Security Management System - Fire and Smoke Detection

Introduction

Note – Add-on license is needed to be activated in the 'Security Management System Server software' for 'Fire and Smoke Detection' feature. If the add-on license is not available, the 'Security Management System Server software' will not display the GUI for 'Fire and Smoke Detection' configuration described in this document.

This document describes the steps for configuring the 'Fire and Smoke Detection' feature available in the Security Management System software.

Security Management System 'Fire and Smoke Detection' module is designed for simplest possible configuration, with only a few parameters required to be configured by the users. All other complexities are managed by the algorithms internally.

'Fire and Smoke Detection' algorithm require relatively high processing power. Please refer to the camera configuration guidelines document for ensuring proper video stream selection for video analytics processing. Same video stream is used for 'Fire and Smoke Detection' processing too. Please refer to the hardware recommendation document for details about expected hardware capabilities.

Importance of Correct Camera Setup

'Fire and Smoke Detection' algorithm is advanced and complex; and rely 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 'Fire and Smoke Detection'.

The 'Fire and Smoke Detection' algorithm expects 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 for 'Fire and Smoke Detection'.

It is recommended to consider the camera setup requirements for 'Fire and Smoke Detection', during the design phase of a project - where camera positions, angles and zoom levels are decided.

In case where 'Fire and Smoke Detection' 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 'Fire and Smoke Detection' algorithm, as per the guidelines described in the next section.

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

Camera Setup Guidelines for Fire and Smoke Detection

1. The 'Fire and Smoke Detection' algorithm uses color, hence please use 'Fire and Smoke Detection' module for cameras streaming videos with real-life colors. The 'Fire and Smoke Detection' algorithm would not work on black & white video streams, infrared video streams, thermal video streams, night mode video streams etc.

2. The 'Fire and Smoke Detection' algorithm uses 'pre-learnt data' available in the software's in-built database, which is for standard real-life fire and smoke situations. Hence 'Fire and Smoke Detection' module should be used for detecting standard real-life fire and smoke. The algorithm would not work on different or custom situations eg industrial fire.

3. The camera image parameters like hue, saturation etc should be adjusted for real-life colors in the video stream.

4. 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 'Fire and Smoke Detection' algorithm 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.

5. Camera should be a fixed camera, rigidly mounted. The shakes and vibrations may create problems for the 'Fire and Smoke Detection' algorithm.

6. Camera should be mounted and zoom level should be adjusted such that fire or smoke visible in field of view of the camera cover at least 15% of the image captured by the camera.

7. 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.

8. 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 as far as possible.

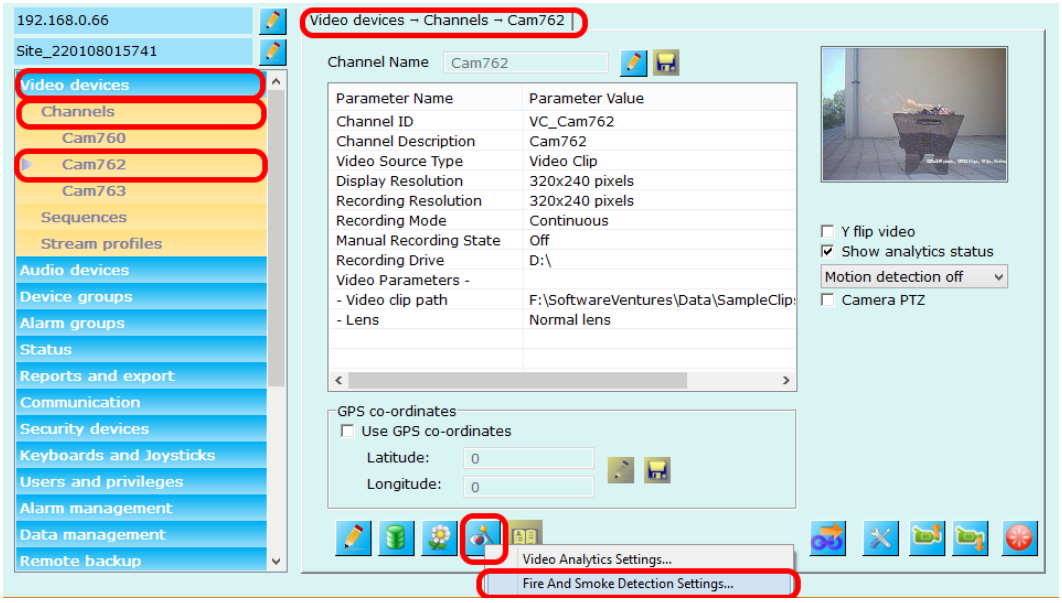
Accessing Fire and Smoke Detection Configuration

