IoT Gateway Solutions

Pre-integrated HW/SW/Services Packages

- ╱ IoT Solution Framework
- ╱ Gateway Software Packages
- ╱ Pre-integrated Starter Kit
- ╱ Multifunction Gateways
- ╱ Wireless Gateways
- ╱ Energy Saving Gateways
- ╱ IoT Alliance Program
- ╱ Case Studies

ADVANTECH

Enabling an Intelligent Planet

Advantech IoT Gateway Solutions

2016 is going to be a boom year for the IoT industry. Most company executives and managers are targeting the IoT as part of their key strategies for future business growth. This could be for new market development, or it could be for improving production efficiency. Whatever the purpose, one challenge is how to start their IoT ventures. Advantech IoT Gateway Solution is ideal for jumpstarting their IoT. It not only transports data but also analyzes it as well, accelerating decision making and resulting in increased efficiency. This helps customers acquire the intelligence to drive new design innovations, making business transformation a profitable action rather than a challenge.

Key Value to Enable IoT Applications
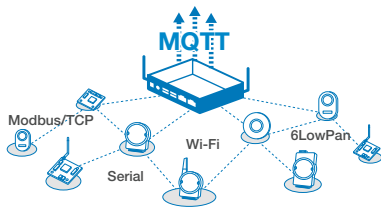
Unified IoT Protocols
Provides comprehensive software solution building blocks and SDK to connect various wireless/wired things, and unifies different protocols to the MQTT IoT standard.

Cross-system Integration
Built-in WISE-PaaS IoT software platform services integrate multiple systems and provide dashboard builder and RESTful APIs that help design user interfaces and create various web services.

Enable Data Analytics Services
WISE-PaaS/RMM is ready on Microsoft Azure Marketplace, users can easily push their data and analyze it in Azure. This saves time and effort when enabling data analytic services.

Full Range of IoT Gateway Solutions

Advantech provides three types of gateways: Multifunction Gateway, Wireless Gateway, and Energy Saving Gateway. Multifunction Gateway can not only provide scalable I/O interface for target machines and facility devices, but also operate in harsh, wide-temperature environments. Wireless Gateway focuses on high network connectivity through WWAN, Wi-Fi, and Zigbee. It provides more antennae for flexible connectivity and offers CE/FCC RF and safety certifications. Energy Saving Gateway is powered by an ARM-based platform with wireless mesh solution that features an ultra-low-power central management network for high-reliability and robustness against interference. Advantech provides a full range of IoT gateway solutions to fulfill various customer requirements.

Multifunction Gateway
ARK-1123H, ARK-2121L
- Supports RS-232/ RS-422/ RS-485, display, communication interfaces.
- Supports wide range temperature from -30~70 ^{O}C with industrial grade components.

Wireless Gateway
UTX-3115, UTX-3117
- High Expansion Capability: Wi-Fi/ 3G/ 4G/ BLE/ Zigbee
- Wi-Fi/3G CE/ FCC RF Certified
- Mobile PTCRB/ GCF Certified

Energy Saving Gateway
WISE-3310, UBC-220
- NXP ARM® Cortex-A9 dual/ quad core with low power consumption 3W
- Supports Giga LAN/Wi-Fi/ 3G networking

Open and Standardized IoT Framework

A key challenge for IoT realization is closing the technical gap between engineers and managers. Facility managers have expert knowledge of their equipment but suffer from IT departments' reluctance to open up their data gathered from equipment. IT departments have different challenges and ideas about industrial automation, and there are no universal standards like there are in the regular IT world. Advantech provides an open and standardized IoT framework to help customers solve these challenges:

● Connect Different Things: RS-232/422/485, Digital I/O, Analog I/O…
● Handle Different Protocols: Industrial/Private Protocol, Open/Private Data Format…
● Support Different Systems: Dashboard, Database, Big Data…

Integrated IoT Software Packages

In this framework, all gateways have **WISE-Agent** built-in and provide a connectivity SDK for data acquisition and transmission. This unifies different protocols as a standard IoT protocol – **MQTT**. As for transporting data to top level applications, **WISE-PaaS/RMM** plays an important role in the middle tier, connecting different gateways, providing centralized management features and transporting the filtered data to different applications. It provides **RESTful APIs** widely used in standard web services, a **Dashboard Builder** web-based user interface design tool and **Node-RED** data flow logic designer. Using these standard data service and design tools, IT departments can easily build web-based interactive dashboards, data roaming information on network based displays, and mobile devices to enable application intelligence. And **WISE-PaaS/RMM** is ready on **WISE-PaaS** and **Microsoft Azure Marketplace** to provide IoT big data analytics and directly help improve products, services and strategies.
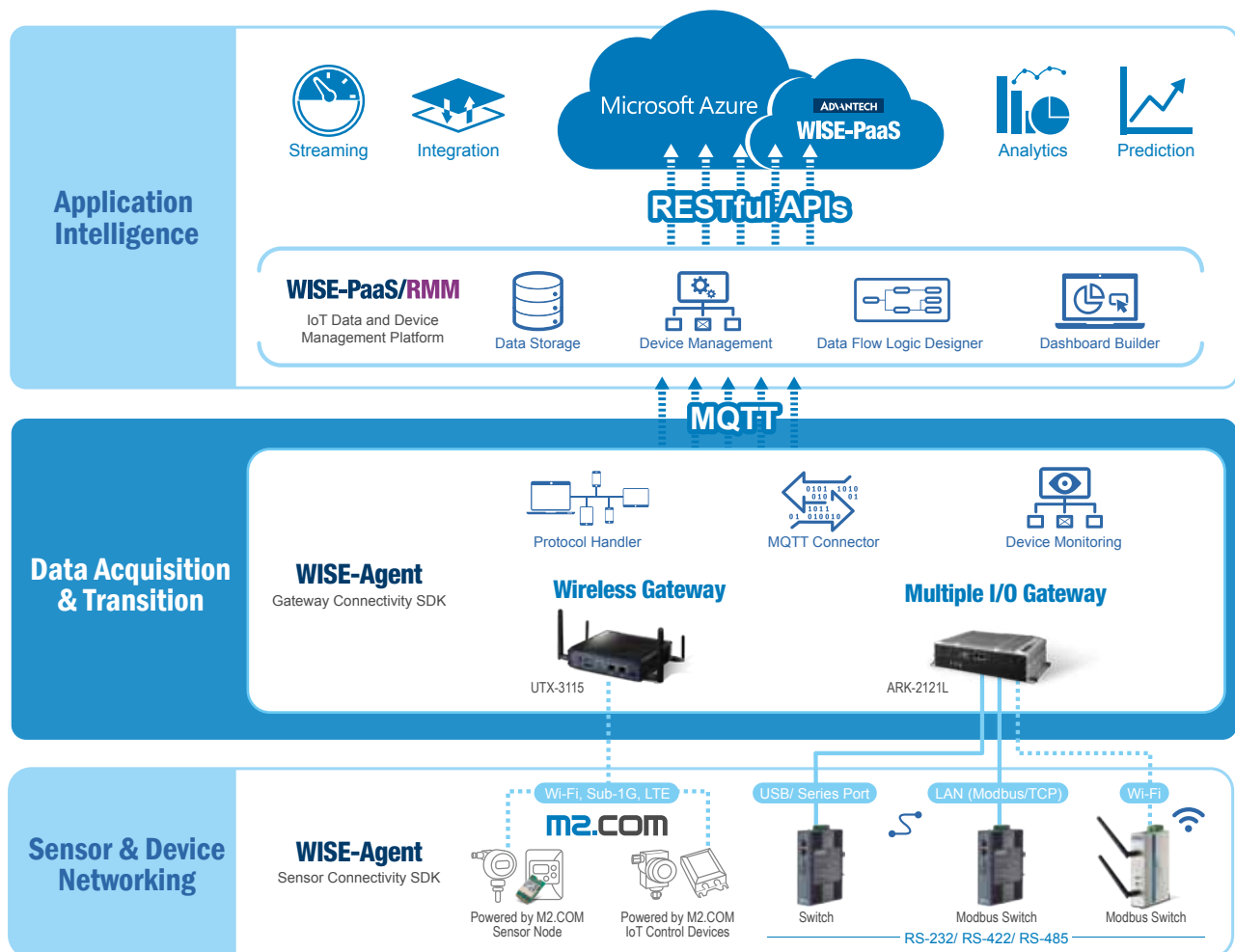
IoT Data & Device Management Platform Services

