

# Smart Tracking Advanced

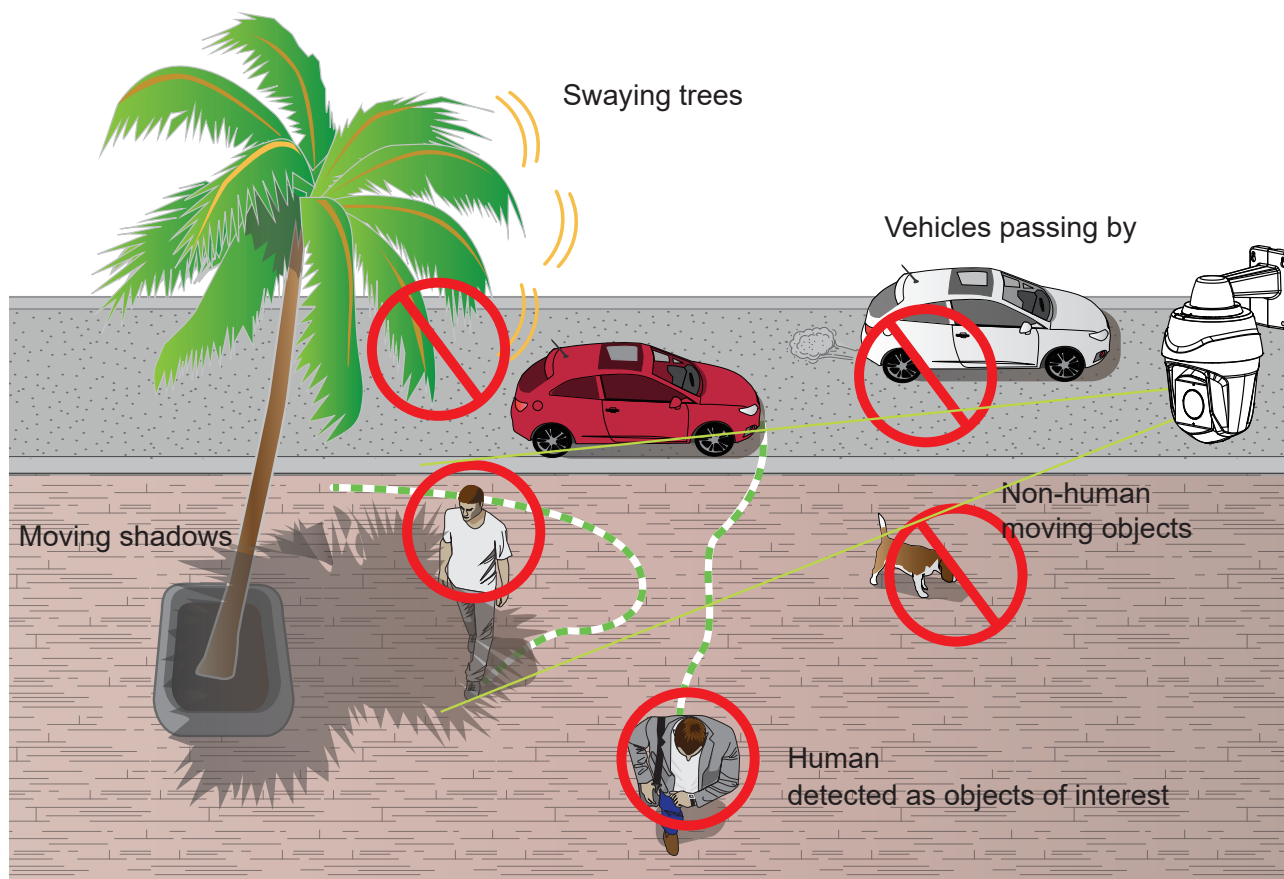
## User Guide

Traditional motion detection or tracking relies heavily on the detection of pixel changes or motion vectors, and false alarms can be triggered by swaying trees, clouds floating by, or even the appearance of little animals. The Smart Tracking feature, with the detection of human silhouettes, can eliminate the defects of traditional detection and facilitate the configuration at a surveillance site.

A key feature in the Smart Tracking is the People detection. Based on a human silhouette database and the rapid responses via an artificial neural network technology, the Smart engine instantly recognizes human appearances in a video surveillance area. Since people are the objects of interest in the majority of video surveillance, the People detection feature enables users to quickly configure his installation.

With People detection, light changes or swaying vegetation, vehicles passing by, or animal activities in the scene are not taken as event triggers. Only human activities will trigger an event. This helps reduce false alarms and the time and efforts for a camera configuration.

Smart Tracking automatically detects, zooms in, and keeps track of moving personnel. It relieves the efforts of discovering, tracking, and zooming from an operator. The feature is suitable for PTZ cameras installed at low-traffic areas such as parking lots, or the monitoring of facilities during the off-office hours.



## Revision History

- Rev. 1.0: Initial release



### IMPORTANT:

#### Requirements for Running the Smart Tracking Feature:

1. The embedded video tracking and counting analysis requires a monitoring session on Chrome browser.
2. Lens cleanliness is also required because dust spots or smears on dirty lens can produce miscalculation of pixels, correlation, and movements.
3. For other installation concerns, please refer to page 3, Considerations.
4. Avoid glass and reflective materials, such as aluminum foils, in the field of view. If unavoidable, you can use the Exclusive area settings to get rid of the side effects.
5. Make sure the camera is installed appropriately above the area of your interest, e.g., an entrance to building. Installation at an extremely busy area, e.g., a square or cross road section with dozens of passengers per minute, may not apply.
6. Due to the system load, do not open two configuration web consoles at the same time.



### NOTE:

1. The effectiveness of the Smart Tracking detection will diminish for objects lower than 130cm, such as children.
2. When using an HTTPS connection, you should stop and re-start the VCA after you upload a license.

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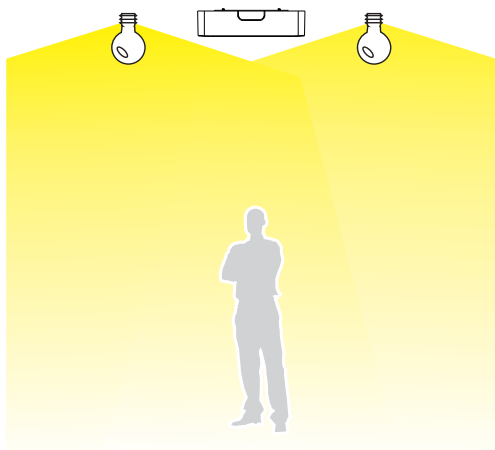
#### Applicable Cameras:

Please refer to VIVOTEK's VCA package and camera documentation on the website. This feature applies to Speed Dome PTZ cameras.

