



Power Grid Management Solutions

GDU-TECH CO.,Ltd

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An aerial photograph of a modern building with a green roof. A large, dome-shaped structure is prominent on the roof. In the background, there is a body of water and a distant shoreline under a cloudy sky. The text "ABOUT GDU" is overlaid in the center.

ABOUT GDU

≡ ABOUT GDU

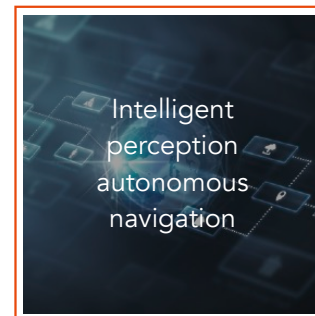
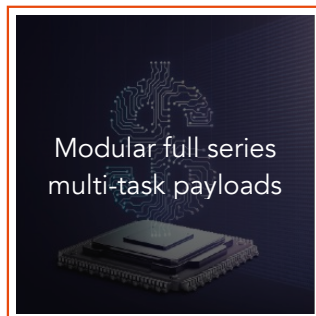
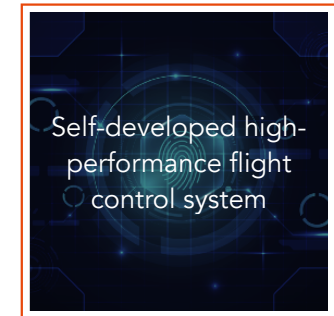
GDU, a high-tech enterprise that integrates drone R&D, production, sales, operation and maintenance, and data operation. It was established in 2015 and headquartered in Wuhan, China. Its marketing centers are spread across more than 30 cities worldwide, with nearly 800 employees, over 60% of whom are engaged in research and development.

As a leader in professional drones, GDU possesses comprehensive R&D capabilities across the entire drone industry chain. It has a rich product lineup and continuously innovates products and solutions in areas such as drones, automated drone docks, payloads, software platforms, and data operation. It is one of the few in the industry that holds independent intellectual property rights for the entire drone system.

In the context of the rapidly advancing low-altitude economy, GDU focuses on diverse application scenarios in smart cities. Utilizing drones as carriers and an AI middle platform as the core, it is building a low-altitude perception network to provide a high-visibility, high-precision, high-frequency, and 3D "unmanned" regulatory model for urban governance. Based on integrated chips for drone algorithms, it establishes a "comprehensive and large-capacity" algorithm repository, covering multiple fields such as smart cities, urban management, smart transportation, environmental water services, and forest fire prevention, thereby driving the digital transformation of urban governance comprehensively.



≡ CORE TECHNICAL ADVANTAGES



A dark, atmospheric photograph of several high-voltage power line towers and their associated cables. The towers are silhouetted against a dark, cloudy sky. The cables stretch across the frame, creating a sense of depth and perspective. The overall tone is moody and industrial.

BACKGROUND

≡ CHALLENGES

Situation

Drones are widely used in power line inspections, assisting in operation and maintenance, improving inspection quality and efficiency, and freeing up human resources. How can we further enhance the utility of drone inspection equipment to meet the various practical needs encountered during inspections?

Challenges

01

The inspection environment is complex, and the safety risks during inspections are high

In outdoor natural environments and under conditions such as high electric fields and high magnetic fields within substations, manual inspection involves a heavy workload and poses significant personal safety risks

03

The technology for defect and fault identification needs improvement

With massive amounts of inspection data, relying solely on manual visual identification results in a heavy workload and a high rate of missed reports.

Inspection scenarios are diverse, and inspection efficiency is low

Staff can remotely initiate fully automated drone inspections through the dock management platform.

