

Ernitec EVA VCA Configuration

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Introduction

VCAsys, the real-time video analytics engine utilizes advanced image processing algorithms to turn video into actionable intelligence. At the core of the product is an advanced object tracking engine that continually tracks moving and stationary targets. The tracking engine features built-in robustness to environmental nuisance conditions such as changing illumination, moving foliage, rippling water, etc.

VCAsys is a generic name for a suite of analytics products that include:

- **VCApresence:** continually tracks moving and stationary targets and generates real-time alerts of object presence in multiple overlapping detection zones.
- **VCAsurveillance:** continually tracks and classifies moving and stationary targets and features a full suite of rule-based filters including: enter, exit, appear, disappear, stopped objects, directionality constraints, object counting, loitering, object type and object speed. Multiple filters are supported on any combination of multiple overlapping detection zones.

Using the intuitive web-based configuration application, it's possible to quickly and easily define rules that generate real-time alerts when triggered. The alerts are available in all formats supported by the hardware on which it is enabled.

This user guide will help you get VCAsys configured for your application quickly, as well as lead you through some of the advanced features provided by the product.

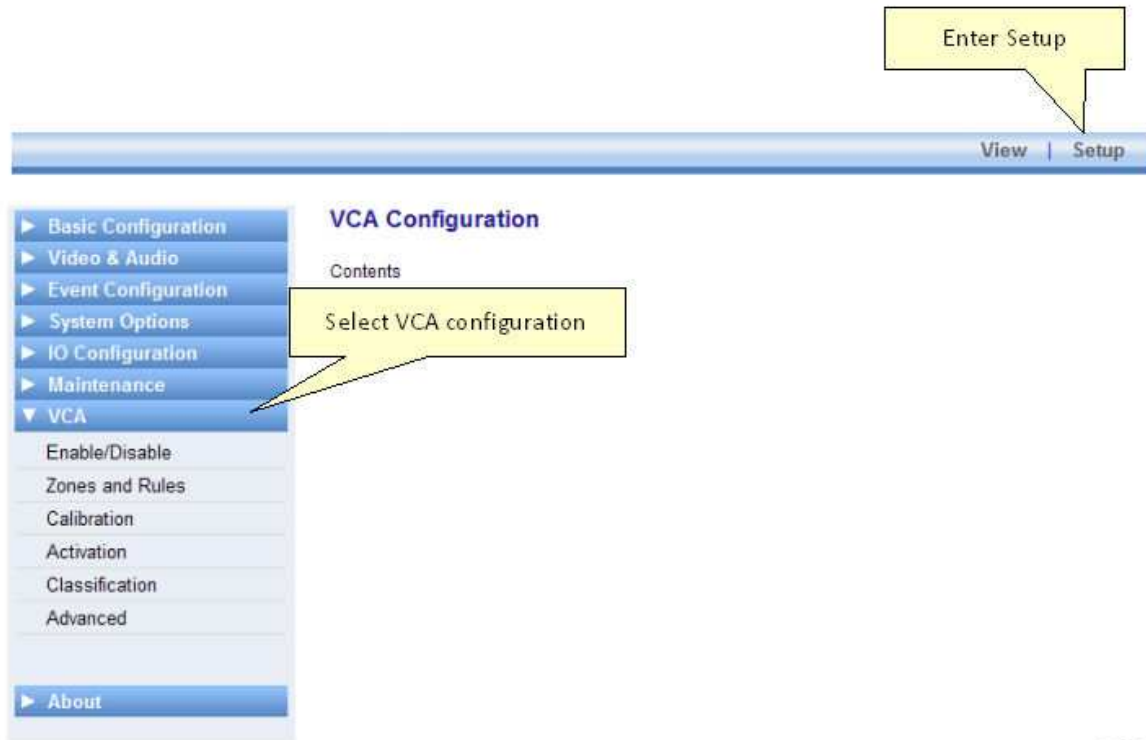
Getting Started

In order to get up and running as fast as possible, the following steps should be executed:

- Locate a unit that supports VCAsys and ensure it is upgraded to a firmware version that contains the VCAsys engine.
- Obtain an [activation](#) code for the feature set required. The different feature levels available are as follows:
 - **VCAPresence**: generates real-time alerts of object presence in multiple overlapping detection zones.
 - **VCAsurveillance**: fully featured analytics suite composed of multiple filters including: enter, exit, appear, disappear, stopped objects, directionality constraints, object counting, loitering. All filters are supported on any combination of multiple overlapping detection zones.
- Connect power, network and input video.
- [Activate](#) the VCAsys engine.
- [Calibrate](#) the unit [VCAsurveillance only].
- Configure the [detection rules](#).
- Configure the [alert output format](#).

Accessing VCA Configuration

All configuration of the VCAsys engine is performed by accessing the VCA section of the unit setup page:



v1.00.00

Activation

Activation

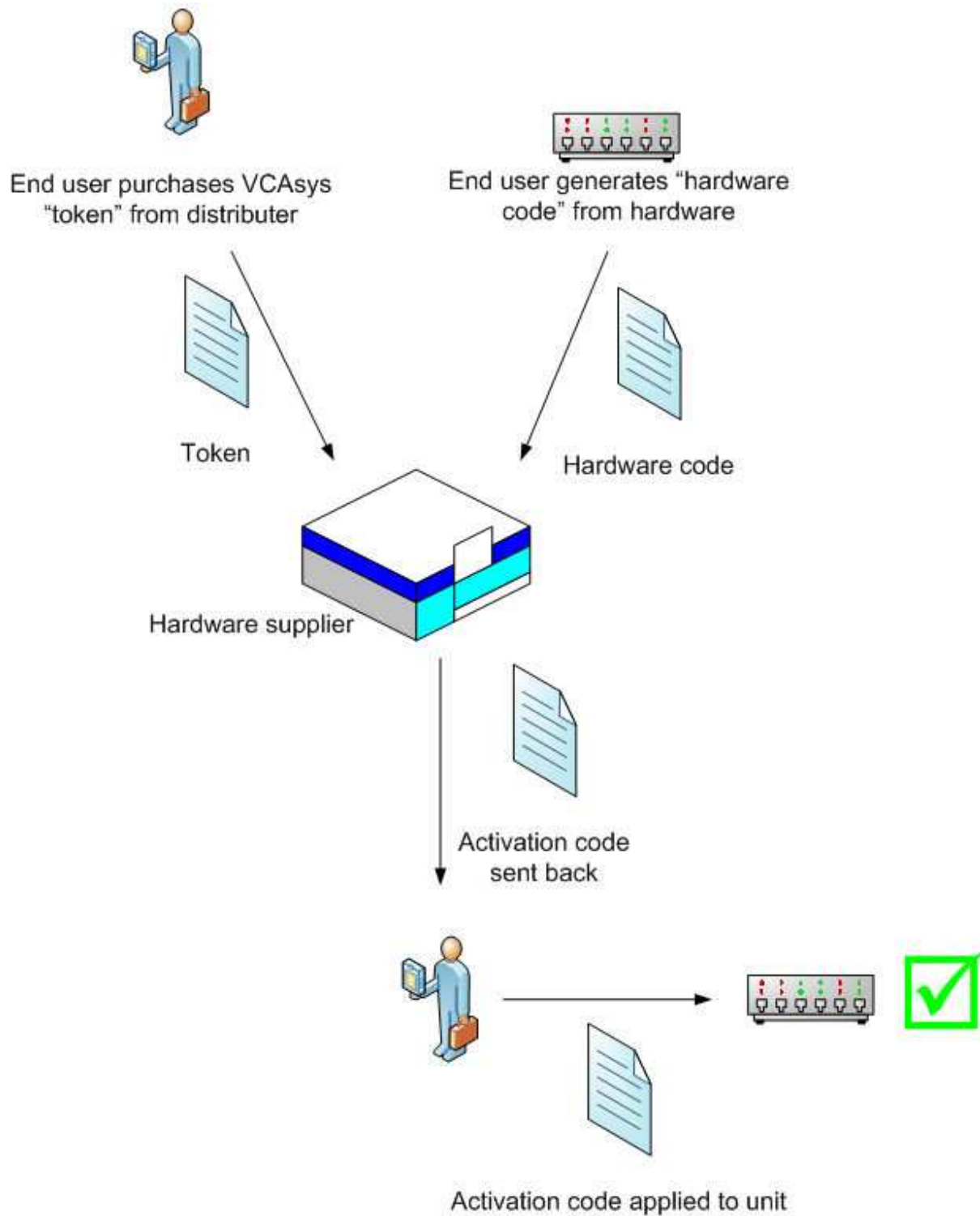
Some features of VCAsys must be activated before they can be used. Activating VCAsys consists of the following two steps:

- [Obtaining an activation code](#) from your hardware supplier.
- [Applying an Activation code](#) to the unit.

Obtaining an Activation Code

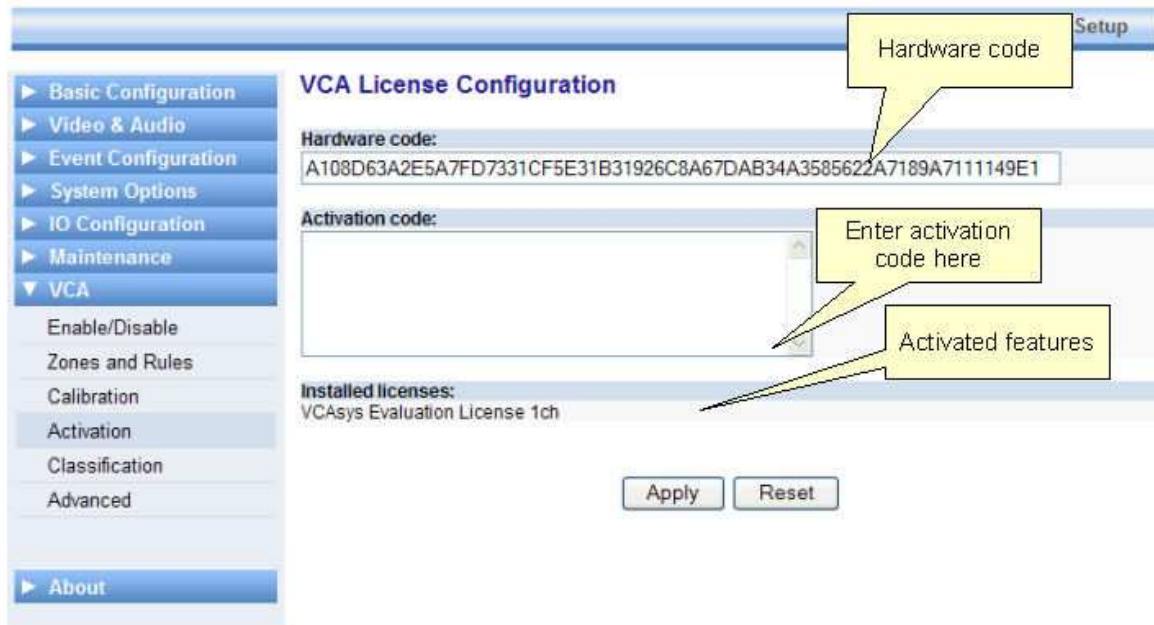
Before VCAsys can be enabled, it must be activated. Typically, an activation code is supplied by the hardware provider, upon receipt of a valid product token, and a unique hardware ID generated by the unit on which VCAsys is to be activated.

