

UNMANNED SYSTEMS ASIA

DAILY NEWS

Day Three

20 April 2017

HIGHLIGHTS

Technology seminars

Complimentary seminar sessions for all attendees at:
 10:30am – 11:00am
 11:30pm – 12:00pm
 12:30pm – 1:00pm
 Check out www.unmannedsystems-asia.com/technology-seminar.html for more details!

Air & Ground Demonstration Area

Witness the latest unmanned system technologies at the Air & Ground Demonstration Area, which aims to provide a realistic platform for showcasing them. Timings:
 10:30am – 11:00am
 11:30pm – 12:00pm
 12:30pm – 1:00pm
 2:00pm – 2:30pm
 3:00pm – 3:30pm
 4:00pm – 4:30pm

Education Day

The Education Day promises to inspire and nurture the next generation of industry professionals with talks by renowned industry leaders. Join in to learn about the latest technologies.

Unmanned Systems Asia Daily News is published by Shephard Media in association with Experia Events. Printed by Xpress Print, Singapore. © Shephard Media 2017

Three editions of the show daily are being produced on site. The team can be contacted in the Media Centre or by e-mail at showdaily@shephardmedia.com



Photo: Gordon Arthur

Safety culture crucial for future unmanned integration

Delegates and officials at Unmanned Systems Asia were keen to stress the importance of inculcating a safety culture into unmanned aviation to enable its integration with manned airspace and realise the potential that the technology promises.

While that technology develops apace, the need for improved safety awareness among industry and operators has arisen, particularly those coming from an R&D background rather than aviation.

This challenge in many ways mirrors the efforts under way around the world to create a legislative framework, such as the US FAA's Part 107, to assist with unmanned systems operation.

Kenneth Witcher, dean of Embry-Riddle's College of Aeronautics – which also has a Singapore campus – said that safely operating unmanned systems was crucial.

'When I come to events like this, I tell [unmanned systems operators]

that they are operating in a national airspace system... safe integration is key. There is a huge growth opportunity but we feel that it has to be done right.

'Talking to people in manned aviation I tell them that this is the future, that it is not going away, but also tell UAS operators that they are operating in a shared environment.'

Witcher added that in conversations Embry-Riddle has had with aviation authorities in countries like Brazil, Singapore and the US, the same message was repeated: 'We have to do this and we have to do it safely.'

'The netted demonstration areas at an event like Unmanned Systems Asia show an aviation safety attitude. You don't need it but it mitigates the risk,' he added.

Much of this work in bringing about a level of knowledge of the responsibilities that operators must shoulder can be performed by academic institutions – officials and students who were present at the

show were keen to highlight this was paramount for them.

