SILENT SENTINEL ARE SPECIALISTS IN LONG RANGE OPTICAL SENSORS INCLUDING BOTH COOLED AND UNCOOLED THERMAL CAMERAS

FIXED MODUM ETS SOFTWARE GUIDE

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SILENT SENTINEL
VISION & MOTION CONTROL

Conditions of Release

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If you need the latest version of this manual, please contact us. Silent Sentinel recommends that you use this manual under the guidance of professionals.

Record of Changes

Issue	Date	Details of Changes	Amended by
V1.0	22/06/2020	Initial draft	Xueer Lin
V1.1	25/06/2020	Add context about text size, login pwd, BB-R, NUC, EdgeVis pwd	Xueer Lin
V1.2	30/06/2020	Modified context for release of v1.84.3-devA	Xueer Lin
V1.3	03/07/2020	Add license related content. Add pre-configuration instructions. Add common trouble shooting.	Xueer Lin
V1.4	06/07/2020	Formatting, spelling.	Xueer Lin
V1.5	14/07/2020	Update license request form	Xueer Lin
V1.6	05/10/2020	Add Thermal-only content	Xueer Lin

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1. Prerequisites

Please refer to the help desk to ensure you have the latest version of the software applications and user guides:

https://silentsentinelhelp.helpdocs.com/fixed-modum

2. Introduction

The aim of this document is to detail the steps required to configure and operate the SS ETS (Silent Sentinel Evaluated Temperature Screening) system and associated capability.

3. System Overview

The entire ETS System has several components required to provide its entire capability as follows:

Local Viewing. The local viewing capability allows the local operation and detection of objects from a 2 to 5 meter range. A local operator is deployed at the front end with the equipment providing a first layer mechanism of viewing and alerting. The local viewing equipment consists of:

- MODUM Camera (Thermal & HD Daylight);
- Equipment Enclosure;
- Local Viewing Laptop running the Intelligent Screening Software;
- Blackbody Temperature Sensor (place at 2-5 meters away from the cameras);
- Transportable Equipment Platform / Housing.

4. Network Architecture

Figure 1 shows the system architecture/ connectivity of the capability.

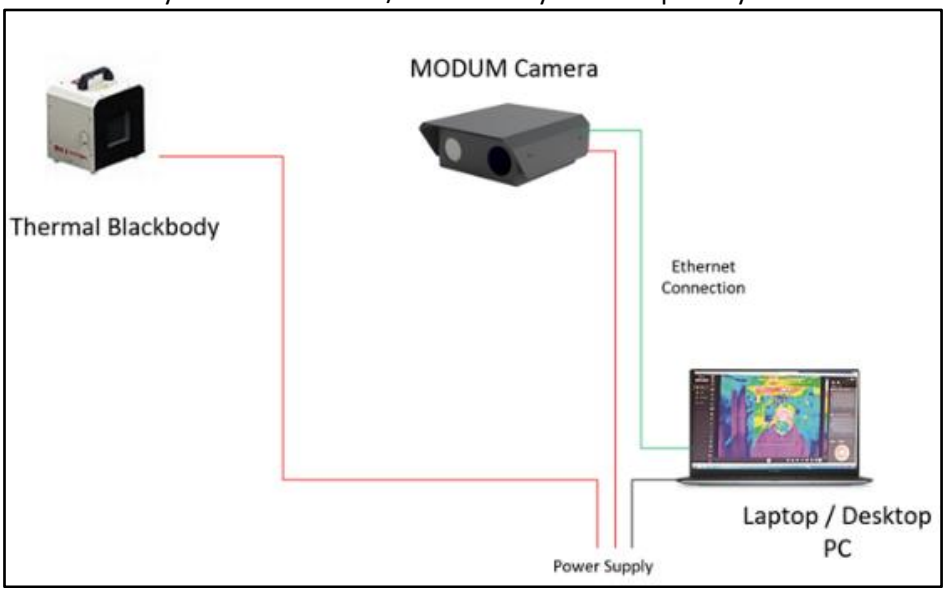


Figure 1 ETS System Architecture

5. Junction Enclosure IP address

Junction Enclosure IP addresses (for all Junction Enclosures) are shown in Table 1. The laptop should be given a static IP address other than 192.168.1.101 and 192.168.1.100. Detailed instructions on how to configure a static laptop IP address can be found in Appendix A – Configure a Static Laptop IP Address.

Device	IP Address	Default Gateway	Subnet Mask
Thermal Camera	192.168.1.101	192.168.1.1	255.255.255.0
HD Camera	192.168.1.100		

Table 1 System IP Address Scheme

6. Computer Requirements

System requirements for the software are as follows:

- **Operating System**: Microsoft Windows 10.
- **Processor**[1]: 32-bit or 64-bit Intel i5 or equivalent processor.
- **Memory**: 8GB RAM.
- **Monitor Resolution**: High Definition
- **Hard Drive Capacity**: >= 256GB

7. ETS (Evaluated Temperature Screening) Software Operation

This section of the User Guide details how to connect, configure, and operate the MODUM Screening application installed on the supplied laptop.

Hardware Setup

Before opening the software, please make sure that:

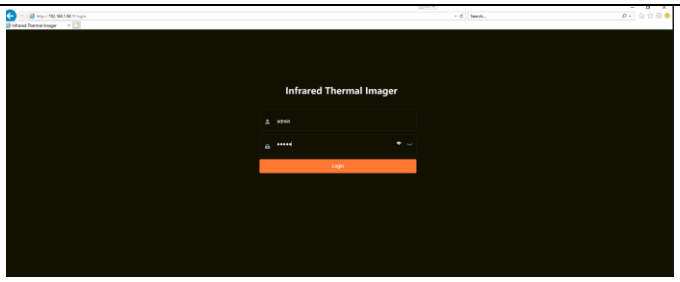
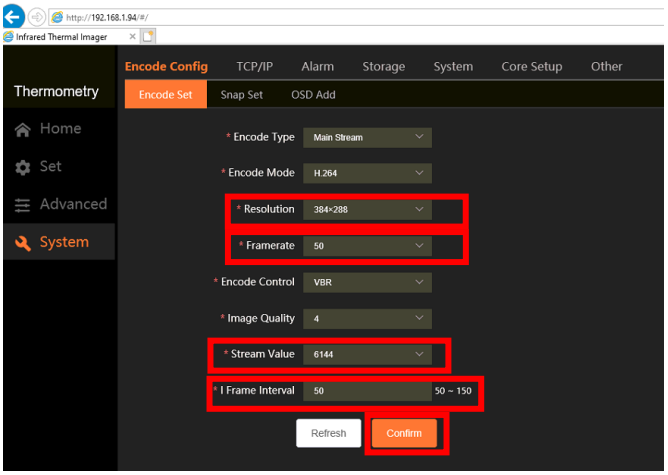
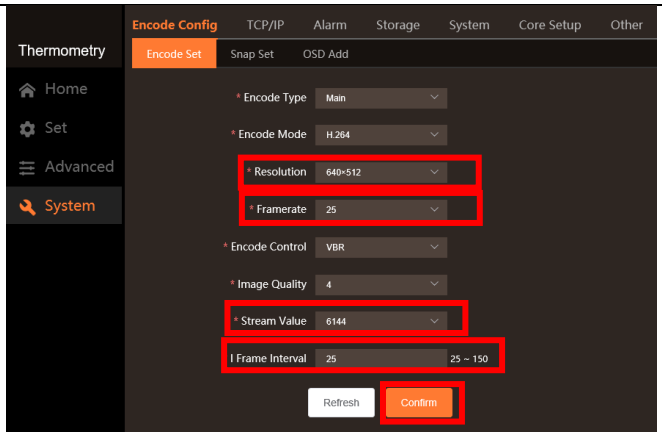
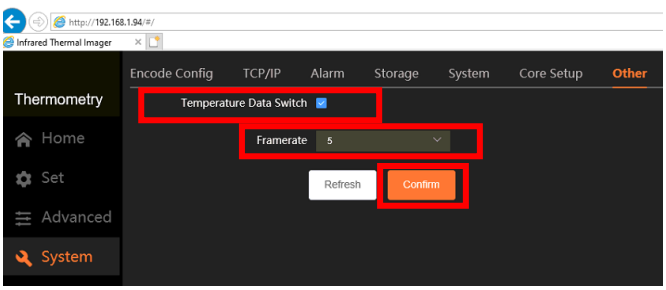
- MODUM device is powered on.
- MODUM is connected to the laptop via Ethernet cable, as shown in Figure 1.
- The laptop in use is connected to the same network/subnet as the MODUM camera and meets the specification detailed in Chapter 6.
- If an Ethernet-USB convertor is used, please check if the LED on the ethernet side is flashing constantly, as shown in Figure 2.
- The laptop's LAN connection has a static IP address. Instructions of setup a static IP can be found in Appendix A – Configure a Static Laptop IP Address.
- The Blackbody Temperature Reference device deployed with the FoV of the MODUM unit, at the distance of 2-5 meters away and set as 35°C.

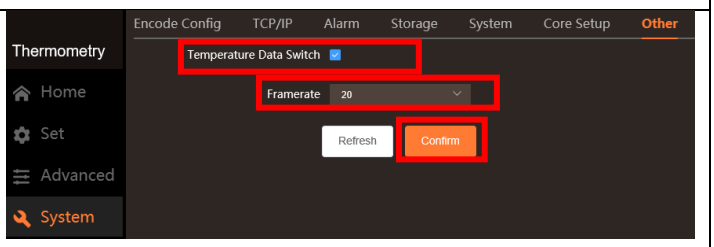
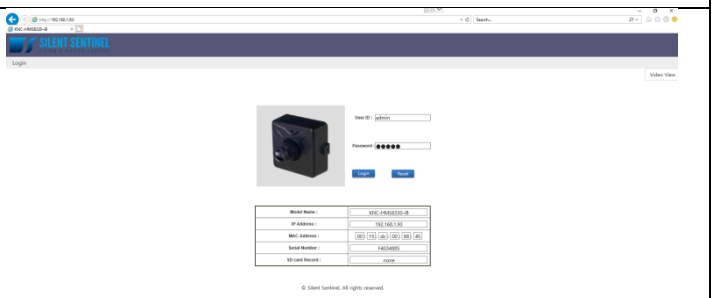
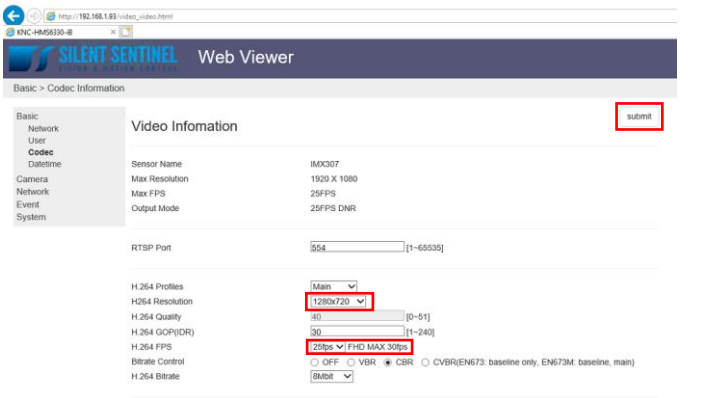
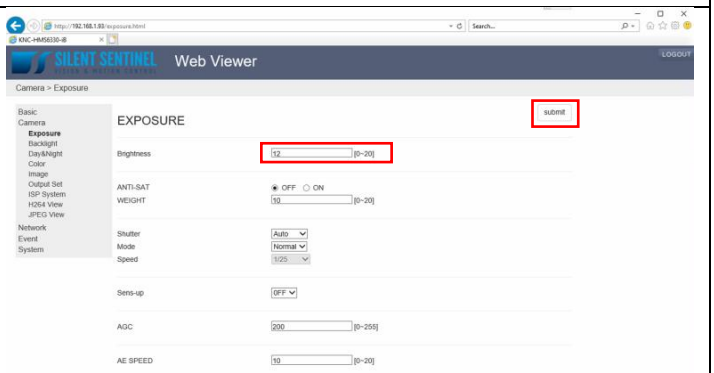
Figure 2 USB-Ethernet converter with LED indicator on and flashing

[1] The CPU processer should have a benchmark score of greater than 7500 - www.cpubenchmark.net

Cameras Setup

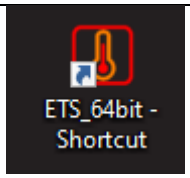
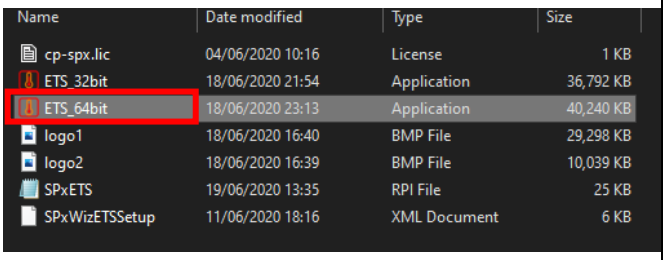
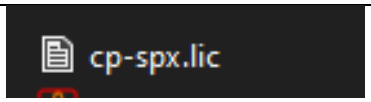
If you are switching from Silent Sentinel's old solution to the new one, please make sure your thermal and daylight camera are correctly configured as shown below.

