Mobotix Thermal Camera Integration App-note

Contents

1. Introduction 3
1.1 Model and firmware 3
1.2 Requirements 4
1.3 Integration Components 4
2. Device Addition and Configuration 5
2.1 Mobotix Web Interface Setup 5
2.2 Add a Camera in CathexisVision 6
3. Analytics Setup 10
3.1 Setting up a Thermal Analytics 10
4. Integration Database 14
4.1 Integration Database Setup 14
4.2 Navigate to the Database 14
4.3 Database Interface 15
5. Events 21
5.1 Creating an Event 21
5.2 Triggers 22
5.3 Actions 23
6. Conclusion 25

1. Introduction

This document will detail the integration of the Mobotix M series thermal camera, with CathexisVision software. Functionally, this integration involves utilising a Mobotix M series camera with dual sensors, one thermographic and one visual. The Mobotix SDK has the ability to send the raw thermal data of the thermographic image and which Cathexis can then match to faces detected in the visual stream.

Note: The thermal camera should be properly installed and calibrated according to Mobotix's best practice in order to attain the best accuracy for the thermal readings. Cathexis does not warrant the accuracy of the readings but does provide a number of mechanisms to allow the operator to select which temperatures are preferred:

Custom Events:

- Sound camera alarms
- Display Message
- Display pop-up

Pre-defined Events:

- Call Base-station
- Record a camera
- Sound an alarm
- Send Email
- Controlling a device input and other integration devices

Note: It is possible to store the temperature readings on a metadatabase. Email support is also provided when a particular temperature is reached, in such cases the user has the option to email themselves the trigger.

1.1 Model and firmware

The following camera model and firmware were used to test this integration:

Model	M series Dual sensor – Thermographic / Visual
Operating System Firmware	4.6.0-rc5(Linux)
File System Firmware	MX-V5.2.6.7

A NOTE ON CAMERA CHANNELS

The CathexisVision software packages have **limits on camera channels**. A multi-head camera is physically a single device (camera) but it requires a camera channel for each one of the internal cameras. The same applies to an encoder: a 16-channel encoder will account for 16 camera channels on the CathexisVision software, even though it is a single device.

1.2 Requirements

- CathexisVision 2021.1 and later.
- Win 10: 64-bit and later.
- Minimum 16GB of RAM required.
- 8th Generation Intel i7 or later with integrated GPU.
- CathexisVision Server license.
- CathexisVision IP Camera license.
- CathexisVision Analytics III license.

Note: in this integration, individual devices will require a license for each device.

For information regarding the regular operation of a Mobotix M series thermal camera, please consult the relevant Mobotix M series thermal documentation.

1.3 Integration Components

All CathexisVision integrations have two component levels: **Device** and **Object**.

Device	The device is CathexisVision software's interface, which handles all the interaction between CathexisVision and the integrated hardware. When an integration is added to the CathexisVision system, a device is added. The messages received from the device are called Device Events.
Objects	Objects are the individual pieces of hardware that comprise the integration. There may be multiple "object types" under the objects group.

USEFUL LINKS

*To view **tutorial videos** on CathexisVision setup, visit https://cathexisvideo.com/resources/videos*

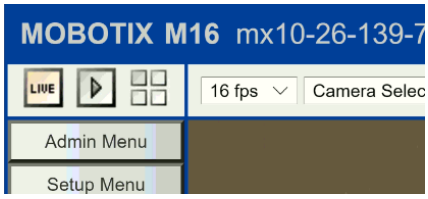
*Find answers to Cathexis **Frequently Asked Questions**: https://cathexis.crisp.help/en/?1557129162258*

2. Device Addition and Configuration

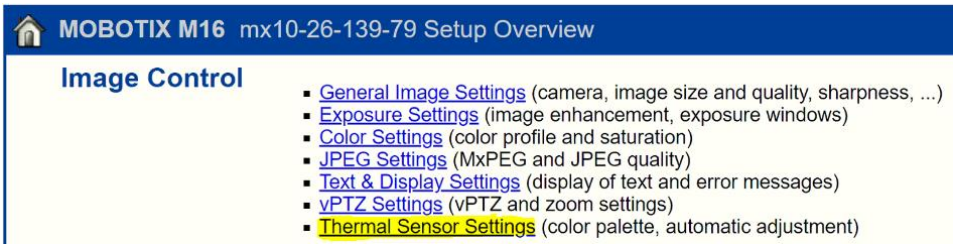
This section will detail the procedure for setting up the two systems, CathexisVision and Mobotix, to effectively communicate with each other.

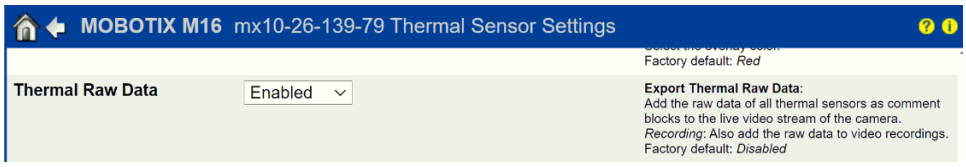
2.1 Mobotix Web Interface Setup

1. Log in to the Mobotix camera web interface with the user's camera credentials and go to the Setup Menu Tab.



2. Go to Thermal Sensor Settings menu and enable Thermal Raw Data.

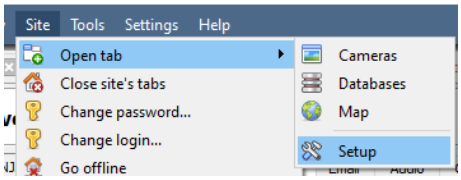




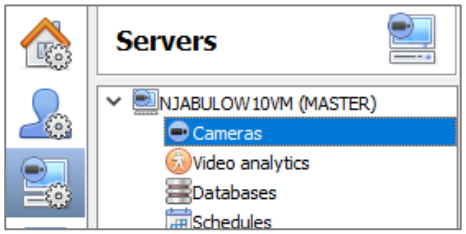
3. Click **Set** at the bottom left to save the settings

4. Then click **Close** and **OK** to store the setting permanently.

2.2 Add a Camera in CathexisVision



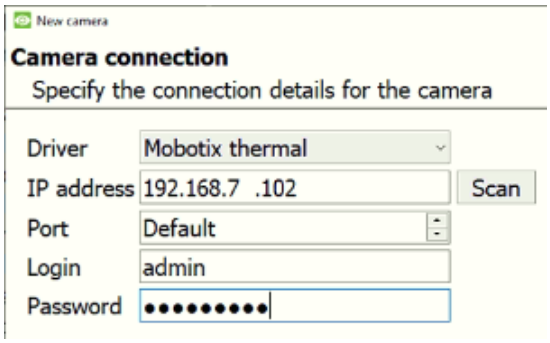
1. To add a camera in CathexisVision, go to **Site / Open tab / Setup.**



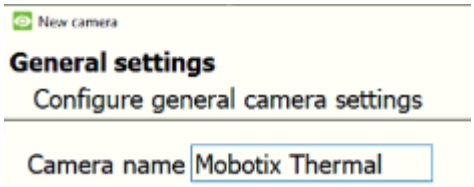
2. Go to Server / Server name / Cameras.

