# Security Management System
Object Counting

This document describes the steps for using the 'Object Counting' module available in the Security Management System software.

# (A) Object Counting Configuration

1. Please run the Security Management System server software
2. Add cameras to the Security Management System server software for monitoring
3. Navigate to the 'Video devices' link from the navigation bar available at the left hand side. Under 'Channels' sub-link, click on the link specific to the camera on which 'Object Counting' needs to be configured.
4. This will display the camera information page
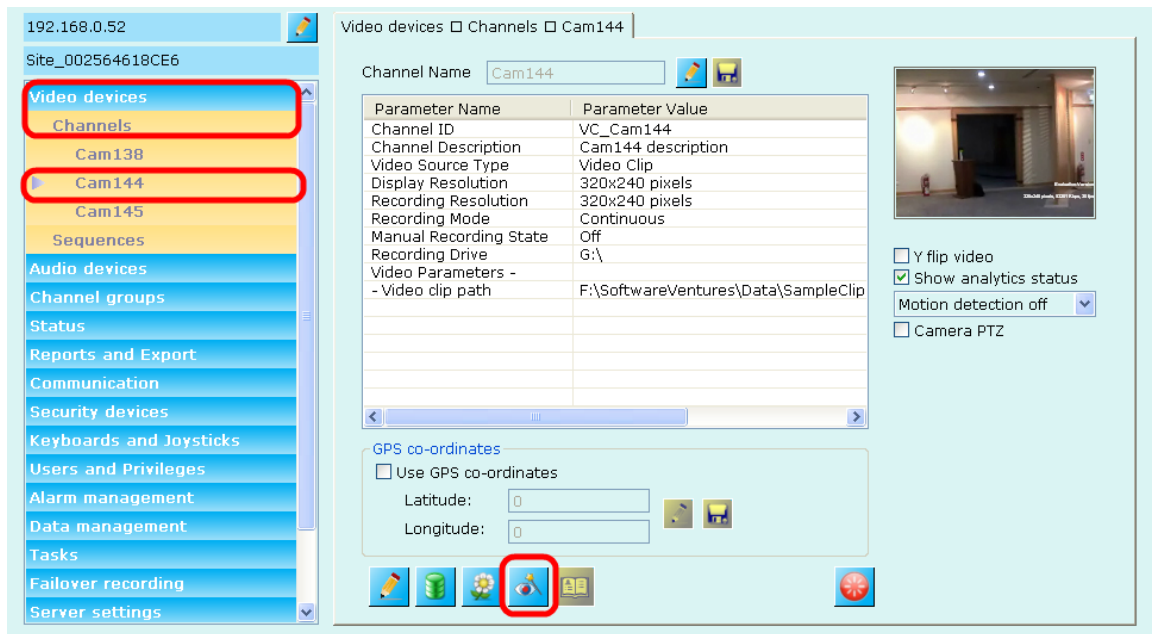
5. On the camera information page, click on the 'Analytics settings' button, available in the toolbar, at the bottom of the page
6. This will pop up the video analytics configuration dialog box
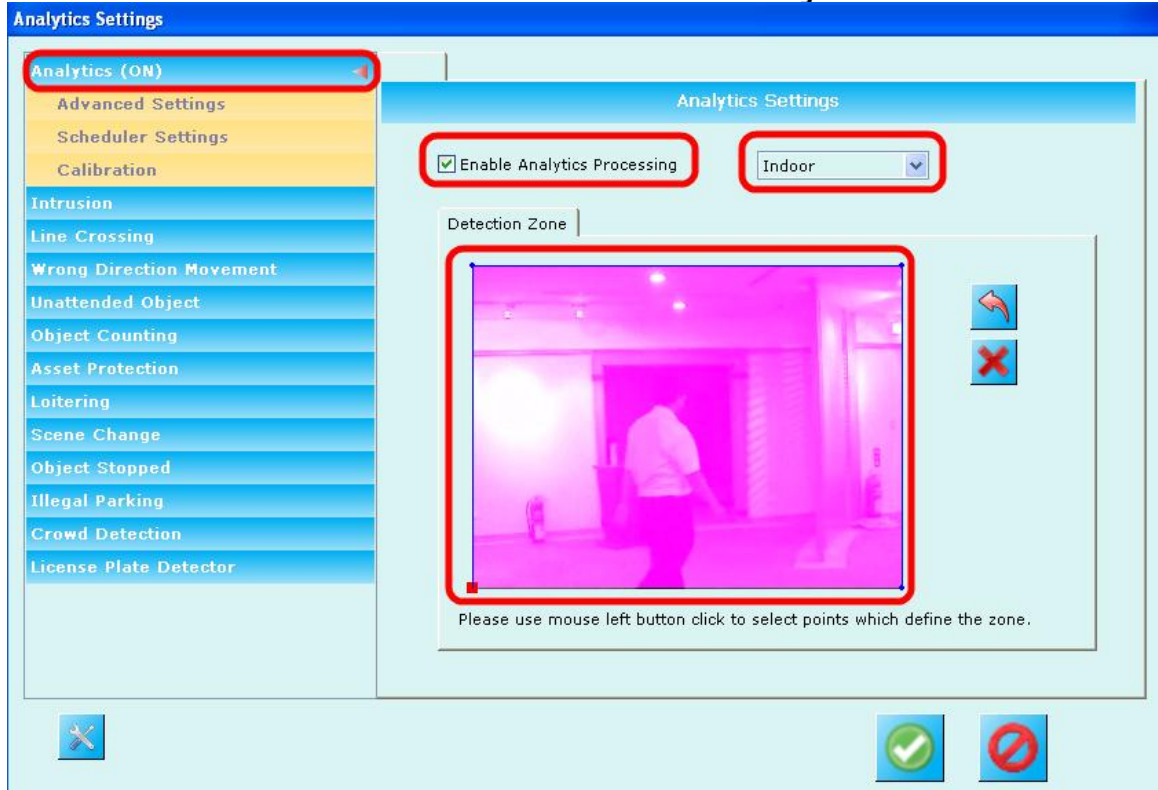
7. Click on the 'Analytics' link from the left hand side navigation bar.
8. This will display the 'Analytics Settings' page
9. Select the check-box to 'Enable Analytics Processing'
