AT Series

Temperature Measurement Analysis PC Software

Operation Manual

V1.0.1

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Contents

Version History

Version	Date	Description
V1.0.0	2020-2-4	Initial version

Application Range

Temperature measurement analysis PC software manual introduces the method of using the temperature measuring analysis of the PC software, including access to product information, calibration data, set up product working status and update the firmware, image display, temperature analysis, generate CSV report, test report, photos, video, generate JPEG infrared thermal images, and the use of infrared thermal image for secondary analysis and so on.

Preparations

1. A computer equipped with " IRay Camera Control Software ";

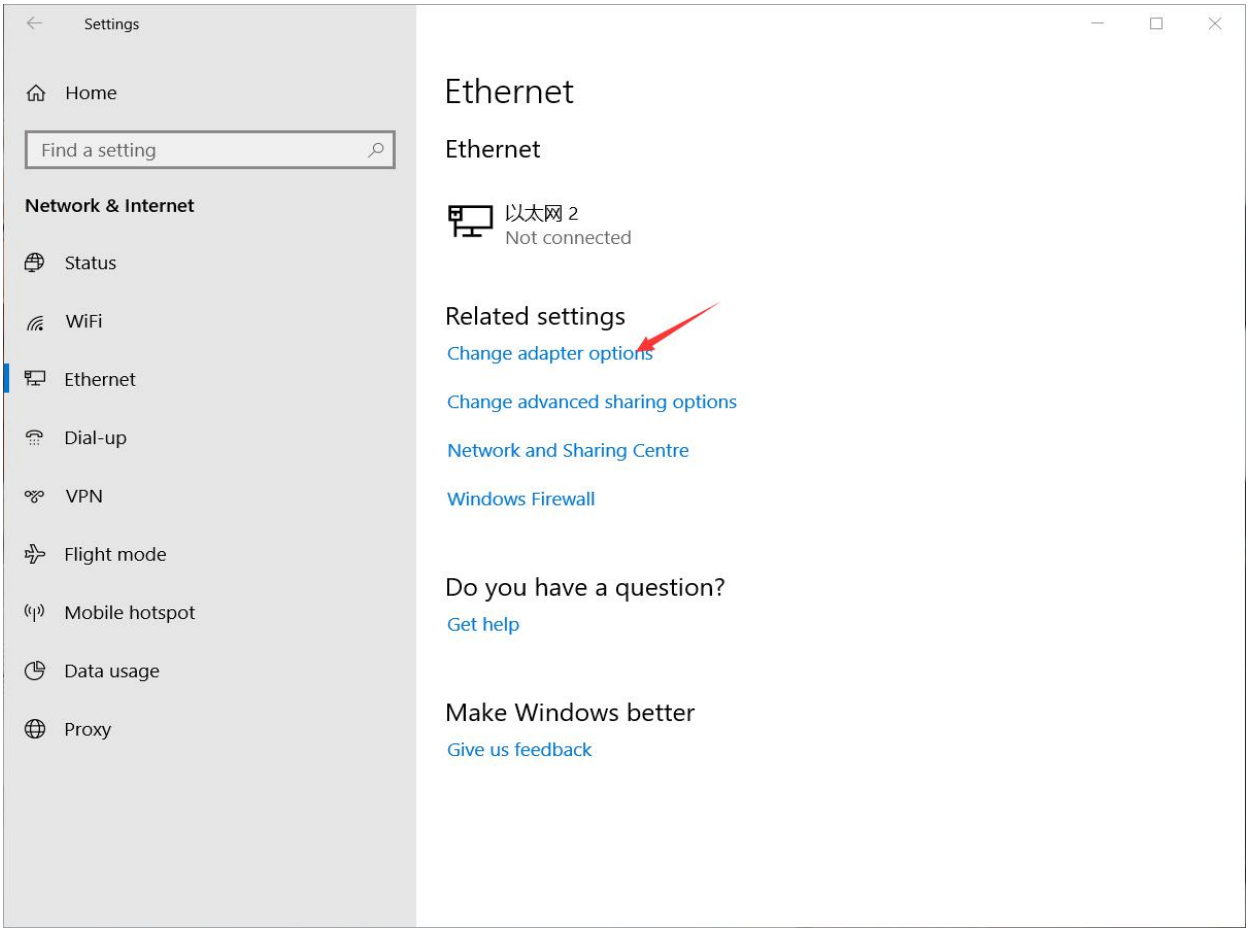
2. A dedicated cable for normal product connection;

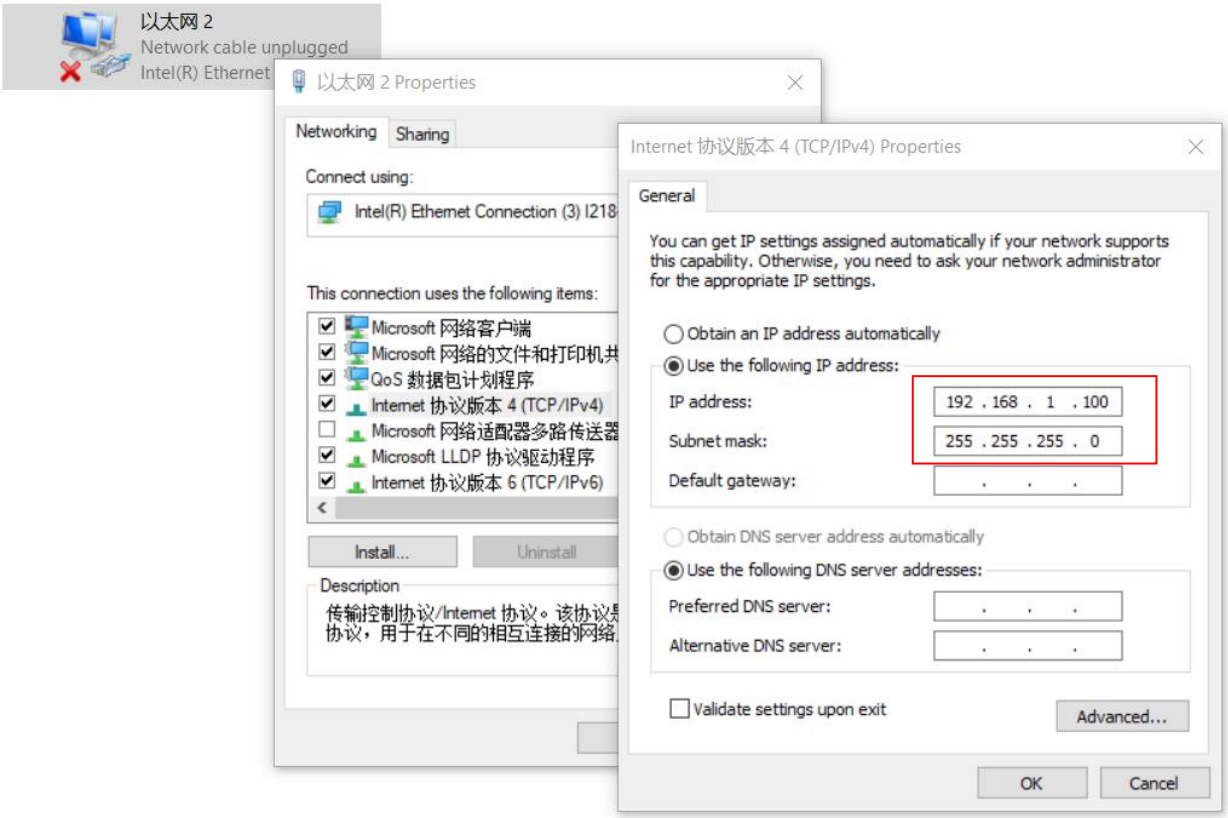
3. A monitor or other compatible display equipment;

4. The IP address of computer should be set as 192.168.1.***, and prepare a power supplier that can output 12VDC.

How to set IP address(as shown below):

Open the **Network Settings → Select Ethernet → Change Adapter Options → select IPV4 property → Change IP & subnet mask.**


Settings
Home
Find a setting
Network & Internet
Status
WiFi
Ethernet
Dial-up
VPN
Flight mode
Mobile hotspot
Data usage
Proxy
Ethernet
Ethernet
以太网 2
Not connected
Related settings
Change adapter options
Change advanced sharing options
Network and Sharing Centre
Windows Firewall
Do you have a question?
Get help
Make Windows better
Give us feedback



Select “Use the folloing IP address” and enter the IP address “192.168.1.***” manually .