Data and Device Management WISE-PaaS/RMM

WISE-PaaS/RMM serves as an data and device management platform that manages connected devices remotely, providing centralized management features, including HW/SW status monitoring, remote control, system backup/recovery, etc. Moreover, it supports server redundancy and hierarchical server management, which increases service reliability and availability. WISE-PaaS/RMM utilizes standard IoT protocols, like MQTT from IBM, to communicate with IPCs, IoT gateways and sensors, provides WISE-Agent a framework for data acquisition from devices, and offers RESTful API web service, Dashboard Builder web-based user interface design tool, and Node-RED data flow logic designer which allow the user to integrate WISE-PaaS/RMM functions with other applications or do further customization.
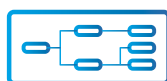
Device Management | **System Security** | **Dashboard Builder** | *Node-RED*

Device Management
1. Remote monitor and control (Power, KVM)
2. Devices/ Groups/ Map view device management
3. Device event history

Data Storage
1. Relational DB (PostgreSQL) for device and account management
2. NoSQL DB (Mongo DB) for big sensor data
3. Redundant server to provide data and service redundancy

Data Flow Logic Designer
1. IBM Node-RED flow design tool
2. Drag and drop plug-in nodes
3. Integrated WISE-PaaS/RMM function nodes

Dashboard Builder
1. Supports Google Maps, gauge, spark line, &c.
2. Multiple format data source supported
3. Supports Websocket data stream and JSON content

Data Acquisition & Transition WISE-Agent

Advantech gateway with built-in WISE-Agent, a software framework, enables seamless connectivity from across pervasive sensor devices, data flow, and the public IoT cloud. We provide WISE-Agent Software Development Kit (SDK) that includes data collection handler and communication protocol connector. Data Handler helps collect data from sensor devices, equipment and even all kinds of software/hardware machine data and then formats that data following IPSO standards within the WISE-Agent core. Protocol connector establishes secured connections to WISE-PaaS/RMM server/cloud with standard MQTT protocol and transfers data collected by data handler through the connection. Device Monitoring, a distributed supervisor process presented in the form of Agent Handler, continuously monitors and sends hardware performance telemetries include CPU usage, temperature, fan speed, voltage value, etc. to WISE-PaaS/RMM server/cloud. This data can help detect possible hardware damage at an early stage, supervise important software process status, monitor software CPU and memory usage, and keep important software working.

Data Handler
1. WISE-Agent's dynamic data collection module
2. Plug needed handler into different usage scenarios
3. Provides handler sample code for RS-232/485, Modbus-TCP/RTU, GPS...etc.

Protocol Connector
1. IoT standard M2M protocol
2. Small code footprint
3. Publish-Subscribe structure to provide one-to-many message sharing

Device Monitoring
1. Hardware monitoring : CPU temperature, fan speed, voltage
2. Software monitoring : CPU/memory usage and process status
3. Distributed threshold-based detection and alerts

IoT Software Platform Services **WISE-PaaS**

Powerful Development Capabilities and Win-Win IoT Partnership

WISE-PaaS is an integrated IoT software services and cloud platform providing an operating environment with stability, speed, integration, and modularity for system integrators. Customers can benefit from highly efficient management and fast inter connectivity among these cloud services to increase competitiveness and create new business opportunities. Advantech WISE-PaaS also provides WISE-PaaS IoT Partner Alliance program to help partners solve IoT application challenges and take those applications to market.

WISE-PaaS/RMM for Data and Device Management

WISE-PaaS/RMM is a powerful device management software that collects IoT data, remotely manages devices and safeguards equipment and critical data with real-time backups, and application restoration.

Microsoft Azure for Cloud Platform Service

Advantech is partnering with Microsoft® through the Microsoft CSP (Cloud Solution Provider) Program. Microsoft Azure is pre-integrated with WISE-PaaS to provide cloud services that allow you to quickly deploy infrastructure and services that meet all your business needs.

WISE-PaaS/Security for Cloud Security

World leading security brand McAfee offers Whitelisting, Blacklisting, and Data Security to ensure top security for your systems and services.