The activation process is outlined as illustrated:



Applying an Activation Code to a Unit

Once an activation code has been received from your hardware supplier, it's simply a case of entering the code on the appropriate web page. Select the VCA menu and then the Activation sub menu:



Enter the activation code and click "Apply". If the activation code is valid, the activated features will be displayed in the "Installed Licenses" box.

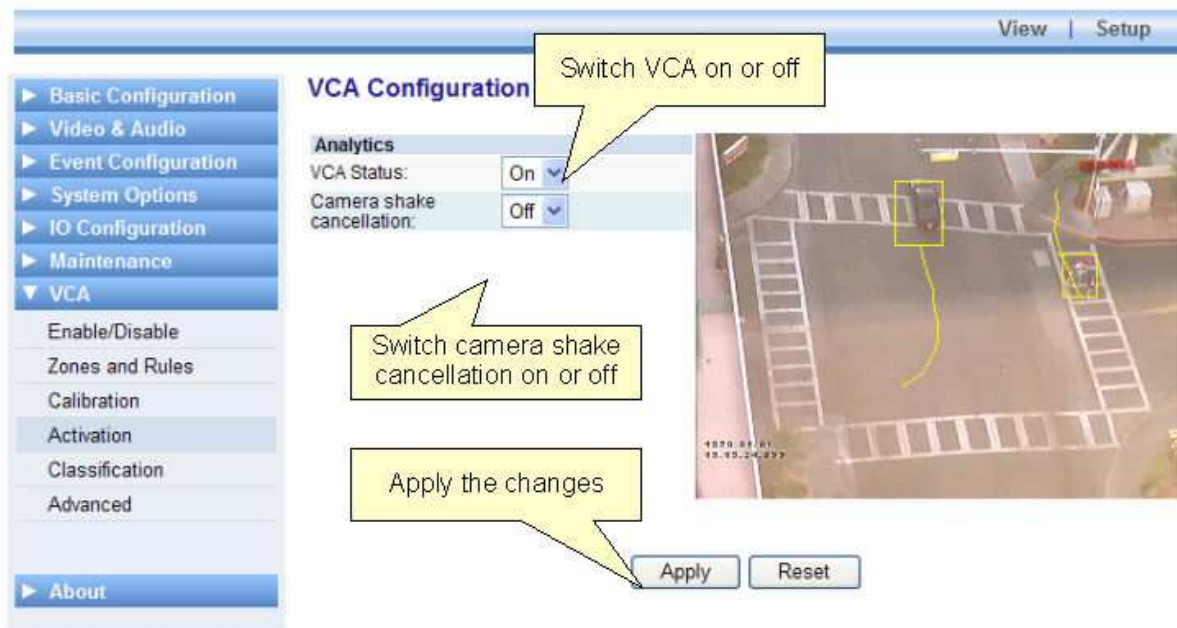
Enabling VCA

Switching VCA On and Off

By default, VCA is disabled. In order to enable VCA it must be switched on. Select the VCA menu and then the Enable/Disable sub menu.

Camera Shake Cancellation

The camera shake cancellation function is used to improve the VCA performance with shaking cameras. By default the camera shake cancellation is disabled. If your installation suffers from camera shake problems, enable this function to improve the VCA performance. If camera shake is not an issue in your installation, best performance will be achieved with this setting disabled.



Enabling Metadata Streaming

In order to visualize the VCA output, metadata streaming must be enabled for RTP. Select System Options and then the RTSP/RTP sub menu:

View | Setup

- ▶ Basic Configuration
- ▶ Video & Audio
- ▶ Event Configuration
- ▼ System Options
 - TCP/IP
 - NTP
 - UPnP
 - USB/SD Storage
 - USB Wireless LAN
 - RTSP/RTP
 - mDNS
 - SMTP(email)
 - AVI File Recorder
 - LED
- ▶ IO Configuration
- ▶ Maintenance
- ▶ VCA
- ▶ About

RTSP/RTP Setting

RTSP Configuration

- Enable RTSP Server
- Uri format:
- Port: (1 ~ 65535)

Select unicast configuration

MULTICASTUNICAST

Enable RTP Session

RTP Configuration - first stream

- IP address: (You can do filling 0.0.0.0 if you want to auto config.)
- Port: (1 ~ 65535)
- TTL: (1 ~ 255 count) (1:limit to subnet, 255:unlimited)
- Packet Size:
- Session name:
- Session information:
- Session description:
- Include audio stream
- Include meta stream

Enable meta stream

RTP Configuration - second stream

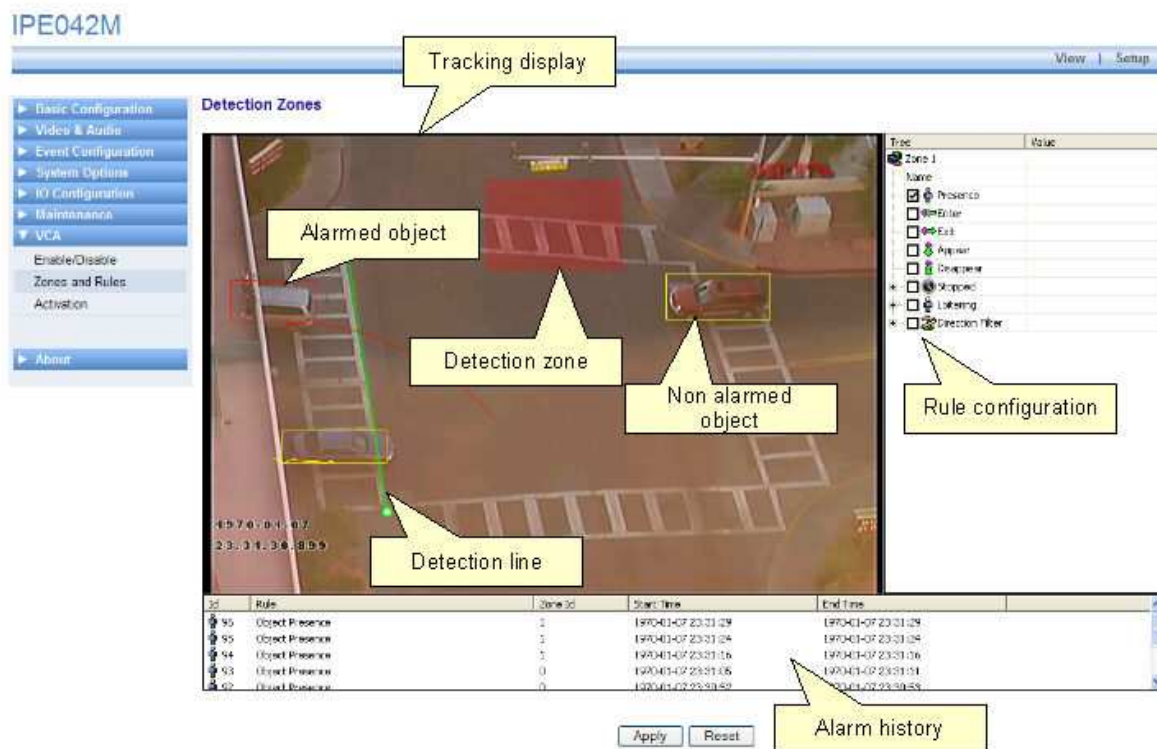
- IP address: (You can do filling 0.0.0.0 if you want to auto config.)
- Port: (1 ~ 65535)
- TTL: (1 ~ 255 count) (1:limit to subnet, 255:unlimited)
- Packet Size:
- Session name:
- Session information:
- Session description:
- Include audio stream
- Include meta stream

Apply the changes

Configuration of Zones and Rules

Configuration of Zones and Rules

In order to create some useful output, it is necessary to configure detection zones and detection rules. The detection zones and rules are configured by selecting VCA and then the Zones and Rules sub menu:



Tracking Display

The [tracking display](#) window shows all moving and stationary targets that are currently being tracked by the engine. Objects that have triggered a rule are displayed in red. Conversely, objects that have not triggered a rule are displayed in yellow.

This snapshot shows a detection zone, in red and a detection line, in green.

The [tracking display](#) window is useful for prediction how the rules will operate. By examining how the trails of the objects intersect the detection zones and lines, it is possible to determine how the rule can be optimally configured.

