UNMANNED SYSTEMS GRAHAM WARWICK / WASHINGTON DC

Military and commercial roles in GoldenEye sights

Flight-testing of private-venture ducted-fan VTOL UAV expected within a month

Aurora Flight Sciences is preparing to fly a ducted-fan vertical take-off and landing (VTOL) unmanned air vehicle (UAV). The GoldenEye is aimed at commercial as well as military low-altitude, local-area surveillance, including law enforcement, fire-fighting, pipeline monitoring, tuna fishing and news gathering.

Flight-testing of the private-venture GoldenEye 100 should begin within a month, says programme manager Carl Schaefer. A half-scale version, the GoldenEye 50, is being built and will be first to transition from vertical to horizontal flight, scheduled for August, he says. Manassas, Virginia-based Aurora has also proposed an 85%-scale version of the vehicle to meet the VTOL UAV requirements of the US Army's Future Combat System.

Aurora plans to begin commercial production early next year, initially building a fleet of six vehicles for demonstration or lease to customers. "We are looking at both vehicles, but near term it is likely to be the GoldenEye 50," says Schaefer. There is a potential homeland defence market for the smaller UAV for nuclear, biological and chemical detection. In rate production, the GoldenEye 100 will cost about $100,000 and the half-size UAV about $50,000.

AURORA FLIGHT SCIENCES

Aurora plans to build a fleet of six GoldenEyes

The GoldenEye 100 is a 68kg (150lb) gross-weight vehicle capable of carrying 20kg of payload and fuel. With a 9kg payload, the vehicle can hover for up to 60min or cruise for 4h at 140kt (260km/h), with a range exceeding 925km (500nm) and a dash speed of 160kt. The powerplant is a 28kW (38hp) UEL AR781 rotary engine. The vehicle is controlled from a laptop computer.

The 0.9m (3ft)-diameter duct increases fan efficiency, improves safety, reduces noise and provides lift in forward flight, says Aurora. A variable-geometry nozzle optimises fan efficiency and provides thrust-vectoring for vehicle control. A 3m-span pivoting wing increases endurance in forward flight, reduces gust sensitivity in the hover and allows a rapid transition from horizontal to vertical flight, says the company.

SPACECRAFT EMMA KELLY / PERTH

CSIRO to develop 'self-repairing' tile

Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) aims to develop, by September, an "intelligent" spacecraft thermal protection tile that is capable of "self-organising" and responding to damage.

The demonstrator will be the first result of a "smart spaces" project that CSIRO believes could lead to the development of an aircraft or space vehicle capable of sensing a fault and repairing itself in flight.

The project has added impetus following the *Columbia* Space Shuttle disaster which is believed to have been caused by a panel that had been damaged by an unexpected impact, says Dr Geoff James, CSIRO's smart spaces project leader.

The project is aimed at developing the first working smart spaces – intelligent systems, using sensors and actuators, which have the flexibility to deal with unforeseen events and can self-configure, self-repair and adapt to changing conditions. "Smart spaces will supersede today's conventional, massively engineered systems, where every increase in complexity presents fresh opportunities for failure that may be avoided with this new approach," says James.

The smart spaces concept involves a loosely designed system where the parts are designed to be self-organising, which will be more reliable in the long-term, he adds.

CSIRO is working with NASA on the aerospace applications, with the US space agency providing funding and researchers for the project. An unnamed large aerospace manufacturer has expressed interest in the programme, says James. About A$2 million ($1.26 million) has already been spent on the aerospace applications.

Aerospace developments in the programme are part of CSIRO's Ageless Aerospace Vehicle project which was launched in 2001 in conjunction with NASA's Langley Research Center. That project is intended to result in a vehicle that is capable of self-assessment and repair, has adaptive shape control, highly efficient propulsion and is capable of "thinking and sensing".

MISSILES

UK's Qinetiq moves on with seeker sensor tests

Qinetiq has successfully completed "hardware-in-the-loop" testing of its phased-array missile seeker, in what it believes is the first test of its kind. It hopes continued testing could lead to applications early in the next decade.

Whereas conventional radar sensor antennas are mechanically steered within the missile to maintain radio-frequency (RF) energy on the target, the phased-array sensor is strapped down to the missile and steers its energy electronically.

In closed-loop tests, Qinetiq demonstrated that the passive phased-array sensor could achieve the basic functions required to guide a missile to its target. The testing was conducted in the UK Ministry of Defence's (MoD) Defence Science and Technology Laboratory (DSTL) at Farnborough, one of the largest mechanical array facilities of its kind.

Qinetiq's future systems technology group says the seeker successfully tracked simulated static, constant cross-range and accelerating targets.

Chris Alder, product area manager in Qinetiq's sensors and electronics division, says one of the main advantages of phased-array seekers is their considerably greater resistance to electronic countermeasures. "We see a move towards phased-array seekers for all applications within about 20 years," he says.

Alder says sensor ruggedisation and industrialisation are key drivers in the programme. "Seekers today typically make up about a third of a missile's cost," he adds. The elimination of moving parts in the seeker would reduce costs significantly.

The testing is part of UK MoD-funded seeker development and was conducted with AMS's Radar Systems Division, which helped develop the hardware.