CYG长园 股票代码 600525.SH Stock Code

CYG Auxiliary Equipment Control System

CYG SUNRI CO., LTD.

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目 录

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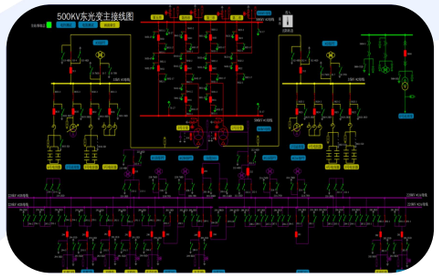
PART 01

Background

With the continuous expansion of the scale of power grid equipment, the contradiction between the continuous growth of production equipment and the insufficient allocation of operation and maintenance personnel is becoming increasingly prominent

The substation is located in a remote area, and manual operation and maintenance are time-consuming and laborious

Equipment surge, high workload and long time for manual operation and maintenance



The independent design of each subsystem of auxiliary equipment makes information fusion difficult, resulting in information silos

Manual operation and maintenance heavily rely on personal experience, making it difficult to ensure service quality

Risk identification relies on regular verification, with information delay and poor timeliness

PART 02

Product

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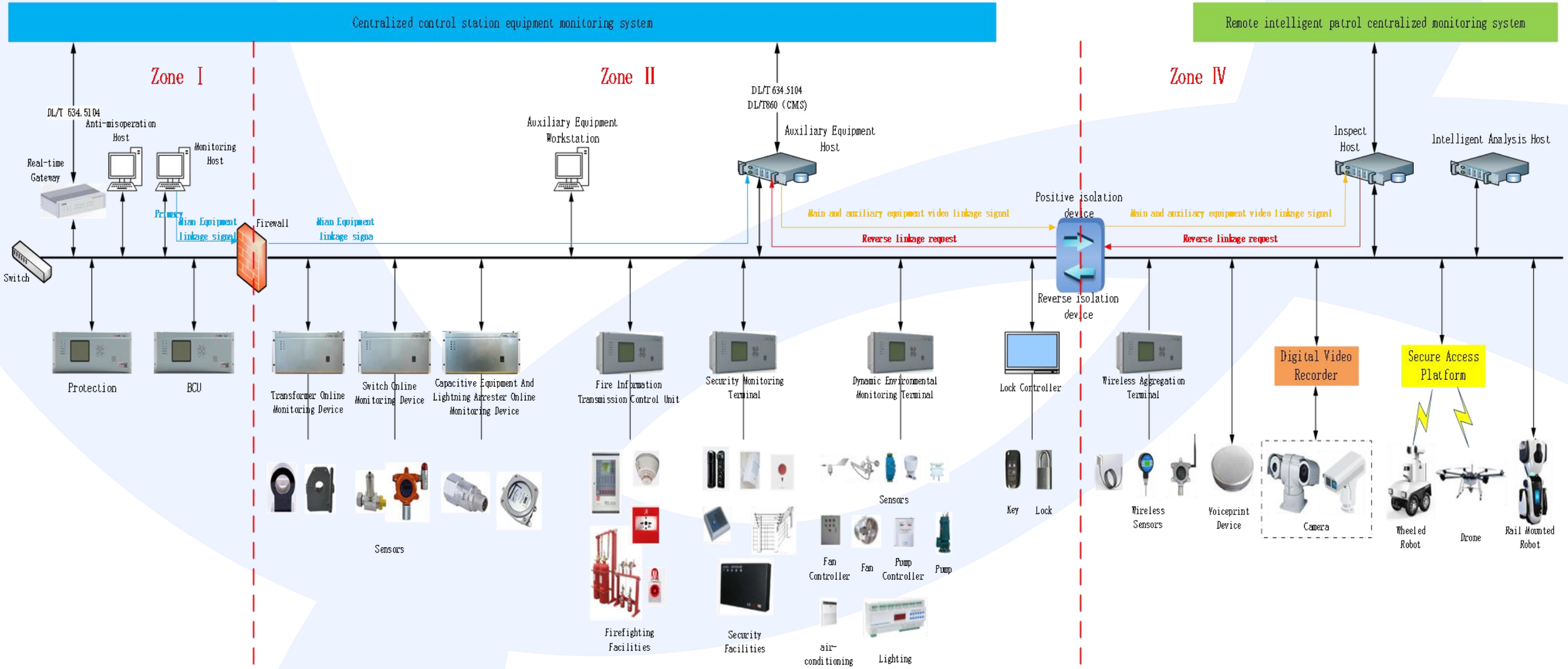
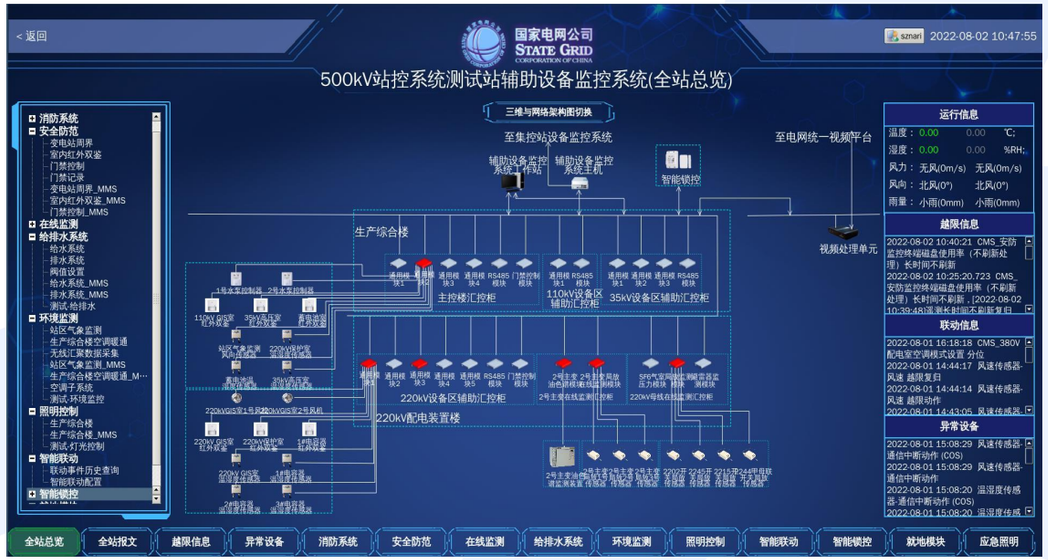
Architecture



①PRS-7030 Auxiliary Equipment Control Host

- Support the collection, storage, processing, main auxiliary linkage, software version control, and equipment management of substation auxiliary equipment
- Implement communication between the substation auxiliary equipment monitoring system and the centralized control station equipment monitoring system
- Provide protocol conversion and data, model, and file transmission services for the monitoring and control of centralized control station equipment monitoring systems, information queries, etc



Technical Specifications	Technical Indicators
Processor	Dual processor, 64 bit word length, clock speed ≥ 1.8GHz, ≥ 4 cores
Memory	≥16GB
Hard disk	≥1TB
Ethernet Port	4个100M/1000M
Power	Dual hot swappable redundant power supply
Screen switching response time	Real time screen ≤ 1s, other screens ≤ 2s
Signal delay	Alarm signal delay ≤ 1s, control response time ≤ 1s
Response time for switching between primary and backup machines	≤30s
CPU load	Under normal circumstances (within any 30 minutes) ≤ 30%, during emergencies (within 10 seconds) ≤ 50%
Historical storage	Historical storage time ≥ 3 years

②PRS-7950-IPS Inspection Host

- Realize unified access of monitoring devices, issuance of control and processing of inspection results
- Control the inspection terminal to conduct joint inspections and receive inspection data/files
- Analyze and collect data, generate inspection results/reports, and promptly send alerts
- Real time monitoring and intelligent linkage
- Interact with the remote intelligent inspection centralized monitoring system to support the joint inspection business of the main station

Technical Specifications	Technical Indicators
Processor	Dual processor, 64 bit word length, clock speed ≥ 2.0GHz, ≥ 8 cores
Memory	≥32GB
Hard disk	≥5TB
Ethernet Port	4个100M/1000M
Minimum number of access inspection points	≥20000
Response time for video control switching	＜2s
Monitoring screen display time difference	＜2s
Image recognition algorithm model	Accuracy ≥ 80%, false positive rate<30%, algorithm running time<500ms
Image Discrimination Algorithm Model	Under normal circumstances (within any 30 minutes) ≤ 30%, during emergencies (within 10 seconds) ≤ 50%
One click sequential control video confirmation	Position discrimination accuracy>99%, fault omission rate<0.1%

③PRS-7950-IAS Intelligent analysis host

- Deploy intelligent analysis algorithms such as device status detection, device defect recognition, personnel behavior detection, and environmental status monitoring
- Receive video image data collected by the inspection host, perform image recognition and discrimination of specified analysis types based on video streams and images, and output analysis results to the inspection host

