



## Audio Analytics Apps

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This chapter provides information about the audio analytics apps for Cisco IP cameras. These apps enable an IP camera to trigger events when it detects certain sound patterns.

This chapter includes these topics:

- [About the Audio Analytics Apps, page 2-1](#)
- [Audio Analytics Apps Guidelines and Operational Specifications, page 2-1](#)
- [Configuring an Audio Analytics App on an IP Camera, page 2-4](#)
- [Testing an Audio Analytics App, page 2-6](#)
- [Running an Audio Analytics App, page 2-7](#)
- [Stopping an Audio Analytics App, page 2-7](#)

### About the Audio Analytics Apps

The Audio Analytics apps include the following:

- **Aggression**—Detects aggressive speech or shouting
- **Car Alarm**—Detects standard car alarms
- **Glass Break**—Detects standard window glass breaking
- **Gunshot**—Detects a variety of firearms being discharged.
- **Demo**—Lets you test the response of the Audio Analytics apps to an aggression, car alarm, glass breaking, or gunshot sound.

### Audio Analytics Apps Guidelines and Operational Specifications

The following sections provide guidelines and operational specifications for the Audio Analytics apps:

- [General Guidelines, page 2-2](#)
- [Aggression App, page 2-2](#)
- [Car Alarm App, page 2-3](#)
- [Glass Break App, page 2-3](#)
- [Gunshot App, page 2-3](#)

- [Demo App, page 2-3](#)

## General Guidelines

The following general guidelines apply to the Audio Analytics apps:

- **Microphone quality**—The microphone that is used to capture audio for an Audio Analytics app should have frequency response of  $\pm 3$  dB for frequencies in the bandwidths 0.1 kHz through 8.0 kHz.
- **Microphone mounting**—The microphone should be mounted in a fixed and stable position. Excessive vibration or movement should be avoided. Physical contact with the microphone by hand or object should be avoided. The microphone should be protected from environmental states such as wind and rain.
- **Microphone placement**—For use indoors where the expected sound source is within 33 feet (10 meters) of the microphone, the microphone should be placed in the same room as the expected sound source. For use indoors where the expected sound source is more 33 feet (10 meters) from the microphone, or for use outdoors, the microphone should have as clear a line of sight as possible to the expected sound source.
- **Type of audio input**—The system is designed to analyze sounds that come from a single, fixed point microphone that delivers a monophonic digital audio signal. The digital audio signal must be encoded in the PCM 16-bit format.
- **Sound integrity**—The digital audio signal that is delivered to the system should be a faithful sampling of the original acoustic waveform. In particular, the signal must not introduce discontinuities or changes in the sequential order in any part of the captured audio.
- **Distortion**—The digital audio signal that is delivered to the system should not clip or distort the original sound.
- **Dynamic range**—The dynamic range of the original audio should be greater than  $-92$  dB to full scale over 1 second.
- **Background noise**—A SNR of 30 to 50 dB provides optimal results.

## Aggression App

The Audio Analytics Aggression app detects the acoustic changes in the voice of someone who is becoming aggressive. Specific factors that the app considers include pitch, tone, and intonation changes that can occur in voice patterns when someone becomes aggressive.

This app is designed to detect actively aggressive speech, not impolite speech, passive aggression, or sarcasm. Therefore, it does not consider semantic information, such as spoken profanity.

Factors such as the accent or language of the voice can affect the performance of this app.

With this app, an IP camera can detect aggression from a sound source that is up to 33 feet (10 meters) away from the microphone and that has been sounding for at least 1 second.

## Car Alarm App

The Audio Analytics Car Alarm app detects the seven standard car alarm types that are used by major car manufacturers in North America and Europe. These alarms are characterized by looping progressions of specific tonal patterns. With this app, an IP camera can detect an alarm from a sound source that is up to 164 feet (50 meters) away from the microphone and that has been sounding for at least 2 seconds.

## Glass Break App

The Audio Analytics Glass Break app detects breaking of four types of glass in their standard thicknesses when used in building applications such as windows and doors. Glass breaking is characterized by the initial sound break, the impact, followed by the glass actually shattering. The system is designed to detect breakage by an intentional hit from a hand-held implement as opposed to breakage by explosion, accident, or natural event.

With the Glass Break app, an IP camera can detect glass breaking from a sound source that is up to 33 feet (10 meters) away from the microphone.

Table 2-1 describes the glass types and characteristics that are required for optimum detection by this app.

