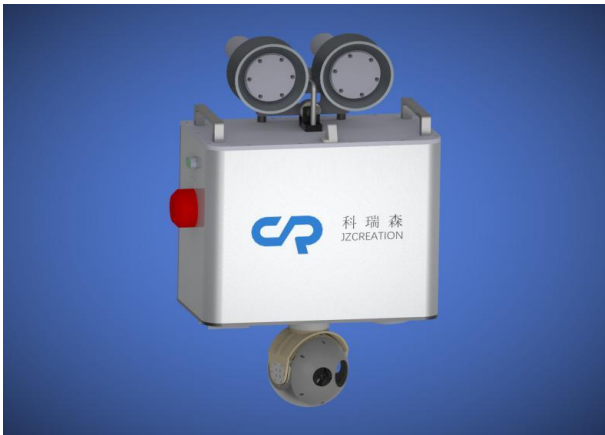




焦作科瑞森重装股份有限公司
Jiaozuo Creation Heavy Industry Co.,Ltd



WELCOME
TO JIAOZUO
CREATION



Design conception

Technical highlights

Applications

Investment benefit

The intelligent inspection robot of bulk material transportation equipment is used to complete the inspection of equipment instead of manual. The robot has many monitoring means, such as infrared imaging temperature measurement, gas monitoring, high definition image / video shooting and so on. It uses independent inspection and remote control inspection instead of personnel to inspect the bulk material transportation equipment .In order to detect the abnormal condition of the equipment in time,it can Provide equipment diagnosis, predictive maintenance and other related data to operation and maintenance personnel.



Comparison of Inspection modes between conventional Inspection and Intelligent Robot

conventional inspection mode

*heavy Inspection tasks

*lack of quantitative data

*physical Safety risk exists

*blind area for inspection at patrol points.

*dependent on personnel quality and experience

bad effect

bad efficiency

tough management

inspection time of Intelligent Robot at Patrol Point

timing, fixed point, no dead angle

infrared temperature measurement, image recognition

Can carry a variety of sensors, abnormal automatic alarm

real-time data transmission, data quantification

good effect
high efficiency
easy to manage

Intelligence、 safety、 high efficiency

It can effectively reduce the personal safety risks in the operation and maintenance of bulk conveying equipment, improve the operation and maintenance efficiency, and meet the requirements of equipment status、 data quantification, early warning and real-time data transmission.

| design target | implementation mode |
|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| full autonomous walking | cable/track+autonomous walking |
| full autonomous charging | after the inspection task is completed, or the electric power is low, moves to the charging pile and charges automatically s |
| Intelligent discrimination of infrared temperature measurement | image acquisition by high definition camera and intelligent image algorithm |
| Intelligent discrimination of infrared temperature measurement and fault alarms | infrared High Precision temperature Measurement and automatic high temperature alarms |
| video collection and storage | infrared image , high definition image, real-time acquisition and storage |
| report analysis and historical data analysis | patrol inspection data compares with historical data, it can automatically generates patrol inspection report. |
| autonomous patrol and remote control inspection | two optional modes |