Technical Specifications	Technical Indicators
Chassis	Rack mounted installation, height ≤ 2U, depth ≤ 480mm
Processor	Processor word length 64 bits, clock frequency ≥ 2.0GHz, ≥ 16 cores
Memory	≥ 64GB , ≥ 128GB
Hard disk	≥2TB
Ethernet Port	2个100M/1000M
Intelligent analysis of AI computing power	≥ 64TOPS INT8 , ≥ 128TOPS INT8 , ≥ 256TOPS INT8
Image recognition algorithm model	Accuracy ≥ 80%, false positive rate ≤ 30%, average running time < 500ms
Image Discrimination Algorithm Model	Accuracy ≥ 80%, false positive rate ≤ 30%, average running time < 500ms
One click sequential control video confirmation	Position discrimination accuracy>99%, fault omission rate<0.1%
Data Storage	System data and operation log data storage time ≥ 1 year

④PRS-7954-FI-TCU-ZK Fire information transmission control unit

- Using RS485/RJ45/CAN communication to connect to the automatic fire alarm system
- Using hard contacts to connect controlled fire-fighting equipment
- Using analog signals to connect to transmitters for fire water tank level, pipeline pressure, power supply voltage, etc
- Upload information to auxiliary equipment monitoring system via IEC 61850
- Control fire protection facilities through hard contact or RS485/RJ45/CAN operation

Technical Specifications	Technical Indicators
Communication Port	4 RJ45 Ethernet interfaces, 2 pairs of LC fiber optic interfaces, 1 CAN interface, 6 RS485 interfaces, and 1 RS232 interface
4~20mA analog quantity	6
Hard contact input	72 channels of conventional 24V input , 35 sets of input feedback, input SOE resolution ≤ 1ms
Hard contact output	35 output
Abnormal empty contact point	1 pair of abnormal normally open contacts of the device, triggered when the device software module alarms
Fault empty contact point	1 pair of normally closed contacts due to device malfunction, triggered when the device fails to operate due to power failure or hardware malfunction
Operating Voltage	DC/AC 220V
Operating Temperature	-25℃～55℃
Historical event records	2048 records, able to maintain information for 14 days after power failure
Action Time	Received control command until contact closure ≤ 1s

⑤PRS-7956-SD-SD-ZK Security monitoring terminal

- Connect security terminal equipment using hard contacts, RJ45 or RS485 communication methods
- Upload information to auxiliary equipment monitoring system via IEC 61850
- Control operations are performed through hard contacts or RJ45/RS485 communication according to system instructions

Technical Specifications	Technical Indicators
Ethernet Port	4 RJ45 Ethernet interfaces, 2 pairs of LC fiber optic interfaces
Hard contact input	54 channel DC 24V input access, input value SOE resolution ≤ 1ms
Hard contact output	14 relay contacts output, long-term allowable closing current ≥ 5A, short-term allowable closing current ≥ 30A, 200ms
Serial	6 RS485 interfaces，1 RS232 interface
Abnormal empty contact point	1 pair of abnormal normally open contacts of the device, triggered when the device software module alarms
Fault empty contact point	1 pair of normally closed contacts due to device malfunction, triggered when the device fails to operate due to power failure or hardware malfunction
Screen refresh time	≤1s
Control response time	≤5s
Operating Voltage	DC/AC 220V，DC 24V
Operating Temperature	-25℃～55℃

⑥PRS-7955-PE-PED-ZK Dynamic environmental monitoring terminal

- Connect the dynamic environmental monitoring terminal equipment using hard contacts or RS485 communication methods
- Upload information to auxiliary equipment monitoring system via IEC 61850
- Control operations through hard contacts or RS485 communication according to system instructions

Technical Specifications	Technical Indicators
Ethernet Port	4 RJ45 Ethernet interfaces, 2 pairs of LC fiber optic interfaces
Hard contact input	54 channel DC 24V input access, input value SOE resolution ≤ 1ms
Hard contact output	14 relay contacts output, long-term allowable closing current ≥ 5A, short-term allowable closing current ≥ 30A, 200ms
Serial	6 RS485 interfaces，1 RS232 interface
Abnormal empty contact point	1 pair of abnormal normally open contacts of the device, triggered when the device software module alarms
Fault empty contact point	1 pair of normally closed contacts due to device malfunction, triggered when the device fails to operate due to power failure or hardware malfunction
Screen refresh time	≤1s
Control response time	≤5s
Operating Voltage	DC/AC 220V，DC 24V
Operating Temperature	-40℃～70℃

PART 03

Function

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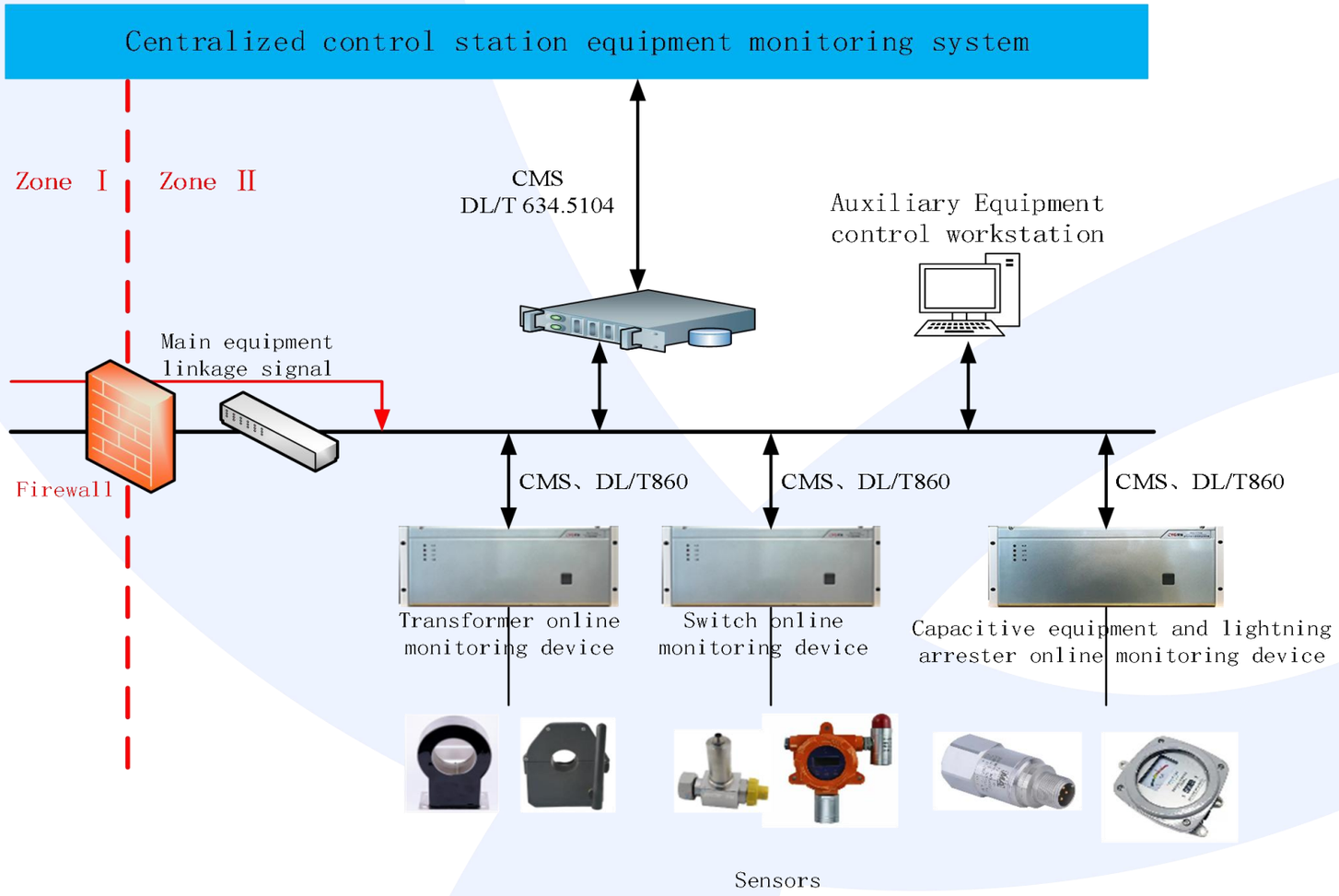
Equipment status monitoring

