Enhancing the safety of air travel with AI-powered defenses against birdstrikes.

As urbanization pushes wildlife ever closer to airports, the threats to commercial air traffic are significant—but existing approaches to bird deterrence rely on manual processes with limited effectiveness. To help it rapidly deploy its automated anti-birdstrike solution, **The Edge Company** used Lenovo AI ThinkSystem SR650 servers with NVIDIA® Quadro RTX 4000 GPUs to create a high-performance appliance—enabling airports around the world to protect their airspace cost-effectively while ensuring the highest level of safety for the traveling public.

Lenovo Infrastructure Solutions for The Data-Centered

(1) Background

Headquartered in Rimini, Italy, The Edge Company (TEC) is a visionary startup that aims to improve lives and safety through AI. Developing solutions for high-tech industries such as aerospace, one of TEC's main offerings is BCMS© VENTUR—a bird and drone detection system based on smart cameras and custom-developed AI algorithms.

Collisions between birds and aircraft represent a significant threat to aviation. In the most extreme cases—such as US Airways Flight 1549, captained by Chesley "Sully" Sullenberger in January 2009—birdstrikes can bring down commercial passenger jets. Even if a birdstrike does not compromise the safety of a flight, the damage they cause can often be significant, driving up the cost of repairs for aircraft owners and operators. These events are also extremely common; around the world, a birdstrike happens every 15 minutes, and the International Civil Aviation Organization (ICAO) estimates that as many as 70% go unreported.[1]

Encounters with birds are most likely to occur in the vicinity of airports, where aircraft are flying relatively low to the ground. Up to 80% of birdstrikes occur below 300 feet above ground level in the takeoff or landing phases of flight, causing an estimated US$1.2 billion in damages and delays for the industry every year.[2]

[1] See page 14 of BCMS© VENTUR Bird & Drone detection system paper at https://www.theedgecompany.net/wp-content/uploads/2020/01/CPTEC.pdf.
[2] Allan, J.R. 2000, 'The costs of bird strikes and bird strike prevention', *Human Conflicts with Wildlife: Economic Considerations*

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Challenge

Traditional methods for avoiding birdstrikes include auditory bird scarers: speakers fitted to vehicles or mounted around the airport that emit loud noises. However, noise deterrents have limited effectiveness, because birds often become habituated to the sounds once they learn that they do not pose a threat.

Fabio Masci, CEO of TEC, takes up the story: "During the 1990s, I was the Chief of Flight Safety for the Italian Airforce—and throughout that period, I spent a great deal of time thinking about the challenges of birdstrikes. As facial recognition technology entered the mainstream during the 2010s, I realized there was a major opportunity to harness AI to protect the travelling public from the hazards of birdstrikes."

Every species of bird has a unique call to warn other birds of danger. By playing the appropriate calls to birds in the vicinity of an airport, TEC realized that it could dramatically increase the effectiveness of auditory deterrents, and discourage birds from returning for longer periods of time.

"This approach to bird scaring hinges on identifying which bird species are encroaching into a hazardous area—for example, the final approach path to a runway—and then playing the correct call to discourage them," Masci continues. "To make these types of proactive measures cost-effective, we collaborated with the University of Verona to build an innovative, AI-powered solution: BCMS© VENTUR."

Using one or more high-definition cameras, BCMS© VENTUR software receives a video feed covering a radius of more than two kilometers around an airport. Using real-time, GPU-accelerated, and AI-based data processing, the solution detects the position and species of all birds in the area, and automatically triggers the appropriate warning calls until birds have been dispersed.

"During the initial development of BCMS© VENTUR, we relied on a distributed IT platform, comprising desktop PCs for video processing and separate rack servers for data management and storage," explains Masci. "But as we prepared to bring BCMS© VENTUR to market, we knew that this infrastructure approach would make it difficult to deploy the solution at airports."

"Although our previous IT architecture had served us well, it was unable to deliver the levels of reliability, cost-efficiency, and manageability we were targeting for client deployments of BCMS© VENTUR. To achieve our goals, we looked for an infrastructure provider that could help us build an all-in-one appliance for our innovative bird-scaring solution."

Fabio Masci
CEO, The Edge Company

Why Lenovo and NVIDIA?
Cost-effective performance, optimized for AI.