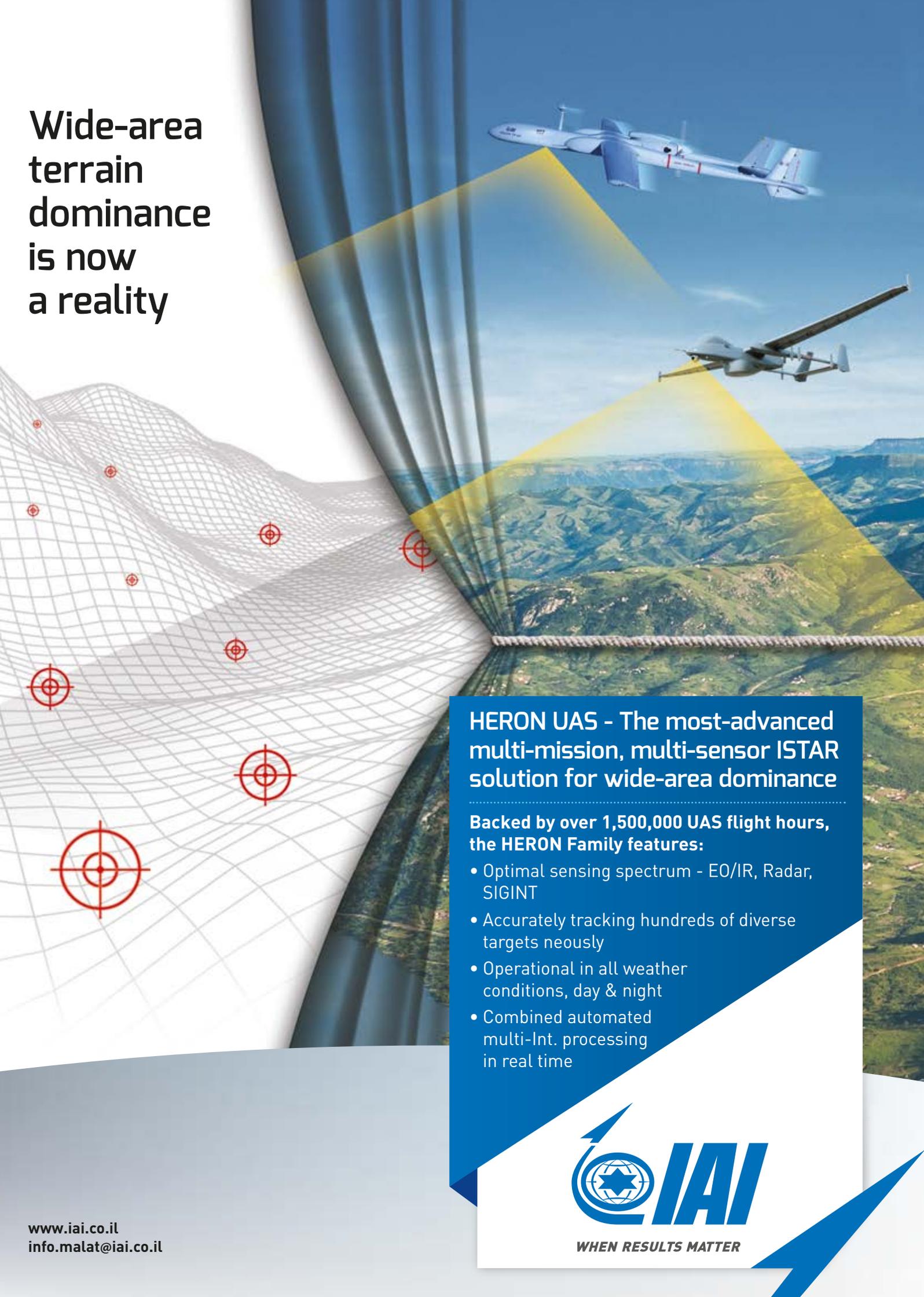
Sutthiphong Srigrarom, associate professor of aerospace systems at the University of Glasgow Singapore, emphasised that safety and technological development were vital for his students. 'We tell our students to be innovative, to try something, to think outside of the box,' he said.

One student told *Unmanned Systems Asia Daily News* that safety during testing and flight operations 'is our key concern'. To aid this, system development on the campus was carried out through simulations and secure test sites, similar to demonstration area at the show itself.

Another student from the National University of Singapore echoed this view, saying that they were mindful of the 'threats and even dangers' posed by unmanned systems and that safety 'is always top priority'.

By Richard Thomas

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WHEN RESULTS MATTER

Singaporean flair in the air

STAND 108

Flare Dynamics, a Singaporean company established in 2014, achieved early success with a contract awarded late last year for 20 tactical micro-UAVs for use by the Singapore Police and Civil Defence forces.

This Discrete-I UAV contract may be seen as a starting point, as it includes an option for follow-on quantities.

Lu Weiyao, Flare Dynamics' technical director, said the 250g aircraft is designed for close-range tactical engagement scenarios by SWAT-style police units. For example, they could fly up to higher floors in multi-storey buildings to look through windows, or even fly through open windows.

The operator controls the micro-UAV with a Command.One Lite GCS worn as a chest rig. Live images are also streamed to a five-inch tablet carried by the police team commander, as well as to a two-inch wrist-worn device carried by the assault team.

Lu said this provided 100% situation awareness for key personnel in any SWAT-type mission.



Photo: author

The Discrete-I, now in its Mk 3 version, comes in two variants.

The EO version is suitable for daylight/low-light conditions, while Lu claimed the IR version was 'the smallest UAS in the world with a full-range thermal imager'. It has a 200m detection range. The Discrete-I's flight range is listed as 800m and it has an

18-minute endurance. Protected by a collapsible safety cage, it is designed to fall from heights of 60m without injuring anyone.

