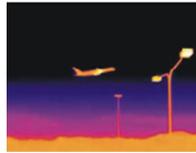# IR-CAM-160-P4

Infrared Body Surface Temperature Rapid
Screening Camera (Thermal Imaging Camera)

# User Manual

2m~5m

**PLEASE READ THIS MANUAL CAREFULLY BEFORE OPERATION**

**MRC. 3.20**

# To Users

**Dear Users,**

**Thanks for choosing the Online Monitoring Thermal Imaging Cores.**

**Please read this user manual carefully before first use. Also please keep it in a safe place for reference in the future.**

**Please operate it according to the recommended instructions in user manual.**

**We reserve the right to change this user manual without further notice.**

# ⚠ WARNING

**KEEP THE CORE FROM DAMP OR RAIN!**

**DO NOT OPEN OR EXCHANGE PARTS!**

**REPAIR ONLY CAN BE CONDUCTED BY OUR STUFF!**

# CAUTIONS

- **In order not to cause malfunctions or even damages for the device, please do not direct the lens towards strong high-temperature radiation source (i.e. the sun) regardless of the power is on or off!**

- **Avoid shock and impact during operation or transport.**

- **Device must be kept in the original case during transport and storage. Storage temperature is between -40℃ and 70℃.**

- **Please keep it in a cool, dry, ventilated, and without strong electrical or magnetic field place.**

- **Keep the lens surface off grease or any chemical substances that would damage the lens. Close the lid after using.**

# Content

# 1. Introduction

It is the Thermal Imaging Core. It is equipped with Uncooled Focal Plane Array (FPA) Micro-bolometer which can produce intuitive thermal images for users by conveying the infrared ray of objects. And it applies IVE image enhancement algorithm to produce clear images. Besides, the Ethernet RJ45 interface is used for video transmitting or controlling, and the SMA analog video interface is used for displaying the analog image.

The Thermal Imaging Cores are packed with advanced features, such as low power consumption, low noise, small size, light weight and high resolution colored images. The cores can be applied in various products, such as vehicles, ships, planes, sights, telescopes, cameras and so on.

**Standard Item List:**

| Item | Quantity | Configuration | Notes |
|------|----------|---------------|-------|
| Thermal Imaging Core | 1 | √ | Standard |
| Software CD | 1 | √ | Standard |
| Video cable of SMA to BNC | 1 | √ | Standard |
| 2P Junctor | 1 | √ | Standard |

## 2. Power supply

- The recommended power supply is DC 12V/2A. And the range of power supply is between 10V to 14V.

- The cores are equipped with protection of over-voltage and over low voltage. And it has the protection of reverse connection.

## 3. The configuration & Accessories

### 3.1 The configuration



Figure 3-1

- **Core:** Thermal Imaging Core which is equipped with UFPA thermal detector. Users can control the core by Ethernet RJ45 interface.

- **Lens:** There are three kinds of fixed-focus lens optional, the 6.2mm lens, the 15mm lens and the 25mm lens.

- **Mounting Hole:** According to needs, users can connect the core to other device by the mounting hole**.**
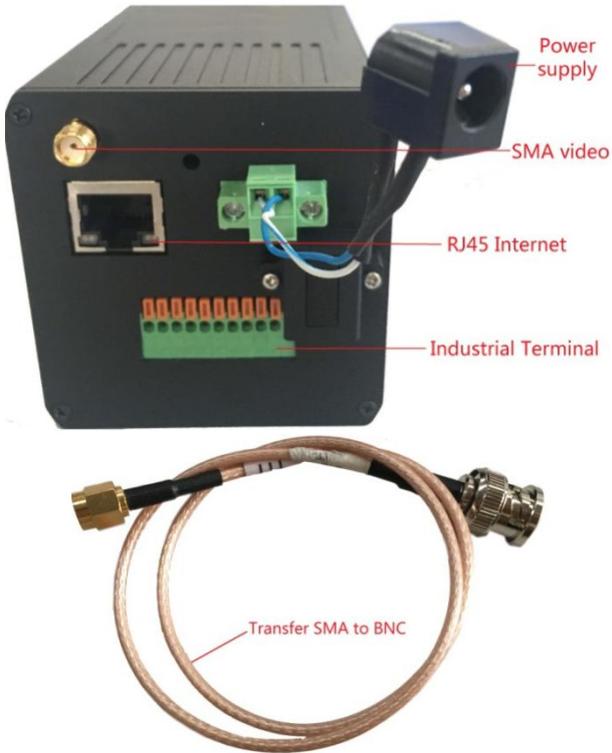
2

## 3.2 The Accessories



Figure 3-2

- **SMA Video:** The interface of SMA Video. It can display the analog images. The Pins from the left to the right are Pin1 to Pin10.