**Table 2-1** Glass Specifications for Optimum Detection

Glass Type	Minimum Plate Size	Minimum Thickness	Maximum Thickness
Laminated	12 x 24 inches (305 x 610 mm)	0.252 inch (6.4 mm)	0.252 inch (6.4 mm)
Plate		0.094 inch (2.4 mm)	
Tempered		0.126 inch (3.2 mm)	
Wired		0.252 inch (6.4 mm)	

## Gunshot App

The Audio Analytics Gunshot app detects a variety of firearms being discharged.

Gunshots are characterized by unique muzzle blasts that are associated with a range of unsilenced weapons that are typically used in civilian gun crimes in the Americas, Europe, Middle East, and Australasia. Types of weapons that this app can detect being discharged are handguns (including 9 mm automatics and revolvers with or without muzzle diffusers), shotguns (including 20 gauge, .410 and 12 bore), bolt-action rifles (.22 mm and 7.62 mm), and automatic rifles (including AK-47, AR-15 and Uzi submachine gun).

With this app, an IP camera can detect a gunshot from a sound source that is up to 656 feet (200 meters) away from the microphone.

## Demo App

The Audio Analytics Demo app lets you test the response of the other Audio Analytics apps to a prerecorded aggression, car alarm, glass break, or gunshot sound.

To use the Audio Analytics Demo app, perform the following steps.

**Before You Begin**

Download the DemoAppSoundFiles.zip file that is provided with the Demo application package. Unzip and play the included audio files to test the connected speakers.

**Procedure**

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- Step 1** From the IP camera web-based user interface, click the **Setup** link, click **Application Manager** to expand the menu, then click **App Setup**.
- Step 2** Click **audioAnalyticsDemo** radio button.
- Step 3** Click **Run**.
- The IP camera becomes ready to detect an aggression, car alarm, glass break, or gunshot sound, based on the configuration settings that you made as described in the [“Configuring an Audio Analytics App on an IP Camera” section on page 2-4](#).
- Step 4** Use an external speaker to play the audio file for an aggression, car alarm, glass break, or gunshot sound.
- Step 5** Verify whether an event was triggered.
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## Configuring an Audio Analytics App on an IP Camera

Before you can use an Audio Analytics app, you must configure the app on each IP camera on which it will run. To configure an Audio Analytics app, perform the following steps.

**Before You Begin**

Install the Audio Analytics app on the IP camera on which it will run. See the [“Related Documentation” section on page 1-1](#) for more information.

**Procedure**

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- Step 1** From the IP camera web-based user interface, click the **Setup** link, click **Application Manager** to expand the menu, then click **App Setup**.
- Step 2** Click one of the following radio buttons to choose the app that you want to configure.
- The buttons that appear on your system depend on which apps you installed.
- **audioAnalyticsAggression**—Aggression app
  - **audioAnalyticsCarAlarm**—Car Alarm app
  - **audioAnalyticsGlassBreak**—Glass Break app
  - **audioAnalyticsGunshot**—Gunshot app
  - **audioAnalyticsDemo**—Demo app
- Step 3** Click **Configure**.
- The Cisco Audio Analytics configuration page for the app that you selected appears.

- Step 4** Enter appropriate values in the Cisco Audio Analytics configuration page fields as described in the following table:

Field	Setting for Listen Mode
<b>Configuration Area</b>	
Audio Trigger Level slider	<p>Drag the slider to select the minimum audio level, in decibels, that a sound that the IP camera microphone captures must register for the camera to trigger an event based on the sound.</p> <p>Valid values are –90 through 0 (decibels). The default value is –90.</p>
Detection Sensitivity slider	<p>Drag the slider to select the relative sensitivity at which the IP camera triggers an event based on a sound.</p> <p>A higher value causes the IP camera to be more sensitive and trigger more events, but can cause false triggers. Lower this value if the camera generates too many false triggers.</p> <p>Valid values are 0 through 100. The default value is 50 for all apps, except for the Glass Break app, for which the default value is 60.</p>
Enable AGC	<p>Check this check box to enable automatic gain control. AGC causes the IP camera to automatically adjust its microphone audio gain to avoid saturated audio from loud sounds and boost low-level audio.</p> <p>In most cases, this option should not be enabled because it can cause audio distortion.</p>
Volume Gain slider	<p>Available only when the Enable AGC check box is not checked.</p> <p>Drag the slider to select the volume gain for the IP camera microphone. Gain can help avoid saturated audio and boost low-level audio.</p> <p>Valid values are 0 through 100. Default value for all apps is 50 except for the Gunshot app, for which the default value is 90.</p>
Enable Test Mode	<p>Check this check box put the camera in test mode, which allows you to test the response of the camera to recorded sounds. For more information, see the <a href="#">“Testing an Audio Analytics App” section on page 2-6</a>.</p> <p><b>Note</b> When a camera is in test mode, it can detect only sounds that are provided in a file that you can obtain from Cisco. Uncheck this check box when you are not testing the camera so that other features operate normally.</p>
Start Audio Recording	<p>Check this check box to cause the app to run in debug mode, which creates a 2 MB audio recording (approximately 1 minute of audio) when the app starts.</p> <p>The recording file is saved on the IP camera. You can export the file as described in the <a href="#">“Export Recording button” section on page 2-6</a> and provide it to a Cisco support representative if requested for troubleshooting.</p> <p>When this check box is checked, the IP camera creates a new recording file each time that you start the app. If there is an existing recording file on the camera, it is overwritten. If you want to save an existing recording file, export it before you start the app.</p>