Flare Dynamics also offers the tethered Lifeline system. Lu revealed that his company is the first permitted to operate a tethered UAS at Changi Airport. Indeed, the Lifeline has been

tried at the airport since early 2017 for surveillance purposes.

The Lifeline is designed to be platform-agnostic. For example, a DJI Phantom could be tethered just as easily.

Furthermore, within a few months the firm will launch a tethered Discrete-I that can operate up to 50m above the ground. Lu said Singapore's police could be a potential customer, as the UAV would be useful for persistent surveillance such as an extended hostage crisis.

One final product Flare Dynamics displayed was its Drone Detection System, a passive acoustic system safe for radio frequency environments. It works by identifying abnormal sounds, directing a camera to objects of interest and then using a pan-tilt-zoom camera to ascertain the threat level.

If a threat is identified, an active directional jammer is engaged to bring the errant UAV to the ground. Flare Dynamics is working with international partners on this project, and by June the system will be ready for sale.

By Gordon Arthur

EWATT powering up for new markets



Photo: author

STAND 114

Chinese unmanned systems manufacturer EWATT Technology turned up in force to showcase its range of UAS platforms and payloads to gathered industry representatives and visitors.

The company develops fixed-wing and rotary systems, primarily for industrial and security purposes,

while also offering unmanned traffic management (UTM), data analysis services and operator training.

Speaking to *Unmanned Systems Asia Daily*

News, Wiktor Paciura, overseas sales director, said that the company had been able to talk to a range of people from within the industry during the show, which could lead to future opportunities.

'There has been a lot of interest from Malaysia and Indonesia, particularly with our LiDAR system and ultraviolet camera. Not many

companies are able to offer these solutions and our portfolio of UAVs,' he said.

While there are security applications for its unmanned systems, much of the business potential for EWATT concerns the civil and commercial market for industrial inspections and surveys, added Paciura.

Also operating a fee-for-service model, EWATT conducted surveys of some 15,000km of power lines in China last year, 4,000km of which were high-voltage. With the company looking to branch out its operations overseas, Paciura said that there had been interest from 'a couple' of potential new markets.

'This is the first time EWATT is moving out of China and we are looking for joint ventures and strategic partners,' he confirmed.

Among the systems on display was the EWZ-S8 universal coaxial octocopter (pictured) which has a maximum cruising time of 42 minutes and cruising speed of 72km/h. A 5kg payload can be fitted to the system.

The company is also developing a gas-powered variable-pitch quadcopter – the EWZ-110 – that will offer an increased endurance of up to 120 minutes with a 20kg payload. The platform is expected to be completed by the second half of 2017.

By Richard Thomas

Hydra 1.0 makes mark in new alpha state



Photo: author

STAND 110

Launched just three weeks ago after two years of development, Lockheed Martin CDL's 1.0 version of the Hydra Fusion 3D mapping software is already making its presence felt, according to officials at Unmanned Systems Asia 2017.

The software, Hydra Fusion Tools in its long-form name, collects

images from an airborne system and produces real-time 3D mapping for operators and service clients. Demonstrating the software's capability at the show, Lockheed Martin CDL says that this capability has not been found anywhere else to date.

'The first reaction is that people don't believe you. It can be run from just a laptop linked to the ground control station and then to the drone,' John Molberg, business development manager at the company, told *Unmanned Systems Asia Daily News*.

It was also not dependent on a particular platform, in terms of unmanned system, the data was gathered from, although a greater

capability and endurance would produce better results.

Such a capability can bring a range of benefits to the military and commercial sectors, said Molberg, depending on the business. One commercial example could be volumetric calculations in the construction sector or inventory tracking, but also infrastructure inspections, among others.

'Someone yesterday asked about the system being used to survey the tops of tall buildings, to determine the best sites for solar panels - there are really more commercial applications [for Hydra Fusion] than military.'

On the military side, Molberg said that similar to volumetric

calculations used in the commercial construction sector, Hydra Fusion Tools could determine aggregate and material volume needs for repairs to damaged facilities.

One challenge to the software was the potential restrictions in bandwidth that UAS providing the data are bound to, which again means that the more capable the airborne platform the faster the information could be transmitted.

