Executive Summary

Equipment maintenance personnel are tasked with keeping the production line running at peak performance while minimizing operations costs. This is made more difficult by the need for specialized skill sets to support a wide range of factory devices that use different communications protocols, data formats, and device management tools, etc. Greatly simplifying this task, it is possible to seamlessly link factory floor devices and processes using technologies from the Internet of Things (IoT), thus enabling remote equipment monitoring and management from a centralized dashboard.

Providing such a solution, the SUSIAccess* remote management system from Advantech* allows maintenance personnel to perform equipment status and maintenance checks from a web browser at any time, from anywhere, and with any connected device. The factory automation solution uses an Intel® processor-based gateway running an Advantech client-side agent to transparently handle protocol and data conversion, and acts as a conduit between manufacturing equipment and the Advantech server-side software. This solution can interoperate with...
Key Business Objectives

Increase production line performance and reduce operations costs without sacrificing quality.

Business Challenge

Although large manufacturers have been using statistical process control and statistical data analysis to optimize production for years, the extreme complexity of today’s data provides opportunities to deploy new approaches, infrastructure, and tools. The challenge is figuring out how to cost-effectively unify device management, control, and data analytics.

In addition, manufacturers need a real-time device management platform that enables them to address maintenance issues on a timely basis. Today, there are many disparate manufacturing systems with their own management tools, which makes maintenance cumbersome and time consuming.

Solution Benefits

Revolutionizing factory equipment management in the IoT era, the Advantech SUSIAccess remote management system delivers the following advantages:

- **Reduced Total Cost of Ownership (TCO):** Saving time for maintenance personnel, centralized remote monitoring continuously checks factory floor devices and sends alerts to their mobile devices as needed. Power usage may be lowered by automatically powering systems on/off according to a preset schedule.

- **Improved Production Line Performance:** Machine data aggregated by the SUSIAccess server is processed by big data analytics to uncover ways to increase product yields, improve predictive maintenance, and identify manufacturing problems more quickly.

- **Easy Integration:** The solution provides a comprehensive, seamless, device monitoring and control system that includes both hardware and software.

- **Higher Equipment Availability:** If a system fails, the keyboard-video-mouse (KVM) feature enables remote diagnosis and recovery for most software issues, enabling factory devices to be brought on line much faster and at lower cost than sending a technician onsite.

Solutions can be tailored to meet the specific requirements of different factory environments given Advantech’s comprehensive system integration experience. Founded in 1983, Advantech is a leader in providing trusted, innovative hardware and software products, services, and global logistics support.
Solution Overview
Advantech has taken its turnkey solutions for factory automation to a new level by incorporating IoT technologies as the foundation for a cloud-based platform running data analytics, remote management, and a wide range of third-party applications. This is done with a cloud management framework consisting of three layers – web-based Console, Server, and Agent – as illustrated in Figure 1.

1. Agent: SUSIAccess client-side software runs on Advantech IoT gateways or IoT devices (e.g., automation controller, edge computer, and sensors/actuators) on the factory floor.

2. Server: A central control room or a cloud-based service, such as Microsoft Azure and Amazon Web Services, runs SUSIAccess server-side software that is in direct contact with agents.

3. Console: A web-based interface that communicates with Agents via the Server, presenting IoT device status and configuration data.

Solution Capabilities
The Advantech Smart Production Line solution provides a range of powerful features to monitor factory devices and perform remote operations.

1. Centralized Remote Management
The Advantech Console-Server-Agent structure allows administrators to perform device status and maintenance checks – at anytime and from anywhere – via the web browser-based SUSIAccess console. Administrators can easily manage all of their devices by simply using their PCs, smartphones, and tablets. The solution also provides a distributed connectivity structure, which solves the challenges brought on by large-scale or multi-site device management.

2. Hardware and Software Monitoring
SUSIAccess ensures Advantech device stability by actively monitoring temperatures, fan speeds, voltages, hard disk states, and other hardware elements, as shown in Figure 2. Active alerts are sent out if any abnormalities are observed, which can trigger user-defined actions, like stopping or restarting processes. Available out of the box, device-side software uses a SUSIAccess API to send device status data to SUSIAccess.

In addition to the hardware monitoring functions, SUSIAccess also performs software monitoring by continually checking program status. Real-time alerts are sent out if any abnormalities are observed. Active management of both hardware and software can prevent serious damage to devices, thus avoiding costly repairs and effectively reducing the cost of ownership.

3. User Friendly Map-view Interface
Maintenance personnel can more easily locate and manage their devices using the map-view interface on SUSIAccess. In addition to the maps, building diagrams are provided to help pinpoint device locations in offices, factories, or wherever.
4. Data Analytics
The SUSIAccess Server software runs on a variety of cloud computing platforms, including Microsoft Azure and Amazon Web Services. These platforms typically include application support for data analytics, machine learning, video recognition, SCADA, business intelligence, and more.

5. Secure Interfaces
The Server-Agent connection is based on the MQTT communication protocol, which offers secure and stable communications and decreases SUSIAccess integration time. The connection is also protected by OpenSSL.

6. Cost Savings
SUSIAccess Server software is provided free, and SUSIAccess Agent software is preloaded on all Advantech solutions. In addition, SUSIAccess will open the Agent source code and RESTful API document to non-Advantech platforms.