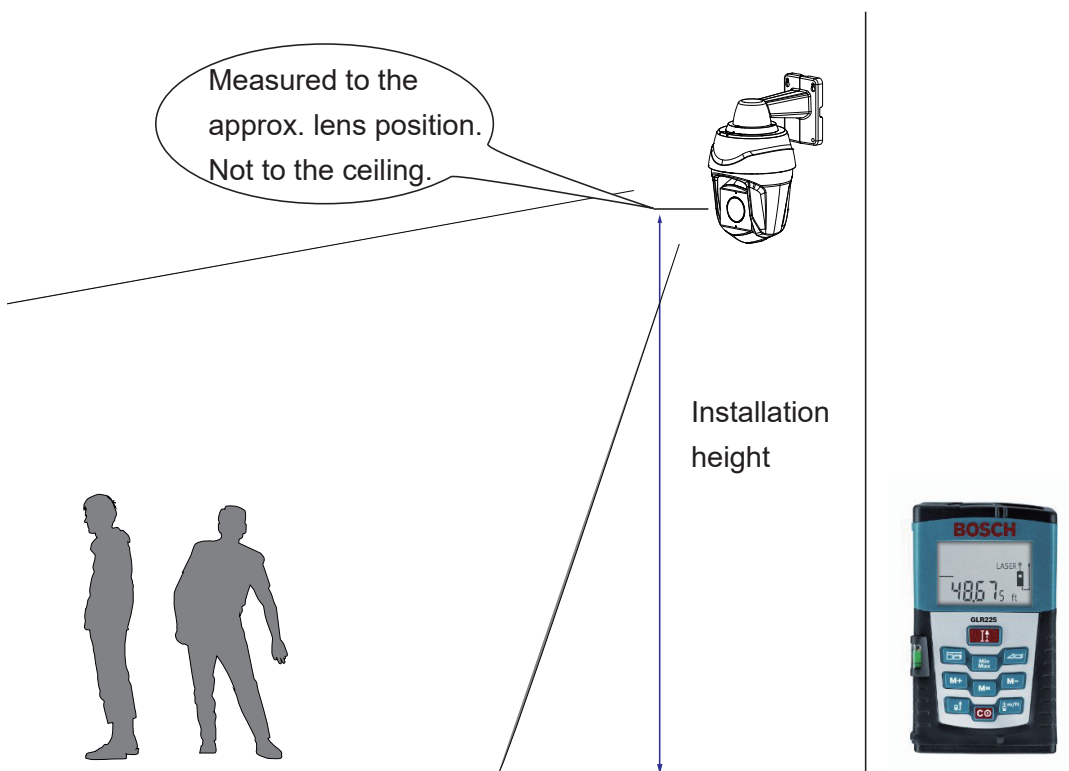
## Considerations

Note the following when planning the camera installation:

1. The installation site must be adequately lit for optimal accuracy with video detection.
2. In the night mode, configure a schedule profile for the different lighting condition. In the night mode, the Smart Tracking works if additional lighting is provided, e.g., using the on-board IR light.

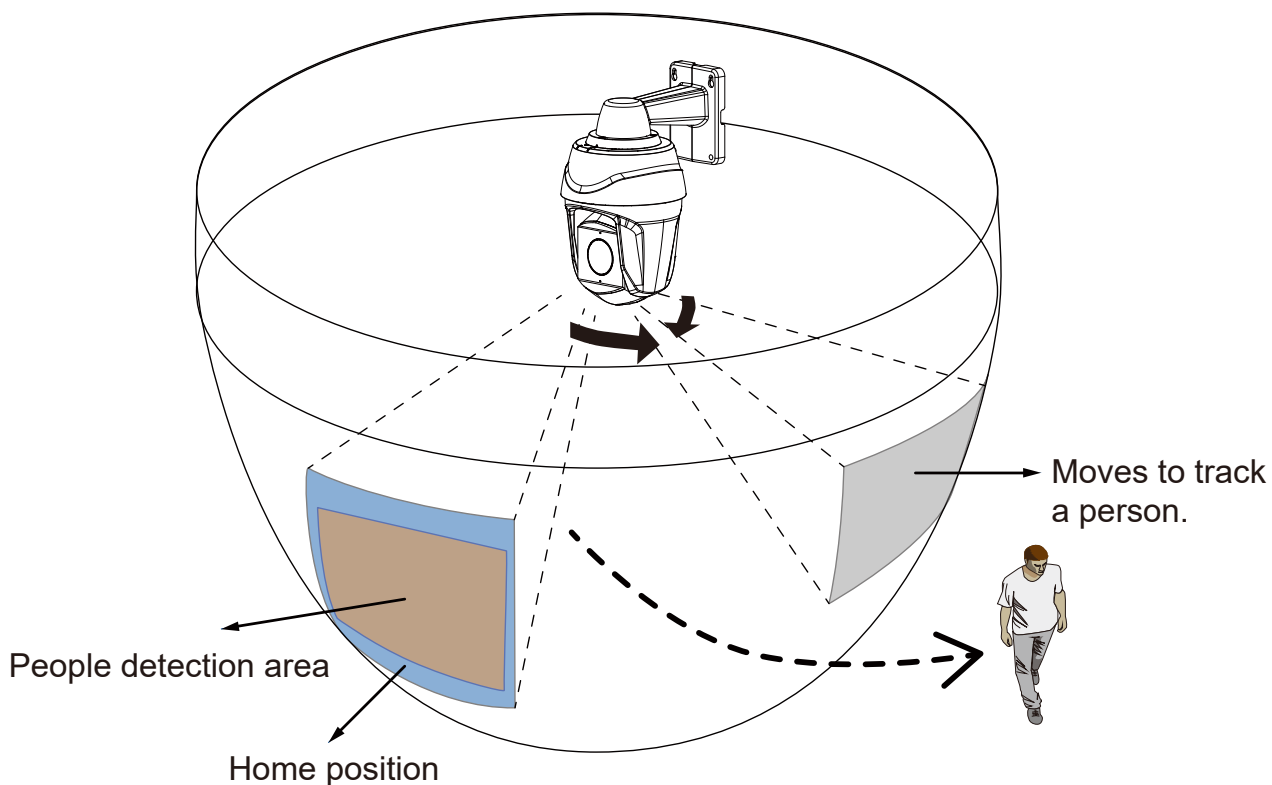


3. Make sure you measure the height of your camera. The height information is important for the accuracy of the video analytics results. Some of the other perspective information are automatically collected by the onboard S-sensor. The height information enables the horizontal and vertical keystone corrections of the field of view. Measure the distance between camera lens and the ground.



4. Below are some basic information for the Smart Tracking feature:

1. The detection takes place at the pre-configured Preset positions. Tracking can only take place during a patrol dwell time.
2. The PTZ camera then moves its lens to track the object found until the object moves away from the scene, or enters a shelter (e.g., getting into a car). The PTZ camera may lose the track when the field of view is blocked by a building. The camera then loses the track.
3. The camera zooms in on the object when it is detected.
4. A person can not be detected when he is squatted, crawling, or riding on a scooter or bicycle since his body silhouette is merged or destroyed.
5. Once the camera stops tracking an object, the FOV will return to the Home position.
6. The maximum tracking range is 200 meters in radius.

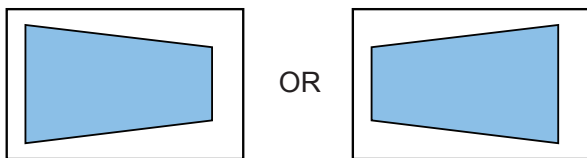




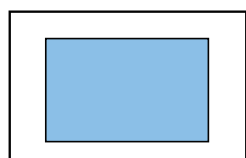
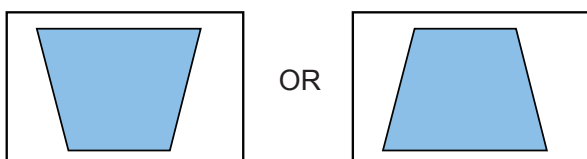
- Because the horizontal and vertical keystone corrections are performed for an accurate detection, the height and tilt information of the camera must be correctly configured.

Use a laser distance meter to measure the installation height. The height information **MUST BE** correctly measured and entered in the camera's configuration page.