The company also displayed its Indago UAS at the show. This is widely used around the world by a number of law enforcement, civil and government operators, with around 500 units operating in over ten countries.

By Richard Thomas

ST Engineering ready to explore uncharted territory

STAND 100

Imagine a scenario such as an earthquake, where buildings have collapsed and the terrain is ravaged. How do first responders find their way around and search for buried survivors? This was the starting point for an ST Engineering project to create a system of multiple UGVs to map an unknown environment.

Catchily called the Autonomous Multi-Robot Exploration of Unknown Environments, these four-wheeled robots (right) traverse different areas without overlapping to create a collaborative 3D map in real time.

Paul Tan, director of ST Engineering - NTU Corporate Lab, and VP of technology development at ST Dynamics, said such robots could save time for emergency response teams. A system of up to six such devices could rapidly deploy to map a disaster-hit zone.

Tan said the key technology is the use of 3D laser scanners for mapping. Each UGV is fitted with a Teledyne laser scanner and a LIDAR collision-avoidance system.



Photo: author

While GPS is fitted, the vehicle is designed to operate without it to optimise performance indoors, for example. Tan revealed that future developments would employ the ST Electronics Searchman, which triangulates cell phone signals to locate trapped persons. Later, ground penetration radars could be added to identify heartbeats of buried victims.

The system should be ready for trials within about a year.

In terms of multi-rotor UAS, ST Aerospace is focusing on its

tri-rotor U-Star Y, even though the U-Star X quadrotor also exists in the company's range. Three examples of the 5kg U-Star Y were exhibited at Unmanned Systems Asia 2017, each with a different payload weighing up to 1kg: a high-definition camera; an EO/IR sensor; and a hazmat detector.

Milly Tay, ST Aerospace's engineering and development centre senior VP, said the focus is on the Rapid Response Network System incorporating GCS, UPORTs and UAS.

UPOINT stands for UAS Portable Outdoor Remote Terminal, a number of which would be strategically dotted around a city. These weatherproof UPOINTs could support 24/7 'hot' launches of a UAS equipped with an appropriate payload to give emergency crews advance information before they arrive on the scene.

Tay said that her company has been talking to various agencies in Singapore and overseas

about the concept.

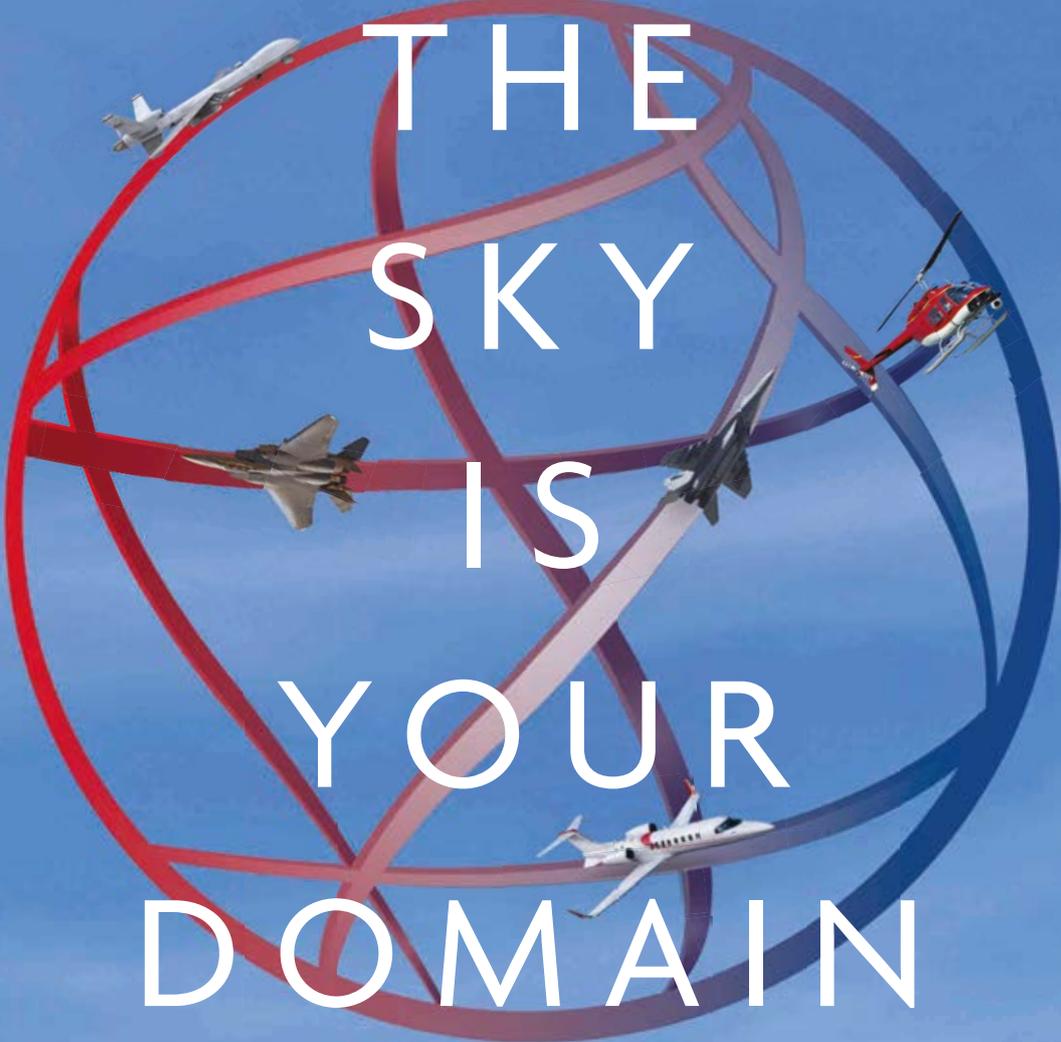
ST Aerospace, Tay revealed, is attempting to increase the endurance of the U-Star family, which currently sits at around 25 minutes. One variant using a 4G communication link gives Singapore-wide ranges.