10. Select 'Indoor / Outdoor' option from the drop-down. Typically, if lighting changes are expected, it is advisable to select 'Outdoor' option. If lighting is expected to be completely unchanged, 'Indoor' option can be selected. When 'Outdoor' option is selected, the software continuously learns and updates the background model – which needs little more processing power, but ensures that object detection is good always.
11. Configure the 'Detection zone'. By default complete scene is selected. Please click on 'Reset (X)' button to clear the zone and click on the image to specify bounding points of the detection zone, the zone will be indicated as a filled polygon. It is advisable to exclude as many region from the detection zone as possible. The areas which are recommended to be ignored are –
    (a) Areas which have continuous movements like doors
    (b) Areas with mirrors and other reflecting surfaces
    (c) Areas with trees, water, sky – if possible
    (d) All areas where we do not care about the objects eg walls and ceiling. As we do not expect to monitor any activities in such areas, its better to exclude them from detection zone
12. Click on the 'Analytics -> Advanced Settings' link from the left hand side navigation bar.
13. This will display the 'Analytics Advanced Settings' page.
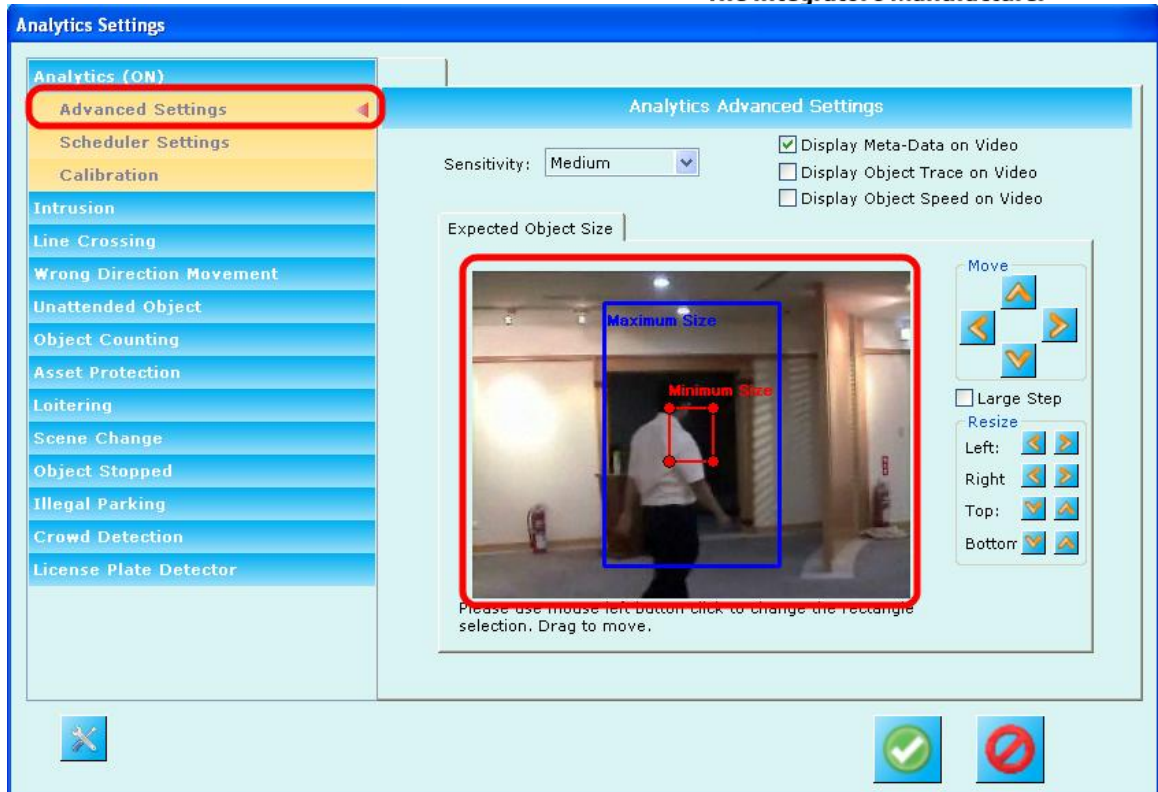
14. Please specify the 'Minimum Object Size' and 'Maximum Object Size'. By default rectangles for both are displayed. Select a rectangle and use the controls from right hand side to set the sizes for both 'Minimum Object Size' and 'Maximum Object Size'
15. Objects available in the image can be used as a reference. Guideline is to select half the size of the smallest expected object as 'Minimum Object Size' and double the size of the largest expected object as 'Maximum Object Size'
16. Click on the 'Object Counting' link from the left hand side navigation bar.
17. This will display the 'Object Counting Settings' page.
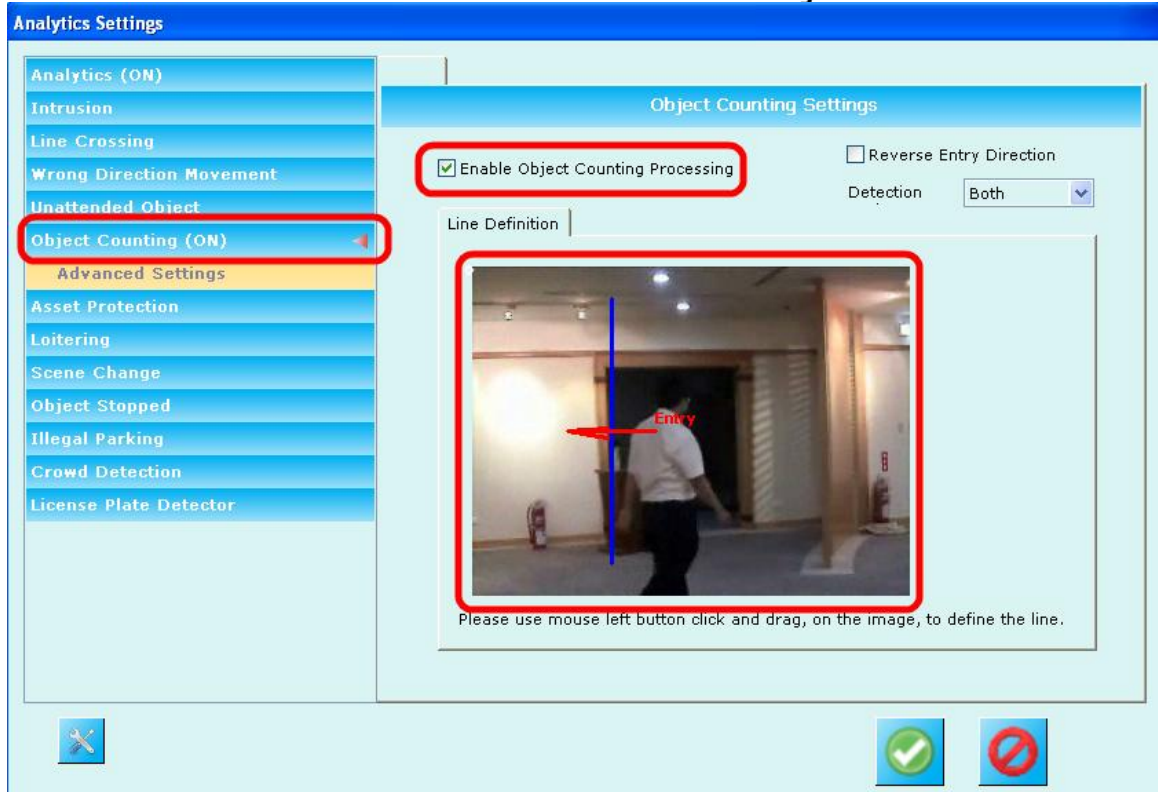
18. Select the check-box to 'Enable Object Counting Processing'
