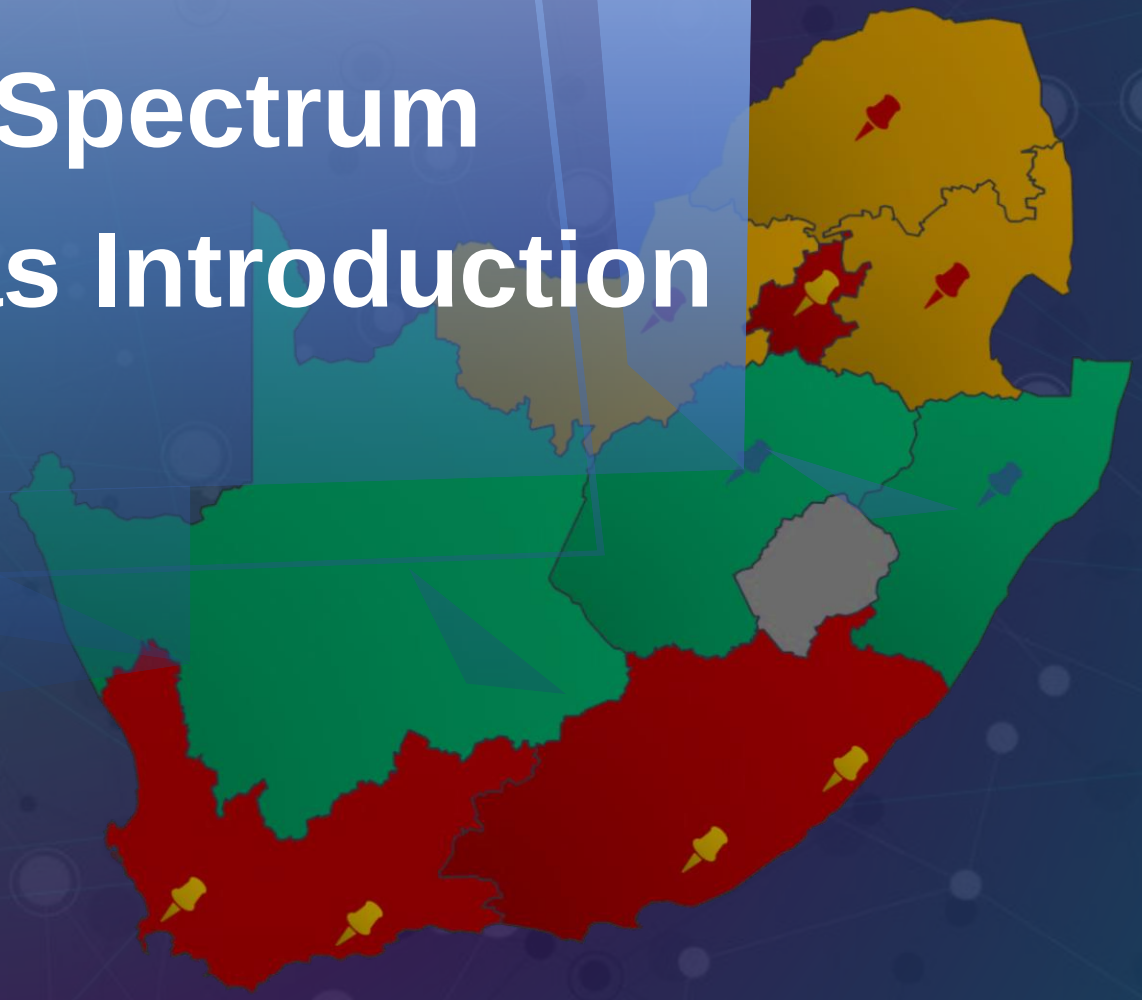
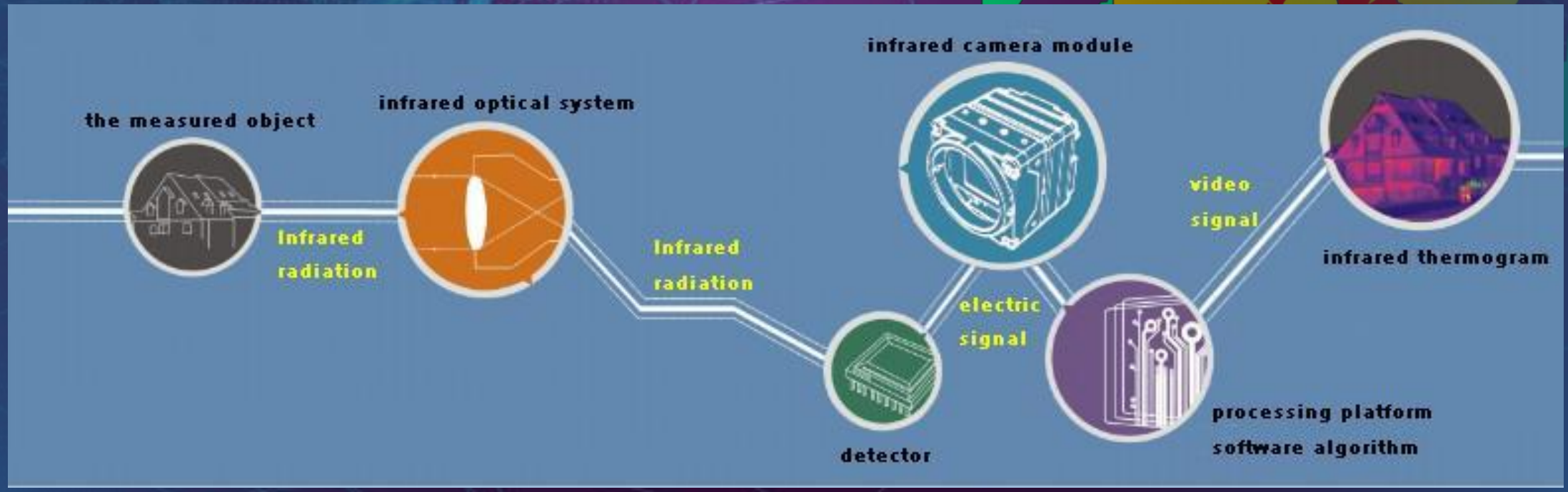
Thermal Dual-Spectrum Smart Cameras Introduction