1. Execute the Security Management System server software

2. Add cameras to the Security Management System server software for monitoring

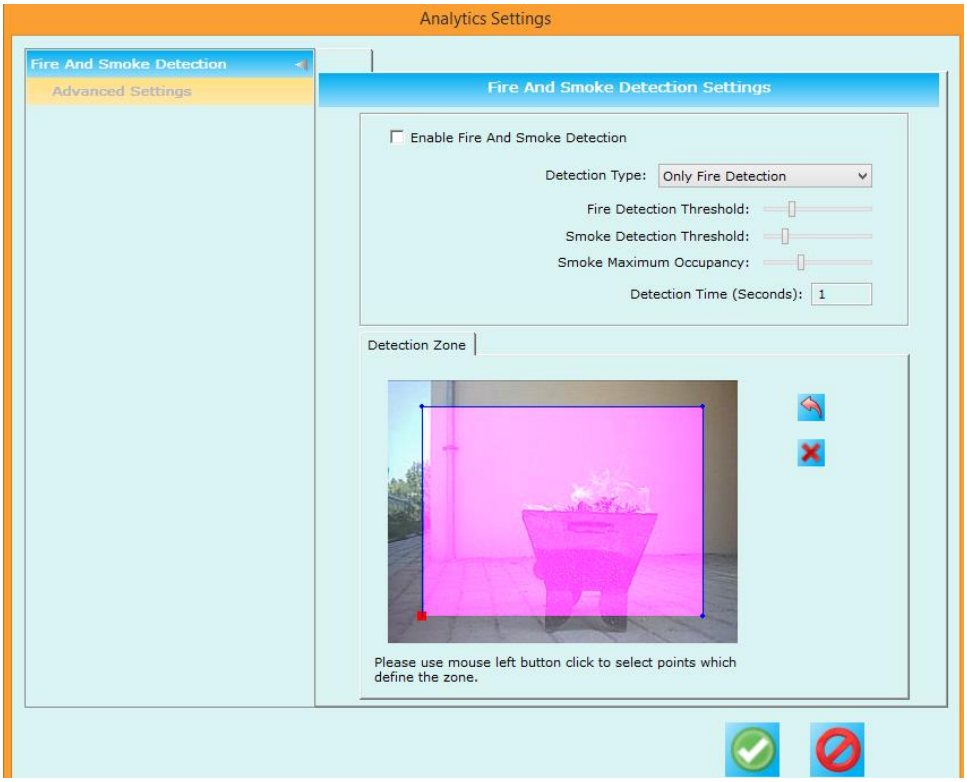
3. Navigate to the 'Video devices' link from the navigation bar available at the left hand side. Under 'Channels' sub-link, click on the link specific to the camera for which 'Fire and Smoke Detection' needs to be configured.

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. This will display a pop up menu. Please click on the 'Fire and Smoke Detection Settings..' menu.