- **RJ45 Internet:** The interface of Ethernet RJ45. It has many functions, such as video transmitting, core controlling and software updating.

- **Power Supply:** The interface of power supply. The recommended power supply is 12V DC.

- **Industrial Terminal:** There are many functions. For example, it is available for RS232 pin and Reserved I/0 pin. And it has the alarm function. According to needs, users can connect the core to other device by the mounting hole**.**
- **Transfer SMA to BNC:** It is compatible with SMA Video.
- **Micro SD Card (built-in):** It can increase the memory of the cores to record more pictures and videos.

The definitions of all industrial terminals:

| No. | Identifications | Pin Functions |
|---|---|---|
| PIN1 | Power | Isolate power input |
| PIN2 | GND | Isolate ground |
| PIN3 | PC_TXD | RS232 |
| PIN4 | PC_RXD | |
| PIN5 | GND | |
| PIN6 | 485_D- | RS485 |
| PIN7 | 485_D+ | |
| PIN8 | GND | |
| PIN9 | ALAM_IN | I/O |
| PIN10 | ALAM_OUT | |

**Notes：**

  （1）Power Input: 10V~14V.

  （2）AV Video Output Mode: PAL and NTSC are both available.

  （3）Polarity switching is also for the color bar switching.

  （4）Zoom ratio: 1X, 2X, 4X.

  （5）Trigger the Video PIN, start recording video.
    Trigger the Video Pin again, stop recording.

  （6）Trigger the Motorized focus PIN, start motorized focusing.
    Trigger the Motorized focus PIN again, stop motorized focusing.

  （7）The PWM square wave reference figure as below.



```
Period      20ms
Voltage high levels are:
1.0 ms    Mode 1
1.5 ms    Mode default
2.0 ms    Mode 2
```
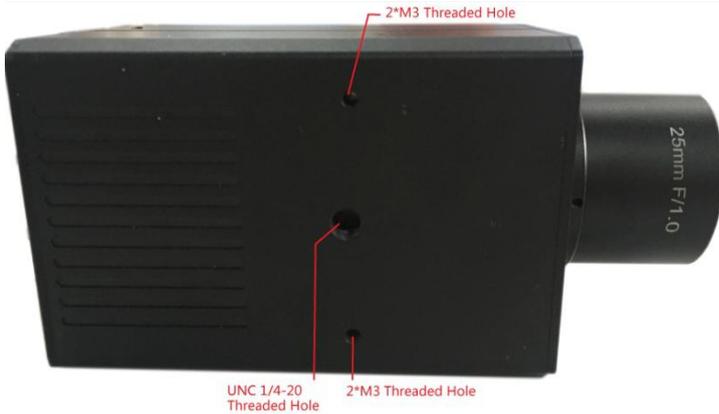
## 3.3 The Installation



Figure 3-3

- **UNC 1/4-20 Threaded Hole:** It can be fixed in tripod or others bracket.