Thermal camera		
1	Enter *http:///(Thermal cam IP address)* in IE. Log in as **admin/admin** (default password)	
2	Open **System – Encode Config – Encode Set**. For <u>low resolution</u> camera: Resolution: **384 x 288** Framerate: **50** fps Stream Value: **6144** I Frame Interval: **50** Click **Confirm** to save the settings.	
	For <u>high resolution</u> camera: Resolution: **640 x 512** Framerate: **25** fps Stream Value: **6144** I Frame Interval: **25** Click **Confirm** to save the settings.	
3	Open **System – Other**. Tick **Temperature Data Switch**. For <u>dual light</u> unit (daylight + thermal): Set the **framerate** to **5** fps.	

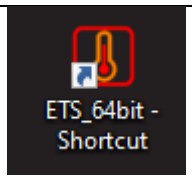
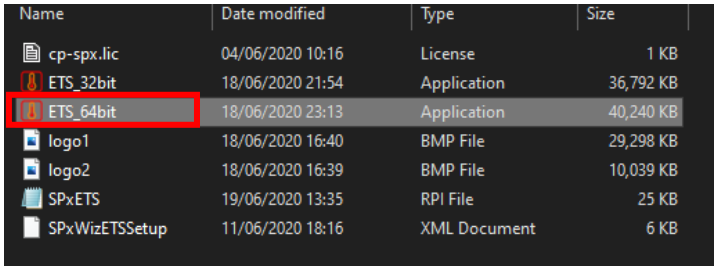
	Click **Confirm** to save the settings.	
	For <u>single light</u> unit (thermal only): Set the **framerate** to **20** fps. Click **Confirm** to save the settings.	
Daylight (Visual) camera • If a thermal-only unit is in used, you don't need to configure daylight camera.		
1	Enter *http:///(Daylight cam IP address*) in IE. Log in as **admin/admin** (default password)	
2	Open **Basic – Codec**. Set H.264 resolution to **1280 x 720** Set H.264 FPS to **25** fps. Click **Submit** to apply the settings.	
3	If the lighting condition in the room is not good enough to run face detection, increase the brightness setting. Open **Camera – Exposure**. Increase the brightness value accordingly. Click **Submit** to apply the settings.	

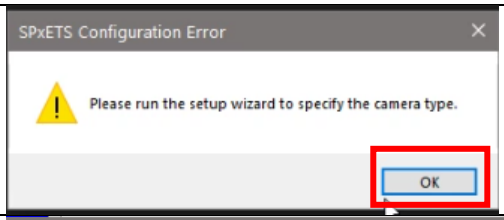
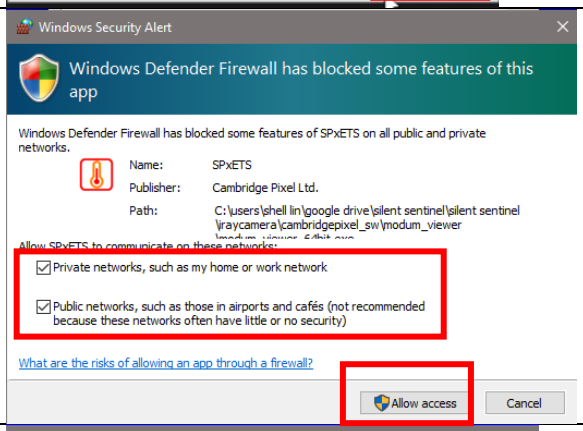
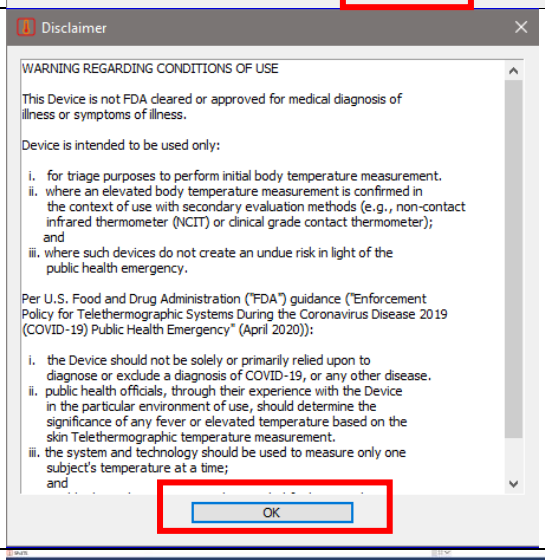
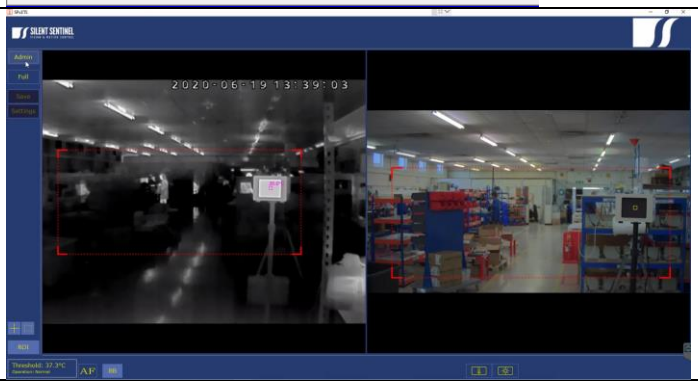
7.1. First-time Setup

7.1.1. Import License

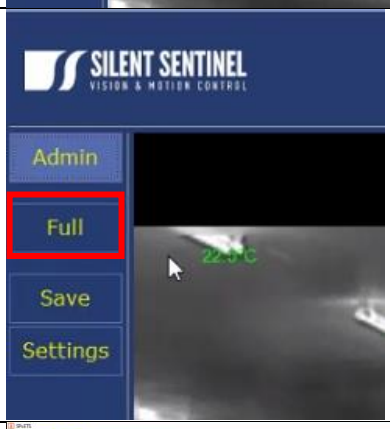
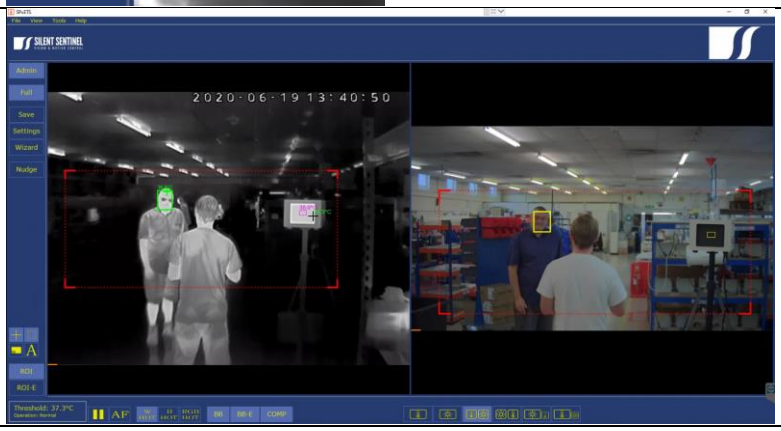
1	Double-click the **ETS** shortcut on the desktop. OR open the **SPxETS** application from the **SS_ETS** folder. There are 32-bit and 64-bit executables. It is suggested to run the 64-bit version whenever possible (i.e. not on a 32-bit only OS).	 
2	If a license is absent or invalid, it will prompt for the MAC address to generate a license for. **Use the form below to request a license:** **https://form.jotformeu.com/201672508535354**	
3	After receiving the license associated to the unique MAC address, rename the license as "**cp-spx.lic**" and place it in the application folder.	
4	Now you should be able to run ETS as normal.	

7.1.2. Open the Software

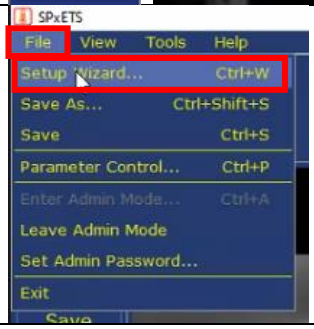
1	Double-click the **ETS** shortcut on the desktop. OR open the **SPxETS** application from the **SS_ETS** folder. There are 32-bit and 64-bit executables. It is suggested to run the 64-bit version whenever possible (i.e. not on a 32-bit only OS).	 

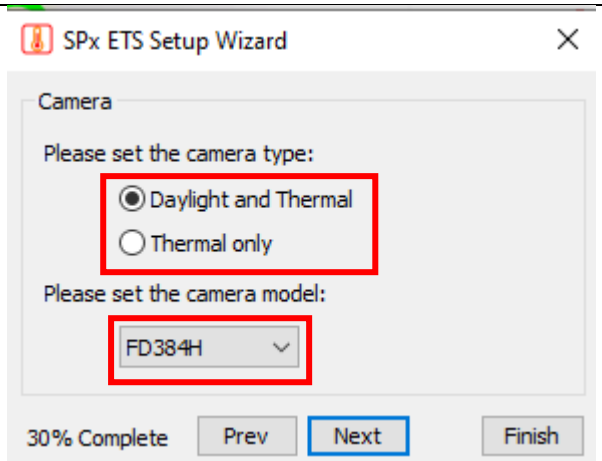
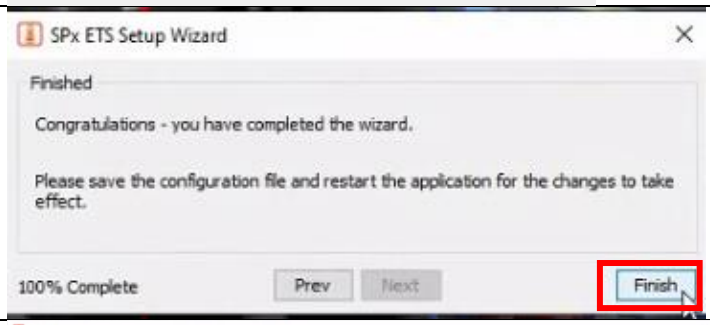
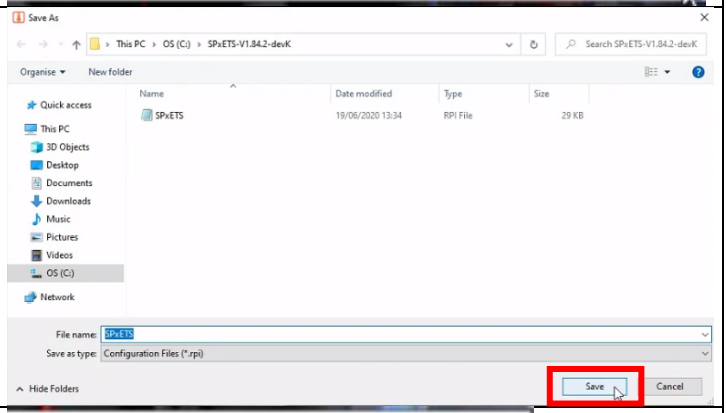
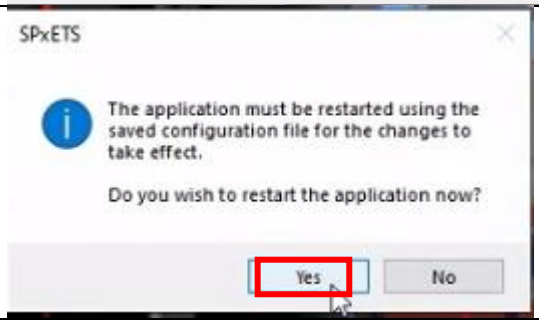
2	When first run, it should prompt you to run the wizard to specify which camera model you are using.	
3	**Allow** all network access if Windows Security Alert pops up.	
4	**Acknowledge** the Disclaimer.	
5	The home page with video display should be as per image on the right.	