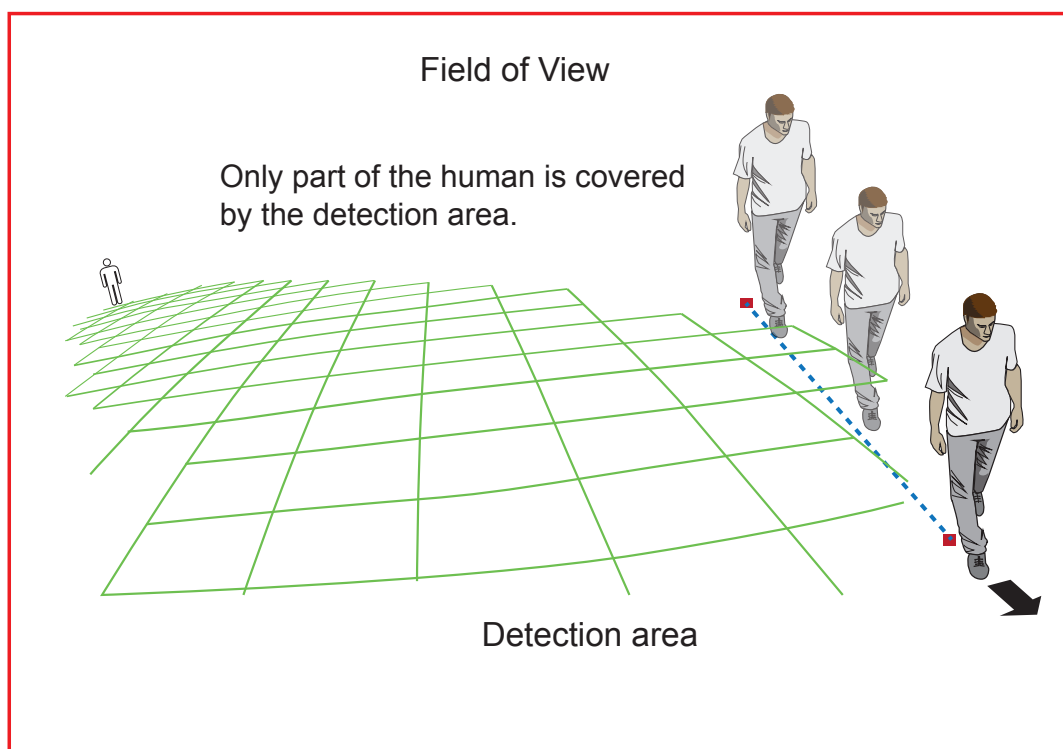
Horizontal keystone correction



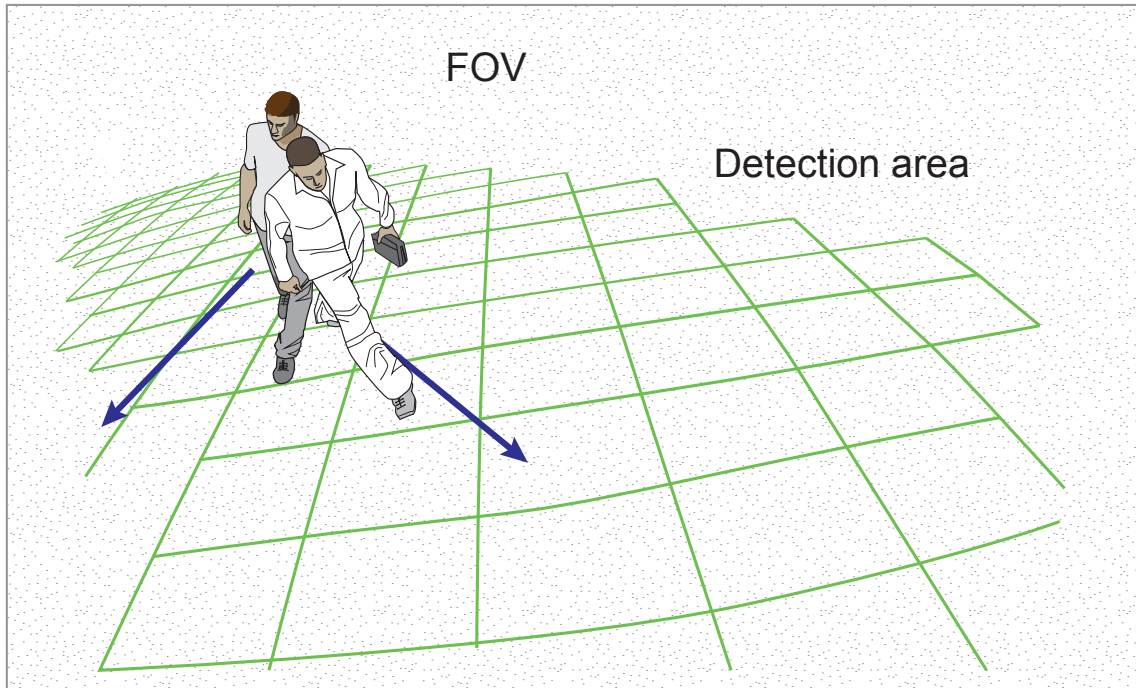
Vertical keystone correction



- For People detection, as long as a human silhouette is detected in the field of view, and his feet travelled through the People detection area, he can be detected. Due to the visual perspective of lens, sometimes the entire body may not be covered by the detection area.



- Due to the optic concave characteristics of a lens, men can be temporarily blocked behind other men. When a man's head-shoulder feature is concealed, he may not be detected for the short moment.



7. A man sitting, squatted, or men lying on the floor may not be detected as a human, because his silhouette has been destroyed. Detection may also be affected when a human form is changed, e.g., a man's body is hidden behind a counter, or a man showing only the upper half of his body by leaning on a desk.

## Configuration:


- Before configuring the Smart Tracking, go to **onfiguration > PTZ settings** to configure several PTZ preset positions of your interest. Move your PTZ camera lens to the areas of your interest and save them as PTZ Presets.

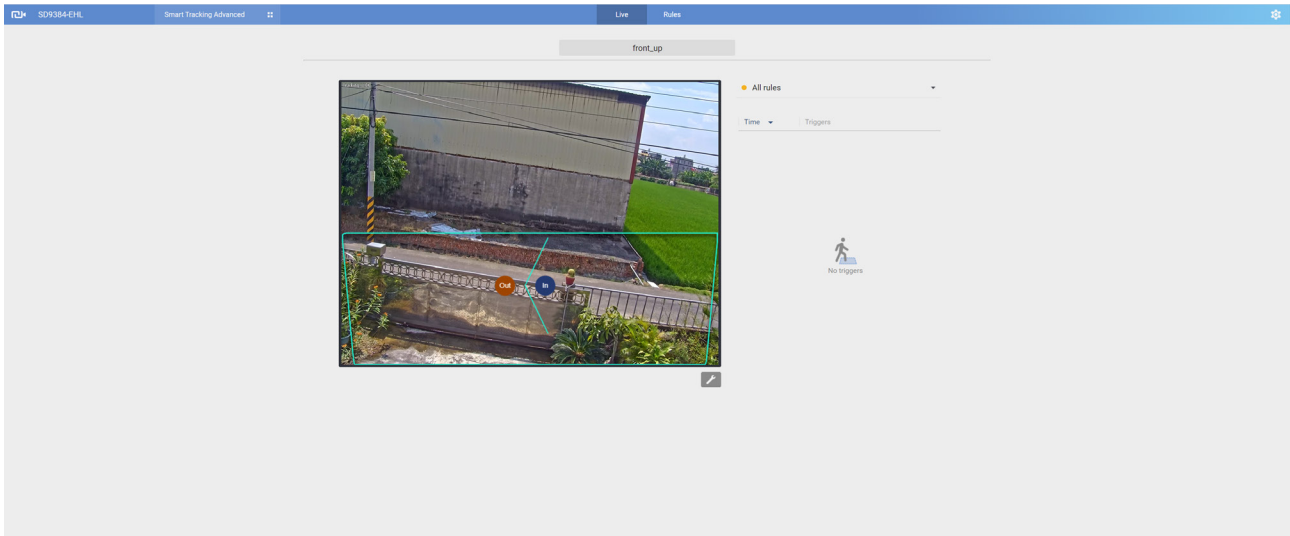
The screenshot shows the VIVOTEK PTZ settings page. The breadcrumb navigation is "PTZ > PTZ settings". The left sidebar lists various system settings, with "PTZ settings" selected. The main content area includes a live camera view, control buttons for Home, Zoom, Focus, Pan speed, Tilt speed, Zoom speed, Focus speed, and Auto pan speed. Below the camera view are sections for Home location settings, a Patrol list table, and Misc settings.