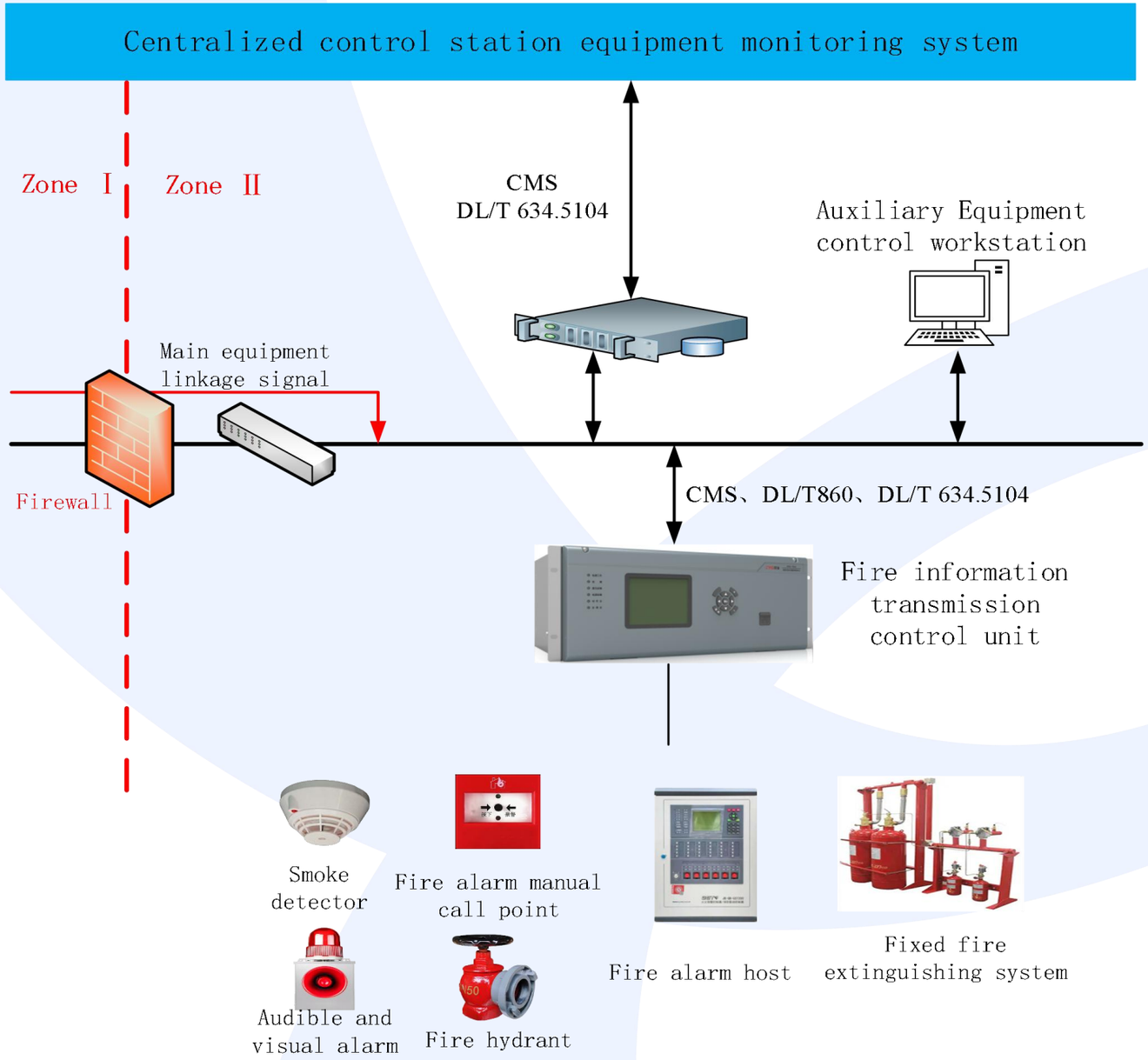


Monitoring

- Information monitoring and analysis of transformer online monitoring data
- Information monitoring and analysis of switch online monitoring data
- Information monitoring and analysis of online monitoring data for capacitive devices
- Information monitoring and analysis of lightning arrester online monitoring data

Control

- Remote control and active operation of real-time monitoring and sampling data
- Switching of monitoring data display mode, threshold/status alarm configuration, sampling frequency configuration
- Equipment alarm confirmation

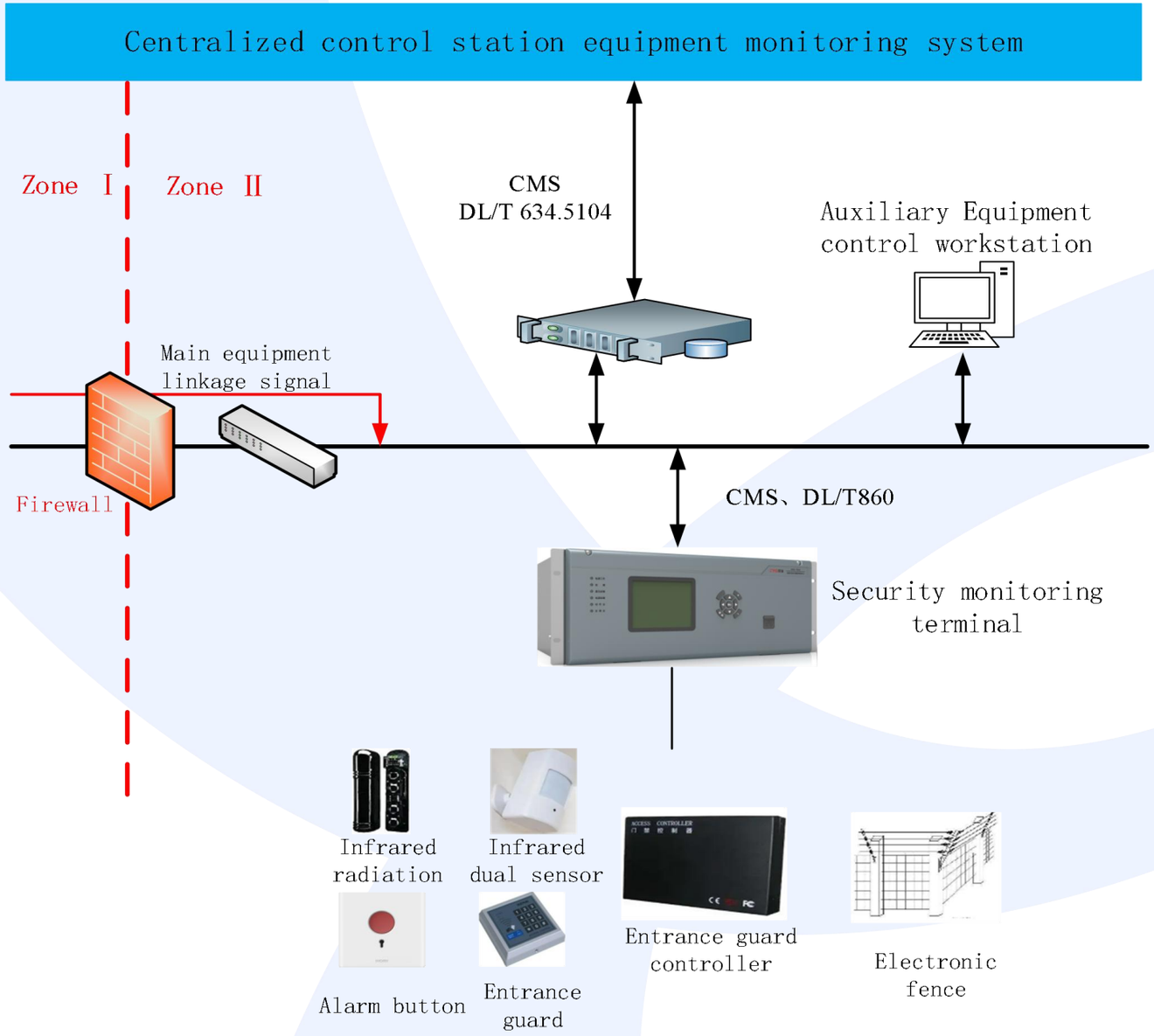


Monitoring

- Regional fire alarm controller monitoring
- Fire alarm points, start stop status, action feedback, supervision, shielding, and fault information monitoring of fire-fighting equipment
- Monitoring of information collected by other fire sensors

Control

- Fire alarm system alarm confirmation
- Remote verification, reset, and isolation of faulty equipment for alarm signals of regional fire alarm controllers
- Local and remote start and stop of fixed fire extinguishing system, supporting manual and automatic mode local switching



Monitoring

- electronic fence
- Infrared radiation
- Infrared dual sensor
- access control panel

Control

- Information modification and alarm confirmation of intrusion prevention devices
- System remote deployment, disarming, and equipment remote reset
- Anti intrusion alarm sound and light alarm control, trigger time and alarm delay settings
- Electronic fence maintenance and tagging
- Remote access control configuration, authorization, and door opening