19. Define the reference line for object counting. Objects crossing this line are counted. Algorithm is lot more complex but for configuration, we can treat the reference line as the one used to check objects crossing over from one side of the line to the other side
20. The line should be configured such that new object detected on one side of the line should be fully visible and should be detected before it crosses the line. So defining the line very close to edge of the scene is not recommended
21. Click on the 'Object Counting -> Advanced Settings' link from the left hand side navigation bar.
22. This will display the 'Object Counting Advanced Settings' page.
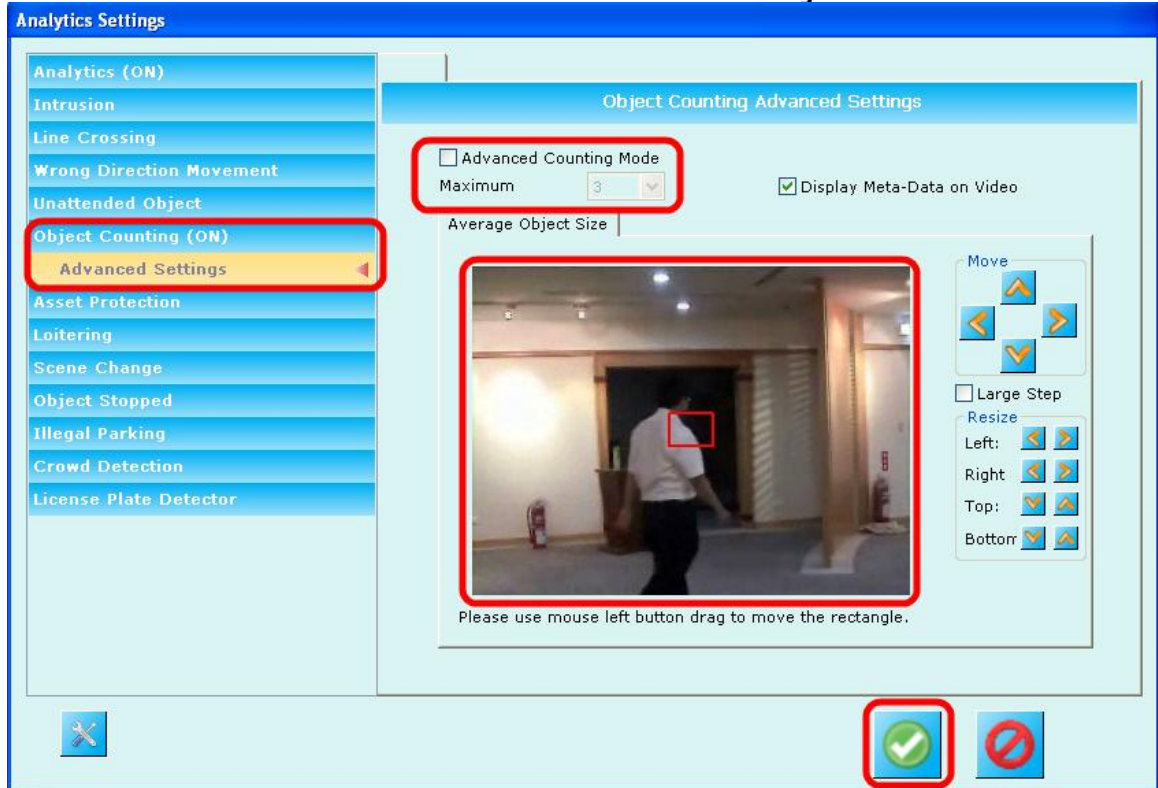
23. Change settings on this page, only if more than 1 objects are expected to be together which they are crossing the counting reference line. Otherwise ignore settings on this page
24. Enable 'Advanced Counting Mode' by selecting the check-box.
25. Specify 'Maximum' number of objects which can cross the counting reference line together
26. Specify the 'Average Object size' by defining the rectangle. This should be as close as possible to the actual average object size. You can use the object in the image as reference to define the 'Average Object size'
