

AI ABNORMAL NOISE AND VIBRATION DETECTION SYSTEM

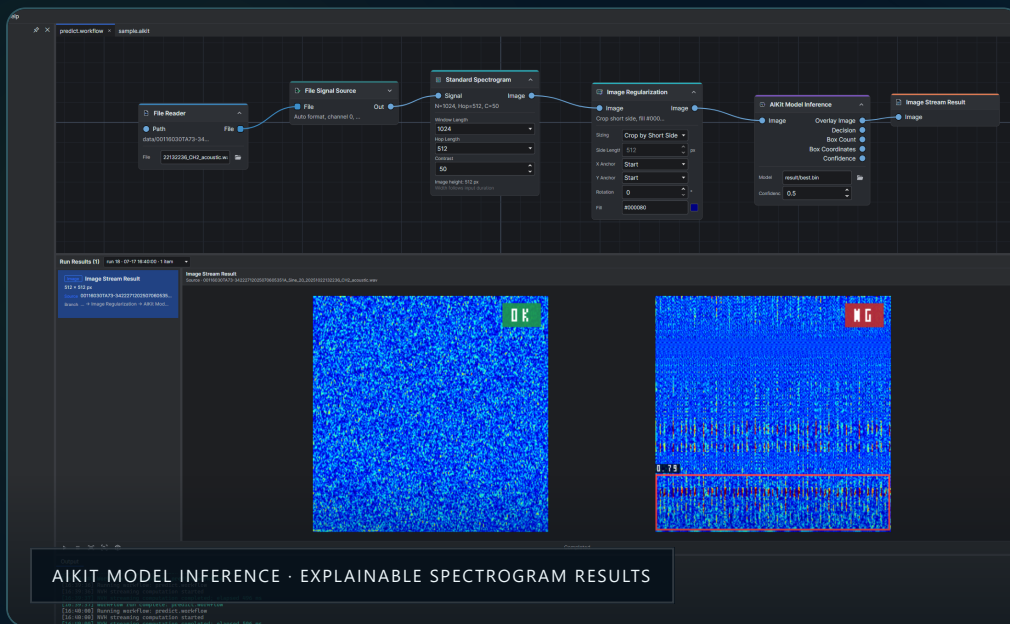
The system acquires audio and vibration signals through microphones or accelerometers. One-dimensional signals are converted into two-dimensional time-frequency spectrograms and visualized as pseudo-color images. An AI-based object detection model identifies and highlights abnormal regions, providing the corresponding time and frequency ranges, anomaly type, and confidence score for automated quality inspection with explainable results.

>99%

DEFECTIVE-PART DETECTION RATE

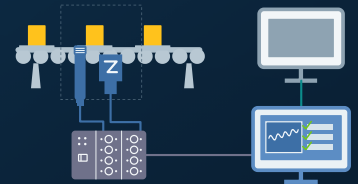
>95%

GOOD-PART ACCEPTANCE RATE



NI DATA ACQUISITION

Microphones · accelerometers · production-line integration



SYSTEM ARCHITECTURE

SPECIFICATION

Signal inputs	Audio signals acquired by microphones and vibration signals acquired by accelerometers
Signal conversion	One-dimensional audio and vibration signals converted into two-dimensional spectrograms
AI algorithms	Anomaly detection, classification, and region localization
Performance	>95% good-part acceptance rate and >99% defective-part detection rate (for typical stable and mature production lines)
Software	Model training, online inspection, result playback, and reporting

APPLICATIONS

- End-of-line PASS/FAIL inspection
- Abnormal noise and vibration detection
- Anomaly localization in the time and frequency domains
- Product consistency evaluation and quality traceability

DUTS

- Motors and rotating machinery
- HVAC systems, pumps, compressors, and fans
- Electromechanical actuators (e.g., oscillating air-vent louvers)
- Acoustic products (e.g., audio headrests)
- Other noise- and vibration-sensitive products