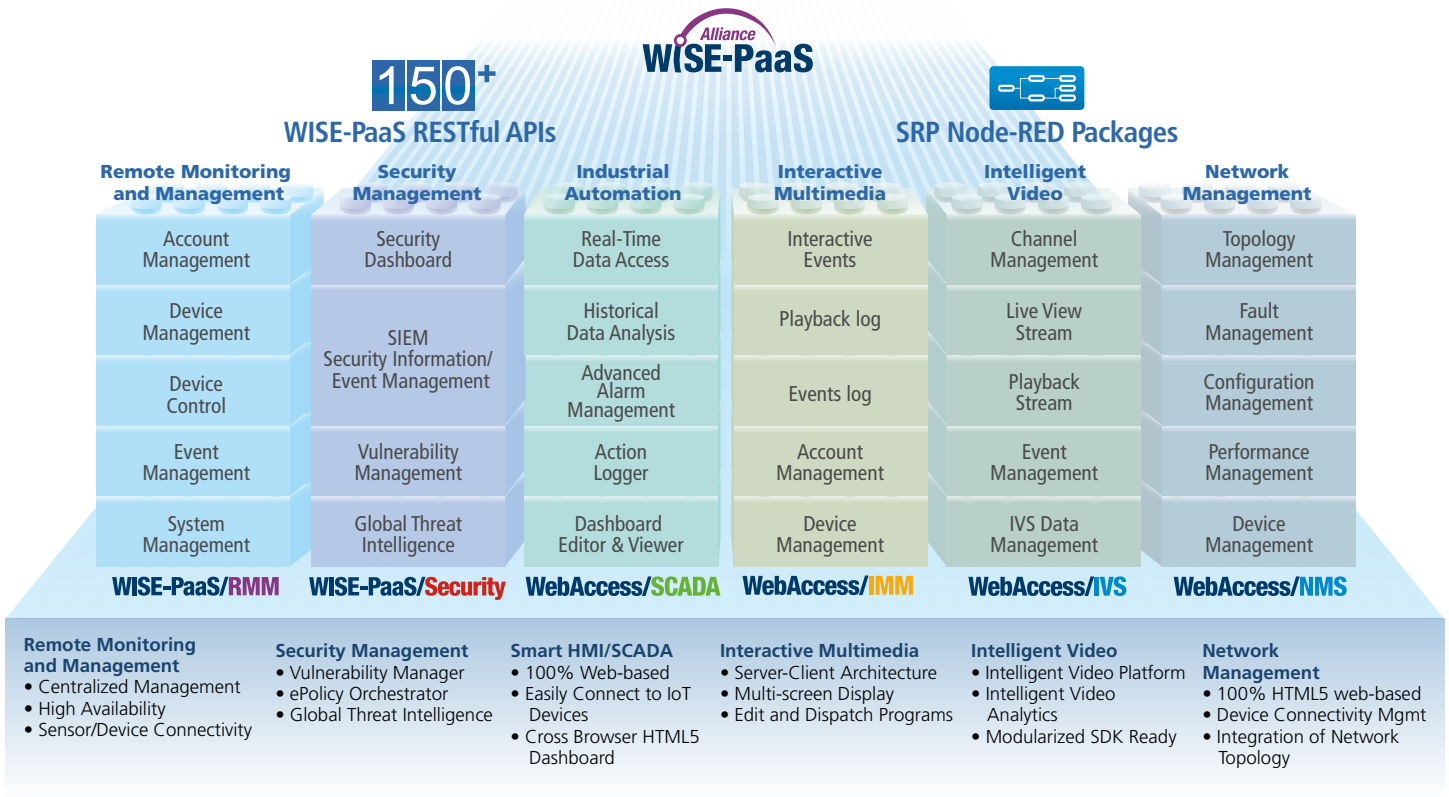### RESTful API for Cross-system Integration

No matter which operating system or language, development can be easily integrated and information uploaded through HTTP Request.

WebAccess+ Integrated Software Suite

WebAccess+ is an integrated software suite that combines WebAccess/SCADA, WebAccess/NMS (Network Management Software), WebAccess/IVS (Intelligent Video Software) and WebAccess/IMM (Interactive Multimedia) for diverse customers' needs.
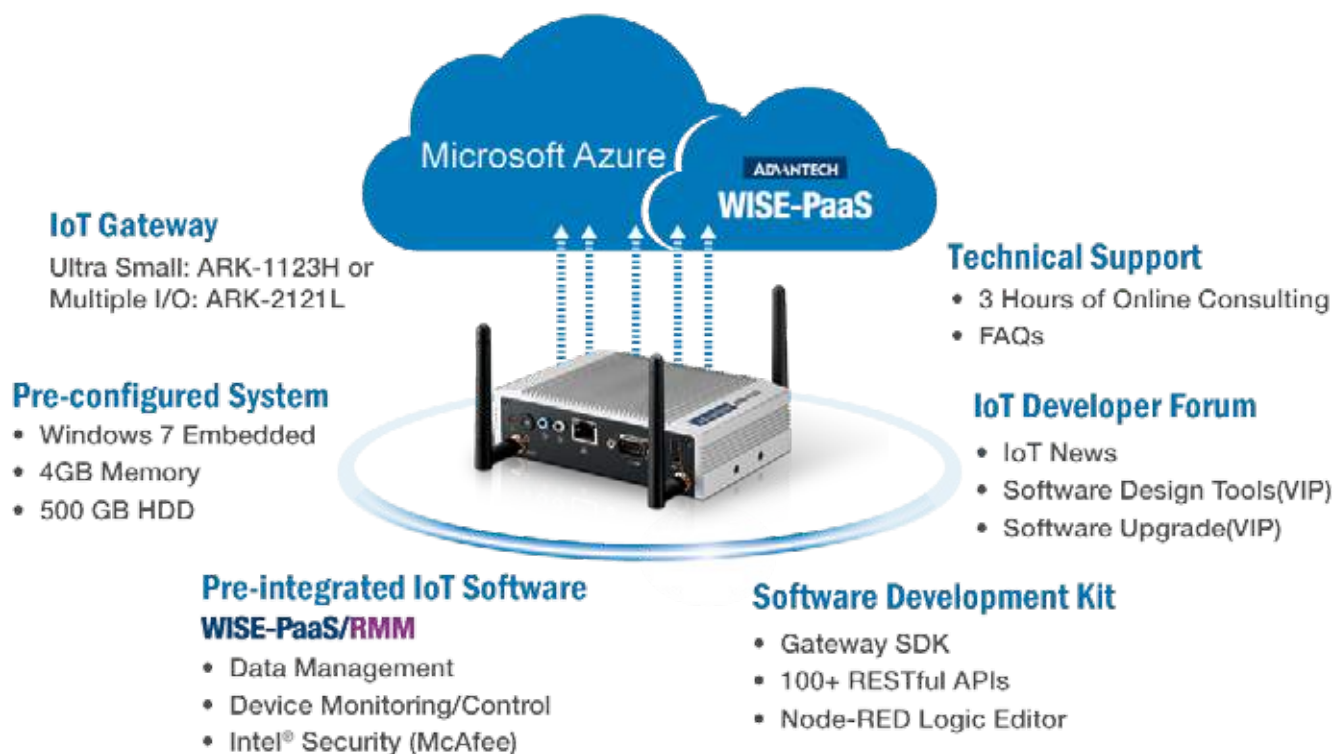
Comprehensive Development Service

Training and consulting services are provided that help VIP members pick up IoT technologies easily; this shortens the design phase, and gets your IoT solution to a faster, solider, and higher quality launch.

