

***Location:***            **University of NSW@ADFA, Canberra.**

**Charles Sturt University**



in conjunction with

**The University of NSW@ADFA**

**School of Information Technology and Electrical Engineering  
Artificial Life and Adaptive Robotics Lab (A.L.A.R.)**

Australian Postgraduate Award Industry (APAI) with tax-free stipend of \$33,556 per annum, plus project funding from NCR, available to a full-time PhD candidate

***Project Title:*** **Modelling a Scenario Planning Operational Network**

***Part of a larger project on:*** **Scenario Driven Management in a Network Environment**

***Industry Partner:***        **NCR**

The artificial life and adaptive robotics lab is located at the School of Information Technology and Electrical Engineering, the University of New South Wales at the Australian Defence Force Academy in Canberra, Australia. The lab carries out cutting-edge multi-disciplinary research in the areas of complex adaptive systems, data mining, evolutionary computation, multi-agent systems and robotics. The lab currently has 3 PhD students and is hosting the Canberra node of the ARC Centre on Complex Systems. In addition to this APAI's advertisement, the lab will advertise soon for another 2 PhD scholarships in the area of complex adaptive systems.

**Nature of the Research Project**

The overall aim of the larger project is to develop a continuous process of scenario planning that captures learning about the future as it emerges, and facilitates exploration of possible future states of organisations. To achieve that aim, the use of agents for intelligent data collection and negotiation will be fused with agent-based modelling to build powerful network-based scenario modelling systems.

This specific project on “modeling a scenario planning operational network” will address the need to model an operational business network to support scenario planning. This project will involve the development of a detailed agent model and protocols for the automated replication of the agent schemas, modelled to relevant stakeholders external to the business network. Modelling the

operational network provides a unique set of challenges. Here the agents are more heterogeneous, including clients, suppliers, financial and other services, government agencies and so forth. The APAI will make use of the XML methods from another research stream in the overall project, but will take an important step forward in autonomous agent creation. The agents will be tested in the overarching framework developed in the integrating phase of the overall project.

### **Aims of the APAI's Research Project**

1. develop a minimal agent specification to represent a class as specified by an XML template. This class might be clients in a particular expenditure bracket which would generate agents representing government, SMEs, retail customers, each with their own world view.
2. with the chief investigator responsible for this research stream, investigate machine learning methods such as temporal difference learning and modern heuristics techniques to develop the "world view" for each agent..
3. automat the parameterisation or training of the network while mining the data warehouse of client information.

### **Skills of Applicants**

This project will be exciting and challenging for an IT graduate with demonstrated knowledge in programming, data mining and/or the application of intelligent agents.

The APAI will develop experience of both writing and running agent based models. The student will learn mainstream modelling packages such as Repast (SWARM). In porting models to the top end MPP and SMP NCR machines, he/she will learn the use of libraries such as MPI. He/she will further develop programming skills to a high-level in object-oriented languages such as C++, and will focus on building agents describing the component organisations. The APAI will acquire a detailed understanding of XML, particularly the RDF and Schema specifications as they will be applied in agent descriptions. He/she will select suitable software systems for integrating tacit information. Further, the APAI will learn standard data mining techniques, such as neural networks, and learn to extract and integrate information from NCR data warehouses. He/she will learn the use of KIF (Knowledge Interchange Format) and KQML for mining NCR databases.

The APAI will gain an in-depth understanding of the contribution of theory to commercial practice. The APAI will establish links with other doctoral students at CSU investigating linked marketing/management and IT issues. At the end of the project, the APAI will have established an outstanding career potential for business and academia.

We are seeking applications from students who have demonstrated a high level of achievement in at least four years of tertiary education in information technology, and have obtained First Class Honours or equivalent results.

### **For further information please contact:**

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