02

The quality requirements for inspection data are stringent

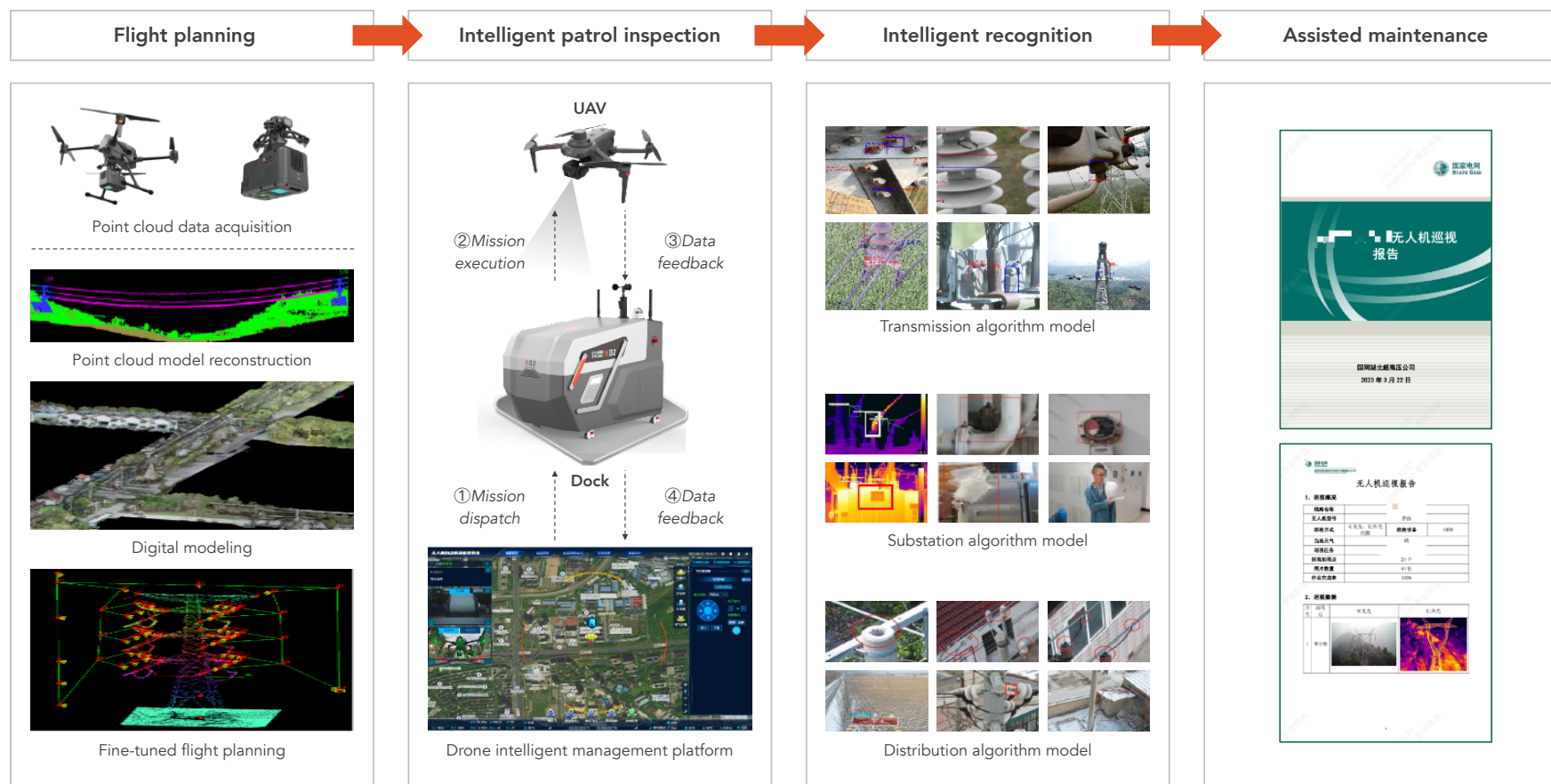
The power grid environment is intricate, with large equipment, and the results of detailed inspections demand high-quality photographs.

04

A dark, atmospheric photograph of a forested hillside. In the foreground, a dense green forest covers the slope. Two tall, metal lattice power line towers stand prominently on the left side of the frame. A drone is visible in flight, positioned between the two towers and slightly to the right. The background shows more distant hills and power lines under a dark, overcast sky. The word "SOLUTION" is overlaid in large, white, sans-serif capital letters in the center of the image.

SOLUTION

PROCESS



≡ TECHNOLOGICAL ADVANTAGES

Hardware and software optimization has improved the system in four aspects: inspection mode, equipment performance, automation level, and information security.

Unmanned Operation

The inspection system consisting of docks and drones, which achieves unmanned operation, with machines replacing manual inspections to improve data accuracy and consistency. Data is automatically transmitted and automatically generated inspection reports.



- Unattended operation
- Intelligent take-off and landing
- Remote control
- Multi-drone network
- AI intelligent analysis
- Environmental perception
- Fast charging
- Uninterruptible Power Supply (UPS)
- Industrial-grade protection

HD Camera

The 1K dual-lens camera and 8K camera serve as the primary collection devices for drone inspections. The infrared image resolution is 1280*1024, which is four times that of standard infrared gimbal resolution, allowing for clearer detail presentation. The conventional infrared image resolution is 640*512.



1K Dual-sensor Camera

- Infrared: 1280*1024
- Visible light: 8000*6000



8K Camera

- 48MP effective pixel

Cross-obstacle Networking

The terrain of power grid lines is variable, and wireless communication obstacles are common. By implementing a networking system, cross-obstacle communication is achieved, expanding the inspection boundaries.



Data Encryption Gateway

Upgraded encryption modules enable bidirectional identity authentication and encrypted data transmission at the network layer.

- Port Data Encryption
- Professional Processor
- Custom Protocol
- High Reliability
- Custom System
- High Network Adaptability



Encryption Module

A dark, monochromatic photograph of a drone flying over a landscape with hills and power lines. The word "APPLICATION" is overlaid in large white letters.

