

Attack of the drones

Unmanned aircraft are now a vital tool in war zones, but our skies could soon be buzzing with spy planes that feed information back to the police – and even the paparazzi

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An MQ-9 Reaper during a combat mission over southern Afghanistan Photograph: Leslie Pratt/ASSOCIATED PRESS

There is a second-and-a-half delay between the RAF operator pressing his button and the Hellfire rocket erupting from the aircraft he is controlling, circling in the sky above Afghanistan.

That's a long time in modern warfare, but the plane is an unmanned "drone" and its two-strong crew are 8,000 miles away at Creech Air Force Base in Nevada. Right now, the Reaper is being commanded from a console with twin video screens shaped to resemble a plane's cockpit.

The UK has five Reapers like this one operating in Afghanistan. With a wingspan of 66ft, they are 36ft long, reach a top speed of 250 knots and usually carry four Hellfire rockets and two laser-guided bombs. These Unmanned Aerial Vehicles (UAVs) – which rely on fibre optic cables, European "upstations" and satellite links – are part of an international trend towards remote combat. RAF-controlled Reapers used their weapons in Afghanistan 123 times in the first 10 months of 2010.

British forces are also using smaller drones, such as Lockheed Martin's hand-launched Desert Hawk. The lightweight surveillance aircraft is flown by Royal Artillery controllers to provide army patrols with "over the hill" vision for improved reconnaissance. Last summer the Ministry of Defence ordered £3m worth of an enhanced version that will give troops in Afghanistan "greater situational awareness" and upgraded "target acquisition" capabilities. On the US side, there were more than 100 CIA-led drone strikes in Pakistan last year and the Pentagon is about to deploy its intimidatingly named Gorgon Stare airborne surveillance system, a multi-image video device for tracking suspects across large areas.

But interest in UAVs is not limited to the military. Advances in remote control, digital imagery and miniaturised circuitry mean the skies might one day be full of commercial and security drones.

They're already being used by the UK police, with microdrones deployed to monitor the V festival in Staffordshire in 2007. Fire brigades send similar machines to hover above major blazes, feeding images back to their control rooms. And civilian spin-offs include cheaper aerial photography, airborne border patrols and safety inspections of high-rise buildings.

Despite this development, not everyone, even within the military, thinks that drones will eventually replace all other planes. Wing Commander Christopher Thirtle is responsible for the RAF's strategy on remotely piloted air systems (RPAS) — the term preferred in air force circles.

"Reapers will not replace Tornados. Human beings bring flexibility like no computers," he told an audience at the Royal Society in London.

It may be just as well: there has been international criticism because a significant number of those killed in drone attacks have been reported to be innocent tribesmen misidentified as al-Qaida leaders, or villagers caught up in targeted explosions.

But Thirtle insists the RAF is bound by international laws governing armed conflict — specifically the principle of attacks being discriminate and proportionate. "We have a targeting directive which sets down who are combatants and sets out rules on how we can engage [them]."

A ground pilot's extreme distance does not necessarily result in greater collateral damage, he argues. Aircrews in Kosovo conducted bombardments from 22,000ft. "If I was asked where I make the best decisions about people on the ground, then my clarity of thought is much more conducive at a ground control station [without] a 10lb flying helmet on my head."

Accustomed to the 20th-century gadgetry of cruise missiles, CCTV, satellite phones and radio-controlled model aeroplanes, technical experts and peace campaigners have only belatedly become alarmed by the combination of such capabilities.

The International Committee for Robot Arms Control (Icrac), founded in Britain in 2009, marked the beginning of a global — if small-scale — protest movement. The organisation held its first workshop in Berlin last summer and called for a ban on the "further development of armed autonomous robots", limits on numbers operated by any state and restrictions on the use of armed drones for "targeted killings in sovereign territories not at war".

Even the UN human rights special rapporteur, Philip Alston, has warned that US drone killings may violate international law. He has called on the US to explain the legal basis for its attacks. Others have taken direct action: peace protesters recently breached the gates of the Creech base — 14 of them were arrested for invading the site. Kathy Kelly, their spokeswoman, said: "We protested because . . . the US is, at an alarming rate, moving into robotic warfare, kind of a mission creep, that could lead us into perpetual war."

Opponents of drones fear they will lower the threshold for wars to start in places such as Yemen and Somalia, where the US is not involved in any formal conflict. Yemen was the site of one of the earliest CIA-co-ordinated Predator drone attacks on al-Qaida targets as early as 2002. There have been further drone strikes there since the failed Christmas Day attack on a transatlantic airliner. A fresh onslaught, it is suspected, is being planned in the wake of the recent Yemeni-based plot to destroy cargo planes.

Noel Sharkey, professor of robotics and artificial intelligence at Sheffield University, told the Royal Society meeting there are credible estimates that one in three casualties from drone attacks is a civilian. His chief anxiety is the development of "autonomous targeting", where unmanned planes are engineered to lock automatically onto what their onboard computers identify as the enemy. The military are keen on this because it would no longer have to worry about radio signals being jammed.

