

Position Description

Postdoctoral Research Fellow

Position Number: 00065768
Position Title: Postdoctoral Research Fellow
Date Written: 24 September 2020

Faculty / Division: Engineering
School / Unit: Electrical Engineering & Telecommunications
Position Level: Level B

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.

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 B).



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 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/>.

This role of Postdoctoral Research Fellow (PDRF) is to support the research group led by Scientia Professor Andrew Dzurak in the School of Electrical Engineering & Telecommunications. **Professor Dzurak’s group is developing the core technologies required to enable full-scale, fault-tolerant quantum processors based on silicon CMOS technology.** Over the past decade the group have demonstrated a number of breakthroughs related to this technology, including the world’s first one-qubit gates (*Nature Nanotechnology* **9**, 981 (2014)) and two-qubit logic (*Nature* **526**, 410 (2015)) based on this qubit platform, together with the first demonstration of silicon qubit operation above one kelvin (*Nature* **580**, 350 (2020)). **This PDRF will be focused on the development of measurement systems and devices to enable the coupling of spin qubits (confined in silicon-MOS quantum dots) with microwave photons (confined in superconducting resonators).** Spin-photon coupling has considerable potential for the transfer of quantum information across an integrated circuit and could have major benefits for scalability of spin qubits. The PDRF will undertake cryogenic measurements on quantum devices, undertake device design and modelling, and (depending on their experience) may also contribute to components of the micro/nanofabrication of quantum devices. The PDRF will generally contribute to project milestones of Professor Dzurak’s research group, disseminate research outcomes through the production of journal publications, conference and seminar presentations, and reports to funding bodies.

The role of Postdoctoral Research Fellow reports to Scientia Professor Andrew Dzurak and has no direct reports.

RESPONSIBILITIES

Specific responsibilities for this role include:

- Development of quantum devices and measurement protocols in support of core research goals, including:
 - Quantum device design;
 - Cryogenic measurements;
 - Data analysis and modelling.

- Conduct research in the area of silicon-based quantum computing independently and as part of a team, including leading some areas of the project where the opportunity arises and where appropriate.
- Disseminate research results through writing of scientific papers and reports for international journals and progress reporting to other researchers and industry partners.
- Participate in the definition of research directions and actively contributes to the coordination of research activities and research outputs to meet project milestones.
- Independently seek and apply for external funding opportunities to grow and enhance the research project.
- Participate in and/or present at conferences and/or workshops relevant to the project as required.
- Joint supervision of honours and HDR students and supervision of research-support and administrative staff involved in the staff member's research.
- Assistance in the training and supervision of undergraduate and graduate research students.
- Involvement (where appropriate) in the promotion of research links with outside bodies.
- Attendance at meetings associated with research or the work of the organisational unit to which the research is connected and/or departmental and/or faculty meetings.
- Participation in various research-related administrative functions.
- 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 in Electrical Engineering or Physics, and/or demonstrated ability to conduct independent research supported by strong track record of publications, conference papers, reports and/or professional and/or technical contributions in a relevant discipline area.
- Demonstrated ability to conduct independent research with limited supervision.
- Demonstrated ability to supervisor honours and postgraduate research students.
- Strong track record of publications and conference presentations relative to opportunity.
- Proven 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.
- Solid background in either semiconductor device physics or superconducting circuit technology.
- Experience in electrical measurements at cryogenic temperatures.
- 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.