

# Shaping the Future of Smart Manufacturing with IIoT System Analytics

**PARTNER**

Panasonic

**INDUSTRY**

Industrial Manufacturing

**OBJECTIVE**

Develop advanced analytics solution for the optimization of factory operations

**SOLUTION**

PARC's MOXI™ IIoT System Analytics suite

**FOCUS AREA**

IIoT and Machine Intelligence

**COMPETENCIES**

System Prognosis and Health Management

Robots and other complex machines are widely used to improve productivity, quality, and safety in manufacturing processes. However, machine degradation can result in quality issues and unforeseen shutdowns can cause interruptions in the production line - resulting in inefficiencies, expensive unplanned downtime, economic and production losses, and even accidents and work injuries. Additionally, electricity can account for as much as 40% of factory costs worldwide. With its Industrial Solutions Company already a major player in factory solutions and industrial automation, Panasonic collaborated with PARC to develop a robust solution for detecting anomalies associated with factory productivity and energy consumption to help its customers maximize operational efficiency.

**OBJECTIVE**

*Develop advanced analytics solution for the optimization for factory operations*

The advent of sensing technologies has allowed for the collection of massive amounts of factory data, which has the potential to optimize factory operations. The automated detection of anomalies and extraction of actionable insights is

critical to helping factories exploit such sensing technologies and factory data to reduce unplanned downtime and improve productivity. However, conventional detection methods can be ineffective due to the lack of labeled training data sets that are not readily available for real-world industrial applications.

**“PARC’s MOXI IIoT System Analytics suite has demonstrated its potential to transform the way our customers harness their data and make smart manufacturing a reality.”**

– Panasonic Industrial Solutions Company

Panasonic was in search of a novel solution to robustly detect and classify anomalies associated with productivity and energy consumption, despite the data labeling constraints. This solution would help its customers monitor, diagnose, and predict the behavior of factory systems in real-time and further enhance operational efficiency.

**WHY PARC?**

***Advancements in self-aware systems for smart manufacturing***

PARC has made significant advances in enabling self-aware, self-adaptive systems for various industrial applications, including manufacturing, with the integration of its MOXI™ technology suite. MOXI allows for continuous and remote monitoring of system state. It also employs low-cost embedded sensors and model-based algorithms to predict adverse system conditions with high accuracy, negligible false alarm rates and near-zero missed detections.

**SOLUTION**

***PARC’s MOXI™ IIoT System Analytics suit***

Unsupervised fault detection in industrial robots: PARC applied a novel analysis framework for fault detection, using Panasonic’s sensor data collected from industrial robots

- Data was automatically filtered to eliminate noise and outlier values
- Faulty data was automatically segmented from healthy data
- Features associated with the fault were reliably extracted from the signal data
- Unsupervised detection algorithm was applied to compensate for lack of labeled data sets

Advanced analytics for the optimization of electricity usage and factory productivity:

PARC explored different methods to automatically analyze factory data sets and provide suggestions for energy efficiency and productivity improvements. PARC evaluated:

- Factory machine productivity
- Energy usage from compressors and air conditioning
- The opportunity for energy reduction and cost optimization across periods of production

**RESULTS**

***Demonstrated energy savings potential and high-accuracy fault detection***

The factory data analysis was validated to reveal fault detection in industrial robots with > 96% accuracy. PARC’s anomaly detection algorithms show the potential to significantly improve productivity and energy consumption, as well as reduce the maintenance cost and unplanned downtime of industrial robots. PARC and Panasonic continue their validation of the fault detection algorithms using other commercial factory data sets.

PARC has proposed further integration of its MOXI technology suite into Panasonic’s existing factory monitoring platform. This would provide factory operators quick and easy access to real-time monitoring, anomaly detection, data exploration, diagnostics, and prognostics – resulting in significant efficiency improvements and cost savings.

Contact PARC to learn more: [engage@parc.com](mailto:engage@parc.com)

**REFERENCES**

[A. Raghavan, F. Cheng, D. Jung, Y. Sasaki, and Y. Tajika, “High-accuracy unsupervised fault detection of industrial robots using current signal analysis,” IEEE International Conference on Prognostics and Health Management \(ICPHM\), 2019.](#)