APPLICATION

≡ DIGITAL MODELING, TRAJECTORY PLANNING, REAL-TIME OPERATING CONDITION ANALYSIS

Point Cloud Data Acquisition

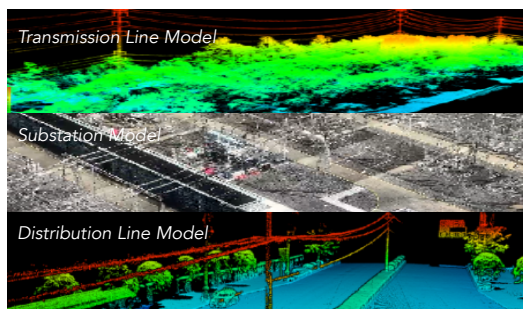


S400E

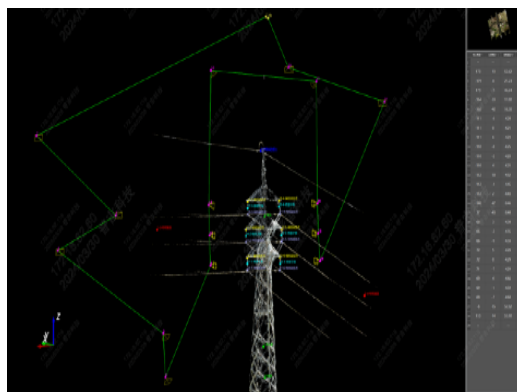


LiDar

Point Cloud Reconstruction



Flight Route Planning

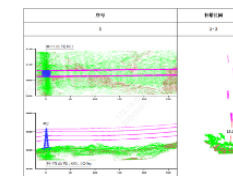
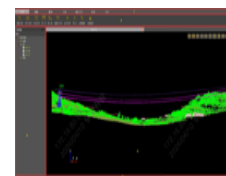


Trajectory Planning

- **Route File:** Standard formats KML, KMV, etc., support import and export

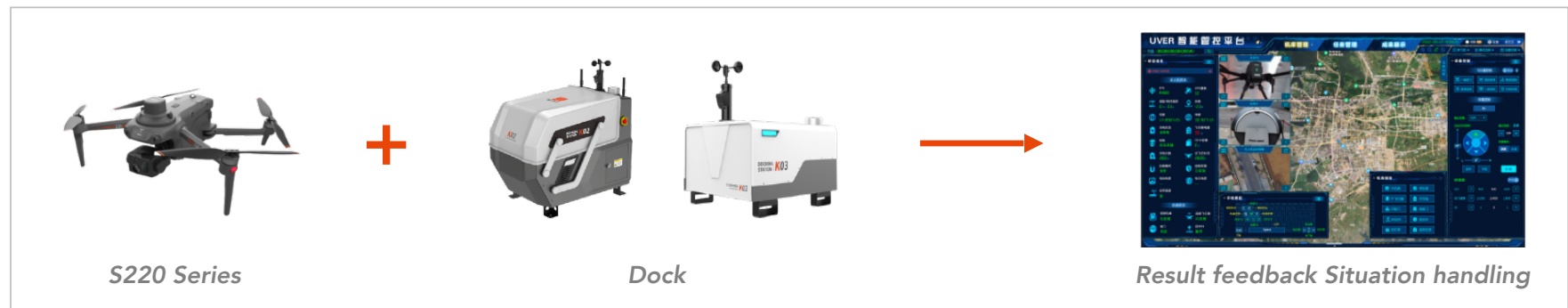
Real-time Condition Analysis

Using point cloud models to analyze real-time hazardous points such as tree obstructions and crossings along the route, visually displaying the spatial relationship between power lines, towers, and corridor features in a three-dimensional manner.



No.	Tower Section	Pole Spacing (m)	Distance to Smaller Tower (m)	Coordinate Point	Hazard Attribute	Horizontal Distance (m)	Vertical Distance (m)	Clearance Distance (m)	Distance to Ground
1	2-3	374.30	339.39	103.57144 410°E 30.642570 38°N	Ground	2.17	13.11	13.29	0.00

≡ INTELLIGENT INSPECTION OF POWER TRANSMISSION AND DISTRIBUTION LINES



≡ SUBSTATION 3D INSPECTION

Substation 3D Inspection

HD Video + Robot Inspection

Responsible for low-level and mid-level inspection points, upward camera inspection points