7.1.3. Admin Login & Full Control Panel

1	Click the **Admin** button. Default password: **admin**	
2	Click the **Full** button to display all the control panel buttons.	
3	Home page with full control panel is shown as per image.	

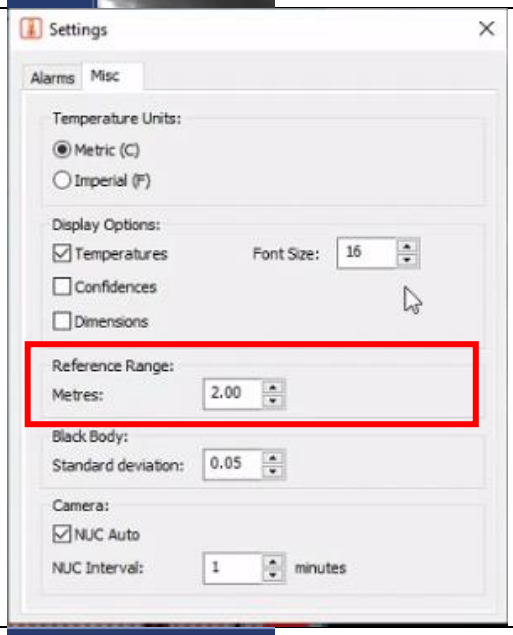
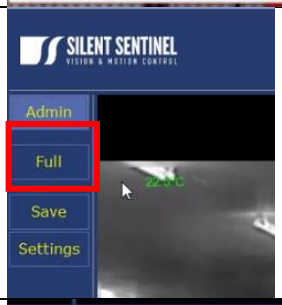
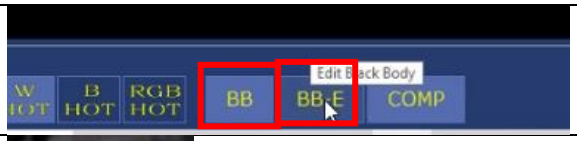
7.1.4. Select Thermal Camera Type

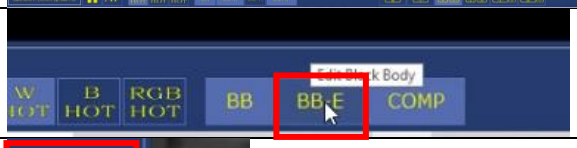
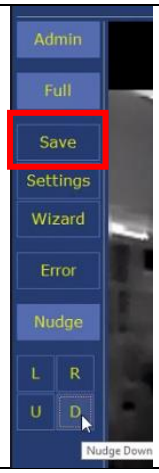
1	Log in as **admin**	
2	Open the **File** drop-down menu. Select **Setup Wizard** from the dropdown menu.	

3	Keep clicking **Next** until you arrive at the **Camera** page. Select the camera type being used: **dual light** or **single head**. Select the camera model being used: **FD384H** (low resolution) or **FD640H** (high resolution).	
4	Keep clicking **Next** until you arrive at the **Finished** page. Click **Finish**.	
5	Save the .rpi file.	
6	Click **Yes** to restart the application.	

7.1.5. Offset and Alignment Nudging (Dual-light system only)

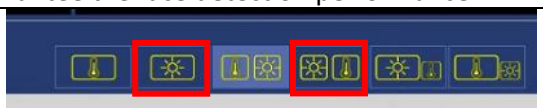
1	• Measure the distance between blackbody and camera (recommened distance: 2-5m). • Avoid placing blackbody at the edge of FOV. • Make sure you have set the camera type as instructed in 7.1.4. • For single light MODUM unit (i.e. thermal only), you can skip the alignment step.

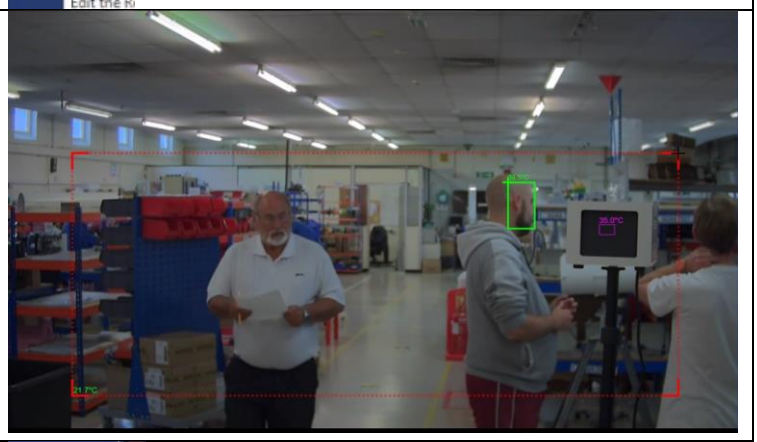
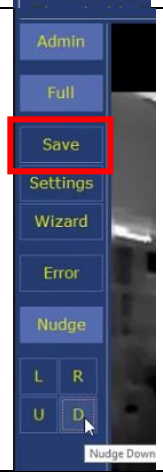
2	Open **Setting** windows.	
3	Enter the distance between the camera and blackbody as **Reference Range**. Close the window to apply the setting.	
4	Show the **Full** interface	
5	Switch to **Side-by-Side (thermal-daylight)** display.	
6	Enable **BB** and **BB-E.**	
7	Draw a small rectangle to cover around 30% of the blackbody area in the **thermal** stream.	

8	Disable **BB-E.**	
9	Use the **Nudge** buttons (**L/R/U/D**) to align the <u>yellow</u> rectangle in the <u>daylight</u> stream to cover the same area as the <u>purple</u> box thermal display.	
10	Click **Save** to save the configuration.	

7.1.6. Set Region of Interest (ROI)

<u>Face detection is only applicable within the region of interest</u>. Setting a proper ROI can reduce the CPU usage and guarantee the face detection performance.

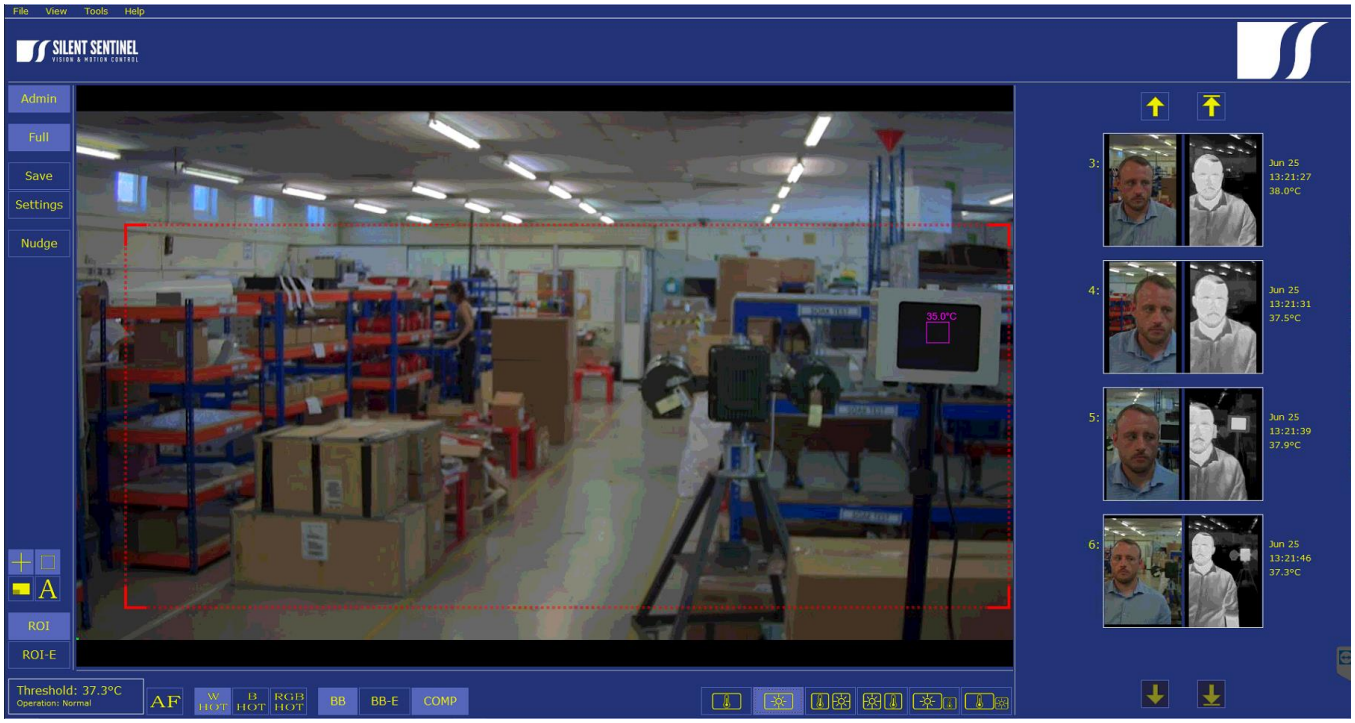
1	Open **daylight**-only or **side-by-side (Daylight-Thermal)** display. * For single-head unit, you will not see this option.	

2	Enable **ROI** and **ROI-E.**	
3	Draw the area of interest in **daylight** display. Note: If the ROI is too large, the face detection ability might be compromised. A recommended size for ROI is shown as per image.	
4	Disable **ROI-E.**	
5	Click **Save** to save the configuration.	

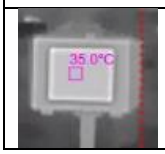
7.1.7. Set background image

This button is only displayed if a thermal-only camera is configured (i.e. not a combined daylight/thermal video camera). If the operator notices poor performance (for example, because a sudden change has happened - such as the camera being moved without rebooting or a new object being placed into view), then the **Reset B/G** button can be used to immediately reset the background image. It should only be used with a “clean” view (with no people in view, because those people will not be detected).	

7.2. Home Screen Brief Introduction

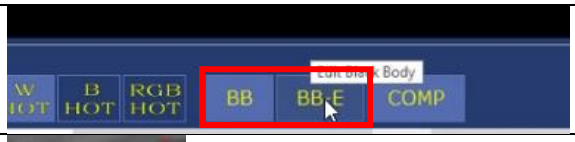
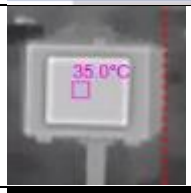


Title	Description
Admin	Admin log in. Logging in enables access to more advanced control.
Full	Show the full control panel display.
Save	Save the current configuration.
Settings	To open the setting window.
Error	When the software encounters an error message, this button will appear. Press F8 to check the error logs. Clicking the button acknowledges the error.
Nudge L R U D	Nudge to align daylight and thermal display for correct mapping.
	Spot measurement (cursor reading)
	Face bounding box
	Pic-in-Pic display
A	Overlay text
ROI	Region of Interest display
ROI-E	Draw the region of interest

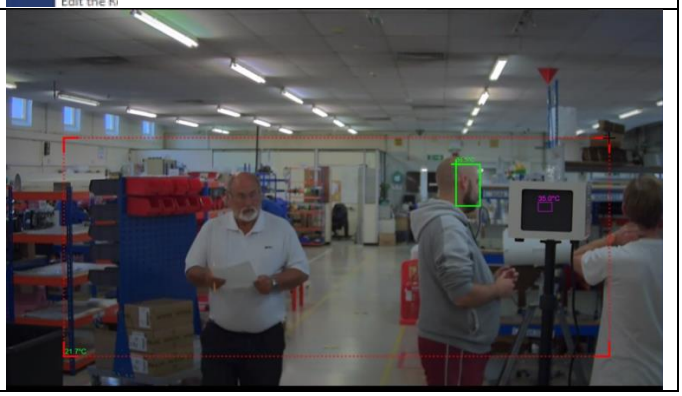
	Alarm alert threshold and operational status.
	Freeze thermal display
	Auto focus the thermal lens.
	Colour palette: White Hot, Black Hot, RGB Hot.
	Enable/Disable blackbody correction.
	Draw blackbody area.
	This button is shown when BB-E is enabled, and a blackbody obstruction error has occurred. Pressing this icon acknowledges the error and resume other functions.
	Enable/Disable Temperature compensation.
 (Dual light system only)	Video display layout options.
 (Single light systme only)	Reset background image for thermal detection.
	Display thumbnails and data from alarms.
	Region of interest where the camera will check for faces
	Blackbody area where the camera will reference temperature from.

