

# Axis Video Analytics

Enhancing video surveillance efficiency



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## 1. What is video analytics?

Video surveillance systems produce massive amounts of video. The main part of that video is never watched or reviewed, due to lack of time or resources. As a result, security incidents will be missed and suspicious behavior will not be noticed in time to prevent incidents.

Video analytics is about reducing the vast amount of information contained in video, making it more manageable for systems and people. Video analytics surveillance systems automatically perform an analysis of captured video, making the resulting data useful by tagging it with appropriate labels. Incorporating video analytics into network cameras creates a versatile video surveillance system, drastically reducing workload for staff. Video analytics also makes it possible for an operator to use the surveillance system proactively, receiving early warnings about situations that could constitute potential risks. Video analytics can also be used for business intelligence purposes, for example, to analyze customer behavior and improve customer experience.

Applications performing these analyses are referred to as Video Content Analysis (VCA) or more commonly Video Analytics (VA). They range from video motion detection and audio detection to more advanced systems, including camera tampering detection, people counting and virtual trip wire.

## 2. Why use video analytics?

Video analytics offers a wealth of benefits, such as a more efficient use of staff, reduced costs for storage and servers, and faster access to stored video. By means of video analytics, systems can be set up to deliver far more targeted and specific information, creating increased business value.

Video analytics automatically analyzes and tags surveillance video in real-time. Video analytics detects suspicious activities and initiates video recording, triggers alarms or other actions, alerting operators or field personnel. By automatically monitoring video for security incidents, video analytics can give users early warnings, making it possible for them to prevent crime rather than just react to it or analyze it after the incident.

### 2.1 Efficient use of manpower

Video analytics means that fewer operators can monitor even very large installations, since staff will not be required to watch several monitors for long hours to spot suspicious activity. Instead, the video analytics system will inform operators about incidents, such as people moving in restricted areas, cars driving the wrong way, or someone trying to tamper with the video surveillance cameras.

The combination of video analytics and video verification improves surveillance efficiency. When a video analytics application has alerted an operator about an incident, the operator can verify the alarm before sending a security guard. This way the number of unnecessary emergency responses can be kept down.

### 2.2 Reduced network load and storage needs

Video analytics systems that include video motion detection and audio detection minimize the need for storage space by recording only video that contains activity. Also, by processing as much as possible of the video in the network camera itself, so called 'intelligence at the edge', the load on the network is significantly reduced as only relevant video is streamed from the cameras. Using Axis' Zipstream technology that has been optimized for video surveillance lowers bandwidth and storage requirements even more.

[See Section 8, Useful links](#), 'Axis' Zipstream technology', for more information on Axis' Zipstream technology.

### 2.3 Faster retrieval of stored video

Video analytics, such as video motion detection, ensures that only relevant video footage is stored. When the need arises to return to old recordings, only video that could potentially include the event in question is retrieved. For example, a video analytics system that has tagged the video stream with appropriate labels during recording can automatically search through days of stored video to find the right video footage in a matter of seconds.

### 2.4 New business opportunities

Video analytics also enables the use of video for applications outside security. It can extract video and data from surveillance video streams and integrate that information with other applications, such as retail management systems or access control systems, using business intelligence to create new benefits and open up new business possibilities. For example, in airports, a video analytics system can measure the queue time between entering and exiting a check-in point, helping direct staff and minimizing waiting time for travelers.

## 3. Implementing video analytics

There are two broad categories of system architecture for implementing video analytics: centralized and distributed. In centralized architectures, video and other information is collected by cameras and sensors and brought to a central server for analysis. In distributed architectures, the edge devices (network cameras and video encoders) are capable of processing the video and extracting relevant information.

The first video analytics applications, used in analog systems, were centralized. In these installations, the video was transferred to a digital video recorder where the analysis took place. This meant that all video had to be transferred—often many hours of video with no interesting content—requiring a large amount of network capacity and storage needs. Also it required additional, costly servers to be used for the processing of such large amounts of data.

The next generation of video analytics, distributed or edge analytics, distributes video processing to the location where it makes most sense, that is, the camera or video encoder. Digital network video allows for distributed intelligence, overcoming the limitations of centralized architectures by distributing the processing to different elements in the network. Analyzing at the edge means that no dedicated analytics servers are needed and that the analysis can take place on the uncompressed video feed, since transferring data to a central server requires data compression. The result is a much more cost-effective and flexible architecture. Servers that typically processed only a few video streams when doing the entire video processing can handle hundreds of video streams if some of the processing is done in the cameras.