Indicator light and meter identification

Inspection of low-level points such as leads



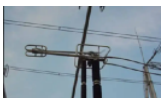
Circuit breaker indicator light



Energy storage indicator light



Oil level gauge



Lead joints



Pressure plate



Breathing apparatus



Switch on/off indicator



Signboard

Light-weight UAV Inspection

Responsible for the internal mid-level equipment positions in the substation

Unified Low Altitude Standard Specification System



Main Transformer



Coupling capacitor



Series compensation device



Parallel capacitor



Substation Transformer



Wall bushing



Dry-type reactor



Lightning arrester



Current transformer



Isolating switch



Combined electrical device



Circuit breaker



Voltage transformer



Neutral point grounding device



High-voltage fuse



Rheological oil level inspection

Small size UAV Inspection

Responsible for security at high-level locations and surrounding periphery

High-level equipment
Surrounding periphery



Insulators



Busbars



Power cables



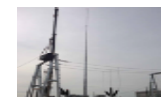
Security patrols



Portal Frame Structure Support



High-frequency wave blockers

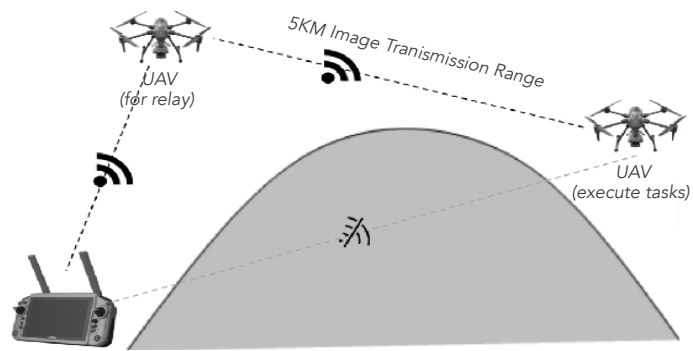


Lightning rods



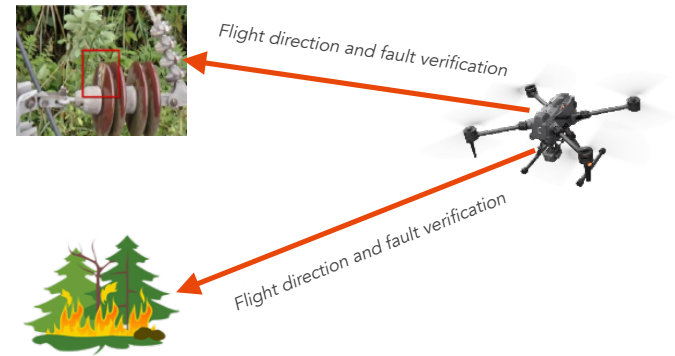
Civil engineering facilities

≡ EMERGENCY RESPONSE



① Relay network communication

② Emergency precision inspection

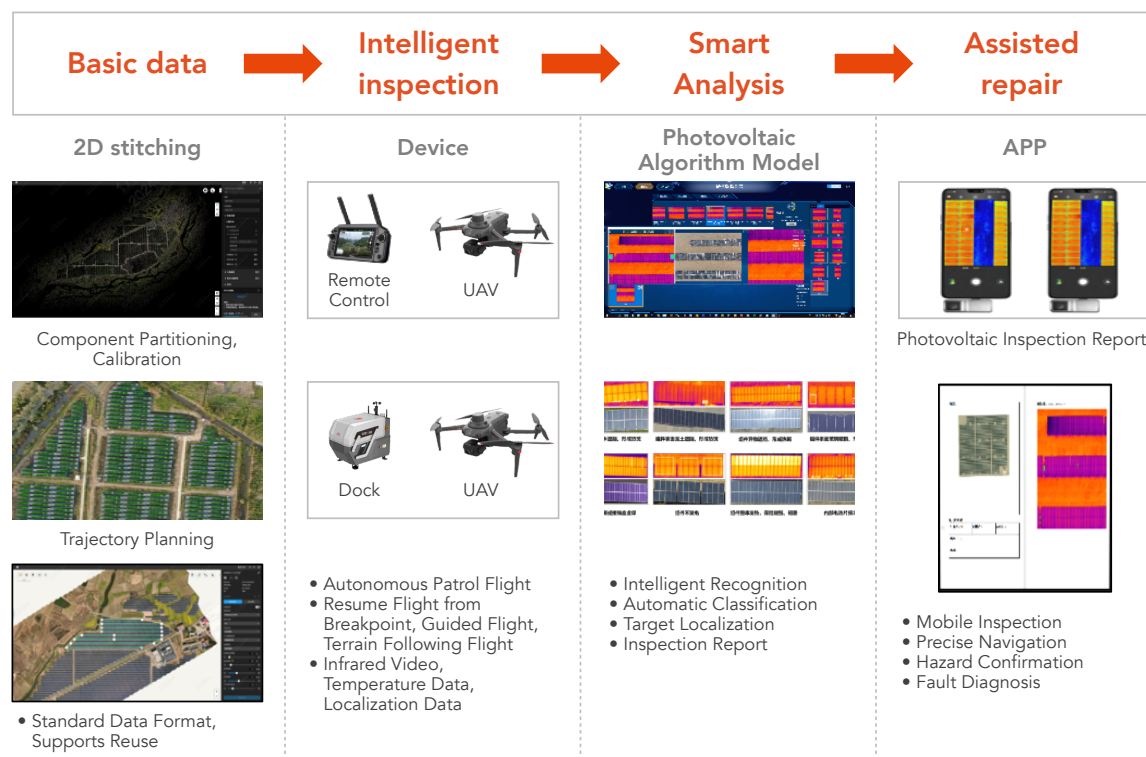


④ On-site auxiliary rescue

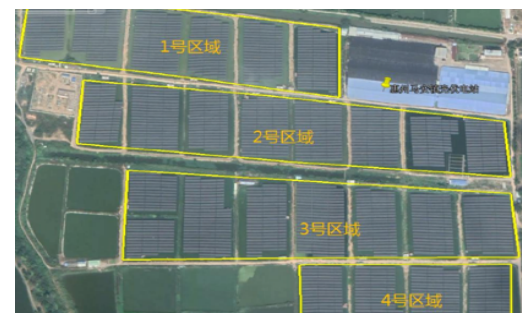
③ On-site loudspeaker guidance



≡ PHOTOVOLTAIC INSPECTION

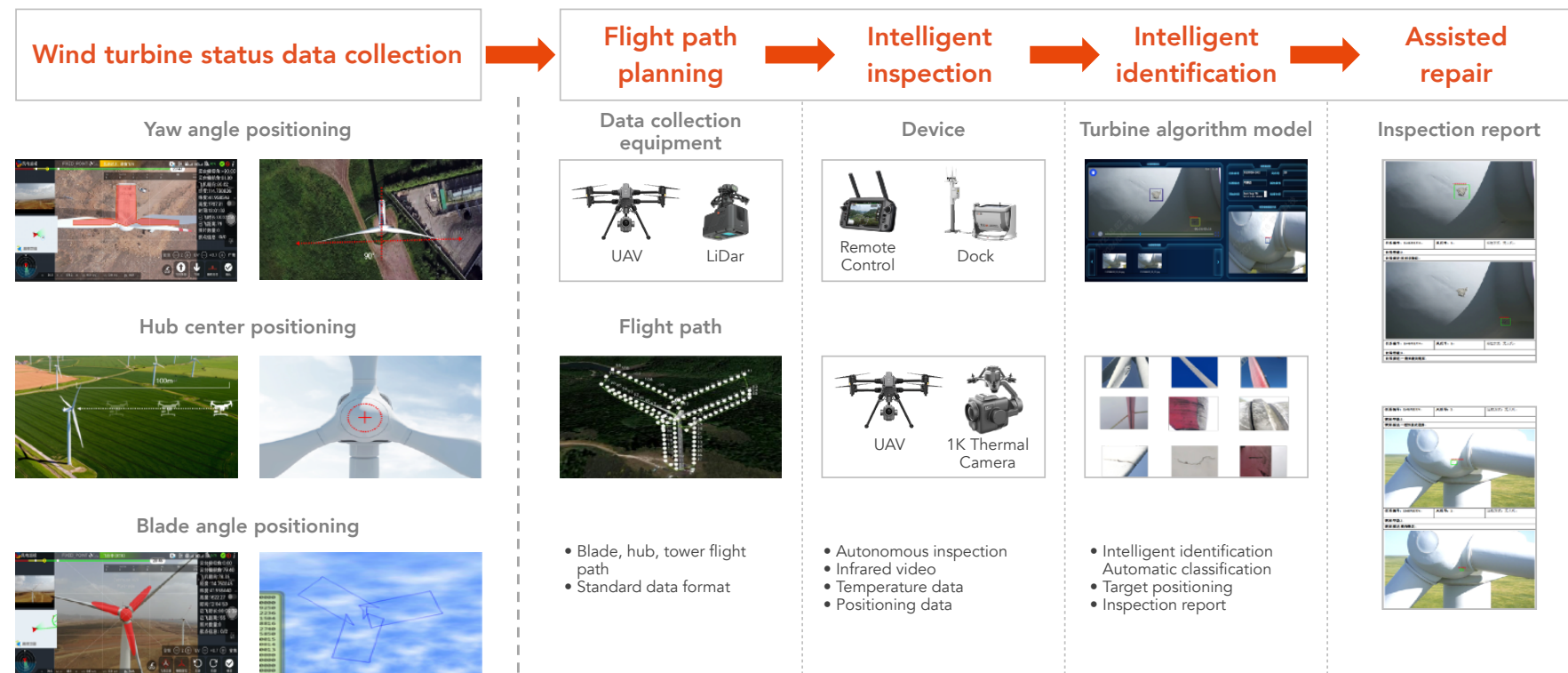


Distributed Photovoltaic Inspection



Centralized Photovoltaic Inspection

≡ WIND POWER INSPECTION



PRODUCTS



≡

FLAGSHIP

S400E



S400E is a brand-new light industrial-grade flagship UAV. It integrates a number of cutting-edge technologies of UAV systems, and has made major breakthroughs in stability, autonomy, and intelligence. With the industry-leading UAV cross-line-of-sight networking technology, it can easily realize the intelligent interconnection of multiple UAVs and control equipment, and double the operation efficiency.

