New Technologies for Panoramic Surveillance

Steve Ma, PhD EVP, VIVOTEK

Panoramic camera has become very popular in video surveillance because of its wide angle field of view which significantly reduces the amount of cameras needed for complete video coverage. This brings total system cost saving benefits to the end user. There are two major technology trends in the next generation panoramic camera. The first trend is improving low lux performance by adding built-in IR illuminators so that the camera is able to record useful image even in challenging low light condition. The second trend is to run video content analysis (VCA) inside the camera to provide intelligent features.

IR Illumination for Panoramic Cameras

Built-in IR illuminators have been widely used in many surveillance cameras to capture useful footages during nighttime. However, due to the nature of wide angle field of view, adding IR LEDs to the fisheye camera come with 2 sets of challenges. The first issue is correcting bad uniformity of the illumination, and the other is eliminating over exposure problem of the foreground objects.

The result of the traditional IR illumination looks like the following picture, the central area has much higher light density which is often refer to as "white out or glare". This is due to the light-emitting pattern of the IR LED and the wide coverage of the fisheye lens. As result, the video captured by the panoramic camera using traditional IR LEDs will not have proper exposure level. The peripheral area tends to be too dark and if there is an object in the central region, it tends to be overly exposed.

Fig. 2: Illumination pattern from an IR LED

VIVOTEK has developed a unique technology to solve this problem. Instead of using IR LEDs only, we added a reflector with precisely calculated surface to shape the IR lights so that the illumination gets evenly distributed across the entire view angle. The design of the reflector is illustrated in the following figure.

The following picture shows the modified illumination pattern after using the reflector. It is clear that the VIVOTEK unique IR technology is able to distribute illumination evenly without glare spot in the center.

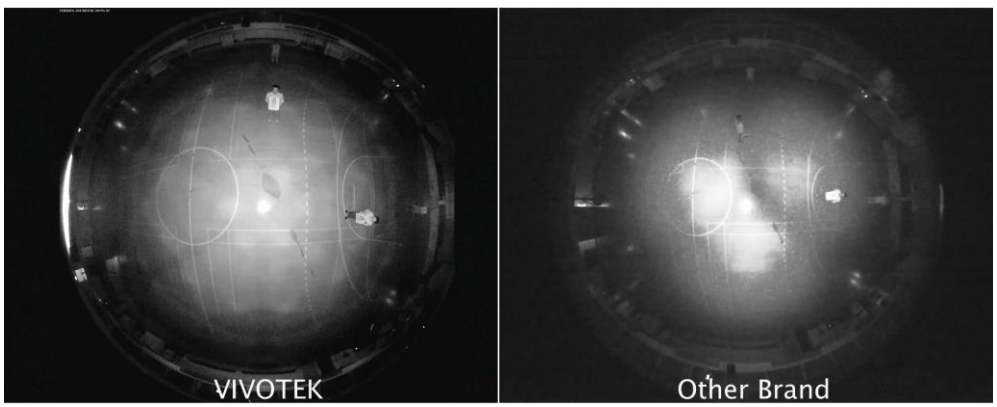

Fig. 3: Illumination pattern of an IR LED with reflector

With the specially designed built-in IR illuminators, IR solution has been optimized to fit the VIVOTEK fisheye camera's wide view angle and gives an even illumination across the entire area while the result from other brand shows “glare” spots in central region and dark peripheral, which is a waste of illumination power.

The following images demonstrate the advantage of VIVOTEK's unique IR technology compare to another manufacturer.