Customers can save up to 30 percent on deployment costs with worry-free compatibility and zero integrated software license fees.

IoT Gateway
Pictured in Figure 3, the UTX-3115 is a member of the Advantech Embedded IoT Gateway series, designed for efficient, stable, and 24/7 operation. Equipped with a dual-core Intel® Atom™ processor E3826, the gateway is built with extremely reliable hardware and is easy to integrate with back-end maintenance and operating systems. The UTX-3115 is based on the Intel® IoT Gateway, which is a proven, application-ready platform with pre-validated, industry-leading software. Integrated and validated components provide maximum flexibility, and fast application development and field deployment. The Intel IoT Gateway is built on open architecture to ensure interoperability between systems, enable wide application development, and simplify services deployment.

Figure 3. UTX-3115 IoT Gateway
The UTX-3115 IoT gateway includes Wind River* Intelligent Device Platform (IDP), which is a complete software development environment used for building IoT applications and devices that communicate with the cloud. It provides building blocks components to secure, manage, and connect IoT gateways to the cloud and is based on Wind River industry-leading operating systems, which are standards-compliant and fully tested.

**SUSIAccess**

SUSIAccess Server software delivers IoT Cloud capabilities that provide real-time hardware and software monitoring and maintenance with key features shown in Figure 4 and described in the following:

- **System Backup and Recovery:** Powered by Acronis* Backup and Recovery technology, this feature performs regular, automated backups with dynamic scheduling, hot backup without interrupting current tasks, and differential backup used to save precious storage space.

- **Remote Monitoring:** Administrators can monitor remote device status, including hard disk temperature, hard drive health, network connection, system/CPU temperature, system/CPU fan speed, and system voltages.

- **System Protection:** McAfee Embedded Control security software maintains the integrity of the Advantech embedded systems by only allowing authorized code to run and only authorized changes to be made. It automatically creates a whitelist of the authorized code on the system. Once the whitelist is created and enabled, the system is locked down to the known good baseline, no program or code outside the authorized set can run, and no unauthorized changes can be made.

- **Remote Keyboard-Video-Mouse (KVM):** Administrators can use their consoles to control and display the graphical user interface (GUI) of an IoT device on the factory floor using Keyboard-Video-Mouse (KVM) redirection. No additional hardware is required. Administrators can control a device as if they were sitting right in front of it. Remote KVM is a feature in Intel® Active Management Technology (Intel® AMT), which also enables administrators to diagnose and repair devices remotely, thereby significantly lowering support costs. For instance, it is possible to remotely remediate and recover systems after an operating system or driver failure.

- **Remote On/Off:** Administrators can switch IoT devices on/off based on a preset schedule.

- **Automatic Alerts by Email/SMS:** SUSIAccess actively sends alerts so administrators can receive real-time notifications of IoT device status through email or smartphone.

**IoT Tenets**

The Advantech SUSIAccess remote management system is designed to provide security and interoperability from edge to control center or cloud in keeping with five key tenets defined by Intel:

- **World-class security** as the foundation
  - The solution implements robust hardware and software-level protection that secures data between IoT-based factory devices and the cloud.

- **Automated discovery and provisioning of edge devices** to ease deployment
  - SUSIAccess discovers and provisions Advantech devices on the factory floor.

- **Data normalization** through protocol abstraction to improve interoperability
  - The Advantech IoT Gateway supports and abstracts a wide range of protocols, including MQTT, TR-069, OMA, OSGi, Wi-Fi, and ZigBee*.

- **Broad analytics infrastructure** from edge to cloud to realize customer value
  - The web-based Console-Server-Agent structure of the Advantech solution enables users to aggregate and move data from factory floor to analytic applications.

- **Infrastructure** to monetize hardware, software, and data management from edge to cloud
  - This cloud-based solution provides the tools needed to realize substantial improvements in manufacturing performance.
Summary

Bringing the power of IoT to factory automation, Advantech’s SUSIAccess solution is able to help manufacturers improve the production line performance and lower operations costs by connecting factory devices to the cloud. The solution is made up of client-side agent software and server-side management software that enables seamless device interconnection and easy-to-use management interface. Using this tool set, customers can save time when resolving device maintenance issues and, most importantly, reduce the total cost of ownership (TCO) of factory equipment.

The solution features a streamlined interface designed to offer a smooth, intuitive experience, making it easier for administrators to get up to speed right away. As a result, equipment maintenance personnel will find it much easier to use big data analytics to improve manufacturing performance and remote device monitoring to reduce support costs. Advantech, working with Intel, is incorporating IoT technology to enable new opportunities on the factory floor.

Resources

Intel® Internet of Things Solutions Alliance

Members of the Intel® Internet of Things Solutions Alliance provide the hardware, software, firmware, tools, and systems integration that developers need to take a leading role in IoT.

Intel® IoT Gateway Development Kits

Intel IoT Gateway development kits enable solution providers to quickly develop, prototype, and deploy intelligent gateways. Available for purchase from several vendors, the kits also maintain interoperability between new intelligent infrastructure and legacy systems, including sensors and data center servers.

For more information about Advantech solutions for Factory automation, visit www.advantech.com.

For more information about Intel® solutions for the IoT, visit www.intel.com/iot.