- ◆ Multi-machine Relay Networking

◆ Millimeter Wave Radar Barrier Avoidance

◆ 49mins Max Flight Time

◆ 1K HD Infrared Camera

◆ 3KG Loading

◆ Portable&Compact

Index	Content
Unfolded dimensions	549 × 592 × 424mm(exlcude paddle)
Folded dimensions	347 × 367 × 424mm(including tripod&paddle)
Max take-off weight	7kg
Max loading	3kg(Max loading, Max safe flight speed 15m/s)
Max horizontal flight speed	23m/s (sport mode, horizontal /no wind)
Max take-off altitude	5000m
Max wind-resistance level	12m/s
Max flight time	49mins(no wind/light wind, hovering test battery runs from full capacity to out of capacity)
IP level	IP45
Video transmission range	15km(Flying at an altitude of 200 meters without any interference)
Omnidirectional barrier avoidance	Obstacle perception range(Buildings, trees, utility poles, towers over 10m) Front:0.7m~40m (80m max detectable distance for large metal objects) Left&right:0.6m~30m (40m max Omnidirectional barrier avoidance detectable distance for large metal objects) Up&down&back:0.6m~25m
AI function	Target inspection, follow, recognition
Flight safety	ADS-B function, Can sense surrounding civil aviation aircraft information for evasion

≡ FLAGSHIP



GDU has launched the K01 dock, which integrates features such as unattended operation, automatic takeoff and landing, automatic charging, autonomous flying, and intelligent data recognition. It boasts an integrated design with the S400E professional-grade drone. The roll-up hatch is resistant to wind, snow, and freezing rain, and it is not afraid of debris accumulation—these are two major highlights. When paired with the S400E drone and a series of payloads, as well as the UVER intelligent management platform and low-altitude shared drone platform, it revolutionizes traditional piloting operations and strongly empowers new infrastructure in low-altitude airspace, ushering in a new era of "unattended operation" for various industries.