3. Click New to **add a new camera.**

4. Choose the **driver as Mobotix thermal** and enter connection details.



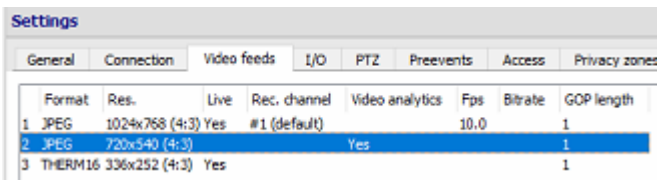
5. If successful, **give the camera a descriptive name**, then click Next.



6. Configure the three streams as follows:
   a. Stream 1 - Live and main recorded stream.
   b. Stream 2 – Analytics stream, ensure the same aspect ratio as stream 1
   c. Stream 3 – Thermal stream

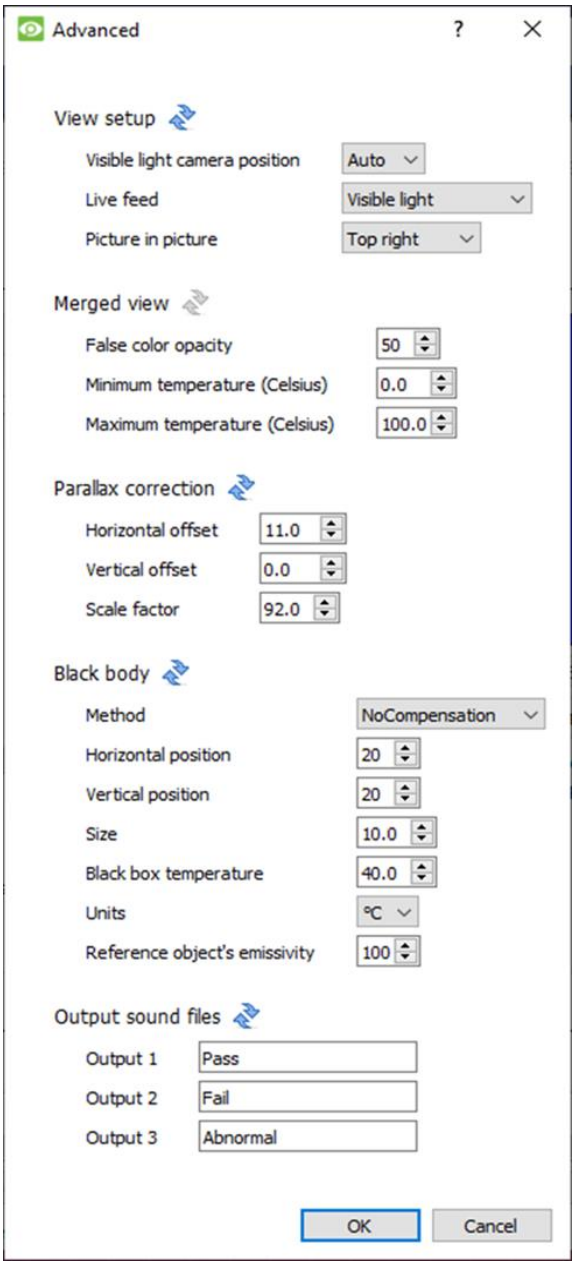
   Note: the last two streams have limited options.

7. Enable video analytics in stream two by right-clicking and selecting enable video analytics.



The 2nd stream here should be disabled for live, but enabled for analytics.

8. To configure camera view settings, parallax error compensation, the black-body regulator and the output sound files please go to Advanced settings.



View Setup

The camera view is fully customizable. The position of **Picture in picture** can be changed and the **Live feed** can be configured. Use **Visible light** for general display.

Merged view

Use **Merged view** to set the parallax. In Merged view configuration, one can set false colour opacity, minimum temperature and maximum temperature.

Use **False Colour** Thermal where the client requires the people being measured to remain anonymous.

Parallax correction

As the M series cameras are supplied with two sensors, and those sensors will have different lenses and look in slightly different directions, it is necessary to compensate for the different views.

When the Cathexis analytics has located a face in the visual stream, it is essential that the correct co-ordinates are then applied and used when extracting the relevant raw thermal data from the thermal image.

For this, the visual image and thermal image must be aligned and of the same size. The **Parallax correction** settings are used to achieve this.

1. First set the View Setup to Merged.
2. Have someone stand in front of the camera on the chosen measurement point. **Note:** the people being measured should always be as close as possible to the measurement point, the parallax point. The distance from subject to camera should be in accordance with the recommended tolerances of the Mobotix camera.
3. In Parallax correction, alter the scale setting until the person seen in the thermal image is the same size as they are in the visual image.
4. Then adjust the horizontal and vertical off-sets until both images are perfectly aligned.

Once the configuration is complete, the View Setup can be set back to Visible Light.

Black body

- If Black Body Radiator is selected, a Thermal Overlay comprising a black box with 4 red outline quadrants will appear in the False colour thermal view. Move the thermal overlay so that it covers the heat emitter of the black body radiator by adjusting the horizontal position, vertical position and Size.
- **Size** refers to the size of the cross in reference to the object.
- **Black body temperature** is the black body temperature in Units (Celsius or Fahrenheit can be used)
- **Reference object's emissivity** refers to the emissivity of the reference objects.
- The accuracy of the temperature measurement depends on whether the emissivity of the measured object, which is determined by its material and surface, has been taken into account accordingly and entered correctly in the camera software.
- The virtual black body is an alternative method to correct drift that occurs in the raw thermal data. The setup consists of placing a measurement box on a flat box and setting the emissivity (For a wall, it is around 0.9). A virtual black body can be used if the user does not have a black body radiator, but it is not a replacement for a black body radiator as it is not 100% accurate.

The last two configuration options can be used to fine tune the on screen measured readings with that of the manual (thermometer) readings.

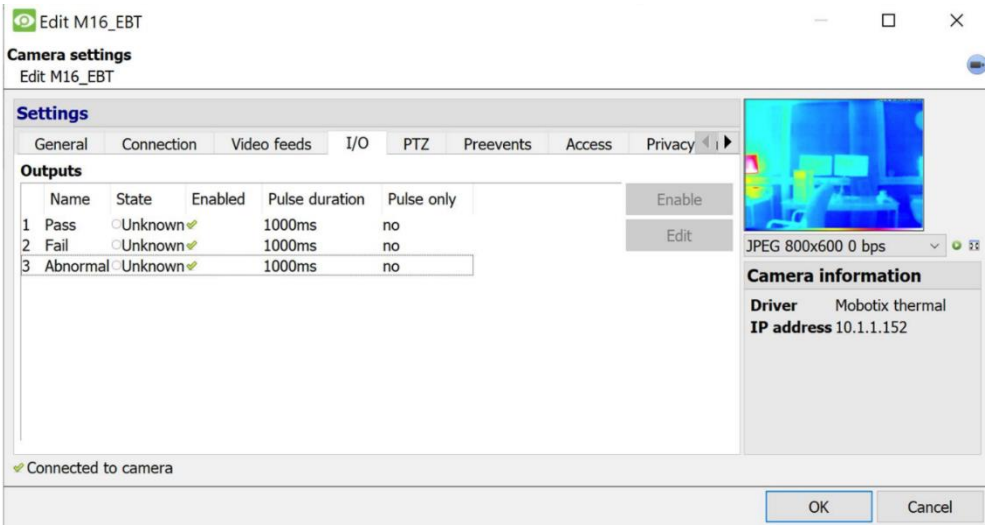
Output sound files

The integration can also set audio sounds to be played out of the camera by triggering I/O configured in the camera.