Name	Status	Mode	
presets	ON	Preset	Delete
presets_tour	OFF	Preset	Delete

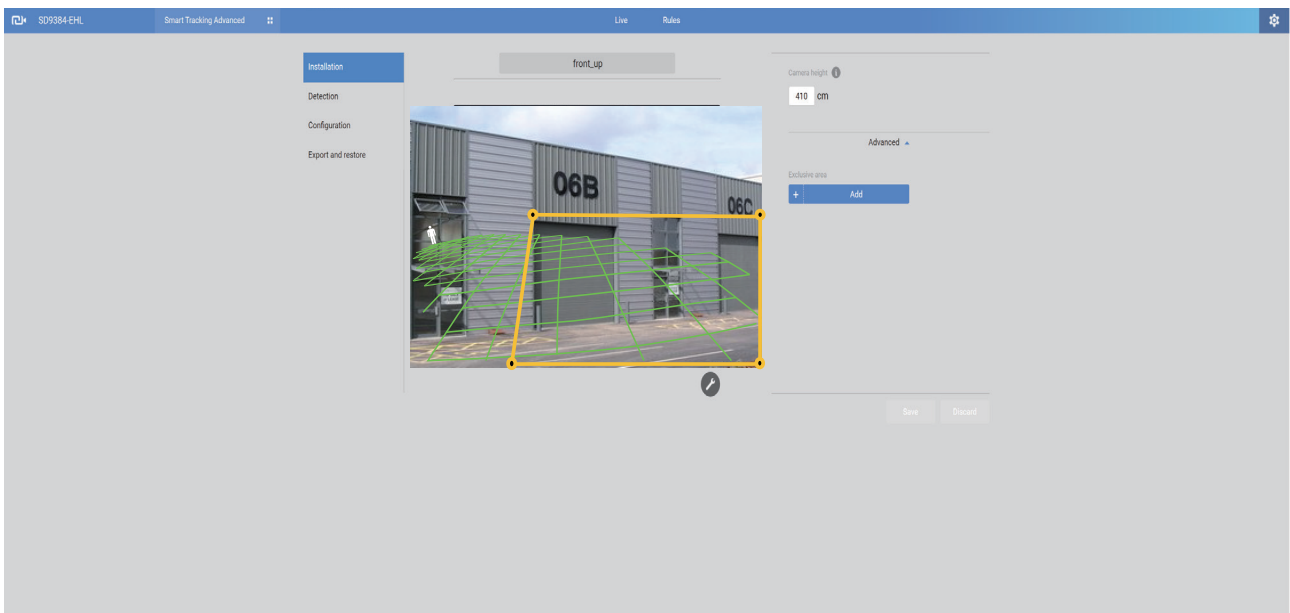
- Open a web console to the camera using the Chrome browser. Enter the **Configuration > Applications > Smart Tracking Advanced**. Click on **Smart Tracking Advanced** to open the monitoring and configuration page.

The screenshot shows the VIVOTEK Configuration > Applications > Smart Tracking Advanced page. The breadcrumb navigation is "System > General settings". The left sidebar lists various system settings, with "Smart Tracking Advanced" selected. The main content area shows the System time settings, including Host name (SD9384-EHL), Time zone (GMT+08:00 Beijing, Chongqing, Hong Kong, Kuala Lumpur, Singapore, Taipei, Irkutsk), and NTP server (192.168.51.211). A hand icon points to the "Smart Tracking Advanced" menu item in the left sidebar.

3. The utility defaults to the Live page. Click on the Settings  button on the upper-right corner to enter the Settings page.



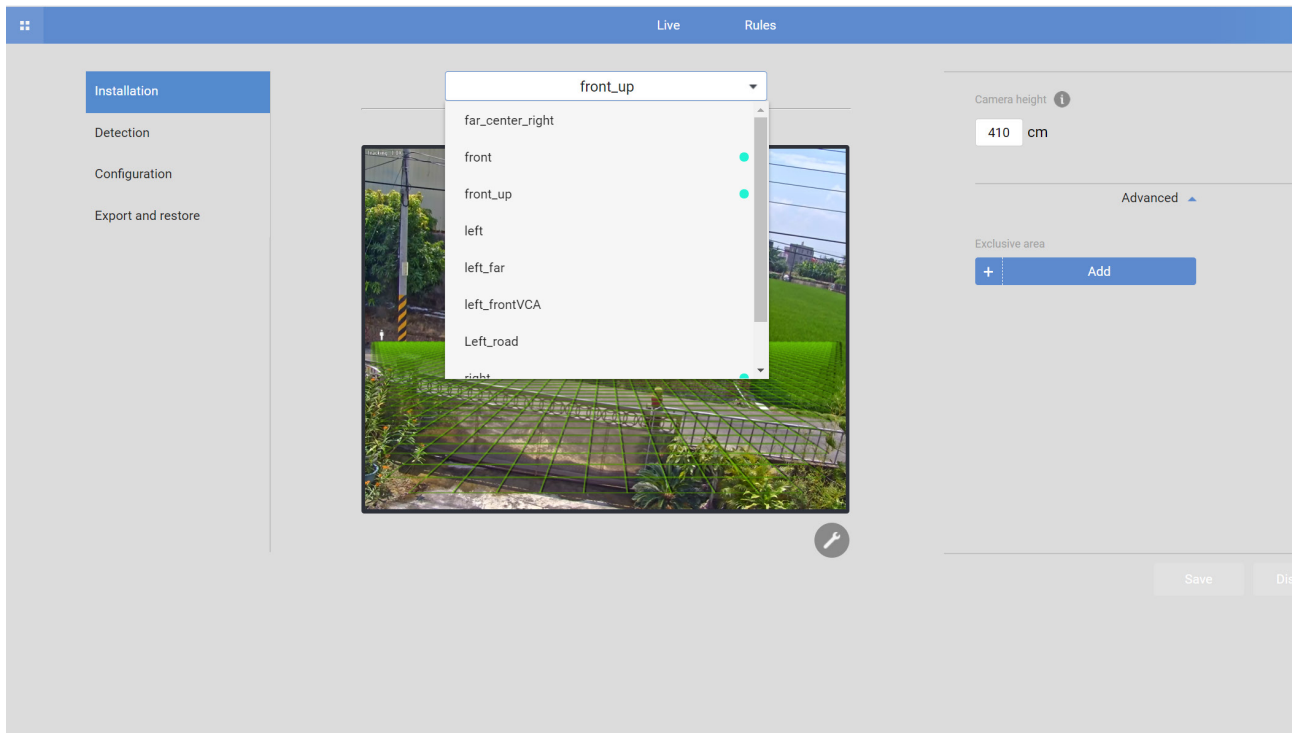
4. Enter the correct **installation height**.



Note that either in the Live view or the Settings page, using the PTZ control buttons automatically pause the on-going tracking activities.