Architecture of the system configuration

software
platform

cable
track

intelligent
robot for
patrol
inspection

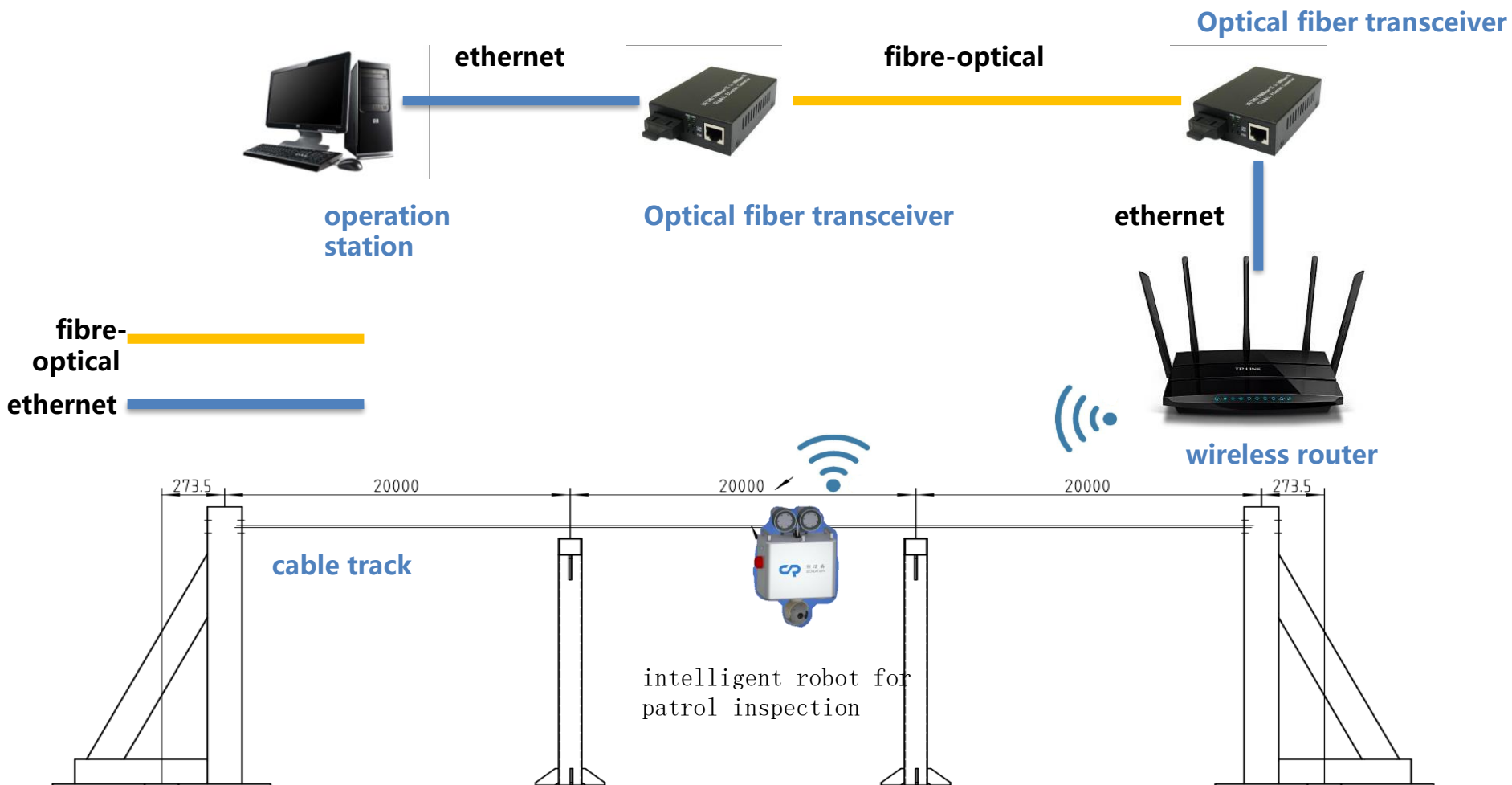
power
supply
system

communication
system

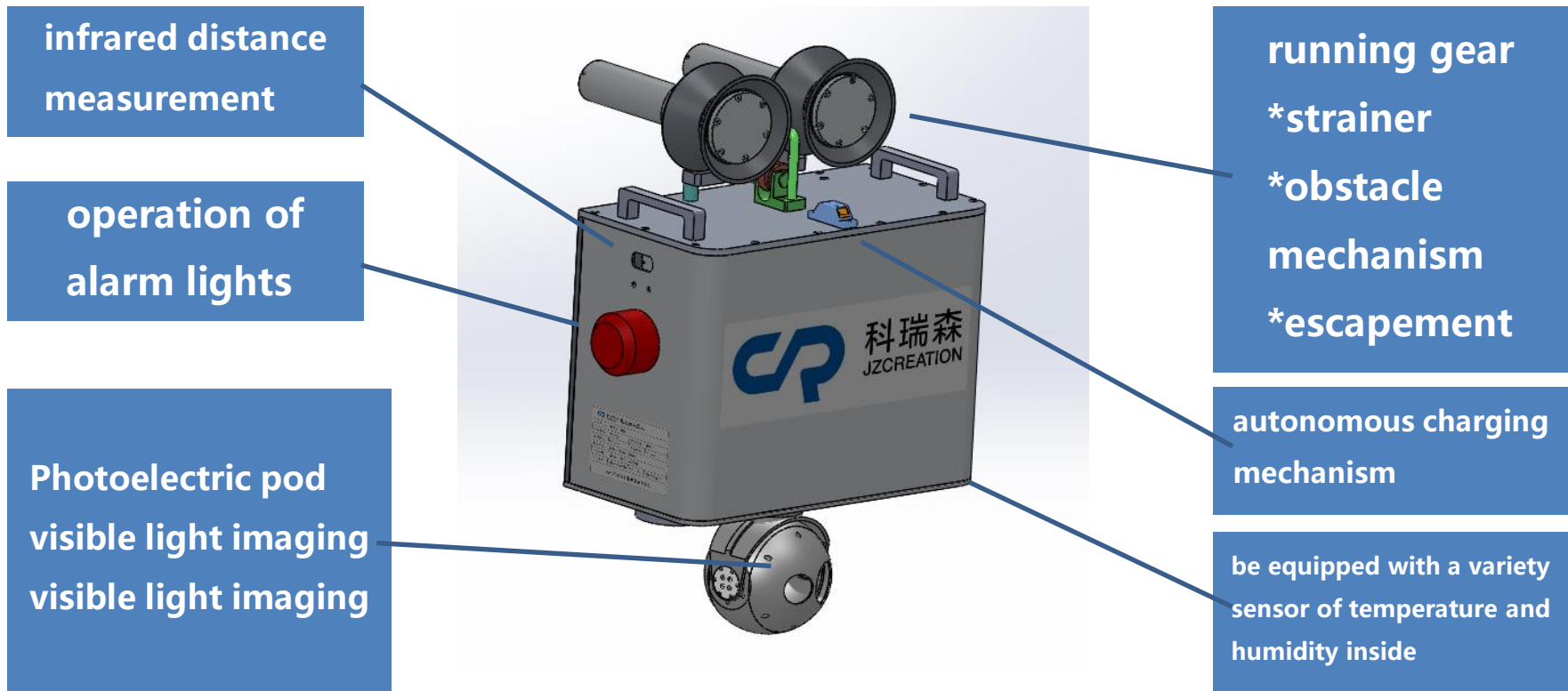


Design conception

Communication network architecture

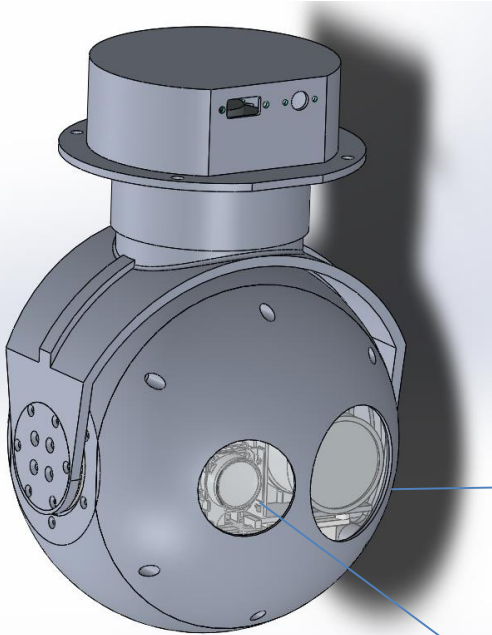


Structure composition of Intelligent Inspection Robot



The main components of the intelligent inspection robot are walking mechanism, photoelectric pod (visible light, infrared light), power supply, wireless communication, various sensors and other related components.

photoelectric pod



1. visible high-definition video images and infrared observation / temperature measurement images can be provided in real time
2. high precision about two-axis stabilization system
3. target tracking, target locking, target position solving function
4. multi-target detection and recognition based on deep development
5. big data and custom development of artificial intelligence target recognition technology



Infrared thermal

the infrared thermal imager realizes the on-line temperature measurement of the bad weather in daytime and night target scene imaging,
* it can measure temperature, and owns the function of temperature early warning (0 °C ~ 120 °C)

*640 × 480 pixel

*temperature measurement mode: the temperature bar (pseudo color display) is the highest temperature, the lowest temperature, and the center temperature of the field of view



visible light

the visible light camera realizes the imaging of the target scene during the daytime

*with 10 times optical *1920 × 1080 pixels.



