360 degree View Surveillance

Fisheye and panoramic cameras offer a 360 degree field of view. Unlike fixed cameras that narrow in on a specific spot or area, fisheye and panoramic cameras can cover a much wider area. A fisheye or panoramic camera can provide surveillance for broad areas like stores, warehouses, parking lots, stadiums, museums, concert halls, and ports.

Fisheye cameras create an image that replicates a circle or barrel, with a 180-degree or 360-degree wide field of view shown in the lens' diameter circle. The curve of the fisheye lens can see in all directions at the same time, making it a practical surveillance camera choice for retail boutique stores, transportation vehicles, or office. Fisheyes are usually flush mounted on a ceiling or wall to monitor and record a wide area, particularly at the centre point of the location. **Fisheye cameras have a discrete shape so they blend in exceptionally well with just about any background. VMS platforms and NVRs can de-warp the fisheye image to form a flat, two-dimensional view.**

A **fisheye lens** is an ultra wide-angle lens that produces strong visual distortion intended to create a wide panoramic hemispherical image. Fisheye lenses achieve extremely wide angles of view by forgoing producing images with straight lines of perspective (rectilinear images), opting instead for a

special mapping, which gives images a characteristic convex non-rectilinear appearance. The angle of view of a fisheye lens is usually between 100 and 180 degrees.

Most manufactures use a 5MP sensor, or 2592 x 1944 pixels, and the image is then cropped to the size of the lens, or a circle within a rectangle. The circle, therefore, has a diameter of 1944 pixels. Manufacturers match the lens to the diameter of 2144, maximizing resolution and providing the very best 360-degree resolution.

Panoramic surveillance cameras use more than one image to create a 180-degree or 360-degree view of a large area of space.

Perfect for sporting events, parking lots, marinas, and department stores, panoramic security cameras can monitor and record all activity in its field of view. With these cameras it is possible to capture entire scenes with greater detail and in many directions. Megapixel panoramic view cameras generate high-resolution images.

Advantages of 360 degree view cameras

Traditional cameras with a narrow field-of-view and pan-tilt-zoom (PTZ) need to be spread throughout the site. Therefore a greater number of cameras have to be installed which in turn requires much higher infrastructure and installation costs. Besides, PTZ cameras are positioned only to cover key areas and will only record where the PTZ is pointing, always leaving a number of blind spots and an inconclusive evidence trial.

Even though a PTZ can be programmed to respond to an event trigger it will arrive at, and show video after the event has taken place. It is always desirable to be able to see what happened before the alarm.

Dewarping

Dewarping converts the original 360-degree or fisheye image view to a flat, two-dimensional image.

Dewraping can be done either at the camera or on the client-side application.

Dewarping on the client side allows for retrospective viewing, which enables the user to go back in time to view the total scene in its original form and then pan, tilt, and/or zoom within the 360-degree image as desired. This also makes it possible for multiple clients to view the same image, with different perspectives, concurrently.

Dewarping on the camera lets the customer create virtual views or narrow-field windows. However this creates blind spots similar to conventional cameras. **Dewarping on the camera does not allow the ability to retrospectively view the 360-degree image, which is one of the biggest advantages of using 360-degree cameras.** Further, similar to a conventional PTZ camera, all users need to view the same image at the same time, severely limiting its usefulness for remote viewing by different clients at the same time.

Typical Deployment

Cameras with 360-degree views that are mounted onto walls can create a floor-to-ceiling bubble effect around the area of interest. **Any event or activity, taking place within this bubble, is visible to the camera, which is providing total situational awareness.** This "blanket of eyes" can be replicated by using a number of narrow fields of view that are then stitched together. However this requires the use of multiple cameras which adds both cost and complexity whereas a single, multi-megapixel 360-degree view camera could achieve all of this.

To get the best possible situational awareness, the camera should be mounted in an area that is open and away from obstructions. Outdoors, 360-degree cameras work well when mounted on the corners of buildings using a parapet mount. When placed on an external corner of a building, the camera will, in effect, see around corners. When mounted on a light post in a parking lot, the field of view could be upwards of 300 feet in any direction. When mounted indoors, the appliations include a hallway crossing to show all four directions, or three directions of a "T" hallway.

With a panoramic view, two 180-degree views are displayed side by side to show both directions of a street or hallway with just one camera.

Ceiling-mounted fisheye cameras are strategically positioned in the centre of a scene to maximize the video coverage of large areas. **Since the camera sees a complete 360-degree picture, 100% visual coverage with no blind spots is obtained and can provide a conclusive evidence trail.**

Applications.

Retail

In addition to surveillance, 360-degre technology provides additional marketing and business intelligence. It provides customers with marketing intelligence; they are no longer limited to counting people as they come through the front door because it can also provide path analysis, queue counting and dwell time. Customers, in effect have "eyes" over an entire store. A store owner or manager sitting at home with his tablet PC can access not only the live images from the store, but view any part of the store at any time in the day by having access to 360 degree images, as if he was there, in person.

Gaming

A 360-degree technology solution installed across the gaming floor, integrated with the VMS, can be used for forensic purposes. The cameras replaces traditional surveillance methods used by some casinos, in which hundreds of pan/tilt/zoom (PTZ) cameras are deployed.

City Centres

360-degree technology can revolutionize the way cityscapes are surveyed. Four, six, or even eight cameras at intersections can be replaced with one 360 degree camera.

Other applications:

- Parking Lots

See more with just one camera

- Warehouses
- Ports
- Stadiums

There are no limits on how 360-degree technology, coupled with the best dewarping technology can be used for effective video surveillance. With retrospective dewarping and analysis this also offers the best forensic tool available.

Conclusions

- **Provides situational awareness with coverage that has no blind spots.**
- **Ability to retrospectively analyze a scene with speed and accuracy that no number of traditional cameras can. Enables the user to go back in time to view the total scene in its original form and then pan, tilt, and/or zoom within the 360-degree image as desired. Users are able to go back in time and retrospectively review a scene after an event has happened. This cannot be done with a traditional, narrow field-of-view camera or with a motorized PTZ, because with this equipment, users can only record the spot where the camera is pointing.**

- **Can be deployed in a way that one camera replaces four to six (or even more) old cameras**
- **Cost-effective solution that eliminates the need for mechanical pan-tilt-zoom (PTZ) devices.**
- **Global interest in 360- degree cameras is growing exponentially**
- **It is tomorrow's technology today.**

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