



DRONE DANGER

Timothy Compston navigates his way through the latest solutions to clip the wings of hazardous drones following recent events at Gatwick airport

The security and safety risks that commercially available drone systems or UAVs (Unmanned Aerial Vehicles) represent in the wrong hands has been brought into sharp relief, thanks to a series of well reported incidents. On the aviation front, the situation at London Gatwick airport, the UK's second largest, captured the headlines before Christmas with multiple drone sightings by airport personnel and the police leading to several days of grounded flights. What seemed to be a deliberate attempt to close the airport had major financial ramifications as the travel plans of an estimated 140,000 passengers were disrupted and 1,000 flights cancelled or

diverted. Eventually, with the police unable to stem the tide, the military were called in to assist by deploying specialist counter-drone technology.

Given the evolving threat landscape, an increasing number of vendors are seeking to bring solutions to market to tackle the scenarios where rules and regulations are simply not enough of a deterrent or drones are accidentally flown into restricted areas like airports and other critical infrastructure. Potential routes to tackle rogue drones are wide ranging. These include geofencing technology that creates virtual fences within drones to limit the airspace they can fly through; providing an early warning of any drone intrusion with a range of detection technologies; identifying the location

of the operators; jamming signals sent to the drone; firing lasers which both the Chinese and Israelis have done successfully; taking control of drones remotely and launching nets from anti-drone guns (or even other drones). Perhaps one of the most surprising options considered to take out drones in flight comes in the shape of birds of prey, specifically American sea eagles, which the Dutch National Police have explored.

ELECTRONIC WALLS

Speaking to British Army officer Richard Gill, the founder and CEO at Drone Defence – a drone focused security consultancy – about the direction of travel here, he feels electronic interference is really the best way to combat malicious drones, which are essentially radio-controlled devices. He cites the example of Drone Defence's SkyFence solution, which has been installed on the fence-line at a critical infrastructure site, namely Guernsey Prison in the Channel Islands. SkyFence's panels create a 500m-high electronic wall to thwart drones and can, says Gill, be deployed alongside an automatic detection system like Drone Defence's AeroSentry – that can detect the presence of a drone's RF signature – or be manually activated by security staff: "Attacking that radio-controlled aspect means that the device [drone] doesn't fall out of the sky and you stop it from reaching its target."

Despite the very successful Guernsey Prison deployment, which even received a mention in Parliament from the UK's Minister of State for Prisons, Gill admits that the picture for the rollout of drone jamming technology is much more complicated on the UK mainland. Here he points out that legislation – such as the Wireless Telegraphy Act – is a big barrier to its take up by sites. "There are acts [of Parliament] which say it is only when you need to preserve life that it is proportionate to use jamming technology." In the case of an airport the issue arises when air operations cease but drone activity continues: "Even though there are economic and reputational impacts they [the Acts] no longer judge that as a threat to life so that then removes the legal basis of jamming technology under current legislation," explains Gill.

Asked if the situation is different if the jamming equipment is in the hands of the police or army, Gill responds in the affirmative: "When the military – or police – deploy, they do so with special rules." Gill also contends that there is a second reason why jamming is more complicated for airports: "We have not tested jamming systems alongside fully operational airports so we don't yet know the impact that a jammer would have on the instrument landing system (ILS) or other essential safety mechanisms that airports need to operate."

Moving ahead, Gill says that Drone Defence is lobbying hard for change: "Last week we wrote to 30 MPs who had expressed an interest in counter-drone technology to say that we believe that baseline levels need to be increased as at the moment there isn't any type of barrier to stop a drone flying where it shouldn't." He stresses the importance of testing in the field: "One of our lines was that we are ready to support the Home Office in the testing of this equipment, but they need to test it now because airports and prisons across the UK are still at risk from illegal drones."

While more limited in application, he believes that given the current regulatory landscape other options are going to come into the spotlight: "We are working on a system at the minute that puts a net on a drone that can drop it onto another drone with a parachute," he explains. "If it is an exceptional drone like that reported to have been used at Gatwick airport, then you have got to deploy something more advanced like a net system."