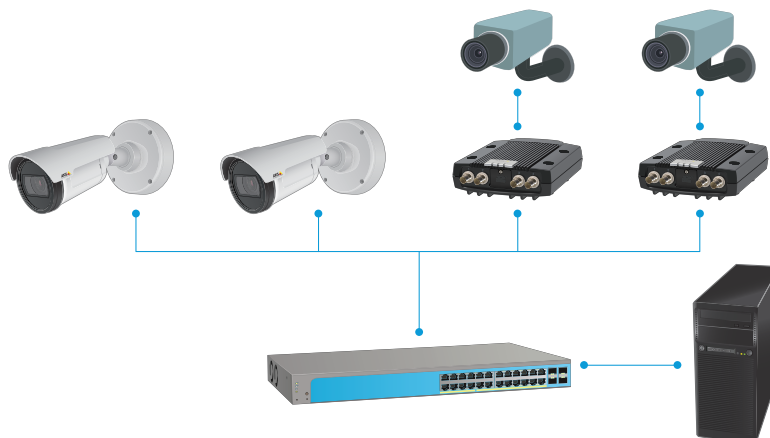


Figure 1. A distributed system with intelligence at the edge.

For specialized video analytics, such as people counting or automatic License Plate Recognition (LPR), where only the data is needed and not the video, running the applications in the camera has a dramatic impact on network and server load since the cameras can extract the required data and send just that information, with perhaps a few snapshots.

## 4. Axis' video analytics portfolio

Axis offers a number of video analytics applications that support security operators in their daily work by solving real-world video surveillance challenges. Axis' video analytics portfolio makes it possible to create scalable video analytics solutions for a wide range of network video products with diversified requirements, ranging from basic camera-enhancing software applications to specialized video analytics systems.

Axis' portfolio of video analytics targets different customer types and usage scenarios, such as basic motion recording, surveillance analytics, integrated analytics and intelligent camera functionality. Axis' own video management systems, AXIS Camera Companion and AXIS Camera Station, include several, fully integrated video analytics applications that operate in the camera.

AXIS Camera Application Platform (ACAP) is an open platform available on most Axis cameras that makes it possible to add analytics and other applications to meet specific security and business requirements.

[See Section 8, Useful links](#), 'Analytics & other applications' for more information on ACAP.

### 4.1 AXIS Guard Suite

AXIS Guard Suite comprises three video analytics applications: AXIS Motion Guard, AXIS Fence Guard and AXIS Loitering Guard, offering motion detection, perimeter protection and loitering prevention. The suite enables efficient protection of business premises and property, around the clock. AXIS Guard Suite provides robust detection as video analysis is performed directly on the camera's uncompressed video stream. The suite is also supported by AXIS False Alarm Filtering technology for high reliability. Smart configuration options suppress most common sources of false alarms and help focus the operator's attention on actual threats.



Figure 2. AXIS Fence Guard can be used to protect industry premises.

#### 4.1.1 AXIS Motion Guard

AXIS Motion Guard is a motion detection application designed for general indoor and outdoor installations. It triggers alarms whenever objects move across the camera's field of view. AXIS Motion Guard can be configured to adjust for perspective, to support long-range detection scenarios, with a simple calibration procedure. The application is ideal for after-hours monitoring of office buildings, retail stores, industrial properties, vehicle depots and other unattended areas where reliable motion detection is needed.



Figure 3. AXIS Motion Guard is ideal for after-hours monitoring of retail stores.

#### 4.1.2 AXIS Fence Guard

AXIS Fence Guard is a trip wire application designed for protecting fenced-off areas from intrusion. The application detects moving objects, such as persons and vehicles, that cross a defined virtual line. It automatically triggers an alarm whenever someone tries to pass a fence in the camera's field of view. AXIS Fence Guard can be configured to adjust for perspective, to support long-range detection scenarios, with a simple calibration procedure. AXIS Fence Guard is well suited for after-hours monitoring of office buildings, industrial properties, vehicle depots and other fenced-off areas. AXIS Fence Guard is an upgrade of Axis Cross Line Detection, Axis' first trip wire application.