7.3. Basic Operations

7.3.1. Set Blackbody Area

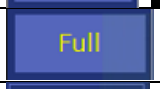
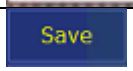
1	Make sure that both streams are aligned. See 7.1.5 above for details.	
2	Enable **BB** and **BB-E.**	
3	Draw a <u>small</u> rectangle at the centre of the blackbody area in the **Thermal** stream's FOV.	
4	Disable **BB-E.**	
5	Click **Save** to save the configuration.	

7.3.2. Set Region of Interest (ROI)

1	Make sure that both streams are aligned. See 7.1.5 above for details.	
2	Open **daylight-only** or **side-by-side (Daylight-Thermal)** display. * For single-head unit, you will not see this option.	
3	Enable **ROI** and **ROI-E.**	
4	Draw the area of interest in **daylight** display. Note: If the ROI is too large, the face detection ability might be compromised. A recommended size for ROI is shown as per image.	

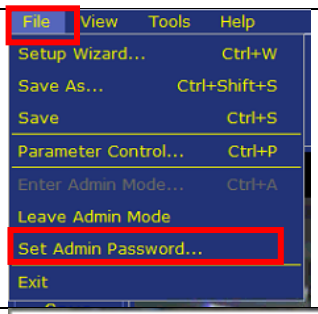
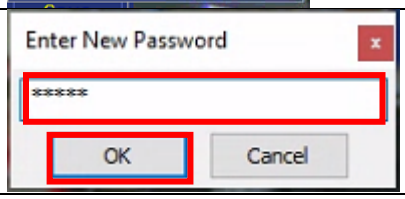
5	Disable **ROI-E.**	
6	Click **Save** to save the configuration.	

7.3.3. Change Text size

1	Log in as **admin**	
2	Click the **Full** button to display all the control panel buttons.	
3	Click **Settings** to open the configuration window.	
4	Under the tab **Misc**, set the **Font Size** for temperature data display. Close the window to apply the settings.	
5	Click **Save** to save the configuration	

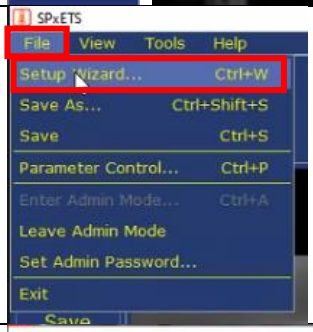
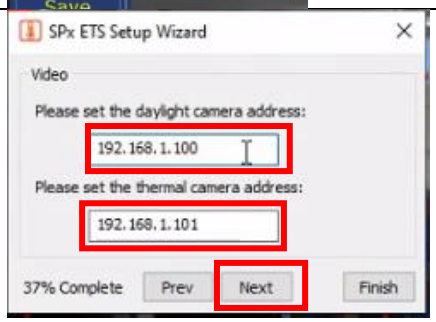
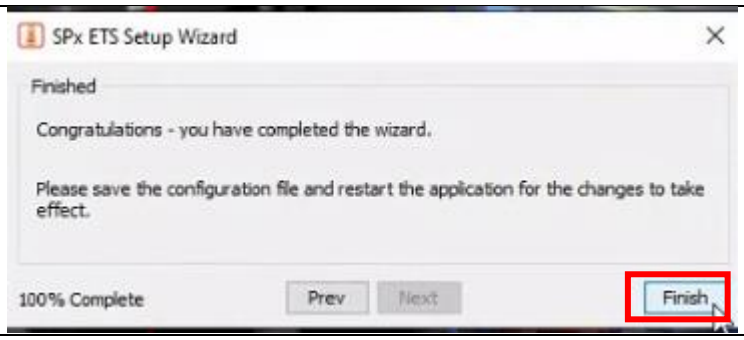
7.3.4. Change log in password

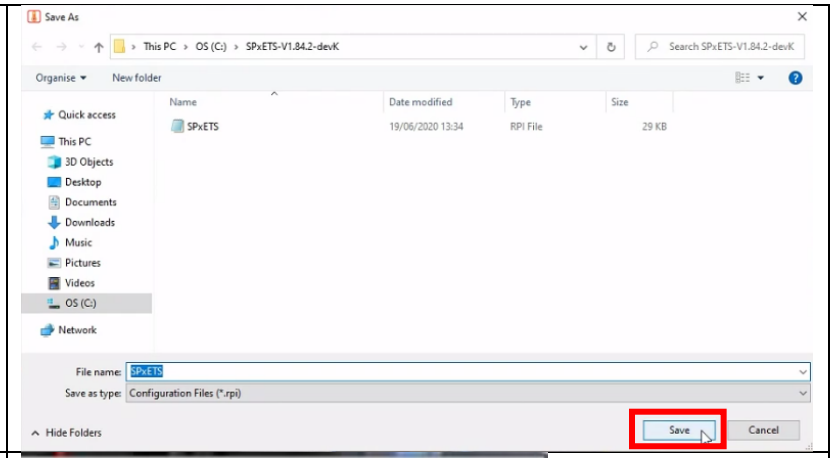
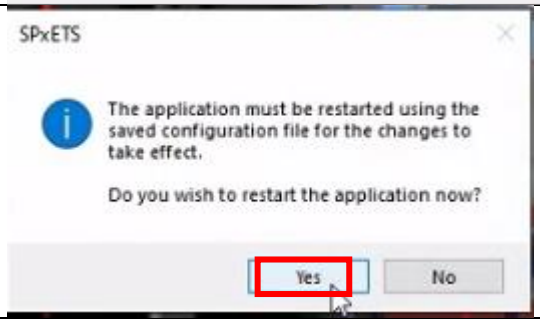
1	Log in as **admin.**	

2	Open the **File** drop-down menu. Select **Set Admin Password** from the dropdown menu.	
3	Enter the new password. Click **OK** to save and apply the setting.	

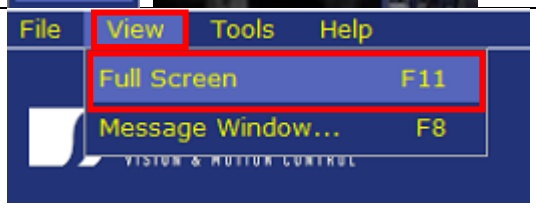
7.3.5. Set IP Address for Video Source

The following steps show how to change the IP of video source. It does NOT change the camera's IP address. To change camera's IP address, one must go to Web GUI to do so.

1	Log in as **admin**	
2	Open the **File** drop-down menu. Select **Setup Wizard** from the dropdown menu.	
3	Keep clicking **Next** until you arrive at the **Video** page. Type the IP addresses of the video stream sources.	
4	Keep clicking **Next** until you arrive at the **Finished** page. Click **Finish**.	

5	Save the .rpi file.	
6	Click **Yes** to restart the application.	

7.3.6. Full screen display

1	Log in as **admin.**	
2	Select **View** menu. Select **Full Screen** from the dropdown menu. Or press **F11**.	

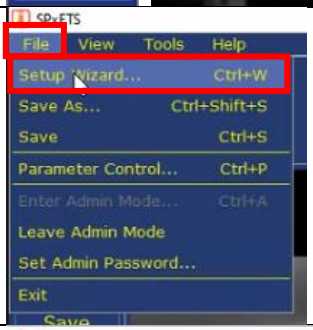
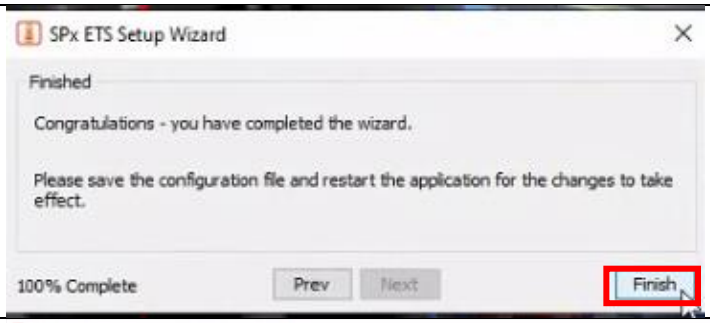
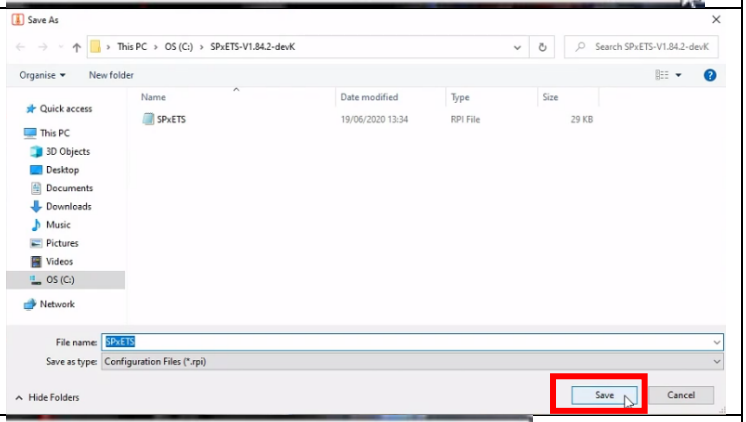
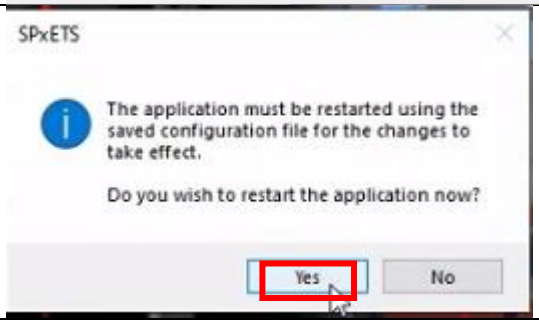
7.3.7. Disable Blackbody Calibration (not recommended)

The MODUM software uses the blackbody temperature reading as a reference. It is strongly advised to keep this function enabled at all times.

1	Log in as **admin**	
2	Disable the **BB** button – not recommended.	

7.3.8. Change Blackbody Temperature (not recommended)

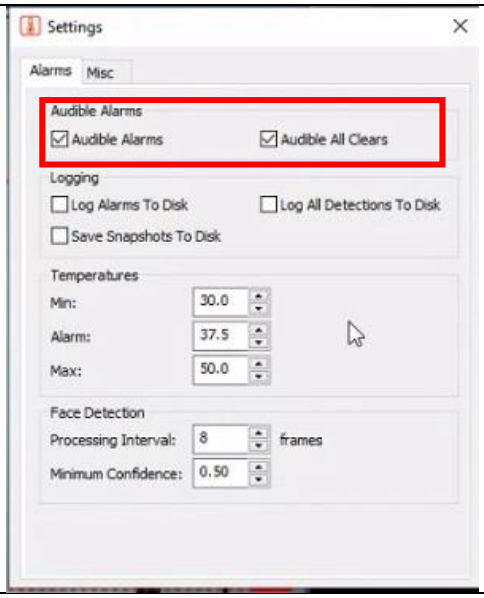
As the blackbody provided by Silent Sentinel is set to a fixed temperature of 35°C by default, it is suggested to keep the blackbody temperature value as 35°C in the ETS software.

