

UAVs offer threats and opportunities on the perimeter

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Security solutions evolve to meet the challenge and positive potential of UAVs. *Ben Vogel and Barry Cross report*

Until recently the main threats to airport perimeters came from individuals, wildlife, or vehicles approaching the fence line, but the evolution and growing use of unmanned aerial vehicles (UAVs) is forcing technology developers and security regulators to adapt to a changing landscape.

Multiple technologies are available for perimeter protection, depending on the specific threat assessments or operating environment at an airport. One traditional method is to add CCTV coverage to a plain ('dumb') fence, although this approach is now largely eschewed in favour of perimeter intrusion detection systems (PIDS) that can include infrared (IR) or electro-optical (EO) solutions, microwave sensors, or ground-based radar. This mix of technologies can be controlled from a security management platform with data analytics powered by artificial intelligence (AI).



D-Corative fence at Ben Gurion International Airport. (D-Fence Electronic Fencing & Security Systems)

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One covert option is distributed acoustic sensing (DAS) using a network of sensors in fibre-optic cable, which listens for acoustic disturbances near the fence. In April, for example, UK-based Fotech (a company with wide experience in providing acoustic sensors for the oil and gas industry) launched a new DAS-based security management platform for perimeter intrusion monitoring called LiveDETECT. The platform includes “cutting-edge photonics, AI, and edge computing to deliver comprehensive 24/7 monitoring”, according to Fotech. It added that these features help LiveDETECT to “automatically identify different types of threats”.

It is not clear if DAS technology can detect a small UAV approaching the perimeter, but this is a matter of growing concern for regulators and the aviation community as consumer UAVs become more widely available with high-end capabilities.

The case for radar

Some manufacturers say their perimeter security technology can be adapted for UAV detection. For example, the software-defined S-band GroundAware radar from US company Dynetics was originally developed to secure commercial airport perimeters against trespassers on foot, unauthorised vehicles, intrusions via waterways, and stray wildlife, but it has also been tested to detect UAV intrusions over airports and military sites.

Another US manufacturer, Echodyne, claims to offer high-performance perimeter coverage for 10% the cost of military-grade installations. Its latest product, called Echoguard, employs Metamaterial Electronically Scanning Array (MESA) technology that has been used for airbase perimeter protection.

“We have designed Echoguard to be able to reliably detect a small drone at distances of around 1 km, humans at up to 2.2–2.4 km, and a vehicle at 3.5–4 km,” said CEO Eben Frankenberg.

A tripod-mounted Echoguard installation weighs no more than 20 lbs (9 kg) and sells for USD60,000. In comparison, similar technology acquired by one US federal agency in 2012 weighed 750 lbs and cost USD800,000 per unit. Admittedly, the more expensive system could detect potential intruders at up to 3 miles (4 km), but Frankenberg argued that Echoguard makes sense for airports that do not require this kind of long-range coverage.

“Our kit is particularly suited for medium-sized airports that don’t have the budget for military-grade equipment. However, even larger airports might be tempted to acquire six to eight of our units, which combined would cost no more than USD250,000, since each radar unit can cover an arc of 120 degrees and when networked would give secure perimeter protection over a large area,” he said, pointing out that there is no danger of interference since Echoguard works at frequencies not used by aviation.

However, radar detection of small UAVs is complicated by their minimal electromagnetic signature, whereas thermal imagers can pick up minor differences in IR signature. This

capability helps improve UAV detection performance compared with other systems, although the most effective approach is to monitor airport perimeters with a mix of technologies.

Ben Gurion International in Israel and Dallas Love Field in the US have adopted the SPEED-BIRD system from CONTROP Precision Technologies Limited integrated with the Pharovision SENTINEL EO/IR-based automatic detection and tracking system.

SPEED-BIRD employs panoramic scanning to detect threats automatically. SPEED-BIRD includes a thermal imaging camera and a colour day camera, both of which feature continuous optical zoom. The system delivers real-time day/night target detection and tracking and it includes advanced software developed specifically for aviation safety.

SPEED-BIRD integrates with the SENTINEL automatic detection and tracking system, which was originally developed to prevent birdstrikes and wildlife intrusions around airports, but has been installed at Ben Gurion and Love Field to scan for UAV intrusions as well. The system automatically determines what an object is, tracks it, and alerts airport personnel. "Dallas [Love Field] wanted to be able to designate targets [drones and wildlife] for security teams to follow up," said Pharovision CEO Nicholas Carter.

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