The U-Star Y is in operational use, although ST Aerospace could not divulge its customers, although it has applicability to both military and parapublic/law enforcement agencies.

By Gordon Arthur



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Programme progress



The Tapas MALE UAV from the DRDO is meant to be eventually adopted by all three of India's military services. (Photos: author)

Military UAV designs from a number of Indian companies and government agencies are progressing – albeit sometimes slowly – towards service entry. **By Gordon Arthur**

In recent months India has moved to showcase its expanding range of indigenous UAVs – from micro-UAS all the way up to a MALE platform – which serves to highlight its growing technological capability.

At an aerospace show in India in February a full-scale mock-up of the Tapas platform was on display with Defence Research & Development Organisation (DRDO) representatives disclosing that more flights of the system would be taking place. Flight tests began in late 2016.

Its endurance will be 24 hours with a cruising speed of 160kt and a service ceiling of 9,750m. DRDO is developing the associated data link giving a 250km range or 1,000km if SATCOM is fitted.

The MALE airframe is well developed, so for the next 18 months or so the DRDO will focus on developing payloads for the Tapas, including sensors such as medium- and long-range EO/IR, COMINT, ELINT and synthetic aperture radar.

Initially the DRDO will use sensors from overseas vendors, before attempting to develop indigenous equivalents. The aircraft's payload capacity is 350kg, but the DRDO wishes to increase that and reduce the weight of the airframe. Currently about 80% of the latter is made from composites.

The Tapas is tapped as a tri-service platform, with the first of 76 desired examples to go to the Indian Army, followed by the Indian Air Force (IAF) and finally the Indian Navy (IN).

A spokesman optimistically thought production could occur late in 2018. DRDO would hand over responsibility for that to Hindustan Aeronautics Ltd (HAL), while Bharat Electronics Ltd (BEL) would take care of sensors and systems.

The Tapas is envisioned as having an ISR role. In the future, though, it could be weaponised.

Army rotors

At the other end of the scale, the 900x900mm Netra quadrotor has been in Indian Army service for about five years after making its first flight on 3 July 2010. The improved v2 launched in 2015 benefits from a 35% improvement in endurance, a longer range, an encrypted data link and digital video link. It can also monitor radiation.

Fitted with a 10x zoom camera and weighing less than 3kg, the Netra v2 has a flight endurance of 40 minutes and a 4km line-of-sight (LoS) range.