Rule Configuration

The rule configuration control allows the user to assign detection rules to detection zones and detection lines. Available rules will depend on the features available, and may include the following:

- [Object presence](#)
- [Object entered](#)
- [Object exited](#)
- [Object appeared](#)

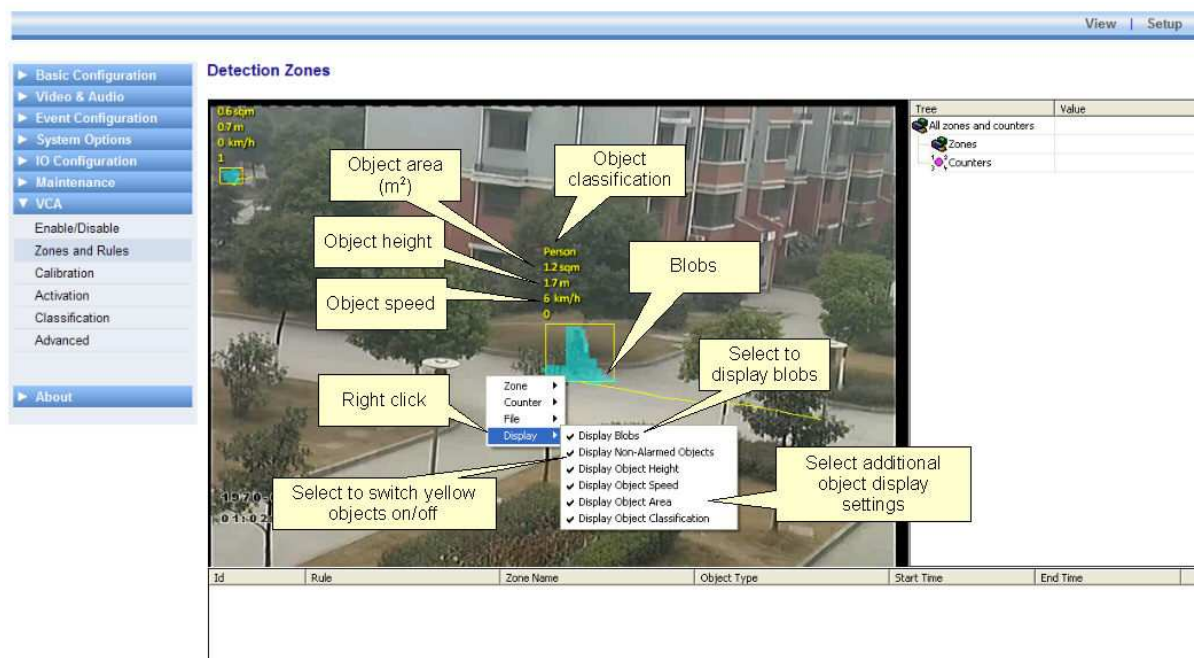
- [Object disappeared](#)
- [Object stopped](#)
- [Object loitering](#)
- [Object direction](#)
- [Object speed](#)

Alarm History

The alarm history control shows the history of objects that have triggered rules and generated alarms.

Customizing the Tracking Display

The tracking display window can be customized to show various levels of tracking data. Simply right click on the tracking display window and select the Display option:



Display Blobs

By default, the blobs are not displayed. It's possible to switch the blob display on in order to observe how the algorithm performs in different scenarios. Blobs are displayed in turquoise, as illustrated in the figure.

Display Non-alarmed Objects

By default, all objects are displayed: alarmed objects in red; and non-alarmed objects in yellow. The display of non-alarmed objects and their trails helps optimally configure the rules by allowing the user to see how the detection zones and object trails intersect. Uncheck this item to switch the display of non-alarmed objects off.

Display Object Height

Check this option to display the object height. This option is only available when the camera has been calibrated.

Display Object Speed

Check this option to display the object speed. This option is only available when the camera has been calibrated.

Display Object Area

Check this option to display the object area. This option is only available when the camera has been calibrated.

Display Object Classification

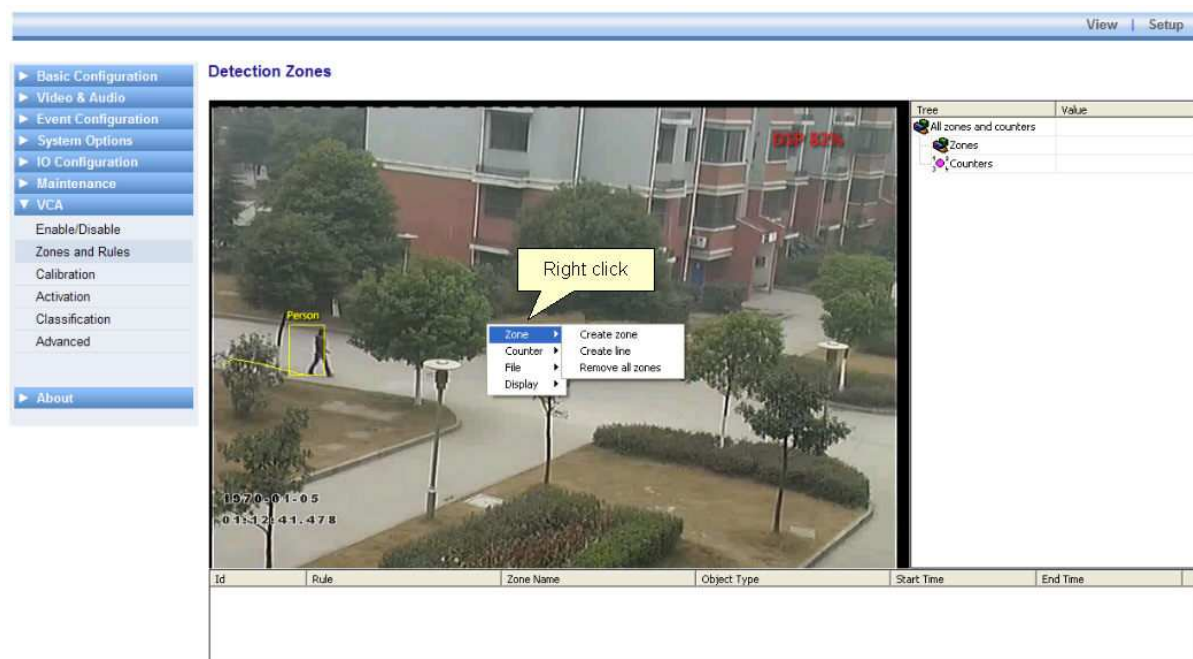
Check this option to display the object classification. This option is only available when the camera has been calibrated.

Creating Detection Zones and Lines

In order to detect events of interest, detection zones and lines must be defined. Detection zones define an area of interest. Detection lines are similar to detection zones but they define a perimeter instead of a region.

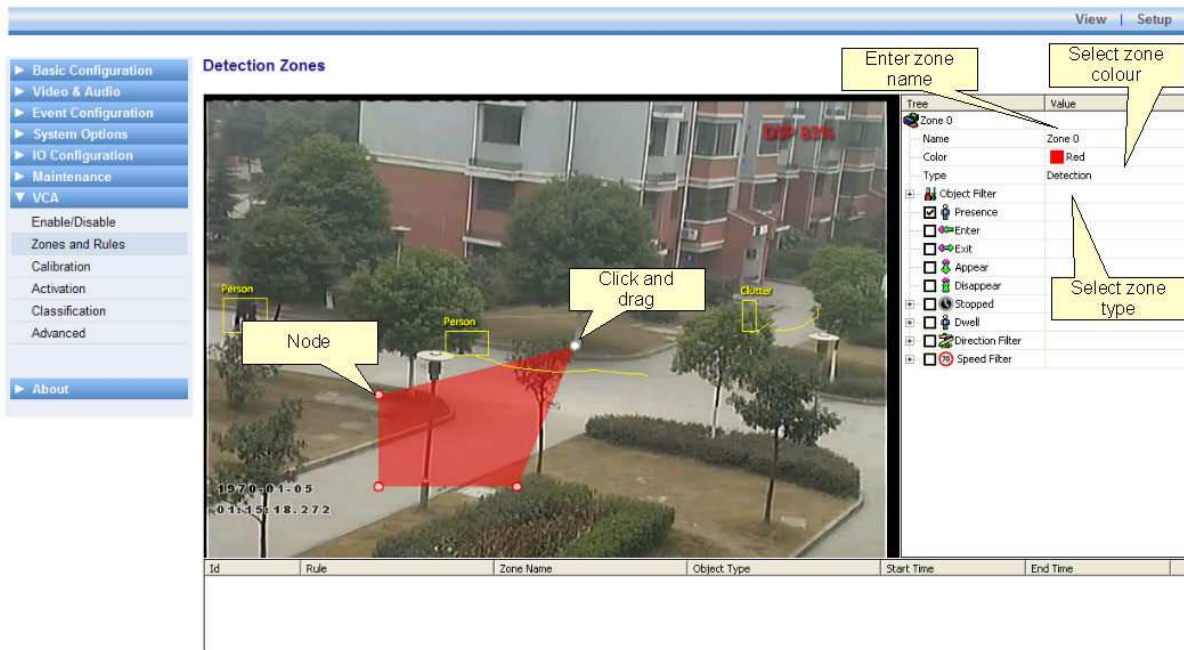
Creating a Zone or Line

To create a zone or a line, either double click the left mouse button or right click and select Zone... Create zone/Create line:



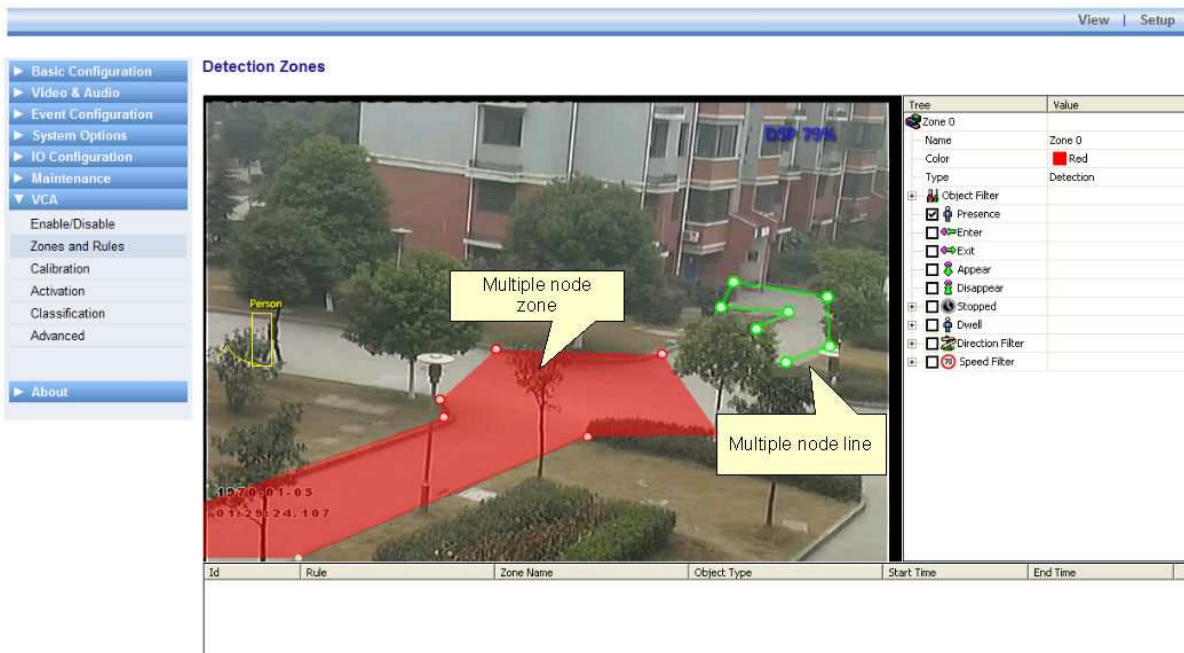
Editing Zones and Lines

Zones and lines can be edited to be any shape or size. Zones and lines are controlled by manipulating "nodes" that represent the zone/line vertices. To change the shape of a zone or line, simply grab a node with the left mouse button and drag it to the desired location:



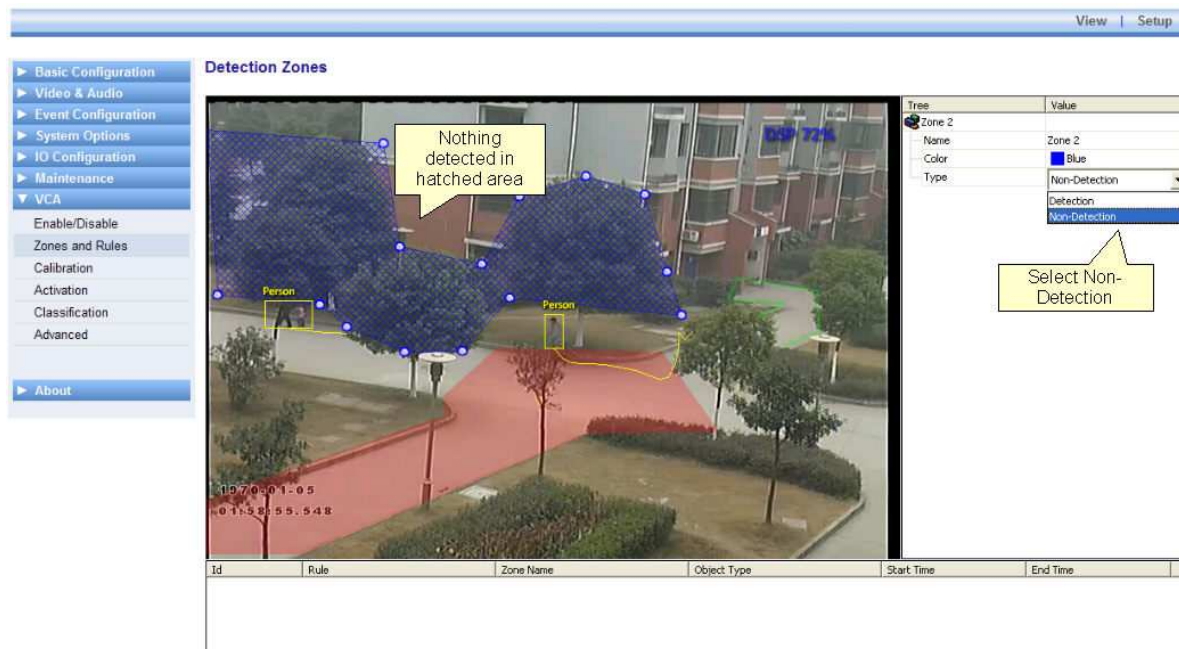
Adding and Removing Nodes

Zones and lines can be tailored to any scenario by simply adding more nodes to define the shape required. To add a node, simply double click on the zone or line at the point where the new node should be added. Nodes can be deleted by right clicking on the node and selecting Node... Remove node:



Non Detection Zones

In some situations, especially where the scene is busy, objects tracked in some areas can interfere with detection zones in other areas. For example, on a windy day, moving foliage can generate false alarms that in some situations could be tracked through a detection zone. In order to minimize such issues, it is possible to configure "non-detection" zones, where nothing is detected or tracked.

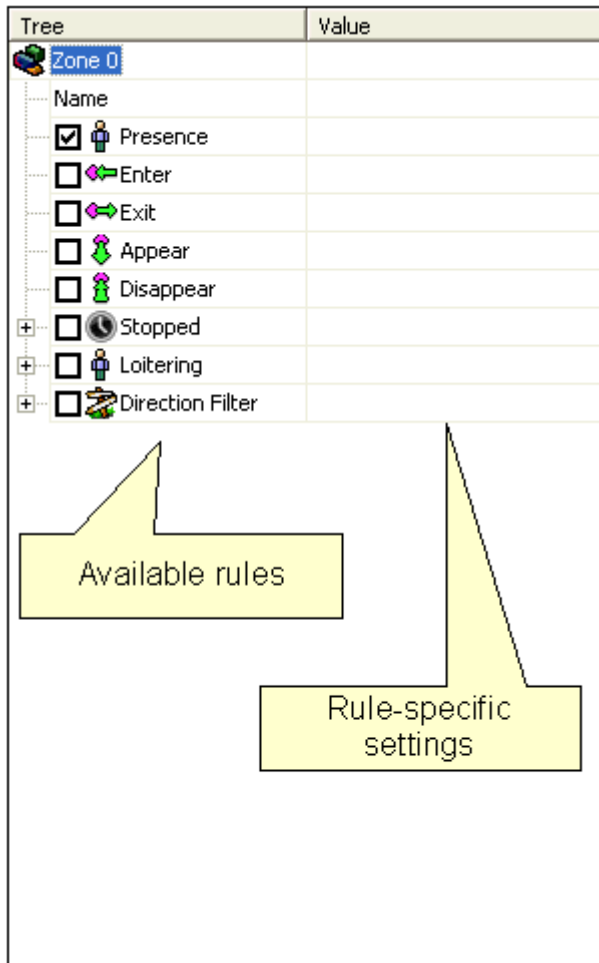


Detection Rules

Detection Rules

Once some detection zones and/or lines have been configured, it's possible to define some detection rules that apply to the zones/lines. By default, zones and lines are automatically configured to detect object presence.

The rules are defined in the Rule Configuration control:



The rule configuration control is context-sensitive to the zone selected. As different zones/lines are selected, so the rule control changes to reflect the rules currently configured on that zone. Defining a rule is a simple matter of checking the box next to the rule required. In all cases, the rules are configured with sensible default values. Of course, these can be customized to suit the detection scenario. The selection of multiple rules on a detection zone is supported.

Object Presence

Enable the object presence rule on the selected zone by checking the Presence box in the alarm rule control.

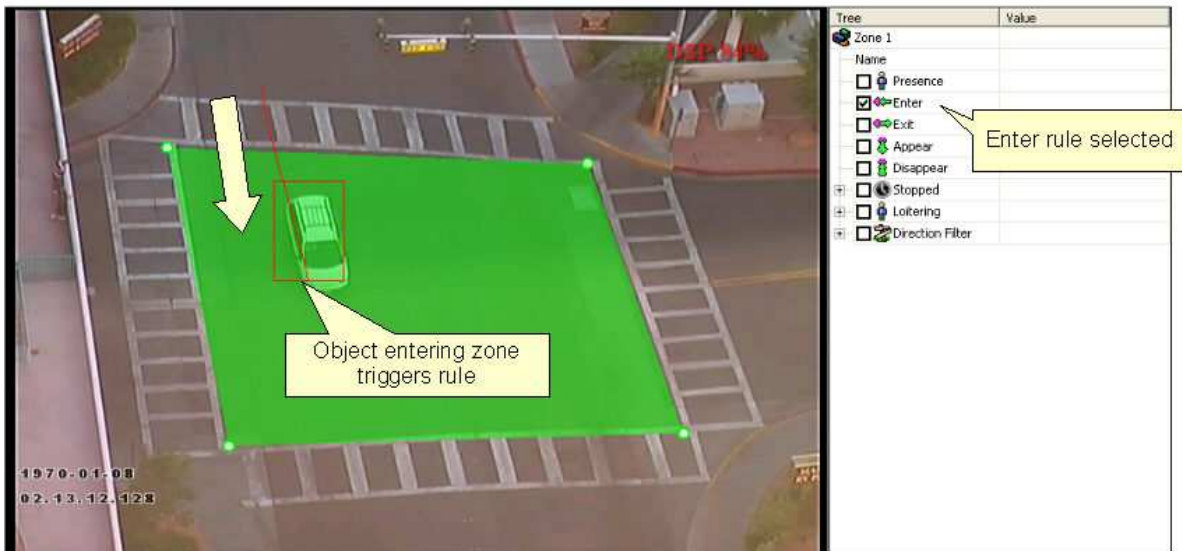
Objects that are present inside a zone or pass through a line will trigger the rule and raise an alarm.



Object Enter and Exit

Enable the object enter and exit detection by checking the corresponding check boxes in the alarm rule control.

An object entered alarm is raised when an object crosses from the outside to the inside of a detection zone or line. Conversely, an object exited alarm is raised when an object crosses from the inside to the outside of a detection zone or line:





Object Appear and Disappear

Enable the object appear and disappear detection by checking the corresponding check boxes in the alarm rule control.

An object appear alarm is raised when an object appears inside a detection zone. Note that this is different from object entered detection since the object must be initially detected inside the zone, e.g. people appearing in a doorway, or cars appearing from an underground carpark.

Conversely an object disappear alarm is raised when an object disappears inside a detection zone. Again, this is different from object exit detection since the object must be tracked into the zone and then disappear without exiting the zone.

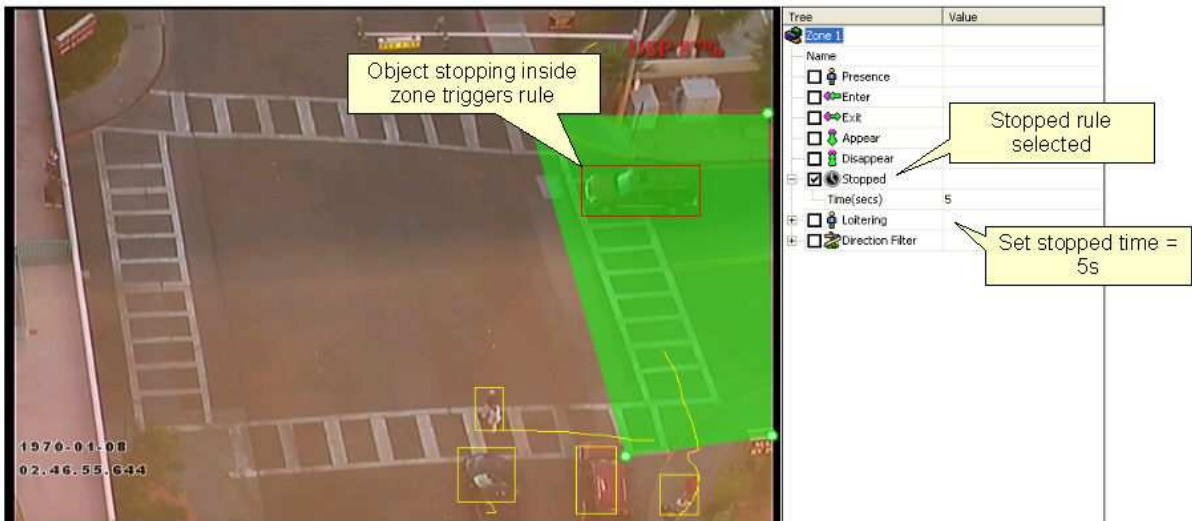




Object Stopped

Enable the object stopped rule on the selected zone by checking the Stopped box in the alarm rule control.