The audio files are .wav files. They need to be formatted in mono at 8Khz, A Law. The camera has 46984 Kb of storage available for sound files. The "Pass", "Fail" and "Abnormal" files are about 4Kb each. The default sound files are the Mobotix 'Beep', 'Alarm' and 'Busy' sound files that are already loaded on the camera, corresponding to 'Pass', 'Fail', and 'Abnormal' conditions.

These files can be uploaded to the camera in the **Admin Menu / Manage Audio Messages**. Once this is done the outputs on Cathexis can be set up in the camera **Video Feeds / Advanced menu** (as shown above).

Each output must be changed to match the name of the desired audio file exactly, without the extension on the end. Pass.wav would be entered into the box as "Pass". To make Cathexis play the file the corresponding output must be pulsed.



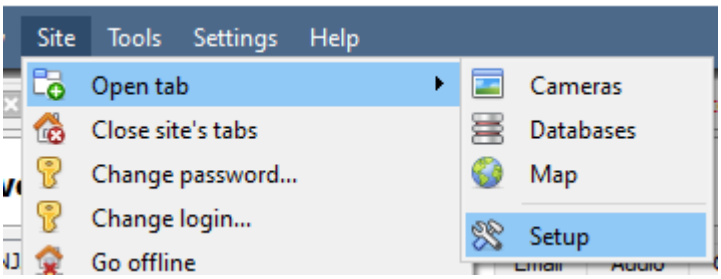
Then in the event, trigger that I/O as an action and it plays the relevant sound out of the camera.

3. Analytics Setup

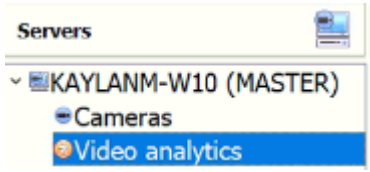
This section details how to configure thermal face temperature analytics.

3.1 Setting up a Thermal Analytics

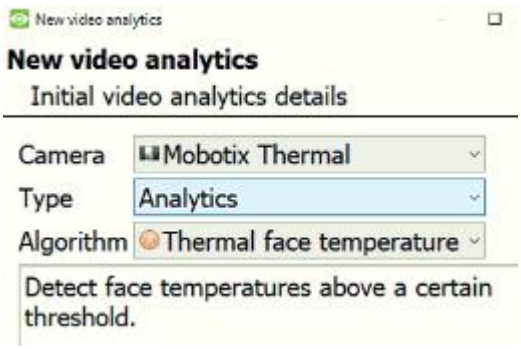
1. To configure video analytics in CathexisVision, go to **Site / Open tab / Setup**.



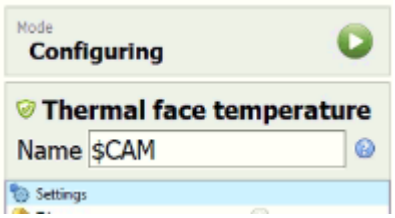
2. Then go to Video analytics in the server that has the Mobotix camera.



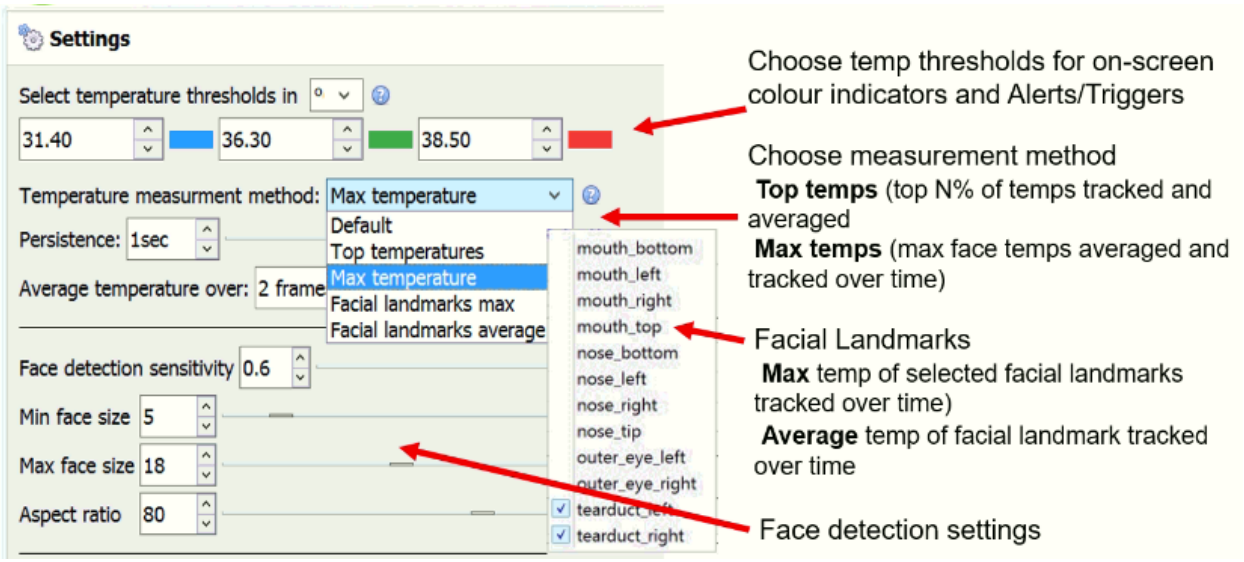
3. Right-click or select New to configure new analytics.
4. Choose the Camera, Analytics as the type, and the Algorithm as Thermal face temperature. Then click next to continue.
   Note: Enable video analytics stream 2 to see the camera here. Analytics License III is needed for this.



5. Click on Settings to configure rules.



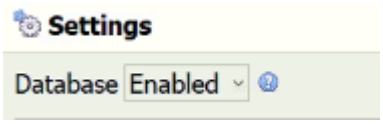
Configure the settings.



Note: the minimum temperature read is 30 degrees Celsius. Anything less than this value is considered as an invalid reading and will not trigger. Temperatures are read in degrees Celsius, degrees Fahrenheit, and Kelvin.