Click the frame of Subnet mask, “255. 255. 255. 0” will appear automatically.

1. Software Connection

Firstly, connect the product with specific cable and provide a suitable power voltage. Then, connect the software according to the following steps:

1. Double click on the “IRay Camera Controller application icon as shown in Figure 1.1 and camera connection interface will pop out as shown in Figure 1.2.

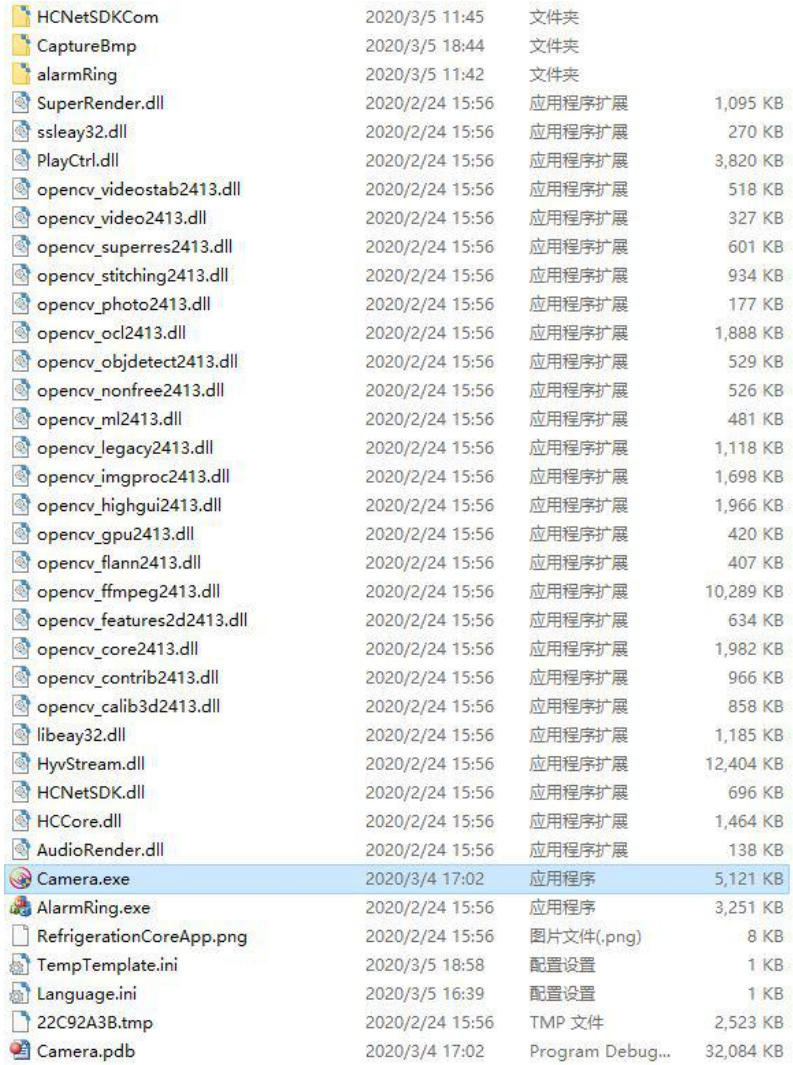


Figure 1.1 Controller software operation icon

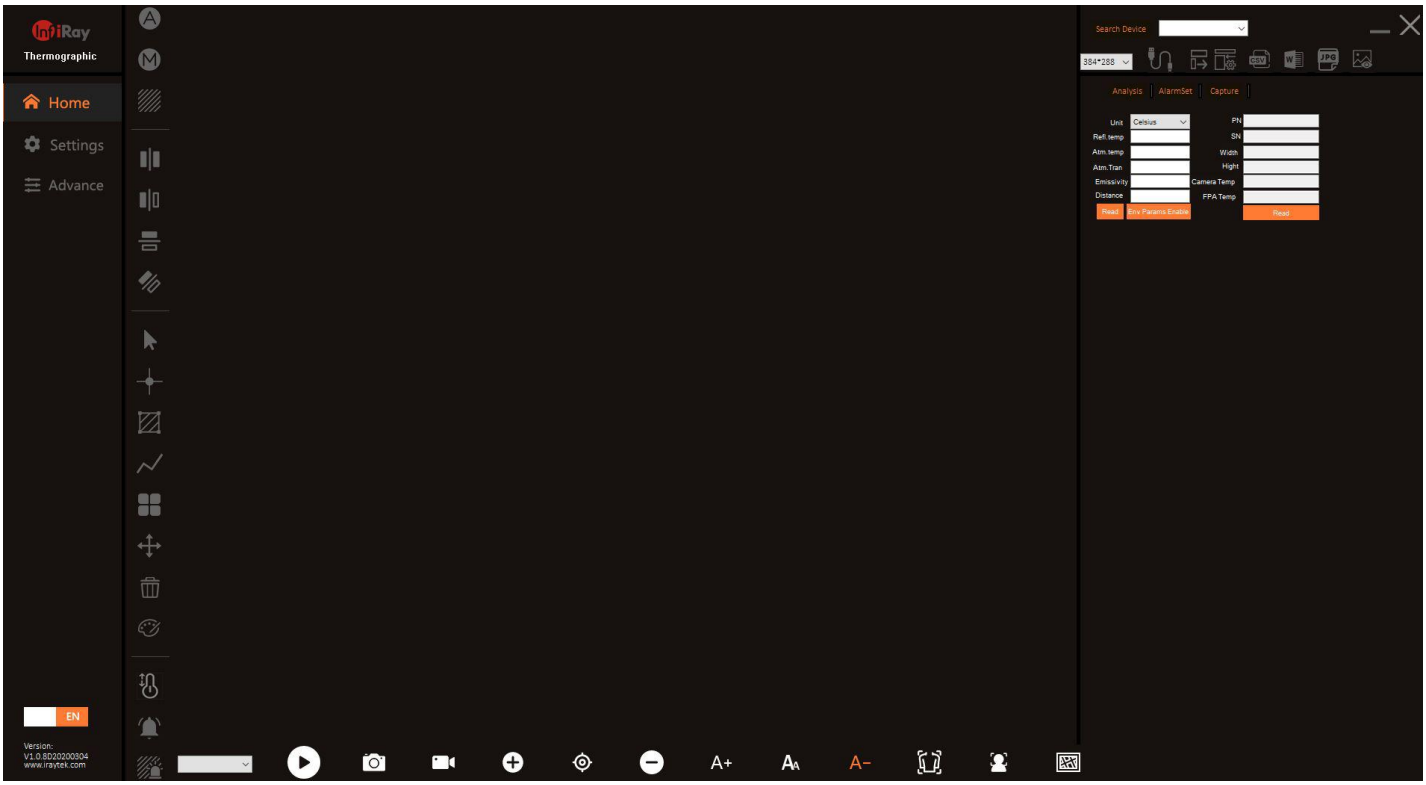


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Figure 1.2 Software connection setting interface

2. As shown in Figure 1.3, if we connect the Camera to PC and search the device we want to connect, then all on-line devices will be successful. Click the connection button, you can get the image, use the software for device control and temperature analysis.