Objects that are stopped inside a zone for longer than the defined amount of time will trigger the rule and raise an alarm.



The stopped time can be configured by simply clicking in the Time box on the rule control and editing the value in-place.

Object Loitering

Enable the object loitering rule on the selected zone by checking the Loitering box in the alarm rule control.

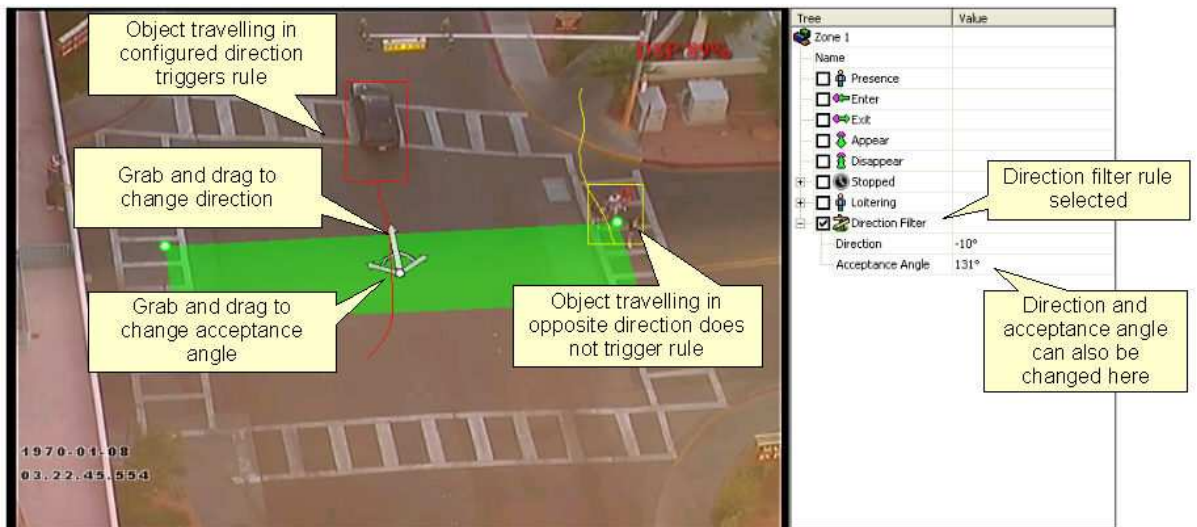
Objects that dwell inside a zone for longer than the defined amount of time will trigger the rule and raise an alarm.



Object Direction

Enable the object direction rule on the selected zone by checking the Direction Filter box in the alarm rule control. Adjust the direction and acceptance angle to suit the detection scenario.

Objects that travel in the configured direction (within the limits of the acceptance angle) through a zone or over a line trigger the rule and raise an alarm.

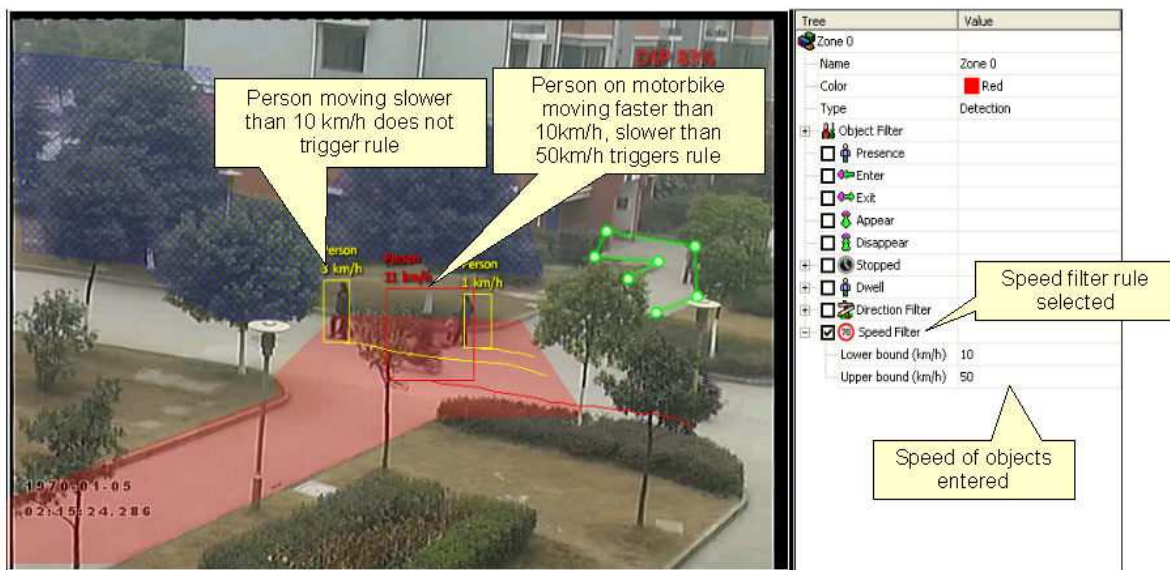


Object Speed

Enable the object speed rule on the selected zone by checking the Speed Filter box in the alarm rule control. Adjust the lower and upper speed limits to suit the detection scenario.

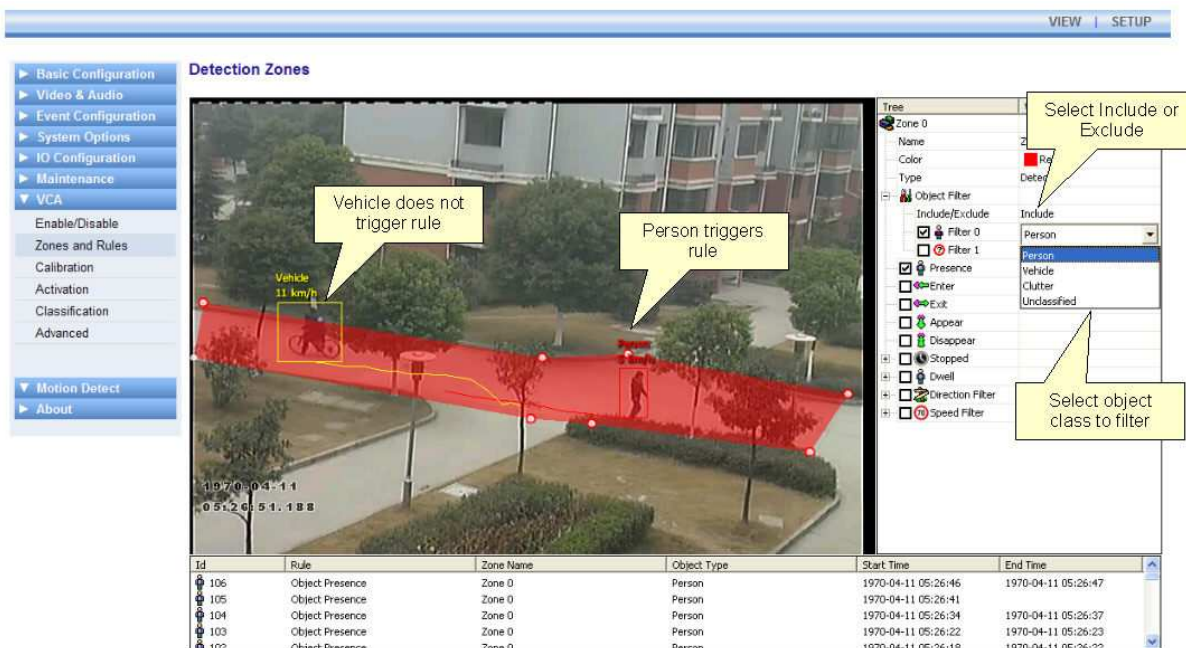
Objects that travel within the bounds of the configured speeds, through a zone or over a line trigger the rule and raise an alarm.

Note that the camera must be calibrated for this function to be available.



Object Class

Once the camera has been calibrated, it's possible to include or exclude specific object types in the detection rules.



Select and enable an Object Filter by checking the box. Select whether the rule should include or exclude the object type. Select the object type to include or exclude.

Apply the changes.

In this example, the rule has been configured to include detection of people only. As illustrated, the person generates an alarm, but the vehicle is filtered out and does not.

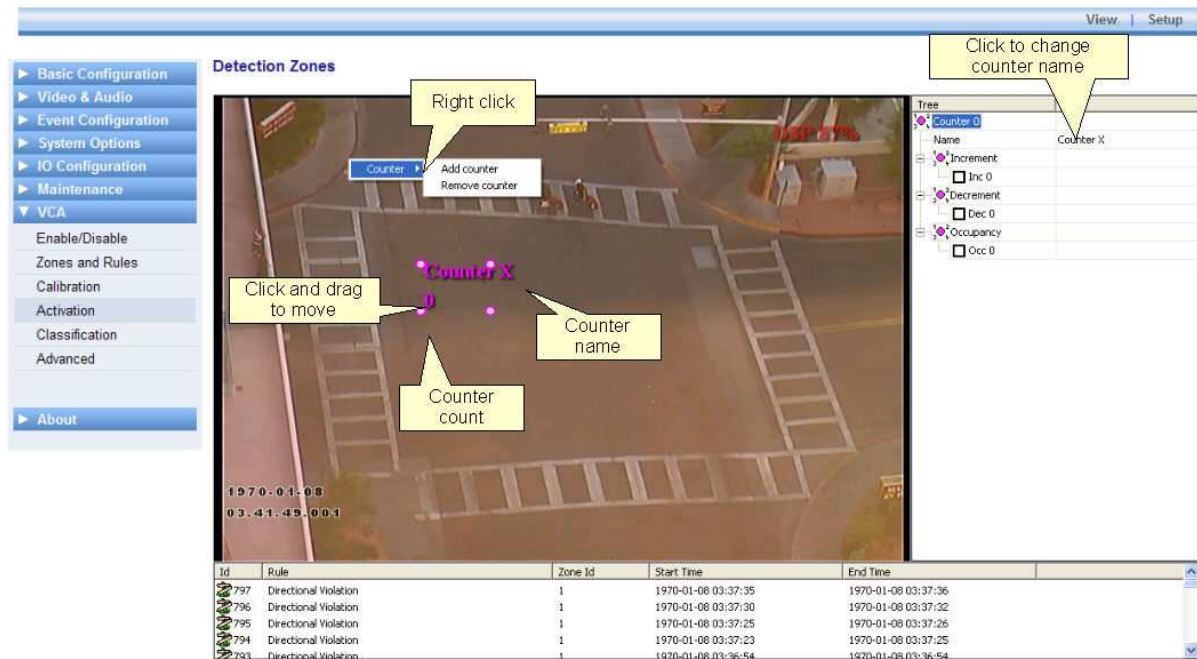
Counters

Counters

VCAsys also supports object counting. Any combination of detection zones or lines can be assigned to a counter. Counters can be configured to perform any combination of incremental, decremental or occupancy counting. Counter configuration is managed through the rule control in a similar way to the zone configuration.