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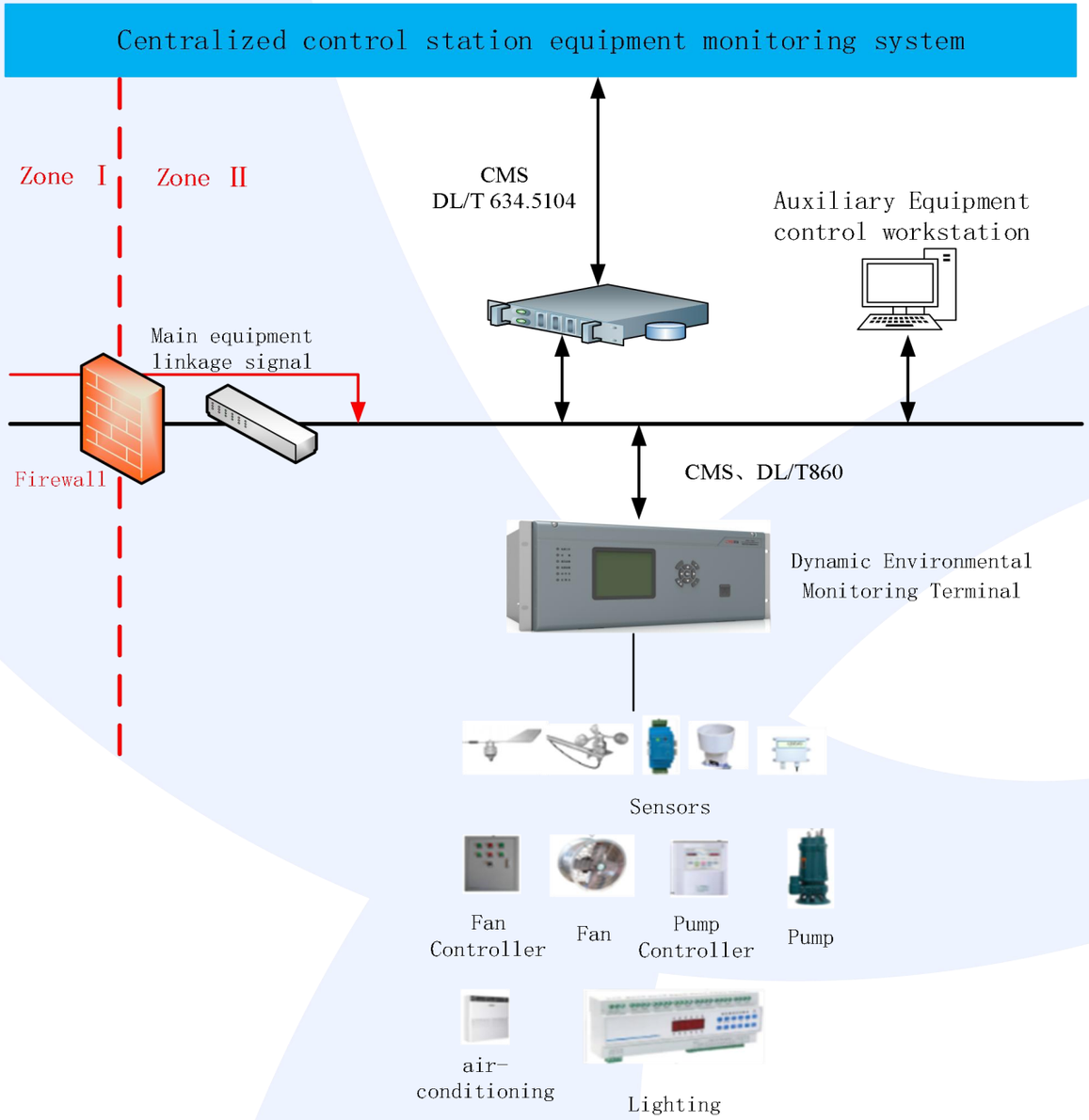
Monitoring of dynamic environmental system



Monitoring

- Sensor measurement values: including temperature, humidity, etc
- Equipment operating status: including the start/stop operation status of fans, water pumps, dehumidifiers, etc
- Air conditioning operating parameters: including wind direction, wind speed, etc
- Operation status of various sensors: including temperature and humidity sensors, water level sensors, water immersion sensors, wind speed sensors, etc
- Sensor alarm information: including water immersion alarm, motor circuit power failure alarm, etc

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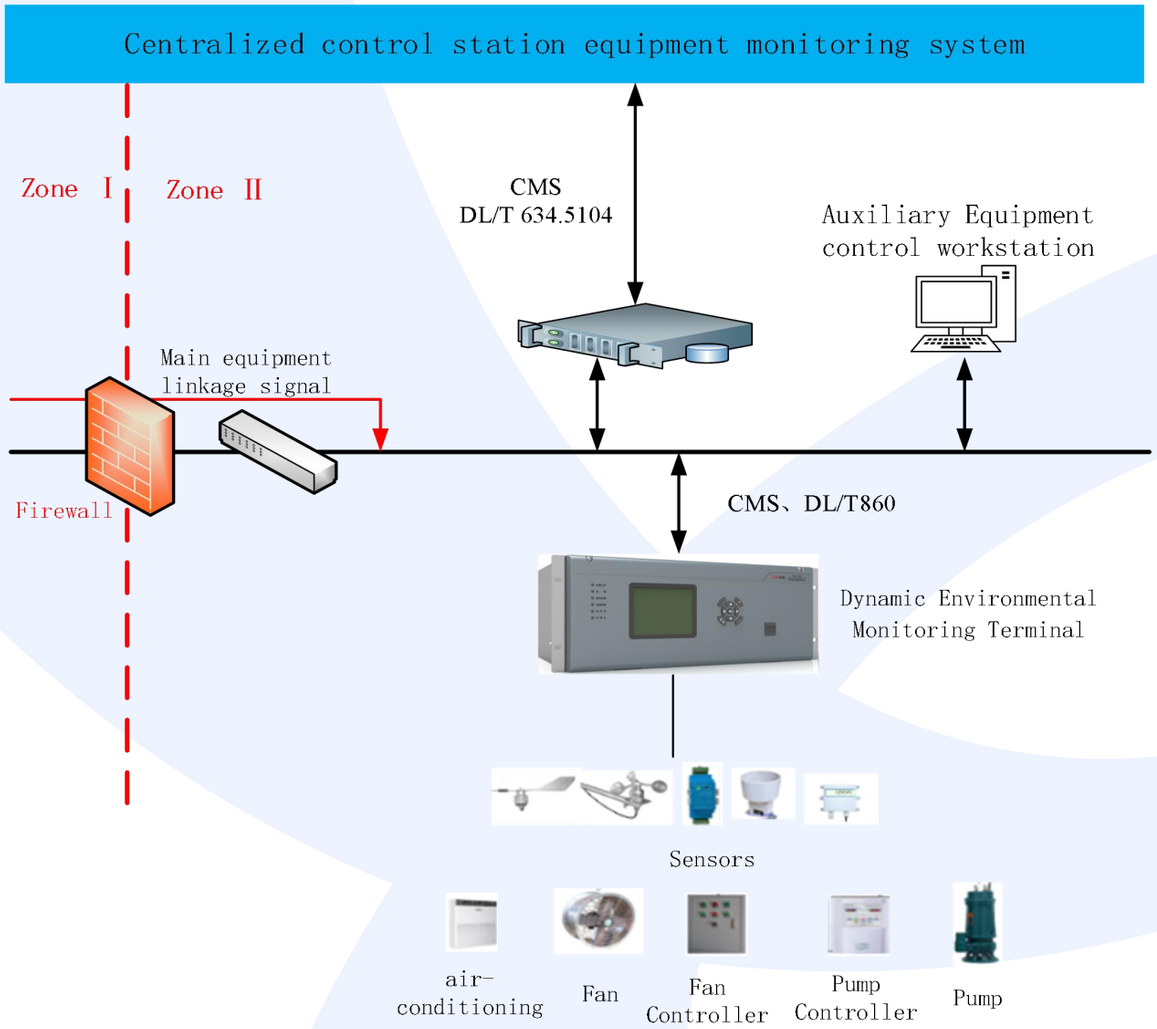
Monitoring of dynamic environmental system



Control

- Remote adjustment of air conditioning
- Remote start/stop control and maintenance tagging of wind turbines
- Remote start/stop control and maintenance tagging for water pumps
- Remote start/stop control and maintenance tagging for dehumidifiers
- Temperature, humidity, wind speed, rainfall, water level and other threshold alarm configurations, al arm mode settings
- Indoor temperature and humidity limit alarm settin g, automatic control of air conditioning (fan) sta rt/stop, operation mode adjustment, etc
- Water immersion alarm in the collection well, auto matic control of water pump start, delayed stop

