



Planning Instruction

IPS Video Analytics for Axis ACAP Cameras and Encoders

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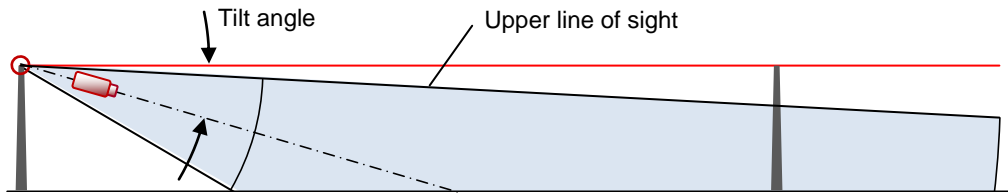
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1 General Guidelines

The following rules apply to every analytics application.

1.1 Camera Planning

The upper line of sight shall be parallel to the ground or tilted down as required. Especially avoid the situation that the sun shines directly into the lens.



Avoid disturbances within images where possible by optimized selection of

- Camera position
- Viewing direction: rotation angle (pan), tilt angle
- Angle of view (focal length of the lens)

1.2 Lighting Planning

1. Minimum illumination reflected from the ground must be 150 x the sensitivity of the camera (light sensitivity of the camera is defined at a level of 50 IRE) or a minimum of 20 lux (apply when camera light sensitivity is unknown).
2. For outdoor applications observe the distance between camera and lamp: 1,5 m
3. Avoid mixture of differing light types (visible light and IR)
4. Avoid back light blinding
5. Avoid lamps being visible in the camera image
6. Avoid reflections (by sunlight or artificial light) being visible in the camera image

1.3 Analytics Planning

If one of the limits listed in the table below applies to the system try to improve the situation as recommended under Improvements.

Limit	Improvement
Reduced detection on or under water surfaces	Reposition camera so that scene doesn't contain open water surfaces
Reduced detection when sun shines directly into lens	Tilt down camera and / or install a sun shield and pull it forward
Reduced detection due to infinite length of scene	Tilt down camera
Limited detection in case of mixed light scenes	Remove illuminators of one type of light
Limited detection in case of mirroring effects	Reposition camera so that it looks parallel to the glass pane
Limited detection in case of dense vegetation	Reduce amount of vegetation
Limited detection due to backlight (depending on camera technology)	Reposition camera
Reduced video alarms in case of blinding due to insufficient analogue video level setup	When analogue cameras are used in connection with video encoders ensure the video output signal has a minimum of 1.1 Vpp (peak white) in the case of blinding with a light source.

2 Analytics Modules versus Applications

The following table shows which applications are covered by the individual analytics module.

Application	Camera monitoring	Open area monitoring	Fence monitoring	Building monitoring	Entrance monitoring	Corridor monitoring	Room monitoring
Motion Detection		◆				◆	◆
Sabotage Detection	◆						
Indoor Detection						◆	◆
Loitering Detection		◆	◆	◆	◆		◆
Intrusion Detection		◆	◆	◆	◆		



3 Specific Guidelines

3.1 Camera Monitoring

For camera monitoring (sabotage detection) no specific guidelines have to be observed.
For other analytics modules besides the **General Guidelines** additionally specific guidelines apply depending on the application.

3.2 Open Area Monitoring

Parameter	Value			
Camera layout				
	Angle of view	4:3	16:9	
Max. detection range for colour cameras 1)	90°	14 m	12 m	
	60°	23 m	21 m	
	30°	48 m	43 m	
Max. detection range for thermal cameras 1)	15°	96 m		
	10°	144 m		
Mounting height	4 m or higher			
Tilt angle	10° - 45°			
Maximum height of a person in foreground	40% of the image height			
Camera parameter				
Minimum image resolution for colour b/w cameras	352 x 288 pixels			
Minimum image resolution for thermal cameras	160 x 128 pixels			
Minimum frame rate	8 fps			
Shutter speed	1/25 s			
Special requirements				
<ul style="list-style-type: none"> The image should not contain elements of the sky 				

- 1) Object height: minimum 7% of image height; object width: minimum 2% of image width (for a "norm object" which is a person with 1.7 m height and 0.7 m width)

Important note: These values do not depend upon the image resolution, as the size of an object on the screen (relative width and height) is equal for different resolutions.