Creating Counters

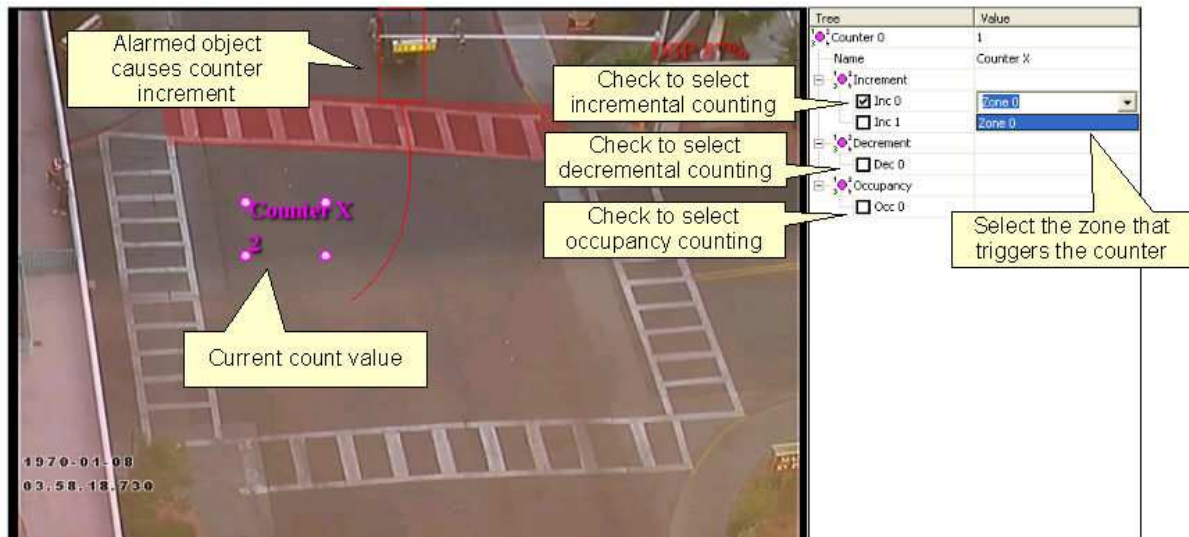
To create a counter simply click the right mouse button and select Counters... Add Counter.



The counter name can be changed by clicking in the Name box on the rules control.

Assigning Rules to Counters

Counters count triggers generated by rule violations. For example, if it is required to count the number of objects entering a zone, a zone must initially be configured to raise an alarm every time an object enters it. The zone can then be assigned to a counter and the counter will count the objects according to the type of counting required (increment, decrement, occupancy).



In this example the red zone is configured to trigger when object travelling in the north direction are detected. The counter has been configured to increment the count whenever the zone (Zone 0) is triggered. Currently two objects have been counted.

Incremental Counters

When a zone is assigned to an incremental counter, the count will increment by 1 every time the zone is triggered.

Decremental Counters

When a zone is assigned to a decremental counter, the count will decrement by 1 every time the zone is triggered.

Occupancy Counters

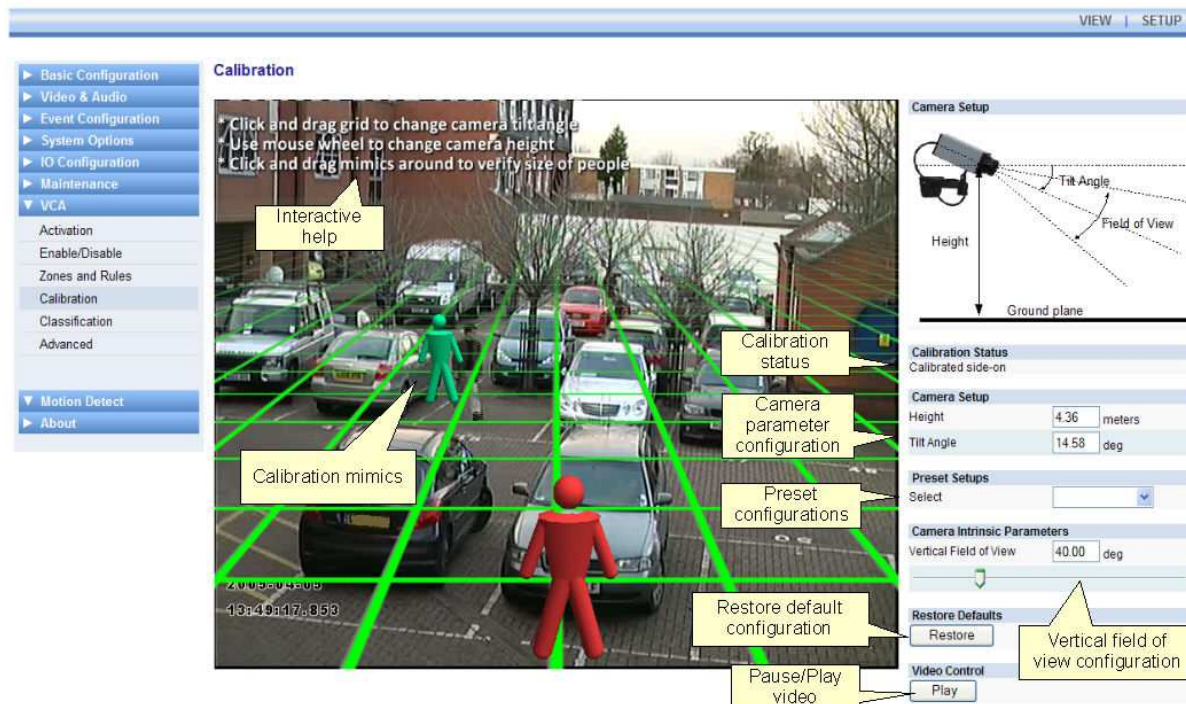
When a zone is assigned to an occupancy counter, the counter displays the number of active triggers in the zone. E.g. if there are 2 objects in the zone that triggered the detection rule, then the count will display 2.

Camera Calibration

Camera Calibration

In order to estimate object parameters such as height, speed, area and classification, the camera must first be calibrated. Camera calibration involves establishing a reference to the ground plane in the scene.

To calibrate the camera for the scene, select the Calibration setup page:



Calibration Page Elements

The following describes the purpose of each element of the calibration page. To get started calibrating straight away, see the [Calibrating a Camera](#) topic.

Calibration Mimics

The calibration mimics are used for verifying the size of a person in the scene. Place one in the foreground and one in the background and adjust the camera height and tilt angle until both mimics are the same size as a real person at that position in the scene. Click and drag the ground plane to change the tilt angle and use the mouse wheel to adjust the camera height.

Verify the tilt angle and camera height are correct by dragging the mimics around the scene and making comparisons with real people or people sized objects at as many places as possible.

Calibration Status

Reports the status of the camera calibration. Check this area after applying a new camera calibration for errors or warnings.

Camera Setup

Shows/sets the camera height and tilt angle (see picture in the top right hand corner of the web page).

Preset Configurations

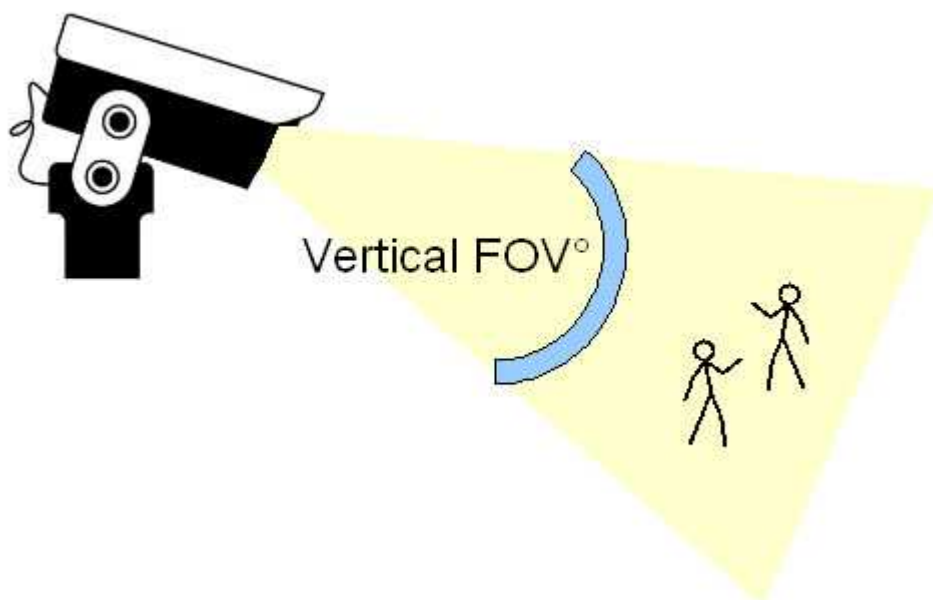
A selection of preset configurations are supplied for common calibration scenarios. These are:

- Overhead. The camera is mounted directly overhead. This preset may be suitable for overhead people-counting applications.
- 60° Lookdown. The camera is mounted with a look-down angle of 60°.
- 30° Lookdown. The camera is mounted with a look-down angle of 30°.