Alliance WISE-PaaS

150+
WISE-PaaS RESTful APIs

SRP Node-RED Packages

Remote Monitoring and Management	Security Management	Industrial Automation	Interactive Multimedia	Intelligent Video	Network Management
Account Management	Security Dashboard	Real-Time Data Access	Interactive Events	Channel Management	Topology Management
Device Management	SIEM Security Information/ Event Management	Historical Data Analysis	Playback log	Live View Stream	Fault Management
Device Control		Advanced Alarm Management	Events log	Playback Stream	Configuration Management
Event Management	Vulnerability Management	Action Logger	Account Management	Event Management	Performance Management
System Management	Global Threat Intelligence	Dashboard Editor & Viewer	Device Management	IVS Data Management	Device Management
WISE-PaaS/RMM	**WISE-PaaS/Security**	**WebAccess/SCADA**	**WebAccess/IMM**	**WebAccess/IVS**	**WebAccess/NMS**

Remote Monitoring and Management
- Centralized Management
- High Availability
- Sensor/Device Connectivity

Security Management
- Vulnerability Manager
- ePolicy Orchestrator
- Global Threat Intelligence

Smart HMI/SCADA
- 100% Web-based
- Easily Connect to IoT Devices
- Cross Browser HTML5 Dashboard

Interactive Multimedia
- Server-Client Architecture
- Multi-screen Display
- Edit and Dispatch Programs

Intelligent Video
- Intelligent Video Platform
- Intelligent Video Analytics
- Modularized SDK Ready

Network Management
- 100% HTML5 web-based
- Device Connectivity Mgmt
- Integration of Network Topology

Pre-Integrated Starter Kit Packages

Advantech also provides pre-integrated gateway starter kit to jumpstart your IoT innovation. The kit simplified integration, minimize development cost, and accelerate time-to-market. There are three gateways selected for the Starter Kit, which are based on Intel IoT Gateway Technology and verified through the Microsoft Azure Certified for IoT program: Wi-Fi/3G CE/FCC/UL RF certified UTX-3115, ultra-small ARK-1123H, and the multiple I/O ARK-2121L. They are both designed to withstand harsh environments, with good scalability for networking and versatile I/O communication. Besides the ready-to-run gateway system, a software solution is also included in the package. This includes WISE-PaaS/RMM Pro version: IoT device remote monitoring and management software for data management, device monitoring/control and security (Intel® Security McAfee). And WISE-PaaS/RMM is ready on Microsoft® Azure Marketplace to enable big data analytic services. As for IoT design-in services, we provides gateway and security SDK, 100+ RESTful APIs, Node-RED logic editor design tools and documents. With 3 hours of online consulting services, customers will have their exclusive account to submit, manage, and track service status.

Microsoft Azure · **ADVANTECH WISE-PaaS**

IoT Gateway
Ultra Small: ARK-1123H or
Multiple I/O: ARK-2121L

Pre-configured System
- Windows 7 Embedded
- 4GB Memory
- 500 GB HDD

Pre-integrated IoT Software
WISE-PaaS/RMM
- Data Management
- Device Monitoring/Control
- Intel® Security (McAfee)

Technical Support
- 3 Hours of Online Consulting
- FAQs

IoT Developer Forum
- IoT News
- Software Design Tools(VIP)
- Software Upgrade(VIP)

Software Development Kit
- Gateway SDK
- 100+ RESTful APIs
- Node-RED Logic Editor

iotforum.advantech.com

Real-time Access IoT Developer Forum

For a quick jump into the core discussion with professional consultants, Advantech built an IoT Developer Forum. The IoT Developer Forum is a real-time, online platform for sharing the IoT technologies news and posting questions. Discuss a variety of development topics, from getting started to working with the latest software and IoT technologies. Any customers who purchase the Starter Kit are eligible to become VIP members in our IoT Developer Forum community. On the Forum there are dedicated Advantech technical experts for technical Q&A, and for download, the latest technical tools and documents that help customers shorten their design phases and speed their launches.

IoT Gateway Selection

Advantech provides full range selection of IoT gateways to fulfill diverse IoT applications. Delivers an integrated, pre-validated, and flexible open-computing gateway platform, including foundational hardware, software, and security building blocks to allow fast solution development and deployment.

Ultra Small
ARK-1123H
- **Palm-size: 133.8 x 43.1 x 94.2 mm**
- **Weight: Only 1.2kg**
- Intel® Celeron™ J1900 Quad Core 2.0 GHz SoC
- 1 x RS-232/422/485
- 1 x Full-Size MiniPCIe for Wi-Fi or 3G/LTE
- Option Wi-Fi module with FCC/CE RF certification
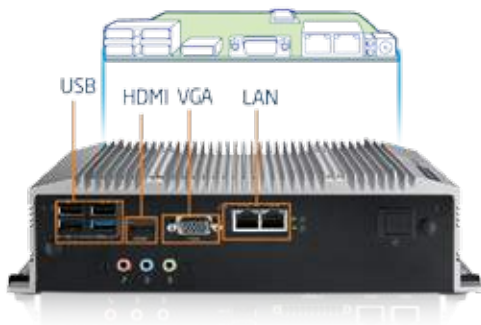
Multiple I/O
ARK-2121L
- **2 x RS-232, 2 x RS-232/422/485 with auto flow control**
- **iDoor Mini PCIe module expansion compatible**
- Intel® Celeron® J1900 Quad Core 2.0 GHz SoC
- Mini PCIe with SIM holder for communication module
- 9 ~ 36 VDC wide range power input
- -20 ~ 70°C extend temperature operating

Wireless Communication
UTX-3115
- **Intel® IoT Gateway Technology bundled**
- **Wi-Fi/3G CE/FCC/UL RF certified**
- Intel® Atom™ Dual Core E3826 & E3815
- Mobile PTCRB/GCF certified
- 2.5" HDD/SDD equipped
- -20 ~ 60°C working temperature