Design
conception

Technical
highlights

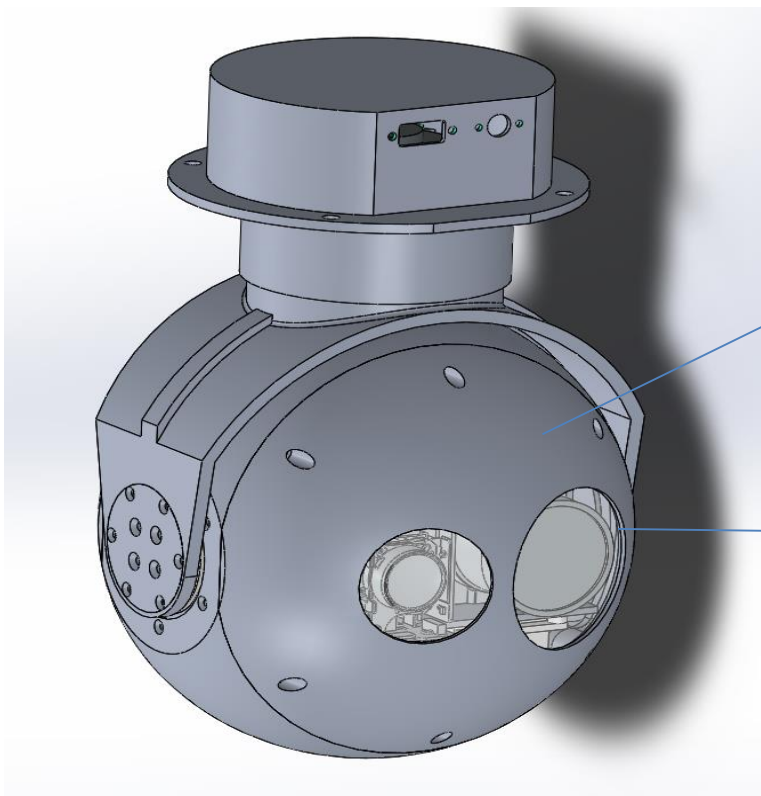
Application
station

Investment
benefit

Technical highlights

stable imaging technique

the military-grade photo-electric pod is perfectly adapted to the flexible line of the steel cable, and the image quality of the image is effectively ensured.



built-in multiple gyroscopes——accurately perceiving the state of its own position

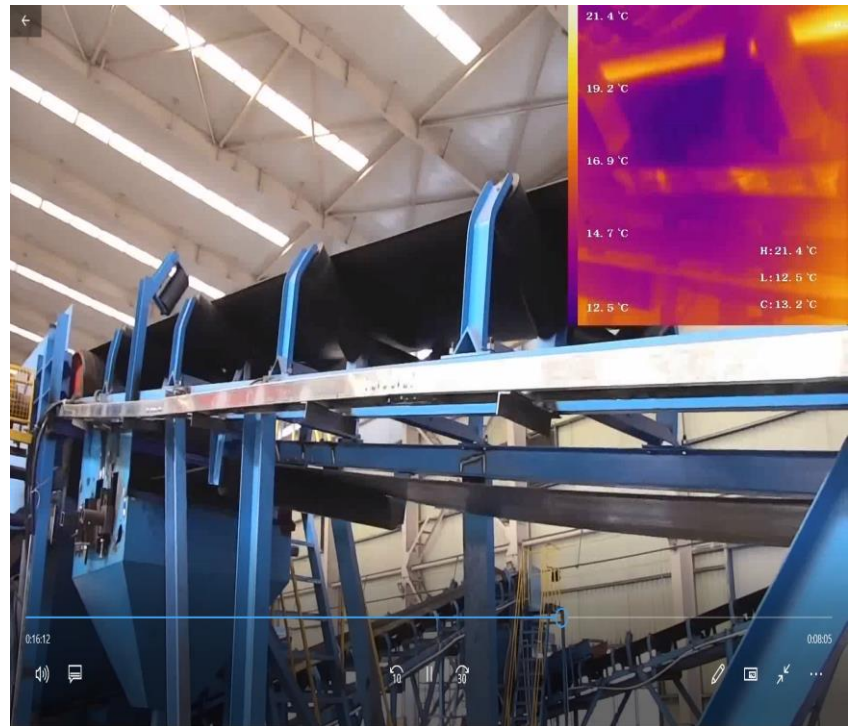
advanced control technology ——adjust its posture accurately

Identification technology of visual temperature

Non-contact temperature measurement (Automatically identify maximum temperature, minimum temperature, center temperature), image displays, and abnormal temperature alarms.