Thermal Imaging Principle

An IR thermal camera produces images based on the thermal radiation characteristics of objects. The basic imaging process is:

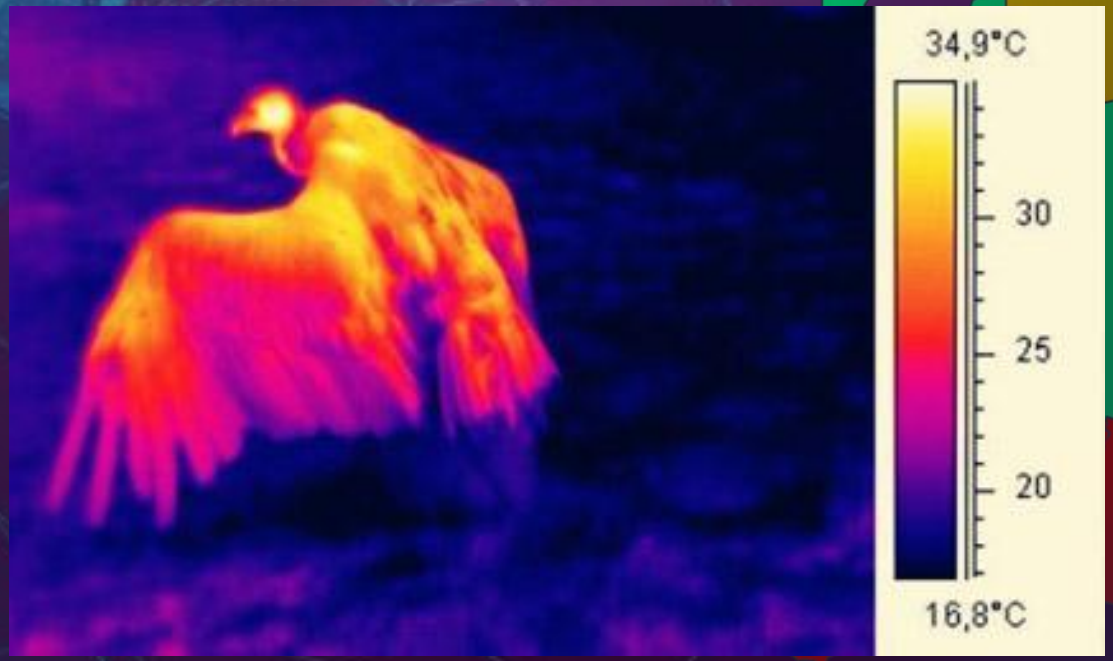
The camera passively receives the IR of objects through the photoelectric infrared detector, and converts radiation signals of varying strength into electrical signals, and then forms thermal image video signals after the system processing.



Thermal Imaging Principle

The images output by IR thermal cameras are often referred to as "thermal images". Since different objects or even different parts of the same object radiate different infrared energies, thermal images can present the fluctuations in radiation of each part of the scene, so as to show the characteristics of the scene.

Different from visible light images, thermal images are **images of the target surface temperature distribution.**



Imaging Resolution

As an important parameter to measure the quality of a thermal detector, resolution reflects the arrangement and overall number of detecting elements on the focal plane of the detector.

The currently mainstream resolutions in the market are 160x120, 384x288, 320x240, 640x480, etc. Uniview adopts 384x288 resolution, which is comparatively high.