3.3 Fence Monitoring

Parameter	Value			
Camera layout				
	Angle of view	4:3	16:9	
Max. detection range for colour cameras 1)	90°	14 m	12 m	
	60°	23 m	21 m	
	30°	48 m	43 m	
Max. detection range for thermal cameras 1)	15°	96 m	-	
	10°	144 m	-	
Mounting height	4 m or higher			
Tilt angle	10° - 45°			
Minimum field of vision for detection	2.5 m offset to the fence (inside or outside)			
Maximum height of a person in foreground	40% of the image height			
Camera parameter				
Minimum image resolution for colour b/w cameras	352 x 288 pixels			
Minimum image resolution for thermal cameras	160 x 128 pixels			
Minimum frame rate	8 fps			
Shutter speed	1/25 s			
Special requirements				
<ul style="list-style-type: none"> No detection through fence possible The image should not contain elements of the sky 				
Disturbances				
<ul style="list-style-type: none"> At fence corners motion outside of the fence where the camera looks through the fence 				

1) Object height: minimum 7% of image height; object width: minimum 2% of image width (for a "norm object" which is a person with 1.7 m height and 0.7 m width)

Important note: These values do not depend upon the image resolution, as the size of an object on the screen (relative width and height) is equal for different resolutions.

Illustrations

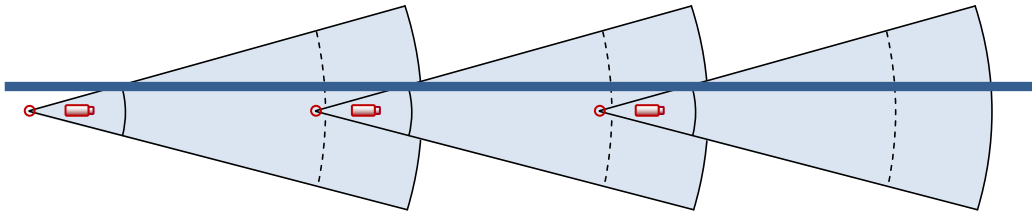


Figure 1: Cameras located along the fence, 2.5 m inside

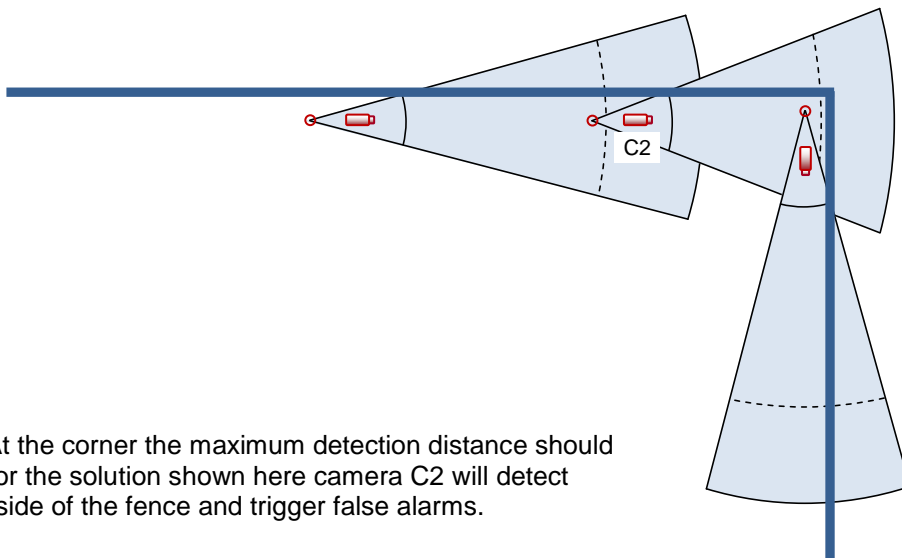


Figure 2: At the corner the maximum detection distance should be 25 m. For the solution shown here camera C2 will detect objects outside of the fence and trigger false alarms.