- Facial landmarks should only be used when:
  - A black body is deployed.
  - The person being read is stationary on a precise spot marked on the floor for at least two seconds.
  - The Parallax has been set accurately.
- However, if Top or Max temperature are used, and applied over the area of a rectangle, the exact overlap of the thermal and visual is less important.
- The head size to position the person. Very small head size could mean a person could be detected far away, and far away from the point of convergence.

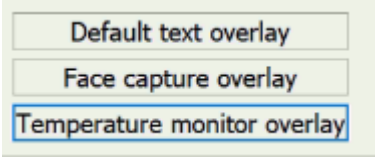
6. In order to database the temperature information, enable the database option. See section 4 to make this option fully operable.

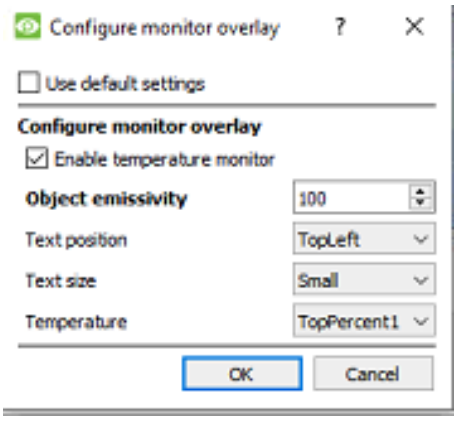


7. In order to receive an email notification when one of the triggers is on, enable email notification. To receive the email with the trigger information/temperature reading, make sure this is enabled.
Note: The server needs to be configured to send mails.

Note: Do **not** add multiple email addresses.

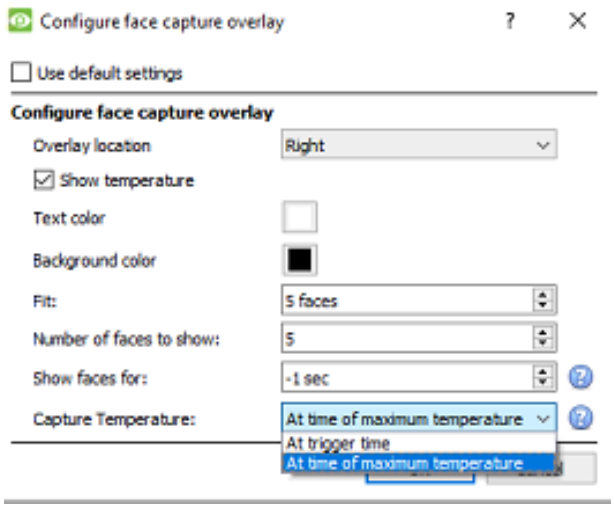
8. There is the option to customise the overlay.





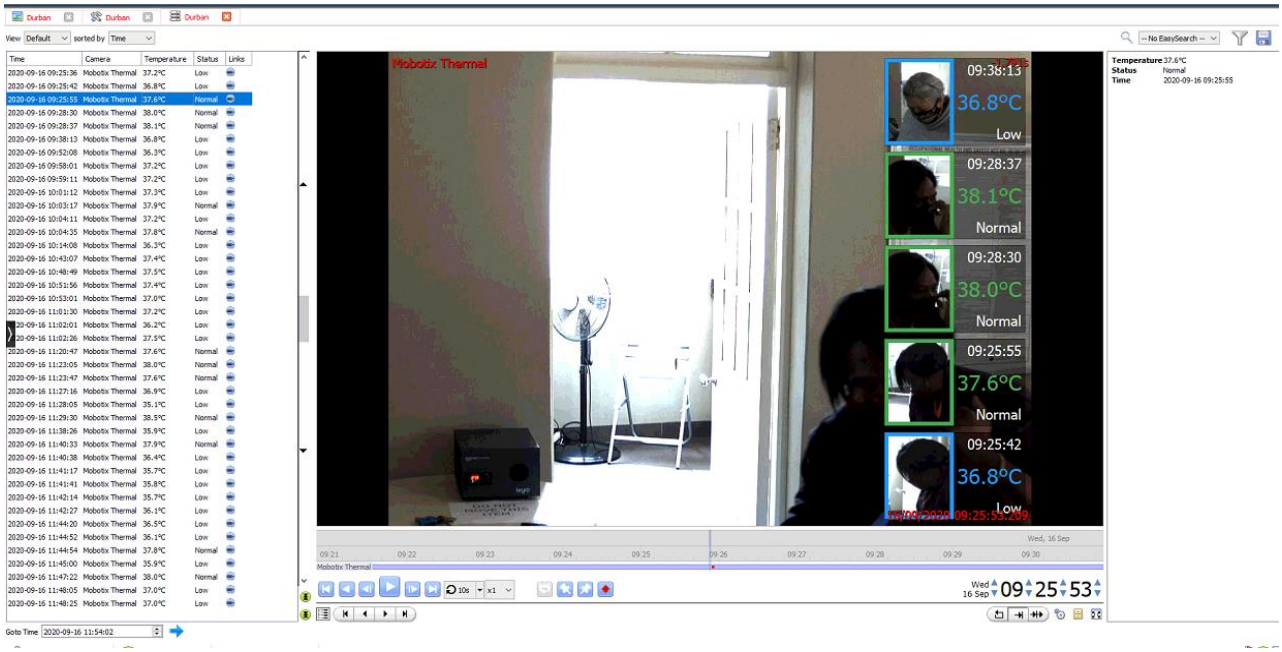
There are two options to capture the temperature Under Face Capture Overlay.

- At the trigger time.
- At time of maximum temperature.



- For option 1, the temperature is stored in the database at the time of the trigger and the face will be displayed at the time of the trigger. For example, if an event has been set to trigger when the temperature is greater than 38 C, the information will be stored to the database the moment the temperature reaches that level while for option 2 (if it happens that there are 5 different readings while the person is still on scene 38,43,40,32 and 42 the maximum reading (43) will be stored in the database).

- For option 2, the temperature of the object/person will be monitored until the person leaves the scene at which stage the maximum temperature, the time it was measured will be stored in the database, and the face will be captured and displayed in the chosen position at the time of the highest reading. The best option is dependent on the camera position.

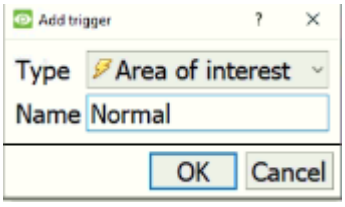


Example of Database View.

Under **Face capture overlay**, there is the option to choose the duration of the face overlay. This means the user can choose to display the face for 5 seconds after the trigger and it'll disappear after that duration.

There is also have an option to display the faces until the next trigger becomes active. For example, in the case of 5 faces upon the 1st trigger the 1st face will be displayed, on the 2nd trigger the 2nd face will be displayed while the 1st face will move down and so on. The faces will shift as soon as a new face is detected.

