The Economist

Aircraft safety

Strike out!

Radar stops aircraft colliding with each other. It should be used to stop them colliding with birds, too

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ONE of the scarier videos on YouTube (ow.ly/sBIOq (http://ow.ly/sBIOq)) was recorded by the nose-cone camera of a fighter jet as it was taking off. Just after the plane leaves the runway a large bird comes hurtling towards it and vanishes into the aircraft's engine. The pilot spends an agonising 30 seconds or so trying to regain control, before issuing the order to eject, after which the viewer is treated to a shot of the onrushing ground before the screen goes blank.

Bird strikes are a problem—sometimes a fatal one—for military and civil aviation alike. America's Federal Aviation Administration (FAA) reports that there are about 10,000 such strikes a year to the country's non-military aircraft, costing more than $957m in damage and delays. The worldwide figure is estimated by the European Space Agency to be $1.2 billion.

Moreover, though relatively few people have been killed in accidents caused by bird strikes (research by John Thorpe, former chairman of the International Bird Strike Committee, recorded 242 deaths between 1912 and 2004), the potential for something horrible to happen is real—as was shown by one of the most famous strikes of recent years. In 2009 an Airbus with 155 people on board hit a flock of geese when it was taking off from LaGuardia airport in New York. The passengers were saved only by the skill of the pilot, Chesley Sullenberger, who managed to ditch the plane safely in the Hudson river.

At the moment, attempts to deal with the problem mostly involve efforts to cull flocks of the larger species—geese in particular—in the vicinity of airports, and also the use of bird scarers to try to drive off those actually sitting near runways. As the figures suggest, these approaches do not work well. There may, however, be a better way. For a decade or more the air forces of several countries have used radar to track birds which might threaten their aircraft. Now, similar

systems are being considered for civilian airports. If they work, the old methods of trying to scare birds away, or cull them, can be abandoned.

A bird in the band

The longest-running study of the use of radar to prevent bird strikes was started three decades ago, in Israel, by Yossi Leshem of Tel Aviv University. It has helped the Israeli air force reduce the number of strikes it suffers by two-thirds.

Dr Leshem began his research using a mixture of powered gliders, drones, ground-based bird watchers and radar to build up data on the flocks that migrate over Israel in the spring and autumn. From these observations he has worked out the meanings of different sorts of radar blips, and can thus tell what is going on ornithologically from radar alone. The upshot is a system which can follow individual birds that weigh as little as ten grams and are as far away as 20km (12 miles). He can track birds the size of pelicans and geese at a distance of 90km. Moreover, knowledge of the weather, and of how birds have behaved in previous years, allows him to predict what they will do next, so aircraft can be routed above them.

Inspired by Dr Leshem, other air forces have taken up the idea of tracking birds by radar. A cottage industry manufacturing kit tweaked to do so has developed (mostly using naval X-band radars, whose wavelength is perfect for spotting birds).

One such piece of equipment, the eBirdRad radar unit made by Accipiter Radar Technologies, a Canadian firm, can track more than 100 targets at the same time, at a range of at least 11km and up to an altitude of 1km, according to a study carried out in 2011 by the IVAR (Integration and Validation of Avian Radars) project, a consortium of government and academic researchers. Accipiter's radars are deployed at Naval Base Ventura County, in California, and Elmendorf Air Force Base, in Alaska. They are also being tested at John F. Kennedy airport in New York, O'Hare airport in Chicago and Seattle-Tacoma airport in Washington state, in an experiment run by the University of Illinois at Urbana-Champaign and sponsored by the FAA.

DeTect, an American firm, has its equipment (branded "Merlin") installed at numerous American air force bases, and also at bases in Latvia, Nigeria, Poland and South Africa. And Robin Radar, a Dutch manufacturer, has created a system which lets the Dutch and Belgian air forces watch their collective airspace—and which has halved the number of bird strikes happening in its purview.

Like Accipiter, Robin has also dipped a toe in the civil-aviation market. In April 2013 the authorities at Schiphol airport, near Amsterdam, started a year-long trial of its system, watching the approaches to one of Schiphol's six runways. Yet, given avian radar's success in the military

arena, civil aviation seems surprisingly sceptical.

One worry seems to be that radar cannot distinguish between different species. At the moment that is generally true, though according to Dr Leshem the Swiss Ornithological Institute in Sempach has developed a Doppler radar that can identify blips by species. Michael Begier, national co-ordinator of the airport-wildlife-hazard programme run by the United States Department of Agriculture (USDA), who is a member of the IVAR, thinks species identification is essential. If a system cannot tell the difference between a flock of waterfowl and a flock of songbirds, he suggests, it is hard to issue meaningful warnings.

Dr Leshem disagrees. “You don’t”, he says, “need to identify the species by radar, but to identify an approaching flock, and this we see perfectly with radars used by the Israeli air force, and in air bases in the Netherlands, Germany and Belgium.” He thinks reluctance to adopt avian radar for civil aviation, in Israel and elsewhere, is caused by bureaucratic inertia.

Gary Andrews, DeTect’s general manager (and thus, admittedly, an interested party), puts it more bluntly. He believes the USDA sees radar as a threat, because the department is paid by local authorities to try to control birds by traditional methods.

Whatever the reason for reluctance in the past, a change of direction now seems sensible. In a report whose publication is pending, the USDA itself recommends that “new technologies such as the use of bird-detecting radar…should be pursued more vigorously.” Perhaps, though, the last word should go to Captain Sullenberger, a strong supporter of avian radar since his unexpected ducking in the Hudson. Noting the slow-footedness of the authorities, he says, “I think many are hoping we can continue to be lucky.”

From the print edition: Science and technology