- **2*M3 Threaded Hole:** It can be fixed in tripod or others bracket. There are 6 holes in total, 2 in bottom, 2 in left and 2 in right side.
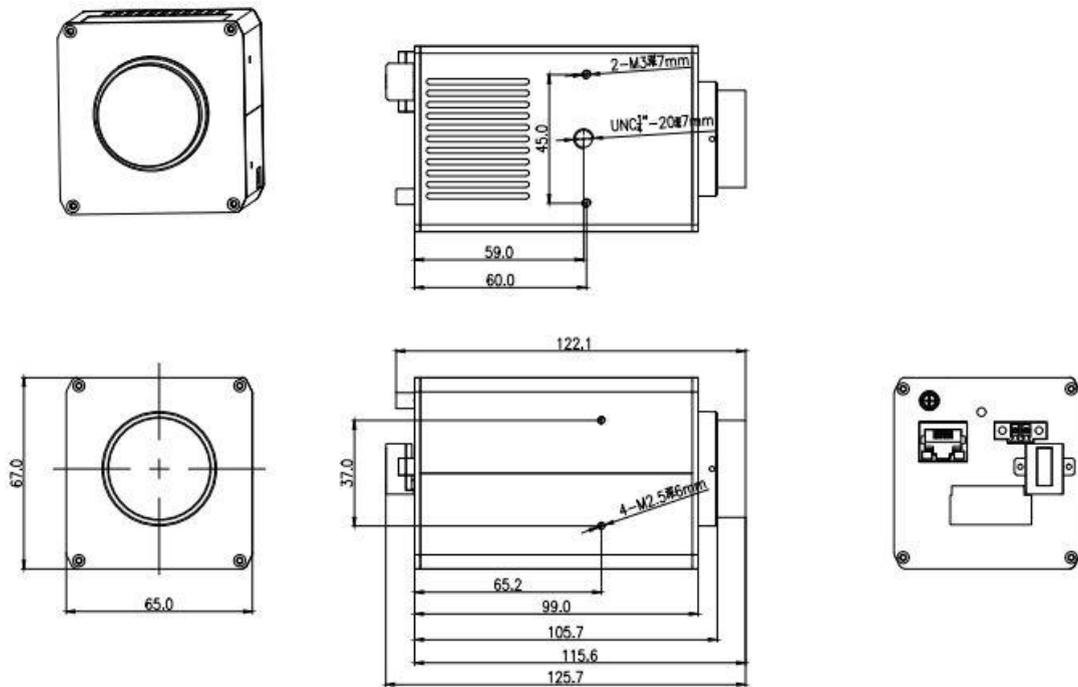
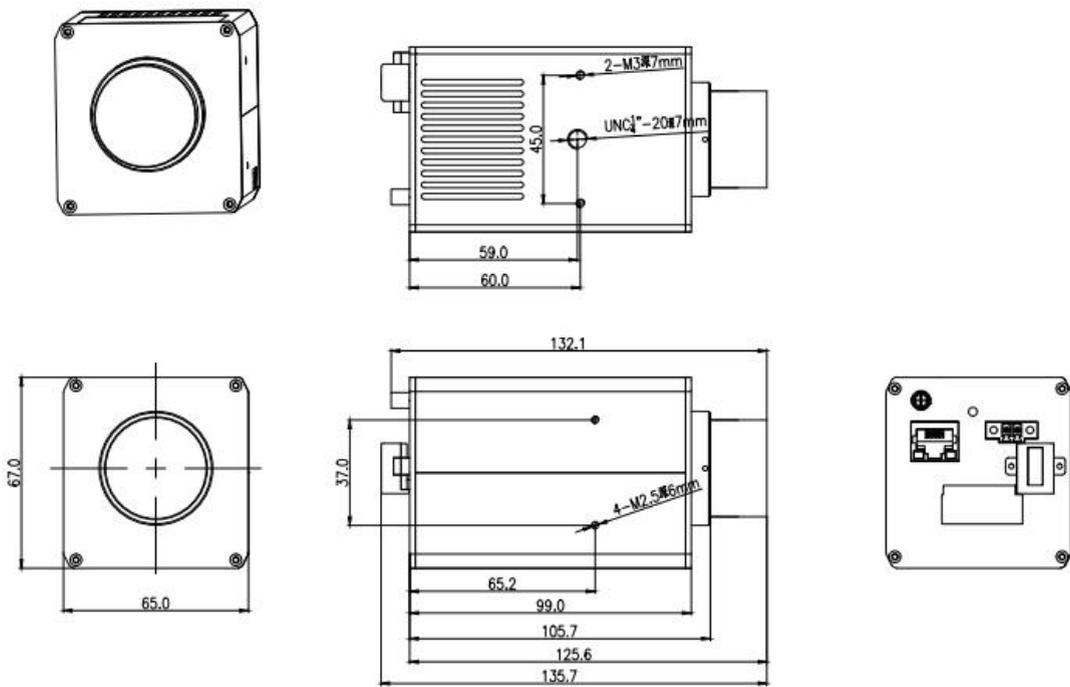6

## 3.4 Core Structure



Figure 3-4 (384×288)

Figure 3-4 (640x480)

# 4. Technical Specifications

| | | |
|---|---|---|
| **Detector Data** | Type | Uncooled FPA detector |
| | IR Resolution | 384×288 |
| | Pixel Pitch | 17μm |
| | Spectral Range | 7.5~14μm |
| | NETD | 80mk |
| **Lens Data** | Focus | Auto/Motor |
| | FOV | 24°×18° |
| | IFOV | 1.13mrad |
| | Lens | 15mm lens |
| **Image** | Image Enhancement | IVE image enhancement algorithm |
| | Frequency | 50Hz/60Hz |
| | Electronic Zoom | 2×, 4× |
| | Palette | 10 optional colors (white-hot, black-hot、 rainbow and so on) |
| | Temp Range | +30℃~+45℃ |
| | Temp Accuracy | ±0.5℃ |
| | Temp Correction | Auto |
| | Tracking of Highest Temp | Real-time displaying of location and temp of highest temperature |
| | Emissivity Correction | 0.01 to 1.0 adjustable, auto correcting according to the inputted emissivity and ambient temperature |
| | Ambient Temp Correction | Auto correcting according to the inputted transmittance |
| | Correction of Atmospheric Transmittance | Auto calculating atmospheric transmittance according to meteorologic parameters and correcting temperature |
| | Function Setting | Date/Time, Temp unit℃/℉/K, Language |