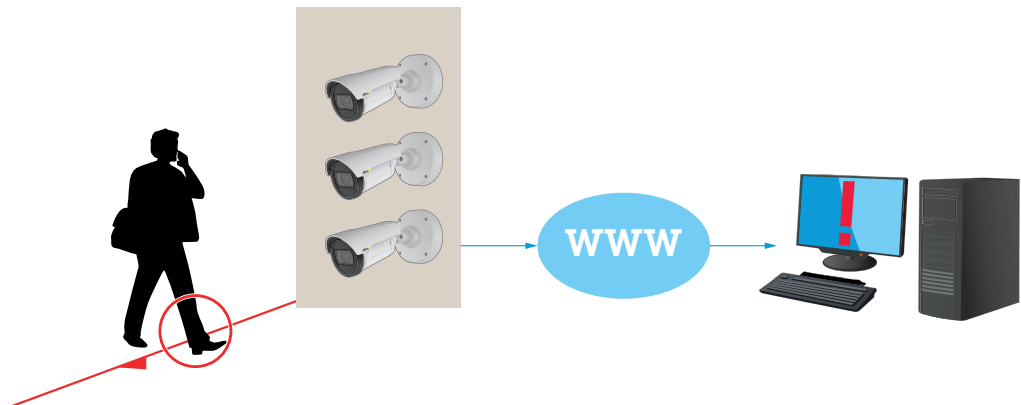


Figure 4. The principle of AXIS Fence Guard.

### 4.1.3 AXIS Loitering Guard

AXIS Loitering Guard is a loitering detection application designed for identifying suspicious behavior. The application tracks persons and other objects and triggers an alarm if they remain too long in the scene, for example, in a parking lot or in front of an ATM. AXIS Loitering Guard can be configured to adjust for perspective, to support long-range detection scenarios, with a simple calibration procedure. AXIS Loitering Guard is typically used in areas with lower activity, such as parking lots, school yards, and fenced-off areas, where loitering might pose a security issue.

### 4.2 AXIS Video Motion Detection

AXIS Video Motion Detection (VMD) is a free application that enables the camera to detect motion in the video and trigger a recording, either locally or in a video management system. It enables reliable motion detection in variable lighting conditions and works for indoor and outdoor installations such as corridors, parking lots and unattended shop areas. It is primarily used to reduce the amount of video that is stored, by flagging video that includes changes and eliminating video in which no motion is detected. By only storing video in which changes occur, video can be stored for a longer time period on a given storage capacity. VMD is also used to flag events to operators, for example, persons entering locked areas, for immediate action.

VMD can either be built-in into a network video product or made available by video management software. It constitutes the foundation for a large number of more advanced video analytics, such as people counting, virtual trip wire and object identification.

### 4.3 AXIS Digital Autotracking

AXIS Digital Autotracking automatically detects, zooms in on and follows moving objects such as persons and vehicles, making it possible for the operator to effectively handle incidents and object identification. Without locking on a single object, it adapts the view to include several moving objects to reassure that no incidents will be missed. The application has an intuitive user interface with real time visual confirmation that provides an easy way to validate that the application detects objects correctly. Axis False Alarm Filtering makes it possible to ignore disturbing object motion such as headlights, swaying trees and smaller animals.

AXIS Digital Autotracking is well suited for monitoring areas with lower activity such as parking lots, museums and after-hours surveillance of schools, stores and constructions sites.

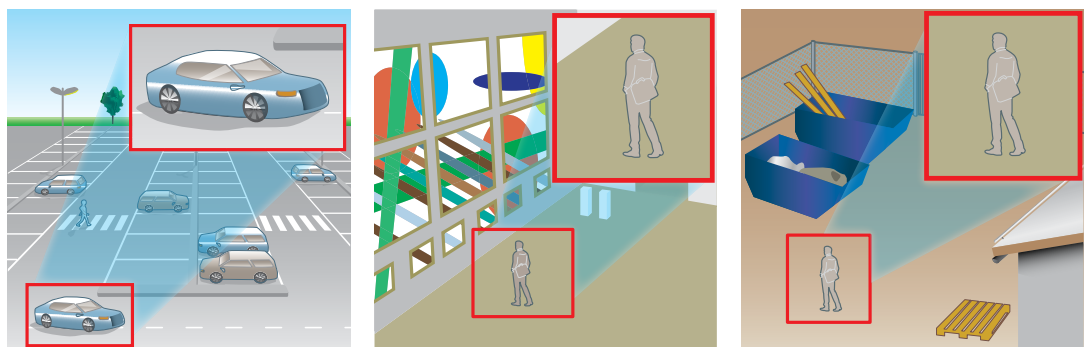


Figure 5. AXIS Digital Autotracking is well suited for monitoring parking lots, museums and constructions sites.

## 4.4 Active tampering alarm

Active tampering alarm enables security staff to detect disrupted camera operation, by automatically alerting the operator when a camera is manipulated in any way. The application is especially useful where there is a risk of vandalism, such as in schools, prisons, public transportation, and in harsh environments where weather, vibration or dirt can disturb the camera performance. Active tampering alarm detects incidents such as accidental redirection, blocking or defocusing of cameras, and reacts when the camera is attacked, spray-painted or intentionally covered.