6. This will pop up the 'Fire and Smoke Detection' configuration dialog box.



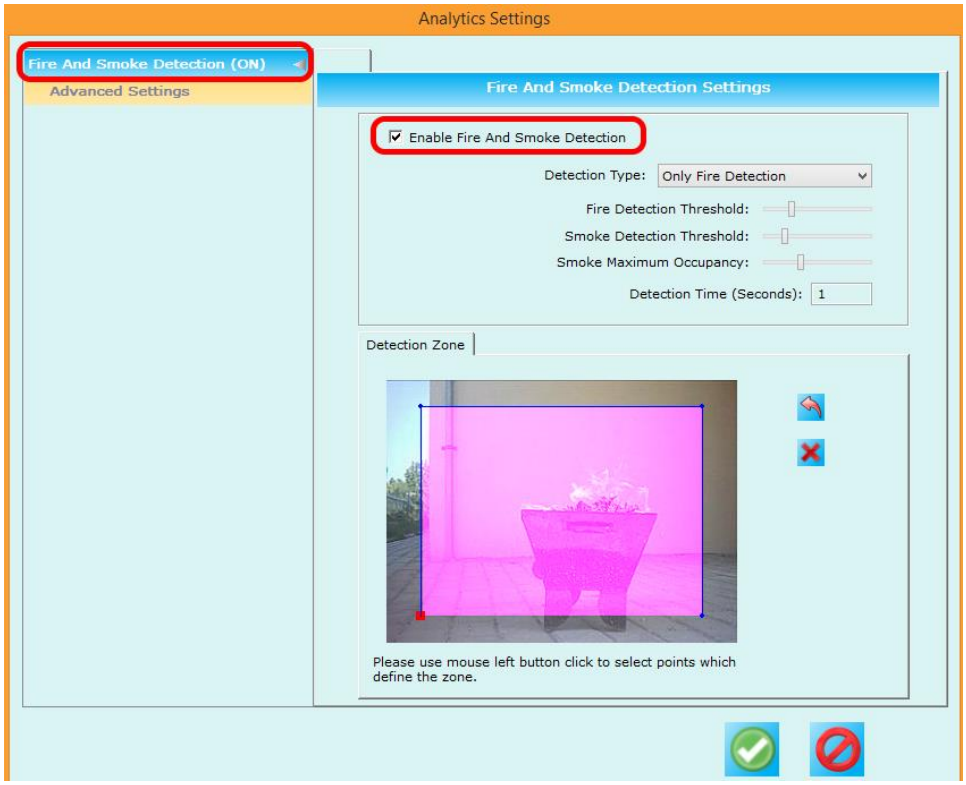
7. Fire and Smoke Detection configuration for the specific selected camera can be done from this dialog box.

8. Fire and Smoke Detection configuration is applicable to single selected camera. To configure Fire and Smoke Detection for multiple cameras, please open the 'Fire and Smoke Detection configuration' dialog box for each of those cameras and configure Fire and Smoke Detection parameters for each camera separately.

Basic Settings

1. Click on the ‘Fire and Smoke Detection’ menu from the left hand side navigation bar.

2. Select ‘Enable Fire and Smoke Detection’ check-box. This will enable Fire and Smoke Detection processing



3. If ‘Enable Fire and Smoke Detection’ is un-checked; Fire and Smoke Detection processing will stop. All configurations will be remembered but Fire and Smoke Detection will not be processed. Hence ‘Enable Fire and Smoke Detection’ can be used as single click ON/OFF for Fire and Smoke Detection processing, without resetting complete configuration.

4. Please set the ‘Detection Type’. The options available are ‘Only Fire Detection’, ‘Only Smoke Detection’ and ‘Fire and Smoke Detection’. Please select correct ‘Detection Type’ as per the site requirement. It is advised not selecting ‘Fire and Smoke Detection’ option unless both Fire Detection and Smoke detection is required.

5. ‘Fire Detection Threshold’ - Lesser ‘Fire Detection Threshold’ results in higher detections, where-as higher ‘Fire Detection Threshold’ results in lesser detections. Correct threshold is important for good accuracy of fire detection - to avoid false detections and to avoid missed detections.
   In most of the real-life situations, the default setting for ‘Fire Detection Threshold’ is recommended.