9. To configure a trigger, go to Trigger menu. Click on the green **+** icon and give the trigger a descriptive name.



10. Setup the area of interest, choose the temperature/s for the event to trigger on by checking the relevant boxes.

11. Click **OK** to save settings.

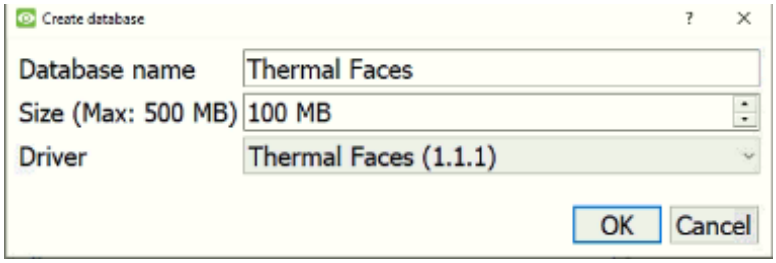
4. Integration Database

This section will detail how to configure the integration database for the Mobotix M16 thermal camera. The database tab allows navigating to the databased entries, for each individual database. In the database tab, each database is presented as a table. It has built in filters, and the ability to navigate by timestamp. If a database entry has an associated recording, this recording can be launched from within the database tab.

Most integrations will have a different database presentation, and unique filters, due to the different parameters sent to CathexisVision by the integrated device.

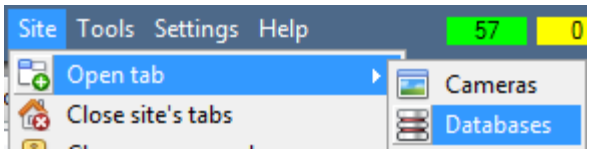
4.1 Integration Database Setup

1. To create a database, go to Site / Setup / Integration Database.
2. Initialise the database if this has not been done.
3. Choose the partition location and size. Then click OK.
4. A pop-up message will appear indicating that the software will restart, accept and log in again.
5. Go to Site / Setup / Integration Database.
6. Click on New if the database had not already been initialised.
7. Give the database a descriptive name, size, and choose the **Thermal faces (1.1.1) driver**.



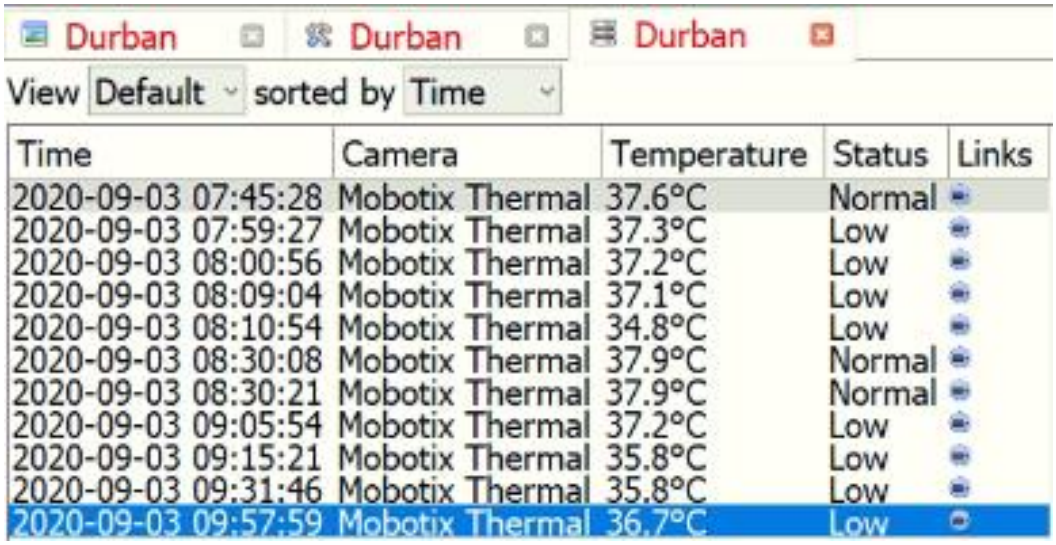
8. Click OK to save.
9. Then click on Close to close the setup.

4.2 Navigate to the Database

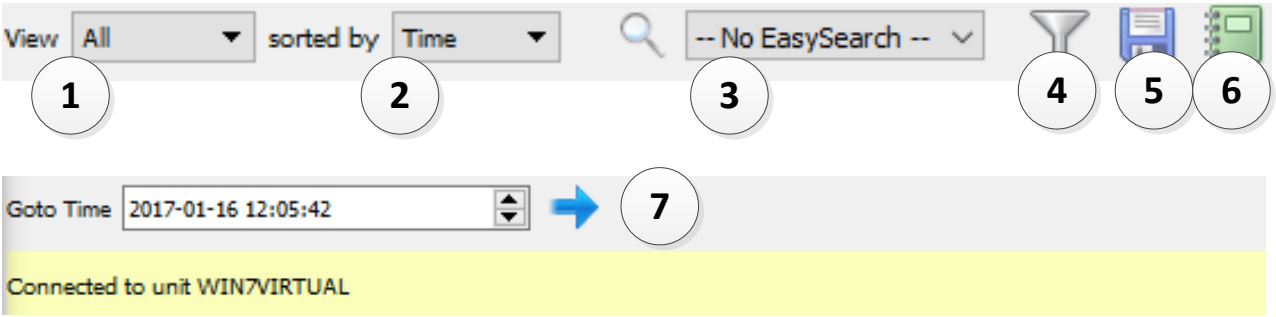


View information stored in the Integration database, by following the path seen to the left. This will navigate to the Database Tab.

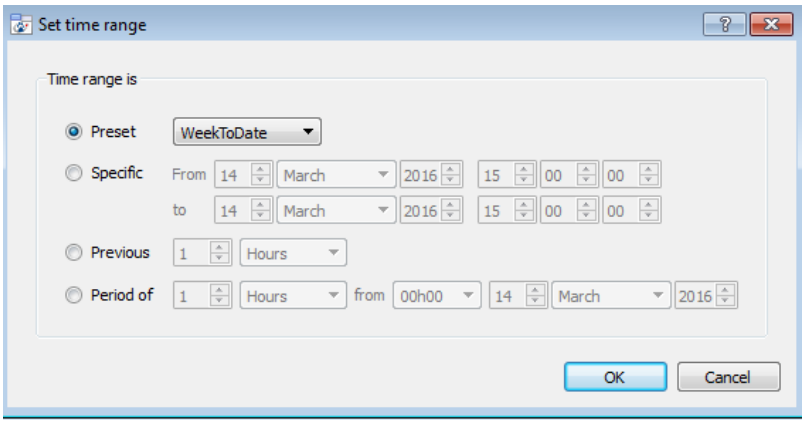
Once in the databases tab, select the relevant integration database. The databases are ordered under the NVRs that they are attached to. Below is an image of a Mobotix Camera database:



4.3 Database Interface

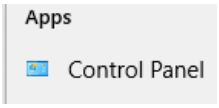


① **View**	Changes the way that the database is presented. The Mobotix M16 Thermal Camera only has a default view option.
② **Sorted By**	Sort the Events based on the following parameters: **Time**
③ **Easy Search**	The easy search option allows quickly searching the database within one of the following options: -- No EasySearch -- -- No EasySearch -- Temperature Status Max temperature Camera Camera number ID
④ **Filter**	Filter offers a more advanced manner of sorting information in the Integration Database table. Once the filters dialogue is open, the following options are available: 1. To **enable** filters, check this box: Enable filters 2. To **add** a new filter, click on . The filter icon will change to when filters are active. 3. To **delete** an added filter, click .

