



## POSITION DESCRIPTION

School of Computing and Information Systems  
Melbourne School of Engineering

# Research Fellow in Adversarial Machine Learning

*In line with the special measure H103/2014 provided for under section 12 of the Equal Opportunity Act 2010 (VIC), the Melbourne School of Engineering strongly encourages applications from suitably qualified female candidates.*

POSITION NO	0044709
CLASSIFICATION	Research Fellow Grade 1 (Level A)
SALARY	\$69,148* - \$93,830 p.a. (*PhD entry Level A.6 \$87,415)
SUPERANNUATION	Employer contribution of 9.5%
EMPLOYMENT TYPE	Full-time (fixed-term) position available for 1 year Fixed term contract type: Research
OTHER BENEFITS	<a href="http://about.unimelb.edu.au/careers/working/benefits">http://about.unimelb.edu.au/careers/working/benefits</a>
CURRENT OCCUPANT	New
HOW TO APPLY	Online applications are preferred. Go to <a href="http://about.unimelb.edu.au/careers">http://about.unimelb.edu.au/careers</a> , select the relevant option ('Current Staff' or 'Prospective Staff'), then find the position by title or number.
CONTACT FOR ENQUIRIES ONLY	Dr Benjamin Rubinstein Tel: +61 3 9035 6657 Email <a href="mailto:brubinstein@unimelb.edu.au">brubinstein@unimelb.edu.au</a> <i>Please do not send your application to this contact</i>

For information about working for the University of Melbourne, visit our website:  
[about.unimelb.edu.au/careers](http://about.unimelb.edu.au/careers)

## ***Position Summary***

Postdoctoral research fellow open in the "Adversarial Machine Learning for Cybersecurity" project in the School of Computing and Information Systems at the University of Melbourne, Australia. The 1 year full-time position is funded by the Defence Science and Technology Group, with CSIRO/Data61.

This project aims to deliver new algorithmic and theoretical results on the robustness of machine learning systems, particularly reinforcement learning, in adversarial environments. Today Machine Learning and Statistics are employed in many technologies where participants have an incentive to game the system, for example network management, autonomous vehicles, medical devices, credit risk in finance, and smart utility grids. However little is known about how well state-of-the-art inference techniques fare when data is manipulated by a malicious adversary. Less is known about how to make learners robust to manipulation. This is particularly true for reinforcement learning. Key outputs of this project include publications reporting new algorithmic and theoretical ideas in adversarial learning, and demonstrations of adversarial reinforcement learning in software-defined networking.

The ideal candidate would be an enthusiastic researcher with strong skills in: machine learning algorithms (particularly but not limited to reinforcement learning and deep learning methods), optimisation & linear algebra, and programming. Experience with machine learning applied in security (e.g., intrusion detection) or game theory is a plus.

You will be part of a cross-institutional team spanning Melbourne and Swinburne Universities, DSTG and CSIRO/Data61, who collaboratively work on all aspects of the project, from concepts, theoretical underpinning, and design, through implementation and experimentation, to publication of results, curation of data, and maintenance of generated software. You will work side by side with other researchers in machine learning, game theory and computer security.

Being located in the School of Computing & Information Sciences within the Melbourne School of Engineering, you will be expected to be an active member of the School, collaborating with other researchers. You may undertake small amounts of teaching and research supervision directly related to your area of research, as required.

The Melbourne School of Engineering is strongly committed to supporting diversity and flexibility in the workplace. Applications for part-time or other flexible working arrangements will be welcomed and will be fully considered subject to meeting the inherent requirements of the position.

The University plan seeks to increase the diversity of the workforce and the representation of women in areas they have been traditionally under-represented. Consistent with this the School is seeking to increase the representation of women in the academic workforce across engineering disciplines. Under a Special Measure, under Section 12 (1) of the Equal Opportunity Act 2010 (Vic) the School is seeking to lift the representation of women from 20% in 2014 to at least 25% over the next 5 years, and strongly encourages applications from suitably qualified female candidates.

## ***1. Selection Criteria***

### **1.1 ESSENTIAL**

- ▶ A PhD in computer science, or closely related discipline;

- ▶ Significant research experience in machine learning – or related fields of statistics, control – and familiarity with its foundations in linear algebra, probability, optimisation;
- ▶ Strong software development skills;
- ▶ A record of quality research as evidenced by publications in leading journals and at conferences commensurate with opportunity;
- ▶ Ability to perform independent research and a commitment to interdisciplinary research;
- ▶ Demonstrated capacity to communicate research concepts to technical and non-technical audiences;
- ▶ Excellent ability in analysing data, problem solving and maintaining accurate research records;
- ▶ Capability for innovative research, as evidenced by scholarly publication;
- ▶ Experience in using initiative, working with minimal supervision and ability to prioritise tasks to achieve project objectives within timelines;
- ▶ Excellent written and verbal communication skills, demonstrated by presentation of research results at conferences, internal forums and through manuscript submissions;
- ▶ Excellent interpersonal skills, including an ability to interact with internal and external stakeholders (academic, administrative and support staff) in a courteous and effective manner.