Camera Intrinsic Parameters

In order to calibrate a given camera for a particular scene, information about the camera must be supplied.

The vertical field of view of the camera can be adjusted by changing this setting. The vertical field of view is illustrated below:



If you don't know the vertical field of view for your camera, you can look it up in the [Vertical Field of View Table](#).

Restore Defaults

It is possible to re-center the mimics and reset the ground plane to a default position by clicking this button. This can be useful if the current calibration parameters are inappropriate for the intended application.

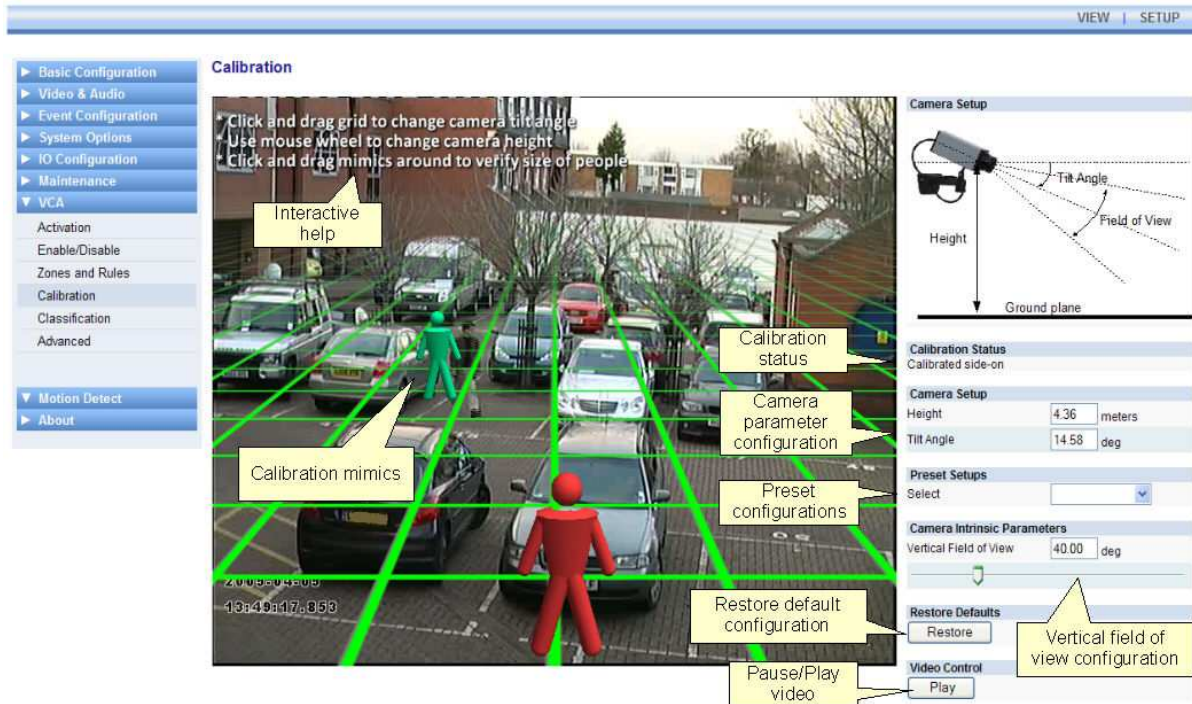
Video Control

This button can be used to pause/play the video. This can be useful when trying to line a mimic up with an object in the scene.

Camera Calibration

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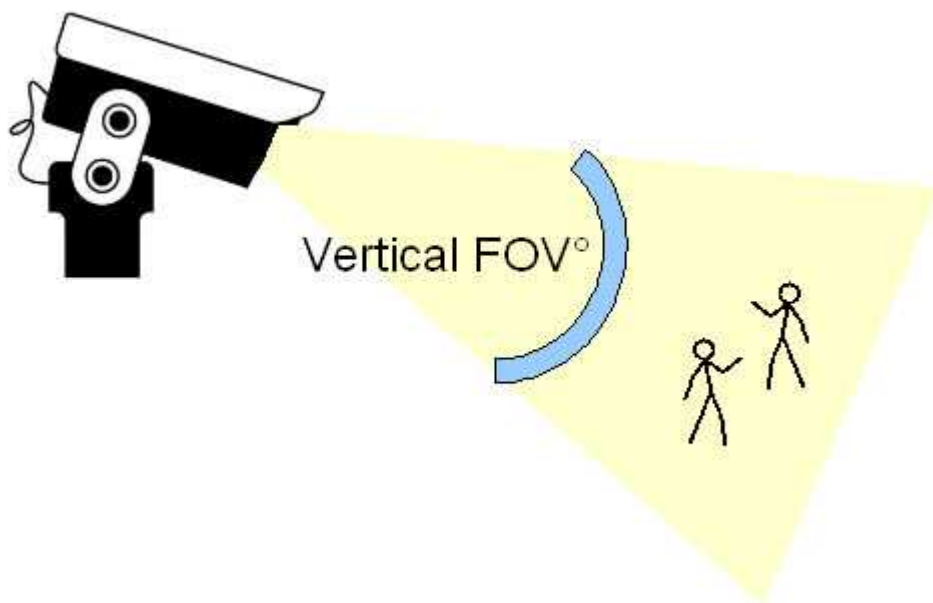
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Video Control

This button can be used to pause/play the video. This can be useful when trying to line a mimic up with an object in the scene.

Calibrating a Camera

Calibrating a camera is necessary in order to estimate object parameters such as height, area, speed and classification. If you know the height, tilt angle and vertical field of view corresponding to your installation, you can simply type the parameters in the appropriate boxes and apply the changes.

If however, you do not know, or are unable to find out the camera parameters, this topic provides a step-by-step guide to calibrating a camera.

Step 1: Find some people in the scene

Find some people, or some people-sized objects in the scene. Try to find a person near the camera, and a person further away from the camera. Place the mimics on top of or near the people.

The screenshot displays a web-based camera calibration interface. On the left is a sidebar menu with options like 'Basic Configuration', 'Video & Audio', and 'Calibration'. The main area shows a live video feed of a street with a green grid overlay. Two red human figures (mimics) are placed on the grid. Text boxes provide instructions: 'Click and drag grid to change camera tilt angle', 'Use mouse wheel to change camera height', and 'Click and drag mimics around to verify size of people'. Two callout boxes say 'Put one mimic on top of this person...' and '... and another one on top of this person'. On the right, the 'Camera Setup' panel shows 'Height' set to 10.5 meters and 'Tilt Angle' set to 18.19 degrees. Below this is a 'Camera Intrinsic Parameters' section with 'Vertical Field of View' set to 40 degrees. At the bottom right, there is a 'Video Control' section with a 'Play' button.

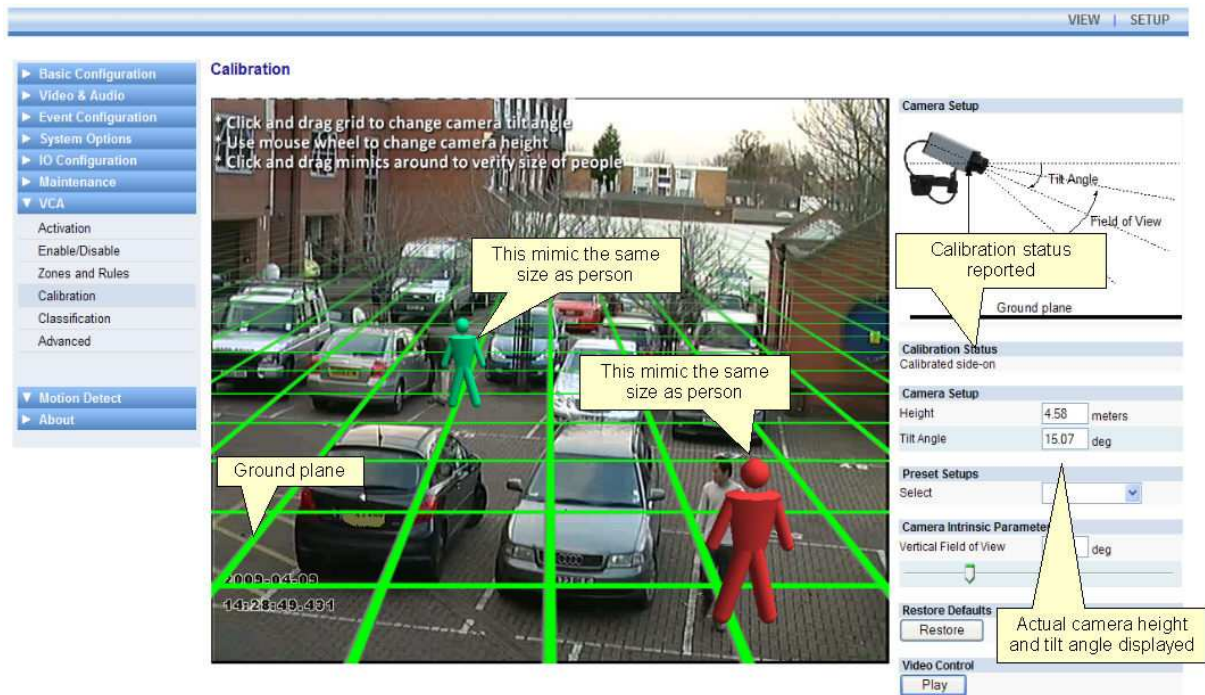
Step 2: Adjust tilt angle and camera height

Now, adjust the camera tilt angle and the camera height until the mimics are approximately the same size as the people in the scene.

To adjust the tilt angle, click and drag the ground plane with the left mouse button. To adjust the camera height, scroll the mouse wheel up and down. The actual tilt angle and camera height will be reflected in the edit boxes in the Camera Setup section of the web page.

It is useful to use the Video Control button to pause the video so the mimics can be accurately placed.

Apply the changes:



Once the changes have been applied, the Calibration Status reflects whether the operation was successful, and if so, in which mode the camera is calibrated.

Step 3: Verify the setup

Once you are happy that the scene is correctly calibrated, verify the settings by dragging the mimics around and comparing them to other people or people-sized objects in the scene. The more locations in the scene where the calibration is verified, the more accurate the calibration will be.

The tilt angle and camera height can be fine-tuned in the same way as detailed in Step 2.