1	Log in as **admin**	
2	Select **File** menu. Select **Setup Wizard** from the dropdown menu.	
3	Keep clicking **Next** until you arrive at the **Blackbody** page. Enter the temperature that matches the blackbody reference value.	
4	Keep clicking **Next** until you arrive at the **Finished** page. Click **Finish**.	
5	Save the .rpi file.	
6	Click **Yes** to restart the application.	

7.3.9. Remove Blackbody Error

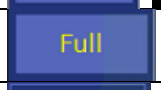
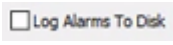
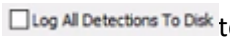
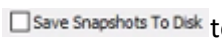
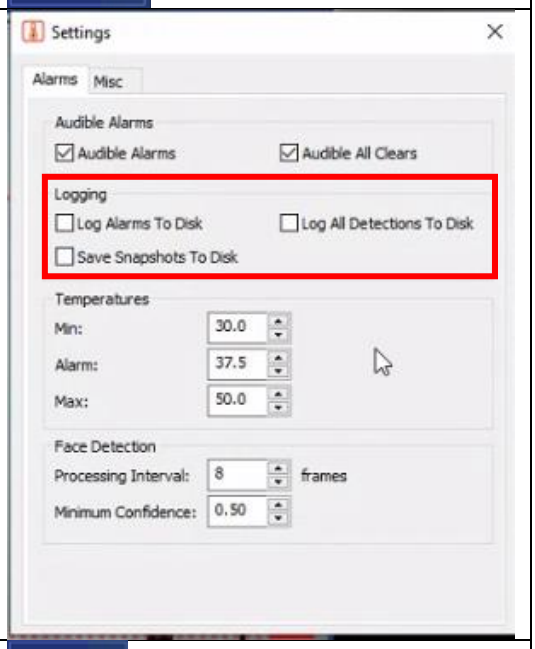
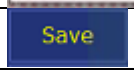
1	When the blackbody is not aligned with the marked area set by ETS, a warning message will overlay on the video display, as per image. When this message shows up, all temperature-related service will stop, e.g. face detection, cursor reading etc.	
2	The error can be removed by redrawing the blackbody area. Detailed instructions can be found in 7.3.1.	
3	If the blackbody area is correct, click **BB-R** to acknowledges the error and resume other functions. Note that BB-R only appear when **BB-E** is enabled.	

7.3.10. Configure Audible Alarm

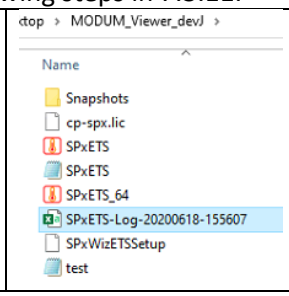
1	Log in as **admin**	
2	Click the **Full** button to display all the control panel buttons.	
3	Click **Settings** to open the configuration window.	
4	Under the section **Audible Alarms**: Tick/Untick ☑ Audible Alarms to enable/disable a sound notification for *every alert triggered*. Tick/Untick ☐ Audible All Clears to enable/disable a sound notification for *every non-fever detection*.	

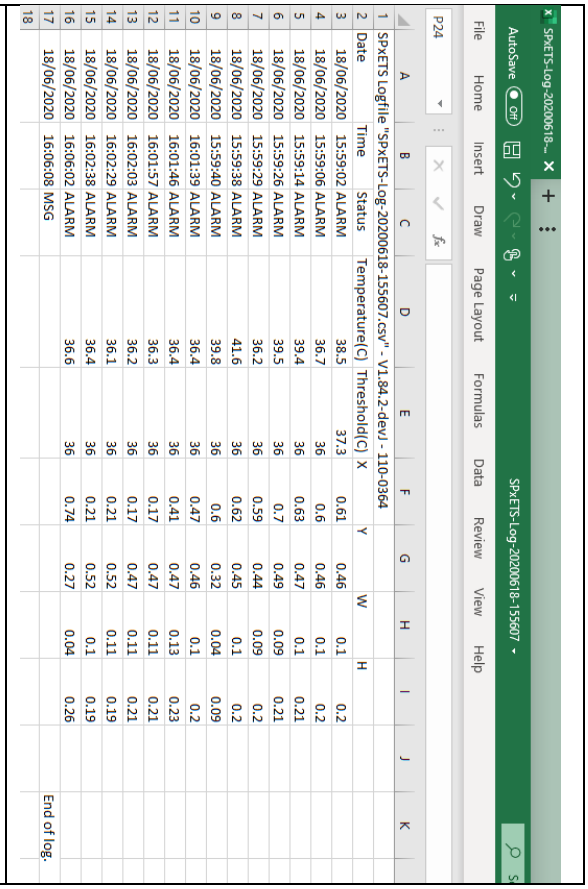
5	Click **Save** to save the configuration.	

7.3.11. Configure data logging/saving

1	Log in as **admin**	
2	Enable **full** control panel	
3	Click **Settings**	
4	Under the section **Logging**: Tick/Untick  to enable/disable logging of *all detected fever*. Information logged includes Date, Time, Status, Temperature, Threshold and screen coordinated of the detected face. Tick/Untick  to enable/disable logging for *all detected face*. Same information is saved as detailed. Tick/Untick  to enable/disable saving a snapshot of the *fevered face*.	
5	Click **Save** to save the configuration.	

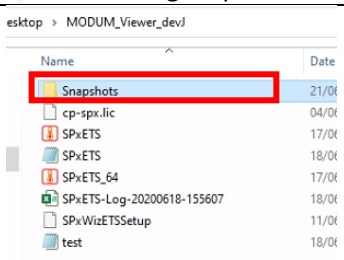
7.3.12. Check logged data

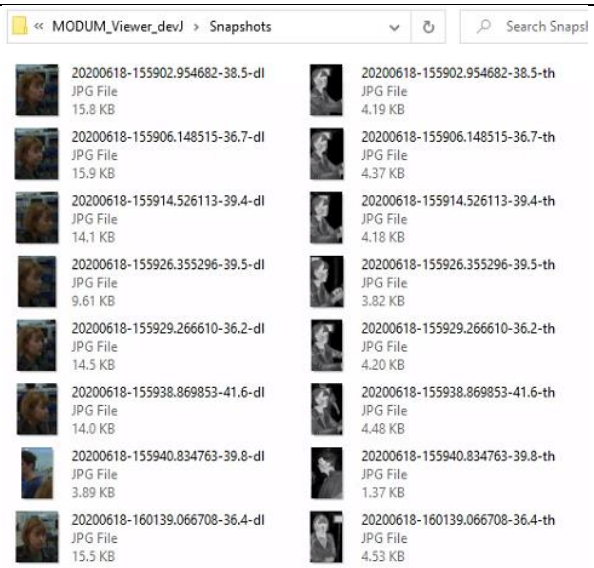
1	Data logging can be turned on/off following steps in 7.3.11.	
2	Navigate to the folder **SS_ETS**. Open the .csv file "**SPxETS-Log-Date-Time.csv**"	

3	An example of log (Alarm Only) as per image. X and Y coordinates are mapped to have the bottom-left corner be (0,0) and top-right corner be (1,1). The values represent distance in percentages of the dimensions of the snapshot (Example: the X and Y coordinates of the centre in a 1920x1080 snapshot would be (0.5,0.5)). The width and height are not coordinates, but instead perimeter (in percentage of snapshot dimensions) of the area detected with a face in it starting at the bottom-left corner as the point given with the coordinates.	

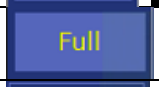
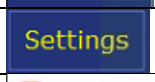
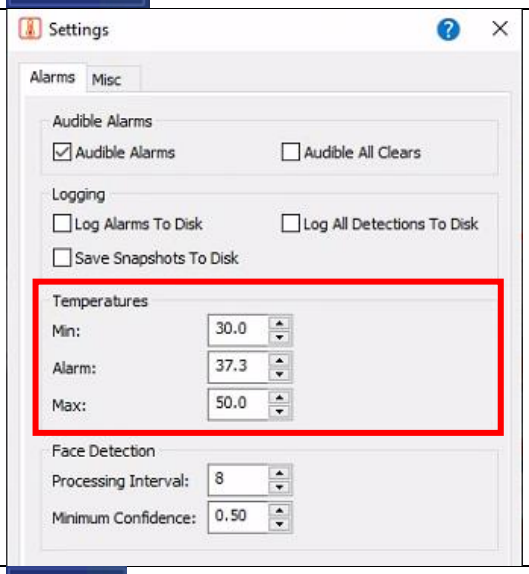
	A	B	C	D	E	F	G	H	I	J	K
1	SPxETS Logfile "SPxETS-Log-20200618-155607.csv" - V1.84.2-devJ - 110-0364										
2	Date	Time	Status	Temperature(C)	Threshold(C)	X	Y	W	H		
3	18/06/2020	15:59:02	ALARM	38.5	37.3	0.61	0.46	0.1	0.2		
4	18/06/2020	15:59:06	ALARM	36.7	36	0.6	0.46	0.1	0.2		
5	18/06/2020	15:59:14	ALARM	39.4	36	0.63	0.47	0.1	0.21		
6	18/06/2020	15:59:26	ALARM	39.5	36	0.7	0.49	0.09	0.21		
7	18/06/2020	15:59:29	ALARM	36.2	36	0.59	0.44	0.09	0.2		
8	18/06/2020	15:59:38	ALARM	41.6	36	0.62	0.45	0.1	0.2		
9	18/06/2020	15:59:40	ALARM	39.8	36	0.6	0.32	0.04	0.09		
10	18/06/2020	16:01:39	ALARM	36.4	36	0.47	0.46	0.1	0.2		
11	18/06/2020	16:01:46	ALARM	36.4	36	0.41	0.47	0.13	0.23		
12	18/06/2020	16:01:57	ALARM	36.3	36	0.17	0.47	0.11	0.21		
13	18/06/2020	16:02:03	ALARM	36.2	36	0.17	0.47	0.11	0.21		
14	18/06/2020	16:02:29	ALARM	36.1	36	0.21	0.52	0.11	0.19		
15	18/06/2020	16:02:38	ALARM	36.4	36	0.21	0.52	0.1	0.19		
16	18/06/2020	16:06:02	ALARM	36.6	36	0.74	0.27	0.04	0.26		
17	18/06/2020	16:06:08	MSG							End of log.	
18											

7.3.13. Check alarm snapshots

1	Snapshot saving can be turned on/off following steps in 7.3.11.	
2	Navigate to the **SS_ETS/Snapshots** folder.	

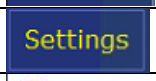
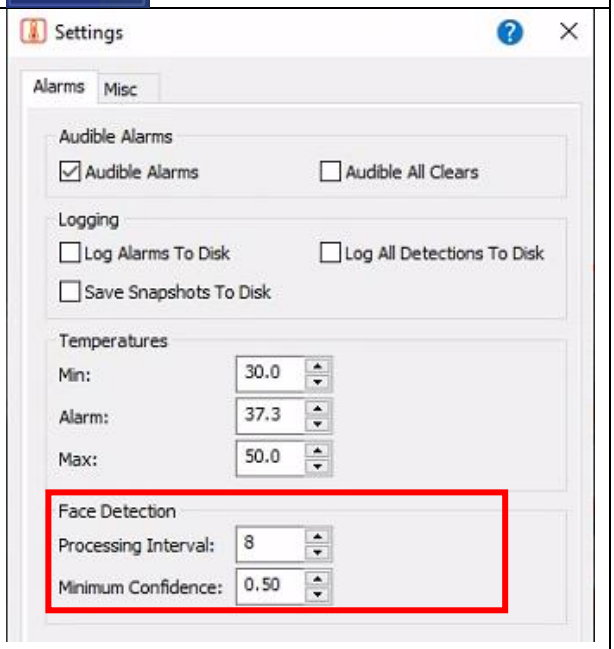
3	The snapshots are from *alarm only.* Each picture is named with capture date, time, temperature and source stream.	

