



NO PILOT? NO WORRIES

Research could help position Australia as a world leader in civilian uses for pilotless planes

By **YOUNA ANGEVIN-CASTRO**

A focus by a new aviation research that centres on civilian uses for pilotless planes – such as collision avoidance, search-and-rescue efforts and border control – will help to position Australia among the leaders in the commercial development of Unmanned Aerial Vehicles (UAVs).

The \$3.6 million Australian Research Centre for Aerospace Automation (ARCAA) is a collaborative project between CSIRO and Queensland University of Technology, with facilities planned at Brisbane's International Airport.

The project eventuated in response to the Australian Government's Aerospace Industry Action Agenda Report, whereby recommendations solicited from the main players in the aerospace industry indicated strong support for more research and development into UAV design and manufacture.

"This is a unique opportunity for Australia to carve a niche for itself in an emerging part of the aerospace industry," says Associate Professor Rod Walker, of the Airborne Avionics Research Group at the Queensland University of Technology.

As ARCAA Director, Associate Professor Walker believes the centre's focus on UAV research will allow Australia to compete at an international level.

"Other areas of the aerospace industry, such as the manufacture of fighter jets and passenger aircraft, are well-established overseas," he says. "They also require billions of dollars of infrastructure, which Australia doesn't have. In comparison, UAV research requires significantly less capital investment."

While other UAV research centres exist in the United Kingdom and the United States, ARCAA's point of differentiation is a focus on civilian UAV applications. "This is where ARCAA will break new ground," says Dr Jonathan Roberts of CSIRO's ICT Centre. "There are other UAV centres of excellence around the world, but they tend to be dominated by defence applications."

When Queensland University of Technology and CSIRO joined together three years ago, Dr Jonathan Roberts had been using robotics to develop a vision-based control system for a helicopter. This work had enormous synergies with the work of Associate Professor Walker, who had been using his experience as a private pilot to

research the future needs of autonomous aircraft.

The centre has 11 PhD research students working on a variety of projects aimed at increasing the level of autonomy and safety in small UAV systems.

"For example, we currently have a project looking at how to get the unmanned vehicle on to the ground safely if something goes wrong," says Associate Professor Walker. "This is one of the things a human pilot can do quite reliably with training, but which needs to be replicated safely in an unmanned situation.

"By installing cameras on the aircraft, and using machine vision algorithms to identify open paddocks free of human life, the vehicle can recognise this as a suitable place to crash-land if the need arises. From an airspace regulation perspective, this is a really critical technology that UAVs must have."

Other areas of research include collision avoidance, risk analysis to people on the ground and how to get unmanned vehicles to fly safely among manned aircraft. Work is also being done to identify specific applications, such as power-line inspection.

"Currently manned fixed-wing aircraft or helicopters check power lines for faults or excessive vegetation that might pose a fire risk," says Dr Roberts. "We believe there is an opportunity here to use UAVs to inspect power lines autonomously."

And the possibilities are endless. UAVs could potentially be used for search-and-rescue efforts where resources are limited, border patrol and security, agricultural applications, and even to deliver mail in remote areas of Australia.

Research conducted at ARCAA will also have enormous value to the commercial sector, with large aerospace companies, such as Boeing, likely to draw on the centre's expertise to advance their own commercial projects. For example, Boeing Australia and its partner, Israel Aircraft Industries (MALAT Division), have been selected to deliver the most advanced tactical unmanned aerial vehicle (TUAV) to the Australian Defence Force under project JP 129.

Lindsay Pears, Boeing Australia chief strategist says: "We look forward to a successful partnership with the Commonwealth throughout the service life

PAUL DICKENSON



of the TUAV system, and working collaboratively with industry, academic institutions such as CSIRO

and ARCAA to further develop and grow these key in-country capabilities in the challenging new frontier of unmanned systems."

Associate Professor Walker says working with industry in areas like this is strategically important for Australia. "With a reasonably small population spread out over a massive land area, expensive assets in very remote parts of Australia and an economy which cannot support the high dollar infrastructure that Americans and Europeans can afford, we need to look at more cost-effective ways of doing things.

"The use of low-cost airborne UAV technology

will really offer us that capability, and strategically we are in a very good position to develop the technology and become leaders in the field." □

APPLICATION Unmanned aerial vehicles could be used for search-and-rescue efforts, border patrols and agricultural applications

BENEFIT By concentrating on civilian uses, Australia is hoping to carve itself a niche in an emerging part of the aerospace industry

Telephone enquiries: 1300 363 400;
email: solve@csiro.au; website: www.csiro.au