Once the settings have been successfully applied, objects in the scene are annotated with height, area, speed and classification:

Tip: If it all goes wrong

If you find that the mimics get lost or disappear due to an odd calibration configuration, the process can be restarted by clicking the "Restore" button.

Vertical Field of View

The vertical field of view is required when calibrating a camera. If you know the vertical field of view of the camera it can be entered directly. If however, you don't know the vertical field of view, it can be determined from the following table, given the camera sensor size and its focal length:

CC Size (in)	CCD Height(mm)	Focal Length(mm)															
		1	2	3	4	5	6	7	8	9	10	15	20	30	40	50	
1/6"	1.73	81.72	46.78	32.17	24.40	19.63	16.41	14.09	12.34	10.98	9.89	6.60					
1/4"	2.40	100.39	61.93	43.60	33.40	26.99	22.62	19.46	17.06	15.19	13.84	9.15	6.87				
1/3.6"	3.00	112.62	73.74	53.13	41.11	33.40	28.07	24.19	21.24	18.92	12.37	11.42	8.58	5.72			
1/3.2"	3.42	119.30	80.99	59.31	46.24	37.72	31.78	27.42	24.10	21.49	15.72	12.99	9.76	6.52			
1/3"	3.60	121.89	83.97	61.93	48.46	39.60	33.40	28.84	25.36	22.62	20.41	13.69	10.29	6.87	5.15		
1/2.7"	3.96	126.41	89.42	66.85	52.67	43.21	36.53	31.59	27.80	24.81	22.40	15.04	11.31	7.55	5.67		
1/2"	4.80	134.76	100.39	77.32	61.93	51.28	43.60	37.85	33.40	29.86	26.99	18.18	13.69	9.15	6.87	5.50	
1/1.8"	5.32	138.79	106.11	83.11	67.24	56.02	47.81	41.61	36.78	32.92	29.79	20.11	15.15	10.13	7.61	6.09	
2/3"	6.60		117.56	95.45	79.05	66.85	57.62	50.48	44.83	40.27	36.53	24.81	18.74	12.55	9.43	7.55	
1"	9.60		134.76	115.99	100.39	87.66	77.32	68.88	61.93	56.14	51.28	35.49	26.99	18.18	13.69	10.97	
4/3"	13.50			132.08	118.70	106.94	96.73	87.92	80.31	73.74	68.04	48.46	37.30	25.36	19.16	15.38	

If you are unable to determine the vertical field of view for your camera from the above table, leave the field of view at its default setting, 40°.

Object Classification

Object Classification

VCAsys can perform object classification once the camera has been calibrated. The object classification is based on properties extracted from the object including object area and speed. VCAsys comes pre-loaded with the most common object classes, and in most cases these will not need to be modified.

In some situations it might be desirable to change the classification parameters, or add new object classes.

To adjust the object class settings, select the Classification page and the object class to modify:

View | Setup

Basic Configuration
Video & Audio
Event Configuration
System Options
IO Configuration
Maintenance
VCA
Enable/Disable
Zones and Rules
Calibration
Activation
Classification
Advanced
About

VCA Object Classification

Object Classifier List

Choose an object classifier

Id	Name
0	Person
1	Vehicle
2	Clutter

Detailed object classifier information

Name: Person
Enable: Yes
Min Area (m²): 0.5
Max Area (m²): 2
Min Speed (km/h): 0
Max Speed (km/h): 20

Add New Object Classifier Remove Object Classifier
Apply Reset

Select object class

Adjust object class parameters

Adjust the minimum and maximum object speed and area, and apply the changes.

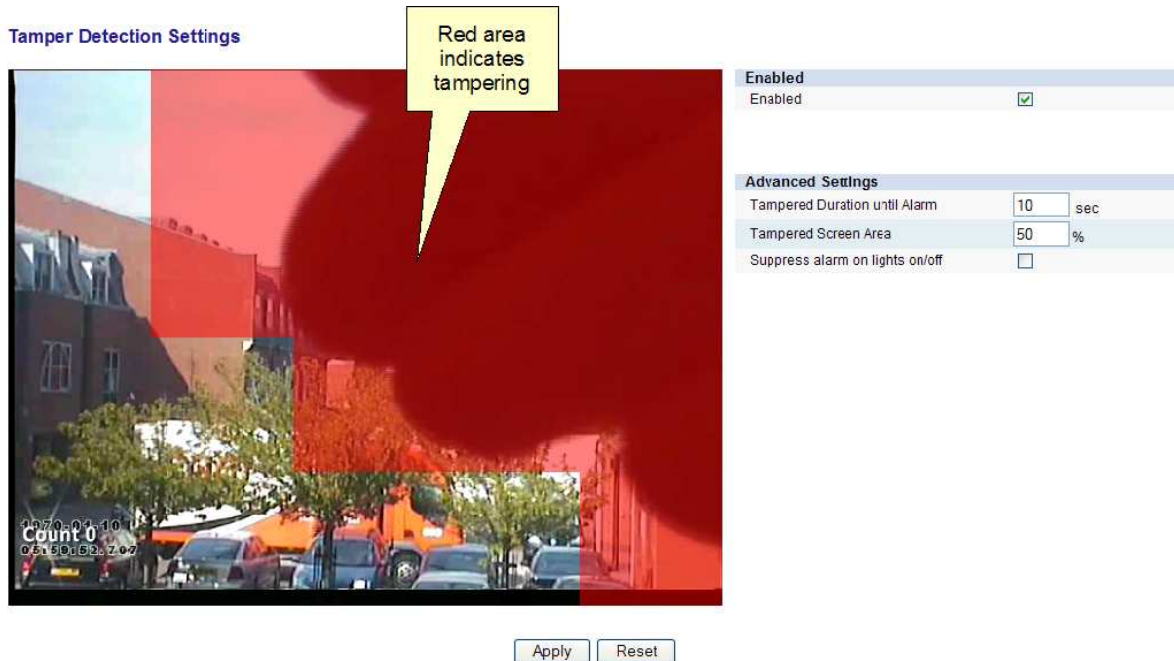
Objects that do not fit into any class are labelled as "Unclassified".

Tamper Detection

Tamper Detection

The Tamper Detection module is intended to detect camera tampering events such as bagging, de-focusing, moving the camera, etc. It does this by detecting large persistent changes in the image.

Tamper Detection Settings



Enabled	
Enabled	<input checked="" type="checkbox"/>

Advanced Settings	
Tampered Duration until Alarm	10 sec
Tampered Screen Area	50 %
Suppress alarm on lights on/off	<input type="checkbox"/>

Apply Reset

On the image display one can see the output of the tamper detection algorithm as red blocks on the image. The red area is where the algorithm has detected that the image has changed from its reference image. Once enough of the image has changed and remained so for a certain length of time, a tamper alarm is triggered.

Note: In order to see the output of the tamper detection on the image you must first enable the Tamper Debug metadata on the VCA -> Advanced page.

Tamper Debug

Advanced Settings

In the advance settings you can change the thresholds for the area of the image which must be changed and the length of time it must be changed for before the alarm is triggered.

- **Tampered Duration until Alarm:** The length of time that the image must be persistently changed before the alarm is triggered.
- **Tampered Screen Area:** Percentage area of the image which must be changed for tampering to be triggered.

If you are experiencing false alarms you should increase the duration and/or area so that large transient changes such as a close object temporarily obscuring the camera do not cause false alarms.

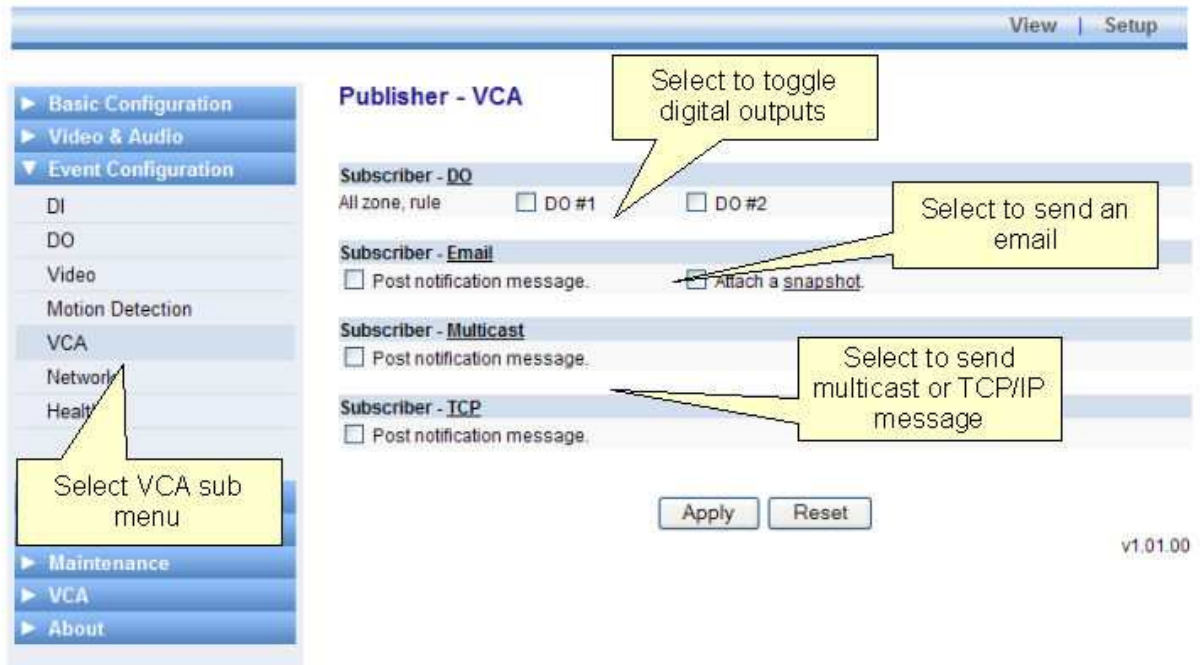
Suppress alarm on lights on/off:

Large fast changes to the image lighting such as switching on/off indoor lighting can cause false tamper alarms. Enable this option if this is likely to be a problem in the area where the camera is installed. However this option will reduce sensitivity to genuine alarms so it is not recommended if fast light changes are not likely to be a problem

Generating External Event Notifications

It is possible to assign the VCA alarms to trigger external events, e.g. a relay contact closure, a TCP/IP message, etc.

To access the event configuration select the Event Configuration menu and then the VCA sub menu:



The external event notification will be generated every time there is at least 1 VCA alarm active.