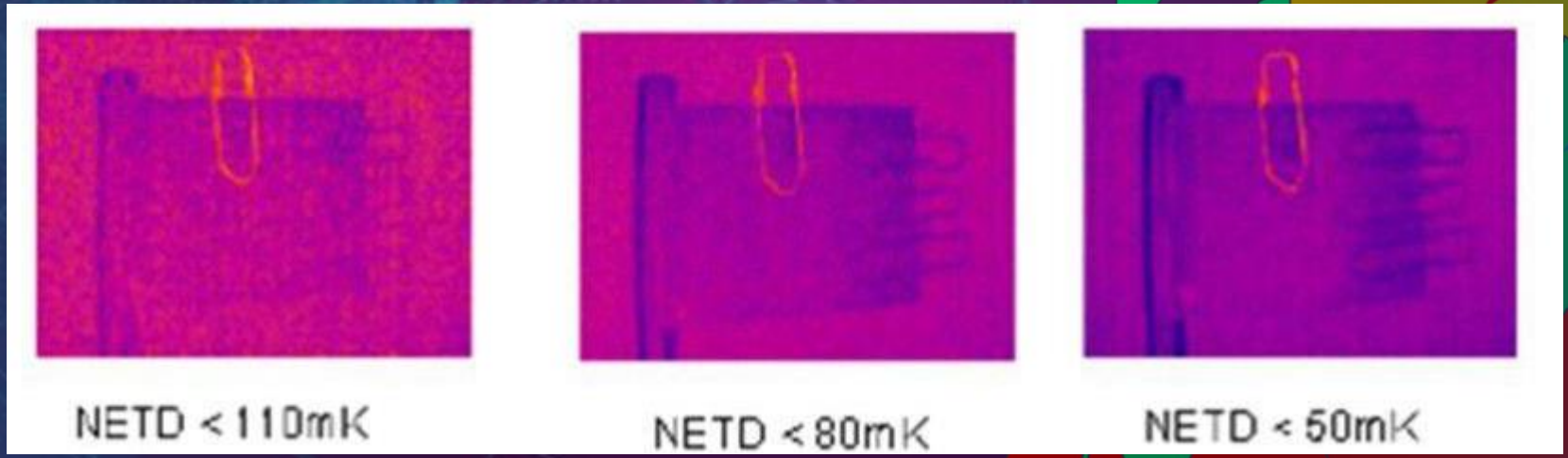
IR Image of 160x120 Resolution

IR Image of 384x288 Resolution

Thermal Sensitivity (NETD)

Thermal sensitivity, or temperature resolution, refers to the ability of an IR thermal imager to enable an observer. to accurately distinguish the minimum thermal radiation temperature difference of the target from the background. A smaller temperature resolution means that the IR thermal imager is more sensitive to temperature changes.

With a 160x120 IR thermal imager and fixed temperature scale, images taken by instruments with different thermal sensitivities are as follows:



Conclusion: With different thermal sensitivities, the effects of images presented are quite different. The smaller the sensitivity value, the higher the thermal sensitivity and the clearer the images.

Features

Good concealment	Passive target imaging and recognition with good concealment
Permanent presence	24/7 monitoring, both day and night
Quasi-all-weather	Reliable operation even in adverse weather conditions such as smoke, fog, dust, rain and snow
Wide coverage	Strong detection capability to observe people at a distance of over 2200m, fire sources at over 4400m, and vehicles at over 6000m
Auto alarm	Front-end high temperature alarm linked with the background to realize automatic fire alarm
Anti-EMI	Anti-electromagnetic interference to accurately track targets at long distances

IR thermal camera can see through smoke

Thermal Dual-Spectrum PTZ

Product Model

Model: TIC6831-IR@F50-4X38

Visible light | Optical interface & network interface | GPS + BeiDou | Wiper | 1/1.8"| 4MP | IR-150m

Thermal imaging | Fire source detection | Perimeter protection | 50mm | 720P

Detect Distance	Vehicle：4000m（Target Size: 4mX1.8m）；Human：1500m（Target Size: 1.8mX0.6m）；Fire：3000m（Target Size: 2mX2m）
Recognize Distance	Vehicle：1000m（Target Size: 4mX1.8m）；Human：400m（Target Size: 1.8mX0.6m）；Fire：750m（Target Size: 2mX2m）
Identify Distance	Vehicle：658m（Target Size: 4mX1.8m）；Human： 255m（Target Size: 1.8mX0.6m）；Fire： 490m（Target Size: 2mX2m）

Product Model

Model: TIC7632@F75-2X55

Visible light | Optical interface & network interface | GPS + BeiDou | Wiper | 1/1.8"| Alarm I/O 7/2

Thermal imaging | Fire source detection | Perimeter protection | 75mm | 720P

Detect Distance	Vehicle：6000m（Target Size: 4mX1.8m）；Human：2200m（Target Size: 1.8mX0.6m）；Fire：4400m（Target Size: 2mX2m）
Recognize Distance	Vehicle：1500m（Target Size: 4mX1.8m）；Human：570m（Target Size: 1.8mX0.6m）；Fire：1100m（Target Size: 2mX2m）
Identify Distance	Vehicle：850m（Target Size: 4mX1.8m）；Human： 300m（Target Size: 1.8mX0.6m）；Fire： 740m（Target Size: 2mX2m）

Highlights

Dual-spectrum imaging

Visible light imaging and thermal imaging, not affected by harsh environmental factors such as haze, smoke, rain, snow and night

Fire source/high temperature detection

Detection and region shielding of fire sources for more accurate detection of fire dangers

Synchronous zoom

Visible light lens linked to focus to the alarm area when the thermal lens generates an alarm

