



Improve Railway Safety and Security with Computer Vision AI

Safety and Security Challenges

Applying real time computer vision AI to railway video networks offers a compelling range of benefits for improving the safety, security and operations of railways in all weather and lighting conditions. These include improving stopping distances by earlier detection of people, animals, or debris on the tracks and at crossings; better perimeter security for facilities and trains from intruders; streamlining preventative maintenance and inspection processes; and lowering the total cost of ownership of video and lighting infrastructure.

Analyzing images and video feeds from sensors is often impeded by operational complexities, including the inability to interpret real-world, unconstrained environments where video and images are less than perfect. Like humans, even the highest quality cameras and sensors do not see through night, glare, fog, rain, snow, dust, pollution, and other visual obstacles. And most often, computer vision AI solutions are trained on pristine imagery and unobscured objects.

Why AI-Enabled Computer Vision

Applying real time, AI-enabled video restoration to new and existing railway video networks can immediately address a wide range of complex operational and safety problems. ProHawk AI solves the challenges in acting on high and low-quality live videos due to environmental factors that arise from particulates of varying sizes that obstruct videos and challenges related to lighting conditions, including both excess and insufficient light.

Key Benefits and Outcomes

ProHawk AI Vision in the video workflow overcomes all environmental impediments and lighting issues to enable decisive actions at the decisive time and place, with a lower TCO.

- **Enhance safety and security on trains and at crossings:** In all weather and lighting conditions reduce stopping distances with earlier and greater detection of vehicles, people, animals and other objects at railway crossings and on the tracks. Detect potential threats like jumpers or intruders on trains.
- **Improve operations and facility safety and security:** Detect perimeter security breaches and suspicious activity and emergencies in all weather and lighting conditions for train stations, ticket offices, and other facilities. Improve preventive maintenance such as track and equipment inspection and reduce false positives for objects and potential threats to minimize manual checks and dispatches.
- **Lower TCO of video camera infrastructure:** Existing sensors see more and further in all environmental conditions, extending camera life and avoiding new capital expenditures for disruptive lighting upgrades. Greatly increases object detection and reduces time required to process and analyze video data, critical for real-time decision-making and AI inferencing.

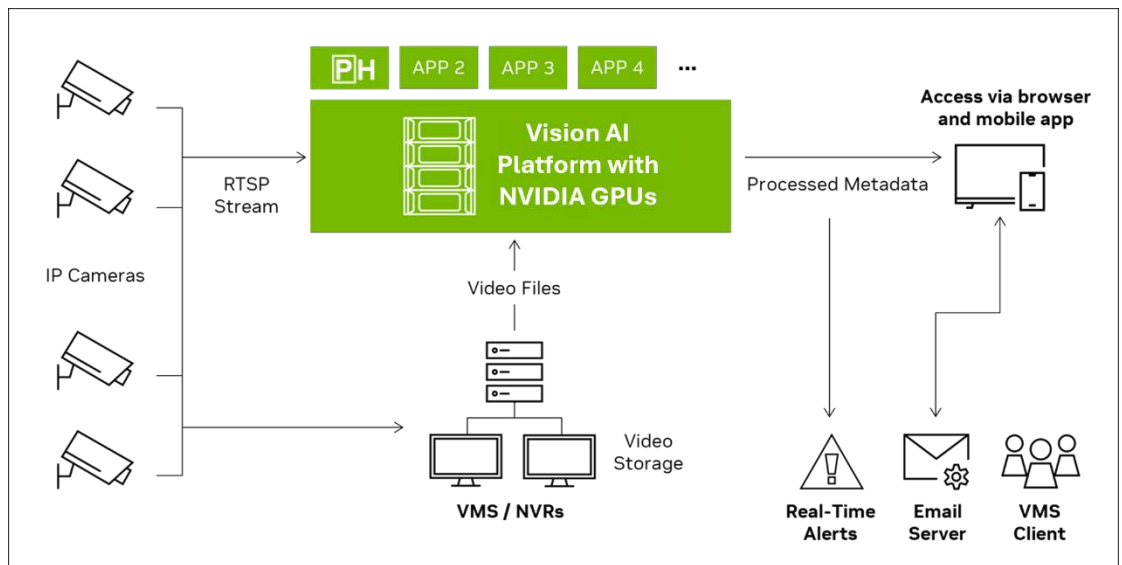
Better Business Outcomes Powered by NVIDIA Accelerated Computing

By using accelerated computing solutions with NVIDIA GPUs, ProHawk AI Vision transforms video in real time, on a pixel-by-pixel basis, overcoming all environmental obstacles and lighting conditions to restore live video and images. Previously unseen objects and their details are revealed for humans and AI tools, as can be seen in images below from before and after video restoration by ProHawk AI.



Downstream video workflow processes and AI inferencing 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, 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, with 3-4X more clarity for degraded visuals
- 30X faster video stream restoration than conventional systems
- <3 milliseconds of latency, or faster than the blink of an eye.

Overall, video restoration from ProHawk AI improves stopping distances, security, safety and reliability of railway operations, extends camera life, and eliminates the need for expensive and disruptive lighting systems upgrades.