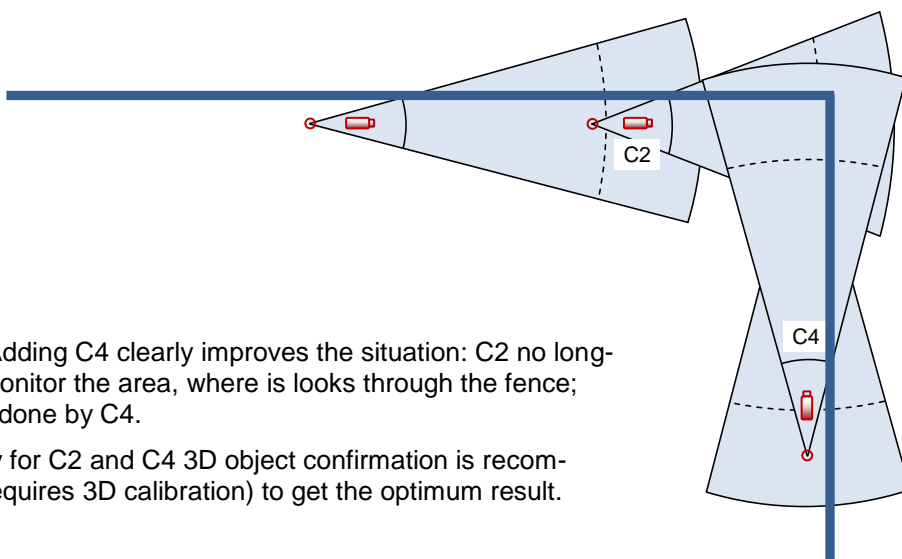


Figure 3: Adding C4 clearly improves the situation: C2 no longer has to monitor the area, where it looks through the fence; this is now done by C4.

Additionally for C2 and C4 3D object confirmation is recommended (requires 3D calibration) to get the optimum result.



3.4 Building Monitoring

Parameter	Value			
Camera layout				
	Angle of view	4:3	16:9	
Max. detection range for colour cameras 1)	90°	14 m	12 m	
	60°	23 m	21 m	
	30°	48 m	43 m	
Max. detection range for thermal cameras 1)	15°	96 m	-	
	10°	144 m	-	
Mounting height	4 m or higher			
Tilt angle	10° - 45°			
Minimum field of vision for detection	2 m offset to the building			
Maximum height of a person in foreground	40% of the image height			
Camera parameter				
Minimum image resolution for colour b/w cameras	352 x 288 pixels			
Minimum image resolution for thermal cameras	160 x 128 pixels			
Minimum frame rate	8 fps			
Shutter speed	1/25 s			
Special requirements				
<ul style="list-style-type: none"> Cameras are directed away from the building Complete detection will require 2 cameras per façade in order to eliminate blind spots Alternatively cameras may be offset from the building (mounted on masts) Allow for generous overlaps at building corners The image should not contain elements of the sky 				

- 1) Object height: minimum 7% of image height; object width: minimum 2% of image width (for a "norm object" which is a person with 1.7 m height and 0.7 m width)

Important note: These values do not depend upon the image resolution, as the size of an object on the screen (relative width and height) is equal for different resolutions.

Illustration

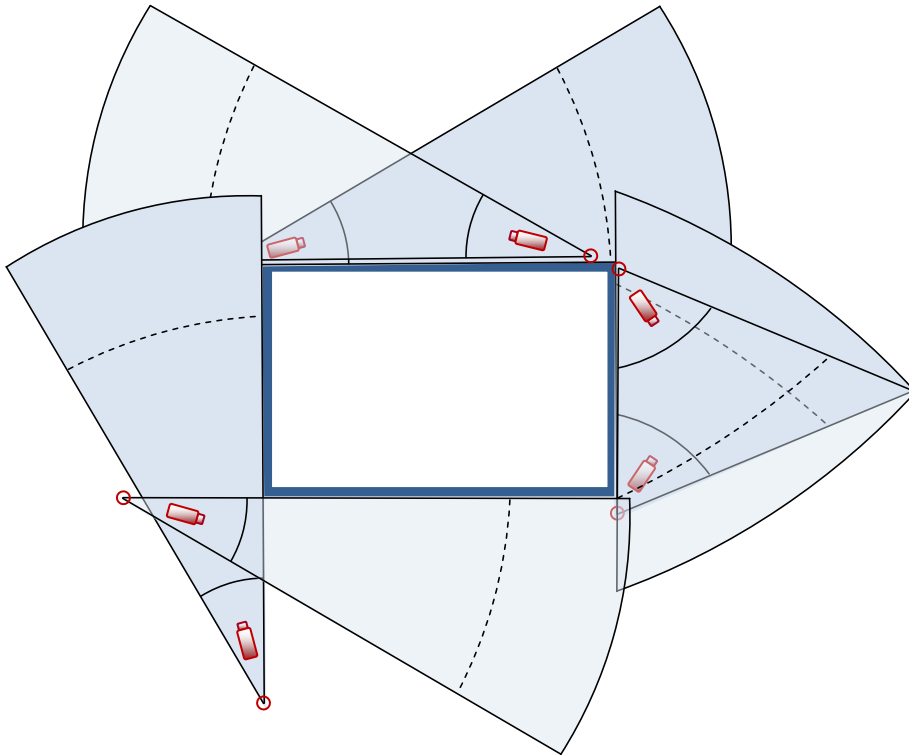


Figure 1: Cameras located along the building, 2 of them on masts offset from the building