6. ‘Smoke Detection Threshold’ - Lesser ‘Smoke Detection Threshold’ results in higher detections, where-as higher ‘Smoke Detection Threshold’ results in lesser detections.

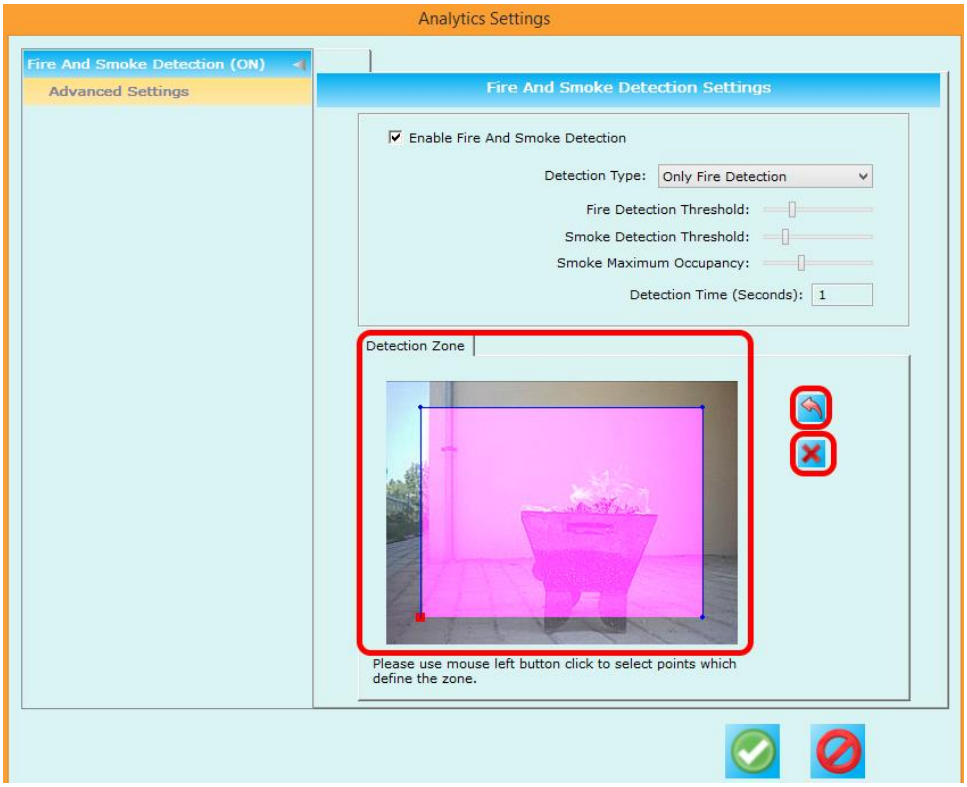
Correct threshold is important for good accuracy of smoke detection - to avoid false detections and to avoid missed detections.
In most of the real-life situations, the default setting for 'Smoke Detection Threshold' is recommended.

7. 'Smoke Maximum Occupancy' threshold - Lesser 'Smoke Maximum Occupancy threshold' results in lesser detections, where-as higher 'Smoke Maximum Occupancy threshold' results in higher detections. Correct threshold is important for good accuracy of fire detection - to avoid false detections and to avoid missed detections.
   In most of the real-life situations, the default setting for 'Smoke Maximum Occupancy threshold' is recommended.

8. Please set 'Detection Time' in seconds. This is the time for which fire (or smoke) is continuously detected by the algorithm, before alarm is generated.

9. The Fire and Smoke Detection zone can be defined from the 'Detection Zone' section

10. The detection zone consists of series of points, which define a region. All pixels inside the defined zone are highlighted in the user interface. All pixels outside the defined zone are not highlighted.



