WIDE AREA SURVEILLANCE ON FORWARD OPERATING BASES

OVERVIEW

Customer: US Army Forward Operating bases in Afghanistan.

Challenge: • Provide fast (1-2 sec), actionable intelligence to the soldier over a wide area on the inner perimeter around the base (up to 3km), when reaction time is critical. • Alleviate cognitive burden on the operator who performs surveillance mission. The operator can be overwhelmed with a multitude of blips coming from a radar, making it difficult to quickly and effectively discriminate false alarms from real threats. Even with the help of a long range PTZ, the "soda straw effect" can limit mission success.

Solution: Electro Optical Industries' Spynel, infrared surveillance system, allows for optimal tactical advantage on the inner perimeter of a layered surveillance system through 360 degree near-real time imaging, intrusion detection and tracking of unlimited targets. The Spynel provides fast, actionable intelligence to the soldier, all weather night and day, by allowing for quick discrimination of threats from false alarms through data fusion with radar tracks.

Results: • Fast (1-2 sec) detection of threats when time matters most. • Fast installation, easy integration with other sensors and Common Operating Picture, ultra-fast training, low total cost of ownership.

CUSTOMER

Electro Optical Industries provided an Army tower program with added capabilities for Force Protection. Coalition bases in Afghanistan operate in harsh environments, whether in desert-like conditions or a mountainous geography. The sites are fairly isolated and require effective surveillance on a wide perimeter in order to protect from attacks. As layered defensive capabilities are deployed, the initial focus is on perimeter intrusion detection then evolves towards detection of unusual behaviors in a well-known environment through persistent surveillance. Training infrastructure and resources can be limited and installation time must be swift to minimize exposure to danger.

The US Army was on the lookout for proven COTS solutions that could provide superior situational awareness. Integrated on fixed towers, the solution provided a backup to aerostat surveillance when the blimps were down for maintenance or because of adverse weather conditions.

CHALLENGE

Forward Operating Bases in Afghanistan were being equipped with towers combining medium range radars and long range PTZ FLIR cameras in an integrated architecture where all sensor feeds were centrally displayed in a Common Operating Picture. Although very effective, at times this layered defense system provided an overload of data (hits, tracks) with insufficient qualitative information to determine in a fast, efficient way if the targets were threats or "false alarms". Although very powerful, each sensor had its own limitations: the radar's detection range was long enough to provide adequate reaction time but the sensor did not provide visual cues and forced the operator to frantically point the FLIR camera to one threat after the other in search of valuable information. The operator was at times overwhelmed with a multitude of blips coming from the radar, making it difficult to quickly and effectively discriminate false alarms from real threats. Even with the help of a long range PTZ, the "soda straw effect" would limit mission success.

As the threats come closer to the inner perimeter of the base, in the 2 to 3 km zone, reaction time is paramount. The operator needs to quickly classify multiple potential threats and prioritize them based on their distance to coordinate interception.

Additionally, a very hot and dusty environment requires all equipment to be fully ruggedized and able to sustain temperatures superior to 40°C on a continuous basis. Maintenance time must be minimized. The terrain can be cluttered by a lot of vegetation: detection and tracking can become challenging and performance will depend upon a tracker's advanced algorithms.

Last but not least, access to proper training is often compromised in theater. Operators will often have to use equipment in absence of a lot of guidance. Ease of use and minimal operator interaction with complex settings will be key to success.

SOLUTION

The Spynel-C uses a continuously rotating line scan sensor to produce a 360 degree image with 12 megapixels every 2 seconds and detect and track an unlimited number of intruders in near real time. Essentially the Spynel cameras operate like a high definition "optical radar", providing operators with clear, reliable and actionable data.

In the FOB deployment, a single Spynel camera was mounted to a stationary, 25-meter tower that already included a medium range Doppler radar and a long range PTZ. The Spynel advanced long wave infrared sensor demonstrated its ability to detect and reliably track a person at up to 2.5 km in temperatures approaching the human body or at temperature crossover. It detected and consistently tracked vehicles at up to 4km. The software provided distance evaluation of targets to allow for the prioritizing of threats and precise azimuth and elevation.

The Spynel software relies on powerful algorithms perfected to minimize false alarms due to dust clouds and vegetation blown by wind. The high thermal sensitivity (30 mK) allows for detection of the smallest threats at a great distance. No event is missed: people walking slowly or crawling, even when camouflaged. The Spynel is completely passive and cannot be jammed. It can operate in total darkness.

The Spynel software was developed on an open architecture and can easily be integrated within a third party software. For this US Army program, the Spynel's target tracks as well as images were sent to a Command and Control software where they could be overlapped with radar tracks. The operator could then cue the PTZ camera in order to perform identification.

The intuitive, user-friendly software interface reduces operator fatigue, which in turn reduces the potential for human error during surveillance. The display can be entirely customized with the touch of a button: color palettes, brightness, contrast, the number of zoom windows and type of display are set in seconds. Exclusion/inclusion zones can be created with a few clicks to eliminate areas that are of no interest for surveillance.

An independent assessment conducted by the Rapid Technology Office in July 2012 at Yuma Proving Ground demonstrated that the Spynel achieved at least similar performance, if not better ones, when used in "auto-settings mode" versus manual mode – even when the operator was expertly trained.

Detection settings are automatically determined by the system. Powerful forensics capabilities allow analysts to replay a scene after the fact and gain a broad understanding of how events unfolded. Footage can be re-played as if it was live: display can be changed as well as detection settings. Details that were missed while responding to a threat can be analyzed and understood after the fact.

RESULTS

Dozens of Spynel infrared systems were deployed in theater to enhance perimeter protection in coalition bases. Installation and integration were performed smoothly and existing towers were quickly retrofitted in order to meet the US Army's expectations.

CONCLUSION

The EOI Spynel infrared system provides thorough and accurate coverage of wide areas while offering a low total cost of ownership. The system can be installed in 30 minutes, requires minimal training and is able to perform in all weather conditions and harsh environments. Based on an open architecture, the solution provides an ideal complement to an existing layered defense system or can replace a short range radar as a standalone system with far superior effectiveness. The EOI Spynel infrared surveillance system is an ideal strategic solution to ensure wide area surveillance for Force Protection.

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