Combining Sensors for More Efficient Perimeter Protection

*Video Analytics & Intelligent Fences*
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Protecting critical facilities and perimeters is a critical accountability faced by security professionals. It is the security professional’s job to have a system in place to manage security situations in an effective manner, within the constraints of a limited budget. Fence intrusion systems and camera enabled video analytics systems are two popular forms of perimeter protection for critical facilities. Historically, facilities have often chosen either a fence system or an intelligent camera system to provide their primary perimeter protection. In many cases the choice of one or the other may be insufficient, when the combination of these sensor technologies can result in a more efficient and effective perimeter solution.

Fence Intrusion Systems

Fence Intrusion Detection Systems (FIDS) fall into a category of sensors that provide linear type protection perfect for following a defined perimeter. The systems range greatly in style and technology. The most popular systems in today’s market are the ones that measure a disturbance of the fence electrically over a coax or fiber and then analyze and report relative information about that disturbance, including location. They also have the ability to tune out typical nuisance events like wind or vibrations from items such as nearby roads or taxiways. In many cases, these products mount physically to a fence, but in other cases they may be buried along the perimeter. These intrusion systems have several capabilities that make them attractive for perimeter protection. One of these is their immunity to some weather conditions. With the exception of very deep accumulating snow, fence intrusion systems continue to detect in rain, fog, snow and wind, albeit with potentially higher false alarm rates under such conditions. These systems have been deployed in a vast array of climates and continue to perform as intended.

A condition that is often overlooked, or perhaps “under budgeted,” is detection capabilities in low light conditions. This type of system shines in these situations, as it requires no illumination to detect.

Finally, fence sensors adapt well to varied terrain and jagged perimeters. Since they attach to the fence, or follow its base, the varied direction and elevation has no impact on detection capabilities. Of course, the fence must be maintained in good condition.
working order to avoid false alarms from excess fence movement.

**Video Analytics / Cameras**

The use of intelligent imaging sensors is also a popular and effective perimeter protection choice. Intelligent cameras come in many forms, analytics may be embedded in the camera, in a nearby edge-device or it may reside as a software function in a DVR/NVR.

Video Analytics or Video Content Analysis (VCA) goes well beyond motion detection. Most systems provide a much higher level of detection, discrimination and identification. These systems analyze image pixels to understand what constitutes the scene and what is considered an object of interest.

An obvious advantage of VCA systems is the ability to actually see the object of interest. Studies show that vision is the dominant sense for humans. When placed in conflict with other senses, humans will overwhelmingly select and accept the decision that favors a visual input. The visual aspect of VCA solutions, including set up, detection and notification all plays to our comfort as humans, and security personnel, to base decisions on visual data.

*Studies show that vision is the dominant sense for humans...this applies equally to security situations*

Another advantage is the vast amount of information that can be utilized. Video has many dimensions, many of which can be used in detecting and reporting. This includes attributes such as distance, proximity, color, time, texture, and contrast. This allows video analytics systems to be very specific in their alarm criteria and reported alarm data. Setting a VCA alarm to detect a specific threat or safety issue such as “large trucks entering an area traveling at excessive speeds during working hours” is easily accommodated.

**Complementary Sensors**

Although both types of sensors, Fence Intrusion Detection and Video Analytics, are excellent choices for perimeter protection, using them together provides for a very complementary solution.

One of the most obvious benefits is performance in low visibility weather conditions. Video systems must be able to “see” the intrusion. In cases where this is not possible, the system cannot provide alarms as it is not receiving images. Of course, the use of thermal cameras with video analytics enhances detection in weather conditions that affect visibility. On the other hand, the fence system, although not being able to provide as robust target information, can continue to detect even when visibility is impaired.

Fence systems are very linear in nature and discrete in their alarm capabilities. In most cases, the alarm indicates an intrusion. But they cannot provide an early warning (i.e. approaching the perimeter), nor do they afford a post mortem analysis. Video Analytics offer an area-based sensing capability, not merely a singular line. This affords the ability to create many zones of interest and look for various suspicious activities such as loitering, speeding, crowding or classes of vehicle. Likewise, adding a video based component helps to provide the “how” factor. For future prevention it may be nice to
know how the fence was breached. A video based component can complement a fence system with this type of predictive and post-mortem analysis.

It is often easier for a facility to obtain funds for a non-recurring purchase versus asking for an increase in yearly operating budget. Of course this varies by organization. The combination of a Fence System and Video Analytics system can help minimize those recurring costs.

One “recurring cost” that can be mitigated by combining sensors is the ability to efficiently respond to the perimeter system. Often time facilities, such as utilities, may have site locations that are separated by many miles. Some locations may be unmanned. The combination of fence and video sensor technology can decrease the recurring cost of validating alarms. Video analytics can help to automatically validate the fence alarm, automatically follow the intruder with a PTZ camera and provide video alarm information. The security professional now has cost saving options. When the system alarms due to kids jumping the fence, but doing no damage, the flexibility to verify the event and track it to confirm no harm was done, may save valuable time and fuel costs by not needing to immediately react.

Typical Architecture

Architectures to capitalize on the advantages of combining fence sensors and video analytics vary based on sites and potential threats. However, the basics remain the same. Typically fence sensors are used to protect long stretches of perimeter, or areas of varied terrain (hills, staggered perimeter). PTZ cameras are then utilized to cover these segments of fence, allowing the ability to verify fence alarms and auto follow intrusions. Cameras with video analytics provide flexibility in the perimeter, wider area coverage and ability to perform forensic actions.

Conclusion

Fence Intrusion Detection and Video Analytics systems are both effective perimeter systems. However, the combination can result in a more efficient and effective system. A facility can expect higher overall detection, lower false alarms and reduced operating costs.

FIGURE 3

A layout showing the combination of fence intrusion detection sensors (FIDS) and cameras providing video content analysis (VCA). Using both types of sensors to complement each other provides a highly efficient and effective perimeter protection.
NEXT STEPS FROM PURETECHSYSTEMS

**Fence Integration:** Critical Facilities often have large fenced perimeters which make the use of an intelligent fence an attractive security measure. Although intelligent fences are great detection devices, you still require eyes on the intruder. Check out this article describing how the combination of video analytics and intelligent fences can be used to protect these critical facilities.

**PTZ Auto Follow:** Often time facilities have security sensors, but lack a large security force to manage and react to them. Enabling cameras with PTZ Auto Follow allows the camera to automatically follow the intruder so your security personnel can coordinate a response. Check out a narrated video of PTZ Auto Follow in action.

**Camera Layout Help or Demo:** Request help with your camera layout or view a live demonstration to get ideas on how to protect your facilities. Ask questions and get a better understanding for the best way to achieve your security goals within your given budget. Contact Us or download our camera layout worksheet.

**11 Things You Should Know About Smart Security Cameras:** More and more we see the idea of “smart cameras” being introduced in the physical security marketplace, but are smart cameras really the best choice for your physical security needs? This white paper discusses 11 items you need to understand before making this decision.

**About PureTech Systems**

PureTech Systems Inc. is a manufacturer of wide-area perimeter surveillance software solutions including internally developed outdoor video analytics, PTZ Auto Follow, multi-sensor integration and a map-based (real object size) command and control. It is offered to fortune 1000 firms, petro-chemical, water and electric utilities, seaports, airports and federal, state and local governments. With headquarters in Phoenix Arizona, PureTech Systems serves national and international markets. To find out more about PureTech Systems Inc. visit our website at www.puretechsystems.com, follow us on Twitter or sign up for our email list.