E-**NNOVATE 2025 Poland International Innovation Exhibition Online Exhibition**
English Content of Invention Project Display Board - Part 1
CAI No.12-1

Invention： Collaborative Method, Device, Processor, and Electronic Equipment for Operations
(An Intelligent Supervision and Collaboration System for Marketing Operations Based on 5G Visualization)
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Patent No.: 202411706934.7

Project Introduction:
This invention leverages the new features of 5G technology and integrates intelligent wearable devices by installing smart equipment on traditional safety helmets. It innovatively proposes a "Safe Operation + Safety Management" model combining first-person and third-person perspectives, enhancing the safety supervision capabilities of all parties involved in on-site construction operations. By integrating smart wearables, 3D visualization, and AR remote collaboration, it advances key intelligent operation technologies, ensuring visible and controllable on-site operational risks while reducing wiring errors. The system enables full-time online operation collaboration and supervision, as well as on-site safety risk prevention and control.

Power workers use AR glasses connected to the dedicated wireless network to send service requests and access the automation system, obtaining task information.

On-site personnel can perform standardized operations based on the task prompts, workflow settings, and task panels displayed on the AR glasses, freeing their hands for on-site interaction. They can quickly submit execution results and record both the outcomes and the process. In scenarios such as low-voltage meter installation, workers can follow standardized procedures step by step, achieving higher efficiency and greater compliance.

Fig 1: Low-voltage new electricity meter installation operation scenario

I. Enabling Multi-Perspective Visualized Remote Safety Supervision

Building upon onsite surveillance cameras, workers are equipped with wearable cameras. Leveraging 5G's high-bandwidth capacity and concurrent HD video transmission, both onsite safety supervisors and remote personnel can simultaneously receive real-time feeds from both third-person perspectives (surveillance view) and first-person perspectives (worker's view) on their mobile terminals, significantly enhancing supervisory coverage. The system also supports comprehensive video recording and archiving throughout the entire operation.

II. Digital-Physical Convergent Equipment Management: Hands-Free Operation Beyond Screens

By directly loading the Technical Management Specifications, customer archive records, and critical meter installation knowledge bases into AR glasses, field operators can break free from traditional screen constraints. This enables true hands-free interaction during installation processes, ensuring faster and more accurate task completion while allowing back-end supervisors to conduct real-time wiring verification. The innovative model delivers Ultra-HD real-time monitoring and multi-party collaborative communication, with remote AR-guided training as its pivotal technological breakthrough.

(1) . AR Remote Assistance for Emergencies & Technical Exceptions

When encountering unexpected, abnormal, or technically challenging situations, field personnel can instantly establish AR-based remote communication with technical experts or supervisors. Remote specialists can perform real-time spatial annotations directly on the live AR feed, marking critical safety alerts, potential hazards, and operational guidance—all instantly visualized within the field operator's AR display. Multi-User Collaborative Guidance System 。 The system supports simultaneous audio-video connections among multiple participants. Multi-Stakeholder Remote Consultatio.

(2) . Advanced AV Communication & Intelligent Stream Processing
Utilizing terminal AV capture and ACC Codec technology, the system achieves ultra-low-latency (<200ms) audiovisual communication. The cloud server employs stream mixing technology to integrate and archive all participants' AV streams, creating comprehensive troubleshooting records for post-analysis and accountability tracking. Concurrently,
- Performance evaluation indicators for personnel assessment