"There's a really big drive to get autonomy," he says. Manufacturers are even working on "swarms" of vehicles that can co-operate. "The big problem is there's no system capable of consistently distinguishing [between] targets. The Pentagon is funding research labs and saying these things can 'think': that's strong anthropomorphic language."

However, Thirtle is adamant we will never reach a Terminator-style situation where robots run out of control. "There will be an enduring need for a man in the [control] loop for the foreseeable future," he maintains.

The Oxford-based Fellowship of Reconciliation is "seriously concerned" the UK might be sanctioning a culture of "convenient killing . . . Our core concern is with 'PlayStation warfare', where the geographical and psychological distance between operator and target lowers the threshold for launching an attack."

Thirtle dismisses the accusation. "The people doing this are adults," he said. "They understand flying and the effects they are having on the ground. They are not remote. One pilot told me he had never felt more connected to the ground than in flying a Reaper."

But Steve Graham, professor of cities and society at Newcastle University, who studies urban battle grounds, warns that the US military's "technophilia" and "fantasies of omnipotence" blur the distinction between surveillance and killing. As he puts it in his book *Cities Under Siege*: "The possibility of deploying swarms of armed and unarmed robots to loiter persistently across regions of the world deemed trouble spots is clearly a good fit with the Pentagon's latest thinking surrounding the long war."

The growing popularity of UAVs can also be witnessed in the UK's congested skies. The Civil Aviation Authority (CAA) has conducted two safety inquiries, the first of their kind involving UAVs, into the use of drones over Salisbury Plain following reports of near-collisions with helicopters. (It concluded that the ground operator avoided a risk of collision.)

Border patrols present a further opportunity for deployment. The US Customs and Border Protection Agency has announced that it is patrolling all 2,000 miles of the Mexican border with Predator drones equipped with night vision cameras. Frontex, the European border agency, has held a drone demonstration conference in Bulgaria, while the UK Border Agency says: "[We] do not rule out the use of drones in the future if they can be shown to provide a value for money increase in our border security."

At least four police forces – Essex, Merseyside, Staffordshire and the British Transport police – have bought or used microdrones. Last summer the Serious Organised Crime Agency published a tender notice requesting information on "a fully serviced, airborne, surveillance-ready platform for covert observation" provided by either drones or manned aircraft. And several fire brigades – including West Midlands and South Wales – regularly send up drones to check on the spread of blazes.

Commercial distributors and manufacturers are convinced drones will gradually displace expensive manned aircraft and expand into even more areas. Aviation experts already envisage a time when unmanned cargo planes, fitted with collision-avoidance detectors, circle the world.

Given this progress, it cannot be long before news organisations exploit microdrones to obtain picture exclusives: imagine aerial races between Hello! and OK! magazines. Last autumn a US academic claimed he was developing a "[paparazzi drone](#)". Ken Rinaldo of Ohio State University said it would have a lot of "flash and bling".

"UAVs will, to an extent, replace helicopters," believes Mark Lawrence, director of [Air Robot UK](#). "Our 'air robots' cost £30,000 compared with £10m for a fully equipped modern helicopter. We have even been asked to put weapons on them, but I'm not interested in getting involved in that."

Alistair Fox, commercial director of [Air Power Systems](#), which supplies microdrones to the fire service and the government's Health and Safety Laboratory, claims drones have "all sorts of commercial applications for safety inspections. With thermal imaging and air-sampling devices they could check for cannabis being grown under lamps in roof lofts." Another suggested use is perimeter patrols around prisons.

There are possible uses – drones have already been used for high-altitude research into hurricanes. And Israel lent the Chilean airforce several to inspect damage after the country's earthquake this spring. In Japan, drones are used to cropdust rice fields.

Many of the 70 permissions already granted by the CAA for drones to fly in UK airspace this year are thought to relate to civil engineering surveys or aerial photography companies. But the agency has warned: "In the wrong hands or used irresponsibly in built-up areas, or too close to other people or property, [drones] represent a very real safety risk."

The advent of effective "sense and avoid" systems would transform the technology, the CAA admits, opening up a future where unmanned UAVs could float safely above our heads. The first firm to design an acceptable system could make a fortune.

Part of the CAA's anxiety was due to postings on YouTube showing near-collisions in central London involving microdrones launched for amusement. Some of the latest models can be controlled by iPhones. Permission is now required to fly a drone "within 50 metres of a person, vehicle, vessel or structure" not under the control of the remote operator.

Even without these restrictions, it may be a while before our streets echo to the buzz of unmanned aircraft. John Moreland, general secretary of [the Unmanned Aerial Vehicle Systems Association](#), the trade body that represents the industry in the UK, suspects that security surveillance at the 2012 Olympics will be conducted from an airship rather than highly mobile drones.

The CAA, he says, is unlikely to allow UAVs to operate so close to large crowds because of "reliability" issues. The east London site, he also points out, is too close to London City Airport.

One airshow enthusiast has nonetheless contacted the Guardian to say he is convinced he spotted a drone passing over the Olympic site. "Its length was about 8ft and its altitude between 300ft and 400ft," he said.

The authorities denied any knowledge of the flight. "The public perception of drones at the moment is that they are a little bit sinister," Moreland adds, "but the technology is becoming more widespread and there are lots of applications. Everyone is feeling their way forward."

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