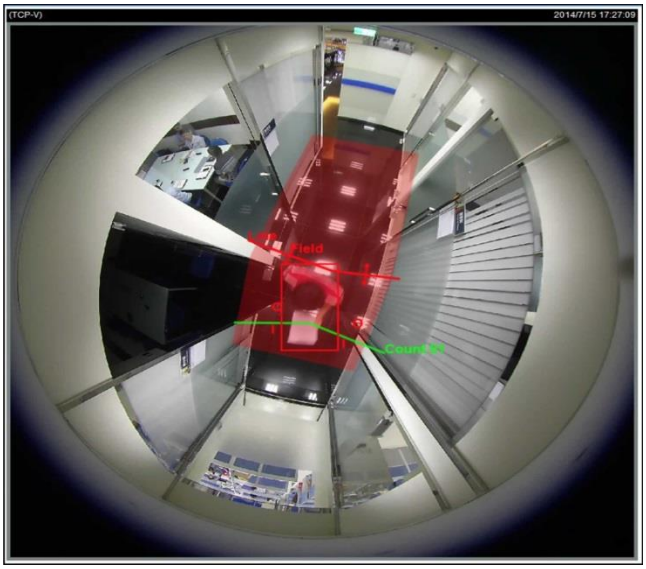

Fig. 4: Images captured from fisheye cameras

VCA (Video Content Analysis) for Panoramic Cameras

Built-in VCA for an IP camera is not a new idea. However, running VCA on a panoramic camera has a nature advantage. In most application, the 360-degree fisheye camera is often installed on a ceiling to cover the adjacent area that provides video with overhead view. This makes an ideal scenario for many video analytics, such as tripwire or object counting. An example snapshot is shown in the following picture.

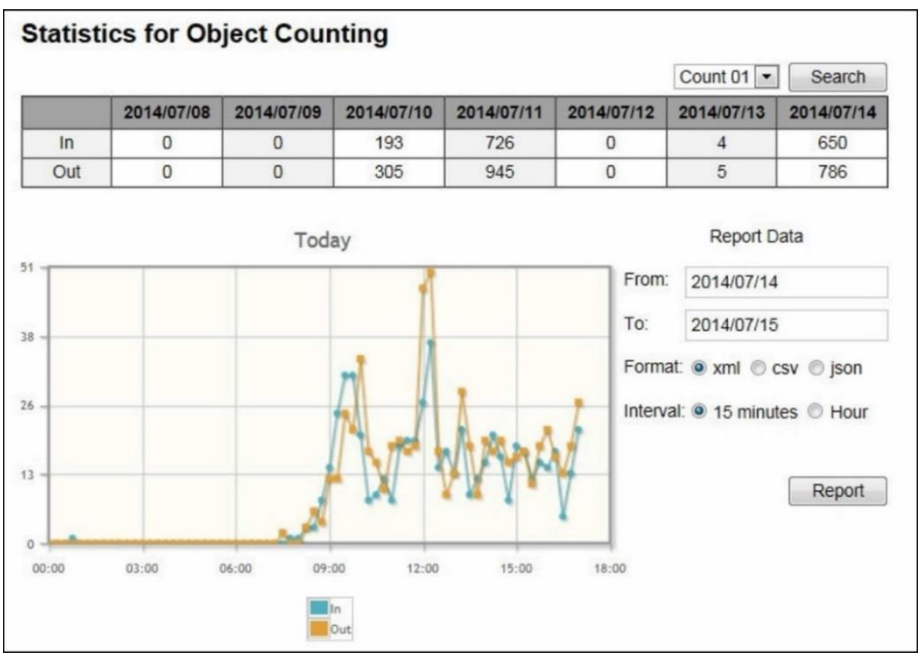

Fig. 5: Object counting example of an intelligent fisheye camera

In addition to the standard security and safety benefits, business owner can get useful marketing and operation information using the VCA features. These features are especially useful in retail application; for example, data collected can be used to analyze different consumer behaviors to better manage merchandising in any number of stores. It can also be used to monitor peak business hours to improve overall staff management and allocation. The following chart shows a sample data collected from the object counting feature.

Another example is the heat map feature shown in the following picture.

A color code is overlaid onto the video to demonstrate the accumulated frequency of object activities. The area with brighter color means there is more traffic in that area.

Using the overview image with heat map captured by the fisheye camera, business owner can easily visualize customer traffic patterns over time as well as in real time. This helps optimize store performance, improve customer service and plan marketing and promotion.

Fig. 6: Heat map example captured during IFSEC 2014

For your next surveillance project, please consider VIVOTEK's fisheye camera in the system to minimize the number of cameras needed for overall complete surveillance. VIVOTEK's unique IR technology dramatically improves fisheye camera's low lux performance and provides the best video surveillance around the clock. Also, don't forget there are tons of add on VCA benefits to the end user.

The above fisheye images are captured by VIVOTEK's latest smart Fisheye camera, FE8181V.

VIVOTEK INC.
6F, No.192, Lien-Cheng Rd., Chung-Ho, New Taipei City, 235, Taiwan, R.O.C.
|T: +886-2-82455282|F: +886-2-82455532|E: sales@vivotek.com | www.vivotek.com