## 1.2 DESIRABLE

- ▶ Experience with adversarial machine learning, game theory or computer security;
- ▶ Experience in supervision of students and/or research assistants;
- ▶ Experience in the completion of ethics applications and submission of grant applications;
- ▶ Ability to structure, engage and present information clearly to various audiences;

## 2. *Special Requirements*

None

## 3. *Key Responsibilities*

### 3.1 RESEARCH – ADVANCEMENT OF THE DISCIPLINE

- ▶ Independently plan and carry out research on the nominated research project and work towards completion of the aims of the project;
- ▶ Develop effective timelines and milestones based on goals of the research programme;
- ▶ Perform data and microstructure analysis, and be responsible for qualitative and statistical analysis of research data and to communicate this information to the Chief Investigators and collaborators;
- ▶ Regularly write technical reports on the outputs of the experiments conducted, and maintain accurate and detailed records of all experiments conducted;
- ▶ Leadership and participation in preparation of manuscripts for publication in peer-reviewed journals;
- ▶ Liaise effectively with collaborators with a variety of internal and external stakeholders;

- ▶ Assist other researchers in carrying out experiments in order to work as a team and further the department's research output;
- ▶ Contribute to the development of the School's strong research program in machine learning and cybersecurity;
- ▶ Work towards building an independent research project;

### 3.2 TEACHING AND LEARNING

- ▶ Contribute to teaching, training, scientific mentoring and supervision of students;
- ▶ Supervise junior research staff in the appointee's area of expertise;
- ▶ Conduct lectures, tutorials, mark and undertake laboratory duties as required by the School. (if required)

### 3.3 ENGAGEMENT

- ▶ Effective liaison with external collaborators for example at Defence, CSIRO/Data61, to foster partnerships and opportunities for impact;
- ▶ Active participation in some outreach activities relating to research and scholarship;
- ▶ Involvement in professional activities, including consultations and referrals;
- ▶ Present results at local, national, and international forums, and to external industry stakeholders;
- ▶ Attend and actively participate in departmental seminars, meetings and/or committee memberships.

### 3.4 SERVICE AND LEADERSHIP

- ▶ Active participation in the communication and dissemination of research;
- ▶ Identify sources of funding to support individual or collaborative projects, relating to teaching, research and engagement practice in the discipline;
- ▶ Effective supervision of research support staff;
- ▶ Service on national and international program committees or editorial boards, and reviewing of papers in the nominees area of expertise.

### 3.5 OTHER

- ▶ Perform other tasks as requested by the supervisor or the Head of the School.
- ▶ Undertake Occupational Health and Safety (OH&S) and Environmental Health and Safety (EH&S) responsibilities as outlined in Section 5.

## 4. *Equal Opportunity, Diversity and Inclusion*

The University is an equal opportunity employer and is committed to providing a workplace free from all forms of unlawful discrimination, harassment, bullying, vilification and victimisation. The University makes decisions on employment, promotion and reward on the basis of merit.

The University is committed to all aspects of equal opportunity, diversity and inclusion in the workplace and to providing all staff, students, contractors, honorary appointees, volunteers and

visitors with a safe, respectful and rewarding environment free from all forms of unlawful discrimination, harassment, vilification and victimisation. This commitment is set out in the University's People Strategy 2015-2020 and policies that address diversity and inclusion, equal employment opportunity, discrimination, sexual harassment, bullying and appropriate workplace behaviour. All staff are required to comply with all University policies.

The University values diversity because we recognise that the differences in our people's age, race, ethnicity, culture, gender, nationality, sexual orientation, physical ability and background bring richness to our work environment. Consequently, the People Strategy sets out the strategic aim to drive diversity and inclusion across the University to create an environment where the compounding benefits of a diverse workforce are recognised as vital in our continuous desire to strive for excellence and reach the targets of Growing Esteem.

## ***5. Occupational Health and Safety (OHS)***

All staff are required to take reasonable care for their own health and safety and that of other personnel who may be affected by their conduct.

OHS responsibilities applicable to positions are published at:

<http://safety.unimelb.edu.au/people/community/responsibilities-of-personnel>

These include general staff responsibilities and those additional responsibilities that apply for Managers and Supervisors and other Personnel.