Wireless Certification
UTX-3117
- **Intel® IoT Gateway Technology bundled**
- **Wi-Fi/3G CE/FCC/UL RF certified**
- Intel® Apollo lake Quad Core
- RS-232 & RS-422/485 with auto flow control
- Supports Wi-Fi / 3G/ LTE/ Zigbee module
- -20 ~ 60°C working temperature

Energy Saving
UBC-221
- **Intel Quark SoC x1000 400MHz processor**
- **Supports Yocto Linux BSP (kernel v3.8.7)**
- Supports 1 x USB 2.0, 1 x PCIe, 2 x 10/100 LAN
  (one LAN supports PoE class 3)
- Supports 2 x GPI, 2 x GPO, 1 x 4-wire RS-232

Energy Saving
WISE-3310
- **NXP ARM Cortex-A9 i.MX6 Dual Core 1GHz**
- **Supports Embedded Linux/Yocto Linux**
- Supports Time synchronization and Channel hopping
  for robustness and anti-interference
- Supports up to 200 nodes for wireless network
  management
- Supports 1 GbE LAN, and 1 embedded half-size
  mini-PCIe slot for Wi-Fi

Energy Saving
UBC-220
- **NXP ARM Cortex-A9 i.MX6 Dual Core 1GHz**
- **Supports Embedded Linux/Yocto Linux/Android**
- Supports dual display with Full HD 1080p HDMI and
  single-channel LVDS
- Supports USB 2.0, USB OTG, and 1 GbE LAN
- Dual mini-PCIe slot for Wi-Fi and 3G support

Compatible Wireless Sensor & I/O Selection

Advantech IoT gateway provides a series of compatible wireless sensors and I/O modules for your applications.

Industrial IoT Sensor Node - M2.COM Modules

Advantech developed the M2.COM open standard to empower more IoT applications. M2.COM is a sensor platform based on a simple modular design that provides a solid, standardized solution for IoT sensor nodes and sensors.

Low Power Wi-Fi WISE-1520

- ARM Cortex-M4
- RAM 256 KB memory /1MB Serial Flash
- Supports 1 UART, 1 I2C,1 SPI, 2 GPIO, 2 PWM,2 ADC

Sub-1G WISE-1510 `2016 Q4`

- ARM Cortex-M4
- RAM 192 KB memory / 1MB Serial Flash
- Supports UART, I2C , SPI, GPIO, PWM, ADC

BLE WISE-1530 `2017`

- ARM Cortex-M4
- RAM 256 KB memory /1MB Serial Flash
- Supports UART, I2C , SPI , GPIO,PWM,ADC

LTE-M WISE-1570 `2017`

- ARM Cortex A7
- RAM 256 KB memory /1MB Serial Flash
- Supports UART, I2C , SPI, GPIO,PWM,ADC

Development Board

- Supports M2.COM key E module
- Supports 1 RS232/ 422/485, 1 USB OTG, 2 PWM, 2 I2C, 1 I2S, 1 SPI, 8 GPIO, 2 PWM, 6 ADC

Switch Hub

Wireless Serial Devices

EKI-1361
1-port RS-232/422/485 to 802.11b/g/n WLAN

EKI-1362
2-port RS-232/422/485 to 802.11b/g/n WLAN

Modbus Devices

EKI-1221
1-port Modbus, 2 x 10/100 Mbps Ethernet ports for LAN redundancy

EKI-1222
2-port Modbus, 2 x 10/100 Mbps Ethernet ports for LAN redundancy

EKI-1224
4-port Modbus, 2 x 10/100 Mbps Ethernet ports for LAN redundancy

IoT I/O Modules

Wireless I/O Modules

WISE-4012
4-ch Universal Input and 2-ch Digital Output IoT Wireless I/O Module

WISE-4050
4-ch Digital Input and 4-ch Digital Output IoT Wireless I/O Module

WISE-4060
4-channel Digital Input and 4-ch Relay Output IoT Wireless I/O Module

Ethernet I/O Modules

WISE-4010/LAN
1-port Modbus, 2 x 10/100 Mbps Ethernet ports for LAN redundancy

WISE-4050/LAN
4-ch Digital Input and 4-ch Digital Output IoT Ethernet I/O Module

WISE-4060/LAN
4-ch Digital Input and 4-ch Relay Output IoT Ethernet I/O Module

Operating Systems Selection

Advantech provides a full range selection of Operating Systems specific for gateway solutions, such as Windows 10 IoT, Intel® IoT Gateway Technology solution, Wind River Pulsar, Open source Yocto, Unbuntu Snappy Core, and Red Hat Jboss. Customers could choose the most suitable platform based on their needs.

Microsoft Windows 10 IoT

Windows 10 IoT is a family of Windows 10 editions targeted towards a wide range of intelligent devices, from small industrial gateways to larger, more complex devices like point of sales terminals and ATMs. Combined with the latest Microsoft development tools and Azure IoT services, partners can gather, store and process data, creating actionable business intelligence that affects business outcomes. Partners building solutions based on Windows 10 IoT will realize expanded opportunities when they harness the full breadth of Microsoft technologies to offer end-to-end solutions.

Windows 10 IoT Core

- Optimized for smaller and lower cost industry devices
- Designed to run a single line of business application
- Runs Universal Windows app

Windows 10 IoT Enterprise

- Supports various industry devices
- Supports both Universal Windows apps and Classic Windows applications
- Advanced protection against modern security threats

AllJoyn Interoperability
- Open Source Framework
- Cross Platform Communication
- Network Management

One Core OS
- Universal Driver
- Common & Consistent APIs
- Accommodates all device types

One App Platform
- Universal App (UAP)
- Maximizes Developer Investment
- Adaptive User Experience

Platform Ready
- Pre-installed & Certified
- Tool & Utility Ready
- Design-in Services

Intel® IoT Gateway Technology

The Intel® IoT Gateway Technology solution is designed on the Wind River® Intelligent Device Platform XT to speed innovation and maintain interoperability with legacy systems. Developers can quickly develop, prototype, and deploy intelligent gateways that meet emerging IoT market requirements, while maintaining interoperability with legacy systems including sensors and datacenter servers. The solution is completely pre-configured and pre-validated with hardware, software, and security capabilities.

Connectivity
- Pre-integrated smart connection capabilities enable rich network options that save development time and costs.
- Validated and flexible firmware provides an extensive network of connectivity choices, including broad modem support and PAN, LAN, and WAN network access.

Management
- Platform customization significantly reduces development time while increasing the product's life span and uptimes.
- Long-term secure remote manageability simplifies deployment, maintenance, and management of remote devices.