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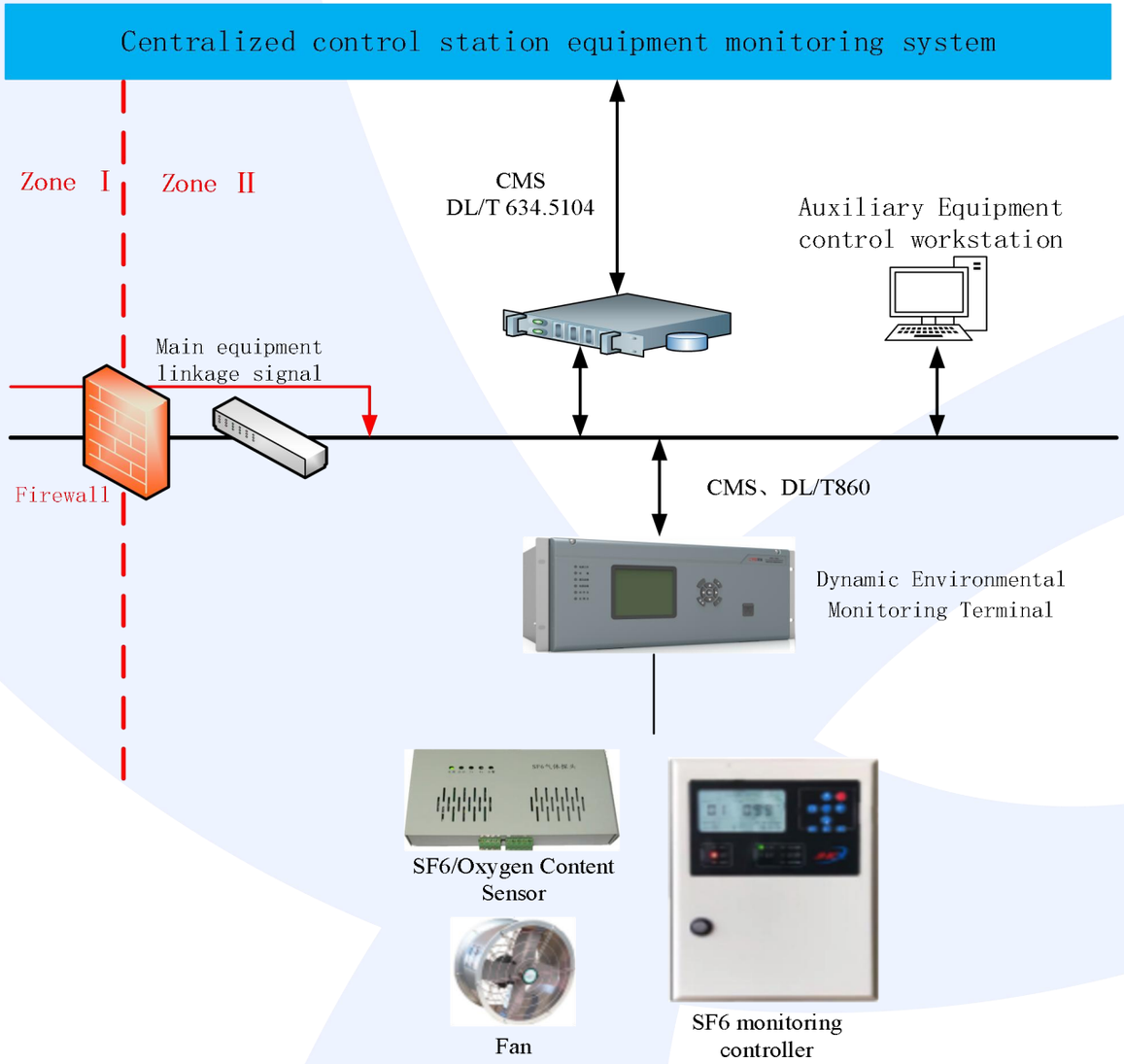
SF6 monitoring of dynamic environmental system



Monitoring

- ◆SF6、 Oxygen gas concentration
- ◆Alarm for low oxygen concentration and alarm for excessive SF6 concentration
- ◆SF6 sensor operating status
- ◆Operation status of SF6 monitoring controller

Control

- ◆Remote start/stop control, timed control, and maintenance tagging of exhaust fans
- ◆SF6、 Oxygen concentration threshold alarm configuration, supporting alarm mode settings
- ◆SF6 alarm automatically starts exhaust fan
- ◆SF6 alarm automatically starts on-site sound and light alarm

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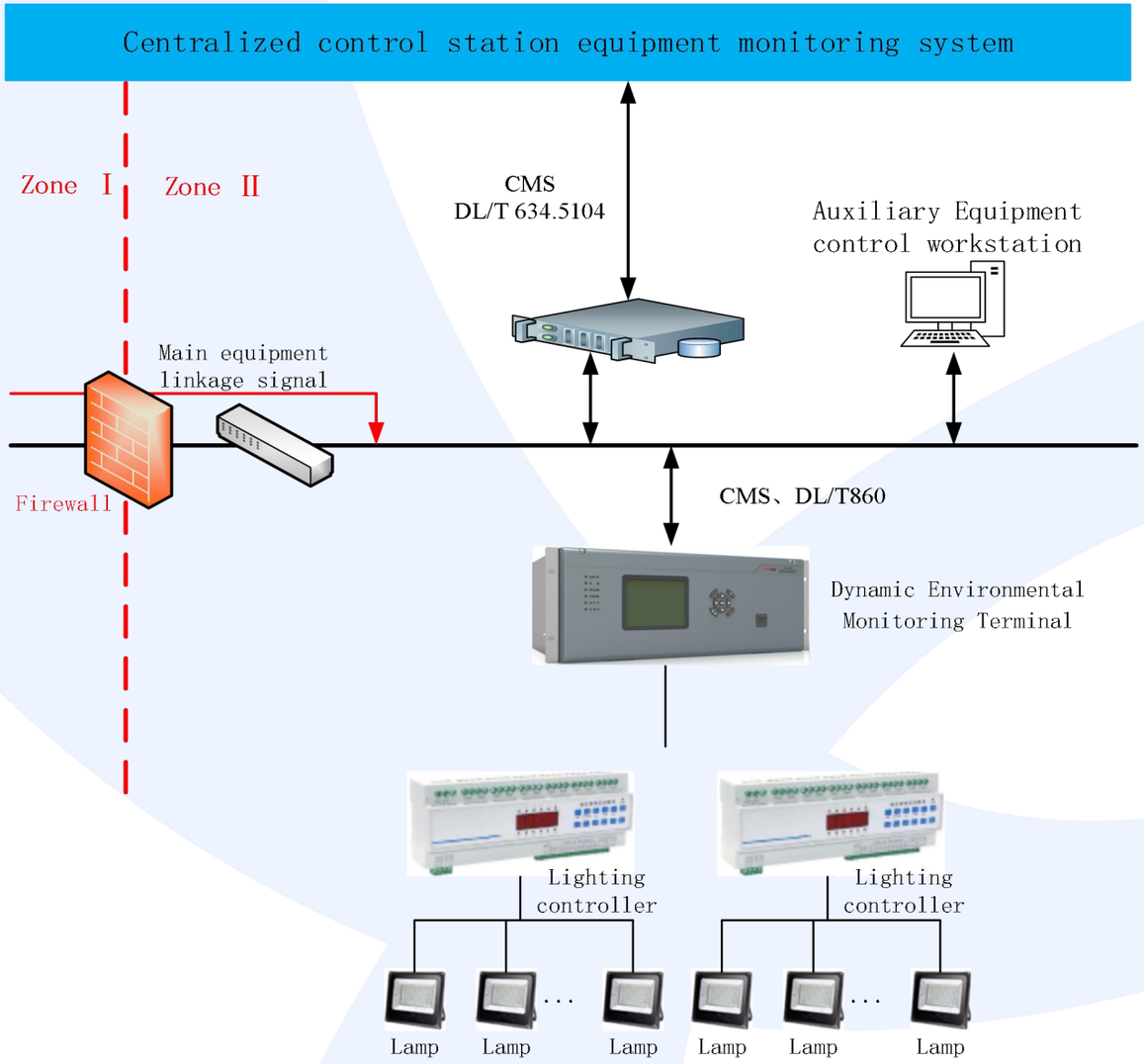
Lighting control of dynamic environmental system



Monitoring

- On/off status of lighting fixtures
- Operation status of lighting controller
- Working status of lighting control circuit

Control

- Local control of lighting on/off
- Remote control of lighting on/off
- Area control lighting on/off
- Timed control of lighting fixtures on/off
- Strategic control of lighting on/off
- Hanging maintenance of lighting fixtures

