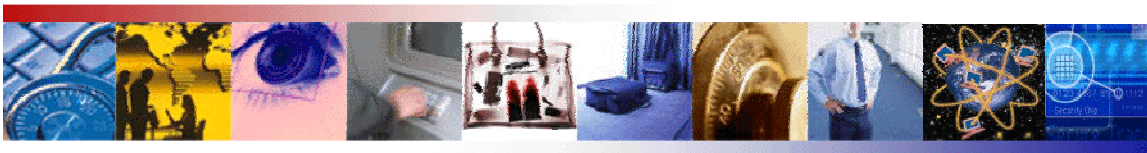




## Camera Placement & Guidelines Documentation

# IntelliVision

*Video Intelligence and Automated Monitoring*



**CONFIDENTIAL**  
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# Camera Placement & Guidelines Documentation

This document provides recommended camera angles and positions for some common applications.

## Overview

### Camera Positioning

Camera positioning angle is very critical to getting good data for analysis. Care should be taken to avoid the following: a) object size being too large so as to occupy a large part of the scene, and b) occlusions.

Typically, cameras can be installed with one of three views:

- 1 Top view (Vertical Ceiling Mount)
- 2 Perspective or Angled view (Wall or Corner mount looking down) – Useful for detecting general intrusion.
- 3 Side View (Horizontal wall mount at lower height).

The Top View is generally good for counting, detecting direction of movement, etc. The second option (at angle looking down) is good for detecting intrusions. The third option (side view) is not recommended as objects can be hidden from view (occlusions).

### FOV (Field Of View) and Object Size

For people detection, the object or person size should be 10-20% of the whole screen. The object should not be so large as to occupy 40-100% of the screen.

## Recommended Scene and Lighting Conditions

Here are some general recommendations for lighting at the scene for Video Analytics.

1. The scene should be well-lit. Low lighting produces video noise that triggers false object alerts.
2. Stable and consistent lighting will provide good results. Fluctuations in lighting or uneven lighting at the scene will cause false alarms in any video analytics system.
3. Avoid occlusions (one object going in front of another). This will break object tracks and will cause object disappearance and other related problems.
4. Avoid pointing the camera directly at light sources as described below. These following situations will make the video unusable for analytics and will temporarily signal saturation.
  - a. Camera pointed directly at the sun.
  - b. Camera pointed directly at light source
  - c. Camera looking at vehicles (cars, trains in tunnels) head on
5. Avoid or minimize shadows by repositioning the camera or light sources.
6. If possible avoid the presence of trees and other vegetation in the camera's field of view. Swaying or movement of trees and bushes in the wind can cause false alarms. If they need to exist, then use special areas/zones to define/block off the zone as vegetation – these zones will be ignored during processing.

7. If possible avoid the presence of water areas – rivers, lakes etc. in the camera’s field of view. Water areas can cause reflections and ripples in the water can cause false alarms. Swaying or movement of trees and bushes in the wind can cause false alarms. If they need to exist, then use special areas/zones to define/block off these zones; they will be ignored during processing.
8. The camera mounts should be sturdy and rigid. If the camera has to be on a pole or wall that shakes, use “Video Stabilizer” option in IntelliVision products. Or you may purchase Video Stabilizer” separately and stabilize the video streams.
9. Ensure that the size of the objects that are to be tracked in the scene is not too small. Object sizes have to be at least 5-10% of the screen size for consistent detection. If the objects are only few pixels (People or vehicles), it will be difficult to detect them consistently will cause false alarms on most systems.
10. Ensure that the object size is not too large – more than 40% of the screen size. The camera should not be too close to the objects being tracked.
11. We recommend you turn off AGC (Auto Gain), Auto IRIS and White Balance on the cameras. These fluctuate some times and cause notable scene changes. It is possible to run the system with these settings ON, with lower sensitivity, if the scene is stable and fluctuations are less.

