REMOTE SENSING

South Africa looks at high-altitude radar

South Africa's Council for Scientific and Industrial Research (CSIR) plans to investigate the use of an unmanned high-altitude platform as a receiver for a bi-static synthetic-aperture radar system that uses a space-based illuminator. In a bi-static radar, the transmitter and receiver are on separate platforms, *writes Rob Coppinger.*

The illuminating source in this case could be transmissions from a commercial communications satellite, and the research project will be funded by the South African National Defence Force. Similar research is under way in China and the USA.

The study will cover integration of the receiver on to an unmanned platform; radar resolution; motion compensation for the UAV receiver; and passive SAR design.

CSIR will also analyse whether the element that receives the illuminator's direct signal has to be co-located with the element that receives signals scattered from the ground. Postgraduate students at the universities of Cape Town or Natal may be asked to conduct the research.

"We might not need a UAV. We could use a blimp-like vehicle [for the receiver]," says Willie Nel, principal radar researcher with CSIR's defence, peace, safety and security division.

He says an airship platform could carry a much larger receiver than a UAV. CSIR has also been examining high-altitude airships for maritime surveillance (*Flight International*, 14-20 March).

CSIR has been working on synthetic-aperture radar research for 10 years, and the council has bought two systems, a VHF radar that was flown and an X-band system that did not get airborne.

UNMANNED SYSTEMS ARIE EGOZI / TEL AVIV

Urban kicks off hunt for Mule medevac UAV partners

Israel-based manufacturer looks to help develop unmanned transporter for Pentagon

Israel's Urban Aeronautics is seeking partners to develop an unmanned air vehicle offered in response to a US Department of Defense request for information on a medical supply and evacuation UAV. Urban's Mule, projected to cost $1.5 million, will have a maximum take-off weight of 1,090kg (2,400lb) and a top speed of 100kt (185km/h) on its 650hp (485kW) engine. The vehicle will be 5.8m (19ft) long, 2.2m wide and 1.8m high, and two Mules could fit into a Sikorsky CH-53E for transport to the combat zone.

Flying autonomously, the Mule could carry 227kg of fuel for a 2h flight with a maximum altitude of 8,000ft. Depending on mission profile, endurance could be up to 4h. Although payload capacity is 454kg, the vehicle would normally be expected to carry two wounded soldiers with a maximum weight of 227kg. "Its speed will be achieved by the use of adjustable louvres on the front and rear of the vehicle and vanes in the intake and exit of the ducts," says Urban Aeronautics president Rafi Yoeli.

The same technologies will be used on the company's manned X-Hawk (*Flight International*, 13-19 June). Yoel expects a fly-by-wire flight control system to enable precise control and positioning for safe manoeuvring and landings on uneven terrain and in obstructed areas. Urban and Bell Helicopter are currently exploring the potential for a US military demonstration of the manned X-Hawk.

URBAN'S MULE MEDEVAC UAV

GAUGING

NASA aims to measure fuel levels using radio

NASA wants to develop radio frequency (RF) gauging of propellant levels in launch vehicle cryogenic tanks for use in low-gravity environments on future exploration missions. An accurate, robust low-gravity quantity gauging system does not exist and is needed to ensure there is adequate propellant before beginning a human mission.

NASA's planned Ares I crew launcher and Ares V cargo launcher would use the RF fuel gauging for their upper stages. The Ares I upper stage will place the Orion crew exploration vehicle into a suborbital trajectory.

The Ares V will use an upper stage that is also the Earth departure stage for a lunar mission, with the Lunar Surface Access Module as its payload.

Radio waves can be used to determine fuel quantities because, says NASA, "the resonant electromagnetic frequencies [in the RF spectrum range] of a tank...are modified by the presence of [the fuel]." A resonant electromagnetic frequency (EMF) is the response of the tank structure's EMF to an external RF signal.

NASA has begun a programme to mature RF gauging to a technological readiness level of six, which means it must be tested in a relevant environment. That could require a sounding rocket flight that would expose the gauge and fuel to microgravity or experiments with test vehicles in orbit.

MATERIALS

UK firm secures brake cash

UK materials company Surface Transforms has secured its second and third contracts, for different aircraft programmes, to further develop its silicon carbide carbon-brake technology. The technology uses a ceramic material within the carbonfibre matrix used for carbon-carbon brake rotors to improve wear resistance.

The technology was initially developed for the Airbus A380. Due to delays in the brake's development, Airbus chose not to use the technology, but it has since been adopted by two other undisclosed aircraft programmes. The second contract was signed 18 months ago and the third in the last quarter.