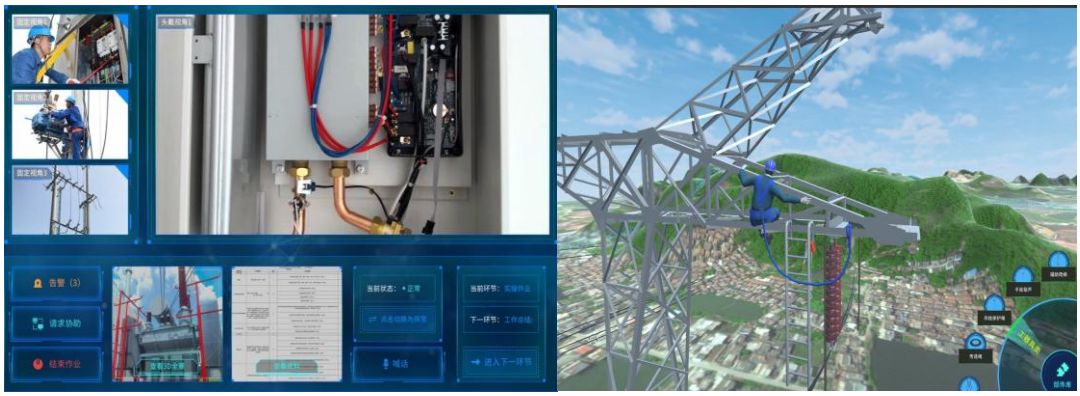

Fig2: Operational Flow of Visual Real-time Supervision
Fig 3: 3D Stereogram

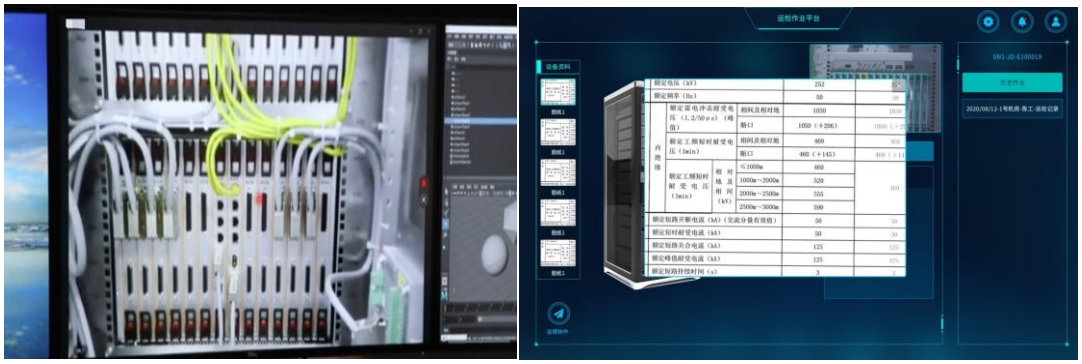

Fig 4: First-person Perspective Real-time Supervision
Fig 5: Synchronous Retrieval of Reference Documents