11. To change the detection zone, click on the 'Reset' button which will remove all the points. Then click on the image with mouse left button to select points one after the other. The points will be connected automatically and the monitoring zone will be calculated automatically.

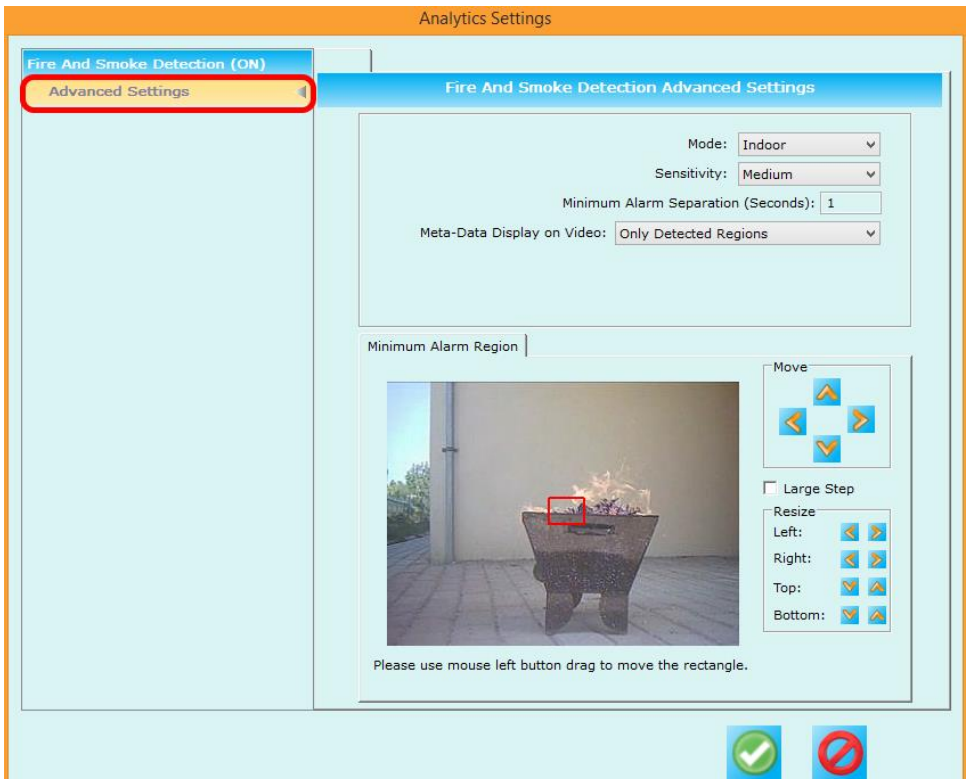
12. Sequence of the points selection is important, as it affects the detection zone calculation. Please use the ‘Remove last point’ button to undo the selection of last selected point.

13. Fire (or smoke) will be detected if it is completely inside the defined detection zone.

14. It is important to define the detection zone correctly. It is also advised to exclude certain regions from the detection zone where fire (or smoke) is not expected to be visible.

Advanced Settings

1. Click on the 'Advanced Settings' sub-menu.



2. Mode - If the lighting conditions are perfectly controlled and they do not change over the day, please select 'Indoor' type. Otherwise, if there is any change in lighting conditions expected, please select 'Outdoor' type.

3. Sensitivity - Keep 'Sensitivity' selection as 'Medium' as the algorithm is able to intelligently adjust the sensitivity for most of the situations.

4. Minimum Alarm Separation (Seconds) – this parameter defines the time duration between 2 'Fire Detected' alarms (or 'Smoke Detected' alarms). If multiple alarms are generated in quick succession, this parameter can be set to higher value; so that when 'Fire Detected' (or 'Smoke Detected') alarm is generated, further alarms will not be generated for the specified 'Minimum Alarm Separation (Seconds)'.
   Note – 'Fire Detected' and 'Smoke Detected' alarms are managed separately for 'Minimum Alarm Separation (Seconds)' parameter. E.g the 'Smoke Detected' alarm may be generated any time, irrespective of last 'Fire Detected' alarm generation time and the 'Minimum Alarm Separation (Seconds)' parameter value.