To help bring its AI solution to airports around the world, TEC selected Lenovo as its preferred infrastructure provider. In partnership with Lenovo, the company has developed a reference architecture based on Lenovo AI ThinkSystem SR650 servers with NVIDIA® Quadro RTX 4000 GPUs.

"Thanks to Lenovo and NVIDIA technology, BCMS© VENTUR can ingest more than ten 4K video streams from ultra-high-definition cameras, contributing to extremely precise identification of bird species at distances of more than a kilometer," comments Masci. "This high level of performance means we can manage feeds from as many as 18 cameras using just a single Lenovo ThinkSystem server—helping to keep both the physical footprint and operating costs for BCMS© VENTUR lean."

"We are keen to bring the benefits of BCMS© VENTUR to airports around the world: including Europe, North America, and Asia. By choosing Lenovo, we gain a partner with truly global reach—ensuring we can deploy the IT infrastructure for BCMS© VENTUR practically anywhere, and access technical support whenever we need it."

Fabio Masci
CEO, The Edge Company

Ready for takeoff.

Working closely with experts from Lenovo and NVIDIA, TEC deployed, tested, and validated the Lenovo ThinkSystem platform for the BCMS© VENTUR solution. Virtualized using VMware ESXi, each system is configured with 16 GB of storage and optimized for workloads such as NVIDIA CUDA, OpenCV, and TensorFlow.

The architecture of the Lenovo ThinkSystem solution makes it easy to replicate for clients around the globe. Using Lenovo XClarity Administrator, TEC can even perform standard management and maintenance tasks remotely, helping to keep costs lean while ensuring high levels of availability.

"Working with a cross-disciplinary team of biology and technology experts, we trained the neural network at the heart of BCMS© VENTUR on more than 100,000 images of various bird species. Today, the solution is capable of recognizing birds with greater than 95% accuracy."

Fabio Masci
CEO, The Edge Company

(3)

Results

With the BCMS© VENTUR solution running on Lenovo AI ThinkSystem SR650 servers, powered by NVIDIA Quadro RTX 4000 GPUs, TEC is accelerating its journey to market. The company is currently trialing BCMS© VENTUR at Verona Villafranca Airport, and the solution is already delivering impressive results.

"BCMS© VENTUR can detect the number, location, and species of birds with a degree of precision that humans are simply unable to match," says Masci. "For example, we recently compared BCMS© VENTUR's performance with a team of human bioenvironmental experts at Verona Airport. Even with only two of five cameras active, BCMS© VENTUR detected over 900 birds—five times more than the human observers.

"Using Antool—a solution that we developed to review system output—we can see just how well BCMS© VENTUR works. Recently, the system detected 56 seagulls flying one kilometer away from the cameras at Verona Airport. This perfectly demonstrates BCMS© VENTUR's ability to count and multitrack the birds with precision, and accurately classify the species."

THE EDGE COMPANY

✓ **Delivers up to 100% accuracy for bird recognition, enabling species-specific deterrents**

✓ **Processes up to 18 HD video feeds on a single server, minimizing physical footprint**

✓ **Offers rapid deployment and easy management worldwide, ensuring scalability**

Flying ahead.

Based on the positive results from its proof-of-concept work with BCMS© VENTUR, TEC is already planning for the future. The company is expanding the BCMS© family of solutions. For example, the company intends to release a version of the solution named BCMS© VENTUR-D to help address the growing threat of drone incursions into controlled airspace around airports, and a version called BCMS© VENTUR-X for airborne obstacle detection.

"Without a doubt, partnering with a leading enterprise like Lenovo lends credibility to our offering," concludes Masci. "As we prepare to bring the BCMS© family of solutions to market, we're very pleased that we have one of the world's largest and most respected infrastructure providers behind us."

"Thanks to our innovative BCMS© VENTUR solution—powered by Lenovo and NVIDIA technology—we are poised to help the aviation industry reduce the risks and costs of birdstrikes."

Fabio Masci
CEO, The Edge Company

What will you do with
Lenovo Analytics & AI solutions?

The Data-Centered reduce the global impact of birdstrikes with Lenovo smarter infrastructure solutions, powered by NVIDIA.

Explore Lenovo Analytics & AI Solutions