Serial connection of optical interfaces and Ethernet interfaces

Ethernet electrical interfaces and SFP optical interfaces provided at the same time, serial connection of optical interfaces and Ethernet interfaces, simplifying engineering wiring

Single-IP and dual-channel

Live views of visible light imaging and thermal imaging at the same time with one IP address, faster and more convenient

Perimeter protection

Thermal intelligent perimeter detection (cross line detection, entrance detection, exit detection, intrusion detection)

Auto/Linked tracking

Automatic or linked tracking of a target, and target snapshots

GPS/BeiDou

Latitude and longitude of the geographic location of the current device displayed on the live view

Highlights

Super optical zoom

38X optical zoom for visible light lens to capture detailed images from a distance

38X

Super starlight

High-sensitivity sensor, clear images and few noises in low-illumination environment

Electronic compass

Built-in electronic compass, sensing the camera direction and angle in real time

Ultra high resolution

Ultra HD output of visible light images of PTZ dome cameras reaching 2688x1520, up to 60 fps
Thermal imaging output up to 1280x720
Max. 30fps

Optical defog

Anti-haze imaging, clear images

8GB eMMC

eMMC

Built-in 8GB eMMC, fast read and write speed, high stability

WDR

120dB WDR, automatic switching based on the ambient brightness to meet the monitoring needs in high-contrast scenes

Gyroscope

Built-in gyroscope, effectively reducing screen jitter and making images stable and clear

Highlights

Super optical zoom

55X optical zoom for visible light lens to meet detailed monitoring

Super starlight

High-sensitivity sensor, clear images and few noises in low-illumination environment

Optical defog

Anti-haze imaging, clear images

Gyroscope

Built-in gyroscope, effectively reducing screen jitter and making images stable and clear

Various alarm pigtails

Alarm I/O 7/2 for more abundant alarm configurations

Level gauge

Built-in level gauge, facilitating installation at high altitudes

Voltage exception alarm

An alarm triggered to protect the device safety when the working voltage of the device changes and exceeds the configured over-voltage or under-voltage threshold