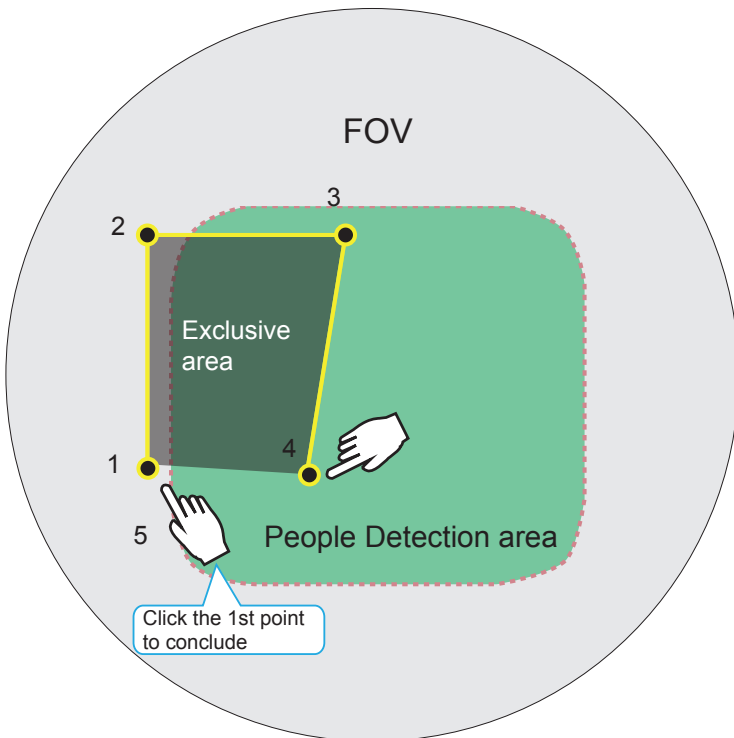
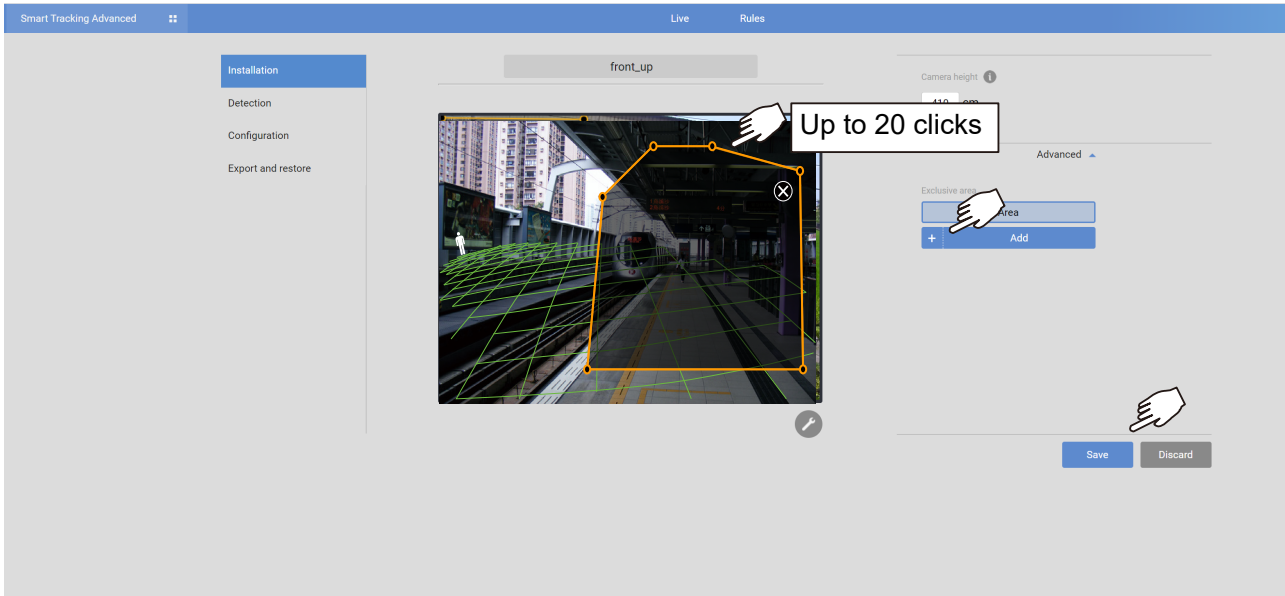
## Exclusive Areas

To configure an Exclusive Area, click to select a Preset position from the top pull-down menu.



Click the Add button to add an Exclusive area. Sometimes there are non-related elements in your field of view, such as a white wall where no one can walk on it or a fish pond with reflective water surface. You can add exclusive areas to block out the unnecessary elements in scene.

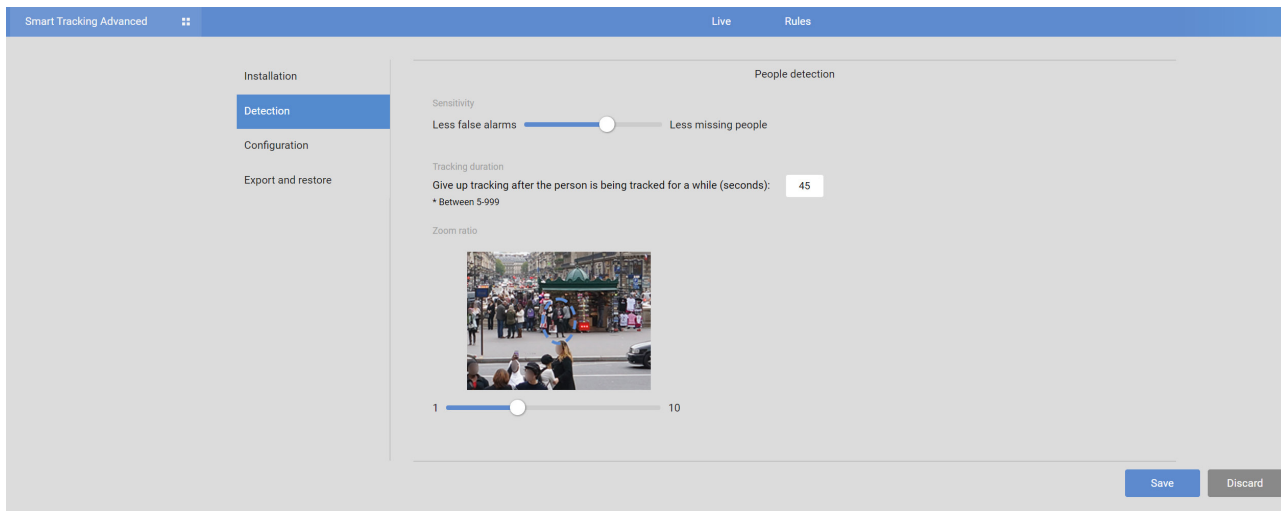
Use mouse clicks on the screen to draw polygons to create Exclusive areas. Click **Save** to preserve your settings.



**NOTE:**

An Exclusive area can be placed outside of the People detection area.

5. When done, click **Save** to preserve your settings.
6. Click on the **Detection** tab to move to the detection parameters page or click the Rule tab to create detection rules. Configure the detection parameters such as those related to **People detection**.



## People detection

PTZ auto tracking:

**Sensitivity:** Tune the sensitivity of human silhouette detection. If you find the situation where people have not been properly detected, tune for a higher sensitivity. If you find the occurrences of false alarms, tune down the sensitivity.

- In real-world applications, the effectiveness of People detection can be affected by the following:
  - Fast moving, running in the scene,
  - Lingered at the edges of FOV,
  - People crouching or crawling.

On the contrary, if tuned towards "Less false alarms," the detection algorithm will apply more strictly human silhouette matching. In some situations, such as when a man crouches down to pick up an object, he will be temporarily undetected.