27. Click on the 'OK' button to save the video analytics settings and to close the dialog box
28. On the main screen of the Security Management System server software, click on the 'Show Video Analytics view' button from the toolbar available at the top of the page.
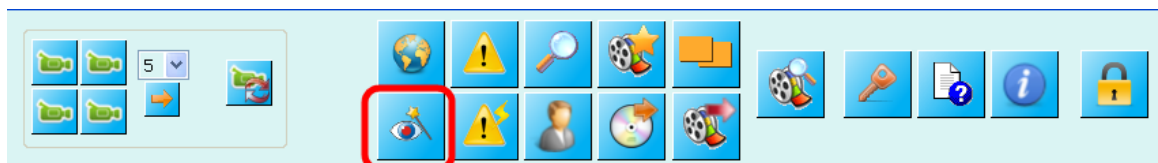
29. This will pop up the 'Video Analytics' screen.
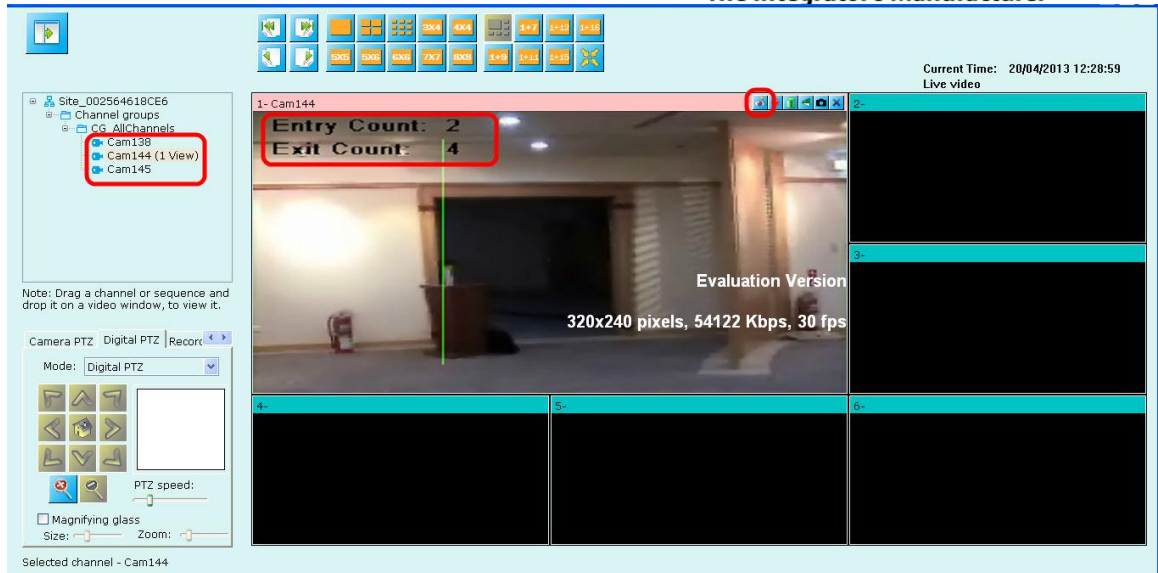
30. The video analytics screen will show a few videos by default. Close all the videos by clicking on 'Close' button available in the video toolbar.
31. On the left hand side, a tree with list of cameras will be displayed.
32. Drag and drop cameras from this tree to the video windows to view live video from those cameras
33. Drag and drop the cameras on which video analytics is enabled.
34. The video will also show the video overlay displaying analytics processing.
35. For cameras on which 'Object Counting' is enabled, 'Entry Count' and 'Exit Count' will be displayed.