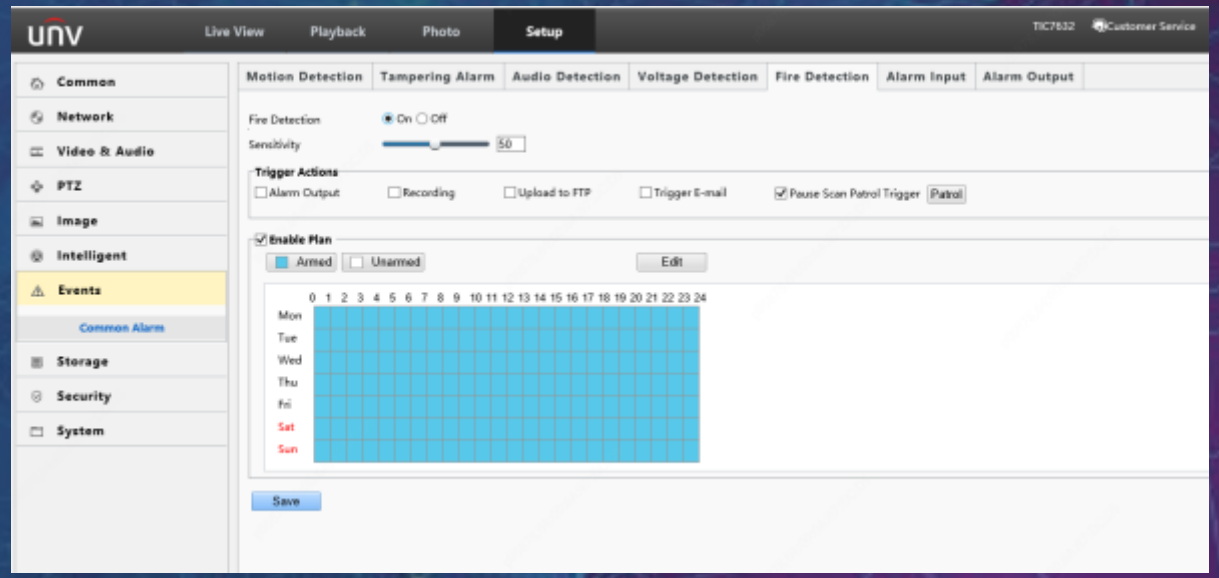
Auto lock upon power failure

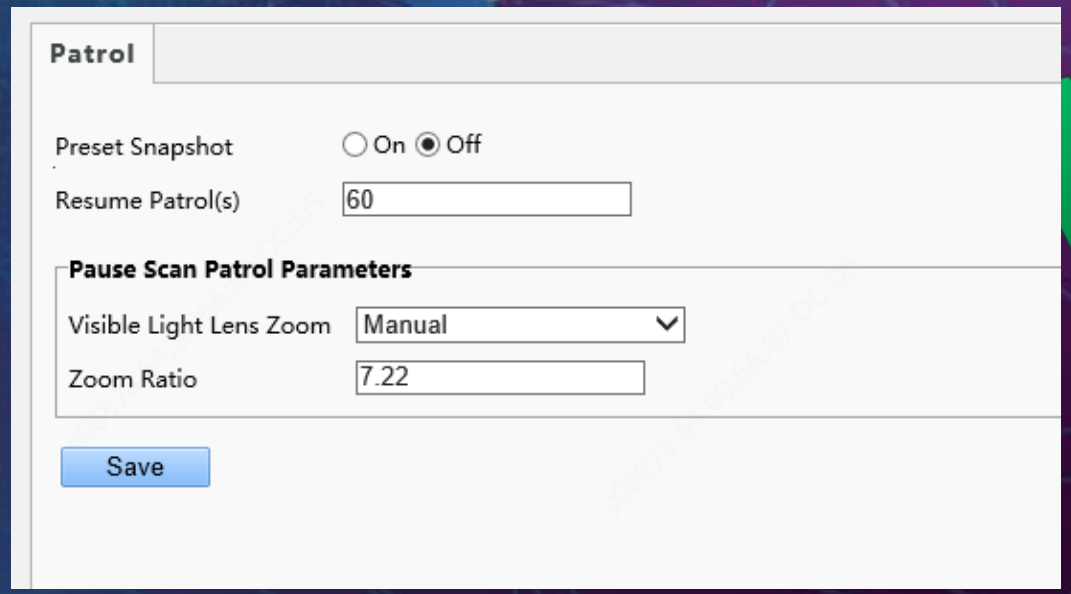
Lock of the PTZ lens upon power failure of the device at the position before power failure, preventing mechanical damage to the device at the moment of power failure and protecting the device safety

Fire Source Detection

Fire source detection: When the thermal lens detects a fire source area, the visible light lens is linked to focus to the fire source position, accurately locating the fire source area, generating an alarm, and protecting the safety.

Fire Source Detection Configuration



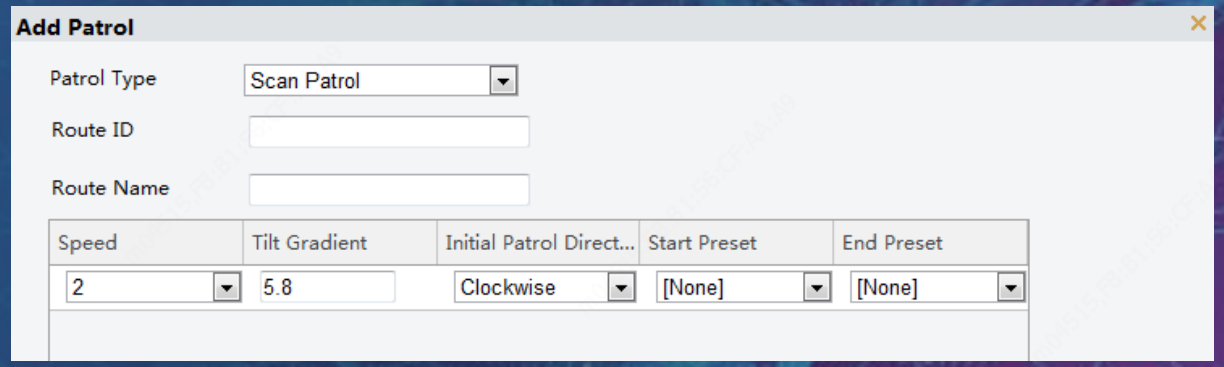


Configuring method: Configure fire source detection and set the scan and patrol path (by preset positions) and patrol recovery time, so that when the thermal lens detects a fire source during PTZ scan and patrol, the visible light lens is linked to track and zoom in.

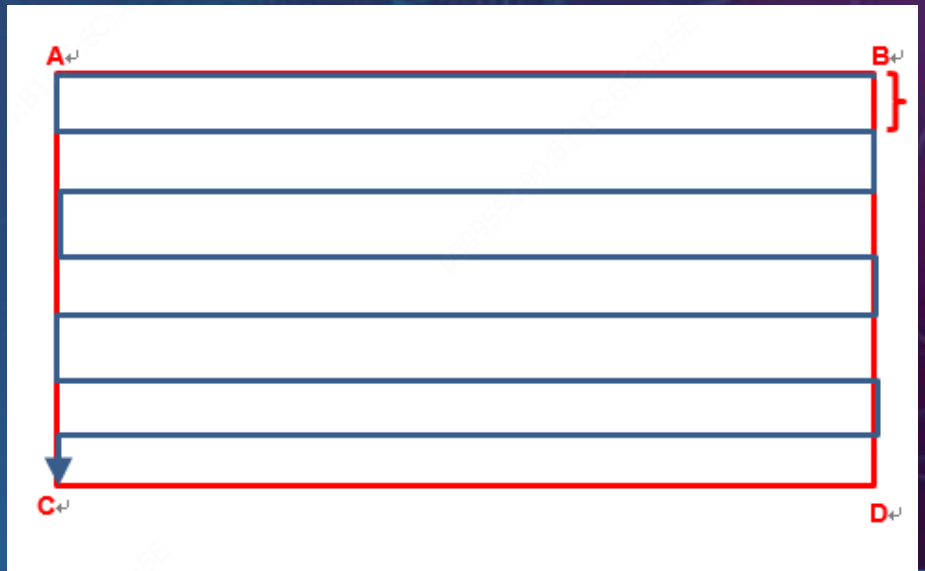
Tracking logic:
If two fire sources appear on the same screen during the patrol, priority will be given to the one with higher temperature. The tracking time is determined by the configured patrol recovery time.
If there are two fire sources on different screens during the patrol, the one first detected according to the patrol route is tracked, and the patrol recovers after the configured patrol recovery time. Then, tracking of the next fire source is performed.

