

POSITION DESCRIPTION:

SECTION A: Position Context

Position Title	Research Fellow
Position Number	28039
Classification	Academic Level A or Academic Level B
Centre	Centre for Advanced Internet Architectures
Faculty	Faculty of Information and Communication Technologies
Division	Higher Education
Effective Date	December 2009

Position Purpose:

This is a fixed-term position to support two ARC-funded projects, entitled “Congestion Control for an Efficient Internet” and “Mechanism Design for Next Generation Random Access Wireless Protocols”. The first project will develop and analyse new techniques to respond to congestion in the internet. In addition to the traditional aim of balancing the rates of user flows given fixed network capacity, this research will investigate ways in which network-induced energy consumption can be minimized, by exploiting periods of low congestion. This research will fit into both the New TCP project and the GREEN project <<http://caia.swin.edu.au/green>> at CAIA. The second project will explore resource allocation for wireless networks, to provide differentiated service but avoid the common problem of given data users an incentive to claim to be real-time users. This will involve game theoretic analysis, protocol modelling and protocol design. This research will fit into the MAGIC project <<http://caia.swin.edu/magic>>.

The research will model the effects of congestion and contention within the network and the appropriate responses of users, and will obtain measurements on testbeds to guide and validate those models.

University Information:

Swinburne University of Technology is a large multi-sectoral and multi-campus institution with a stated mission to be a pre-eminent entrepreneurial university from the Asia-Pacific, thriving on new ideas and knowledge and exploiting its intersectoral heritage to create value for its stakeholders

Swinburne has campuses in metropolitan Melbourne at Hawthorn, Prahran, Lilydale, Wantirna, Croydon and Healesville and an overseas branch campus in Kuching, Sarawak, Malaysia. It also offers an increasing number of subjects and courses via the Internet. Its programs cover the education and training needs of over 40,000 students ranging from apprentices through to doctoral students

Swinburne is proud of its close links with industry, business and the community generally. It has gained a prominent and respected name in education in Australia and overseas through:

- government funded programs and research;
- industry and business funded research;
- consultancy and training;
- fee-for-service teaching;
- An international focus for its curricula, student recruitment and operations.

Faculty, Centre and Higher Education Information Information:

The Faculty of Information and Communication Technologies

The Faculty has approximately 110 EFT staff, including academic, administrative and technical positions. There are approximately a further 40 EFT staff employed specifically to support research activity funded by grants. There are approximately 2,000 EFTSL enrolled across undergraduate and postgraduate programs; of that number approximately 70 EFTSL or 90 students are enrolled in postgraduate research programs. A significant number of the students enrolled in the Faculty are full-fee paying international students.

The Faculty offers a wide range of innovative and industry-relevant undergraduate and postgraduate coursework and research programs. These programs are delivered at the Hawthorn and Sarawak campuses, in Hong Kong and online. The programs encompass major academic disciplines of Astrophysics, Computer Science and Software Engineering, Information Systems and Telecommunications Engineering, each of which is represented by an Academic Group within the Faculty.

The Faculty hosts the following major University research centres: the Centre for Advanced Internet Architectures, the Centre for Astrophysics and Supercomputing, the Centre for Complex Systems and Services and the Centre for Molecular Simulation. The Faculty also supports an Information Systems research group.

URL to web page:

<http://www.swin.edu.au/ict/>

The Centre for Advanced Internet Architectures

The Centre for Advanced Internet Architectures (CAIA) was founded in 2002. CAIA is the home of telecommunications and networking research within the Faculty of Information and Communication Technologies. CAIA conducts research into a broad range of areas involving Internet performance analysis, IP routing and Quality of Service architectures, and IP mobility protocols. CAIA has already established recognition for itself with publications at national and international conferences, and an emerging publications record in international journals. CAIA aims to become an international leader in these areas and create a world-class laboratory for training research students.

CAIA currently consists of one director (Associate Professor Grenville Armitage), five associated members of academic staff in Telecommunications Engineering and an assorted mix of research engineers, research assistants and post-graduate research students.

URL to web page:

<http://caia.swin.edu.au>

HIGHER EDUCATION

Higher Education, located at Hawthorn, Lilydale, Prahran and Sarawak campuses has approximately 17,000 undergraduate and postgraduate students and over 700 academic and other staff. The relatively small size necessitates a focused approach to both program offerings and research activities.