STEP 1. Click"Search Device"

STEP 2. Click"Connect" after IP address appears

STEP 3. Wait during connecting until infrared image appears

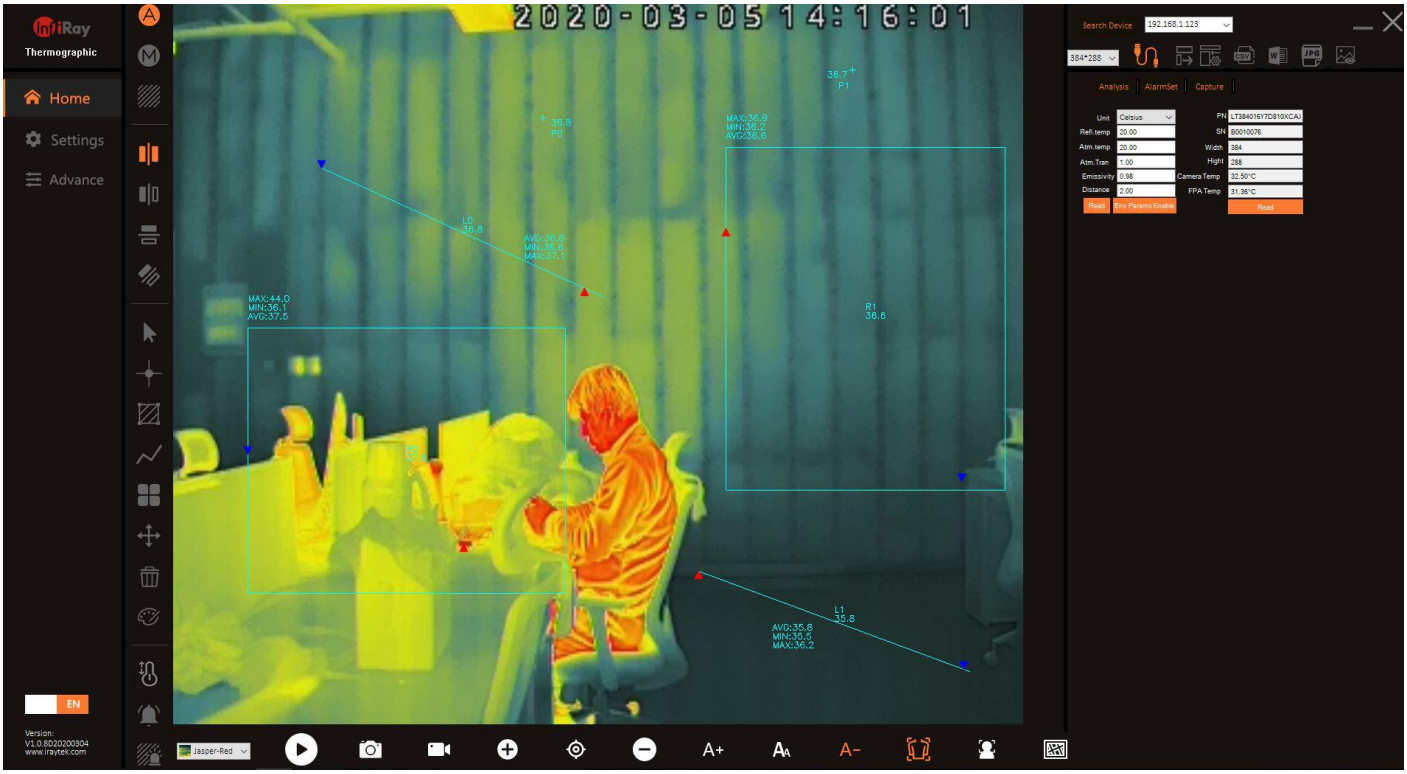


Figure 1.3 Product connect successfully

3. In the connection interface as shown in figure 1.3, you can also select to open the JPEG image for secondary analysis as shown in figure 1.4. Click the JPEG image button in the upper right corner and select the image file, the interface 1.5 will appear. You can use the PC software for temperature measurement analysis and environmental parameters reset.

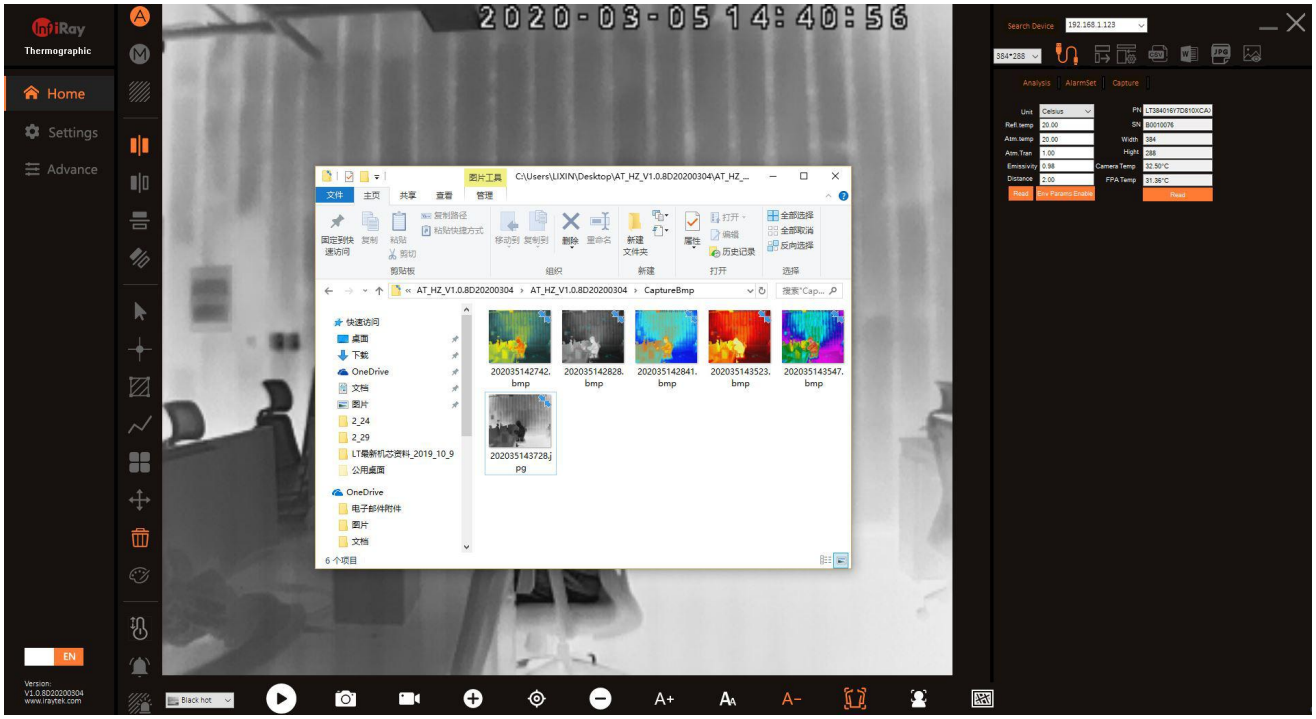


Figure1.4 select the JPEG image

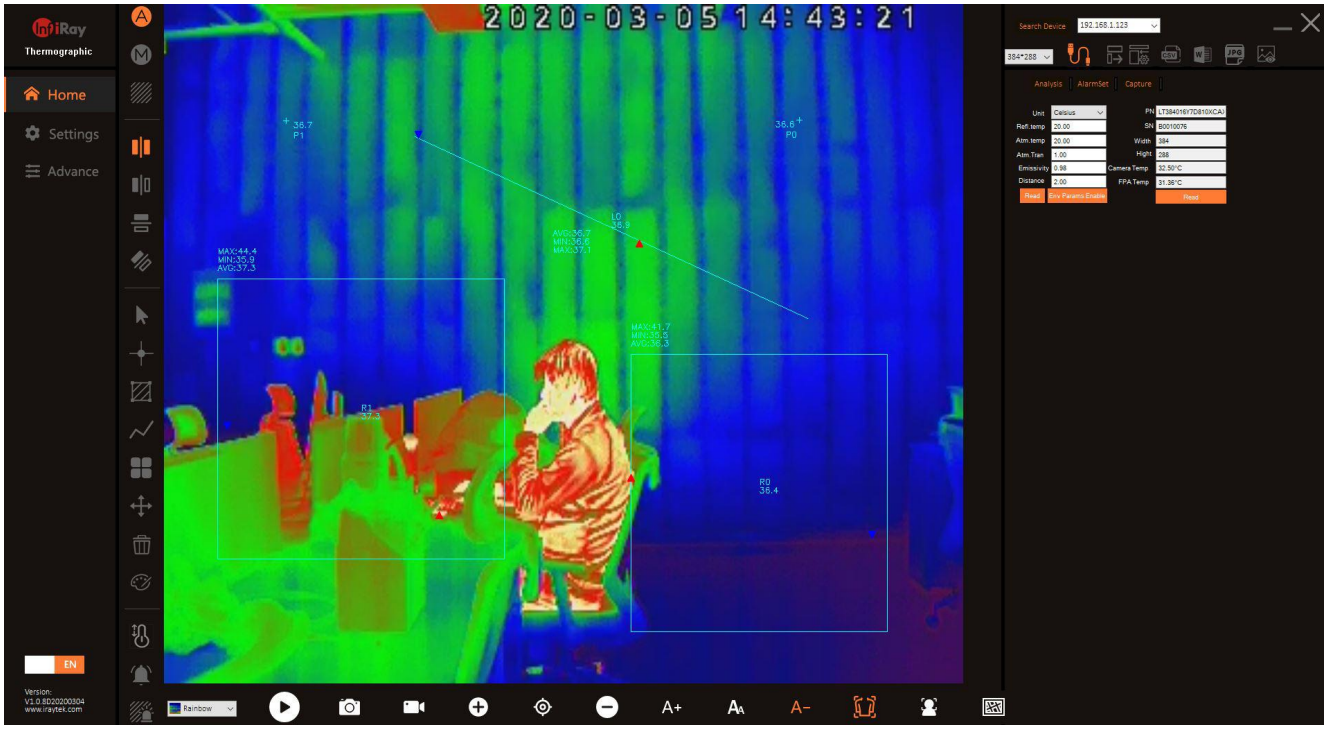


Figure 1.5 JPEG image open correctly

2 Fundamental Functions

2.1 Homepage

Software homepage as shown in Figure 2.1.