Add Scan Patrol

In the live view interface, click the add button (+) at the lower right corner to open the add patrol interface as shown in the following figure.



Example of scan patrol: A, B, C and D are the field of vision to be scanned, starting from the preset B , and scanning to the preset C according to the blue track below.



Tilt Gradient

a)Tilt Gradient： the value of coordinate degree change for each longitudinal movement of scanning, the unit of which is °, it can not be set to 0, and the minimum value is 1 / 64 of the longitudinal angle difference of B and C. For example, the user has set the start preset B and the end preset C, then the camera scans the area formed by B and C.

b) Start preset : scan start position.

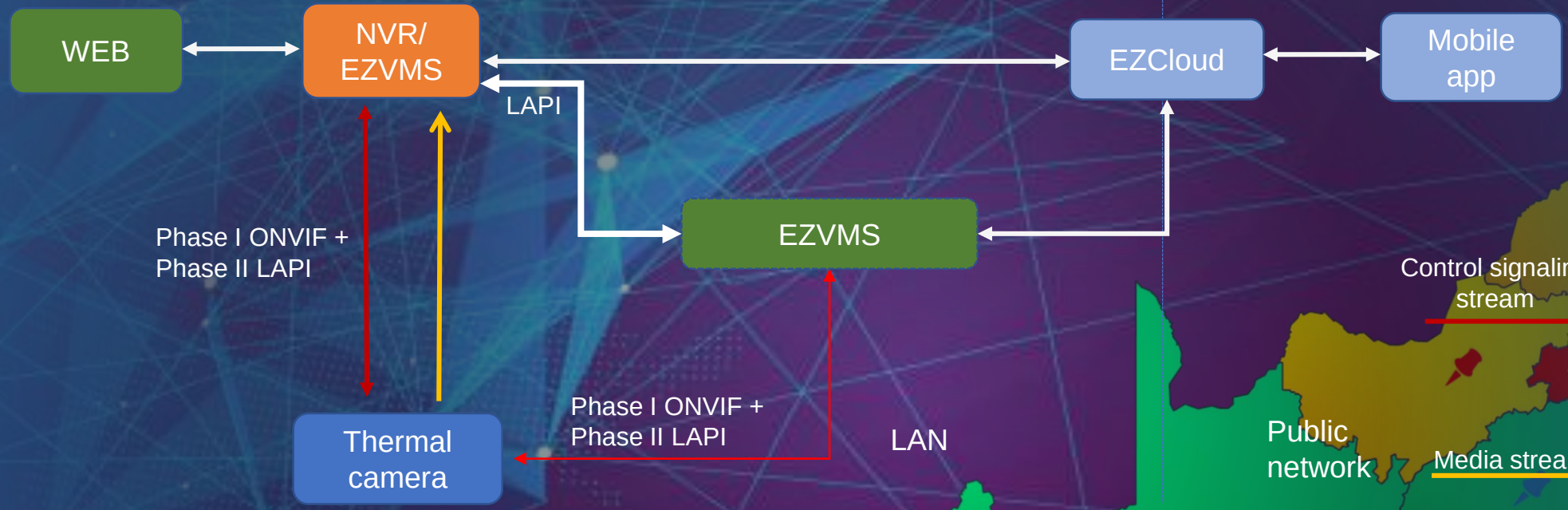
c) End preset : scan end position.

Perimeter Detection

Thermal Lens	Angle of View
TIC6831	7.5° × 5.8°
TIC7632	5.0° × 3.7°

The thermal lens detects whether a motor vehicle or pedestrian meets the triggering rule, and the visible light lens is linked to focus.
The thermal lens effectively guarantees safety regardless of the changes in the environment, and the visible light lens is linked to track and capture the details of the triggering rule.

Networking (NVR/EZVMS)



Functions of the EZVMS: ONVIF access, dual-channel live view access, central storage, PTZ control, fire source alarm (through LAPI), and perimeter alarm

Functions of the NVR: ONVIF access, dual-channel live view access, central storage, and PTZ control

① The camera accesses the NVR or EZVMS through ONVIF+, reports an alarm, and sends dual-channel streams of visible light and thermal imaging.

② The recordings are stored on the NVR or EZVMS. If an upper-level domain is available, the upper-level VM is connected via Chinese standard.

③ Web client or GUI display service: dual-channel screen, alarm display and query

④ Via EZCloud, the alarm is pushed from the NVR to the mobile app so that the live views and recordings (fireproof platform) can be played on the mobile phone.