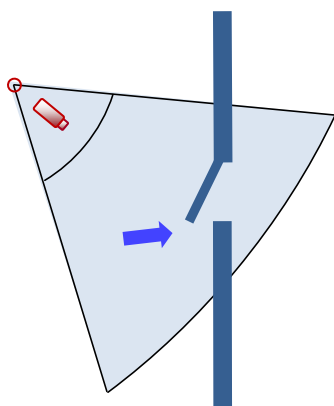
3.5 Entrance Monitoring

Parameter	Value			
Camera layout				
	Angle of view	4:3	16:9	
Max. detection range for colour cameras 1)	90°	14 m	12 m	
	60°	23 m	21 m	
	30°	48 m	43 m	
Mounting height	4 m or higher			
Tilt angle	10° - 45°			
Minimum field of vision for detection	Height of the entrance should be between 20 - 50 % of the image height			
Maximum height of a person in foreground	40% of the image height			
Camera parameter				
Minimum image resolution for colour b/w cameras	352 x 288 pixels			
Minimum image resolution for thermal cameras	160 x 128 pixels			
Minimum frame rate	8 fps			
Shutter speed	1/25 s			
Special requirements				
<ul style="list-style-type: none"> • Suitable only for entrances in sterile areas; for exceptions see Disturbances • Entrance must be clearly visible in the image 				
Disturbances				
<ul style="list-style-type: none"> • Passing people: raised levels (staircases, ramps) enable detection even while people passing 				

1) Object height: minimum 7% of image height; object width: minimum 2% of image width (for a "norm object" which is a person with 1.7 m height and 0.7 m width)

Important note: These values do not depend upon the image resolution, as the size of an object on the screen (relative width and height) is equal for different resolutions.

Illustration





3.6 Corridor Monitoring

Parameter	Value			
Camera layout				
	Angle of view	4:3	16:9	
Max. detection range for colour cameras 1)	90°	14 m	12 m	
	60°	23 m	21 m	
	30°	48 m	43 m	
Mounting height	at the ceiling or at a wall close to the ceiling (minimum 2.3 m above ground)			
Minimum field of vision for detection	room width minimum 1.5 m			
Maximum height of a person in foreground	40% of the image height			
Camera parameter Analytics parameter				
Minimum image resolution for colour b/w cameras	352 x 288 pixels			
Minimum frame rate	8 fps			
Shutter speed	1/25 s			
Special requirements				
<ul style="list-style-type: none"> • none 				
Disturbances				
<ul style="list-style-type: none"> • Switching the lights on or off • Moving shadows • Continuous motion e.g. by a fan 				

- 1) Object height: minimum 7% of image height; object width: minimum 2% of image width (for a "norm object" which is a person with 1.7 m height and 0.7 m width)

Important note: These values do not depend upon the image resolution, as the size of an object on the screen (relative width and height) is equal for different resolutions.

3.7 Room Monitoring

Parameter	Value			
Camera layout				
	Angle of view	4:3	16:9	
Max. detection range for colour cameras 1)	90°	14 m	12 m	
	60°	23 m	21 m	
	30°	48 m	43 m	
Mounting height	at the ceiling or at a wall close to the ceiling (minimum 2.3 m above ground)			
Minimum field of vision for detection	room width minimum 1.5 m			
Maximum height of a person in foreground	40% of the image height			
Camera parameter Analytics parameter				
Minimum image resolution for colour b/w cameras	352 x 288 pixels			
Minimum frame rate	8 fps			
Shutter speed	1/25 s			
Special requirements				
<ul style="list-style-type: none"> • none 				
Disturbances				
<ul style="list-style-type: none"> • Switching the lights on or off 				

1) Object height: minimum 7% of image height; object width: minimum 2% of image width (for a "norm object" which is a person with 1.7 m height and 0.7 m width)

Important note: These values do not depend upon the image resolution, as the size of an object on the screen (relative width and height) is equal for different resolutions.

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