The homepage

Temperature Measurement Type Settings: body temperature measure & standard temperature measure are optional, if select body temperature measure, you can set up relevant parameters.

Face Mode: When enabled, the face in the video range will be automatically recognized and the body temperature will be displayed. The alarm parameters of the whole frame can be used in the alarm page. For example, Setting up alarm conditions, including ringing, bouncing-frame, snap and high temperature alarm thresholds. The effect is as follows:

Normal body temperature

Abnormal body temperature(A hot cup simulates a fever)

Shielding Area Selection： Please turn off **The Face Mode** when selecting the shielding area. Click the icon, when the icon turns orange, start to use “**Measurement Rectangle Setting”.** Select the area on the image that you want to shield and you can select more than one area. After the selection, click the **"Shielded Area"** icon again. The icon turns black and white, and the mask area selection is completed. During the following temperature analysis, no alarm will be given to the shielded area. When you click the **"Shielded Area"** icon again, you can edit the selected area, including move, resize, delete, and add.

The home page, as shown in figure 2.1.

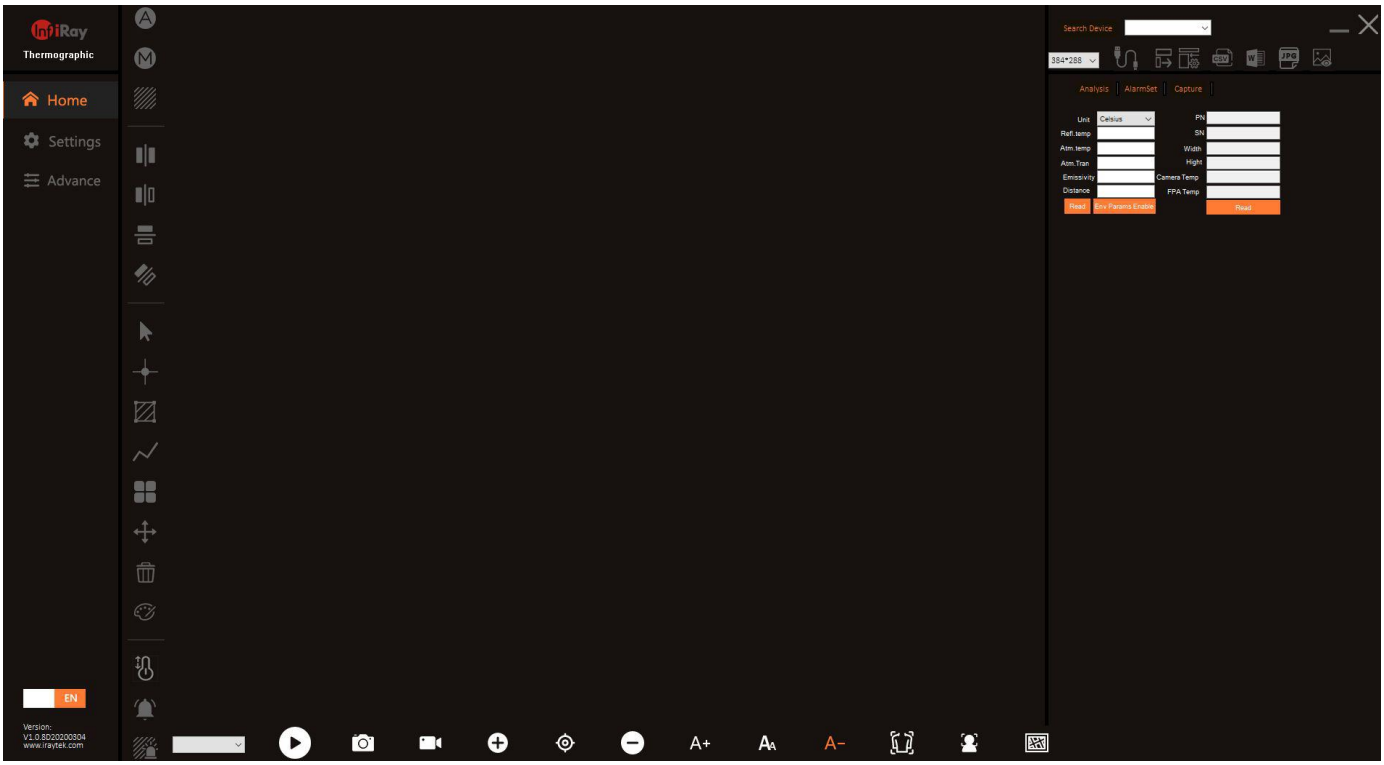


Figure 2.1 The home page --- Not connected

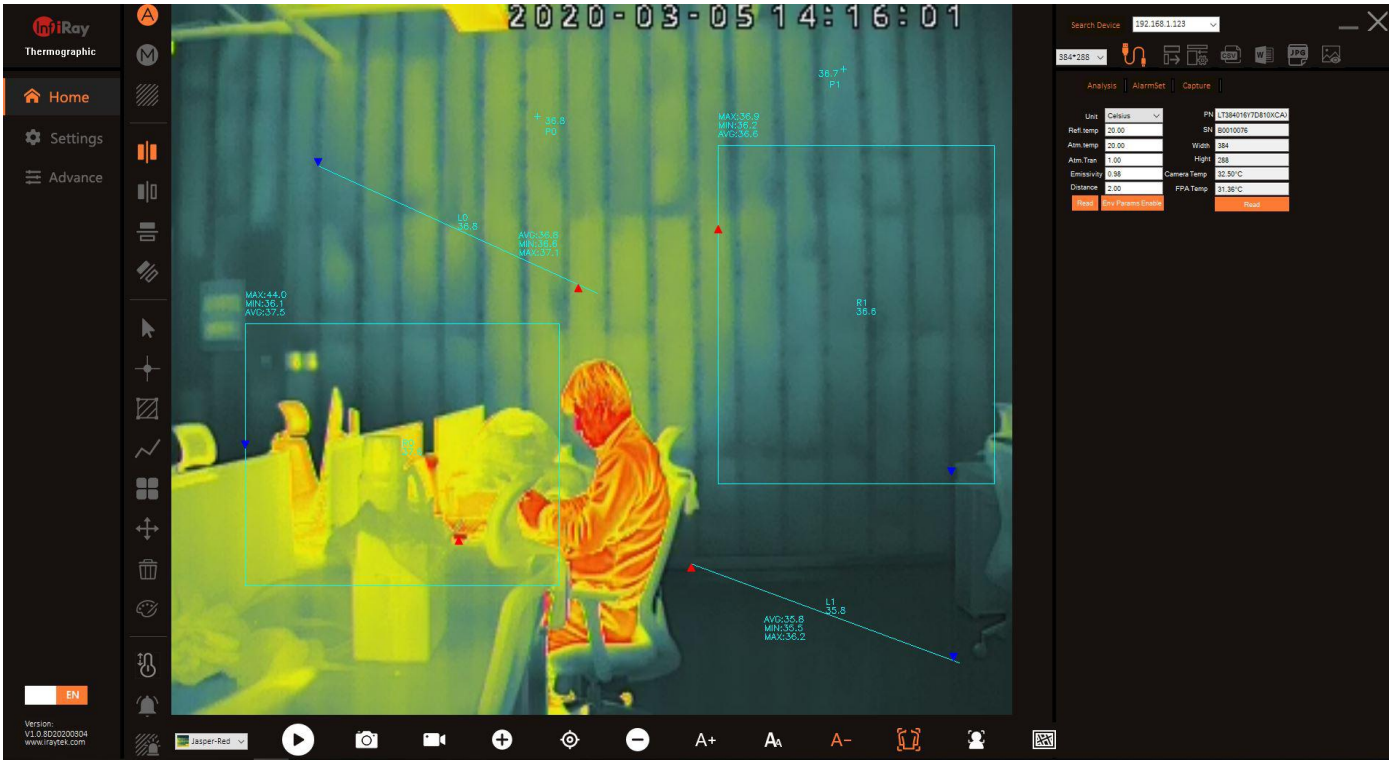


Figure 2.2 The home page --- Connected

Connect the product: select the product name, click this button to connect the temperature measuring product and image.