# Continuous: Technical Specifications

| | | |
|---|---|---|
| Storage Data | Temp Data | MGT format, IRSEEX software to analyze |
| | Temp Data Flow | MGS format, IRSEEX software to playback with timeline. It can adjust speed, frozen, loop playback and process playing image |
| | Image | JPG format (Core), BMP and JPG format (PC) |
| | Video | AVI format, H264 compression |
| | Storage Control | Serial port command. Level trigger and key trigger are optional |
| | Report Generation | Word format |
| | SD Card | 32G built-in IT card |
| Interface | Network Interface | 100M Ethernet, RJ45interface, temp data transmission |
| | Power Interface | DC 12V |
| | Video Interface | SMA RFI |
| | Controlling | RS232, RS485 |
| | Alarm In/Out | Support |
| | API | Support SDK (Win7, Linux) |
| Power System | Working Power | DC 12V |
| | Consumption | < 6W |
| Environment Data | Operation temp | -20℃～+50℃(ambient temperature 10℃ -32℃ accurate measurement) |
| | Storage temp | -40~+70℃ |
| | Humidity | ≤95% ( non-condensing ) |
| | Shock | 25G , IEC68-2-29 |
| | Vibration | 2G , IEC68-2-6 |
| | EMC | CE/FCC |
| Physical Data | Size | 136mm*65mm*67mm (without lens) |
| | Weight | ≤500g |
| | Mounting | UNC 1/4"-20 threaded hole, M3 threaded hole |

# 5. IRX Software Operation

## 5.1. System Requirements

The files of the IRX software consist of IR image, visual image, all of which are far bigger than normal text files, thus the following standards of the computer hardware configuration should be met:

- CPU PENTIUM ® Dual-Core 2.0GHz processor or faster.
- 2Gbytes or more system memory.
- 80G or bigger hard disk.
- 1440×900 or higher resolution screen.(suggestion)
- Operation system: Microsoft Windows XP, Windows 7.

## 5.2 Open the Application

1) Copy the software in the disc to the PC.

2) Open the "IRX.exe". As shown in the figure 5-1.



Figure 5-1

**5.3 Thermal Imaging Camera Setting**

**1) Search:** Click the search button. After a few seconds, the software will automatically search to the thermal imaging camera, and show the IP address. As shown in the figure 5-2.



Figure 5-2

**2) Remote operate:** It can operate the thermal imaging camera multi-functionally, such as Remote setup, Modify IP, AVI preview, Gray preview, Capture image and Downloads file. As shown in the figure 5-3.
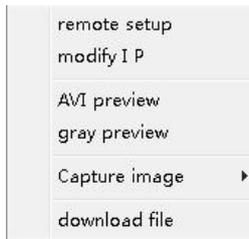


Figure 5-3

**Remote setup:** Adjust the options in Camera, System, Parameter, Temp and Image, as well as look up the basic information of device. As shown in the figure 5-4.

In menu of parameters, uses can set up the temperature coefficients, such as distance, humidity, and radiance.

Distance: Set up the distance in order to get more accurate result. This value can be omitted if target subject is close to device (less than 3m).

Humidity: Set up the humidity in order to get more accurate result. It is recommended to keep the default humidity.

Radiance: Set up the radiance in order to get more accurate result, according to the real transmission coefficient of filter, such as germanium wafer.

In the menu of temp, users can add spots, line or areas, and select one of them as reference. Turn it on to show the relative temperature, and turn off to show the real temperature. It is only available in AVI preview, which is also named real-time observation.