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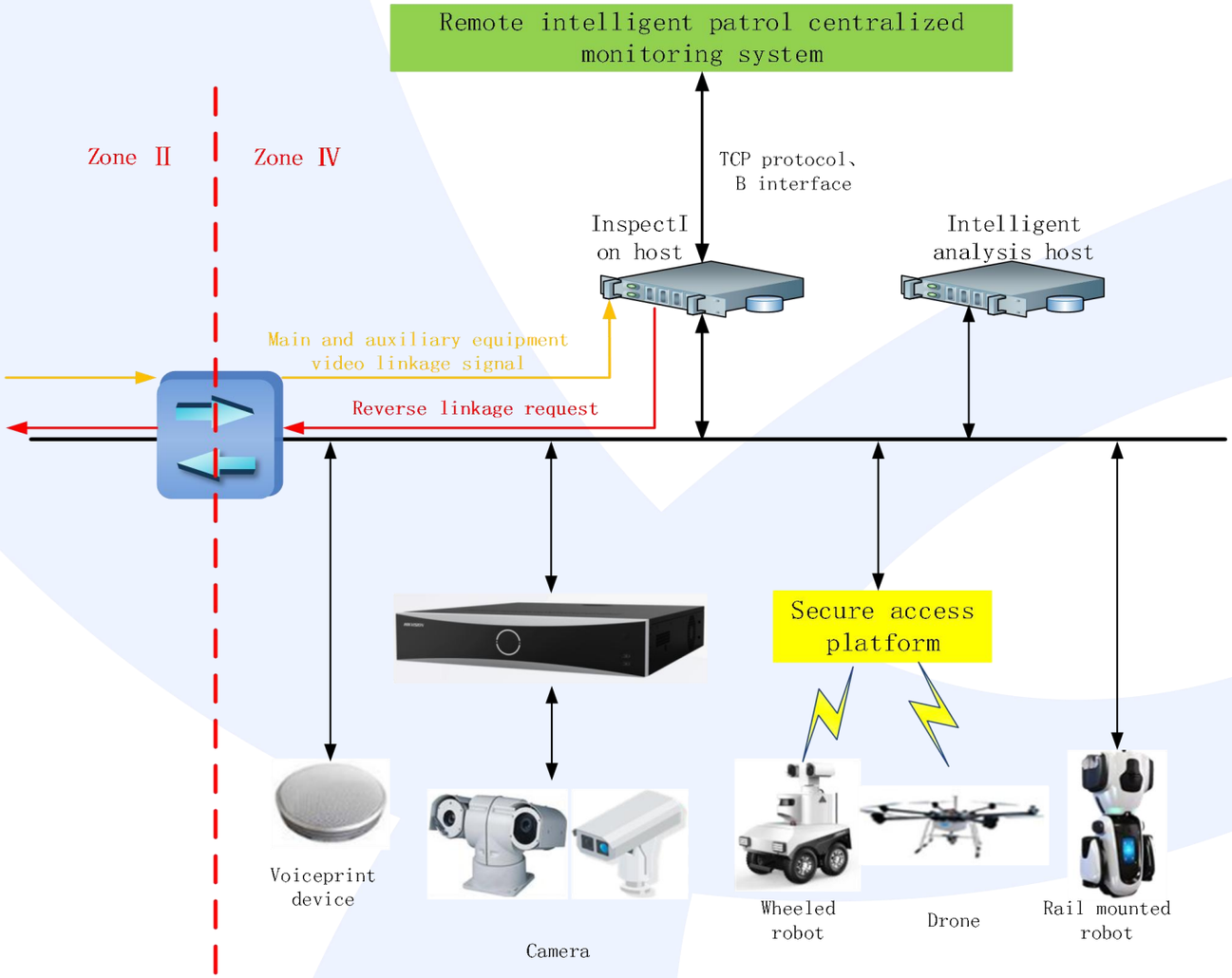
Remote intelligent inspection



- High definition video, robot, drone, voiceprint device data collection
- Real time monitoring
- Operation control
- video replay
- Monitoring point screen polling
- Intelligent Analysis
- Task Management
- Real time monitoring of patrol tasks
- Confirmation of Inspection Results
- Analysis of Inspection Results
- Smart Linkage
- One click sequential control video confirmation
- Inspection equipment ledger management
- 3D browsing, 3D interaction, 3D inspection
- Reliability index statistics
- System self-check

PART 04

Cases and value

Comprehensive perception of device status

Item	Current situation	Auxiliary equipment monitoring system
Main equipment data	Incomplete monitoring information and limited means	Real time monitoring
Equipment appearance	Manual photography recording	Video/Robot Joint Inspection
Runtime environment	Manual recording	Real time monitoring by sensors
Meter data	Manual transcription	Remote transmission meter, video analysis
Partial discharge monitoring	Artificial live detection	Automatic online monitoring acquisition
Mechanical properties	Artificial live detection	Automatic online monitoring acquisition
Infrared temperature measurement	Artificial live detection	Infrared camera automatic temperature measurement

Value:

- Realize multi-dimensional perception of device status (monitoring data/meters/videos/images), providing solid data support for intelligent analysis and decision-making;
- Enhance the comprehensive monitoring capability of equipment

Remote operation of auxiliary equipment

Item	Current situation	Auxiliary equipment monitoring system
Door opening and closing, lighting control	Manual operation	Remote control
Air conditioning and fan start stop	Manual operation	Remote control
Alarm threshold maintenance	Manual operation Main stations are maintained separately	Remote maintenance, shared synchronization between master and slave stations
Operating parameters Setting	Manual operation	Remote setting

Value:

◆ Remote control of main and auxiliary equipment to reduce the number of round trips to and from the substation.

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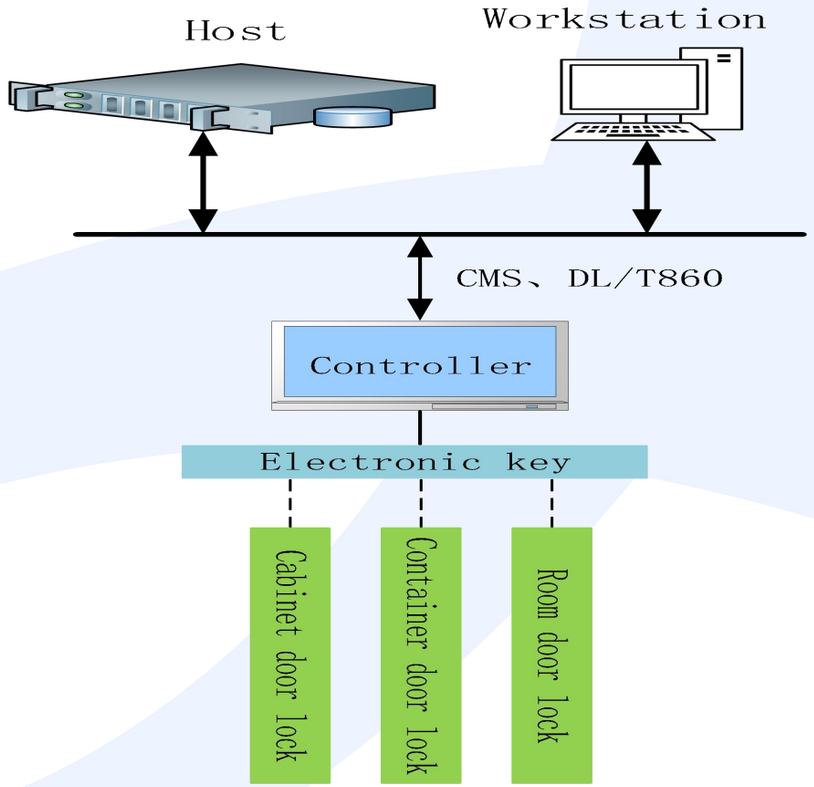
One Key Management



Smart Key One Key Management

The intelligent lock control system consists of a lock control controller, electronic keys, and substation intelligent locks. It replaces various traditional mechanical locks and keys, and has functions such as remote control of unlocking permissions, data-driven storage of unlocking records, and information-based management of unlocking processes.

Core Value

- Electronic management of non error proof locks
- Lock operation can be controlled and recorded

Intelligent linkage for data sharing

Item	Current situation	Intelligent inspection system
Equipment operation	Independent operation, Data island	Data sharing Collaborative cooperation
Fault isolation	Manual on-site operation	Intelligent linkage Timely isolation
Fault confirmation	Manual on-site inspection	Video push Self inspection
Fault handling	Manual analysis、 processing	Linkage control Timely response

Value:

- Collaborative cooperation, intelligent linkage between main and auxiliary equipment, and auxiliary equipment in case of abnormal faults, improves the emergency response speed of defects, and shortens the processing time of defects。

Intelligent inspection

Based on **image intelligent recognition algorithms**, remote joint intelligent inspections are carried out using high-definition videos of substations, robots, drones, voiceprint monitoring devices, etc., to intelligently inspect equipment appearance, equipment defects, etc., achieving machine substitution for humans and improving inspection efficiency.