Automatic shutter correction: after connecting the product to image, click this button for automatic shutter correction.

Manual shutter correction: after connecting the product to image, click this button for manual shutter correction.

Background correction: after connecting the product to image, click this button for background correction.

Image not flipped: after connecting the product or opening the JPEG image imaging, you can click this button to make the image not flipped.

Flip image left and right: after connecting the product or opening the JPEG image imaging, click this button to turn the image left and right.

Flip image up and down: after connecting the product or opening the JPEG image imaging, click this button to turn the image up and down.

Flip image diagonally: after connecting the product or opening the JPEG image imaging, click

this button to make the image diagonal flip.

 **Pointer:** after connecting the product or opening the JPEG image imaging, click this button to display the temperature value of the current position in the image area with the mouse.

 **Set measurement points:** after connecting the product or opening the JPEG image imaging, click this button then click and move the mouse in the image area to add measurement points.

 **Set measurement line:** after connecting the product or opening the JPEG image imaging, click this button then click and move the mouse in the image area to add measurement line.

 **Set measurement rectangle:** after connecting the product or opening the JPEG image imaging, click this button then click and move the mouse at any point in the image area. Drag the mouse to draw a rectangle, again click and move the mouse button, you can complete the drawing.

 **On/Off Full Frame Temperature Measurement:** after connecting products or opening JPEG image imaging, click this button to start full-frame temperature measurement. When full-frame temperature measurement is on, the lowest temperature, the highest temperature and average temperature of the whole frame will be displayed. Click again to close the full-frame temperature measurement.

 **Move measurement position:** after connecting products or opening the JPEG image imaging, you can click on this button to open the mobile measuring position function. Arbitrary measurement point, line, rectangle can be selected, which will follow the moving mouse. Wherever the user want to stop, click the left mouse button again.

 **Delete measurement point, line, rectangle :** after connecting products or opening the JPEG image imaging, Click this button and then click left mouse button on the point/line/rectangle which needs to be deleted.

Figure 2.3 Selected rectangle

Figure 2.4 Selected point

Figure 2.5 Selected line

 **Select measurement color:** after connecting products or opening the JPEG image imaging, you can click this button to select the color of temperature measuring tool.

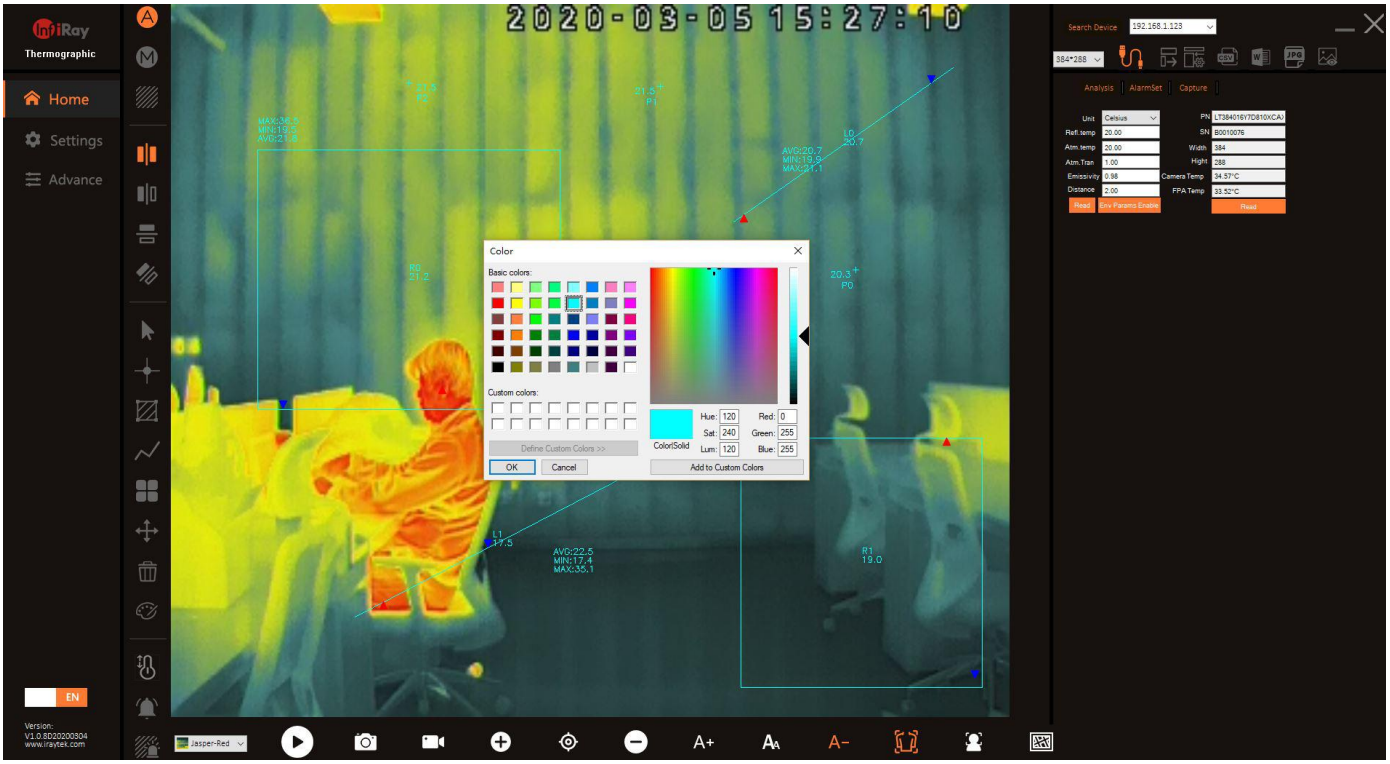


Figure 2.6 Home- Color choices

Figure 2.7 Home- Color choices finished

Temperature width switch: After finishing connection, click this button to open/close the temperature width stretching.

Temperature alarm switch: After finishing connection, click this button to open/close the temperature alarm. The default is to alarm both high and low temperature, the low temperature threshold is 20°C, the high temperature threshold is 40°C, and the alarm threshold and alarm mode can be set up in the settings page. Areas where the temperature is lower than the low temperature threshold show blue, and areas where the temperature is higher than the high temperature threshold show red.

Isotherm switch: After finishing connection, click this button to open/close the isotherm. Then the default low temperature threshold is 20°C and high temperature threshold is 40°C, which can be set up in the settings page.The area between the low temperature threshold and the high temperature threshold is shown in orange.

Export template: After connecting the product or opening the JPEG image, and setting the measuring positions of points, lines and rectangles, click this button to save the temperature measurement template to the specified file (*. INI).

 **Import template:** After connecting the product or opening the JPEG image, click this button to import the temperature measurement template file (*. INI), and automatically map the temperature measurement tools in the template to the current image.

 **Export CSV:** After connecting the product or opening the JPEG image, click this button to generate a CSV report, which stores the current environmental parameters and the whole frame temperature data.

 **Export test report:** After connecting the product or opening the JPEG image, click this button to generate a test report, which stores the current environment parameters and test image screenshot.

 **Export JPEG:** After finishing connection, click this button to save the JPEG image for secondary analysis.

 **Open JPEG:** Click this button to select JPEG image. After the image is turned on, the secondary analysis can be carried out. The environmental parameters, temperature units, measurement points, lines and rectangles can be reset for temperature measurement analysis.