Without active tampering alarm, it may take a long time before tampering is noticed, especially where one operator monitors multiple cameras. If tampering is not detected right away, significant incidents may go undetected and unusable video may be stored. However with active tampering alarm, there is an immediate notification when normal camera operation is disturbed.

## 4.5 Audio detection

Using audio can be a powerful complement to video. Audio detection is based on the same principles as video motion detection: The application detects noise, such as voices or the breaking of a window, and uses this as a trigger to transmit and record video, or to alert operators about suspicious activities.

For audio detection to work, the camera needs to include audio support and either have a built-in microphone or an external microphone attached. The audio detection is configured to react to a certain volume of sound and send an alarm or initiate recording of the video stream and the audio.

Audio detection can supplement video motion detection, since it can react to events in areas too dark for the video motion detection to function properly, or detect activity that is hidden from the camera's field of view.

# 5. Partner video analytics applications

In addition to proprietary video analytics modules, Axis is providing a freely available, industry-standard Application Programming Interface (API) called VAPIX® that facilitates the development of customized software solutions. This ensures that Axis' Application Development Partners (ADP) and the systems integrator community can easily access and embed video analytics into complete video applications.

Development and distribution of edge applications are further facilitated by AXIS Camera Application Platform (ACAP). The open platform enables the development of compatible and reliable third-party applications that can be downloaded to cameras and video encoders. ACAP consists of a Software Development Kit (SDK), an open application platform and a copy protection tool.

[See Section 8, Useful links](#), 'Application gallery' and 'Application Development Partner (ADP) Program', for more information on available video analytics applications and ADP.

## 5.1 Examples

Examples of partner video analytics include applications for enterprise surveillance analytics, to protect airports and other critical infrastructure installations, and intelligent traffic analytics, such as LPR, vehicle counting and automatic incident detection. Applications for business analytics for retail and other segments can also be found among partner applications. People counting to track customer flows to retail stores, queue length monitoring at airports and retail checkouts, occupancy counters for waiting areas are just some of the ways video analytics are benefiting stakeholders outside surveillance.



Video analytics can help retailers increase sales and profitability through analysis of customer behavior. For example, a network camera aimed at a sales display can detect motion around the display, and then stream video to an operator monitoring a central unit. The operator can then analyze dwell times. High volumes of people buzzing around, combined with long dwell times provide a picture of the display success. Also, video analytics can help a business improve customer experience through analysis of queue times and the reaction of waiting customers, helping support decisions to open new tills as queue times start disturbing customers.

## 6. Conclusion

Video analytics ensures that video surveillance systems become smarter, more accurate, more cost-effective and easier to manage. The most scalable and flexible video analytics architecture is based on 'intelligence at the edge', that is, processing as much of the video as possible in the network cameras or video encoders themselves. This not only uses the least amount of bandwidth, but also significantly reduces the cost and complexity of the network.

Open application development platforms such as ACAP facilitate the integration of compatible third-party solutions, resulting in a quickly growing variety of applications—general as well as specialized for different industries. The growing number of video analytics application creates new end user benefits and opens up new business possibilities.

## 7. Acronyms and abbreviations

ACAP	AXIS Camera Application Platform
ADP	Application Development Partner
API	Application Programming Interface
LPR	License Plate Recognition
SDK	Software Development Kit
VA	Video Analytics
VCA	Video Content Analysis
VMD	AXIS Video Motion Detection

## 8. Useful links

For more information, see the following links:

Axis Communications – 'Analytics & other applications':  
[www.axis.com/products/camera-applications](http://www.axis.com/products/camera-applications)

Axis Communications – 'Application gallery':  
[www.axis.com/products/camera-applications/application-gallery](http://www.axis.com/products/camera-applications/application-gallery)

Axis Communications – 'Axis' Zipstream technology':  
[www.axis.com/technologies/zipstream](http://www.axis.com/technologies/zipstream)

Axis Communications – 'Application Development Partner (ADP) Program':  
[www.axis.com/global/en/partners/adp-partner-program](http://www.axis.com/global/en/partners/adp-partner-program)

# About Axis Communications

Axis offers intelligent security solutions that enable a smarter, safer world. As the global 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 its customers and carried 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 2,000 dedicated employees in more than 40 countries around the world, supported by a network of over 75,000 partners across 179 countries. Founded in 1984, Axis is a Sweden-based company listed on NASDAQ OMX Stockholm under the ticker AXIS.

For more information about Axis, please visit our website [www.axis.com](http://www.axis.com).