

ACCS: The ARC Centre for Complex Systems

Main Website: <http://www.accs.uq.edu.au/>

Canberra Website: <http://www.itee.adfa.edu.au/~abbass/accs>

**1 PhD Full Scholarship (\$23.5K pa tax-free), and
1 PhD Top-up (\$10K pa tax-free) for an APA holder Scholarship**

Location

Artificial Life and Adaptive Robotics Lab,
School of Information Technology and Electrical Engineering,
University of NSW @ Australian Defence Force Academy,
Canberra, Australia.



Background

The ARC Centre for Complex Systems (ACCS) was established in 2003 with a total budget of \$6 million dollars over 5 years and funded by the Australian Research Council (ARC) to undertake interdisciplinary research in the emerging discipline of complex systems science and engineering. ACCS conducts world-class basic and applied research on questions fundamental to understanding and managing complex systems. ACCS has leading Australian and overseas researchers in the area of complex systems. It is based at the University of Queensland (Brisbane) with nodes at Griffith University (Brisbane), Monash University (Melbourne), and the University of New South Wales at the Australian Defence Force Academy (Canberra) with associate investigators from other Australian and overseas research organizations. ACCS's partner organizations include Boeing, CSIRO and Sun Microsystems. International collaborating organisations include France's Centre National de la Recherche Scientifique and the Indian Institute of Technology.

Call for PhD Scholarships (3 yrs with possible 6-month extension)

The ACCS's node in Canberra is currently seeking expressions of interest from highly qualified students to join the PhD program. Two scholarships are currently available. The first is a full PhD scholarship which provides living allowances of \$23,500 per annum tax-free. The second is a top-up PhD scholarship for a candidate who has successfully secured an Australian Postgraduate Award (APA). The top-up is for the value of \$10,000 per annum tax free. The successful applicants are anticipated to have a first-class honour or equivalent in Computer Science, Mathematics, or other relevant areas. All applicants are expected to possess excellent programming, communication and research skills. An ideal applicant for the free-air traffic control project would have knowledge in graph-theory, virtual environments, and/or air-traffic management. An ideal applicant for the evolution and learning project would have knowledge in developmental biology, neuroscience and/or dynamical systems. Applications should include a detailed CV, a certified copy (do not send originals) of academic transcripts and a cover letter detailing the applicants' research interest and its relevance to both or one of the two projects. The selection process will be undertaken by a sub-committee of ACCS and applicants should satisfy UNSW admission requirements. Details of the projects are at the back of this flyer. Potential applicants are encouraged to email Dr. Hussein Abbass, h.abbass@adfa.edu.au and h.abbass@optusnet.com.au, as soon as possible. Deadline for applications is January 31st or until the positions are filled for a possible starting date of March 2004.

PhD Full Scholarship (23,500 per annum tax free)

Topic: Evolution and Learning

An important paradigm in complexity is *natural computation*, which interprets natural phenomena as forms of computation. It also imitates nature (e.g. evolution) to derive computational methods for solving complex problems. Biological systems have been a rich source of ideas for solving complex computation problems (e.g. genetic algorithms, neural networks). Further, computational models have provided deep insights into biological processes (e.g. ALife).

Previous studies have shown a great deal of interaction occurring between the evolutionary level and the learning level (e.g. Baldwin effect). The objective of this project is to scrutinize this interaction in non-stationary evolutionary landscapes under complex genotype-phenotype mappings using non-trivial genetic encoding methods inspired by models from developmental biology such as: gradients, reaction-diffusion, chemical waves and genetic regulatory networks.

PhD Top-up for an APA holder (10,000 per annum tax free)

Topic: Multi-Agent Systems for Free Flight Air-Traffic Control

Air traffic control is one of the major bottlenecks preventing increased use of airspace and reduction in travel times. Free flight involves a fundamental shift from centralised control mechanisms (such as en-route air-traffic control) to localised control (whereby pilots take over primary responsibility for maintaining separation between aircraft). Major issues arise with respect to assuring safety and providing aviation services.

The objective of this project is to develop fully de-centralized control mechanisms to achieve safe free flight air-traffic control management systems. A multi-agent approach will be used in conjunction with the Vortex software, a physics-based tool which can support building realistic virtual environments.

Contact

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