



TD SYNnex



NVIDIA®

Navigating Maritime Safety and Security Challenges with Computer Vision AI

Maritime Industry Challenges

The maritime industry faces a complex set of challenges when implementing and using computer vision systems for safety, security, automation, and autonomous operations on land and sea. These challenges arise from:

- **Weather conditions:** Rain, snow, fog, smoke, murky water, and salt spray that obscure the video.
- **Lighting issues:** Operating in low-light, nighttime and subsea, or with sun glare and backlight.
- **Antiquated processes and systems:** Old cameras and illumination systems and manual monitoring can lead to missed and false incidents.

Analyzing video streams in real time or conducting autonomous operations in real-world, unconstrained maritime land and sea environments, where video and images are less than perfect, can lead to inefficient operation including missed and false security incidents.

Video Restoration to the Rescue

Like humans, even the highest quality cameras and sensors don't see through night, glare, fog, rain, snow, pollution, and other visual obstacles. ProHawk AI's vision restoration solution uses NVIDIA frameworks and parallel processing on NVIDIA GPUs to restore clear video quality on live camera streams in the video workflow in real time (< 3 milliseconds). This solves the challenges for humans and analytics systems to act on high and low-quality videos that have environmental impediments and lighting issues, by restoring the videos to day time, unobstructed safety levels.

Key Benefits and Outcomes

Real-time monitoring of maritime environments with ProHawk AI in the video workflow overcomes all environmental impediments and lighting issues to enable decisive action at the decisive time and place.

- **Perimeter security and personnel safety:** Detect security breaches and suspicious activity in all weather, lighting, and other challenging conditions. Applies to facilities, harbors, ports, coastlines, and ships, by identifying suspicious activities, unwanted intruders, and emergencies, allowing for quick decision making. Reduce false positives, minimizing the need for manual checks.
- **Operations safety and security:** Get faster decision-making and response times without the need for additional equipment or staff. Use cases include:
 - 1) Infrastructure and vessel inspection** to detect structural damage or equipment malfunctions, for proactive maintenance and preventing accidents.
 - 2) Cargo monitoring** to identify theft, damage, or unauthorized access ensuring the integrity of goods.
 - 3) Collision avoidance** by real-time object detection and tracking to prevent collisions with vessels, bridges and other obstacles; and increase confidence, range and accuracy of detection.
- **Lower TCO of video camera infrastructure:** Existing sensors see more and further in land and sea environments, avoiding new capital expenditures for camera and lighting upgrades. Greatly increases object detection and reduces time required to process and analyze video data, which is critical for real-time decision-making.

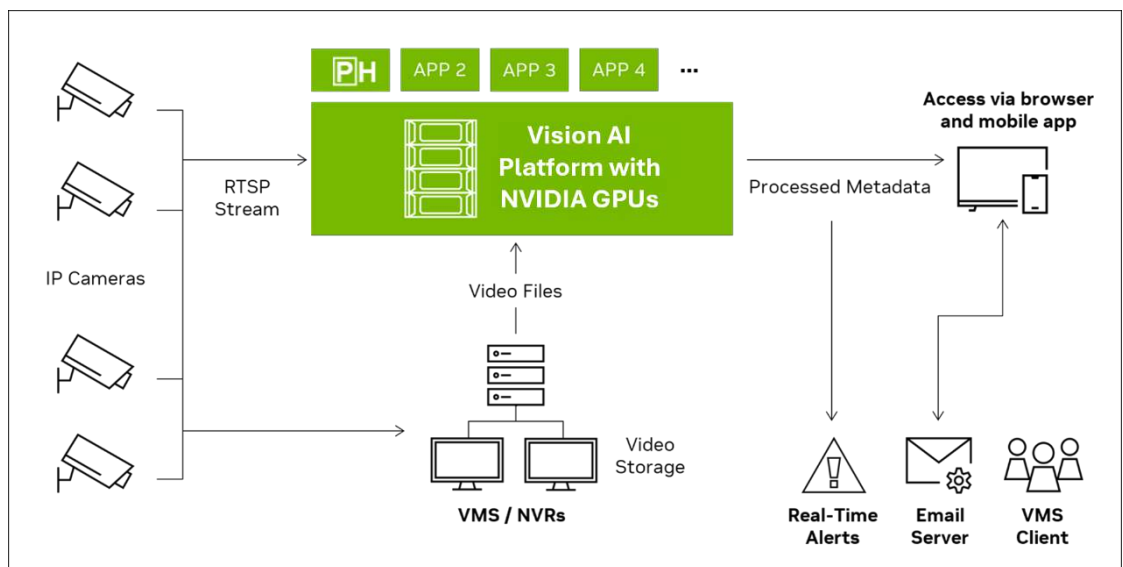
Better Business Outcomes Powered by NVIDIA Accelerated Computing

ProHawk's vision restoration software uses NVIDIA frameworks and parallel processing on NVIDIA GPUs to restore clear video quality on live camera streams, video management system streams, and recorded video. Patented computer vision AI algorithms transform images and video streams in real time, on a pixel-by-pixel basis, to reveal unseen details, as can be seen below in the images before and after ProHawk Vision restoration.



Downstream video workflow processes and inferencing tools can then always perform at unobstructed, daytime safety levels, allowing for earlier and greater object detection and confidence levels, and reduced false positives.

ProHawk AI uses the NVIDIA Metropolis stack for computer vision AI deployments to analyze video and sensor data in real time, to restore clear video for live camera and VMS streams, and restore images and recorded video.



Validated through deployments and benchmark testing on standard GPU accelerated systems, ProHawk AI Vision has demonstrated robust performance improvements:

- 300% improved object detection and tracking accuracy
- 30X faster video stream restoration than conventional systems
- <3 milliseconds of latency

Overall, computer vision restoration from NVIDIA and ProHawk AI improves maritime security and operations by seeing more and further for automating tasks and security processes and enhancing threat detection.