Machine substitution

Joint inspection

Highly intelligent

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Machine replaces intelligent inspection

Equipment status monitoring

- Real time monitoring based on streaming media
- Voiceprint analysis based on audio data

Intelligent Image Analysis

- Equipment status detection
- Equipment defect detection
- Personnel behavior detection
- Environmental status detection

Fault linkage handling

- Visual monitoring based on intelligent linkage
- Emergency response based on intelligent linkage

Remote intelligent inspection

- Parallel inspection based on multi task scheduling
- Intelligent inspection based on multidimensional data fusion

Temperature measurement inspection of power equipment

- Online temperature measurement of power equipment
- Thermal imaging intelligent diagnosis

Sequential control video double confirmation

- Visualization of the process of one click sequential control operation
- Device state detection based on video frame extraction

Intelligent and efficient machine inspection

Item	Current situation	Intelligent inspection system
Labout	8 hours	7*24 hours
Capacity	Different due to experience	Big data and intelligent analysis
Scope	Equipment appearance, defects that have occurred	Equipment appearance and internal full coverage
Report	Manual entry	One-click generation
Frequency	Once a month	Once a day
Efficiency	Arrive at the site in 1-2 hours	Anytime, wherever you point, wherever you go

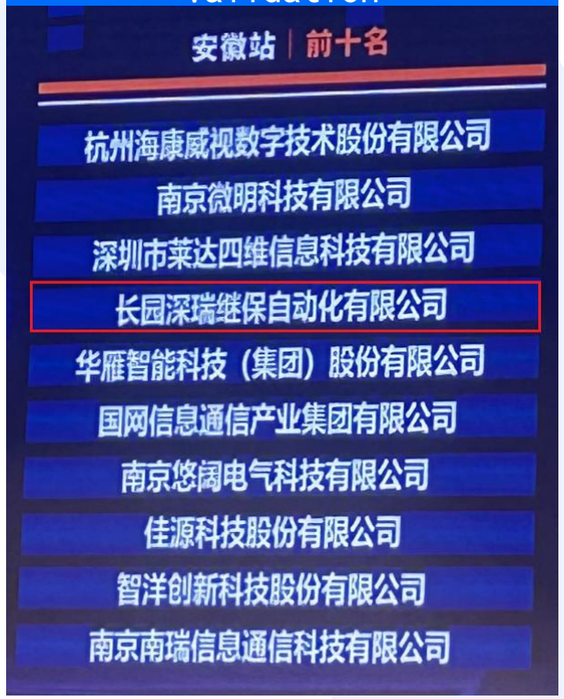
Value:

- Realize **full coverage** automatic inspection, release O&M personnel from a large amount of manual inspection work, greatly **improve inspection efficiency**, and truly realize **unmanned intelligent inspection of substations**.

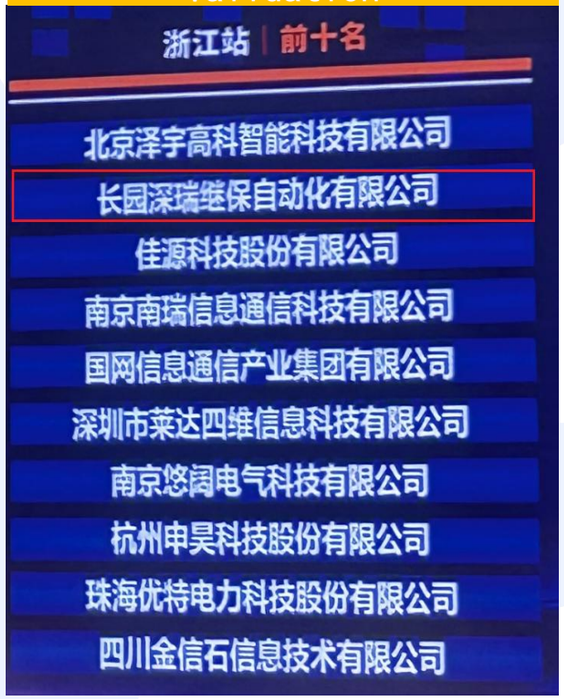
Algorithm Validation Competition

Our company actively participated in the normalization cultivation of intelligent inspection image algorithms for substations organized by the State Grid Equipment Department in 2023, and went through the four algorithm verifications and stood out among them, winning the "Top Ten Comprehensive Verification Teams of the Year".

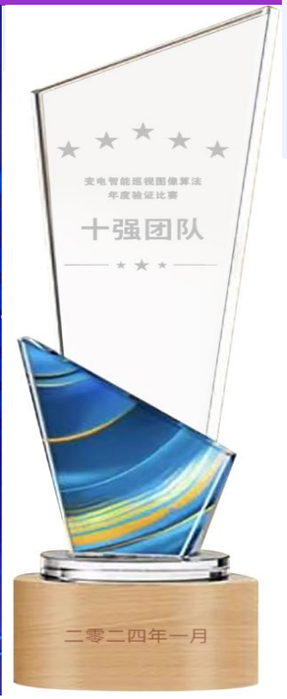
Anhui Station Algorithm Validation



Zhejiang Station Algorithm Validation



Top 10 teams for annual comprehensive verification



Participated in the joint project between State Grid Equipment Department and Digitalization Department to unveil the seed model capability of the 2024 substation intelligent inspection image recognition algorithm

国家电网有限公司

国网设备部 数字化部关于联合开展 2024 年变电智能巡视图像识别算法种子模型能力提升揭榜挂帅的通知

各算法研发单位：

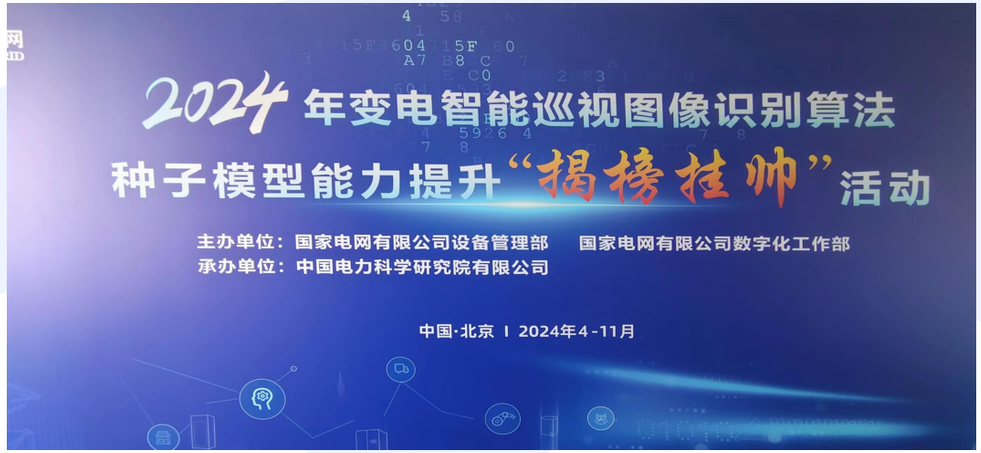
为贯彻落实《关于推进变电专业智能巡视算法提升及实用化应用的通知》和《公司人工智能规模化应用专项行动方案》工作要求，加快提升变电智能巡视实用化水平，国网设备部、数字化部联合开展变电智能巡视种子模型能力提升“揭榜挂帅”活动，具体事项如下。

一、活动目的

聚焦变电智能巡视实用化提升，推进人工智能技术在变电站智能巡视中规模化应用，探索“大模型+专业模型”在变电智能巡视实用化应用，采用“平台+现场”验证模式，开展种子模型能力提升“揭榜挂帅”集中攻关和自主可控硬件适配验证，推进优质算法现场试用和跟踪评估，发掘培育算法研发和实用化综合能力强的单位，突破变电智能巡视图像算法实用化瓶颈。

二、活动原则

公开征集，自愿报名。面向全社会公开征集，畅通参与渠



Test Result

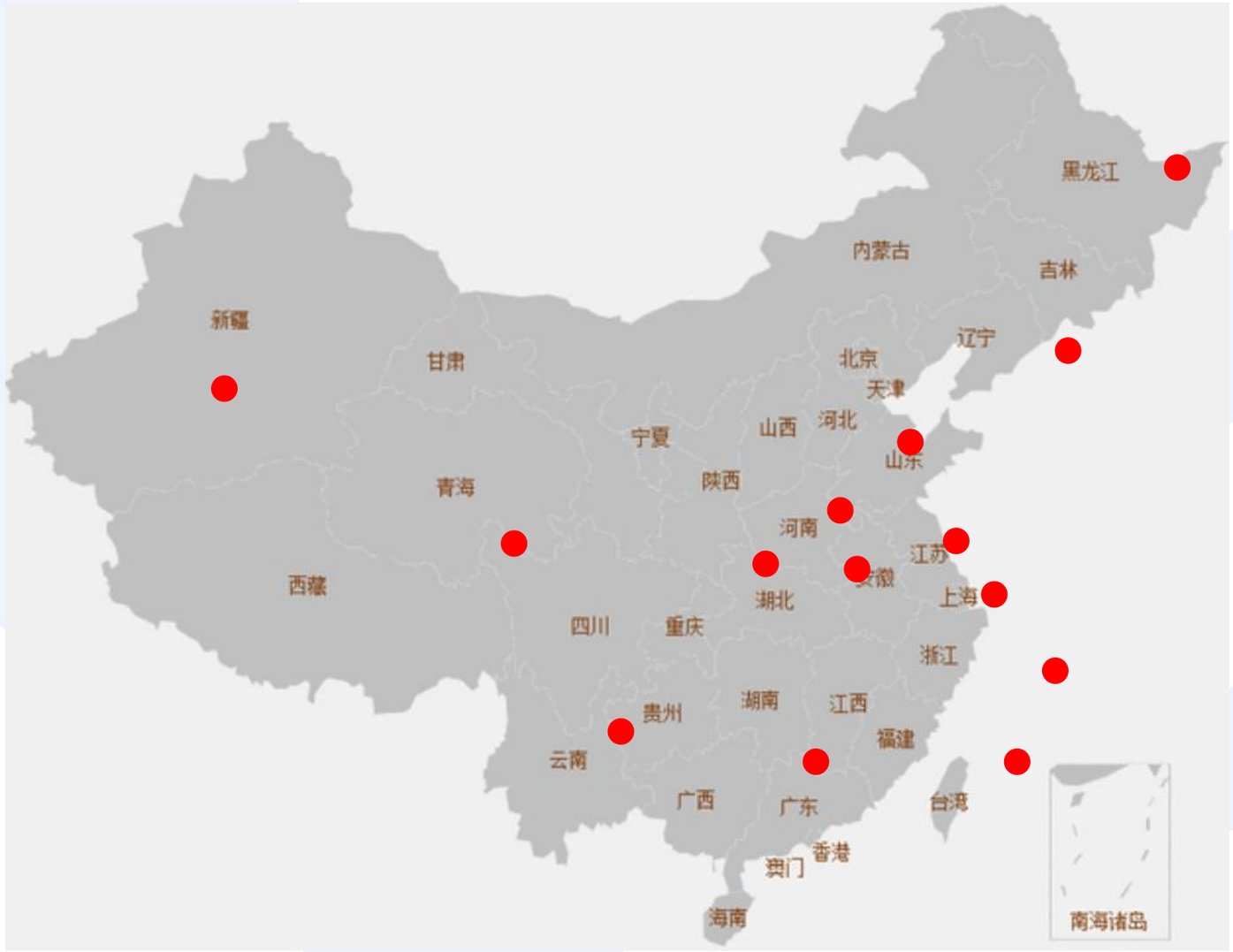
Mean Error	SF6 pressure gauge	Leakage current meter	Oil temperature gauge	Oil level gauge
1.62462%	2.86872%	0.45696%	1.51764%	1.65516%

