Meeting Security and Surveillance Requirements In Challenging Outdoor Environments: *Dramatically Improve Facility Surveillance and Security with ProHawk's Real-time Video Enhancement Technology*

The Challenge: Provide a major utility in Hawaii with a means to dramatically enhance usability and reliability of their extensive surveillance systems at the lowest possible cost.

In addition to reliably generating and delivering electricity to customers across the state, this major utility serves strategic military bases for all branches of service, with responsibilities spanning one third of the globe. Due to the mission-critical nature of these bases, the Department of Defense (DOD) expected the utility's many facilities, including offices, power generation plants, substations, etc., to meet rigorous security and intrusion prevention standards in order to ensure power delivery remained uninterrupted.

As one of the utility's largest customers, the DODs security concerns were of utmost importance to the company. These power generation and power distribution facilities presented a "soft" target for anyone looking to disrupt the power grid. To address any vulnerabilities, the utility worked to harden all of its many facilities, installing radars for detection and camera telemetry, intrusion sensors, surveillance cameras, and infrared (IR) and thermal cameras. These security measures provided the utility with a detection system which identified when an intrusion was underway, allowing for a rapid response by company security personnel and local law enforcement.

However, several shortcomings became apparent after completing installations at the first set of over twenty critical facilities. Due to the humid climate, thermal cameras often struggled to differentiate body heat from the ambient surroundings, rendering them less reliable, and were significantly more expensive than other technologies. Frequent rain and fog conditions reduced the effective range of the surveillance cameras, and night coverage was limited by the scope of infrared perimeter illuminators. Because of these shortcomings, the utility couldn't always rely on visual confirmation of a threat. They needed a means of improving the visual quality of their existing security and surveillance systems in order to stay ahead of constantly evolving potential threats, and utilize video analytic capabilities to their fullest.

The Solution: Real-Time Video Enhancement

The utility turned to their physical security systems design team and security integrator to develop a solution which would address the deficiencies in a scalable and economically efficient manner.

The team explored ProHawk's innovative video enhancement solution as a means to significantly improve the image quality of their security and surveillance camera systems. Prohawk technology was determined to be the most economical and practical means to meet their specific needs, thereby enabling the utility to maintain its status as one of the leading technology innovators in the industry.

The ProHawk Vision Suite's software platform is capable of seamlessly integrating with the utility's 800 security cameras and video management system - all generating H.264 TCP/IP video streams. Video streams are collected at the utility's various hubs, where ProHawk technology is embedded. Images are then enhanced prior to video analytics processing, after which the feeds are sent back to the monitoring center by a variety of methods, including microwave, cellular network, and Internet Protocol (I/P) transmission. ProHawk's edge processing supports video analytic tools which, based on the enhanced imagery, determine if an intrusion is occurring and if an alarm should be issued.

The ProHawk Vision Suite, running on commercial-off-the-shelf (COTS) hardware, features a best-in-class per-frame processing rate of 2-10 milliseconds (0.002- 0.010 seconds), which enables the solution to deliver real-time output. Because of this unmatched processing speed, the ProHawk system avoids video lag from excessive latency, which is crucial for accurate and timely analytics and monitoring. As a software solution, running on COTS hardware, ProHawk is highly scalable, enabling the utility to expand to meet its growing needs.

ProHawk's patented technology offers features, such as:

- Histogram color space brightness contrast optimization which adjusts every pixel to expose fine details.

- Sensitization and noise reduction which eliminates unwanted objects obscuring visibility.

- Contextual color enhancement identifies color in over- and under-exposed areas to deliver improved color representations natural to the human eye.

- Parallel processing handles extreme bright or dark low contrast, as well as enhancement in fog conditions.

Proof of Concept Results: Increased Range of Thermal Camera Analytics by 3x, Infrared Camera Analytics by 5x

For Michael Gonzalez, Director of Technology at Integrated Security Technologies, the results of the proof of concept were clear. "The ProHawk solution made an immediate impact, extending the analytic detection range of the customer's thermal cameras by 3 times and their infrared cameras by 5 times." Situational awareness at the customer site was dramatically improved, as their cameras could now accurately identify any attempted intrusion, even in rainy conditions, fog, shadows cast during bright sunshine, nighttime, or glare from the sun. It also greatly enhanced basic imagery under normal lighting conditions, making it possible to see fine details, such as specific individuals, small objects in people's hands, as well as objects that may have been left near the facility which could present a threat."

Gonzalez stated the ProHawk solution is expected to deliver a tremendous cost savings for the utility. Instead of having to upgrade its 800 cameras across all of its facilities and/or install countless new IR illuminators, ProHawk technology will allow the utility to leverage its existing infrastructure, while still dramatically improving image quality and security effectiveness. Gonzalez estimated the savings amounted to $7 million in cameras and $2 million in IR illuminators and other forms of perimeter and site lighting in their Tier 1 and 2 facilities. Several millions dollars in infrastructure upgrades related to bringing additional power to the fences to support IR and visible light would also be avoided through the adoption of this technology. Since the solution is scalable, it will be easy for the utility to expand to new facilities as they come on line.

"The ProHawk solution will more than pay for itself," concluded Gonzalez. "Not only will our customer save on maintenance and upgrades to their security equipment, and the reduced the manpower associated with those activities, ProHawk's enhanced imagery will reduce costs associated with false positive security alerts, eliminating the need to send in the cavalry unless truly warranted. When the ProHawk solution on the initial substation was installed for the test, we were able to identify activity around the facility that would be considered problematic, which we would not have seen without this tool. This powerful solution has enabled us to fulfill our mission to harden our customer's facilities and deliver on our promise of reliability and efficiency."

The origins of the ProHawk technology stem from work done for the Japanese nuclear power industry, giving the company a unique understanding of today's industry challenges.

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