White paper

Panoramic cameras

180° to 360° overview

AXIS COMMUNICATIONS

Table of contents

1. What is a panoramic camera?

A panoramic camera is a fixed camera that provides an area of coverage between 180° and 360°, depending on the model. It is ideal for indoor and outdoor surveillance applications that require an efficient one-camera installation for an overview of a wide area. A panoramic camera can be used to detect activities in a large area, track the flow of people, and improve area management.

2. Panoramic camera technology

A panoramic camera is an effective alternative to installing two or more fixed cameras to cover a wide field of view. The use of just one camera instead of many makes the installation easy and cost-effective, saving time as well as money. One of the reasons is that reducing the number of cameras also means reducing the number of ports required on a network switch. Most Axis panoramic cameras also have one IP address, which means that only one software license per camera is required for most video management systems.

An Axis panoramic camera is either a single-sensor camera with one wide-angle lens or a camera with multiple sensors and lenses. Most of Axis panoramic cameras do not require any manual focusing since they are factory-focused.

2.1 Single-sensor cameras

Since only one image sensor is required, a single-sensor camera is usually smaller than a multisensor camera, making it easy to place. A single-sensor panoramic camera has a wide-angle lens that gives a 360° fisheye view of an area. The camera can be mounted on a wall, where it will provide a valuable overview at a viewing angle suitable for seeing people's faces. When ceiling-mounted, the camera will produce a circular overview of the entire room as shown in Figure 1.

Figure 1: Example of a 360° fisheye overview.

The circular image can be transformed to different rectangular views including panoramic, double panoramic, or quad-view format (simulating four different cameras) as shown in Figure 2.

Figure 2: Example of the quad-view format.

The fisheye view gives a more natural presentation of movement patterns than the quad-view format.

The transformation from circular to rectangular views is performed through a technique called dewarping, which uses special algorithms to convert the image. This can be done on live-streaming or recorded video, either in the camera or in AXIS Camera Station or other video management systems.

2.2 Multisensor cameras

A multisensor panoramic camera has multiple sensors and lenses that together provide a detailed panoramic overview. With several standard lenses instead of one wide-angle lens, the multisensor camera gives an undistorted image with higher pixel density and image quality, see Figure 3. As the image does not become distorted, no de-warping is needed, which eliminates power-consuming data processing.

The wider the scene, the greater the risk of a vast difference between light and dark areas. Since the full field of view of the camera has been split between multiple sensors, camera settings such as brightness, contrast and white balance can be adjusted individually for each sensor to provide a usable image across the entire panoramic view.

Figure 3: Example of a view from a multisensor camera.

See Section 6, Useful links, for more information on Axis panoramic cameras.

2.2.1 Multidirectional cameras

A multidirectional camera with a 360° coverage is a panoramic camera that can view multiple directions at the same time, thanks to its individually adjustable camera heads. Essentially, a multidirectional camera is several cameras collected into one unit. Its capability to view multiple directions simultaneously makes it a flexible and cost-effective alternative to using several fixed network cameras with similar performance.

3. Application areas

3.1 Single-sensor cameras

Single-sensor panoramic cameras are well suited for monitoring of retail stores, hotels, schools and offices. A main benefit when using a single-sensor camera is the elimination of blind spots when monitoring a smaller area, such as a small to medium-sized retail store.

3.2 Multisensor cameras

Compared with a single-sensor camera, a multisensor camera enables a higher pixel density or resolution for the same area of coverage. A multisensor camera is, therefore, suitable for monitoring wider areas.

See Section 6, Useful links, for more information on pixel density.

The large-area panoramic overview is well adapted for covering sizable indoor areas at railway stations, metro stations and airports, and for monitoring outdoor areas such as squares, stadiums, university campuses and school yards. Other application examples are parking lots outside hotels, offices and shopping malls, where large areas need monitoring in high image detail in order to ensure complete situational awareness. The multisensor technology is also ideal for perimeter surveillance around critical infrastructure as well as around public or governmental buildings, banks and health care centers.

3.2.1 Multidirectional cameras

Thanks to the fact that their camera heads can be positioned independently from each other, multidirectional cameras are ideal for wide areas both indoors and outdoors, for outer corners of buildings, and intersections of hallways or roads, as shown in Figure 4. Other examples are schools, retail stores, shopping malls, hospitals, lobbies of offices or hotels, warehouses, and parking lots.

Figure 4: Views from a multidirectional camera placed at a traffic intersection.

4. Conclusion

Panoramic cameras can provide wide area coverage and excellent image detail at the same time in an efficient one-camera installation. A panoramic camera can have one image sensor or multiple image sensors. Usually, a single-sensor camera is smaller, making it easy to place, whereas a multisensor camera has a higher pixel density that enables higher image quality or wider area of coverage. A multidirectional camera offers even more flexibility since it can view multiple directions simultaneously.

5. Useful links

For more information, see the following links:

Axis Communications – 'Panoramic cameras':
www.axis.com/products/video/camera/panoramic/index.htm

Axis Communications – 'Panoramic cameras - video':
www.axis.com/technologies/panoramic-cameras/video

Axis Communications – 'Perfect pixel count':
www.axis.com/learning/web-articles/perfect-pixel-count/pixel-density

70695/EN/R1/1706

About Axis Communications

Axis offers intelligent security solutions that enable a smarter, safer world. As the market leader in network video, Axis is driving the industry by continually launching innovative network products based on an open platform - delivering high value to customers through a global partner network. Axis has long-term relationships with partners and provides them with knowledge and ground-breaking network products in existing and new markets.

Axis has more than 2,700 dedicated employees in more than 50 countries around the world, supported by a global network of over 90,000 partners. Founded in 1984, Axis is a Sweden-based company listed on NASDAQ Stockholm under the ticker AXIS.

For more information about Axis, please visit our website www.axis.com.

AXIS® COMMUNICATIONS