**Tracking Duration (seconds):** This determines how long will the PTZ camera track a person once he is found in scene. Default is 45 seconds. If necessary, enter a different number of your preference.

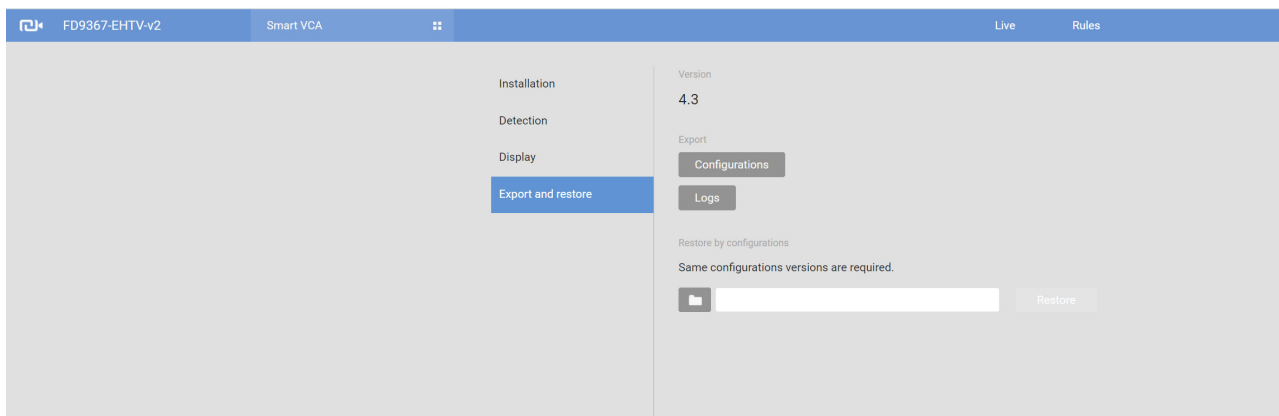
**Zoom ratio:** Use the slide bar to determine the zoom ratio when the camera finds a person. The zoom ratio ranges from 1 to 10.

- Click on the **Configuration** tab to select a video stream for the display on a web console. The smart tracking feature selects to use a video stream automatically.

The **ONVIF** option is selected when you need to display detection details on 3rd-party software, such as Milestones. The metadata is sent to the VMS using the ONVIF protocols.

- Export & restore:** You can export your Smart tracking configurations as a file to your management computer. You can also restore a tracking configuration from a previously-saved file. Select a pre-saved file from your management computer, and click Restore.

The **Export & restore** page can be used to save your configuration as a file. In some cases, your configuration can be repeatedly used at different locations. For example, when you install many cameras at the doors of train carts, you can use one configuration. Since their positions are identical, one configuration file will apply to all.



You can also export system logs for debug purposes or detail examination.



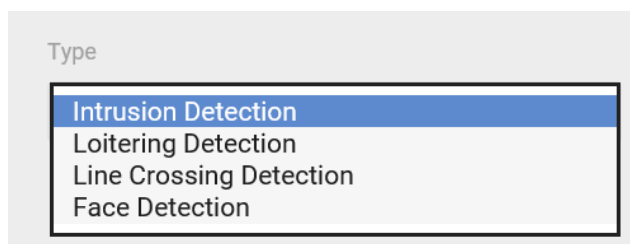
9. Click on the **Rule** tab on top to configure the detection rules.

Use the pull-menu at the top center to select a pre-configured Preset position.

Use the streaming window to create a detection zone. If the need should arise, you can create up to **5** detection zones.

You can create multiple rules in different preset positions. If something is detected during the dwell time, an event will be triggered.

Select the type of detection rule to be configured in your preset position.



You can either,

1. manually create a detection area

- or -

2. use the whole effective range as the detection area by clicking [Draw the same zone as people detection area](#).

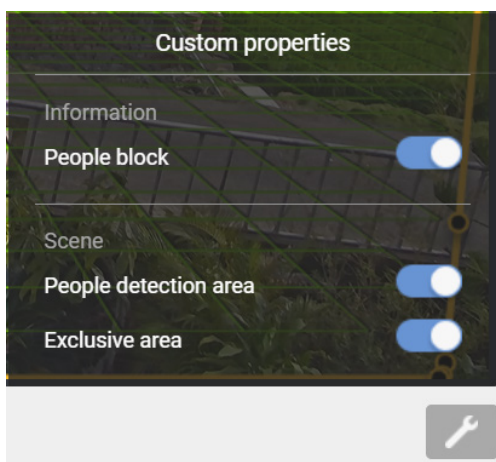
Change the coverage area of the window by clicking and dragging the corner marks. Note that the coverage area should comply with the People detection area. The People detection area is indicated by the green mesh lines.

The screenshot shows the VIVOTEK Smart Tracking Advanced interface. At the top, there are tabs for 'Live' and 'Rules'. Below the tabs, a camera feed labeled 'front\_up' displays a building with a green mesh overlay representing the 'People detection area'. A yellow rectangular box is drawn over the mesh, representing the 'Intrusion Detection' zone. Hand icons and arrows indicate that the zone can be created by clicking and its shape can be adjusted by dragging the corner marks. A callout box says 'Drag to change shape'. Another callout box says 'Click to create.' A third callout box points to the green mesh and says 'Green horizontal grid People detection area'. On the right side, the 'Rule-5' configuration panel is visible, showing the 'Type' set to 'Intrusion Detection', the 'Trigger' set to 'Trigger', and the 'Condition' set to 'People intruding into the zone'. There are 'Save' and 'Discard' buttons at the bottom of the panel.

The display elements can be configured in the **Custom properties** pane:

- \* **People box**: The vertical bounding box surrounding a standing or walking human form.
- \* **Exclusive Area**: Displays the Exclusive area(s) you created in the Settings page.
- \* **People detection area**: The green horizontal grid mesh is automatically generated according to the camera's FOV, installation height, tilt, and roll angles. It is designed to indicate the area where the effective People detection can take effect. Place your detection zone within the green grid.

The approximate distance between any two of the green lines is 1 meter. The height of the little man on the upper left of the grid is approximately 1.7m.



If you select Full Screen Tracking, the complete Home position FOV will be considered as the detection zone.

Below are the common options for the rule types:

- \* **Connect to Event Settings of camera web**: Once selected, the tracking detection features will be available as an event trigger in camera's Event settings. Up to 5 triggers can be created.

You **MUST** enable this option for the Smart Tracking triggers to be available in the camera Event settings.

- \* **Camera tracks the target**: The PTZ camera will try to zoom in on the detected person and keep track of his movement in scene.

\* **Intrusion detection:** You can select people entering or leaving a zone, or both actions as a trigger. The little man on the upper left of the grid is approximately 1.7m.

The screenshot shows a configuration window for a rule named "Rule-4". Under the "Condition" section, three radio buttons are present: "People intruding into the zone", "People leaving from the zone", and "Both of the above". The "Both of the above" option is selected. At the bottom, there is a "More" section with a toggle switch for "Connect to Event Settings of camera web", which is currently turned on.

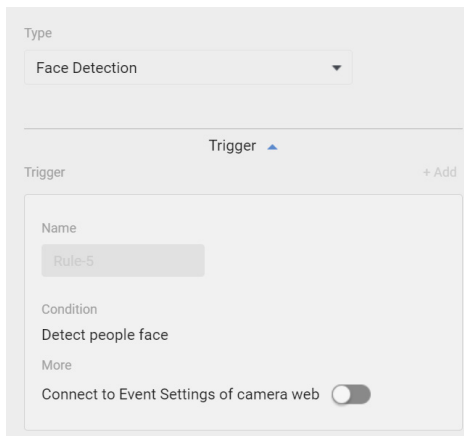
\* **Loitering detection:** You can select the duration of stay before the actions is considered as a trigger.