7.3.14. Change temperature threshold

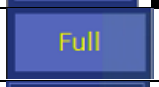
1	Log in as **admin**	
2	Enable **full** control panel	
3	Click **Settings**	
4	Under the **Temperatures** section, set the **min** and **max** temperature of objects that the software can recognize as a face. Adjust the **alarm** threshold to trigger after a face above the threshold value is detected.	
5	Click **Save** to save the configuration.	

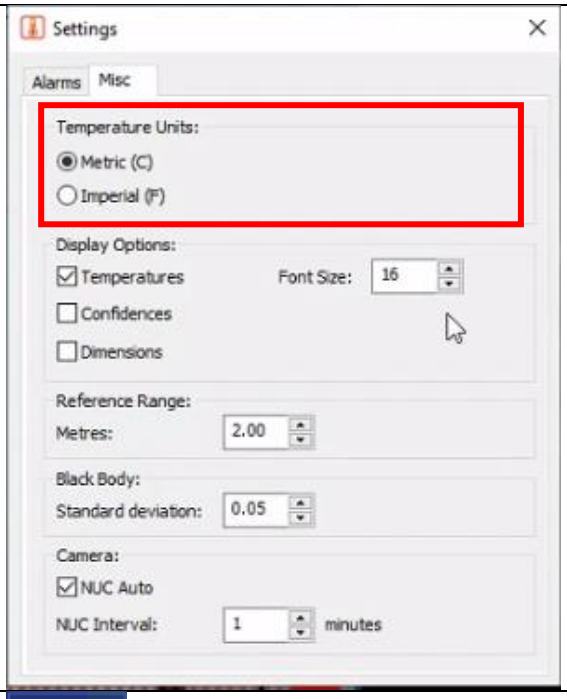
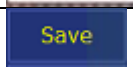
7.3.15. Configure Face Detection Settings

1	Log in as **admin**	

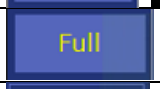
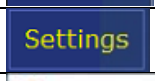
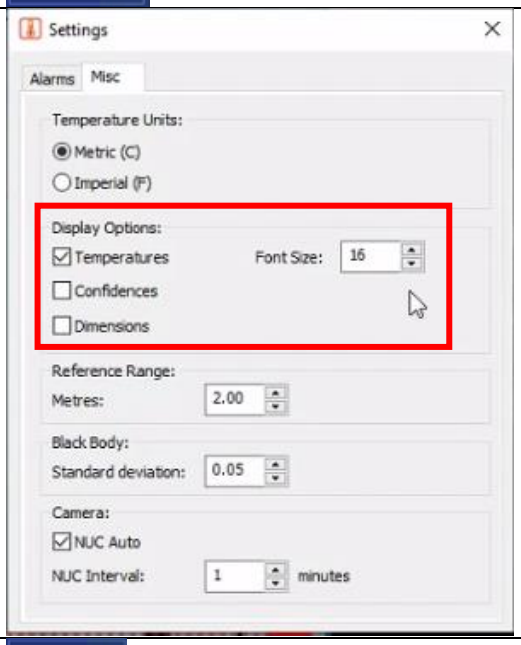
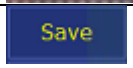
2	Enable **full** control panel	
3	Click **Settings**	
4	Under the section **Face Detection**, set the **process interval** (unit: *frames*) and **minimum confidence** as per image. Processing interval determines the frequency (measured in *frames*) of mapping between daylight and thermal stream. Minimum confidence defines the confidence (measured in percentage) in face detection. Recommended value: *Dual light system:* Processing Interval: **6-8** Minimum Confidence: **0.2** *Single light system:* Processing Interval: **1** Minimum Confidence: **0.4-0.5**	
5	Click **Save** to save the configuration.	

7.3.16. Change Temperature Scale

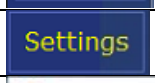
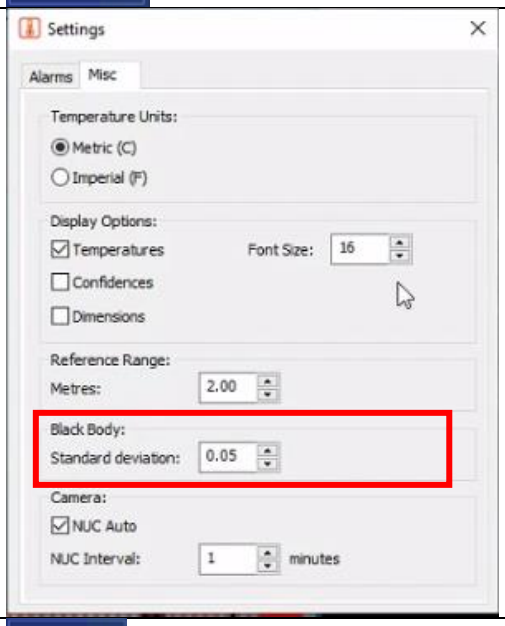
1	Log in as **admin**	
2	Enable **full** control panel	
3	Click **Settings**	

4	Under **Misc** tab, select the **temperature scale**. Close the window to apply any setting.	
5	Click **Save** to save the configuration.	

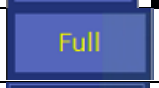
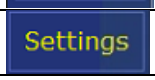
7.3.17. Face Detection Data Overlay Options

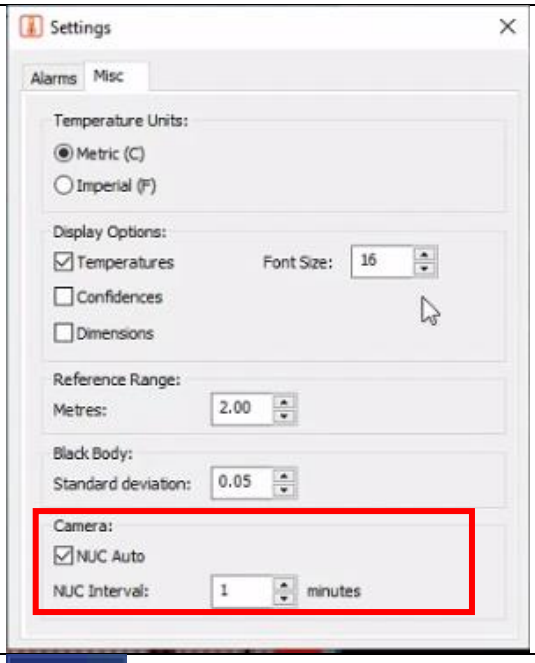
1	Log in as **admin**	
2	Enable **full** control panel	
3	Click **Settings**	
4	Under the **Misc** tab, tick items in the **Display Options** to be included in the face bounding box. Set the size for the displayed text/data. Close the setting window to apply any settings.	
5	Click **Save** to save the configuration.	

7.3.18. Configure Blackbody Obstruction Detection

1	Log in as **admin**	
2	Enable **full** control panel	
3	Click **Settings**	
4	Under the **Misc** tab, set the value for **standard deviation** in the Blackbody section. Recommend value: *0.05*. Close the setting window to apply any settings.	
5	Click **Save** to save the configuration.	

7.3.19. Configure thermal Non-Uniformity Correction (NUC)

1	Log in as **admin**	
2	Enable **full** control panel	
3	Click **Settings**	

4	Under the **Misc** tab, tick **NUC Auto** if you wish to let the camera conduct self-calibration automatically. Set the **interval** (measured in sec). Unticking **NUC Auto** turns off auto NUC. Close the setting window to apply any settings.	
5	Click **Save** to save the configuration.	

7.3.20. Auto focus the thermal lens

1	Click **AF** button to start auto focusing the *thermal* lens.	

7.3.21. Change colour palette

1	Enable **full** control panel	
2	Select the colour palette to display for thermal stream: **White Hot**, **Black Hot** and **RGB Hot**.	
3	Click **Save** to save the configuration.	

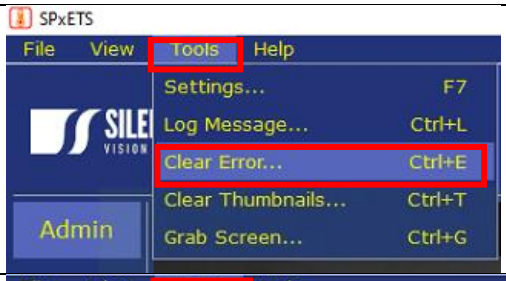
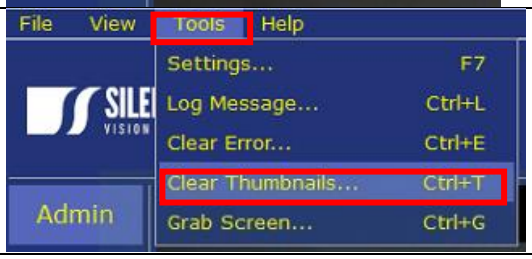
7.3.22. Temperature Compensation Mode

SS ETS uses a temperature compensation algorithm to calculate the core body temperature when given the temperature reading the face skin. The compensation mode can be toggled via following steps.

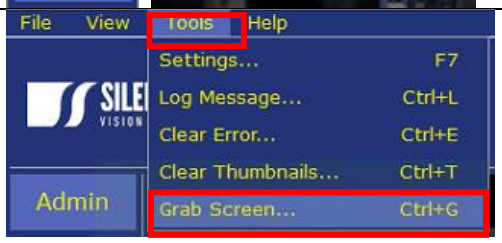
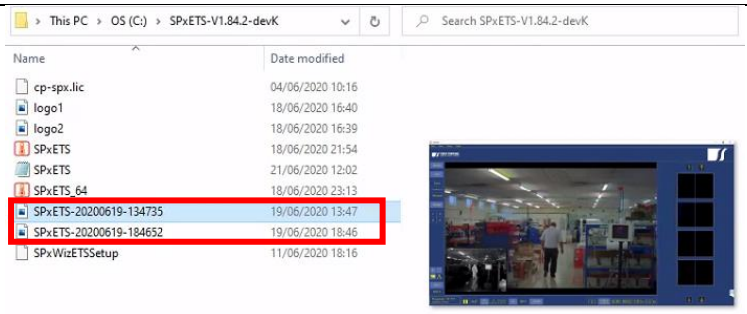
1	Enable **full** control panel	
2	Enable/Disable **COMP** button.	

7.3.23. Clear data (error/thumbnails)

1	Log in as **admin**	

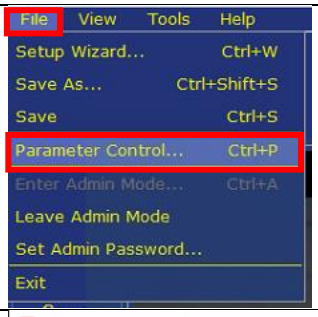
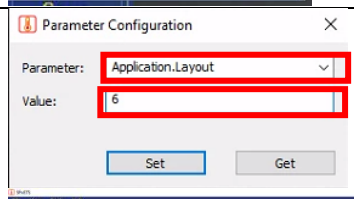
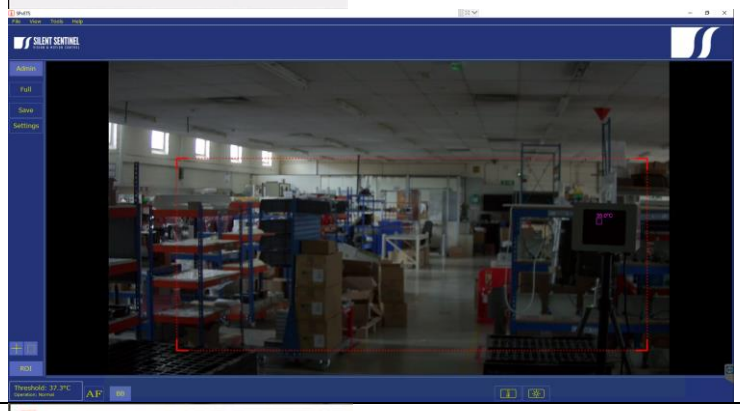
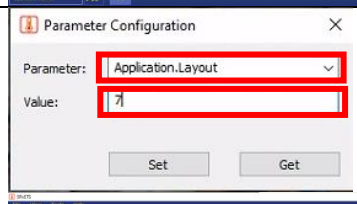
2	Select **Tools** in the top menu bar. Click **Clear Error** to erase all the *logged message.*	
3	Click **Clear Thumbnails** to erase all the *snapshots* stored on the right-hand side.	
4	Note that this step only clears the data stored on the software. It does NOT delete data stored on the disk.	