- ◆ Integrated Design with S400E
- ◆ Rolling cover, worry-free wind, snow and freezing rain&falling objects

Index	Content
Dimensions(cover closed)	Dock: 1460 × 1460 × 1670mm; Weather station: 550 × 766 × 2300mm
Weight	≤255kg
Network Access	Ethernet access(10/100/1000Mbps adaptive Ethernet interface)
Compatible UAV	S400E
Charging mode	Auto charging
Landing positioning	RTK, vision redundancy
Video transmission&control distance	8km
Operating Temperature	-35°C-50°C
Operating Humidity	≤95%
Max Operating Altitude	5000m
Ingress Protection Rating	IP54
Function	UPS uninterruptible power supply, night landing
Power consumption	1700W(max)
Weather monitoring	Wind speed, rainfall, temperature, humidity, air pressure
Back-end control mechanism	WEB
SDK development	Yes

≡ FLAGSHIP

S200

Dual-sensor camera



Index	Content
Dimensions	175×272×130mm (folded) 613×699×133mm (unfolded)
Diagonal Distance	486mm
Weight	1750g
Max take-off weight	2050g
Max flight time	45min
Max ascent speed	8m/s
Max descent speed	6m/s
Max wind speed	12m/s
Max take-off altitude	6000m
Communication distance	15km (FCC), 8km (CE/SRRC/MIC)
Wide-angle visible light lens	1/1.49inch CMOS, Effective pixel: 50MP
Telephoto visible light lens	1/2inch CMOS, Effective pixel: 48MP Optical zoom: 10X, Max hybrid zoom: 160X
IP Level	IP43
Hovering accuracy (RTK)	Vertical: 1.5cm+1ppm, Horizontal: 1cm+1ppm

S220

Trio-sensor camera



Index	Content
Dimensions	175×272×130mm (folded) 613×699×133mm (unfolded)
Diagonal Distance	486mm
Weight	1750g
Max take-off weight	2050g
Max flight time	45min
Max ascent speed	8m/s
Max descent speed	6m/s
Max wind speed	12m/s
Max take-off altitude	6000m
Communication distance	15km (FCC), 8km (CE/SRRC/MIC)
Wide-angle visible light lens	1/1.49inch CMOS, Effective pixel: 50MP
Telephoto visible light lens	1/2inch CMOS, Effective pixel: 48MP Optical zoom: 10X, Max hybrid zoom: 160X
Thermal lens	640×512@30fps
IP Level	IP43
Hovering accuracy (RTK)	Vertical: 1.5cm+1ppm, Horizontal: 1cm+1ppm

S220 PRO

1K thermal quad-sensor camera



Index	Content
Dimensions	175×272×130mm (folded) 613×699×133mm (unfolded)
Diagonal Distance	486mm
Weight	1860g
Max take-off weight	2050g
Max flight time	41min
Max ascent speed	8m/s
Max descent speed	6m/s
Max wind speed	12m/s
Max take-off altitude	6000m
Communication distance	15km (FCC), 8km (CE/SRRC/MIC)
Wide-angle visible light lens	1/0.98inch CMOS, Effective pixel: 50MP
Telephoto visible light lens	1/2inch CMOS, Effective pixel: 48MP Optical zoom: 10X, Max hybrid zoom: 160X
Thermal lens	1280×1024@30fps
Laser ranging	10-1500m
IP Level	IP43
Hovering accuracy (RTK)	Vertical: 1.5cm+1ppm, Horizontal: 1cm+1ppm

FLAGSHIP

K02



It is a high-performance autonomous power change docking station, suitable for S200 series UAVs; Lightweight, easy to deploy, can be equipped with 4 batteries, with uninterrupted continuous operation capability; Support night precision landing, day and night travel, suitable for smart city, energy inspection, emergency fire protection, ecological environmental protection and other scenarios.

- ◆ Four Built-in Batteries Replacement, Continuous Operation
- ◆ Day and Night Operation, 1K Infrared Sensor
- ◆ 1m³ Deployment, Calculating While In-flight
- ◆ 45mins Battery Life of Single Flight

Index	Content
Dimensions	Dock Cover Closed: ≤1030mm×710mm×860mm Dock Cover Opened: ≤1600mm×710mm×860mm (not include the height of the hyetometer, meteorological station, antenna)
Weight	≤115kg
Wind-resistance level	Inspection: 12m/s Precise landing: 8m/s
Power	100 ~ 240VAC, 50/60HZ
Power consumption	Max ≤1500W
Emergency battery	≥5H
Charging time	≤2min
Work Interval	≤3min
Max battery allowed	4 (3 battery packs included as standard)
Battery cabin charging	Yes
Leapfrog inspection	Yes
Data transmission speed(UAV to Dock)	≤200Mbps
RTK base station	Yes
Max inspection range	8000m
Edge computing module	Optional
Mesh module	Optional
Max operating altitude	5000m

≡ FLAGSHIP

K03



K03 weighs only 50kg, covers an area of less than 0.36m², depth standby power consumption is less than 10W; Small size, light weight, low power consumption, with solar power supply, can realize the power tower operation; MESH modules can be connected. In an environment without a public network, the MESH module can be used to connect to the nearest accessible network node.

