

## **PhD research scholarships: Australian Postgraduate Awards (Industry) (APAI)**

### **ARC Centre of Excellence for Autonomous Systems, University of Technology, Sydney**

The Australian Research Council (ARC) Centre of Excellence for Autonomous Systems (CAS) at the University of Technology, Sydney (UTS) is seeking to appoint up to nine postgraduate research students in the area of robotics and autonomous systems. Highly qualified applicants with broad backgrounds in mechanical engineering, mechatronics, computer science, software engineering, electrical engineering, or a related field are encouraged to apply.

UTS is a partner in the ARC CAS centre. The CAS centre has over 200 research staff and students undertaking research in perception, control, learning and systems, with a broad range of autonomous robotic systems applications including cargo handling, construction, defence, forestry and transport; robotic bush fire fighting, search and rescue; air, land and maritime defence; and social applications in robotic health care, automotive and entertainment.

#### **Description of the projects:**

##### ***Project 1: “A Robotic System for Steel Bridge Maintenance” (Up to 3 Scholarships)***

This project will develop methodologies to enable an intelligent robotic system to perform maintenance tasks associated with complex civil infrastructure, including exploration, sensing and 3D map building, material type classification, data fusion, path and motion planning, collision avoidance, etc. The primary application is to autonomously remove paint containing hazardous materials such as lead and asbestos from important traffic infrastructures such as steel bridges. A prototype autonomous system will be developed and the key issues in deploying such a system in the field will be addressed.

##### ***Project 2: “Intelligent Task Allocation and Path Planning for a large fleet of autonomous vehicles in Fully Automated Container Terminals” (Up to 2 Scholarships)***

Autonomous vehicles are now increasingly being deployed to handle materials in complex environments. Given the more challenging conditions under which they are to operate (e.g. constantly changing environments, congestion caused by other equipment, less predictable tasks, etc.), efficient algorithms for allocating handling tasks to the vehicles, generating their collision-free trajectories and replanning vehicle motions in response to unexpected events such as breakdowns are required. Towards realising the full performance potential of automated material handling systems, this project will develop strategies and algorithms for simultaneously allocating tasks to and coordinating the motion of a large fleet of deployed multi-ton driverless vehicles, in a number of complex and dynamic material handling environments.

***Project 3: “Precision three-dimensional localization system for underground mining vehicles, offering improved productivity and personnel safety” (Up to 2 Scholarships)***

This project aims to develop algorithms and sensor packages for determining the three-dimensional position and orientation of machines operating in underground mines. A variety of sensor technologies, including laser range finders and inertial measurement units, will be investigated, adapted and field-tested in real-world mining situations. A self-contained control system platform, including supporting sensor packages and appropriate algorithms, will be developed to suit the range of accuracy and cost requirements as demanded by industry. The project outcomes will enable machines and vehicles to be positioned and operated accurately within a mine, increasing the productivity and safety of mining operations.

***Project 4: “Use of CT Scanned Data in automation of Carcass Processing” (2 Scholarships)***

Meat production is important to the Australian economy. Automation of meat processing represents a potential solution, but brings challenges. This project will develop methodologies to enable a CT Scanning system and a robotic system to automate carcass processing. Elements needed to complete automation, including theoretical algorithms, sensing package, database, structure prediction model, software and mechanical tools and platform, will be developed. A practically deployable prototype system will be developed and the key issues in deploying such a system in the field will be addressed. The outcomes of this project, a practically deployable robotic system, enabling methodologies and a common database, represent a big step towards integrated meat processing and bring enormous economic and health benefits to Australian community.

**Applicants:**

The Australian Postgraduate Awards (Industry) (APAI) are available to outstanding candidates seeking to commence full-time study towards a doctoral or master degree. Each scholarship has duration of three years and provides a tax-free stipend of up to \$26,410 per annum. Travel funding to attend international conferences is also available.

Applicants must hold a first class honours undergraduate degree, or equivalent, and be an Australian citizen/resident. Awards are generally for full-time study only.

For further information contact:

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