7.3.24. Take screenshot

1	Log in as **admin**	
2	Select **Tools** in the top menu bar. Click **Grab Screen** to take a screenshot of the application window. OR press **Ctrl + G**.	
3	Screenshots are automatically saved in the same directory as SS ETS application.	

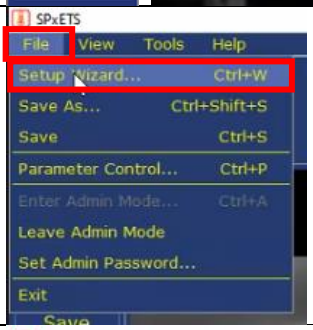
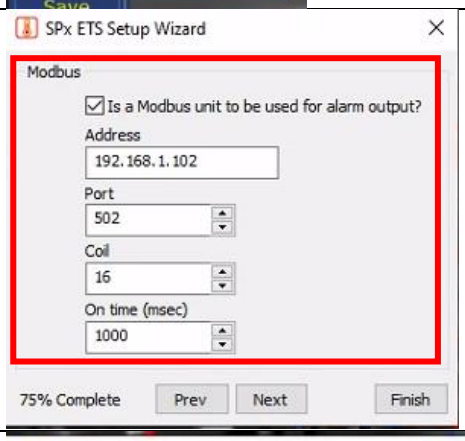
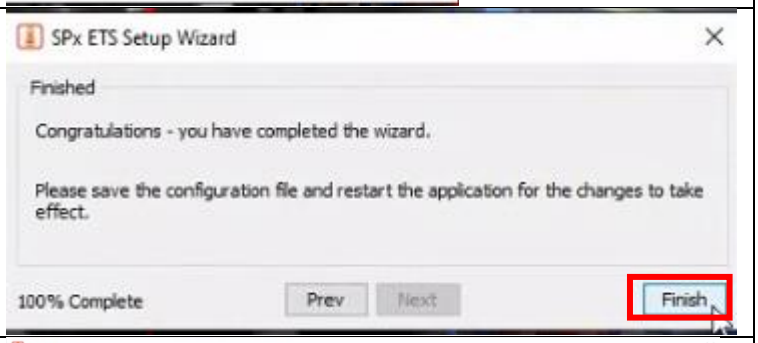
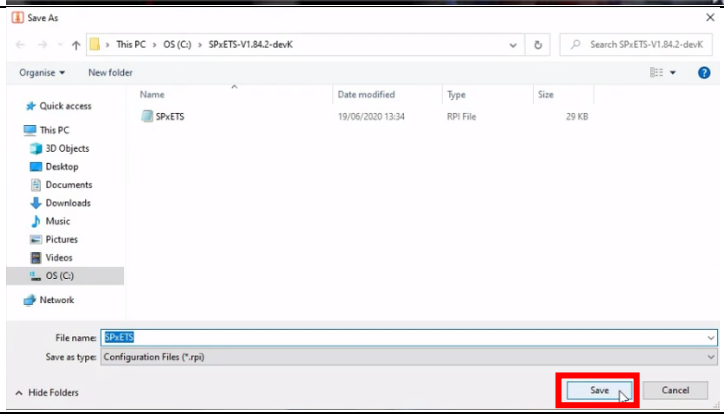
7.3.25. Hide thumbnail display

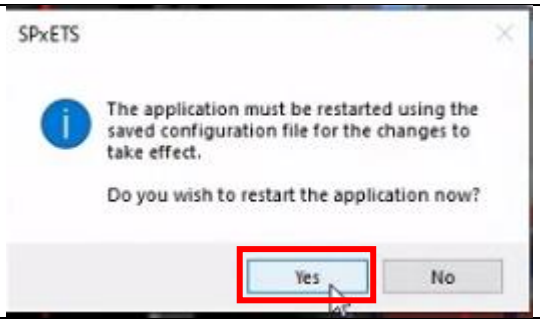
1	Log in as **admin**.	

2	Select **File** in the top menu bar. Click **Parameter Control** to open the Parameter Configuration window.	
3	In Parameter Configuration window, type **Application.Layout** in the Parameter field. Set value **6** for *Daylight-only* display.	 
4	In Parameter Configuration window, type **Application.Layout** in the Parameter field. Set value **7** for *Thermal-only* display.	
5	OR select **Side-by-Side** display to cover the thumbnail display.	

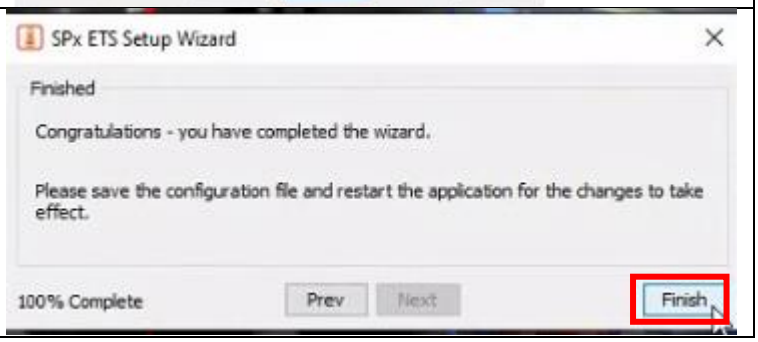
7.4. Advance configuration

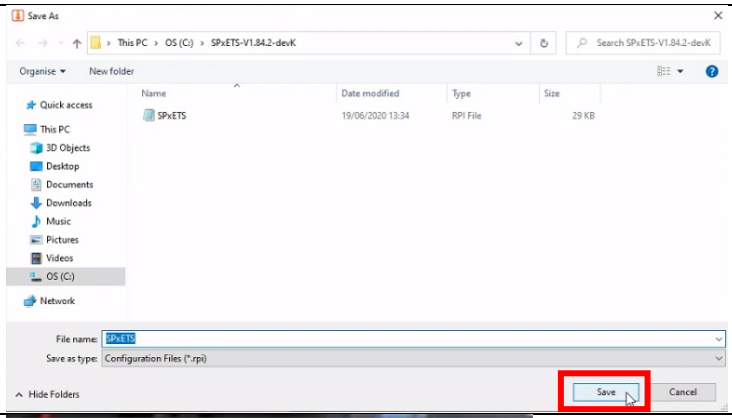
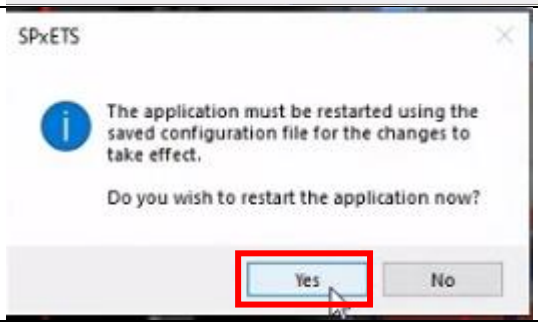
7.4.1. Use Modbus for alarm output

1	Log in as **admin**	
2	Select **File** menu. Select **Setup Wizard** from the dropdown menu.	
3	Keep clicking **Next** until you arrive at the **Modbus** page. Tick to confirm a Modbus module is being used. Set the IP address and relevant information.	
4	Keep clicking **Next** until you arrive at the **Finished** page. Click **Finish**.	
5	Save the .rpi file.	

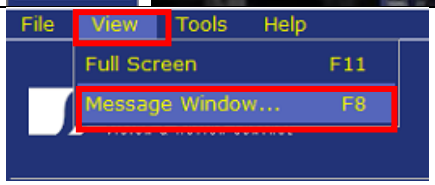
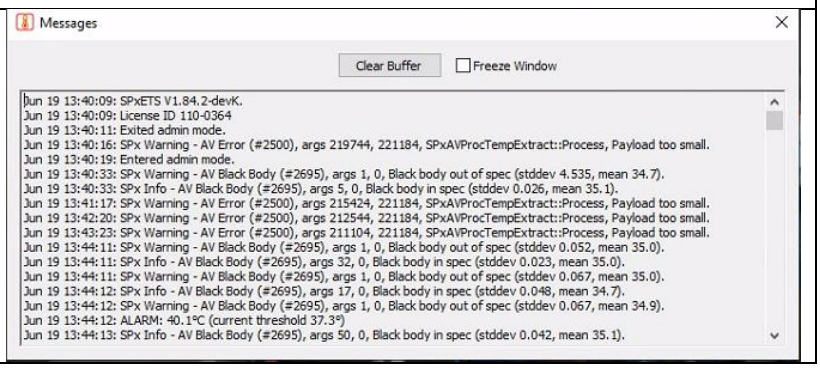
6	Click **Yes** to restart the application.	

7.4.2. Use of EdgeVis

1	Log in as **admin**	
2	Select **File** menu. Select **Setup Wizard** from the dropdown menu.	
3	Keep clicking **Next** until you arrive at the **EdgeVis** page. Tick to confirm an EdgeVis module is being used. Set the IP address, Port number and Password.	
4	Keep clicking **Next** until you arrive at the **Finished** page. Click **Finish**.	

5	Save the .rpi file.	
6	Click **Yes** to restart the application.	

7.4.3. View message log

1	Log in as **admin**.	
2	Select **View** in the top menu bar. Click **Message Window** to open the message log.	
3	An example of Message log is as per image.	

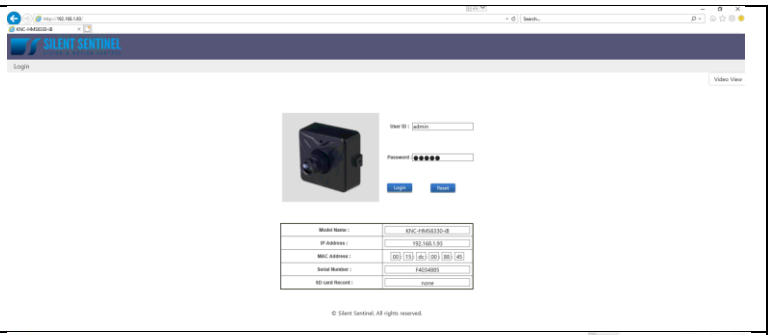
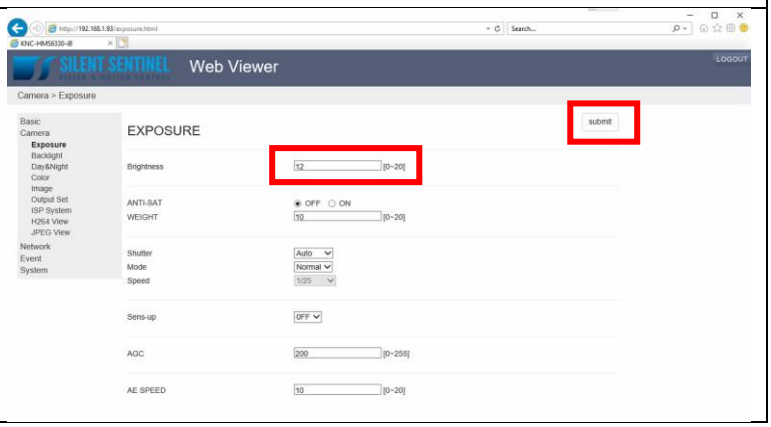
7.4.4. Advanced parameter control

Advice not to change. If necessary, consult Silent Sentinel before modifying. Changes without any consultation may result in a malfunction.

8. Common problems and solutions

8.1. Face detection not working

A. Possible cause: poor lighting condition
Solution:

1	Enter http://(Daylight cam IP address) in IE. Log in as admin/admin (default password)	
2	Open Camera – Exposure. Increase the brightness value accordingly. Click Submit to apply the settings.	

