

# intuVision Embedded Camera Applications

## Best Practices Guide



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## 1. Overview

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This document describes best practices for setting up intuVision's camera embedded applications to maximize their detection accuracy.

## 2. General Setup

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While each application has a specific setup procedure, there are also few parameters common to all applications, such as the camera view type, resolution and detection/tracking settings for applications that require moving object detection.

### 2.1 Camera View Type

For best results with any camera application it is important to select the appropriate camera view in setting up each application. Two viewing angles that are most common to surveillance cameras are:

- Top view: where the camera is looking directly overhead on to the scene. Top-down views are mostly seen indoors..
- Side view: where the camera is viewing the scene in an oblique angle. Side-views are seen both indoors or outdoors and they can be near-field (close views) or far-field as will be seen in the examples given for each application in the following sections.



Top View



Side View (near field)



Side View (far field)

### 2.2 Video Resolution

Since the computational capacity of the cameras are limited the recommended resolution for all camera applications is approximately 160x120 or any available resolution close to this size.

### 2.3 Object Detection and Tracking

Other than the ObjectTaken all camera applications rely on detection and tracking of moving objects to determine if the objects violate the alarm conditions such as activity, an object crossing a line,

entering a zone or moving in the wrong direction. Hence tracking moving objects of interest accurately is the most important factor in the performance of camera applications.

The object detection and tracking settings are view dependent and has to be setup carefully for a given camera view. Once adjusted detection and tracking settings do not need to be changed as long as the camera position and view remains the same. These settings include:

1. **Sensitivity** (for detection):

This parameter (expressed in percentage) controls the detection sensitivity. Higher sensitivity means more objects will be detected. Typically sensitivity range of [60% to 90%] is suitable to a range of camera views and video quality. As seen in the examples below , lower sensitivity ranges are adequate for video with good lighting and contrast as well as close up views while higher sensitivity is needed and recommended for low contrast or darker views as well as far-field views where objects of interest are observed at a distance.

2. **Minimum size (width and height in pixels):**

This parameter determines the minimum object size to be detected. Careful selection of minimum object size acts as a noise filter and prevents detection of objects smaller than the minimum size. Attention should be given to selecting the minimum to be smaller than the expected size of the objects of interest such as people or vehicles in a given view. Example settings given for the scenes below illustrate the selection of minimum object dimensions.

3. **Minimum object age (in seconds):**

Minimum object age is the time required for a detected object to be considered a "valid object" which can trigger the alarms. Similar to the minimum object size this parameter filters out the short lived/spurious objects due to reflections, wind-blown leaves or other intermittent false detections. Typical values for minimum object age are in the range of 0 to 3 seconds and has to be determined based on the distances objects travel in a scene relative to their sizes as will be illustrated in the applications examples of Section 3.

4. **Minimum distance traveled** (in pixels)

Minimum distance the center point of an object needs to move after it is detected in a scene to be considered a valid object. This parameter also acts as a filter to eliminate false objects that do not exhibit consistent motion. Spurious detections due to flickering lights or wind-blown branches tend to center around the same location in the view and get eliminated by proper selection of minimum distance traveled parameter.

### **3. Application Specific Settings**

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#### **3.1 Activity**

Activity application is used to detect general activity in a user-drawn zone of interest and is suitable to be used in most views. Activity triggers when a moving object's center point is

contained in the specified zone. Hence the activity zone needs to be drawn carefully to allow this as illustrated in the example scene snapshot below.



20 pixels

In this example an alarm will be generated because the object's center is contained in the activity zone while objects that pass by on the left side of the view will not trigger alarm.

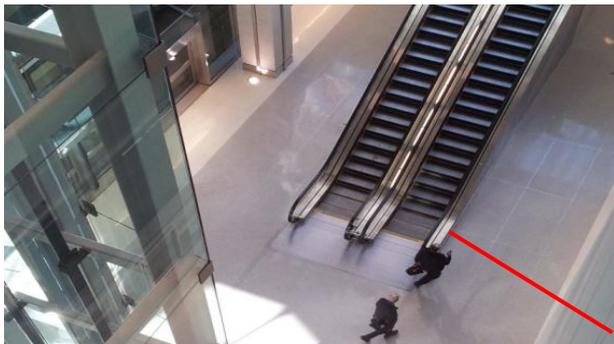
Recommended object detection and tracking settings for this scene are

given below. Since the objects in the back of the view are relatively small, the minimum object size is selected as **3x7**, the minimum object age and the minimum distance moved are set to 1 second and 25 pixels respectively. Normally a view with good lighting and contrast will not require a very high sensitivity but due to the very small size of object in the far field sensitivity is set to **90%**.