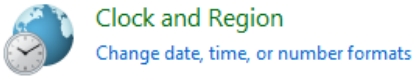
	A **Time range,** within which the search will be conducted, may also be set. To set a **Time range**, click on the blue hyperlinked text which specifies time (for example, *in the Week to date*). This will bring up the following dialogue box, where the time range can be defined:  **Note**: 1. Multiple filters may be run simultaneously. Filters with the same parameters may be run more than once. 2. To change a filter, click on the blue hyperlinked text.
⑤ **Export**	Generate metadatabase reports in PDF or CSV format. See below.
6 **Manage Reports**	Generate scheduled metadatabase reports. See below.
7 **Go to Time**	This navigates to a specific point in time, down to the second. To navigate to a timestamp, set the time using the time and date boxes, and then click on the icon.

4.3.1 Displaying the temperatures in Fahrenheit or degrees Celsius

1. Visit Control Panel.

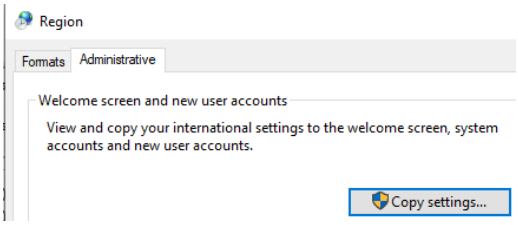


2. Click on **Change date, time or number formats** to change the region.

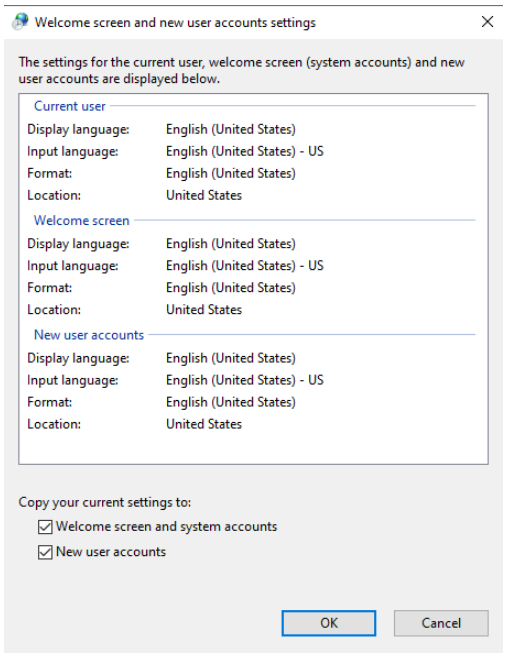


3. To display the reading in F, change the regional system settings to English US. To display in C, change to English UK.

4. Move to **Administrative** tab and click on **Copy settings…**

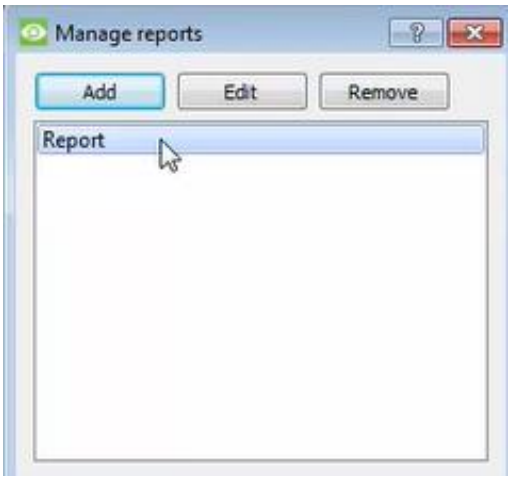


5. Check **Welcome screen and system accounts**. Check **New user accounts**. Click **OK** to save.



4.3.2 Scheduled Metadatabase Reports


Click this icon to open the scheduled report window.



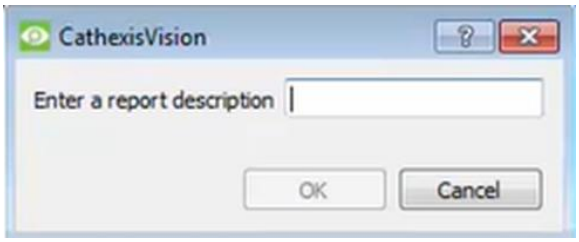
All created reports will be listed here.

First, click **Add** to create a report. Then **edit** to define the reporting schedule. See below for more detail.

To create, edit, or delete a report, select the entry and click on the corresponding button.

4.3.2.1 New Scheduled Report

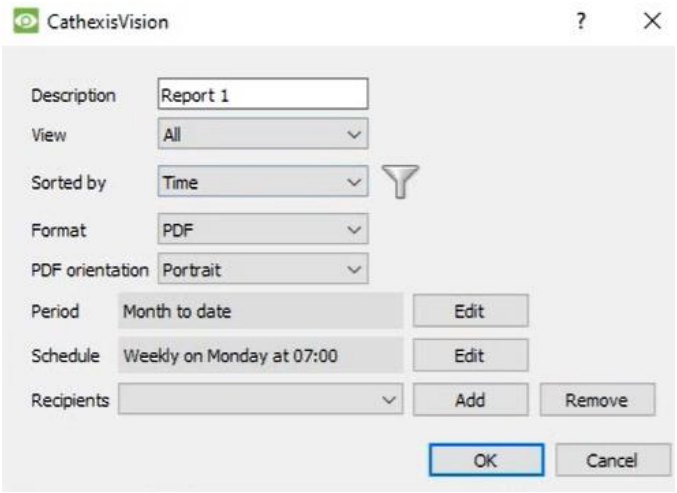
Click **Add** and give the report a description.



Click **OK** when done.

Once the new report is listed with the other reports, select it for editing to define the reporting schedule.

Either right-click the entry and select schedule or select the entry and click the schedule button at the bottom of the screen: Schedule .



Edit the **description** if needed.

Edit **Viewing** options.

Select the **Sorted by** option.

Select the **Format**.

Select the **orientation** of the Format.

Select the **period** to be reported on.

Define the **Schedule** for the report.