Higher Education's mission is to be a research-intensive technological university characterised by

- Research activities of national prominence and international recognition focussed around the University's chosen areas of excellence
- Students of high academic standard in a range of high quality specialist undergraduate and post-graduate coursework and research programs
- Being international in operation and perspective
- A significant level of self determination arising from a sustainable balance between revenue generating activity and prestige.

Higher Education consists of seven academic units:

- Faculty of Business and Enterprise
- Faculty of Design
- Faculty of Engineering and Industrial Sciences
- Faculty of Information & Communication Technologies
- Faculty of Life and Social Sciences
- Higher Education, Lilydale
- Sarawak Campus, Malaysia

Higher Education has a range of undergraduate and postgraduate coursework and research programs focussed around the themes of: Professional engineering, Information technology, Business and innovation, Design, Multimedia, Health and human services and Social Sciences.

Areas of research strength include: Business and Enterprise, Design, Engineering, Information and Communication Technologies, Life and Health Sciences, Physical and Chemical Sciences and Social Sciences.

URL to web page:

<http://www.swin.edu.au/hed/>

Supervision Reporting Relationships:

This position's supervisor/manager	This position is accountable to A/Prof Lachlan Andrew and A/Prof Hai Vu. Specific roles and R&D tasks will be as directed by Lachlan Andrew and Hai Vu. The appointee will be expected to be self-motivated, demonstrating initiative and responsibility in achieving the position's goals and work with minimum supervision.
Other positions reporting to this position	The appointee will not have formal supervisory responsibilities.

Location:

The appointee will be based within the Swinburne Centre for Advanced Internet Architectures (CAIA) at the University's Hawthorn Campus.

Job Summary / Project Outline:

This position is available on a full-time basis for an initial period of 12 months, with an extension of up to 24 months, commencing in early 2010.

It will involve the development and analysis of new techniques to respond to congestion in the internet, and diverse needs of wireless users. In addition to the traditional aim of balancing the rates of user flows given fixed network capacity, this research will investigate ways in which network-induced energy consumption can be minimized, by exploiting periods of low congestion. The appointee will collaborate with researchers in the New TCP, GREEN and MAGIC projects at CAIA.

The research will apply mathematical tools, such as control theory, queueing theory, optimisation theory and game theory, to model the effects of congestion within the network and the appropriate responses of users. This will involve incorporating different concepts of "fairness" into the network utility maximisation framework, for users who benefit more from reliable or timely data transfer than rapid data transfer.

To assist the modelling and to validate the new proposals, the appointee will obtain measurements on open-source testbeds both at CAIA and at Caltech, and also perform simulations using tools such as ns2 and matlab. This will require programming in C/C++, Python and TCL.

The appointee will collaborate with other researchers to quantify the performance benefits which can be obtained by allowing congested network resources (such as routers and the wireless nodes) to indicate that information directly to the end systems. This will involve modelling, forming hypotheses, and then mathematically proving or disproving those hypotheses.

The appointee will be given significant flexibility to pursue exciting research directions broadly in line with this project, depending on experience and qualifications. The appointee will be required to maintain awareness of the current literature regarding the fields outlined here, and other fields whose relevance becomes apparent in the course of the research.

This research will lead to multiple research papers. The appointee will assist in the writing of these papers, including producing numerical results and text.

Participation on Committees:

The occupant will not be required to serve on any university committees.

SECTION B: Key Responsibility Areas

The key responsibility areas (KRAs) are the major outputs for which the position is responsible and are not a comprehensive statement of the position activities.

Key Responsibility Areas		
1.	RESEARCH	<p>Perform specific R&D tasks as directed to meet deliverables of the project, both individually and as a member of a team. This will include involvement in the following areas:</p> <ul style="list-style-type: none"> • Analyse and model communication networks. • Prepare or contribute to the preparation of refereed journal publications, conference and seminar papers arising from the research. • Provide assistance in the running/performance of specific experiments/research projects. • Publish research findings in international refereed journals. • Enhance the research profile of the Faculty through: • Collaborative research with other Universities, organisations and involvement in relevant professional activities.
2.	COLLABORATION	<p>Contribute to the preparation of documents (such as websites, research papers for peer-reviewed publication, or CAIA technical reports) in collaboration with other CAIA members (students and staff) and external parties as required to meet project goals. Take on short-term and long-term tasks in collaboration with other team members as directed, and participate in regular group meetings.</p>
3.	PROJECT MANAGEMENT	<p>Contribute to the achievement of project outcomes.</p> <ul style="list-style-type: none"> • Assist in the development of strategies to coordinate and implement projects • Undertake research, analysis, report writing and publishing.
4.	PROFESSIONAL IMAGE	<p>Develop and maintain professional links with industry and related academic groups, and a professional 'public face' for our project work at CAIA (e.g. through websites).</p>
5.	OTHER	<p>Other duties as directed pertaining to the research mission of CAIA, including support of additional data networking projects from time to time that are not listed above.</p>
6.	OHS	<p>Comply with all occupational health and safety instructions, policies and procedures including departmental safety manuals Report hazards/incidents to manager/supervisor and take action to avoid, eliminate or minimise hazards Seek information or advice where necessary before carrying out new or unfamiliar work Be familiar with emergency and evacuation procedures and comply with instructions given by emergency response personnel</p>
7.	EEO	<p>Ensure compliance with University Anti Discrimination, Bullying and Violence and Sexual Harassment policies and procedures.</p>
8.	Human Resource Management	<p>Participate in the University staff performance, development and reward process</p>
9.	Other	<p>Other duties as directed</p>