Figure 5-4

**Modify IP:** Modify the thermal imaging camera original IP, subnet mask and gateway. As shown in the figure 5-5.

Figure 5-5

**AVI preview:** It can capture the images of thermal imaging camera, record video, stop recording and set up the thermal image focal length. Click the Auto Focus button, then the device will adjust the focus automatically in order to get crisp thermal images. It can be adjusted by clicking the near& far button as well. Besides, users can click the Getwalk button to read the step number of motor, and click the Setwalk button to set the motor step number. As shown in the figure 5-6.
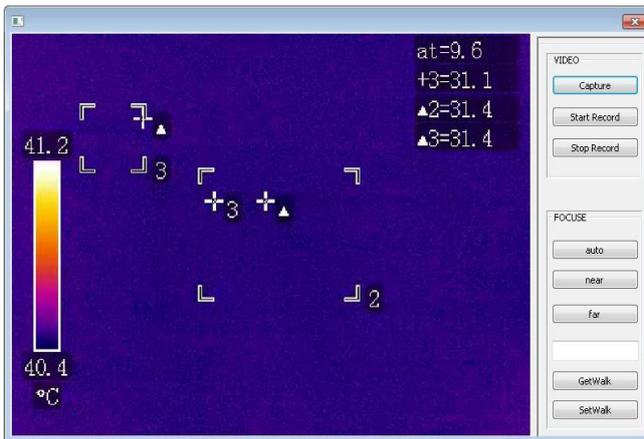


Figure 5-6

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**Gray preview:** Preview and analysis the current target gray value of thermal images. As shown in the figure 5-7.
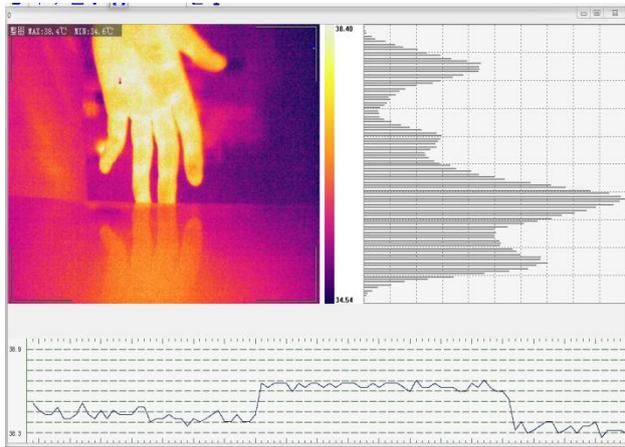


Figure 5-7

**Capture image:** Capture the gray images, JPG images and BPM images.

**Download file:** Download the images and videos which are saved in the device. Select the files you need, make sure of the save path, and then click "Download". It can delete the flies as well.

**3) Mode switching:** It can set up the series and baud rate. Click "Setup" to adjust the options in Camera, System, Parameter, Temp and Image, as well as look up the basic information of device.

## 5.4 Function Area Operation

Function area can analyze images and videos. It divides into 7 parts: Files, View, Analysis, Setup, Help, Report and PTZ control. As shown in the figure 5-8.
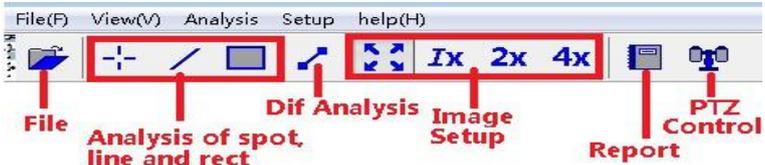


Figure 5-8

**1 ) File**

- Open files or quit the software. Only gray images in Utd form can be opened by the software.

- Analyze the added images or videos.

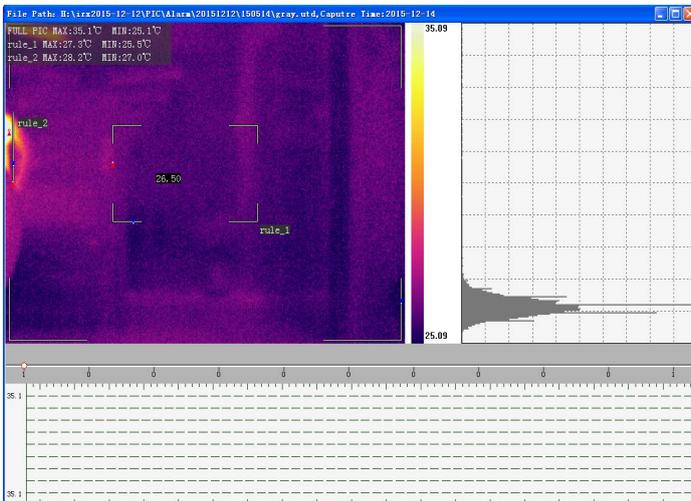- Analyze the added dots, lines and rectangles. As shown in the figure 5-9.



Figure 5-9

**2）View**

● Analyze the added dots, lines and rectangles, as well analyze temperature differences. As shown in the figure 5-10.



Figure 5-10

● Set up the measurement target, object name, alarm temperature, object type and object shape. As shown in the figure 5-11.



Figure 5-11

● Select a measured target, and right-click to select options (target delete, delete all, and property set). As shown in the figure 5-12.