During the February show, the R&D Establishment (Engineers) of the DRDO showed a concept for a tethered data repeater that could be used with the Netra v2 to boost its communications range. By hoisting the Tethered Autonomous Multi-copter Platform (TAMP) aloft for up to an hour, it can relay signals to the Netra if LoS is being blocked.

Additionally, the TAMP could carry a radar or be used for surveillance missions. The TAMP would be fitted to the rear of a light vehicle to give mobility for wherever its services are required, and it receives power via a tether.



The Indian Eagle has a 1.6m wingspan and can fly up to 10km or for a total of 60 minutes.

A representative said the TAMP is still evolving, which was obvious since the concept demonstrator being exhibited was made from stainless steel tubing and looked extremely hefty. It supposedly weighs 20kg and the aim is to achieve a payload capacity of 30kg via eight propellers operating at 6,000rpm.

Slightly larger in scale than the Netra v2 are the 550g Golden Hawk micro-UAV and 2.9kg Indian Eagle mini-UAV, both from DRDO. These two designs powered by lithium-polymer batteries are awaiting a formal order from the Indian Army, possibly worth up to \$85 million, so production can kick off.

The former can fly for up to 30 minutes at a range of 2km and at a 90m ceiling. The 1.6m-wingspan Indian Eagle, meanwhile, has a 10km range, 60-minute endurance and 610m ceiling. Operated by a crew of two, both are portable and hand-launched.

Council work

Also worthy of note are two designs from the Council of Scientific and Industrial Research (CSIR). The CSIR's National Aerospace Laboratories exhibited its Black Kite 300 micro-UAV and Suchan. The former cruises at a

speed of 13m/s at a maximum altitude of 100m, and was developed with DRDO.

The hand-launched Suchan is a mini-UAV with 75-minute endurance. Demonstrations have already been conducted for the National Security Guard, Indo-Tibetan Border Police and Central Reserve Force, among others.

Unfortunately there was no sign of the elusive Ghatak stealth UCAV at the show, this remaining a secretive programme based on the DRDO's Autonomous Unmanned Research Aircraft (AURA). It was

reported that the first funding for a lead-in project was allocated in May 2016.

Israeli cooperation

Meanwhile, illustrating its contribution to India's defence industry, Israel Aerospace Industries (IAI) signed two agreements in February, one involving mini-UAVs.

The IAI agreement with Dynamatic Technologies relates to mini-UAVs 'to jointly address the needs of the Indian UAV market' in terms of production, assembly and support. IAI would agree to

transfer technology to aid the government's 'Make in India' policy.

The specific target is the Indian Army, with IAI already having supplied significant numbers of the larger Searcher and Heron UAVs to the IAF and IN.

It is understood that India is currently in discussions with IAI to order two further II-76-based Phalcon systems, with a decision to be finalised 'in the near future'.

IAI has already provided aerostats and radars to India. Eli Alfassi, executive VP of marketing at IAI, said various other RfIs for aerostats had been issued in the past 18 months, and that IAI was in 'deep discussions with local companies' to help meet 'Make in India' requirements.

The DRDO is leading another project in which both IAI and HAL are involved to create an unmanned version of the Chetak helicopter for the IN. This is known as the Naval Rotary Unmanned Air Vehicle (NRUAV).

These unmanned Chetaks would be used from ships for over-the-horizon surveillance.

The Chetak is thought to be a suitable platform for this capability since it will be supportable for years to come, and it is a light and easily convertible airframe.

The project is still in the definition and workshare planning stage as all parties are waiting for a renewed requirement to be issued by the IN. ■



IAI has displayed a scale model of an unmanned Chetak helicopter at trade shows.



The RAN has ordered two Camcopter S-100s for trials. (Photo: Commonwealth of Australia)

Aviation assets

Australia's armed forces have a wide range of UAV models in service or under evaluation. **By Gordon Arthur**

Among regional operators, the three branches of the Australian Defence Force (ADF) are some of the most comprehensive in their approach to and use of UAS.

The Royal Australian Navy (RAN) recently signed an order for two Schiebel Camcopter S-100 systems (with a single aircraft in each) under Navy Minor Project 1942, which will be used for evaluations as the service moves towards selection of a UAV system for future warships.