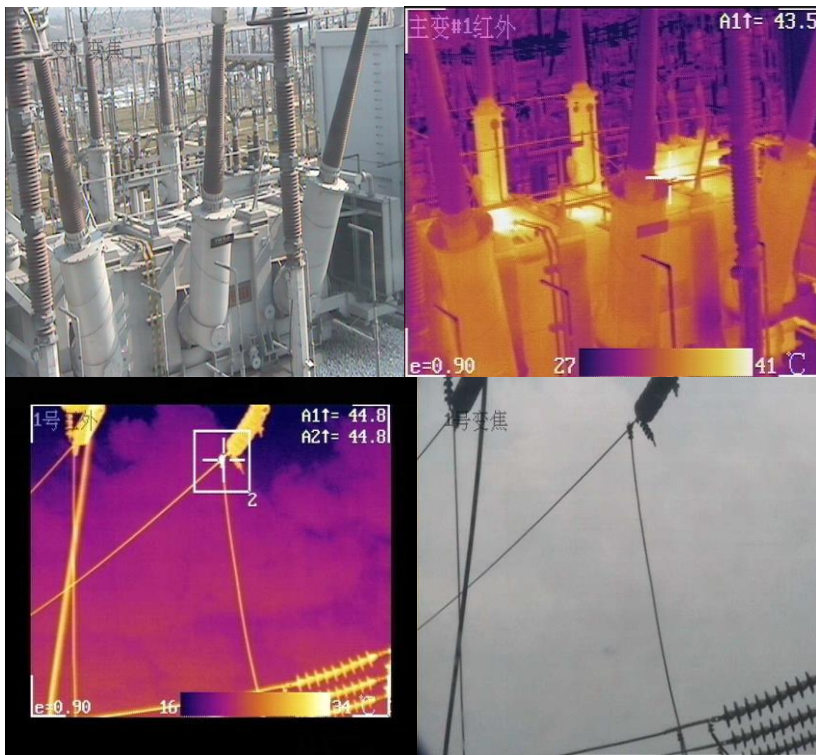
visual observation of double field of view (belt conveyor)



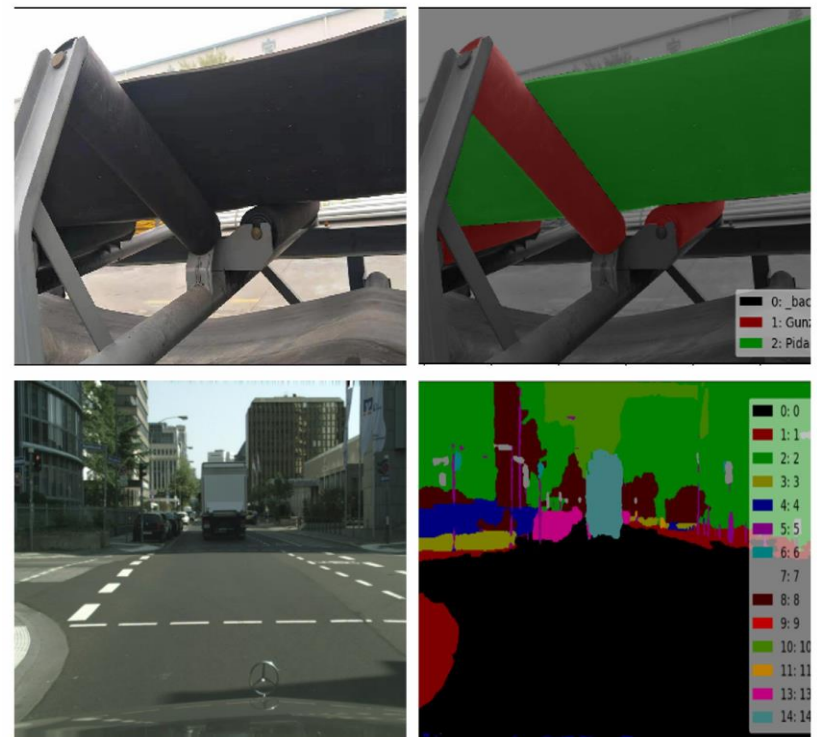
visual observation of double field of view (belt conveyor)

Intelligent identification technology

Automatically identify the observed objects, such as belt conveyor roller, electronic power fittings and so on, and accurately display the temperature measurement value of the object(belt conveyor roller and electronic power fittings)



recognition technology of the intelligent image
(electronic power fittings)