## ***6. Other Information***

### **6.1 SCHOOL OF COMPUTING AND INFORMATION SYSTEMS**

<http://www.cis.unimelb.edu.au/>

The School of Computing & Information Systems undertakes research and teaching across a range of information technology disciplines including Software Engineering, Information Systems, and Computer Science. It offers a comprehensive range of IT courses at all levels, including offerings in science, engineering, and business, and is at the forefront of computing research in Australia and internationally with close links to major computing research initiatives, including the Victorian Life Sciences Computing Initiative (VLSCI), IBM Research, the Microsoft Research Centre for Social Natural User Interfaces (SNUi), and DATA61 (formerly NICTA). It was ranked 13th in the 2016 QS World University Ranking exercise by discipline.

The School's aim is to attract and retain outstanding staff available in order to maintain a leading research and teaching. We have an existing highly successful research team in the area of the appointment, a large number of PhD students, and a substantial cohort of graduate students in our coursework Masters programs.

### **6.2 MELBOURNE SCHOOL OF ENGINEERING**

<http://www.eng.unimelb.edu.au/>

The Melbourne School of Engineering is one of Australia's leading Engineering Schools and aims to be the school of choice for the highest performing students and research staff

in Australia and within the Time Higher Education Supplement top twenty Schools of Engineering internationally by 2020.

### 6.3 THE UNIVERSITY OF MELBOURNE

The University of Melbourne is a leading international university with a tradition of excellence in teaching and research. The University offers staff many benefits and prospective staff are encouraged to view the following web links:

[www.unimelb.edu.au](http://www.unimelb.edu.au)

[www.growingesteem.unimelb.edu.au](http://www.growingesteem.unimelb.edu.au)

[www.unimelb.edu.au/careers](http://www.unimelb.edu.au/careers)

### 6.4 GROWING ESTEEM, THE MELBOURNE CURRICULUM AND RESEARCH AT MELBOURNE: ENSURING EXCELLENCE AND IMPACT TO 2025

Growing Esteem describes Melbourne's strategy to achieve its aspiration to be a public-spirited and internationally-engaged institution, highly regarded for making distinctive contributions to society in research and research training, learning and teaching, and engagement. <http://about.unimelb.edu.au/strategy-and-leadership>

The University is at the forefront of Australia's changing higher education system and offers a distinctive model of education known collectively as the Melbourne Curriculum. The new educational model, designed for an outstanding experience for all students, is based on six broad undergraduate programs followed by a graduate professional degree, research higher degree or entry directly into employment. The emphasis on academic breadth as well as disciplinary depth in the new degrees ensures that graduates will have the capacity to succeed in a world where knowledge boundaries are shifting and reforming to create new frontiers and challenges. In moving to the new model, the University is also aligning itself with the best of emerging European and Asian practice and well-established North American traditions.

The University's global aspirations seek to make significant contributions to major social, economic and environmental challenges. Accordingly, the University's research strategy *Research at Melbourne: Ensuring Excellence and Impact to 2025* aspires to a significant advancement in the excellence and impact of its research outputs.

<http://research.unimelb.edu.au/our-research/research-at-melbourne>

The strategy recognises that as a public-spirited, research-intensive institution of the future, the University must strive to make a tangible impact in Australia and the world, working across disciplinary and sectoral boundaries and building deeper and more substantive engagement with industry, collaborators and partners. While cultivating the fundamental enabling disciplines through investigator-driven research, the University has adopted three grand challenges aspiring to solve some of the most difficult problems facing our world in the next century. These Grand Challenges include:

- Understanding our place and purpose – The place and purpose grand challenge centres on understanding all aspects of our national identity, with a focus on Australia's 'place' in the Asia-Pacific region and the world, and on our 'purpose' or mission to improve all dimensions of the human condition through our research.

- ▶ Fostering health and wellbeing – The health and wellbeing grand challenge focuses on building the scale and breadth of our capabilities in population and global health; on harnessing our contribution to the ‘convergence revolution’ of biomedical and health research, bringing together the life sciences, engineering and the physical sciences; and on addressing the physical, mental and social aspects of wellbeing by looking beyond the traditional boundaries of biomedicine.
- ▶ Supporting sustainability and resilience – The sustainability and resilience grand challenge addresses the critical issues of climate change, water and food security, sustainable energy and designing resilient cities and regions. In addition to the technical aspects, this grand challenge considers the physical and social functioning of cities, connecting physical phenomena with lessons from our past, and the implications of the technical solutions for economies, living patterns and behaviours.

Essential to tackling these challenges, an outstanding faculty, high performing students, wide collaboration including internationally and deep partnerships with external parties form central components of Research at Melbourne: Ensuring Excellence and Impact to 2025.

## 6.5 GOVERNANCE

The Vice Chancellor is the Chief Executive Officer of the University and responsible to Council for the good management of the University.

Comprehensive information about the University of Melbourne and its governance structure is available at <http://www.unimelb.edu.au/governance>