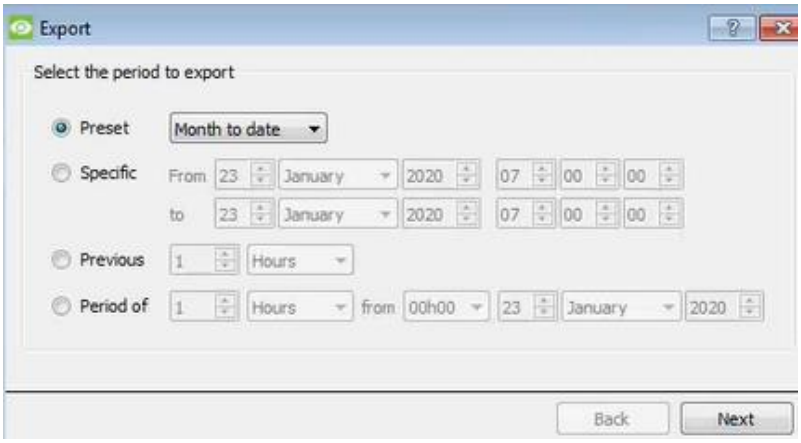
Add/remove recipients to whom reports will be sent.

Add recipient: Click **Add** and enter the email address of the recipient. Multiple recipients may be added. All will receive emails.

Remove recipient: Select the recipient from the dropdown menu and click **Remove**.

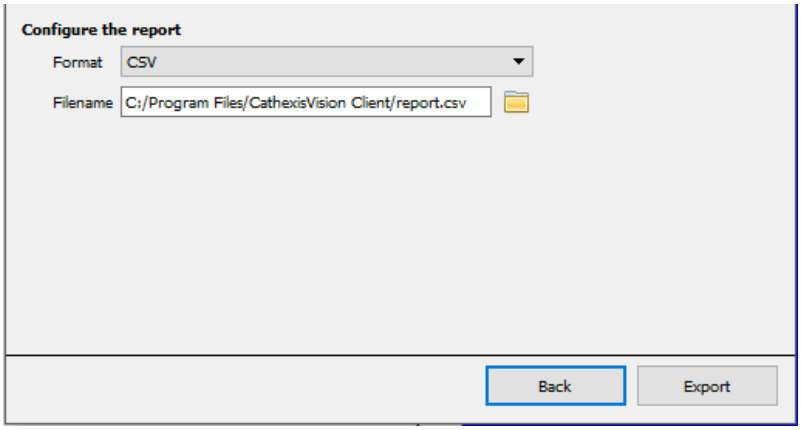
4.3.3 Generate Metadatabase Reports


Click this icon to open the Export window.



Select the **Period** to export, and enter the required details.

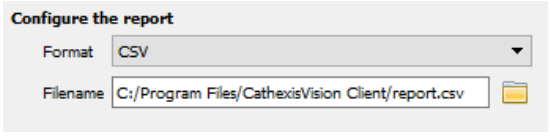
Click **Next**.



Select the **Format** to export the report in; either CSV or PDF.

See below for the two options.

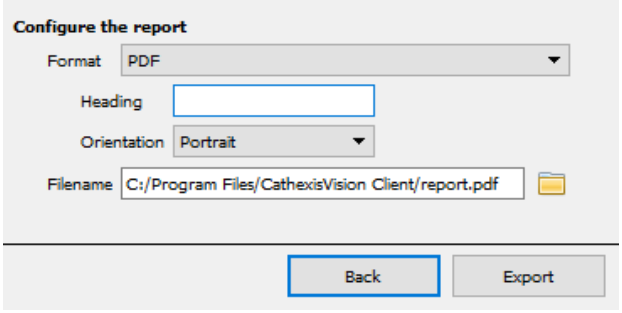
4.3.3.1 Export CSV



Select CSV **Format**.

Edit the **Filename** by either entering it straight into text field (replacing **report.csv)**, or click the  to choose a new save folder and filename.

4.3.3.2 Export PDF

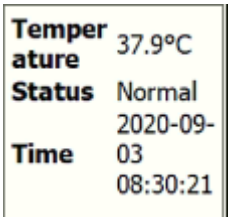


Select PDF **Format**.

Give the PDF a **Heading**.

Select either Landscape or Portrait **Orientation** of the PDF. Edit the **Filename** by either entering it straight into text field (replacing **report.csv)**, or click the  to choose a new save folder and filename.

4.3.4 Metadata



On the right-hand side of the database, meta-data about the event entry is displayed.

4.3.5 Viewing an entry's associated recording

If cameras are attached to device objects in the Integration setup, and these cameras are set up to record continuously, each Integration database entry will have a corresponding recording. To view a databased event's recording, double click it. A floating replay window will appear, from which video content may be archived and reviewed.

5. Events

A CathexisVision event has a trigger, which causes an action. Set integrated devices to act as triggers, or as actions. This document will detail the Mobotix Thermal Camera integration specific aspects of Events. There is a comprehensive guide to CathexisVision Events in the main setup manual.

Most of the data that CathexisVision receives from a device is presented in the Events interface. This is done in order to give the user a full range of options. As a result, some of the options presented in the interface may be *impractical* as an event trigger, or action.

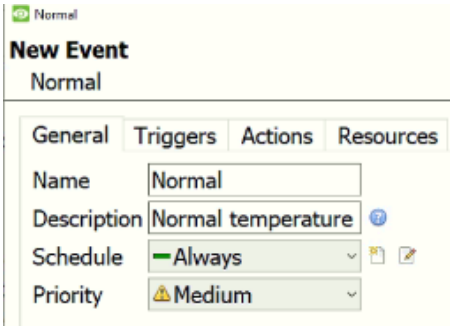
5.1 Creating an Event

5.1.1 Setting up Cathexis pre-defined events

To configure events, go to Server settings, then Events tab.

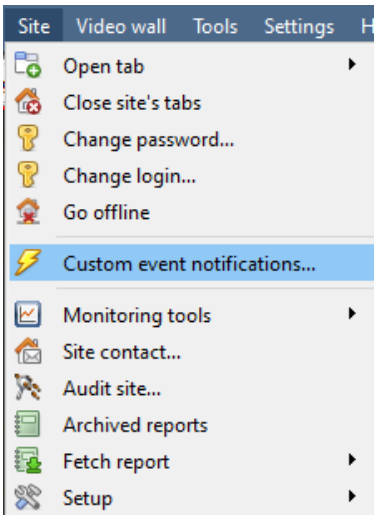
Click New.

Give the event a descriptive name and priority level.

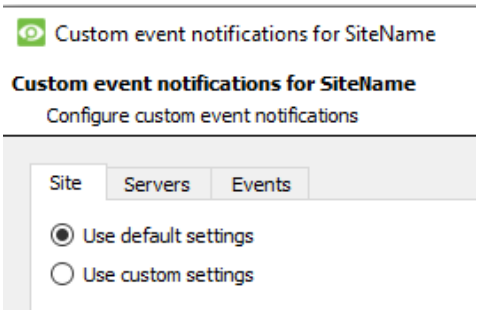


5.1.2 Setting up Cathexis custom events

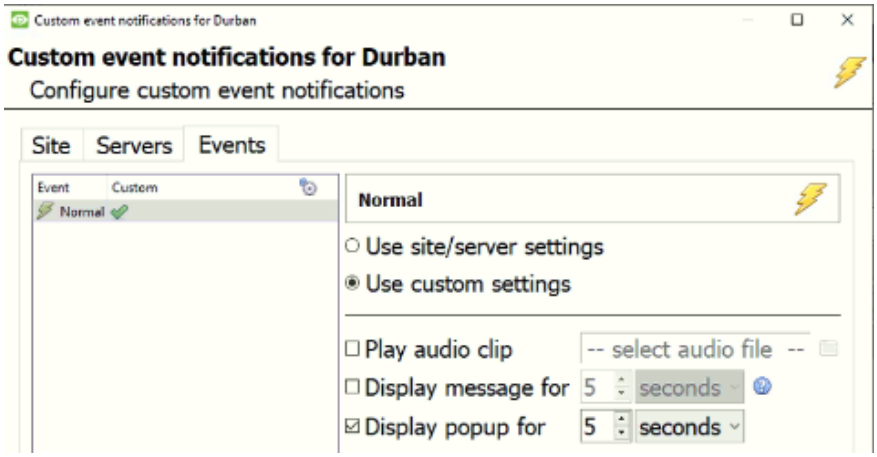
1. To set up Custom Events, go to Site, then choose Custom event notification.