## **Resolution and FPS**

1. We recommend you run in D1 (640x480) or CIF (320x240) resolutions. You can use higher resolutions in VGA, HD etc.; in this case you need to scale the image down in the software settings to get better performance.
2. We recommend you provide at least 10-15 FPS (Frames Per Second) for most cases. You can operate on frame rates as low as 1-3 FPS for special applications and where tracking is not required. If good tracking is required, a frame rate of at least 10-15 FPS is necessary for good performance.
3. Of course the camera lens needs to be clean, and focused for best results.

Camera Zoom, FOV and Angle are important. The following sections address them fully with examples.

## Recommended Camera Positioning for Some Common Applications

### 1. Intrusion

Camera must be at an angle looking down. Camera should be installed at sufficient height to avoid occlusions. The object size should not be too large to occupy large part of scene. It is recommended that the size of object entering in the scene should not exceed 50% of scene size. If the camera is used during night time, then the lighting reflections should be at a minimum to avoid bad detections. Light should be uniformly distributed in the scene and also try to avoid the shadows. Care should be taken that the light source should not be directed on Camera.

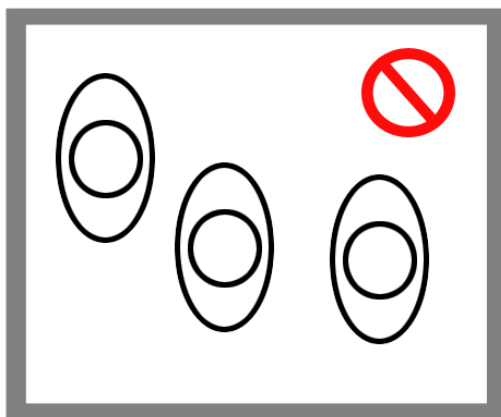
A Camera at an angle looking down as seen from following picture is good for Intrusion. As is a top down view.



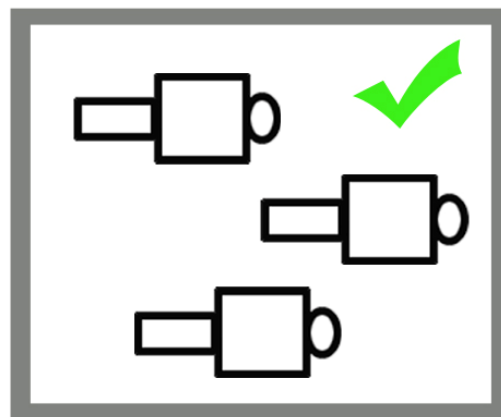
### 2. Fall and Duress Detection

The most preferable position for the Camera is either Front View or Side view. A small angle looking down is acceptable however the Camera should never be installed at Overhead position i.e the Top View. The person entering the scene should be completely visible. The Maximum object size in the scene should not exceed 50-60% of scene size. The lighting reflections should be at a minimum to avoid bad detections. Light should be uniformly distributed in the scene and also try to avoid the shadows. Care should be taken that the light source should not be directed on Camera.

#### Duress Detection



Top Down View



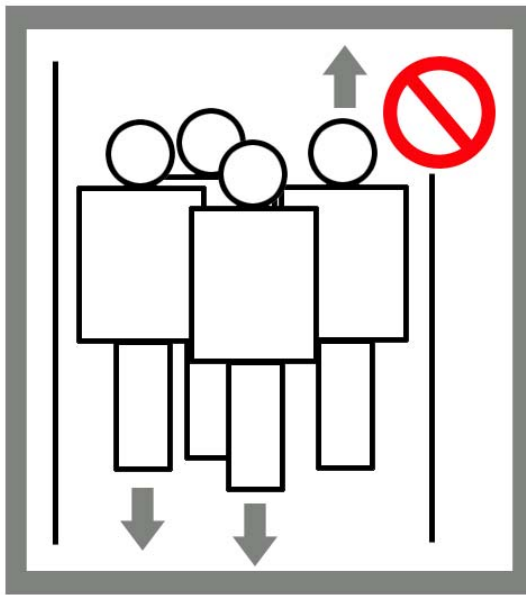
Angled View

### 3. Counting

The camera must be installed at Overhead position. The object size should be constant wherever it is within the scene. The Maximum object size in the scene should not exceed 50-60% of scene size.