Security
- Key features protect critical data traveling across your device network.
- Secure image, secure data, and secure management is supported.
- Encrypted communication is provided between the cloud-based console and your devices.
- Device resource management limits exposure of untrusted applications

WISE-PaaS Alliance Win-Win IoT Partnership

WISE-PaaS Alliance is the IoT partner program launched by Advantech that helps partners solve IoT application challenges and take those applications to market. There are four major offerings in this program: "Diverse Software Solutions", "Eco-System Partner Collaboration", "Marketing & Business Engagement" and "Comprehensive Developer Services". With six Diversify Software Solutions, partners can unify different protocol standards, thus enabling data, image, device and network management, and ensuring that IoT device and data infrastructure is reliable and scalable. Another key objective is to expedite IoT application development. Alliance programs provide comprehensive development services, including development tools, professional consultant and technical support service and VIP IoT Developer Forum. Program members leverage the Advantech marketing platform to generate product awareness, and also engage with local salespeople for sales leads and opportunities.

The VIP Service Network supports Alliance members in achieving their application development and business transformations; we integrate our resources and knowledge to help Alliance members cross the hurdles of IoT data management. In terms of software offerings, Alliance members enjoy shopping all Advantech IoT software in an online store with 24-hour service. This online software store simplifies the procurement process and gives Alliance members the best discounted prices. Training and consulting services are also provided that can help VIP members pick up IoT technologies easily. For a quick jump into the core discussion with professional consultants, IoT Developer Forum consolidates all the latest development tools, technical white papers, and news regarding industrial trends. This can shorten the design phase, and gets your IoT solution to a solider, higher quality, and faster launch.

Marketing& Business Engagement

- Alliance VIP Membership
- Regional Sales Engagement
- Joint Go-To-Market

Diverse Software Solutions

WISE-PaaS/RMM   WISE-PaaS/Security
WebAccess/IMM   WebAccess/SCADA
WebAccess/NMS   WebAccess/IVS

Eco-System Partner Collaboration

- Cloud Platform Partner
- Gateway System Partner
- Sensor Solution Partner

Comprehensive Developer Services

- IoT Developer Forum
- Comprehensive Development Tools
- Technical Consultant Service

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Cross-system Integration of an Intelligent Factory

Introduction

IoT-based Industry 4.0 has become a hot topic in the manufacturing world in the last few years and will probably continue to lead industrial trends for the foreseeable future, bringing bounteous new business opportunities for equipment builders and system integrators as they help to revamp traditional factories into Industry 4.0 manufacturing environments. The principle Industry 4.0 concept is connecting machines, work pieces, and systems to a network, allowing them to communicate with each other to become an intelligent system where individual units can influence each other automatically to maximize throughput and quality. A factory that practices Industry 4.0 is called an iFactory.

In a traditional factory, when a workstation at a production line is out of components or materials, it needs human attendance to check for the supply, but in an iFactory the machine can automatically alert the conveyor system for material feeding. If a machine in an iFactory starts to overheat, it will automatically cease operation and cool down to avoid a breakdown and minimize loss. As all data from devices and systems are converted into a standard protocol, the data can be exchanged, computed and displayed on a dashboard, where factory managers can oversee operating status of all machines and systems on all production lines of all of their facilities, and implement remote management and control. All the things and systems in the factory are virtually combined into one big system. And this intelligent automatic production system can be incorporated with other information systems such as a Manufacturing Execution System (MES), Warehouse Management System (WMS) or Enterprise Resource Planning (ERP) system to streamline corporate operations. Data can also be pushed to the cloud for implementing big data analyses to extract meaningful intelligence.

Application Requirements

Most of the time, an iFactory is not built from the ground up, but is upgraded from a traditional factory that already has equipment with a certain degree of automation. These machines and systems often differ in control logic, interfaces, software use and field level communication protocols, such as CANOpen, Modbus, and more. Therefore, the biggest challenges for an iFactory developer is to bring all these heterogeneous systems to an intelligent network, transform their data into a unified format standard for IoT communication and central management, and to establish logical control flows to coordinate all the systems so they work synergistically.

System Solution

Advantech provides ARK-2121L and ARK-1123H as gateway systems and WISE-PaaS/RMM as software platform for developing IoT-based iFactory, bundled with comprehensive developer tools and cloud service readiness to speed up deployment. The ARK-2121L is a fanless
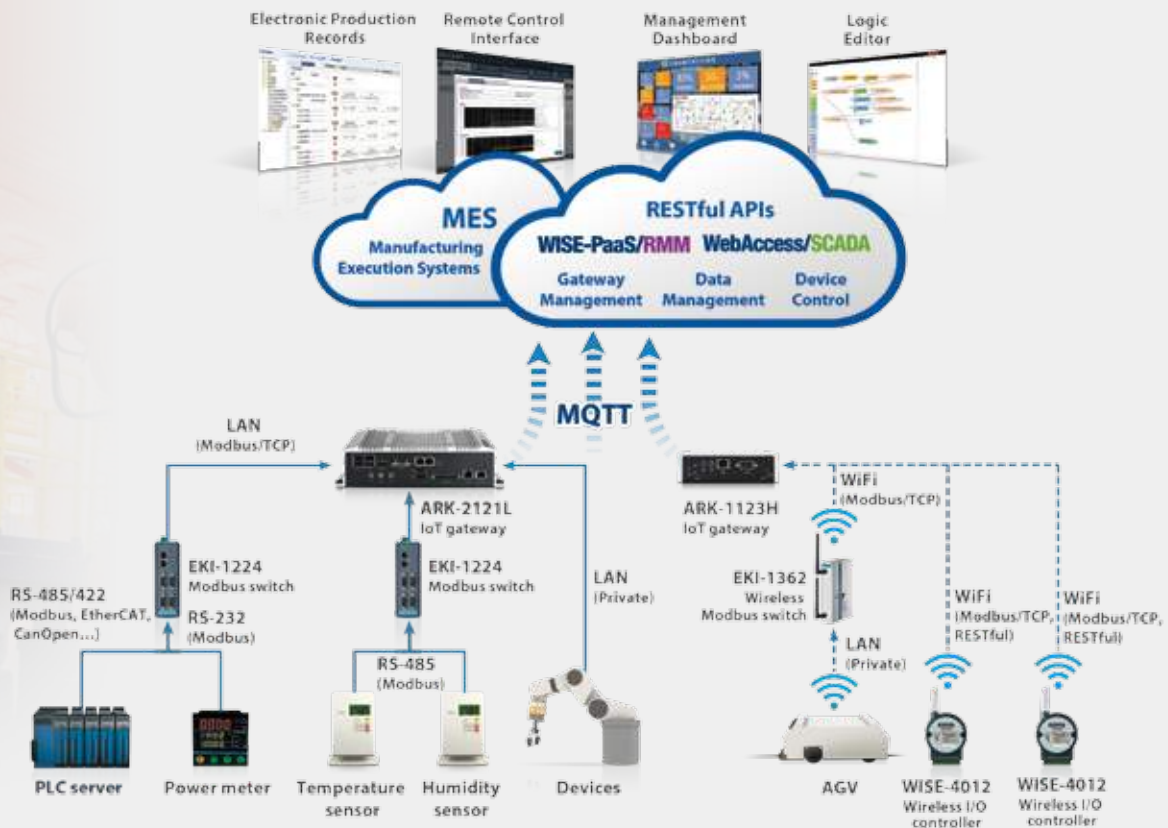
PC box carrying Intel® Celeron® J1900 Quad Core 2.0GHz SoC, suitable for the integration and control needs of a smart factory. The ARK-2121L supports Advantech's unique iDoor modules, which provide a series of optional I/O interfaces including isolated/non-isolated COM ports, CANBus, LAN and digital I/O that can be used to flexibly connect with various equipment and systems already existing on the factory floor. And ARK-1123H is suitable for more simplified data transmission of production line.