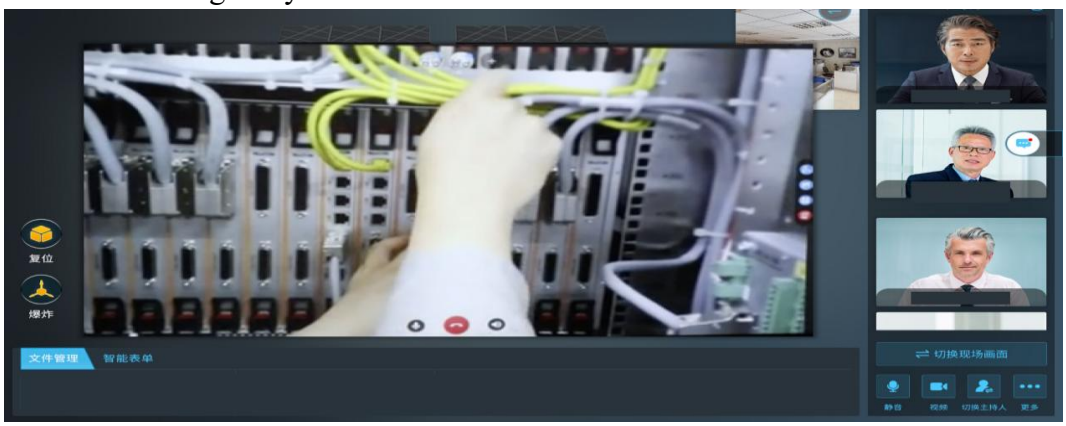

Fig 6: Multi-person Remote Collaboration – Expert Guidance

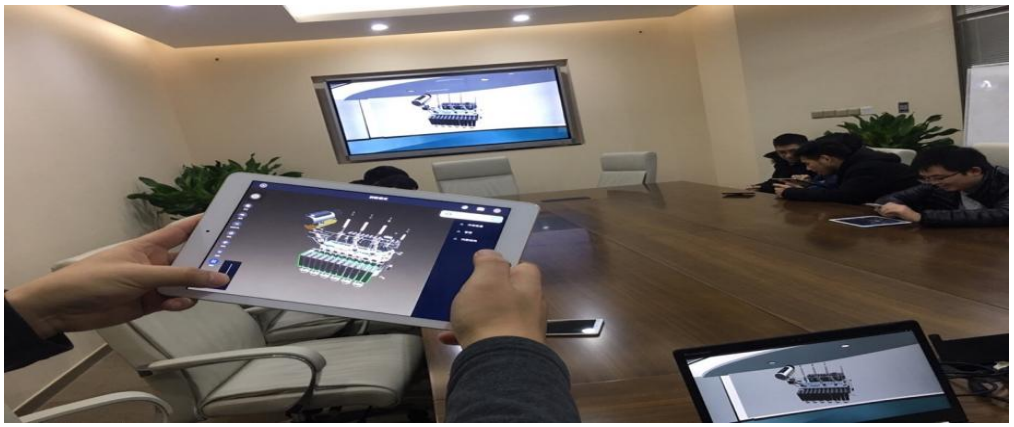

Fig 7: Multi-person Remote Collaboration – Meeting Creation

IV. Economic Benefits & Social Impact

(1). **Operational Efficiency Gains**

After one year of pilot testing and operational deployment, system data shows:

- 28.5% reduction in wiring errors (YOY)
- ≈¥300K cost savings (calculated via reduced labor costs)
- 23.5% increase in operational revenue (YOY)

(2). **Enhanced Social Recognition**

- Fault resolution efficiency improved from 56.7% (2023) to 81.2% (2024)
- Accelerated outage restoration boosted customer satisfaction
- Government satisfaction scores: 82/100 (2023) → 85/100 (2024)

(Consistently high ratings for two consecutive years)

V. Future Development Prospects

(1) . Advanced Data Management

- Ensures real-time data integrity with timestamped records
- Enables multi-dimensional retrieval (time/personnel/location)

Provides:

- Role-based access control
- Application management
- Structured video data storage / analytics
- Builds structured video databases for grid operators

(2) . Industry-Wide Scalability

- Replicable across power utilities
- Adaptable to diverse operational scenarios

(3) . Intelligent Safety Prevention

- 360° situational awareness at job sites
- AI-powered risk assessment reduces accidents
- Enables preventive safety interventions

VI. Awards & Recognitions

This innovation has been honored with:

- **Third Prize,** 2025 National Power Industry High-Value Patent Practical Skills Competition
- **Silver Award,** 2023 National Outstanding Sci-Tech Innovation Achievements
- **Third Prize,** 2023 Zhaoqing Inaugural Innovation Methodology Contest

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Zhaoqing Power Supply Bureau, Guangdong Power Grid Co., Ltd.

Established in 2002, China Southern Power Grid is the parent company of Guangdong Power Grid Co., Ltd., with Zhaoqing Power Supply Bureau operating as its directly affiliated branch.

The Marketing Department of Zhaoqing Power Supply Bureau specializes in:

- Electricity metering research
- Equipment operation & maintenance
- Business expansion & installation services
- Demand forecasting technologies

Beyond these core functions, we:

- Resolve practical challenges in metering equipment maintenance
- Conduct in-depth research on intelligent information technologies
- Pioneer innovations in power information collection systems and applications

In recent years, adhering to our "1+2" development strategy, we have:

✓ Enhanced service quality in the Greater Bay Area
✓ Optimized business environments
✓ Supported Zhaoqing's integration into regional development initiatives

Guided by our principle of "Delivering Tangible Benefits for the Public," and with strong leadership support, we have achieved remarkable outcomes through continuous process optimization:

Developed Software Solutions:

- Remote collaboration installation software
- Automated customer service ticket dispatch system

- Intelligent power supply contract generation platform

Created Innovative Hardware:

- Flip-top protective face shields
- Power marketing promotional devices
- Alert-enabled anti-electrocution workwear
- Foldable low-voltage insulated stools
- Portable cable winding reels
- High-efficiency 10kV overhead line deployment systems