Figure 5-12

● Set up the properties, basic property and thermos. Basic property can adjust the object name, jump points and end

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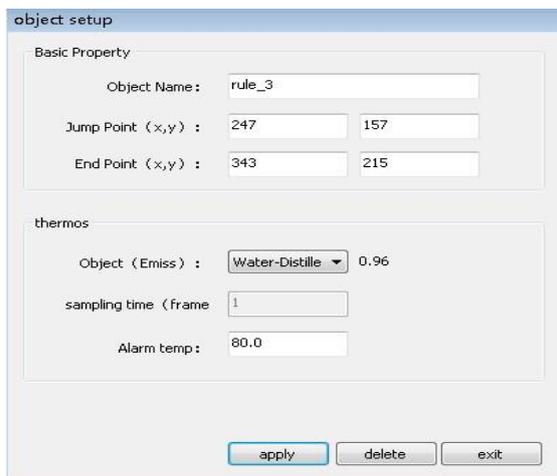point. As shown in the figure 5-13.



Figure 5-13

## 3）Analysis

● Set up the view size: Full screen, Real size, 2X and 4X. As shown in the figure 5-14.



Figure 5-14

## 4） Setup

### Basic setup

● Set up the temperature of the unit.
● Set up the save path of images and AVI videos.
● Select the default object type.
● Select the default alarm temp and Dif temp.

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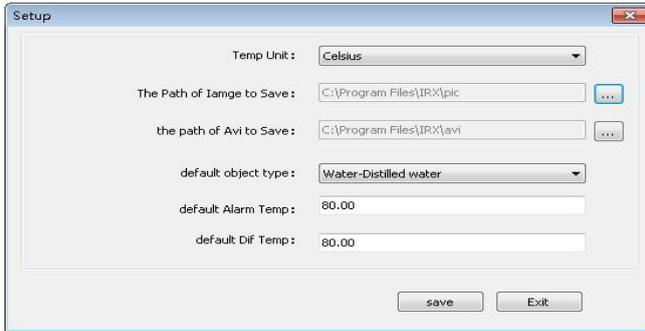More details please refer to the figure 5-15.



Figure 5-15

**Series setup**

● Set up series, baud rate, data bit, check bit, stop bit, buffer size and waiting time. As shown in figure 5-16.
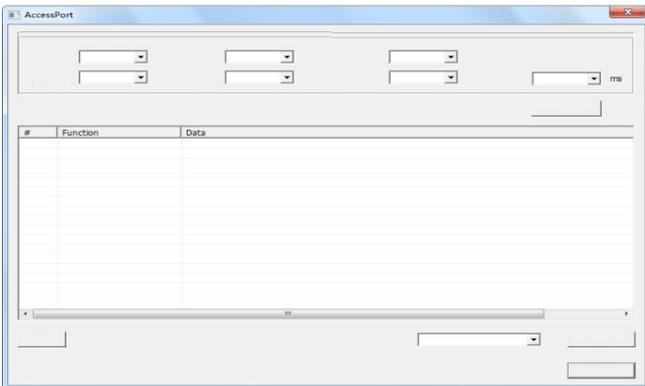


Figure 5-16

**5 ) Help**

● Click the "help" to open the user manual, and click "about IRX" to look up the software information. As shown in the figure 5-17.
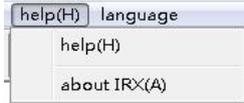
Figure 5-17