Field	Setting for Listen Mode
Export Recording button	Click to save the audio recording file that the IP camera created in debug mode. Use the dialog box that appears to save the file in the location of your choice.
Show Audio Level	Check this check box to display the Audio Level graph at the bottom of the Cisco Audio Analytics configuration page. This graph shows in real time the volume, in decibels, of the audio that the microphone of the IP camera picks up.  This feature is available only if you log in to the IP camera by using an HTTP (not an HTTPS) connection. This feature is not supported if you are using the Safari browser or a version of Microsoft Internet Explorer earlier than version 10.
Save button	Click to save changes that you made on the Cisco Audio Analytics configuration page.
Reset button	Click to reset the values of the options on the Cisco Audio Analytics configuration page to their default values, then click <b>OK</b> in the dialog boxes that confirm this action.  You do not need to click the <b>Save</b> button to save the changes.
View License link	Click to display the license for the open source component of the Audio Analytics apps.

- Step 5** Click the **Save** button in the Cisco Audio Analytics configuration page, and then click **OK** in the confirmation dialog box.

## Testing an Audio Analytics App

You can test whether an IP camera that is running an Audio Analytics app triggers an event as expected. To do so, you run the app and play a test aggression, car alarm, glass break, or gunshot sound.

To test an audio analytics app, perform the following steps.

### Before You Begin

Download the DemoAppSoundFiles.zip file that is provided with the Demo application package. Unzip and play the included audio files to test the connected speakers.

### Procedure

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- Step 1** Put the camera in test mode by checking the Enable Test Mode check box as described in the [“Configuring an Audio Analytics App on an IP Camera” section on page 2-4](#).
- Step 2** Run the app that you want to test.  
  
The IP camera becomes ready to detect an aggression, car alarm, glass break, or gunshot sound, based on the configuration settings that you made as described in the [“Configuring an Audio Analytics App on an IP Camera” section on page 2-4](#).
- Step 3** Use an external speaker to play the audio file for an aggression, car alarm, glass break, or gunshot sound.

- Step 4** Verify whether an event was triggered.
- Step 5** Take the camera out of test mode by unchecking the Enable Test Mode check box.
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## Running an Audio Analytics App

To run an Audio Analytics app on an IP camera, perform the following steps. The IP camera can run one Audio Analytics app at a time.

### Procedure

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- Step 1** From the IP camera web-based user interface, click the **Setup** link, click **Application Manager** to expand the menu, then click **App Setup**.
- Step 2** Click the radio button for the app that you want to run:
- **audioAnalyticsAggression**—Aggression app
  - **audioAnalyticsCarAlarm** —Car Alarm app
  - **audioAnalyticsGlassBreak** —Glass Break app
  - **audioAnalyticsGunshot**—Gunshot app
  - **audioAnalyticsDemo**—Demo app
- Step 3** (Optional) If you want the app to run automatically each time the IP camera reboots, in the Installed Application List area, check the **Start on Boot** check box that corresponds to this app.
- If you do not check this check box, you must run the app manually each time the IP camera reboots.
- Step 4** Click the **Run** button.
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## Stopping an Audio Analytics App

To stop an Audio Analytics app on an IP camera, follow these steps:

### Procedure

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- Step 1** From the IP camera web-based user interface, click the **Setup** link, click **Application Manager** to expand the menu, then click **App Setup**.
- Step 2** Click the radio button for the app that you want to stop:
- **audioAnalyticsAggression**—Aggression app
  - **audioAnalyticsCarAlarm** —Car Alarm app
  - **audioAnalyticsGlassBreak** —Glass Break app
  - **audioAnalyticsGunshot**—Gunshot app
  - **audioAnalyticsDemo**—Demo app

**Step 3** Click the **Stop** button.

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