Temperature unit: There are Celsius, kelvin and Fahrenheit three optional temperature unit.

Temperature measurement parameter: All parameters of temperature measurement can be read and written, including reflecting the temperature, ambient temperature, atmospheric transmissivity, emissivity, distance.

Environment variables take effect: Taking the reflective temperature, ambient temperature, atmospheric transmissivity, emissivity and distance into effect.

Product information: Including the product number and serial number, the array size and the temperature of detector and product.

Temperature alarm: Image color alarm and ring tone alarm can be set respectively.

Temperature alarm---full frame---color alarm: The state of low temperature, high temperature, high and low temperature and shutdown can be set respectively; alarm threshold can be read and written.

Temperature alarm---full frame or partial region--- alarm bell: The state of low temperature, high temperature, high and low temperature and shutdown can be set respectivel; You can select

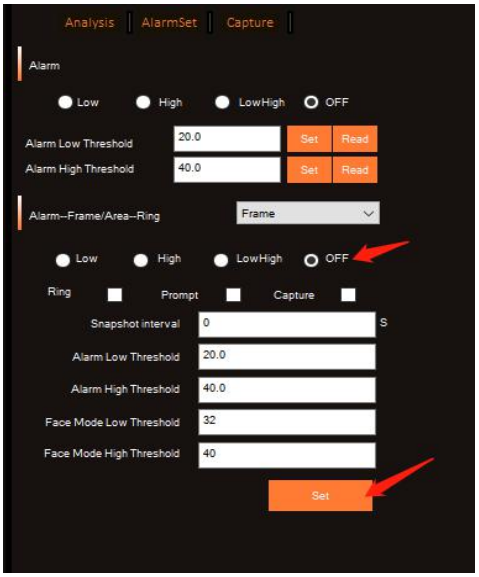
bell enable, bounce enable and photo enable, capture time interval, high and low temperature threshold setting and low/high temperature thresholds for face mode.

Alarm bell enable: When selected, if the temperature alarm, it will ring.

Popout enable: When selected, if the temperature alarm, it will pop-up.

Photo enable: When selected, if the temperature alarm, it will capture pictures. The captured pictures will be saved in the ***CaptureBmp*** folder under the path of the application program file.

Note: if you want to close the alarm, click the "close" button and then click the "set" button to update the alarm status.



2.2 Setting—temperature measurement setting

Settings include basic Settings and temperature Settings.
Temperature measurement Settings are shown in figure 2.8.

Figure 2.8 Setting--Temperature measurement setting

1. Temperature measurement range

High gain, low gain, or auto can be selected.

Low-high gain threshold, low-high gain percentage, high-low gain threshold and high-low gain percentage can be read/set.

2. Temperature wide

The on/off state can be set.

The low temperature threshold and high temperature threshold of temperature wide can be set/read.

Figure 2.9 Setting--Temperature measurement setting --- Low temperature alarm

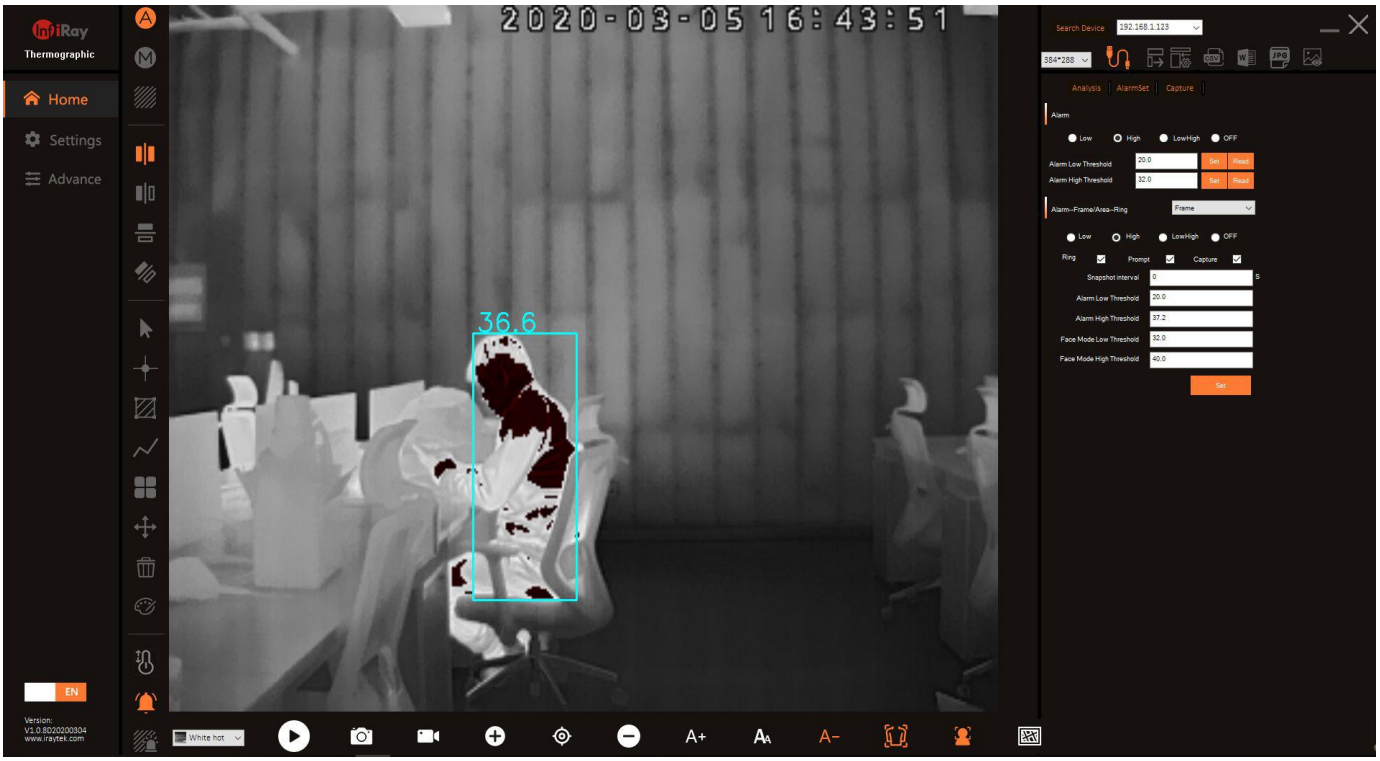


Figure 2.10 Setting--Temperature measurement setting-- High temperature alarm

1. Highest and lowest temperature display control

It can control whether the temperature of measuring line, the lowest temperature and the highest temperature of the rectangle are displayed or not.

2. Center point average temperature display control

It can control whether the temperature of measuring line, rectangular center point and average temperature are displayed or not.

2.3 Language switching

Figure 2.11 Language switching

The software can switch between Chinese (CN) and English (EN) freely. The Chinese state is shown in figure 2.11.