**6）Report**

- Select report template. Users can select the blank template or standard template to edit.
- Set up the appearance of the report, the title, the alignment, the border color and the background color.
- Set up the font of report, the font size, the bold, font color and so on.
- Export files in Microsoft Word or PDF
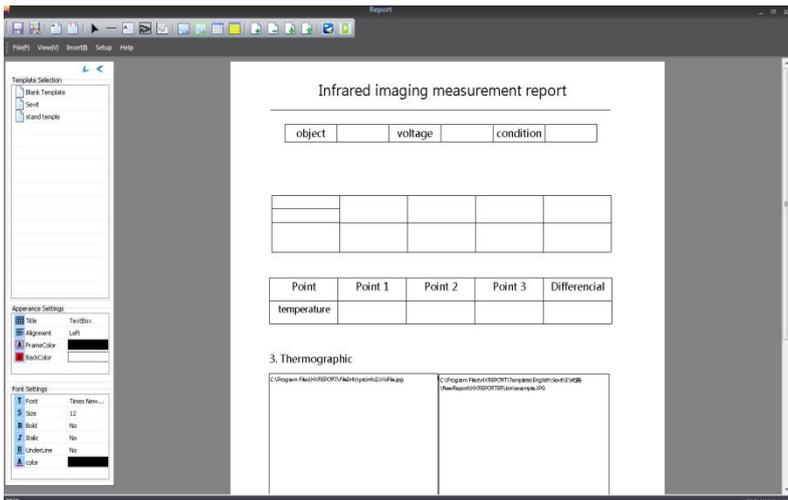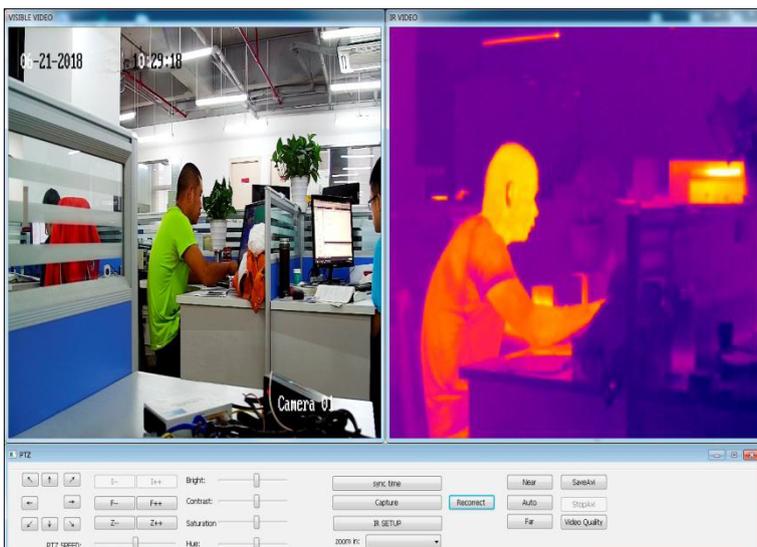
More details please refer to the figure 5-18.



Figure 5-18

**7）Pan &Tilt control**

● Click the button "PTZ Control".   In the interface, users can look over the visible light images and thermal images. In outdoors, GPS will locate to the latitude and longitude, and then display them in the thermal images. As shown in the picture 5-19.



Picture 5-19

● Set up the rotation speed and rotation angle of PTZ. As shown in the picture 5-20.



Picture 5-20

● Click "Recorrect" to rectify the images automatically. Besides, users can adjust the focus by 3 buttons, Near, Far

and Auto. And users can save Avi, stop saving and adjust video quality. As shown in the picture 5-21.
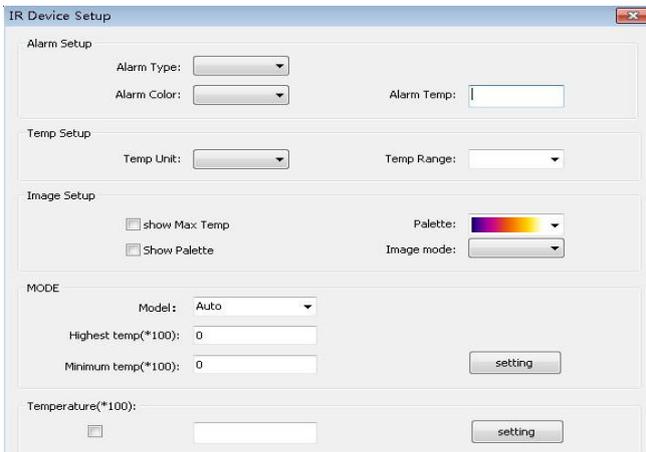


Picture 5-21

● Click the "sync time" to adjust the time, and click the "Capture" to capture images manually. As shown in the picture 5-22.



Picture 5-22

● Click the IR setup button to set up the parameters, such as thermal alarm type, alarm color, temperature unit, palette and so on. As shown in the picture 5-23.



Picture 5-23

## 5.5 The Highest Temperature Trend Chart

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Analyze the trend range of highest temperature when users play the videos. And it will analyze all frames. As shown in the figure 5-24.
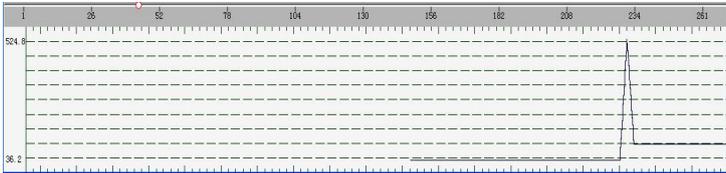

Figure 5-24

## 5.6 Histogram

In the right menu bar, there is an option "☑ Draw Temp. Histogram". Please check it. Then it will analyze the temperature distribution of each frame when users play the videos. As shown in the figure 5-25