B. Possible cause: ROI too large
Solution: re-draw ROI with a smaller size. Detailed steps can be found in 7.3.2 above.

8.2. Face bounding box lagging

A. Possible cause: ROI too large
Solution: re-draw ROI with a smaller size. Detailed steps can be found in 7.3.2 above.

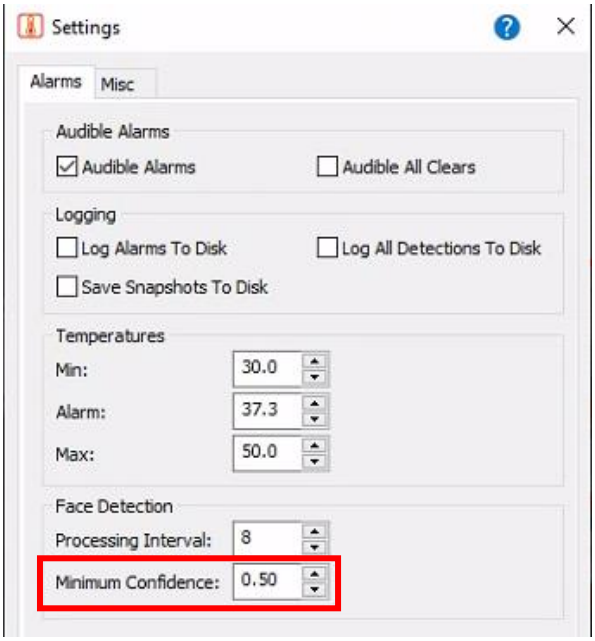
B. Possible cause: face processing interval too long.
Solution: reduce the face process interval by following steps in 7.3.15. Beware that reducing the interval will result increase in CPU usage. Please make sure there is enough CPU resource available on PC.

C. Possible cause: Single light system in used (i.e. thermal-only)
Solution: Add the following line at the end of SPxETS.rpi file located in /Config folder:
Video1.MetadataDelay = 4 # frames

8.3. Thermal-only detection picking up non-face objects (e.g. arms, blackbody…)

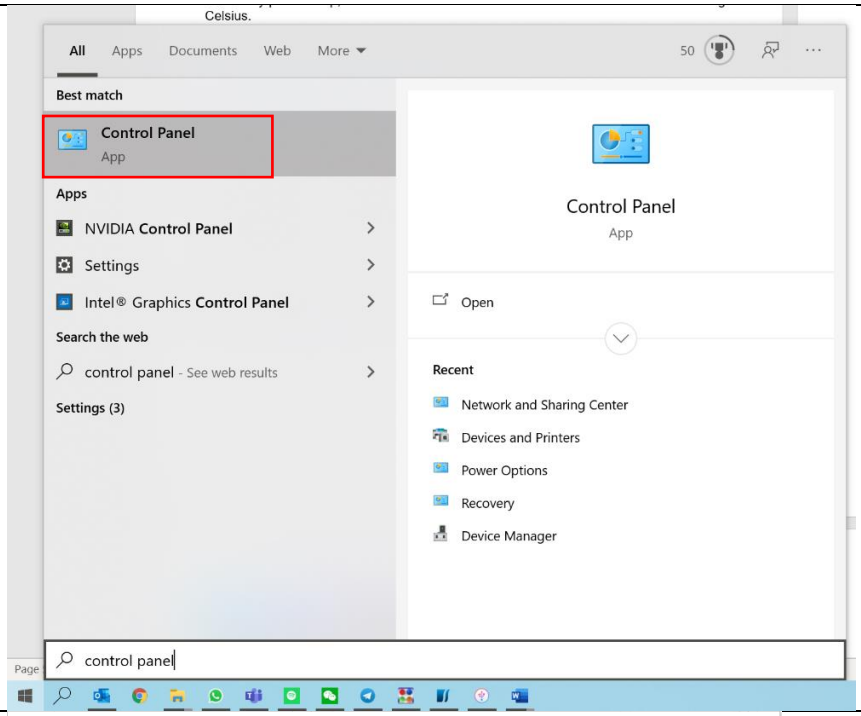
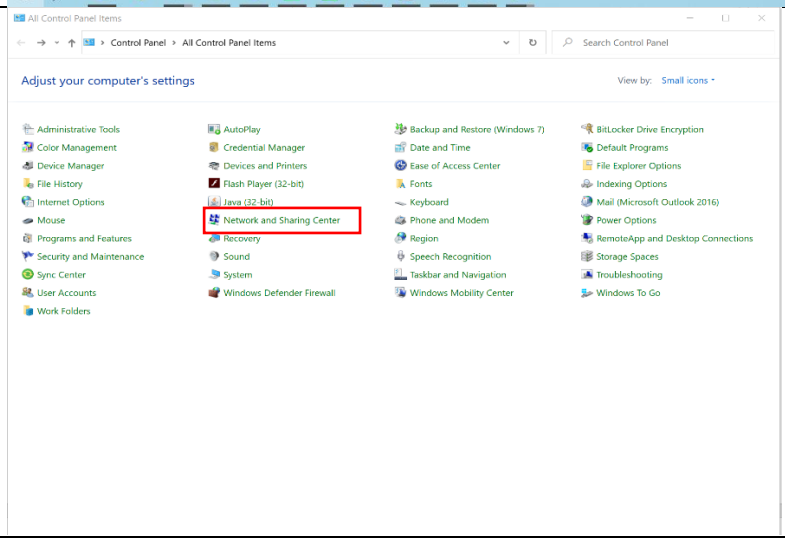
A. Solution:

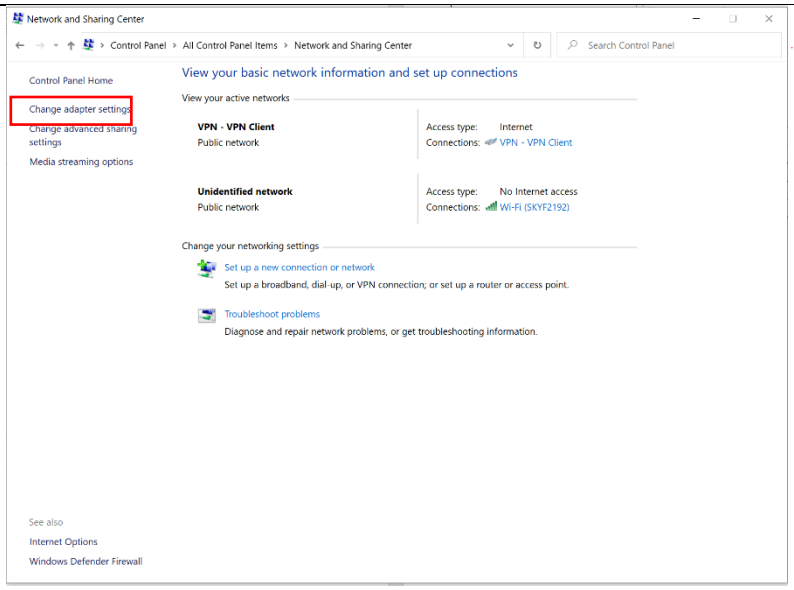
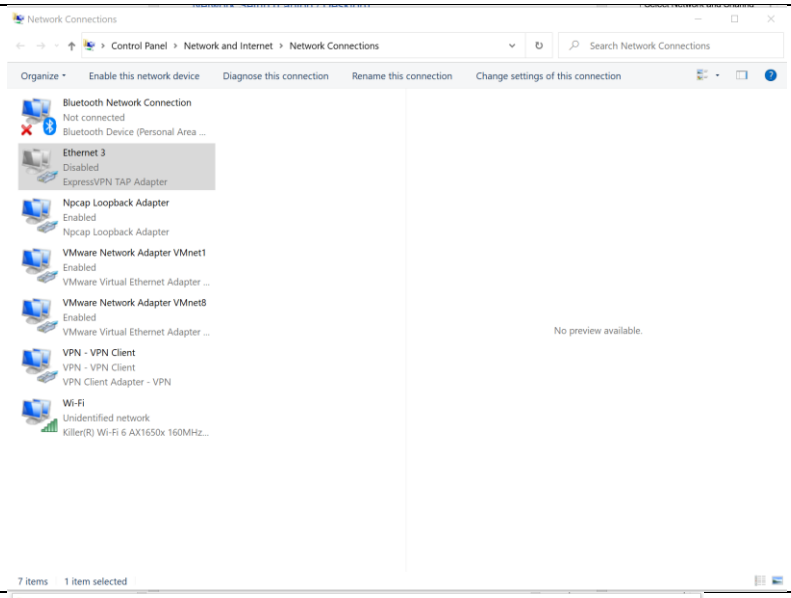
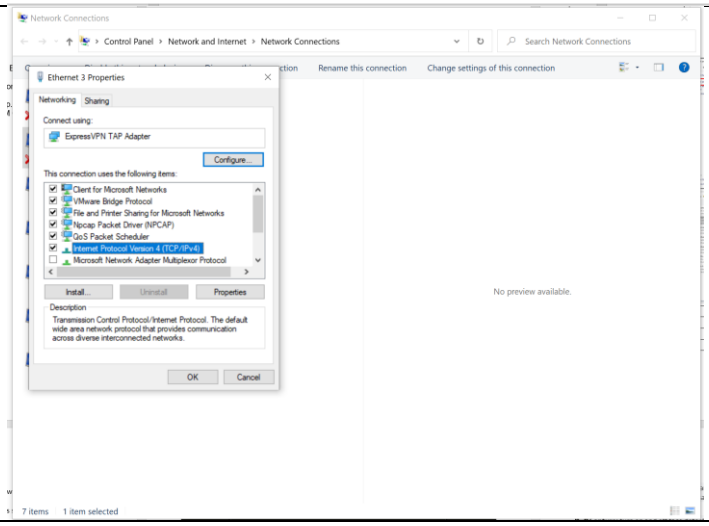
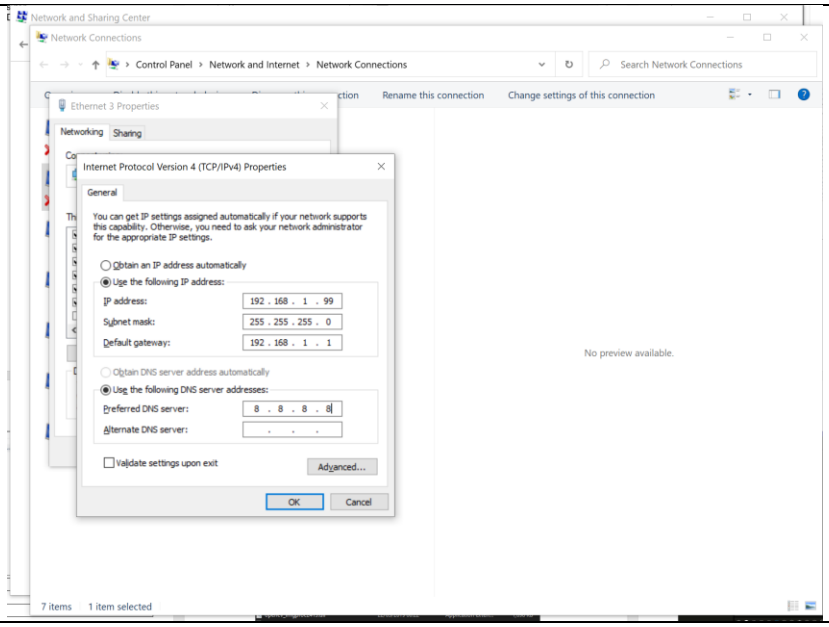
a. When the background is "clean" (i.e. no one in the FOV), press Reset B/G to reset the background image.
b. Increase the confidence threshold for face detection.



c. Reset the Region of Interest (ROI) to exclude body parts.

Appendix A – Configure a Static Laptop IP Address

Select the Start Button and Type 'Control Panel'	
Select Network and Sharing Center	

Select Adapter Options	
Double Click on the relevant network adapter	
Double Click on 'Internet Protocol Version 4 (TCP/IPv4)	

Select the radio button named ‘Use the following IP address’ Enter the information shown in the image to the right. Select ‘Okay’ and the ‘Okay’ on the sub menu.