2. Leave Site tab as default.



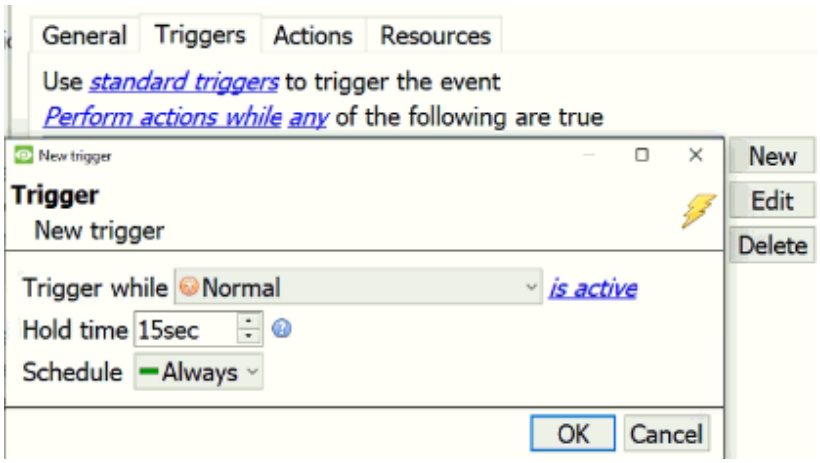
3. Move to Events tab, select the event name and then choose Use custom settings.



4. Choose the notification and adjust the duration as per the specifications. Then click OK to save.

5.2 Triggers

A trigger is the user defined input that notifies the event to start. The trigger causes the subsequent action (which the user will also define).



Move to the Trigger tab and click New to set a new trigger.

Choose a trigger to use. Make sure it is trigger while “triggername” is true (active), or else conditions will be inverted. Then click OK.

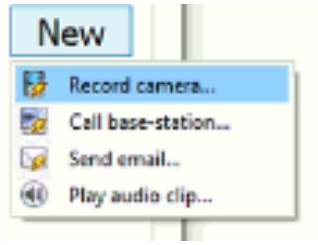
5.3 Actions

Once the triggers that are going to initiate the event are defined, define some Actions.

Move to the Actions tab.

Click New to choose new action/s.

Define action/s rule and click OK to save.



5.3.1 Actions (pre-defined events)

Note two actions: Call base-station and record camera.

With base-station, review the recorded footage and clear the alarm.

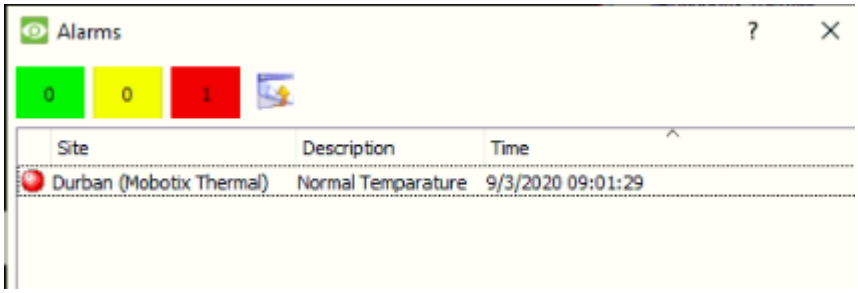
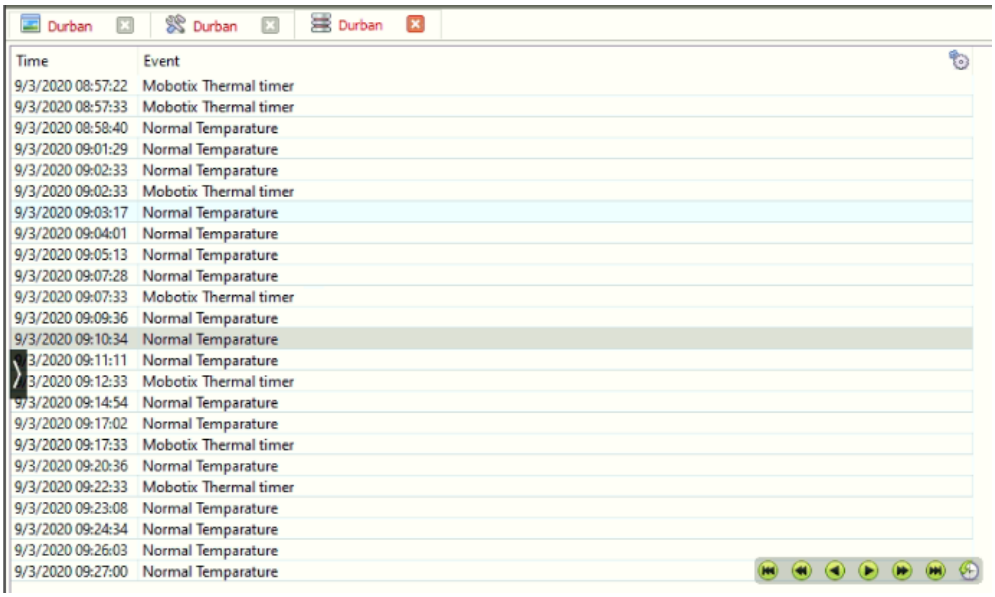


Figure A: Showing Alarm triggered by a normal temperature.



5.3.2 Actions (custom events)

There are two actions: Display message and Display popup.

Figure C: Display message action for custom events.

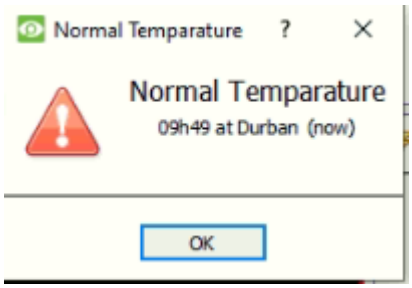


Figure D: Display popup action for custom events.

6. Conclusion

This app-note was designed to deal specifically with this integration. For further information about the CathexisVision software, consult the main manual (http://cathexisvideo.com/). For support, email support@cat.co.za