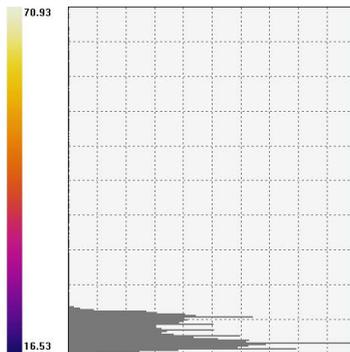Figure 5-25

## 5.7 Iso show & Palette

**1) iso show:** Check " ☑ iso show " , and adjust the maximum or
minimum temperature.

**2) Palette:** There are 12 kinds of palettes are available. As
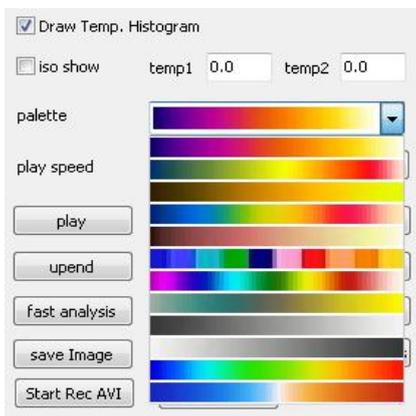shown in the figure 5-26.



Figure 5-26

### 5.8 Video Setup

Related parameters can be set up related to video settings
when users play videos. As shown in the figure 5-27.
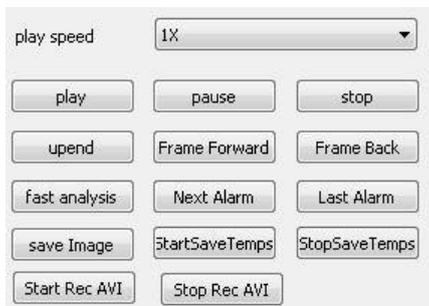


Figure 5-27

### 5.8 Language

Users can select languages according to needs. There are four languages in total.



language

Chinese
English
Spanlish
Portuguese

Figure 5-28

# 6. Appendix: The Emissivity of Raw Materials

（For reference purpose only）

| Material | Surface | Temp（℃） | Emissivity coefficient（ε） |
|---|---|---|---|
| Aluminum | Polished | 100 | 0.20 |
| | Oxidized | 100 | 0.55 |
| Brass | Polished,brown | 20 | 0.40 |
| | Dull, tarnished | 38 | 0.22 |
| | Oxidized | 100 | 0.61 |
| Copper | Strongly Oxidized | 20 | 0.78 |
| Iron | Oxidized | 100 | 0.74 |
| | Rusted | 25 | 0.65 |
| Iron,cast | Oxidized | 200 | 0.64 |
| | Polished | 100 | 0.21 |
| wrought Iron | Rough | 25 | 0.94 |
| | Carefully polished | 38 | 0.28 |
| Nickel | Oxidized | 200 | 0.37 |
| Stainless Steel | Oxidized | 60 | 0.85 |
| steel | Oxidized at 800℃ | 200 | 0.79 |
| Brick, common | --- | 20 | 0.93 |
| Concrete | --- | 20 | 0.92 |
| Glass | Smooth flat | 20 | 0.94 |
| Lacquer | White | 100 | 0.92 |
| | Natural Black | 100 | 0.97 |
| Carbon | Smoky black | 25 | 0.95 |
| | Candle smoke | 20 | 0.95 |
| | Black-lead rough | 20 | 0.98 |
| Paint oil based | Average of 16 colours | 100 | 0.94 |
| Paper | White | 20 | 0.93 |
| Sand | --- | 20 | 0.90 |
| Wood | Polished | 30 | 0.90 |
| Water | --- | 30 | 0.96 |
| Skin | Human | 32 | 0.98 |
| Porcelain | Fine | 21 | 0.90 |
| | Rough | 21 | 0.93 |

# 7. Technical Support

For common mistakes and issues during operation, please refer the following form. If the issue cannot be resolved, please contact our technical support department.

| Problems | Possible Causes | Reference Solutions |
|---|---|---|
| Imaging not clear, temp measurement abnormal | Not Adjust the lens focus | Adjust the lens focus |
| | Not in the valid temp range | Make sure the temp in the valid range |
| Power light indicator off | Power plug is not plugged in correctly | Check the power plug |
| | Power adapter damage | Exchange the power adapter |
| RJ45 yellow light off | The Ethernet cable is not plugged in correctly | Check the Ethernet cable |
| | Ethernet cable broken | Replace the Ethernet cable |