Unmanned assailants: Air defence against UAVs

Unmanned aerial vehicles (UAVs) are becoming more widely available commercially than ever before and, as a result, the threat they pose against both military and civilian targets is increasing. *Oscar Widlund* reports

The global proliferation of cheap and easy-to-operate UAVs has resulted in the necessary development of counter-UAV (C-UAV) systems to address the threat: a trend that was recently demonstrated by the prevalence of C-UAV systems featured at the Eurosatory defence exhibition in Paris in June.

A Guard From Above eagle intercepting a DJI Phantom UAV unmanned aerial vehicle. (Guard From Above)

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Beyond being just used for reconnaissance, UAVs have been employed by militant groups in Iraq and Syria to conduct attacks and for propaganda purposes, with the Islamic State (IS) apparently the most notable group to deploy them for tactical military and propaganda purposes. For example, in January 2017 *Jane's* reported that the group had released a video that for the first time demonstrated its use of commercial UAVs to carry out attacks. The UAV segment of the video showed two militants launching a fixed-wing Skywalker X7/8 UAV with improvised explosive devices (IEDs) under each wing that were later shown being released. The video also showed 19 attacks filmed by UAVs as they dropped IEDs on Iraqi security forces and their vehicles in the streets of

Mosul. However, although the video showed the first attack being carried out using a Skywalker, during the subsequent 19 attacks the IEDs appear to have been released from directly above the target by unseen hovering UAVs. If they had been dropped from a Skywalker, they would have retained some of the fixed-wing aircraft's forward speed and approached their targets from an angle due to their curved (ballistic) trajectories.

In January the Russian Ministry of Defence (MoD) stated that Russian bases in Syria had been subject to the first mass attack by UAVs. It said 10 small UAVs had been detected by air defences at Humaymim Air Base and three had been detected at the Tartus naval station. Of these, seven were destroyed by Pantsyr-S short-range air-defence systems and the other six were intercepted by electronic warfare units. Of those intercepted, three were landed outside the base and three exploded when they hit the ground. UAVs have also been used in Afghanistan by armed non-state groups for surveillance and propaganda purposes. For example, in October 2016 the Taliban released a video showing footage of a suicide vehicle-borne IED attack that had been filmed from a UAV.

Speaking to *Jane's* at the DSEI defence exhibition in London last September, Fabian Ochsner, Rheinmetall's vice-president of business development and marketing for air defence, pointed to eastern Ukraine as an example of where UAVs have been used to direct artillery fire. He also noted that in Yemen Houthi rebels have used UAVs to knock out the radars of Patriot surface-to-air missile (SAM) batteries and then engage the launchers in swarms, thereby threatening the overall air-defence layer that the Patriot system provides. At the Farnborough International Airshow last month Raytheon confirmed in a presentation that off-the-shelf unmanned aerial systems (UASs) can be easily weaponised and used by terrorists to threaten civilian and military personnel and infrastructure.

Moreover, unmanned systems used recklessly pose a threat to civilian air traffic, with near-miss incidents having tripled over the past two years, while earlier this month various media organisations reported that six arrests had been made in Venezuela after two UAVs fitted with explosives attacked an event commemorating the National Guard attended by Venezuelan President Nicolas Maduro.

In the civilian sphere UAVs have the potential to be used for terrorist attacks. As reported in *Jane's Terrorism & Insurgency Monitor* in 2017, UAVs could be used by militant groups to attack mass gatherings. Equally, they may be employed to target airports where they could be rigged with explosives to detonate on impact with an aircraft or simply flown into an aircraft engine. Unmanned systems could also be used against symbolic targets in major cities, where attacks would most likely be conducted for propaganda purposes.

UAVs have also been used by organised crime gangs, primarily by international drug-trafficking organisations, to carry contraband and perform surveillance ahead of trafficking operations across sensitive areas such as the Mexico–United States border. Criminal gangs have also used small UAVs to smuggle contraband and narcotics into prisons.

UAV use by civilian hobbyists that do not have a criminal intent also has the potential to cause accidents. Incidents including a quadcopter landing on the White House lawn and UAVs being flown over nuclear power stations in France are examples that demonstrate the dangers UAVs can present when operated by civilians. There is also the potential for a serious accident if a UAV were to collide with a commercial airliner inadvertently, with near-misses reported close to several airports. As a result, in March 2016 the British Airline Pilots Association (BALPA) called for more research into safety issues associated with UAVs in the vicinity of commercial aircraft.

C-UAV responses

Meanwhile, due to the increased threat from UAVs the United States has issued guidance and requirements to address the issue. In 2016 the US Army examined a range of C-UAV solutions during a trial and issued a request for information (RFI) to identify potential mature solutions that could counter small UAVs in the sub-20 lb (9.07 kg) class (maximum take-off weight). The trials were a response to the recognition that small UAVs represent a security risk to military personnel deployed on operations and in the domestic environment, according to the RFI. In August 2017 the US Department of Defense (DoD) issued a new, secret guidance document for defending against UAVs near military personnel and assets. This was a direct response to US military officials raising concerns about small civilian hobbyist UAVs potentially threatening military flights or activities in the United States; the growing popularity of UAVs among IS fighters in Iraq and Syria, sometimes armed with simple explosives; and their use among Russian-backed forces in Ukraine for targeting opposition artillery sites.

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