The screenshot shows a configuration window for a rule named "Rule-5". Under the "Condition" section, the text reads "After a person stays in the zone (seconds): ≥" followed by a text input field containing the number "5". At the bottom, there is a "More" section with a toggle switch for "Connect to Event Settings of camera web", which is currently turned off.

\* **Line-crossing detection:** You can designate which direction can trigger an alarm, or select both directions. A detection line will appear. You can manually move the detection line on the screen.

The screenshot shows a configuration window for a rule named "Rule-5". At the top, a dropdown menu is set to "Line Crossing Detection". Below this, there is a "Trigger" section with a "+ Add" button. Under the "Condition" section, the text reads "People walking direction:" followed by three radio buttons: "Out → In", "In → Out", and "Out ↔ In". The "Out → In" option is selected. At the bottom, there is a "More" section with a toggle switch for "Connect to Event Settings of camera web", which is currently turned off.

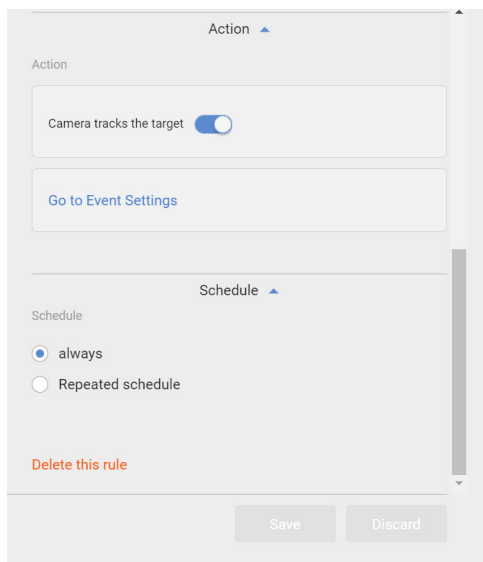
\* **Face detection:** The face detection feature has no configurable parameters.



The screenshot shows a configuration window for a rule. At the top, the 'Type' is set to 'Face Detection'. Below this, the 'Trigger' section is expanded, showing a list of triggers. The first trigger is 'Rule-5'. Underneath the trigger list, the 'Condition' is set to 'Detect people face'. There is a 'More' section with a toggle switch for 'Connect to Event Settings of camera web', which is currently turned off.

### Action:

**Camera tracks the target:** When a camera tracks an object, it zooms in on the target. If this option is disabled, an event is triggered without the zoom-in.



The screenshot shows the 'Action' and 'Schedule' configuration sections. In the 'Action' section, the 'Camera tracks the target' toggle is turned on. Below it is a button labeled 'Go to Event Settings'. In the 'Schedule' section, the 'always' radio button is selected, and the 'Repeated schedule' radio button is unselected. At the bottom of the 'Schedule' section, there is a link labeled 'Delete this rule'. At the very bottom of the configuration window, there are 'Save' and 'Discard' buttons.

### Schedule:

You can select Always or manually create a repeated schedule during which the tracking will take effect.

Below are the statuses of the Smart Motion detection polygon:

Normal

Motion window (normal)



When people is triggered in the window.

Selected by a mouse click. You can click on the delete button X to remove a configured zone.

Motion window (focus)



When moused over. You can edit the positions of the end points.

Motion window (trigger)

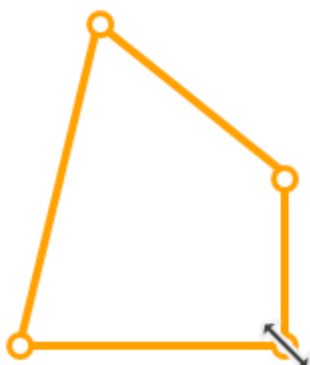


Motion window (hover on area)



Click and drag the end points to edit the coverage of the detection zone.

Motion window (hover on point)

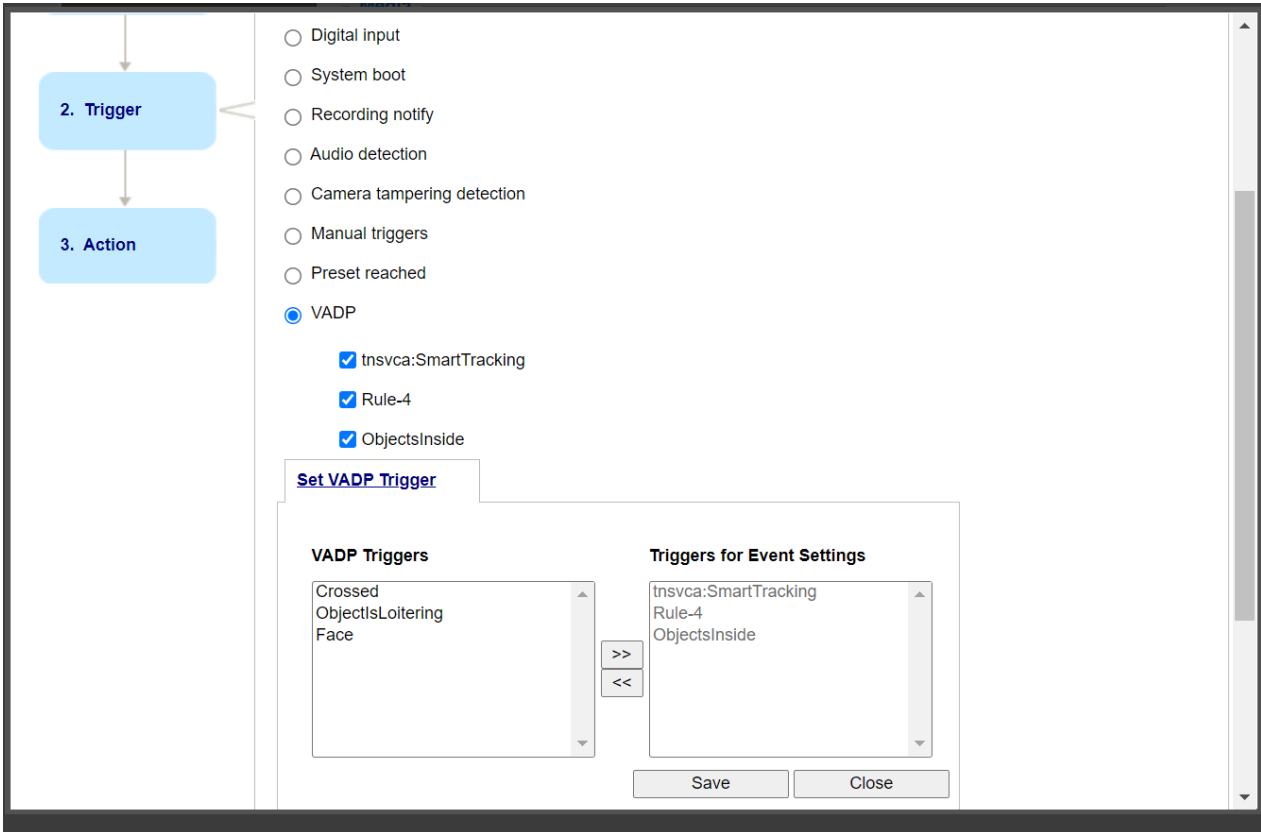


Click on the title bar to enter a name for the detection zone. Default is "Rule-#." Up to 64 alpha-numeric characters can be used in the name. Note that the following characters can not apply:

[ ], [ " ], [ ' ], [ \ ], [ < ], [ > ], [ : ], [ \$ ], [ ( ], [ ) ], [ . ]

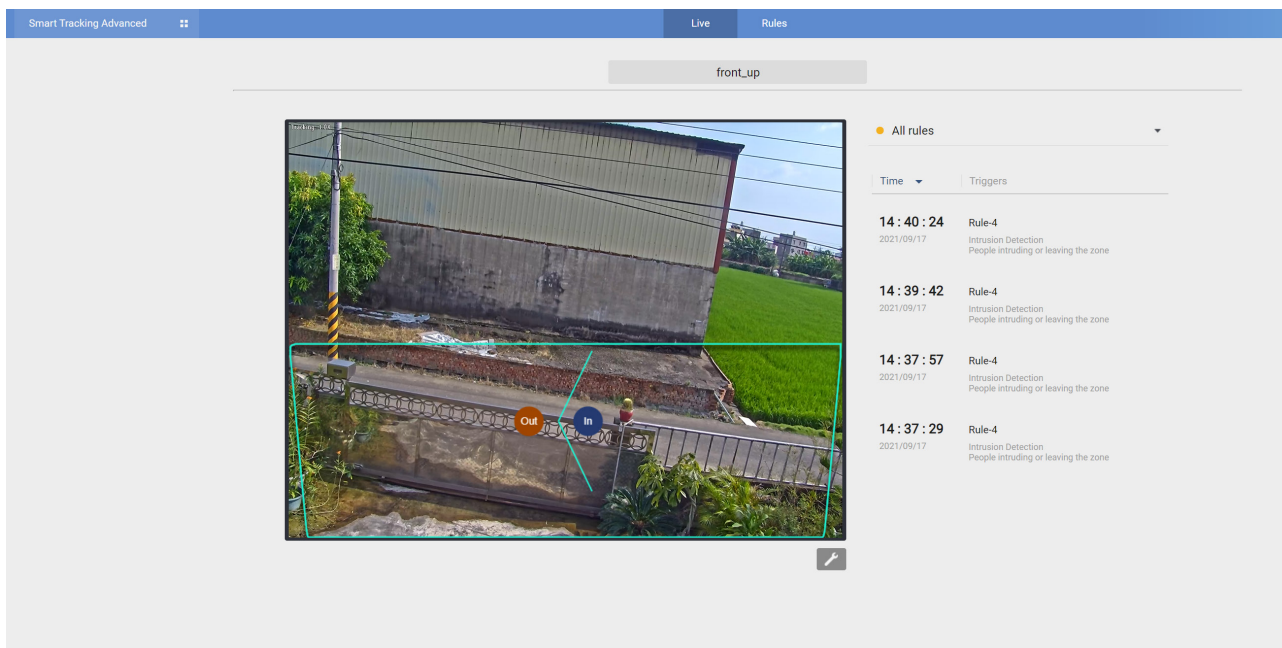
- **Go to Event Settings:** This is a shortcut to the firmware Event settings page. You can configure the occurrences of tracking events with the responses such as sending an Email, or starting a recording, or sending videos to FTP, etc.

Below is using the Tracking Rule as an event trigger.



## Starting the Tracking:

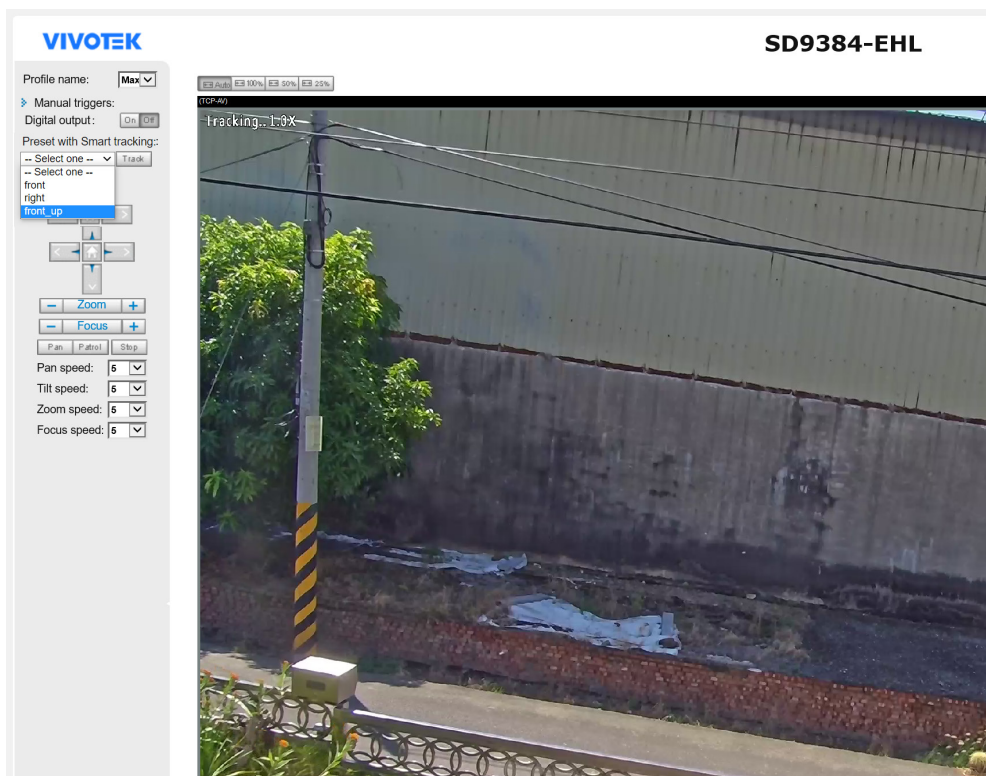
Go to the Live view via Configuration > Applications > Smart Tracking Advanced.



You can also enable the tracking by selecting a preset on a web console, and then click the Track button. You can observe the tracking behavior. You can ask someone to help by walking through the area of your interest.

A Tracking... message will appear on screen.

Note that if you enter the package's live view and there are no operation for 10 minutes, the Tracking feature will enter the idle mode.



## Enabling Tracking during a preset patrol

Tracking can also take place during a patrol. Configure the setting in **Configuration > PTZ > PTZ settings**. Click to enable "Enable track during dwell time." You can also configure the dwell time on each preset position in the PTZ configuration window.

The image shows a multi-step configuration process for PTZ settings:

- Step 1:** Configuration for 'SmartTrackingAdv'. Fields include Name, Patrol speed (0), Patrol direction (Forward), and a checked checkbox for 'Enable track during dwell time'.
- Step 2:** 'Preset and patrol settings' window. It includes a table for 'Patrol list' and a 'Select Preset Locations for Patrol' section. The 'Patrol list' table has columns for Name, Status, and Mode. The 'Select Preset Locations for Patrol' section has two tables: 'User preset locations' and 'Patrol locations'. The 'Patrol locations' table has columns for 'Patrol locations' and 'Dwell time (second)'. A red box highlights the 'Patrol locations' table, showing P-1 and P-2 with a dwell time of 10 seconds.

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The dwell time contains the tracking time. If set to 10 seconds, and if someone triggers a tracking, the tracking will persist for 4 more seconds. The tracking duration of VCA setting also plays a part in the configuration. If Patrol dwell time is 120 seconds, on the 40th second someone triggers a tracking, the tracking will persist for a duration of 60 seconds, it will stop at  $40+60 = 100$  seconds. The lens will return to the original preset. If yet another one triggers a tracking by 110th second, the tracking will start for another 10 seconds, and the PTZ lens will move to another preset.

Patrol action has a higher priority than tracking duration.

On the camera's web console, click on the PTZ Patrol button to start a patrol.