(B) Importance of Correct Camera Setup

Video Analytics algorithms are advanced and complex; and rely heavily on the 'pre-learnt data' available in the software's in-built database. The pre-learnt data is compiled from several real-life installations and is used as basis for object detection, object classification and object tracking operations – which are basic steps in any video analytics algorithm.

The video analytics algorithms expect camera angles, positioning and zoom levels, similar to the ones in real-life deployments. Correct camera setup, including camera positioning, camera angle and camera zoom is essential, to get good accuracy from the video analytics software.

It is recommended to consider the camera setup requirements for the video analytics software, during the design phase of a project - where camera positions, angles and zoom levels are decided.

In case where video analytics software is used as an extension to the existing security system, with cameras already mounted; it is recommended to analyze the setup for every camera as per the guidelines available in this document.

In case the guidelines are not met, the cameras should be tweaked to match the expectations from the video analytics software, as per the guidelines described in the next section.

Most of the camera setup requirements are met in the real-life deployments. In case cases, a few tweaks may be needed, as per the guidelines described in following sections.

(C) Camera setup guidelines for the video analytics software

1. Please mount the camera similar to deployment / real-life situation. Especially during the evaluation, this point is important. E.g. camera placed on a table is not real-life case and hence the video analytics algorithms would not be able to analyze the video correctly, as its database does not have the data for such situations which do not exist in case of real-life deployments.

2. Camera should be a fixed camera, rigidly mounted. Even the small shakes and vibrations would create problems for the video analytics algorithms.

3. Camera should be mounted and zoom level should be adjusted such that a single person (for people detection application) or a single vehicle (for vehicle detection application) is visible fully, at any possible position where the person/vehicle can exist in the field of view of the camera, and is part of the 'detection zone' in the video analytics software. Objects too close to the camera will not be fully visible; hence such camera angles should be avoided.

4. More specifically, the object (person / vehicle) should cover 5% to 15% area on the video image. It should not be smaller or bigger. This is usually available in most of the normal reallife camera installations.

5. Current algorithms are fine tuned for low-crowd situations, where maximum total number of people/vehicles in the scene is 2-3.

6. Please turn off Automatic Gain Control (AGC) or similar settings in the camera which change the video properties (like brightness / contrast etc) automatically, based on the scene changes.

7. The scene as viewed from the camera should have consistent lighting. There can be natural lighting changes, but un-natural changes lighting cases like flashing lights should be avoided.

(D) Additional guidelines for 'Object Counter' application

1. It is recommended to mount the camera at around 10feet-12feet height, looking down at the ground.

2. Avoid camera angle which gives perspective view.

3. Please mount it near the door, to count entry and exits. The door should not open and close in the field of view of the camera

4. The door should be a normal size door where 1 or 2 people can enter at a time

5. It is recommended to have separate entry doors and exit doors, and separate counter instances at each place, to get better accuracy for entry and exit counts

6. It is expected that the people are continuously moving and not standing in a queue. Queue length detection is a separate algorithm available in the Video Analytics Suite; please use the same for cases where queue length detection is required. Object counter is not suitable for such requirements.

7. Every object viewed by the camera, should have at least 1 second of the life span in the field of view of the camera. That is – every new object entered in the scene should take at least 1 second to reach to the other edge of the scene and exit.

8. Counting line should be defined at the center of the view of the camera. Its better to adjust the camera accordingly.

It is important to meet all the requirements, as per these guidelines, to get good accuracy for 'Object Counting'

Notes:

The 'Security Management System' software is fine-tuned for the camera setup as described by these guidelines and will give good accuracy, when all these requirements are met.

'Security Management System' provides several video analytics software applications for different requirements. 'Security Management System' also offers customized video analytics algorithm development for specific custom requirements.
Please contact the vendor, for cases which do not follow the above mentioned camera setup guidelines. We will be happy to provide the customized video analytics software, as per your requirements.