When it comes to detecting drones, Gill says that there are really three primary sensor technology groups, the first concerns radio command signals, which he believes is sufficient for 80 to 90 percent of the current market: "You can triangulate the drone based on the radio signal it is transmitting and if the operator is in line of sight to one of your sensors you can also detect them via radio frequency." Another option is radar. Gill says the drawbacks with radar are that it is either very expensive or not very good at detecting drones because they are so small. Added to this, Gill points out that if you want to see what a drone looks like or if it is carrying anything, cameras need to be utilised as well.

Moving on to another solution, Drone Dome is one counter-drone system that has already garnered much media attention after it was rumoured that the UK military had brought it in to address the recent Gatwick Airport crisis. Although the Israeli supplier

MULTIPLE DRONE SIGHTINGS BY AIRPORT PERSONNEL LEAD TO DAYS OF GROUNDED FLIGHTS

is reticent to confirm whether Drone Dome was actually the system that went 'live' at Gatwick, we do at least know from multiple reports over the summer that the UK military has decided to acquire the radar detection, electro-optical identification and communication jamming elements of the system, but not the hard-kill laser.

360° COVERAGE

Looking in more detail at the thinking behind Drone Dome, which is a good example of the higher-end systems now on the market, Ishai David, the deputy spokesman for Rafael Advanced Defense Systems Ltd, points to the need to address a significant increase in the use of Low, Small and Slow (LSS) UAVs by insurgents and in civilian settings. David confirms that the system, which has 360° coverage, can operate around the clock under all weather conditions against micro and nano UAVs. In the first instance he says that a threat is detected and identified by radar and EO/IR sensors (with image processing including VMD (Video Motion Detection)): "The system initiates either an automatic interference operation, as per pre-defined rules in the C4I engine, or manual operation by the operator." When a hostile drone, classified as a threat, reaches what is termed 'the neutralisation area' it can be neutralised by the activation of a directional GNSS (Global Navigation Satellite System) and RF (Radio Frequency) inhibitor/jammer system. In terms of

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► deployments, David confirms that Drone Dome has been designed to deal with hostile drones in military scenarios as well as to protect civilian targets like airports.

Returning to the situation at Gatwick, when the UK military withdrew their counter-drone solution from the airport, another solution was quickly installed in its place. Unconfirmed reports circulated at the time that the British AUDS (Anti-UAV Defence System) was the technology in question. Commenting on the situation, Mark Radford, CEO of Blighter Surveillance Systems –

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one of the companies making up the consortium that brought AUDS to market back in 2015 alongside Chess Dynamics and Enterprise Control Systems – says, regrettably, that he is not at liberty to either confirm or deny whether AUDS is deployed at Gatwick.

Whatever the truth around Gatwick, AUDS is certainly a very impressive piece of kit, which according to Radford has already been sold to the United States’ armed forces and the Spanish Defence Ministry. He adds that, in the field, AUDS has already successfully defeated nearly 2,000 drone

sorties and been tested against more than 60 types of drone including fixed wing and quadcopters.

When deployed AUDS can be operated by a single user, undertaking detection with an electronic-scanning micro-Doppler radar; tracking and identifying the drone/s in question through precision infrared and daylight cameras and video tracking software – and looks to defeat the threat via a non-kinetic radio frequency inhibitor. Radford claims that AUDS can achieve this in approximately 15 seconds at a range of up to 10km or six miles and is also now configured to be able to counter swarm attacks.

SPOT THE DIFFERENCE

He goes on to stress that an airport is a unique and complex environment for a counter-drone system to deal with: “It has clutter at the ground level and in the skies around it so any system must be able to differentiate between friendly and unfriendly targets. The Blighter A400 series micro Doppler air security radar with D3 technology is a key component of AUDS as it can extract the tiny reflections from modern plastic bodied drones even when they are flying close to the ground or near buildings,” concludes Radford.

With the number of drones taking to the skies showing no signs of slowing down anytime soon it is perhaps not too surprising that the market for counter-drone solutions is very much on the up. It will be interesting to see the trajectory that the approaches take in the months and years ahead and what changes are made to the legislative environment in which they need to operate ●

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The Drone Dome has 360° coverage and can operate around the clock under all weather conditions against micro and nano UAVs



Picture credit: Rafael Advanced Defense Systems Ltd.