Later in the year the RAN will conduct its first embarked trials of the S-100 aboard a frigate. It will be operated by the Naval Unmanned Aircraft Systems Unit (NUASU), which was originally formed in 2011 as a UAV development group.

As well as the S-100, the RAN also operates the Insitu ScanEagle, with eight aircraft currently in service. Three have petrol engines and are used for shore-based training, while another three have heavy-fuel engines that permit them to embark upon warships.

The RAN also has another two ScanEagles equipped with a Visual Detection and Ranging (ViDAR) turret, these being the only two of their type in the world.

Their additional turret under the ScanEagle's nose can rotate 180°, enabling the camera to see 16km either side of the aircraft for broader coverage. Indeed, manufacturer Sentient Vision Systems claims 80-plus times greater coverage for ViDAR compared to the usual 'soda straw' vision obtainable from standard EO/IR sensors.

These ViDAR-equipped ScanEagles were successfully trialled by the RAN on Christmas Island last year.

Long endurance

Andrew Duggan, Insitu Pacific's managing director, said the navy typically got a 12-15 hour endurance with its ScanEagles, which was far greater than the endurance of the operators.

The RAN plans to use both fixed- and rotary-wing UAVs aboard its ships. In around 2023 it will order UAVs under further phases of Joint Project 129.

Duggan said the RAN's current intent is to operate a mixed fleet, but work needs to be done to explore the correct mix and crewing.

One NUASU member said that rotary-winged platforms were preferable aboard ships because

of their much smaller footprint, where the UAV can share space with a helicopter inside the hangar, and can take off and land from the flight deck.

Furthermore, the catapult launcher and skyhook currently used by the ScanEagle add considerable weight, in the order of 2t, to ships.

However, to overcome the weight and footprint problems, Insitu has its eight-rotor Flying Launch and Recovery System (FLARES) under development, which will vertically take off with the ScanEagle attached to it before releasing it, and initiates recovery by dangling a rope on which the ScanEagle can snag.

Duggan said FLARES was currently in low-rate initial production, and that prototypes would arrive in Australia 'shortly'. FLARES will offer the VTOL benefits of a rotary-winged UAV, but with the speed and endurance of a fixed-wing platform.

In addition, Duggan said Insitu Pacific was already working with shortlisted shipbuilders for the RAN's upcoming frigate and OPV competitions to ensure UAVs are fully integrated into the designs with services such as air and power.

Micro machines

The Australian Army, meanwhile, previously conducted successful evaluations with the tiny Prox Dynamics PD-100 Black Hornet nano-UAV and AeroVironment Wasp AE micro-UAV. The infantry and armoured corps employed these on exercises, for example.

The army is buying greater quantities of each type. *Unmanned Systems Asia Daily News* understands that the army is procuring 150-200 Black Hornet kits, with each containing five UAVs (two with daytime cameras, two with thermal cameras and a spare). A tender for this capability closed in August 2016, and the intent is to roll out these aircraft to both the cavalry and infantry.

It is believed the army is also acquiring 78 examples of the Wasp AE under Project Land 129 Phase 4, which seeks UAVs for the battlegroup level. XTEK – teamed with AeroVironment, Sentient Vision Systems and General Dynamics Mediarware – was selected last April as preferred bidder.

The army's largest UAV is the Textron RQ-7B Shadow 200, which is operated by the 20th Surveillance and Target Acquisition Regiment. *Unmanned Systems Asia Daily News* learned at the Avalon air show that work is ongoing to exploit integration of the Shadow's laser designators with aircraft like the Tiger helicopter and Hornet/Super Hornet fighter.

This year the army will also certify the Shadow for use on dirt airstrips.

The Shadow will not come up for replacement until the mid-2020s, but Insitu Pacific already considers the Integrator (known as the RQ-21A Blackjack in US Marine Corps service) as a suitable platform.