Detection Settings	
Minimum Object Width	3
Minimum Object Height	5
Sensitivity	90%
Minimum Object Age	1 second
Minimum Distance Moved	25 pixels

### 3. LineCrossing

Line Crossing application detects moving objects passing across a user-drawn line in the camera view. LineCrossing can be used to monitor foot or vehicle traffic and to count people and vehicles entering and exiting an area. The crossing direction can be specified to detect objects moving left-to-right, top-to-bottom, both-ways etc., as well as an object crossing the line fully or partially as seen in the examples below.



20 pixels



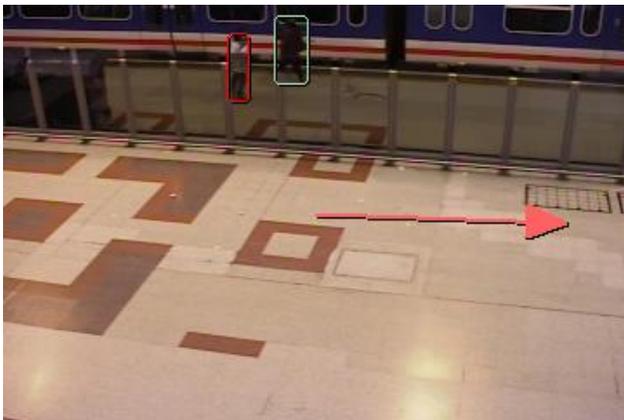
Care should be taken to make sure the line is drawn in such a way that the object completely crosses the line. All four corners of an object's bounding box must cross the line for an alarm to be triggered.

In the overhead view, the minimum object size should be set around **21x21** to weed out spurious objects caused by shadows on the wall. The tracking sensitivity should be lowered from the default of 90% to **60%** as well.

Since the objects in the side view are relatively small, the minimum object size should be lowered to **3x7** in order to detect and track objects in the far view.

#### 4. WrongWay

WrongWay is used to detect objects that move in a specified direction. It should be used in side views where the objects are moving perpendicular to the field-of-view. See the examples below:



Since the objects in both views are relatively small, the minimum object size should be lowered to **3x7** in order to detect and track objects in the far view. The minimum object age should also be set to **1 second** as objects will be moving relatively fast.

## 5. ObjectTaken

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ObjectTaken is used to detect when an asset like a painting or valuable has been removed from scene. It can be used in most views as long as the asset is at least **32x32 pixels**.

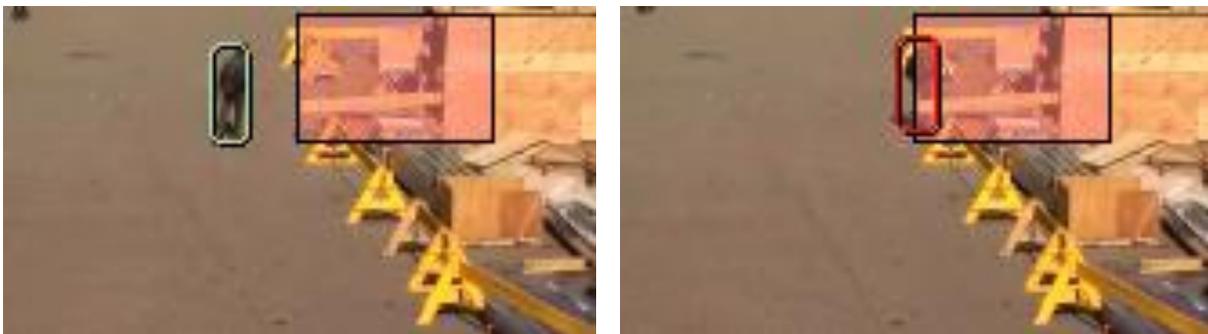
The zone must be drawn around the asset completely so the edges are visible. See the example:



## 6. ZoneIntrusion

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ZoneIntrusion is used to detect objects that enter a zone. It can be used in most views as long as the objects are not too small. Unlike ActivityDetection, objects must first be tracked outside the zone and then enter it. Objects that originate inside the zone will not generate an alarm. See the example below:



In the example an alarm will be generated because the object enters the zone from the left.

Since the objects in the view are relatively small, the minimum object size should be lowered to **3x7** in order to detect objects.