The perspective (angled) view should be used as least as possible. If the camera is installed from the side at a low angle, then the counting accuracy will be lower. The lighting reflections should be at a minimum to avoid bad detections. Light should be uniformly distributed in the scene to avoid the shadows. Care should be taken that the light source should not be directed on Camera.

## Counting



Angled View

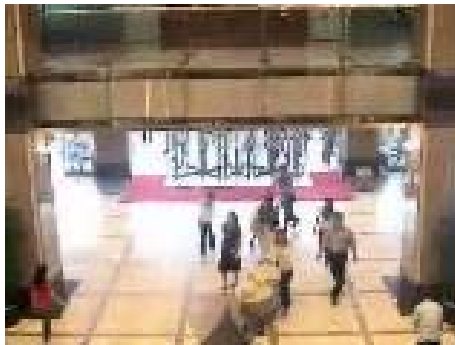
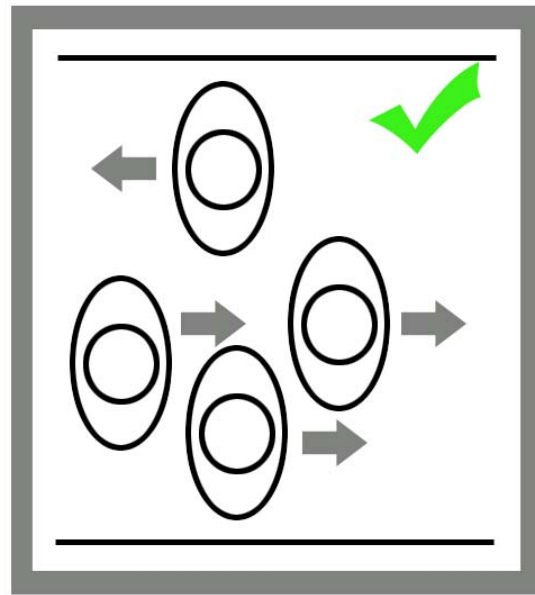


Fig.1



Top Down View



Fig.2

Camera position as seen from above Fig.1 is not very good. Since there are lot of reflections and also the view is perspective. Camera position as seen from Fig.2 is good with far less reflections, shadows and the best perspective view.

#### 4. Camera Tamper Detection

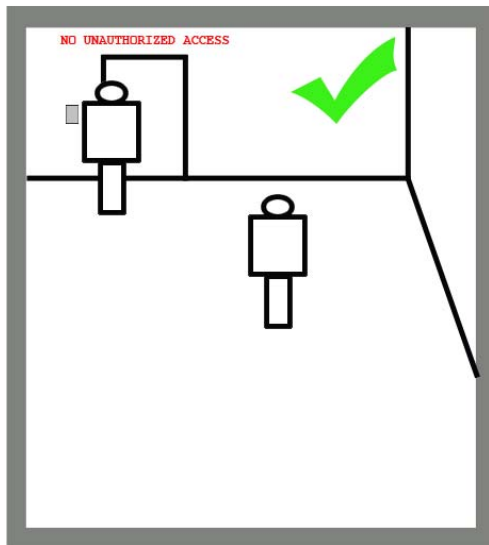
For Camera Tamper detection, the Camera can be located at any position; Either Top View, Side View or Front View. The maximum size of objects entering the scene should not exceed 50% of scene size. If the camera is used during night time, then the lighting reflections should be at a minimum to avoid bad detections. Light should be uniformly distributed in the scene and also try to avoid the shadows. Care should be taken that the light source should not be directed on Camera.