Site Survey Guide – Fire Source Detection

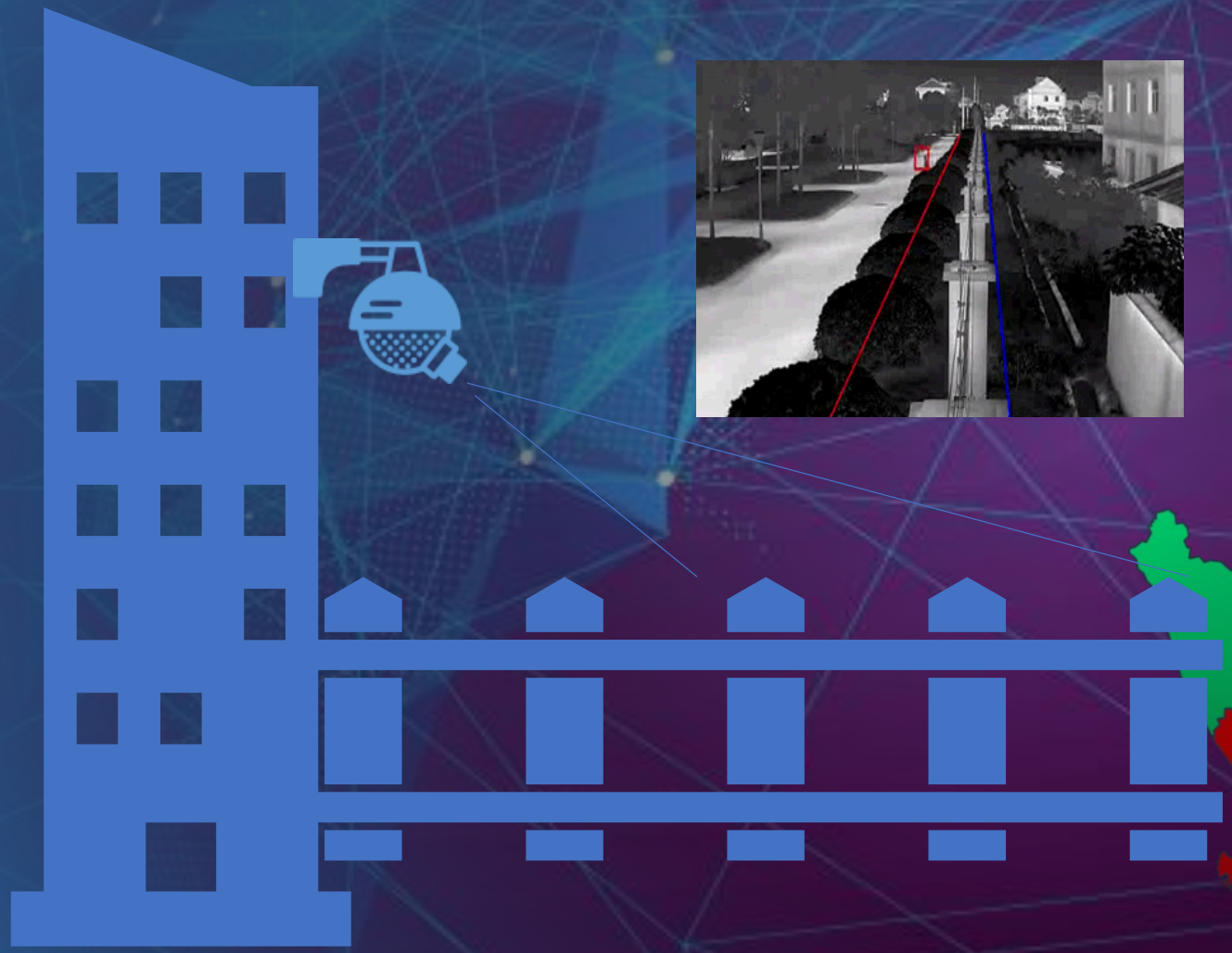
Recommended scenes: empty, wide, clean, and unobstructed outdoor scenes without dense targets

Mounting height: 6–85m

Fire source pixels: 2x2

Distance between the target and device: less than 2km (fire source size 2m x 2m)

Site Survey Guide – Perimeter Detection



Recommended scenes: empty, wide, clean, and unobstructed outdoor scenes without dense targets

Mounting height: 4–6m

Size limits of targets:
Pedestrian: ≥ 10x10 pixels
Vehicle: ≥ 20x30 pixels

Covered distance: 30–250m, 50–300m (Positioning system)
Covered width: 7–25m

Recommended Scenes



Fire source detection: straw burning, and fire prevention of electric transmission lines, forests, and nature reserves



Perimeter detection: perimeter protection of parks, oil pipelines, national borders, and border anti-smuggling

Thermal Dual-Spectrum High Precision Turntable

High precision turntable——USS-HIC

300 Series

380 Series

500 Series

Optical Module	1/2.8′ , 7.5~300mm 40x, 1080P@25fps	1/1.9′ , 14.5~500mm 35x, 1080P@25fps	1/1.9′ , 21~775mm 37x; 16.5~1060mm 64x, 1080P@25fps
Thermal Module	384×288/640×512 pixels f: 50mm/75mm	384×288/640×512 pixels f: 75mm/100mm	384×288/640×512 pixels, f: 100mm/150mm

