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Airport Low-Altitude Security: Thermal Imaging and Multi-Sensor Integration in Action

Customer Profile

Project: Airport Low-Altitude Security Upgrade
Region: East Asia
Airport Type: Civil International Airport
Application: Bird Strike Prevention, Drone Detection & Perimeter Airspace Monitoring

Airport Overview

Located in East Asia, the airport is a major civil aviation hub serving both domestic and international routes. The airport handles approximately 3.5–5 million passengers annually, with two runways, multiple taxiways and extensive airside operational areas.

Operating around the clock, the airport covers approximately 10–15 km^2, creating a broad operational environment that requires continuous situational awareness. Bird activity remains a concern for aviation safety. Unauthorized drones create additional risks for airport operations. Reliable detection, identification and tracking are essential, especially at night and in challenging visibility conditions.

To strengthen its ability to detect and respond to low-altitude targets, the airport's system integrator implemented a multi-layer security system integrating radar detection, electro-optical tracking, bird deterrence and drone countermeasures.

Raythink's PC6 Series multi-spectrum PTZ camera serves as the visual sensing and tracking component of the system, bridging the gap between target detection and response.

The Challenge

High Bird Activity and Emerging Drone Risks

Located in an environment with rich natural habitats and diverse bird populations, the airport experiences significant bird activity around its operational areas. Bird strikes remain an ongoing aviation safety concern, while unauthorized drone activity introduces an additional risk to airport operations.

The airport needed a more reliable way to monitor aerial targets and support rapid assessment across its extensive operational area.

01 Persistent Bird Activity

Migratory birds and changing flock movements can bring birds close to active flight areas. Patrols and conventional deterrence alone cannot provide continuous visibility or rapid response.

02 Identifying Aerial Targets

Radar can detect and locate aerial targets, but operators need visual confirmation to distinguish birds, drones and other objects and determine the appropriate response.

03 Day & Night Monitoring

Aerial targets may appear at any time, while visible cameras can be limited in darkness and challenging visibility. Continuous monitoring therefore requires thermal imaging capability.

04 Faster Assessment & Response

Operators need to quickly identify and track detected targets before taking action. The system therefore connects detection, identification, tracking and response in a single workflow.

Detect → Identify → Track → Assess → Respond

The Solution

To address these challenges, the system integrator deployed an integrated airport aerial target monitoring and response system combining radar detection, electro-optical tracking, bird deterrence and Counter-UAS (C-UAS) capabilities.

The system includes six Raythink PC6 Series Multi-spectrum PTZ Cameras, strategically positioned across key areas of the airport to provide continuous electro-optical coverage. The cameras are deployed around runway areas, aircraft approach and departure corridors, airport operational areas and other key low-altitude monitoring zones, helping extend visual coverage across areas where birds and unauthorized UAS may pose risks to airport operations.

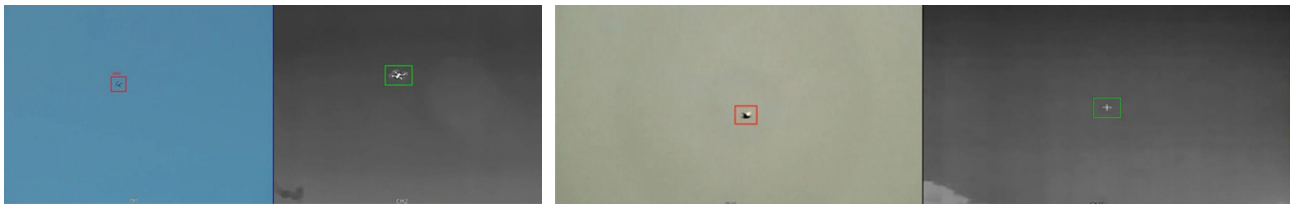
Raythink PC6 Cameras Deployed Across Key Airport Areas

Radar provides long-range detection and target location across the designated monitoring airspace. When an aerial target is detected, its location is transmitted to the corresponding Raythink PTZ camera. The camera can turn toward the target location in as little as **0.5 seconds**, enabling rapid visual verification and tracking.

The Raythink PC6 Series combines thermal and visible imaging to support target verification and continuous tracking in both daytime and nighttime conditions. Thermal imaging provides an additional sensing channel in low-light and challenging visibility conditions, while visible imaging supports detailed observation of the target.

The detected target imagery is **transmitted in real time to the airport's command center**, allowing operators to directly assess the target's type, flight behavior and potential threat level. The PC6 also supports intelligent target recognition, assisting operators in distinguishing between birds, UAS and other aerial objects. Final visual confirmation by operators helps ensure that the appropriate response is selected based on the identified target.

For bird-related events, confirmed bird targets can be coordinated with the bird deterrence system. For confirmed unauthorized UAS, target information can be passed to the Counter-UAS system for appropriate response. This creates a **coordinated monitoring and response chain**, with radar providing initial detection, Raythink PTZ cameras providing visual verification and tracking, and downstream systems supporting the corresponding response.



Real-Time Tracking of Birds and UAS at the Airport

In addition to real-time monitoring, the system provides recorded event footage for review and traceability. Target images and video can be retained for subsequent event review, incident analysis and system optimization, providing airport operators with a visual record of aerial target activity.

By strategically deploying six Raythink multi-spectrum PTZ cameras and integrating them with radar and downstream response equipment, the system provides layered electro-optical coverage of key airport airspace, connecting long-range detection with real-time visual verification, target tracking, coordinated response and event traceability.

Operational Results

During the initial trial operation, the integrated system successfully provided early warnings for multiple bird flock intrusions and approaching drone events. Raythink multi-spectrum PTZ cameras demonstrated stable performance in target positioning, visual identification and moving-target tracking.

The integration of radar, Raythink PTZ cameras, bird deterrence and counter-drone equipment established a coordinated “detect–identify–track–respond” workflow. Operators could quickly verify detected targets and support the appropriate response according to target type, while recorded video provided a basis for subsequent event review and analysis.

The system integrator highlighted the improved visual ver ification and tracking capability provided by Raythink PTZ cameras, particularly their role in connecting radar detection with downstream response equipment.

“The integration of radar and Raythink's PTZ cameras gives our operators a clearer view of detected targets and helps us respond more efficiently to bird and drone events.”

Following the initial deployment, the project team plans to further optimize system coordination and expand monitoring coverage based on operational requirements, providing a foundation for future airport security upgrades.

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