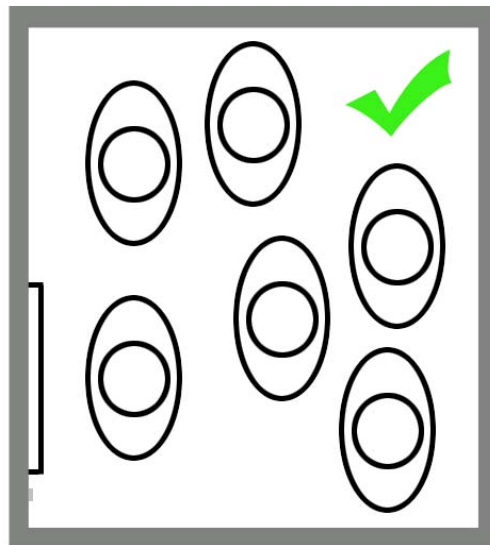
#### 5. Loitering

Typically, this application is deployed for less crowded areas. The second option (Camera installed “At Angle” looking down) can provide good results provided it is installed at a good height. This would help separate multiple people in the scene as well as avoid occlusions. For crowded areas, cameras with a top view would provide best results.

### Loitering



Angled View

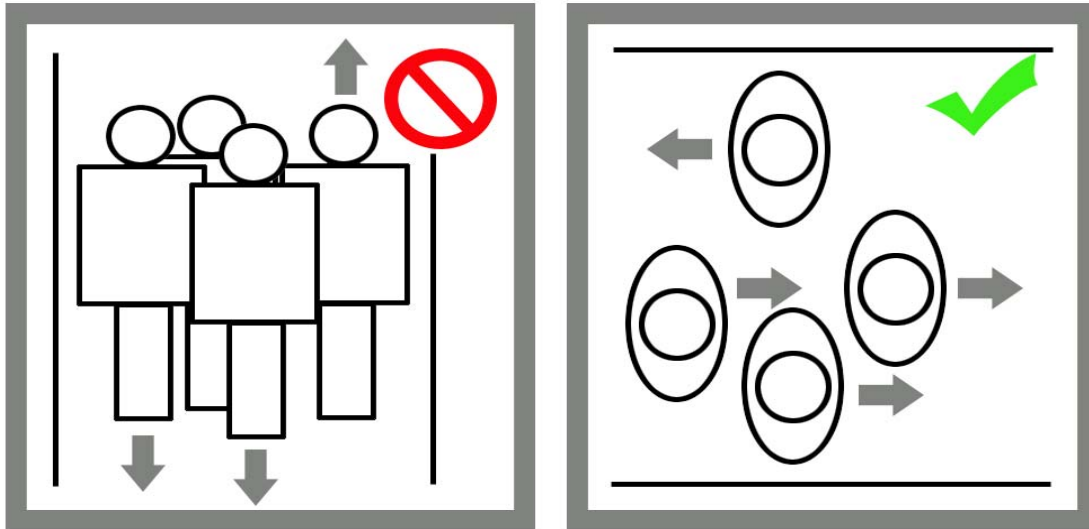


Top Down View

## 6. Direction Monitoring

For Direction Monitoring, again a Top View camera provides the best data. A perspective view will result in merged objects and/or occlusions leading to inaccurate detection.

### Direction Monitoring



Angled View

Top Down View

## 7. Asset Protection / Object Removed

A Top View camera will provide the best data for this application. This helps eliminate occlusions from people and/or other objects. Further, the object size would also remain constant wherever it is within the scene.

If the ceiling is sufficiently high, it may be possible to use a camera with a perspective view. This view necessitates additional configurations since the same object will appear as large or small depending on how far it is from the camera.



e.g In the above scene if we want to monitor the paintings then the Top View of Camera as seen from above fig. will provide the best data for application.

## 8. Object Left

A Top View camera will provide the best data for this application. This helps eliminate occlusions from people and/or other objects. Further, the object size would also remain constant wherever it is within the scene.

If the ceiling is sufficiently high, it may be possible to use a camera with a perspective (angled) view. This view necessitates additional configurations since the same object will appear as large or small depending on how far it is from the camera. Camera position as seen in the figures below are good ones.

### Object Left