Thermal Lens	**50mm**		**75mm**		**100mm**		**150mm**	
Distance: Meter	Detect	Identify	Detect	Identify	Detect	Identify	Detect	Identify
Vehicle 4mX1.8m	4760	1190	7170	1790	9530	2380	14340	3580
Human 1.8mX0.6m	1730	430	2600	650	3460	860	5200	1300
Fire point 2mX2m	5580	/	8850	/	11770	/	17700	/
Remarks	Detection Pixels：1~2; Identify Pixels：6~8							

Structure

shield

Optical lens

Thermal lens

Pedestal

Tilt: Vertical rotation structure

Pan: horizontal rotating structure

Key Specifications

Excellent wind-resistant performance

wind-resistant coefficient of turntable: **0.4**
wind-resistant coefficient of thermal PTZ: 0.8
Resist wind scale to **16** (184-201km/h)

Large monitor scope

Pan: **360°**
Tilt: **-90°~90°**

Corrosion resistance

Anti-oxidation & anti-salt surface coating
Corrosion resistance scale: **10**

Long detection distance

Up to **15km**

Tracking accuracy

Using high-precision torque motor drive & angle encoder servo control
Tracking accuracy as high as **0.01°**

Surge resistance

Surge resistance as 6000V
Normal PTZ as only 4000V

Product Advantages

Item	Sub item	Normal PTZ	High Precision Turntable
PTZ/Turntable	Driving mode	Stepping motor Torque motor	Precision torque motor Self-developed servo control
	Acuracy of rotation	0.1°- 0.06°	0.01° or better
Transmission structure	Transmission mechanism	Gear reducer transmission	Torque motor coaxial transmission
Angle measuring equipment	Digit	12 bits	20 bits or more
	Sampling frequency	Low	High
Vertical shaft	Bearing structure	Ordinary bearing	High precision bearing
	Supporting structure	Bearing structure	High precision plane rotary structure
Horizontal shaft	Bearing structure	Ordinary bearing	High precision bearing
	Supporting structure	Dual-arm structure	High precision dual-arm structure
Rotation range		Pan: 0 ° - 360 ° Tilt: - 45 ° - 45 °	Pan: continuous 360 ° Tilt: - 90 ° - 90 °
Rotation speed		Pan: 30°/s, Tilt: 15°/s	Pan: 0.005-90°/s speed adjustable Tilt: 0.005-90°/s speed adjustable
Maximum load		50kg	75kg
Processing technology		Commercial level	Industrial level (customized military level)
Working temperature		- 30℃ ~ 60℃ (Heater)	-45°C - + 70°C (built-in constant temperature control system)
Service life of mechanical parts		3 years	≥5 years

First product resisting wind scale 16

Wind tunnel test conclusion:

During the test, wind speed gradually increased from scale 0 to 16 (0~52m/s), there is no obvious deformation or vibration on the USS-HIC500 prototype, the device functioning properly under 52m/s wind speed.

Wind Scale	Wind Speed (m/s)	(km/h)
10	24.5-28.4	89-102
11	28.5-32.6	103-117
12	32.7-36.9	117-134
13	37.0-41.4	134-149
14	41.5-46.1	150-166
15	46.2-50.9	167-183
16	51.0-56.0	184-201
17	56.1-61.2	202-220

Recommended Scenes

——Forest Fires Prevention

1

Optical Module

Thermal Module

Built-in fire/smoke identification unit

Turntable
Real-time video surveillance of optical & thermal images.
Analyze and identify the fire situation

5

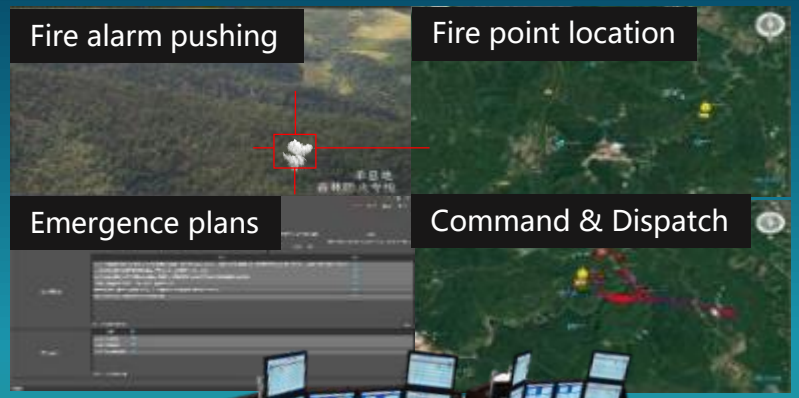
Lightning protection and grounding system.
Protect equipment from lightning

2

Wireless microwave
Video and data transmission

5.8GHz wireless microwave
(or self built optical fiber)

Headquarter Monitoring



3

Power supply system (solar / municipal)

4

Standby Power supply
Battery pack: working at night / rainy days, power off

Front end intelligent monitoring station

Wireless microwave
Video and data receive

Headquarter

Recommended Scenes

——City high point

Recommended Scenes

——Frontier & coastal defence

uniview

Better Security, Better World