Judgment criteria

Qualified: The maximum reading error of various meters is ⩽± 5%, and the actual reading and average reading error of various meters are also acceptable ⩽±2%;

Excellent: The maximum reading error of various meters is ⩽± 2% of the actual reading

Application Cases



- Zhejiang Jinhua 500kV Pancun Substation Intelligent Auxiliary Control
- Zhejiang Wenzhou 500kV Rui'an Substation Auxiliary System Comprehensive Monitoring Platform
- Hebei Baoxi 500kV Intelligent Substation Auxiliary System Comprehensive Monitoring Platform
- Hunan 110kV Shizishan Smart Substation
- Shandong 220kV Tianping Smart Substation
- Shanghai 220kV Shengxin Station Auxiliary Control System Project
- Qinghai Fuyuan 330kV Substation New Construction Project Auxiliary Control Equipment Project
- Shanxi Jinzhong 220kV Wangyu Substation New Construction Project
- 110kV Xinyuan Intelligent Substation Auxiliary System in Puyang County, Puyang City, Henan Province
- Intelligent Transformation Project of Shaanxi Baoji Mingxing 110kV Substation
- Sichuan Deyang 220kV Wan'an Substation
- ...

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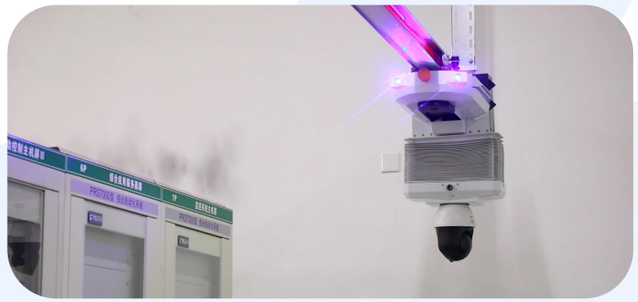
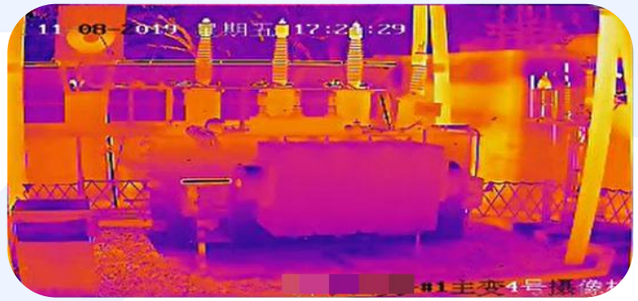
Application Cases

The Hunan 110kV Shizishan Smart Substation project has achieved various functions such as full station video monitoring, intelligent inspection, online temperature measurement, intelligent linkage, and one click sequential control video double confirmation.

Since the system was put into use in 2019, it has carried out thousands of routine and special inspection tasks, enhancing the ability of operation and maintenance personnel to perceive the status of substations, detect defects, respond to emergencies, and control equipment, effectively reducing the daily inspection work of operation and maintenance personnel, and reducing their workload and increasing efficiency.

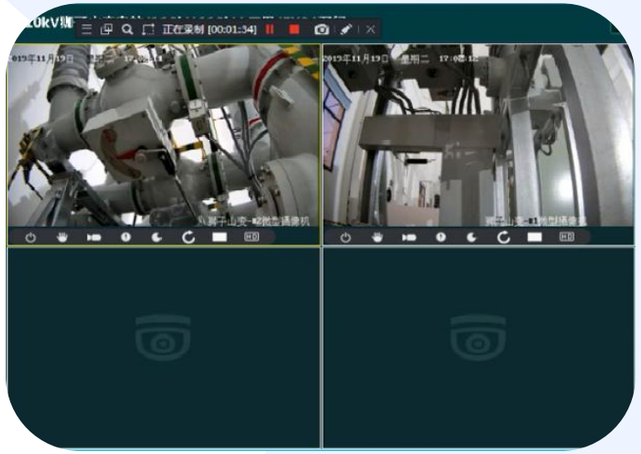


Rail mounted robot

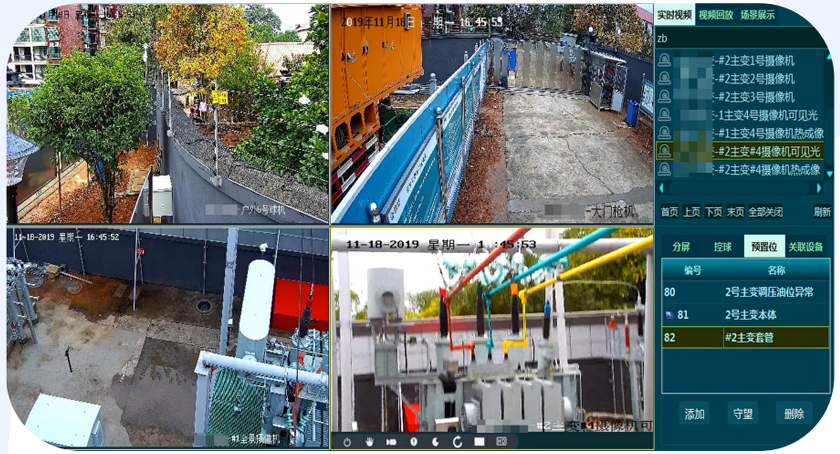


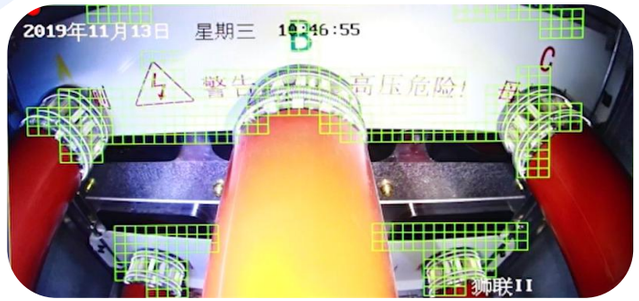
Transformer temperature measurement

Intelligent linkage pop-up window



Execution of inspection tasks





Video double confirmation

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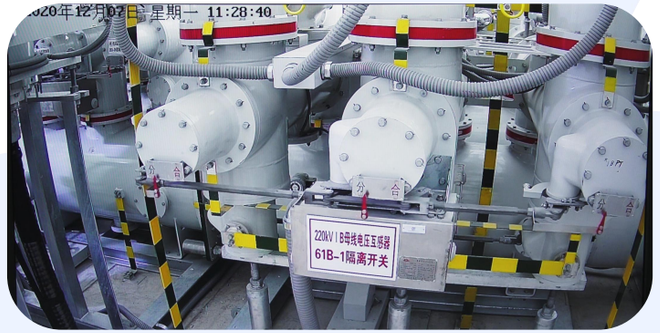
Application cases

The Shandong 220kV Tianping Smart Substation project is equipped with 2 track machines and nearly 150 cameras of various types. The entire station covers 7691 inspection points, fully replacing manual routine inspections, light off inspections, and some special inspections. For 14 special inspection tasks, standardized preset points are set, and customized special inspection tasks are activated when specific situations occur to increase inspection frequency and improve equipment control capabilities.



miniature camera

Inspection task configuration

Execution of inspection tasks

GIS room high-definition camera

Protection room track robot

CYG长园 股票代码 600525.SH Stock Code

Thanks !

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