- ◆ Lightweight&Easy to Deploy
- ◆ Lightweight for Tower (iron tower, pole tower, lighthouse)
- ◆ 0.36m² - the size of a carry-on suitcase
- ◆ 45mins Flight Time Per Trip

Index	Content
Dimensions	Dock Cover Closed:650×555×370mm, Dock Cover Opened:1380×555×370mm (not include the height of the meteorological station, tripod)
Weight	≤50kg
Wind-resistance level	Inspection:12m/s Precise landing:8m/s
Power	100 ~ 240VAC, 50/60HZ
Power consumption	Max ≤1000W
Emergency battery	≥5H
Charging time	≤35min (10%-90%)
Night precise landing	Yes
Leapfrog inspection	Yes
Data transmission speed(UAV to Dock)	≤200Mbps
RTK base station	Yes
Max inspection range	8000m
Edge computing module	Optional
Operating temperature range	-20°C-50°C
Max operating altitude	5000m
Relative humidity of the external environment	≤95%
Temperature control	TEC AC

≡ PAYLOADS

PQL02



Perfectly combines a wide-angle visible light camera, a zoom visible light camera, an infrared thermal imaging camera, and a long-range high-precision laser rangefinder.

Weight: $\leq 380g$

Measurement range: **10-1500m**

Infrared resolution: **640×512**

Wide-angle equivalent focal length: **24 mm**

Zoom: **10x optical zoom; 160x maximum hybrid zoom**

PDL-1K



Equipped with a brand new self-developed infrared detector, the 1K high resolution is four times that of the conventional infrared resolution in the industry.

Weight: **1200g \pm 5g**

Infrared resolution: **1280 \times 1024**

Infrared focal length: **14mm**

Visible light resolution: **8000 \times 6000**

Video resolution: **4K (3840 \times 2160) @ 30fps**

Visible light focal length: **12.8mm**

PDL-300



Supports dual light channels, allowing for clear observation both day and night, meeting the high standards of image quality for industrial applications and the demand for lightweight dual-light functionality.

Weight: **420 \pm 5g**

Infrared resolution: **640×512**

Infrared lens focal length: **13mm**

Visible light resolution: **8000×6000**

Visible light lens focal length: **12.8mm**

PVL-8K



A brand new attitude fusion control algorithm and a high-precision three-axis stabilization gimbal can capture clear and stable images even during high-speed flight and intense movement.

Weight: **290g \pm 5g**

Focal length: **12.8mm**

Sensor size: **1 inch**

Photo resolution: **8000 \times 6000**

Video resolution: **4K (3840 \times 2160) @ 30fps**

≡ PAYLOADS

PLI01 LiDar



Integrates a lightweight and compact LiDAR system, inertial navigation system, control system, and high-resolution surveying camera.

Weight: **1085±5g**
 Measurement range: **190m@10% reflectivity, 450m@80% reflectivity**
 Distance accuracy: **3cm @ 100m**
 Positioning accuracy: **Horizontal 0.02m, Elevation 0.03m**
 Point cloud data rate: **720,000 points/second**

PMP02 (S200 Series Compatible)



PMP02 megaphone, maximum sound volume of 114dB at a distance of one meter for TTS text broadcasting, effective broadcasting range exceeds 300 meters, supports real-time announcements.

Weight: **120±5g**
 Dimensions: **72 × 60 × 115mm**
 Power: **10W**
 Announcement methods: **real-time announcement, recorded announcement, audio playback**
 Audio formats: **mp3/wav/m4a/flac/aac**

PFL01 Searchlight



It is specially designed for drone operation at night. It is composed of optical imaging components with 4 sets of 4 lenses. It weighs only 750g and is smart and easy to use.

Dimensions: **126mm×131mm×167mm**
 FOV: **15 °**
 LED power: **120W**
 Luminous flux: **13400lm±3% (power: 120W)**
 Functional mode: **Normally on: 120 w; Blasting flash: 120w Gimbal angle adjustment/auto follow/ brightness adjustment**

PDR01 Thrower



Total weight: **320 ±5g**
 Dimensions: **Maximum height 97mm (including adapter ring cover), maximum diameter 78mm**
 Power: **10w**
 Number of payloads: **≤4**
 Load weight: **Total load weight/kg: ≤40; Single hook load weight/kg: ≤10 (subject to the actual load of the drone)**
 Operating temperature: **-20°C~50°C**

≡ SOFTWARE

UVER Intelligent Management and Control Platform

It uses the network as a medium to achieve remote interconnection between the command center and the airport and drones at the operation site. The command center can issue operational tasks to the airport and drones at the operation site anytime and anywhere. The airport and drones at the operation site can transmit real-time images from the scene, and after the tasks are completed, the results are automatically uploaded.