SECTION C: Key Selection Criteria

Application letters and/or resumes must address the Qualifications and Knowledge/Experience/Attributes sections under the key selection criteria. Preferably applications should not exceed six (6) A4 pages in total.

Qualifications: Include all educational and training qualifications, licences, and professional registration or accreditation, criminal record checks etc. required for the position.		Essential/ Preferable
1.	Completion of a bachelor degree in an area of electrical engineering, computer science, mathematics or a related discipline.	Essential
2.	Completion of a PhD or Masters (by research) in a relevant area.	Preferable
3.	Either a research higher degree OR a bachelor degree with first-class honours	Essential
Experience / Knowledge / Attributes: Required by the incumbent to successfully perform the positions key responsibilities.		Essential/ Preferable
4.	Substantial knowledge and skill in either mathematical modelling OR programming.	Essential
5.	Demonstrated experience in the theory of stochastic processes, control, optimisation or queueing.	Preferable
6.	Strong programming skills in C/C++. Knowledge of scripting languages such as Python would be an advantage.	Preferable
7.	Knowledge and experience with development of device drivers for wireless chipsets such as Atheros, in Unix and Linux based systems	Preferable
8.	Familiarity with current models of internet congestion control, such as the network utility maximisation framework, and demonstrated experience in performance evaluation and modelling of MAC protocols. This will involve understanding of stochastic processes, optimisation control and/or queueing systems.	Preferable
9.	Experience with networking tools available in Linux or FreeBSD, and familiarity with the implementation of the protocol stack in one or the other.	Preferable
10.	A track record of publications in relevant areas and a demonstration of ongoing research activities within that field. Ability to conduct research and to analyse and communicate research outcomes - demonstrated publication record.	Preferable
11.	Demonstrated capacity to supervise research postgraduate students, or a desire to obtain such experience.	Preferable
12.	Demonstrated ability to develop and maintain links with business, community and industry.	Preferable
13.	Demonstrated high standard of interpersonal and communication skills including the ability to work both independently and collaboratively.	Essential
14.	Fluency with the Matlab and NS2 simulation packages.	Preferable
15.	A passion for research, and an appreciation of the beauty of elegant solutions to difficult problems.	Preferable

Swinburne Attributes:

Our attributes inform the selection process; however, a written response to the attributes is not required. The attributes are:

- ☞ Building Organisational Capability
- ☞ Builds Relationships
- ☞ Creates a Learning Environment
- ☞ Demonstrates Personal Integrity
- ☞ Drives Service Excellence
- ☞ Exhibits Entrepreneurial Skills
- ☞ Manages Change Effectively
- ☞ Provides Educational Leadership
- ☞ Sets Direction

For information refer to the following web link: **Swinburne Attributes** (<http://www.swin.edu.au/corporate/hr/attributes/>).

Further Information:

For further information, please contact **Associate Professor Lachlan Andrew**
Telephone: 03 9214 4837
Email: landrew@swin.edu.au

Supervisor: _____ Date: _____

Signature _____

Head of Department: _____ Date: _____

Signature _____

I accept the Position Description as stated above and that the Position Description may need amending and updating periodically due to changes in responsibilities and organisational requirements. Changes to position descriptions will be in accordance with the position classification and consistent with the purpose for which the position was established.

Incumbent: _____ Date: _____

Signature _____

For more information, refer to following attachments/web links

Recruitment & Selection Guide (http://www.swin.edu.au/corporate/hr/docs/Recruitment_guide.pdf).

Swinburne Attributes (<http://www.swin.edu.au/corporate/hr/attributes/>).