WISE-PaaS/RMM, Advantech's IoT software solution deployed at the gateway and server level, contains WISE-agent at the gateway side to process and convert data sent from the field level of different data formats into the IoT-standard MQTT protocol and pass the unified data to the backend WISE-PaaS/RMM server and cloud database. It also integrates the IBM Node-RED rule engine that can be used to establish data logic flow of the IoT system with simple drag-and-drop operations. With this tool, the user can establish operation rules and logics of the iFactory to allow different systems in the factory to work in synergy and achieve production goals. The Advantech WISE-PaaS/RMM software suite also provides a dashboard builder and a rich cluster of RESTful APIs, which system integrators can use to design and generate user interfaces and create various web-services and mobile applications. The support for RESTful is important for easy and quick system integration with new data and functions and other applications.

For cloud analytics, the WISE-PaaS/RMM provides both correlation database and non-correlation database for convenient data management, and Microsoft Azure cloud service access, which allows users to easily establish cloud applications in the Azure Marketplace.

Benefits

• IoT data acquisition total solution provided by computer-based and controlled based gateway and WISE-PaaS/RMM software
• Streamlined intelligent control and management enabled by modularized and easy-to-edit rule logic engine
• Easy hardware integration provided by flexible I/O modules
• Quick integration of software and functions brought by RESTful API support
• Convenient and efficient database management

Cloud-based Intelligence for Retail Business

Introduction

The more retailers learn about customer behavior, the greater their chances of selling products. Using IoT technology to collect customer and commodity data, and analyzing that data to extract useful information that can improve business strategies and practices is one of the hottest topics in retail today.

By applying Intelligent Video Analytics to the accumulating video database, retailers can analyze customer flows in and out of the store or shopping mall, detecting patterns for females and males, elders and youngsters, where more of them stay and stay longer, and the like. Moreover, the IVA can generate a "heat map" indicating customer flows in the shopping space. Another new tool for detecting customer behaviors is RFID-based electronic tags installed on products; tags track visitor rates and sales rates, showing comparative interest levels in different products.

Application Requirements

A Retail project developer has to face the reality that there are already systems existing in their customers' stores or shopping malls, such as IVS, POS, RFID, Beacon and other environment sensors, all with different I/O interfaces, communication methods and data transmission formats. The system integrator has to find a way to integrate multiple systems and devices into an intelligent network, and provide a platform for creating business intelligence. Both hardware and software solutions are needed to allow data collected from various sources to be transmitted, exchanged, processed and displayed in standard IoT protocols. Data streaming, storage, and analytic tools must be established for cloud applications.

System Solution

For Retail, Advantech provides a comprehensive IoT solution from bottom to top, from hardware to software, all the way to cloud access. There are two gateway systems options: ARK-2121L for cases that need more versatile I/O interfaces and more sophisticated controls; and the more economic ARK-1123H, suitable for more simplified data channeling purposes.

All field devices (video cameras, RFID reader, POS, environment sensors, etc.) send data to the IoT gateway via wired or wireless transmission, either directly or via a router. The Advantech gateway system is equipped with WISE-Agent software, which converts all the received data into MQTT format for IoT data transfer, and sends the unified data to the backend server and cloud databases.
For the agent and server levels, Advantech provides an IoT software platform called WISE-PaaS/RMM Pro version to enable data

VIP Management Interface · Content Management Interface · Remote Control Interface · Heat Map (Retail Store)

CMS — Customer Management Systems

RESTful APIs — WebAccess/IMM · WISE-PaaS/RMM — Data Streaming · Data Analytics · Data Prediction

Microsoft Azure — Machine Learning

MQTT

ARK-2121L IoT gateway · USB/COM (Private) · ARK-1123 IoT gateway · LAN (Modbus/TCP)

WiFi (TCP)

LAN (Media Content) · LAN (Video Streaming) · RFID reader · EKI-1224 Modbus switch

Beacon · RS-485 (Modbus)

Signage player · Camera · RFID · Mobile device · Temperature sensor · Humidity sensor

management, data storage, and data applications. WISE-PaaS/RMM contains a dashboard builder and 100+ RESTful APIs that let designers develop user interfaces on Advantech WebAccess/IMM software. With RESTful support, the retail system can easily integrate new functions, new data and other information systems—such as a Customer Management System (CMS) and digital signage system—so as to maximize value.

For cloud applications, WISE-PaaS/RMM is now available in Microsoft Azure Marketplace, and users can push their data to a space in the marketplace and analyze data with tools provided by Azure. By analyzing big data, tables, trend charts, and heat maps can be generated and displayed on the dashboard. Retailers can view the dashboard on a PC, tablet, smartphone or other device to gain business intelligence anywhere at any time.

With IoT and cloud technology, customer information collected from different sources and different sites can be collected and accumulated into a big database for valuable business intelligence extraction. For example, when a global retail chain deploys an IoT system across its retail sites, it can implement market analyses to determine and predict customer interests in different countries and areas and adjust inventory accordingly. This can help policy makers develop deep overall insight into their business and improve business management and overall strategies.