USER CASES

DOCKING
STATION K01

≡ USER CASES

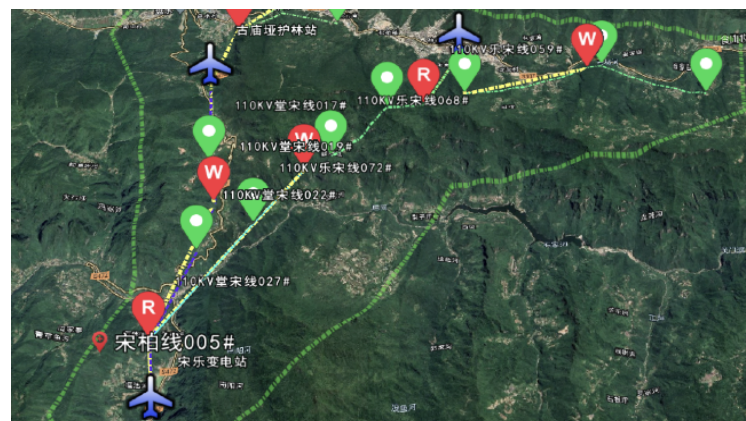
Autonomous UAV Inspection System for Power Grid in Forest Areas

Project Background

This project aims to enhance the digital operation and maintenance capabilities of electrical equipment in forest areas through ground communication, communication relay devices, and the collaborative construction of multiple drones for joint inspections. It enables autonomous drone inspections, effectively improving the service and management capabilities of the power grid in forest regions. Equipment: S400E professional-grade quadcopter + K01 drone automatic dock+ S200 professional-grade quadcopter + K02 drone automatic dock.

Application Effects

Unmanned operations replace manual inspections, reducing personal safety risks; it allows for regular high-frequency inspections over a large area, significantly increasing inspection efficiency; the self-organizing network device data channel enhances the effectiveness of online monitoring applications; it improves the level of intelligent and autonomous operation and maintenance, contributing to the establishment of a demonstration project for autonomous drone grid inspections in signal-deprived areas.



≡ USER CASES

Case Study of the Substation Drone Autonomous Inspection System Integrated with PMS 3.0

Service Content

In September 2022, a 500kV substation successfully established a collaborative task dispatch mechanism between PMS 3.0 and the station's inspection system for the first time, creating an integrated multi-dimensional inspection system that combines drones, high-definition video, and inspection robots.

Application Effect

The autonomous inspection by drones effectively assists in completing inspections, identifying high-altitude defects such as bird nests and rust, thereby improving on-site operational efficiency.



≡ USER CASES

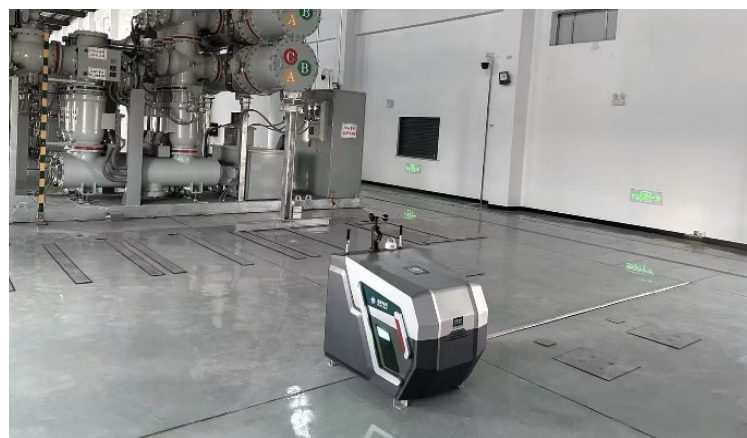
Jiangsu Province First Indoor Drone Autonomous Inspection System for Substations

Service Content

In September 2023, a 220 kV substation independently completed the province's first autonomous drone inspection of the entire station. The process from takeoff, equipment inspection to returning to the dock was conducted without any "pilot operation." Equipment: S200 professional-grade quadcopter + K02 auto dock.

Application Effect

Operation and maintenance personnel only need to remotely "start with one click," and the drone can automatically take off, following the pre-set inspection flight path to complete the inspection task. Utilizing technologies such as edge computing and machine vision, it conducts multi-dimensional intelligent analysis and early warnings on the operational status of the station's equipment. The results are displayed in real-time on a centralized remote intelligent inspection monitoring system, generating detailed inspection reports for operation and maintenance personnel to analyze and address.



≡ USER CASES

Automated Inspection of Ultra-High Voltage Lines in Unnetworked Mountainous Areas

Service Content

In 2022, the Hubei Electric Grid Ultra-High Voltage Company deployed the K01 auto dock, S400E professional-grade quadcopter, dual-sensor gimbal camera, tower communication relay device, and UVER intelligent management platform, covering four 500kV lines with a total of 46 towers. Through meticulously planned inspections and infrared inspection flight paths, unmanned inspections of ultra-high voltage lines in unnetworked mountainous areas were conducted.

Application Effect

Inspection efficiency increased several times, facilitating a significant leap in the transition of grid inspections from "manual machine inspections" to "autonomous machine inspections".



≡ USER CASES

State Grid Xiangyang Power Supply Company Distribution Network Project

Project Background

From May to August 2023, the State Grid Xiangyang Power Supply Company implemented drone inspection technology services for 10kV lines, utilizing multi-rotor drones to enhance the intelligent operation and maintenance level of overhead 10kV lines.

Application Effect

Intelligent flight path planning and one-click autonomous inspections reduce inspection costs and improve inspection efficiency. The combination of human and machine in completing inspection tasks enhances inspection quality and reduces safety risks associated with manual inspections.



≡ PRACTICAL CASES

More and more functional departments and enterprises are incorporating GDU docks and drone products into their daily work.

(Due to client privacy, the names and addresses of clients are not disclosed at this time.)



A person wearing a white hard hat, safety glasses, and a dark jacket is crouching on a gravel path. They are holding a black drone with a camera attached. The background shows some greenery and a clear sky. The image has a dark, semi-transparent overlay.

THANKS!

Any Questions?