings, EE&T@UNSW is placed first in Australia. The School has innovated significantly by introducing the first 5-year integrated bachelors/masters (with minor) and first (non-conversion) 2-year accredited masters programs, each with a major component of engineering design. These innovations have positioned the School in a period of very strong growth. Nationally, the School offers the most complete range of undergraduate and postgraduate electrical engineering and telecommunications programs, and is the largest of its kind. The School community has recently moved into a completely refurbished building equipped with state-of-the-art facilities for teaching and research. With a team that is recognised for its teaching excellence and innovative research, the School is producing the next generation of innovative engineers who will be equipped with the skills and knowledge to make a positive impact on industry and society. http://www.engineering.unsw.edu.au/electrical-engineering/.

The Research Associate will undertake research in the recently establish project: "**Quantum control based on real-time environment analysis by spectator qubits**" The project aims at demonstrating an unprecedented capability: a noise-cancelling system for quantum bits in silicon. The role will contribute to the design, fabrication and operation of a system of spin-based quantum bits in silicon where one acts as the "spectator" and the other as the "data" qubit. The Research Associate will develop and implement advanced control sequences for complex, multi-spin devices, in liaison with our theory collaborators, and contribute to the design and fabrication of silicon nanoscale devices where the spins can be operated and read out. While the project is based upon silicon spin qubits, we encourage applications from researchers with experience in quantum control of superconducting qubits, trapped ions or cold atoms. Many of the techniques developed in those fields for the control of multi-level quantum systems will be extended to complex spin systems within this project.

The Research Associate will join a team, led by Scientia Professor Andrea Morello, that has made several landmark demonstrations in the field, including the world's first single-atom spin qubit in silicon and single-qubit gate fidelities amongst the highest for any solid-state qubit. For this new project, the work at UNSW Sydney will be conducted as part of a large multi-university collaboration that includes Griffith University and University of Technology Sydney in Australia, plus UC Berkeley, University of Oregon, University of Louisiana, Duke University, Johns Hopkins University, Darmouth College, and Massachusetts Institute of Technology in the United States.

The role of Research Associate reports to Scientia Professor Andrea Morello and has no direct reports.

RESPONSIBILITIES

Specific responsibilities for this role include:

- Conduct research in the area of silicon-based quantum computing, independently and as part of a team.
- Contribute to the writing of scientific papers and reports for international journals and progress reporting to other researchers and industry partners.
- Contribute to the development of semiconductor nanofabrication processes in accordance with the safety rules of the facilities in use, and assist in training PhD students in the undertaking of semiconductor nanofabrication.
- Contribute to the integration of semiconductor spin qubit devices with advanced electronic and microwave control systems.
- Contribute to the development of quantum measurement and control techniques for complex spin systems, in liaison with theory collaborators.
- Assist with the coordination of research activities and actively contribute to research outputs to meet project milestones.
- Contribute to the preparation of research proposal submissions to funding bodies and actively seek collaboration with industry partners as appropriate.
- Participate in and/or present at conferences and/or workshops relevant to the project as required.
- Assist with the supervision of research students in the research area where required.
- 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

- PhD (or soon to be awarded) in Physics or Electrical Engineering.
- Demonstrated ability to conduct independent research with limited supervision.
- Demonstrated track record of publications and conference presentations relative to opportunity.
- Demonstrated ability to work in a team, collaborate across disciplines and build effective relationships.
- Strong interpersonal skills with demonstrated ability to communicate and interact with a diverse range of stakeholders and students.
- Experience in semiconductor nanofabrication, quantum measurement and control, quantum information science.
- Knowledge of health and safety responsibilities and commitment to attending relevant health and safety training.

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.