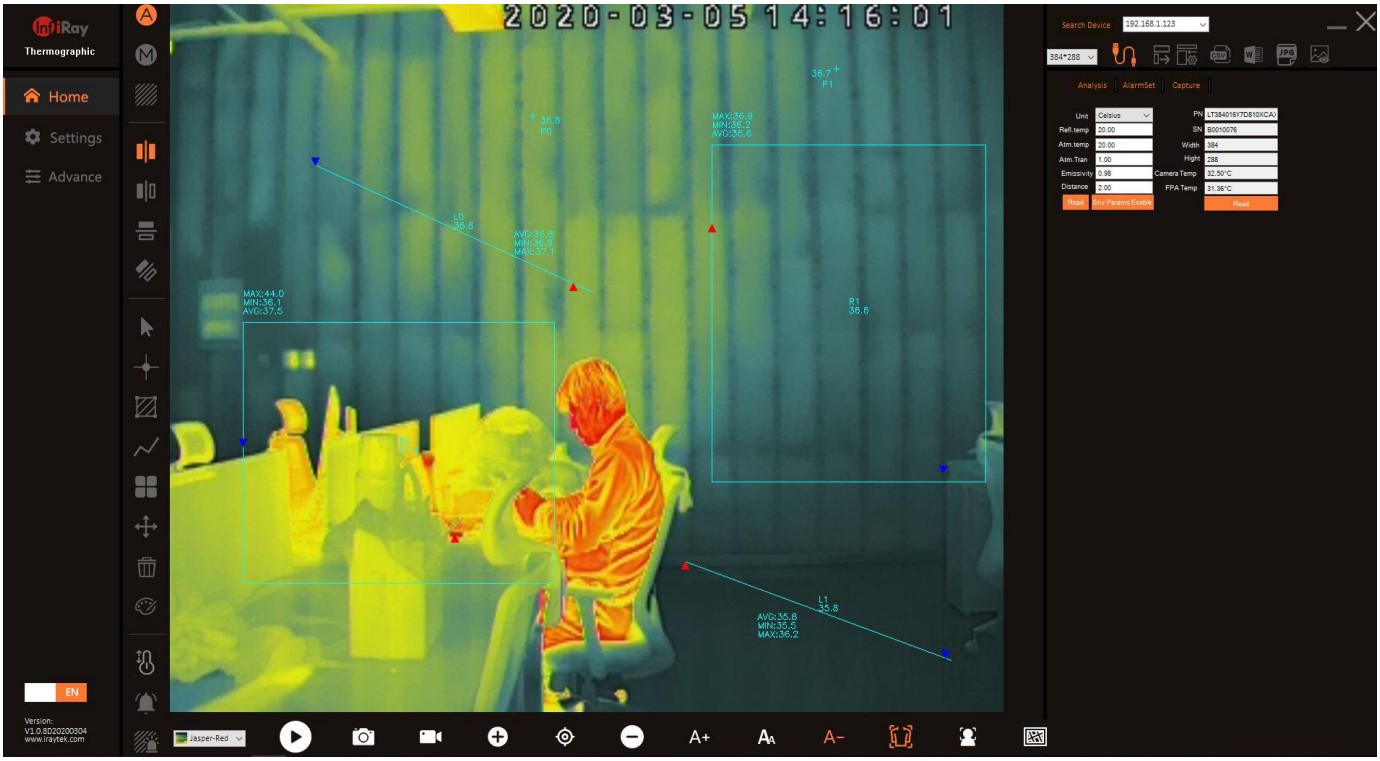


Figure 2.12 English status

3. Advanced Functions

3.1 Blackbody Calibration

This function is used to correct the module temperature, please contact the technical personnel if you need to use, under the guidance of the technical personnel to complete.

You can set the blackbody correction switch.

Drawing mode: select the region coordinates of black body on the image, and inform the module of the region of black body by setting the function of black body coordinates.

Blackbody temperature: you can read and write the temperature of blackbody in use in blackbody calibration mode.

Input the blackbody coordinates Manually. Under the premise of determining the coordinates of the region where the blackbody is located, it can be input by manual.

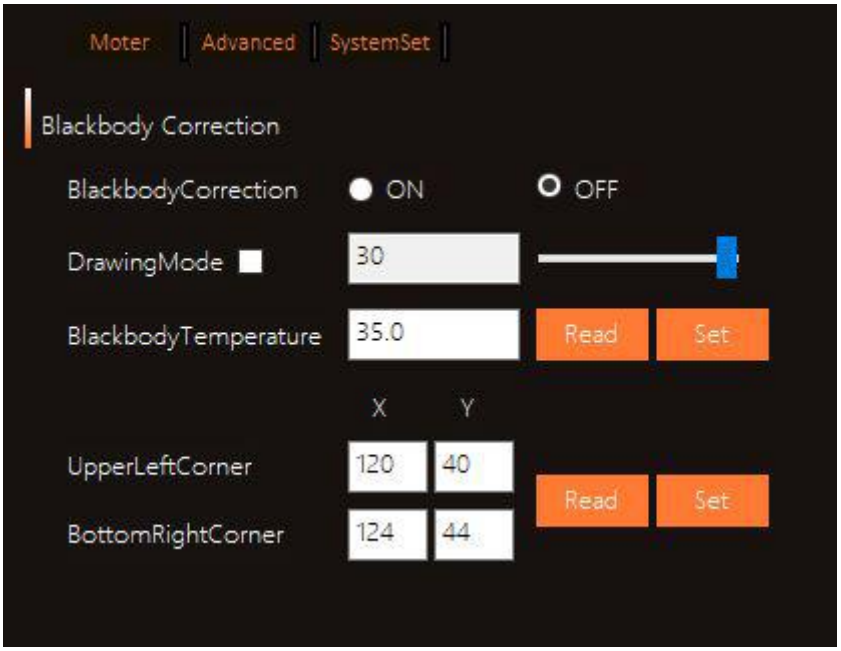


Figure 3.1.1

3.2 Advanced Setting

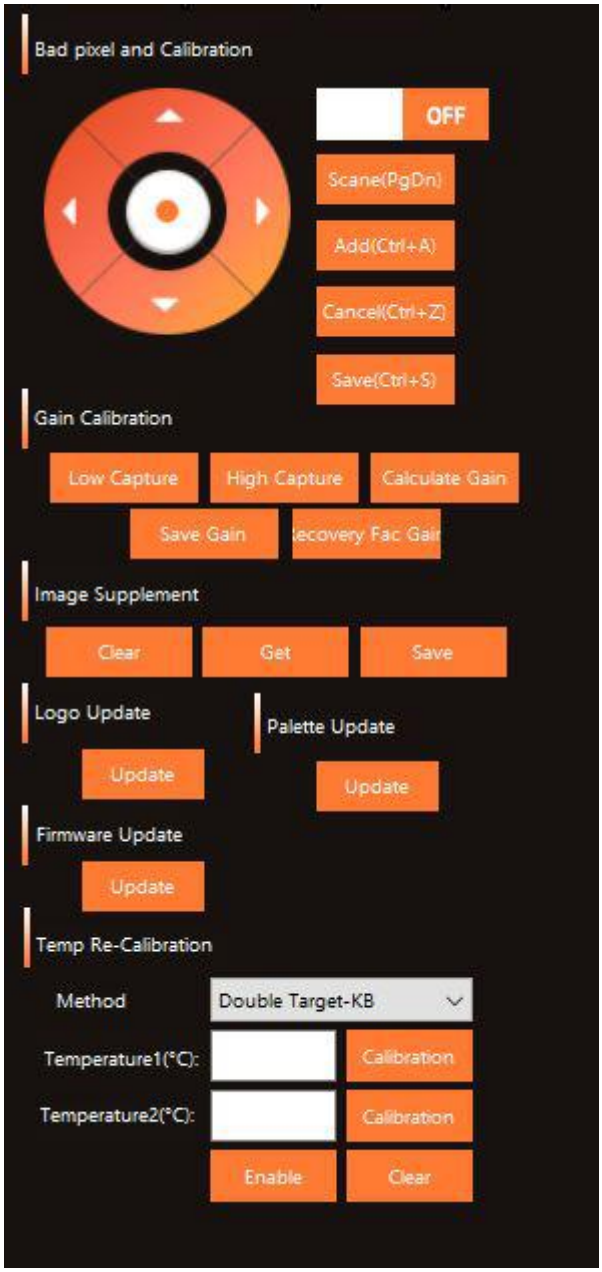


Figure 3.1.2

3.2.1 Blind Pixel Calibration

If new blind pixel appears on the product, we can remove the blind pixel through the function of blind pixel calibration. As is shown in Figure 3.2.1, the process is as following step:

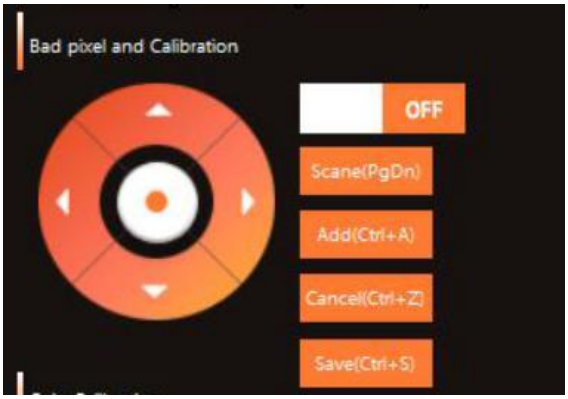


Figure 3.2.1 Blind pixel calibration interface

Step1: Place the monitor connected with product to a position where it is visible clearly, adjust product vision and click “display” button, meanwhile the monitor will display reticle, click “center”button to locate the reticle;

Step2：As shown in Figure 3.2.1, in “blind pixel and calibration ”interface, click “up”、“down”、“left”、“right”button to adjust the center position of reticle to the position of blind pixel, click “add” button to add the center position of reticle to blind pixel table and then view if there is blind pixel in the picture. if the blind pixel still exists, it mean that the center position of reticle isn’t aimed at the blind pixel, click “Cancel” button and move the reticle to replace the blind pixel.