Fig 1: Remote Collaborative Application Software

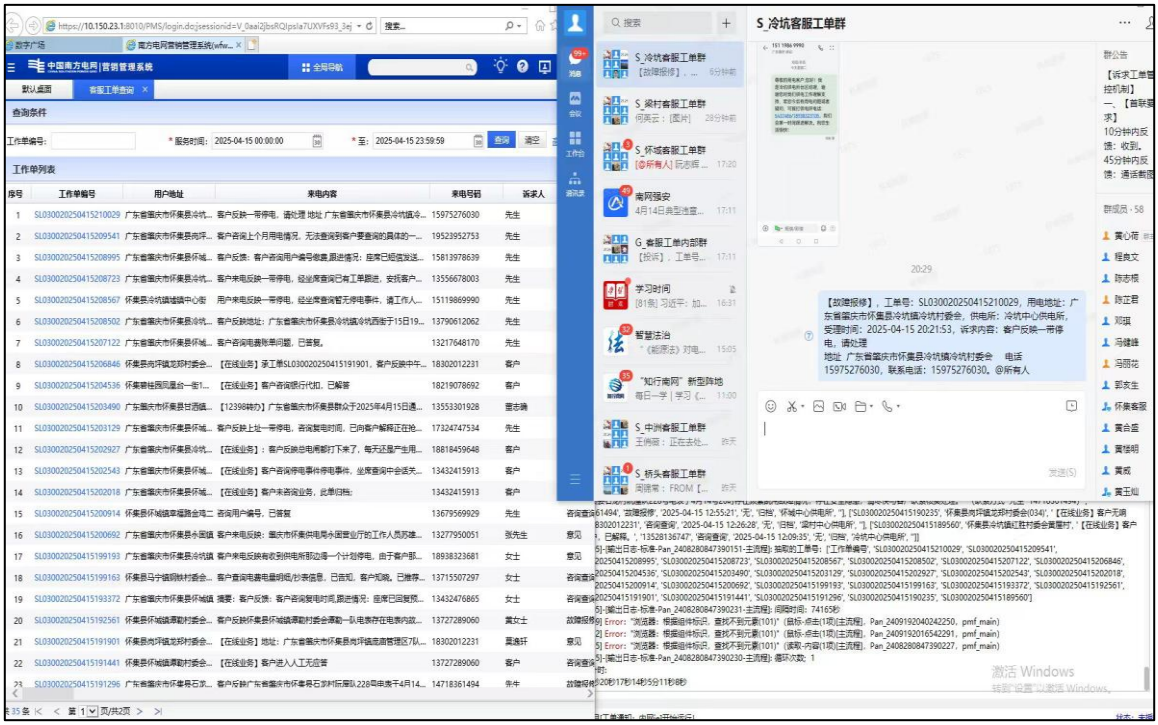

Fig 2: Software for Automatic Distribution of Customer Service Work Orders

Fig 3: Flip-Type Protective Mask

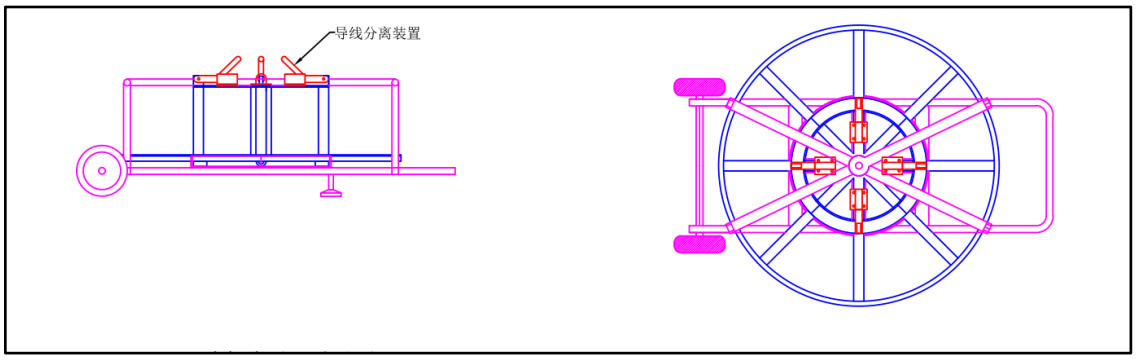

Fig 4: A Portable Cable Reel

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