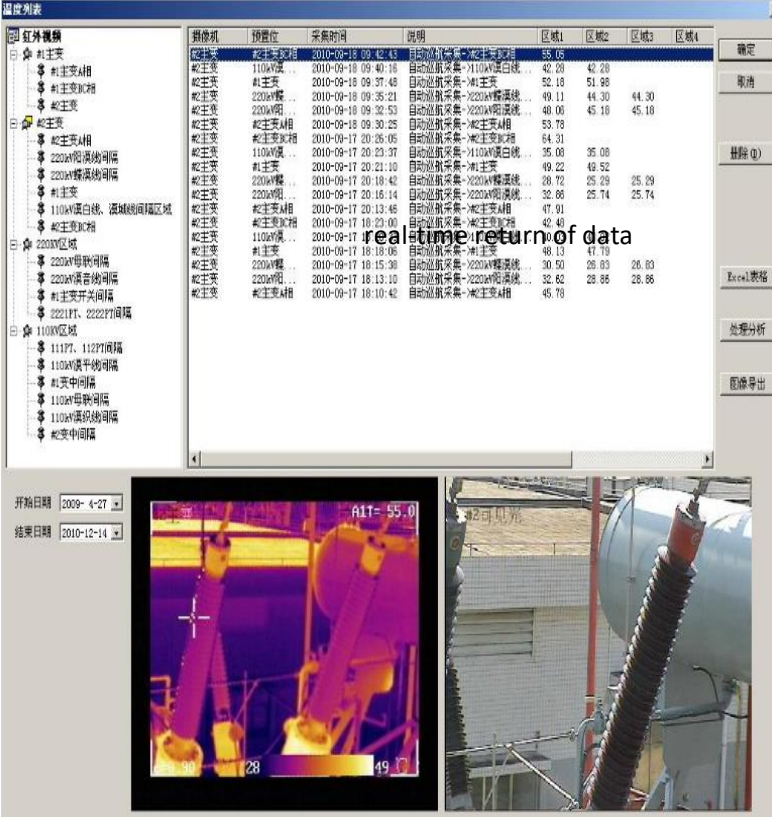


recognition technology of the intelligent image
(belt conveyor roller)

real-time return of data

automatic generation of inspection report

infrared detection report of electrical equipment



红外检测

| 设备名称 | 预置位 | 采集时间 | 说明 | 区域1 | 区域2 | 区域3 | 区域4 |
|---------|---------|---------------------|----------------|-------|-------|-------|-----|
| 110kV区城 | 110kV区城 | 2010-09-18 09:42:43 | 自动巡航采集-110kV区城 | 55.06 | | | |
| 110kV区城 | 110kV区城 | 2010-09-18 09:40:16 | 自动巡航采集-110kV区城 | 42.28 | 42.28 | | |
| 110kV区城 | 110kV区城 | 2010-09-18 09:37:48 | 自动巡航采集-110kV区城 | 52.18 | 51.98 | | |
| 220kV区城 | 220kV区城 | 2010-09-18 09:35:21 | 自动巡航采集-220kV区城 | 40.11 | 44.30 | 44.30 | |
| 220kV区城 | 220kV区城 | 2010-09-18 09:32:53 | 自动巡航采集-220kV区城 | 48.06 | 45.18 | 45.18 | |
| 110kV区城 | 110kV区城 | 2010-09-18 09:30:25 | 自动巡航采集-110kV区城 | 53.78 | | | |
| 110kV区城 | 110kV区城 | 2010-09-17 20:35:05 | 自动巡航采集-110kV区城 | 64.31 | | | |
| 220kV区城 | 220kV区城 | 2010-09-17 20:32:37 | 自动巡航采集-220kV区城 | 35.08 | 35.08 | | |
| 110kV区城 | 110kV区城 | 2010-09-17 20:21:10 | 自动巡航采集-110kV区城 | 49.22 | 49.52 | | |
| 110kV区城 | 110kV区城 | 2010-09-17 20:18:42 | 自动巡航采集-110kV区城 | 28.72 | 25.29 | 25.29 | |
| 220kV区城 | 220kV区城 | 2010-09-17 20:16:14 | 自动巡航采集-220kV区城 | 32.86 | 25.74 | 25.74 | |
| 110kV区城 | 110kV区城 | 2010-09-17 20:13:46 | 自动巡航采集-110kV区城 | 47.91 | | | |
| 110kV区城 | 110kV区城 | 2010-09-17 10:21:00 | 自动巡航采集-110kV区城 | 42.40 | | | |
| 110kV区城 | 110kV区城 | 2010-09-17 18:18:08 | 自动巡航采集-110kV区城 | 48.13 | 41.79 | | |
| 220kV区城 | 220kV区城 | 2010-09-17 18:15:38 | 自动巡航采集-220kV区城 | 30.52 | 28.83 | 28.83 | |
| 110kV区城 | 110kV区城 | 2010-09-17 18:13:10 | 自动巡航采集-110kV区城 | 32.62 | 28.86 | 28.86 | |
| 110kV区城 | 110kV区城 | 2010-09-17 18:10:42 | 自动巡航采集-110kV区城 | 45.78 | | | |