The Royal Australian Air Force also operates the Heron 1, while the General Atomics Reaper and IAI Heron TP were slugging it out at Avalon for the right to supply Project Air 7003 Phase 1's requirement for an armed MALE UAV platform. ■

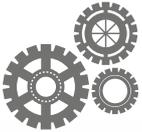
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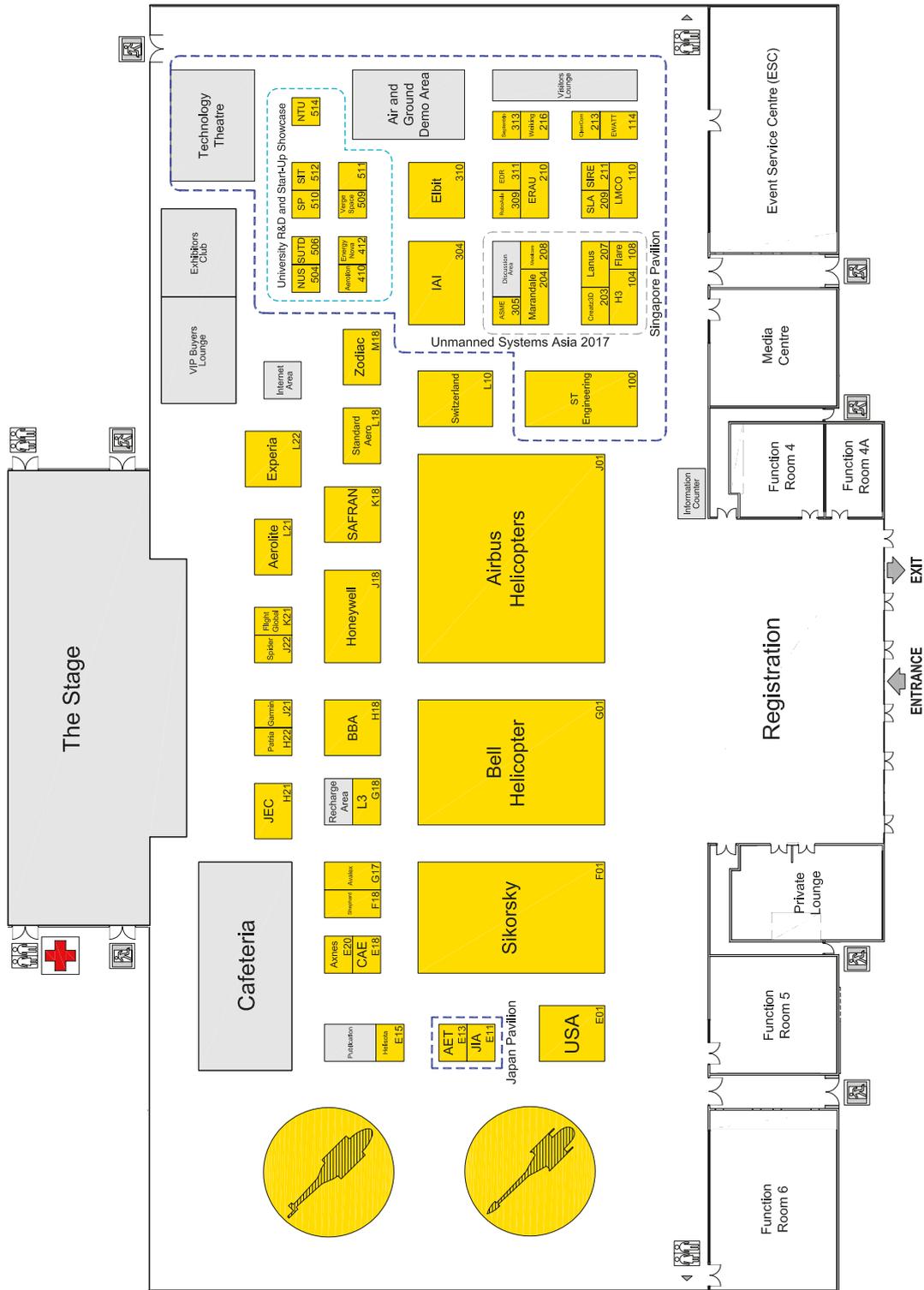
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FLOOR PLAN

LEGEND

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-  Medical Centre
-  Restrooms



Footnote:
 • Floor plan is not drawn to scale.
 • Floor plan is accurate as of 31 March 2017. Please refer to the Exhibition Hall floor plan at the show site in the event of any discrepancies.