

All network cameras have a basic physical limitation: they need light to work. At least up until now, writes Roy Alves, country manager for Axis Communications South Africa.

Some network cameras have night and day functionality that allows them to operate in very poor lighting conditions, down to fractions of a lux. And of course, if natural light is not available it can be substituted by electrical light, either visible to the human eye or infrared.

But in some instances these solutions have serious drawbacks – they can be expensive and inefficient, and illumination creates shadows where an intruder can hide.

The thermal network camera is a perfect complement to any professional IP surveillance system; it can be seamlessly combined with existing equipment, and it is possible to secure an area or a perimeter that lies in complete darkness.

Thermal technology enters the mainstream

Images, as they are perceived by the human eye, can be described as light reflected by different objects. No light means no reflection, and thus the eye is “blind” under such circumstances.

Thermal images, on the other hand, are not dependent on visible light. Instead, images are created by operating in the infrared spectrum. It works perfectly well even in total darkness, since the ambient light level does not matter.

What makes this possible is the fact that all objects – organic or inorganic – emit a certain amount of infrared radiation as a function of their temperature. Humans cannot see this, but can sense it - for example, when approaching a camp fire or entering a sauna. The greater the temperature difference in a scene, the clearer the thermal images will be.

Thermal imaging is nothing new. But until recently, costs have usually been prohibitive, making practical applications outside the military rare. This has started to change as new sensors, new materials and other improvements are driving the volumes, and making prices more reasonable. Thermal cameras can now be found in various lines of business, such as the aircraft and shipping industries, and security and surveillance. The technology is also used in public services, including fire fighting and law enforcement. Lately, it has even appeared in consumer products, albeit often expensive ones, like luxury cars.

Challenges posed by difficult conditions

Thermal cameras do not only perform well in total darkness, they also perform well under difficult climatic circumstances, such as smoke. All the same, there are physical limitations to the performance of thermal cameras.

Water droplets or small dust particles in the air will naturally hinder the transmittance of thermal radiation from a single object, making it harder to detect from a great distance. Consequently, haze, snow and rain will hamper camera performance.

Water limits thermal radiation, and the moisture in the air evens out temperature differences between different objects in the picture. Therefore, a thermal camera will produce better and clearer images during winter time, with clear skies and good weather conditions, than under comparable atmospheric conditions during summer, when humidity is usually higher.

But even with these limitations considered, when it comes to detection, thermal cameras are superior to conventional cameras under a wide range of difficult weather conditions.

Legal issues

A number of products and technologies that can be used both for military purposes and in commercial applications are called dual-use goods. Exports of such items are regulated in the international Wassenaar Arrangement from 1996, which aims to promote transparency and greater responsibility in transfers of conventional arms, as well as dual-use goods and technologies.

Not surprisingly, thermal imaging technologies, which often have been originally developed for military use, fall under this category. Thermal sensors may therefore only be freely exported if the maximum frame rate is 9Fps or below.

Most cameras for surveillance purposes fall under this category. Cameras with a maximum of 111,000 pixels and a frame rate of up to 60Fps can be sold in the US, the EU, and a handful of other friendly nations, on the condition that the buyer is registered and can be traced.

Regardless of these restrictions, resolutions are generally much lower for thermal cameras than for

conventional network cameras. This is primarily due to the more expensive sensor technology involved in thermal imaging. Lower frame rate is less of a problem in most surveillance applications, since thermal cameras are first and foremost used for detection and not for identification.

Real world benefits

With thermal imaging becoming relatively cheaper and an integral part of IP surveillance systems, a whole range of uses becomes both possible and economically viable. Thermal cameras can be an excellent complement in many situations where conventional cameras are inadequate or insufficient.

They are, of course, unparalleled in a situation of total darkness. They can also be an option in areas that are very difficult to illuminate effectively, for example a sea front, a harbour, or any other vast expanse of open water.

Similarly, artificial light not only runs the risk of revealing where the cameras are placed, enabling parties to avoid or vandalise them, but can also create projected shadows in which an intruder can avoid detection.

Furthermore, spotlights can blind as well as illuminate. So cameras that do not rely on light can be the preferred solution in many different traffic situations, whether it is in railway tunnels, on air strips or on regular streets. Thermal cameras, on the other hand, cannot be blinded by bright lights or laser beams.

All in all, thermal network cameras perfectly complement and complete a network video system, making sure that objects, people, and incidents are detected 24 hours a day, seven days a week.

Axis Communications builds on its thermal range

Axis's new AXIS Q1921 and AXIS Q1921-E thermal network cameras are ideal for cost efficient 24/7 area or perimeter surveillance of all security applications, such as roads, tunnels and airports.

The enhanced resolution and the large variety of lens alternatives ensure improved image quality and detection range. The new cameras integrate perfectly with any network video system, delivering all the benefits that customers have come to expect from network cameras.

AXIS Q1921 is designed for indoor surveillance, while AXIS Q1921-E is an IP66-rated, outdoor-ready camera, with four available lens alternatives. In addition, they support key IP-Surveillance features, such as H.264 and Motion JPEG, audio, local storage and Power over Ethernet.

Intelligent video is a key component of any thermal camera, and AXIS Q1921/-E provides tampering alarm, motion detection, and support for AXIS Camera Application Platform.

Both cameras support the ONVIF specification for interoperability of network video products. The cameras will be available in September 2010 through Axis' distribution channels.