Step3: Repeat step2 until all blind pixels disappear, click “ Save ” button, as shown in Figure 3.2.2, when “Save ” button turn orange ,it means that the new blind pixel table is saved successfully. When the product is powered on next time, it will remember the coordinates of new added blind pixel.

It can also use “Scan” function to locate the position of blind pixel. Click “scan” button , the reticle will move to the position where blind pixel is suspected. User can judge if it is a blind pixel, if it is a blind pixel then click “add” button to add the blind pixel to blind pixel table.

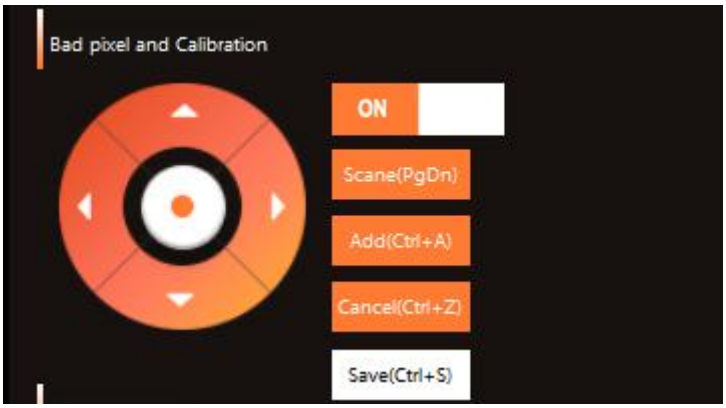


Figure 3.2.2 The process of blind pixel table saved

Note:

1. If he blind pixel disappears actually, it needs to click “Save Bad Pixel Map” button to save the blind pixel table. If not, the blind pixel will be still existed;

2. During the process of blind pixel calibration, we can use the shortcut key of moving reticle、replacing and saving to improve operational efficiency. The direction key can make the reticle move one pixel one time ，“ctrl”+“the direction key”can make the reticle move twenty pixels, the other shortcut key is shown in Figure 3.2.1

3.2.2 The Calibration of Gain

It is required to collect low temperature and high-temperature data of uniform target (such as the black body) for gain calibration. It is recommended to set the low temperature and the high temperature as 10℃ and 50℃ respectively. The interface for gain calibration is shown in Figure 3.2.3.

Figure3.2.3 Gain calibration interface

The temperature of the target must be uniform and stable. It is necessary to make sure the target fills the whole view of the product. The capture of the data at the low temperature and the high temperature is arbitrary, but it is not allowed to power off the product during the procedure of calibration.

Gain calibration steps

Step1: Calibration preparation:

User PC software;

DC power supply;

Black body;

Thermal Camera;

Step 2: Connect device and power on;

Attention: Ensure the temperature of the product is cooled to the room temperature before it is

powered on;

Step 3: Stable for 30 minutes;

Set the shutter to manual mode 2 minutes after the module starts up.

Confirm the temperature of FPA is stable after the module starts up 30minutes.

Select the image to “Whitehot” mode.

Step4: NUC (Non-uniformity Correction)

After the thermal module is stable, click  in “Setup” three times to perform background correction. (Cover the lens with a uniform object)

Step5: Collection, calculation, and conservation of the calibration factor

Set the low temperature (10℃) of the target (eg. Black body) and aiming the camera at it. Then click “Low capture” to collect the data at the low temperature, as shown in Figure3.2.4. After collecting the low temperature successfully, the “Low Capture” button will change orange. Then, set the high temperature (50℃) of the target (eg. black body) to collect the data at the high temperature in the same way.

Figure3.2.4 Window of collecting data successfully

Attention: When collecting the two sets of temperature data, the relative position of the module and the target object should be fixed, otherwise, the calibration results will be affected.

After the two sets of data are completed, the "**Calculate Gain**" can be used, as shown in Figure3.2.3. Click "**Calculate Gain**" to calculate Gain automatically. After the calculation, the "Calculate Gain" is lifted and the product works normally after the manual "**shutter**".

After the "**Calculate Gain**" is completed, “Save Gain”can be used, as shown in Figure3.2.5.

Click “**Save Gain**” and the notice of “Save this gain to defaults?” will pop up. Then click “**Yes**” to save the Gain. Otherwise, the Gain will not be saved. “**Save Gain**” will be lifted after the process of “**Save Gain**” is finished successfully. Wait a moment to make sure the data is saved successfully before power off. Otherwise, the data will be lost, and the product will even fail to work.

Figure3.2.5 Gain Calibration

Step6: Restoring the factory gain

Click "**Restore Factory Gain**"and wait for the data recovery after a few seconds. Perform "**shutter** " manually, and then the product can work normally. Click "**Save Gain**"and wait for a moment till the data is saved. Make sure the data is saved successfully before power off.

Attention: No operation should be performed before the data is saved successfully.

3.2.3 The Calibration of Image Recompensation

The interface of image recompensation on PC software, as shown in Figure 3.2.6.

This function can eliminate the phenomenon of non-uniform, as shown in Figure3.2.7. The procedures of calibration are as follows:

Figure3.2.6 Interface of image re-compensation

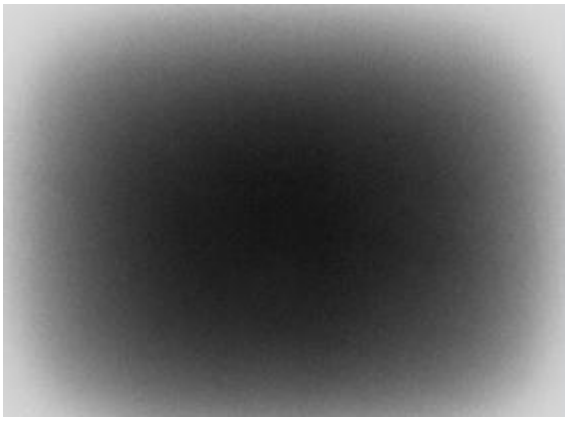


Figure 3.2.7 Non-uniform image

Non-uniform is reduced after shutter calibration

Step1: Calibration preparation:

Imaging module with user lens (making sure the screws、flange、lens are all at the final state, cooling in the room temperature than 20minutes);

Uniform scene (desktop, blackboard, black if possible);

User upper computer;

DC power supply;

Tooling cable;

Supervising device;

Step2: Device Connection and Power on

Attention: Ensure the temperature of the product is cooled to the room temperature before it can be powered on.

Step3: Stable for 2minutes

Aiming the lens at the uniform surface after the thermal imaging module start up for 2 minutes.

Quickly checking whether any bad elements or non-uniform phenomenons exist in the image .

If bad elements exist,we can use the PC software to perform the calibration of bad elements according to the Section 3.2.1 above.

Otherwise, performing the next steps.

Attention: Making sure there is no bad elements exist before calibration, otherwise, the bad elements will be calibrated in the data.

Step4: Changing the setup of product

Select the image as “White-hot”

Step5: Clear the last calibration data

As shown in Figure3.2.7, click ”Clear supplement data”, clear the last calibration data.

It will take 10S to accomplish before ”Clear supplement data”button is lifted .

Step6: Manual correction

Click  to perform shutter correction

Step7: Waiting the thermal module to be stable

Supervising the value of FPA temp and performing the next steps when the value changes is lower than 5℃.

Step8: Getting and calculating the compensation data

Aiming the lens at the uniform surface and clicking ”Get supplement data”.

Getting data successfully when the button is lifted.

Step9: Saving the calibration data and factors

Clicking “Save Supplement Data”， if the result is satisfying after image recompensation.

Power off should not be done during the saving before the button is lifted.

3.2.4 The Temp Re-calibration

According to the temp re-calibration part, please refer to the *Xcore LT Series Temperature Measuring Thermal Imaging Module External Blackbody Calibration Instructions.*