开始日期 2009-4-27
结束日期 2010-12-14

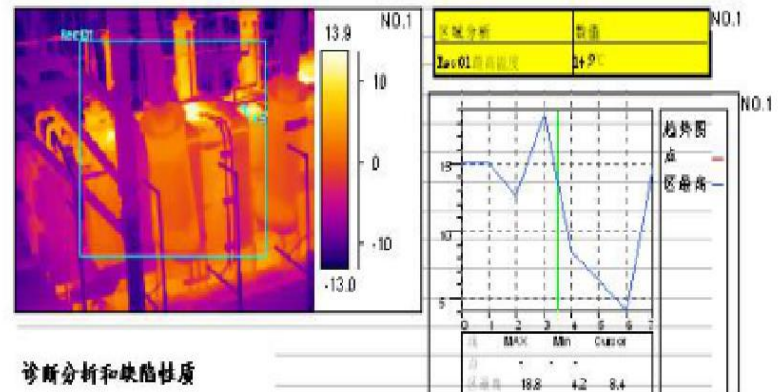
红外图像: 110kV区城, ALT=55.0

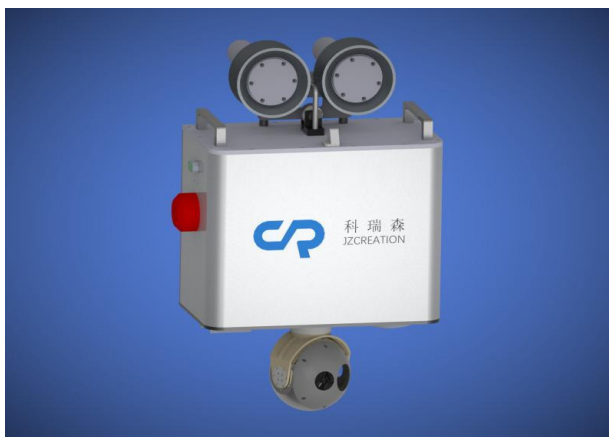
电气设备红外检测报告

| 运行 | 设备名称 | 安装地点 | 设备型号 |
|----|--------|---------|--------|
| | 设备额定电压 | 设备生产序列号 | 设备出厂日期 |
| | 测试仪器 | 测试仪器序列号 | 图像编号 |
| | 辐射系数 | 测试距离 | 带电电压 |
| | 天气 | 环境 | 湿度 |
| | 风速 | 检测日期 | 检测时间 |

图像分析

可见光 (或分析数据)





Design
conception

Technical
highlights

Applications

Investment benefit

Application station

patrol inspection of bulk material to convey equipments



patrol inspection of coal belt conveyor



line inspection of overhead transmission

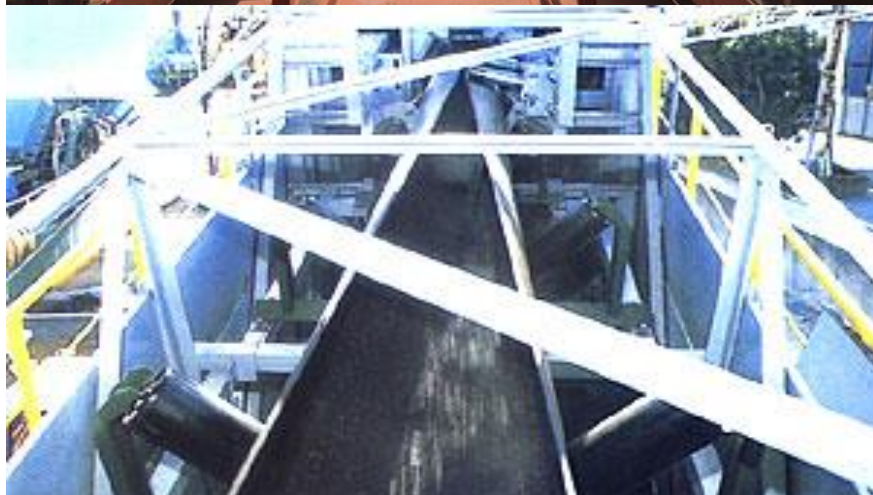


line inspection of overhead transmission

inspection of wharf equipment



corridor inspection of municipal pipe



inspection of transportation equipment



cable tunnel inspection

Application station

stable and reliable operation in different environments

- The maximum running speed can reach 1.5 km / h
 - The climbing capacity should not be less than 15 degrees, which fully meets the requirements of the climbing angle of the bulk material transportation industry
 - It has the ability to cross the obstacle by itself. There is no need to worry that interference charging supported by cable
 - It can be continued for 5 hours at a time to meet the requirements of single inspection of conventional conveyor.
- For ultra-long distance conveyor, multiple charging piles can be equipped with self-charging, without manual interference
- There' s protective coating or anticorrosion design on the surface of the shell. To meet the environmental requirements of each working condition of bulk conveyor
 - The working environment temperature of robot is -20 °C ~ 55 °C
 - Protection grade of overall design is IP65