5. Meta-Data Display on Video – controls the video overlay on camera video stream, w.r.t 'Fire and Smoke Detection' processing.
   (a) None – no video overlay
   (b) Only Detection Zone – only detection zone video overlay is enabled
   (c) Only Detected Regions – only detected fire regions (or smoke regions) overlay is enabled
   (d) All – all video overlays related to 'Fire and Smoke Detection' are enabled

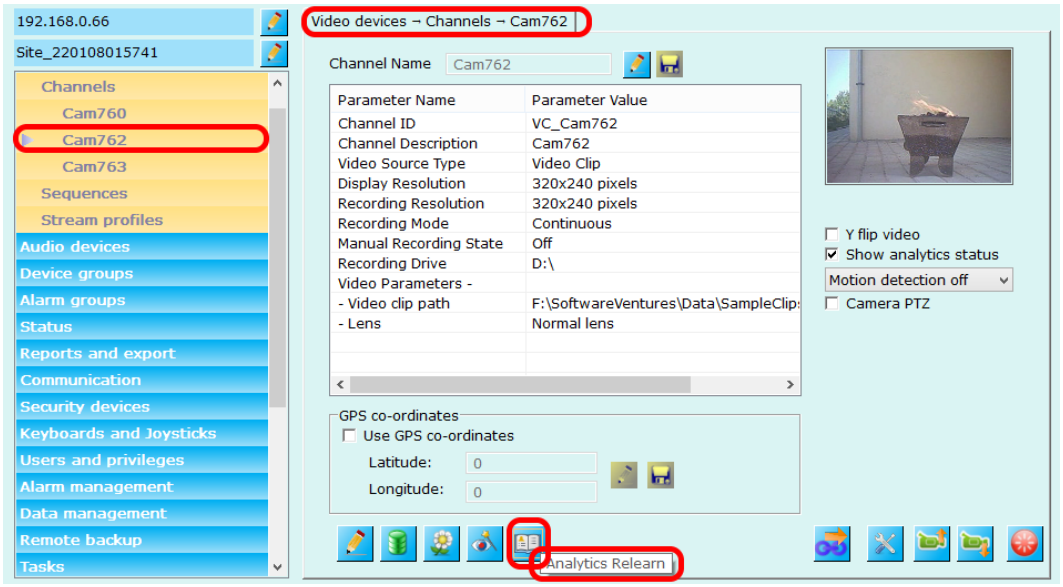
Typical setting expected is ‘Only Detected Regions’. The ‘Only Detection Zone’ option may be used during fine tuning to confirm the detection region on the video.

6. Minimum Alarm Region – Specifies the minimum expected detection region. If the detected dire (or smoke) region is smaller than specified ‘Minimum Alarm region’, it is ignored. It is recommended to specify ‘Minimum Alarm region’ to cover at least 15% of the camera field of view

Testing the Configuration

1. When the configuration is completed and the configuration dialog box is closed, the Fire and Smoke Detection processing will start. Please wait for approximately 5 seconds to allow the algorithm to learn the background. If there are no moving objects in the camera view, learning will be finished quickly, otherwise it may take longer time. Hence during initial quick tests, it is advisable to have no moving objects in the camera view.

2. During initial tests, it is advisable to ensure that no moving objects exist in the camera view, and then clicking on 'Analytics relearn' button available on the camera details page, at the bottom. Click on 'yes' button on the confirmation dialog box, which will be displayed after clicking on the 'Analytics relearn' button.



3. This will initiate re-learning. Please wait for approximately 5 seconds.

4. The Fire and Smoke Detection processing result will now be displayed on the video in form of rectangles drawn around detected fire regions (or smoke regions), in the specified 'Detection zone'