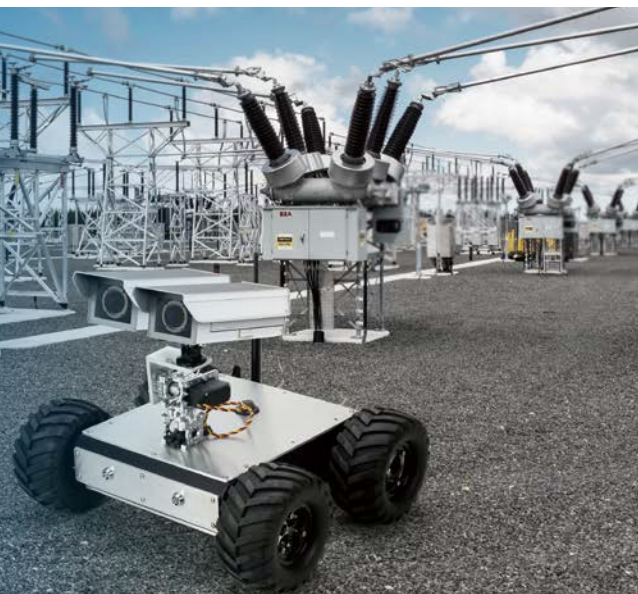


## // CASE STUDY

# Autonomous Power Grid Inspection Robot



## At a Glance

**Industry** Robotics**Location** China

### Solutions

**Hardware****Inference**

AIR-030 with NVIDIA Jetson AGX Orin

**Software**

OS Ubuntu 20.04

SDK JetPack 5.0 and above



Our customer stands as a prominent company in China, spearheading the development and implementation of intelligent inspection solutions for electrical equipment. Committed to aiding power plants and electrical substations, their mission is to address challenges such as diminishing manual inspection requirements, lowering maintenance costs, and mitigating the risk of safety incidents through AI technology and video analysis. By integrating cutting-edge technologies like drones, cameras, and autonomous robots, they have effectively and extensively incorporated AI solutions into diverse facets of power equipment operations such as transmission line maintenance, defect inspection, security monitoring, and distribution maintenance.

### Challenge

Inspection robots play a crucial role in processing a vast number of images and translating diverse sets of values from electricity meters into real-time digital data for subsequent analysis or warnings. Consequently, the computing hardware dedicated to this task demands a high level of AI computing power. Moreover, the power plant's remote location poses challenges for repairing or maintaining damaged robots, adding an extra layer of complexity to the operational demands. As a result, a consistent supply and long-term support are very important. Lastly, developing different software and SDKs around Ubuntu and deploying them to hardware is challenging. Consequently, customers require high levels of technical support for both software and hardware integration.

## Architecture Diagram

# AI Outdoor Inspection Robot

AIR-030



## Solutions

Advantech's AIR-030, serving as the brain of the inspection robot along with software support, perfectly meets the challenges faced by the customer. The powerful edge AI system adopts AGX Orin 32G, providing remarkable AI computing performance capability of up to 200 TOPS. Additionally, the throughput exceeds 340 FPS based on the YoloX-s\_FP16 model. With these features, AIR-030 can perform image collection and analysis synchronously within a short period, significantly improving the accuracy of defect recognition to over 85%. This ensures the inspection robot can read and recognize various values from numerous high-resolution images, enabling the monitoring of different equipment such as voltage transformers, power switches, circuit breakers, cooling systems, etc.

The AIR-030 offers abundant I/O ports for diverse device connectivity and supports versatile industrial protocol communication. For instance, the UART or USB interface can connect with 3D Lidar and radar sensors, allowing smart inspection robots to detect obstacles while moving independently or being controlled remotely in specific plant areas. Through the USB ports, AIR-030 supports infrared cameras and sensor units for conducting abnormal detection of temperature and noise levels in power facilities around electrical substations.

The AIR-030 also supports high-resolution camera input via the Ethernet port to collect images from electricity meters, converting them into digital data. It then transmits the analysis data wirelessly to the backend control center or cloud server, enabling timely judgment of operational risks and early warning of faults in electricity equipment.

This enhances the digitization and automation of inspection work, ensuring the safe and reliable operation of equipment, elevating the level of intelligent safety management, and improving the controllability of the inspection process. Furthermore, AIR-030 features a rugged design and is certified with IEC 61000-6-4 for heavy industry, ensuring the system can operate stably and withstand demanding industrial environments. In addition to this, Advantech has established local dedicated technical teams to provide rapid feedback and solutions for any issues.

AIR-030 comes with the Linux Ubuntu 20.04 OS environment and supports NVIDIA JetPack 5.0 and above, as well as the Isaac SDK, reducing the time and cost of production AI development. Additionally, it supports SUSI and ROS-Compatible Add-Ons & SDK. SUSI is a hardware controller API that supports industry protocols. General robotic SDKs such as RVIZ and MoveIt are also pre-integrated to expedite application development and porting. Customers can benefit from basic Advantech and Canonical services, including security and maintenance updates, along with 5 years of standard technical, long-term support.

## Benefits

- Remarkable AI computing power for real-time video analysis
- Rich I/O connections and ruggedized design
- Local dedicated technical support

## Results

Improved the accuracy rate of defect recognition to

85%

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