Strong expansibility

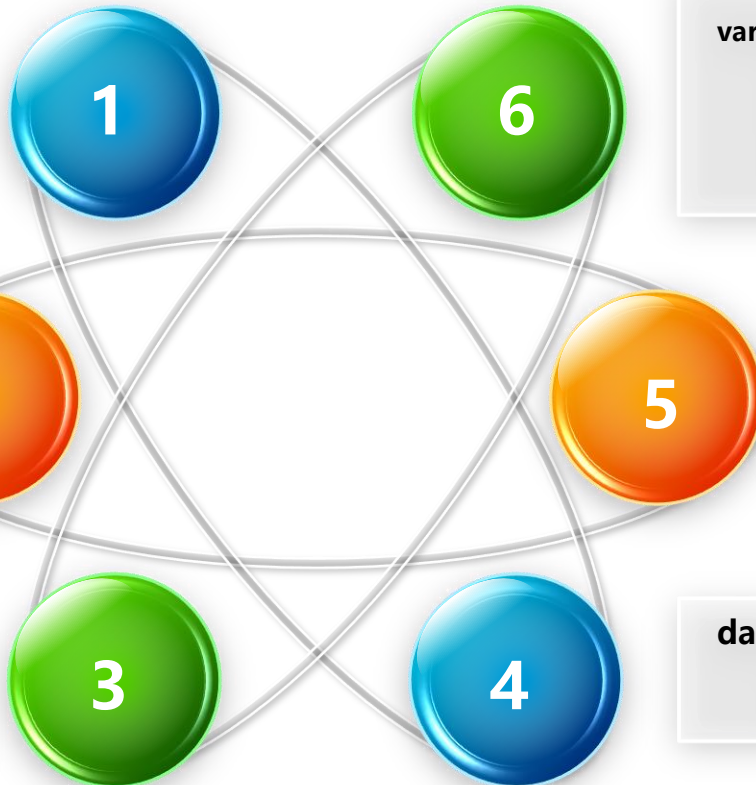


Due to the changes in the environment and increased requirements for applications, there' re some subsequent scalabilities of the device as follows:

enhancement of Real-time Control of Instruments

the upgrade of image processing technology

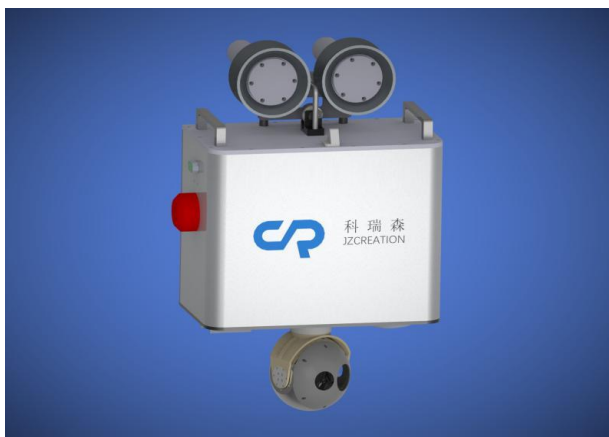
improvement of intelligent recognition technology for Infrared Image



various hardware upgrades, it targets higher demand research and development, such as: inspection robot of tubular belt conveyor , etc.

upgrade the software at client WEB

data interface of operation and maintenance management system



Design conception

Technical highlights

Application station

Investment benefit

Investment benefit: The intelligent inspection robot is simple and convenient to use, easy to operate, more comprehensive and accurate than the inspection data of personnel. It provides a strong technical guarantee for the safe operation of equipment , including the stable operation of production.



Economy benefit: The use of intelligent inspection robot can greatly reduce the long-term manual investment. And the whole day uninterrupted inspection task has been realized.

Society benefit: The routine inspection of the replacement person can be carried out very well under special circumstances (such as thunderstorm days, etc.), and the safety risk of inspection operated by person are reduced.

Thank you for listening!

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