Benefits

• Total software and hardware solutions for POS machines and data acquisition gateway management
• Remote data acquisition and device monitoring for environmental sensors and server room status for each branch store
• Seamless connection to Microsoft Azure cloud service helps users gain business intelligence

Powerful IoT Connectivity Enables Intelligent Buildings

Introduction

IoT technology is elevating traditional buildings from limited automation to real intelligence, increasing our comfort and convenience with enriched user experience and giving more consideration to environmental friendliness. A building is typically composed of a number of systems, including electrical power, water, lighting, HVAC, door entrance, video surveillance, and the like. In the past, these systems might have limited automatic or intelligent functions on their own, without interconnection or interaction. For example, the administrators of an office building use a switch panel to remotely control lighting in different areas of the building, and use a separate switch for HVAC control.

Now, with IoT technology, all devices can be connected to the internet for data transmission and processing. The building administrators may sit in the central control room, viewing data displayed on the dashboard to oversee the overall situation in the building, and control lighting or air conditioning to maximize comfort and efficiency.

Application Requirements

To make a building more intelligent, iBuilding solution designers often have to face the reality that the building already has multiple equipment and systems that use different interfaces, control logic and communication methods. The biggest challenge is how to connect all these pieces of equipment and systems to an IoT platform and transfer data in a unified protocol to enable intelligent control and management.

System Solution

Advantech provides an IoT gateway solution for iBuildings that includes a ready-to-run hardware and software platform and cloud access, enabling iBuilding solution developers to bring control of all equipment and devices to centralized management and push data to the cloud efficiently. The solution uses Advantech's gateway system ARK-2121L, which contains a PCIe slot for Advantech's unique iDoor modules–a series of mini PCIe cards providing varied functional I/O ports—such as isolated/non-isolated COM ports, CANBus, LAN, digital I/O, printer port, and more– which users can select to connect with different interfaces of existing equipment and devices.

he Advantech WISE-PaaS/RMM software suite is deployed at the gateway and server sides. With the aid of WISE-agent software tool, the ARK-2121L gateway can transform formats of data collected from sensors and devices into IoT-standard MQTT communication protocol and send the unified data to a central platform. This is how the solution enables the connection of all devices and helps complete cross-system integration. At this point, the formerly separate and independent systems in the building have become sub-systems of a large
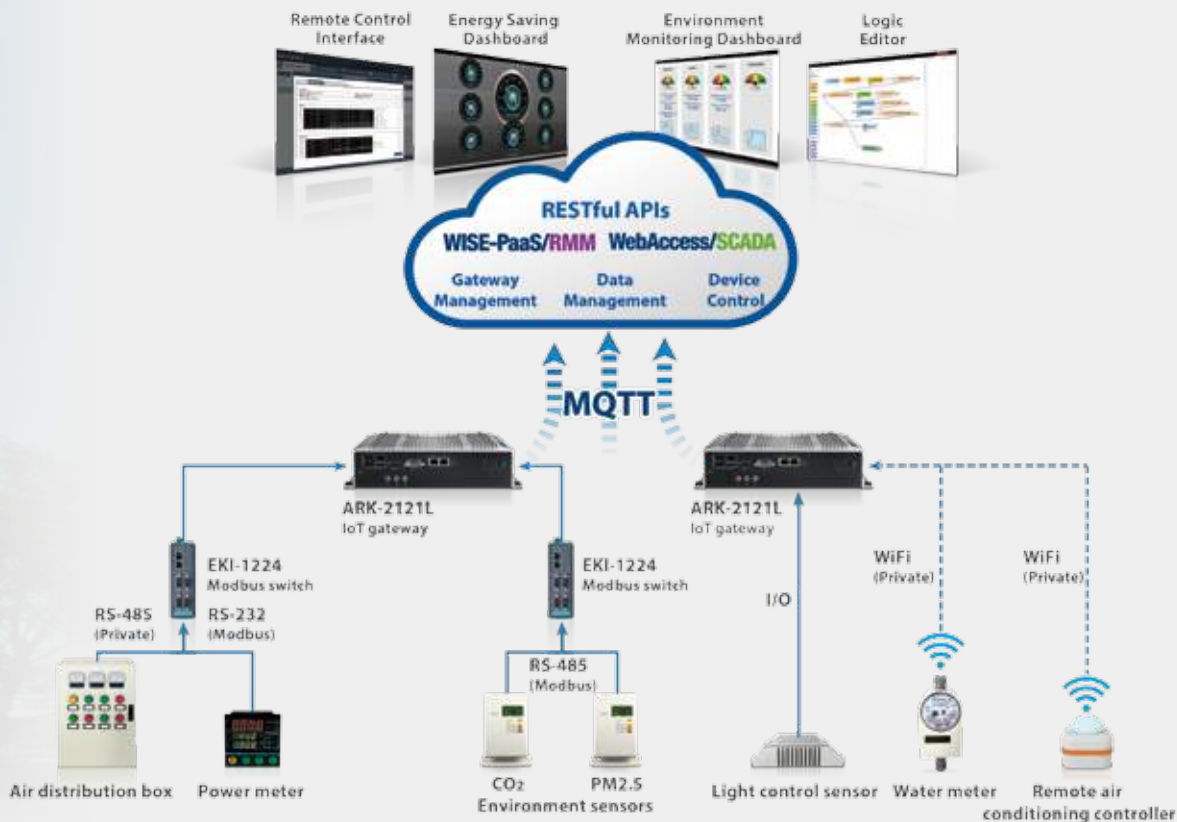
integrated system aimed at intelligent control and management. At the server side, the WISE-PaaS/RMM software kit can be used to facilitate the development of device management and other applications. The kit includes a dashboard builder and 100+ RESTful APIs for developers to build up user interfaces on both Advantech WISE-PaaS/RMM and Web-Access/SCADA platforms for various applications. RESTful API is essential, and allows the Advantech solution to easily connect up different applications and devices.

With this solution, users can easily develop applications including: remote controls such as automated HVAC adjustment according to monitored air condition; energy saving functions such as automated switching of lighting during work hours or off-hours; environmental monitoring functions such as indoor air quality indicators including CO_2 and PM2.5. All the data can be pushed to the cloud to accumulate into big data for future analyses to assist the management staff in developing their strategic policies.

Once a developer completes an iBuilding project, the IoT framework—including how devices can be connected and flow control—can be exported to be reused in another project, so that the developer can save a lot of programming effort when developing a new system; the developer only has to edit and make some changes to certain modules or add newly created functions.

Benefits

- Great connectivity with flexible I/O modules for integrating existing equipment and devices quickly and conveniently.
- High expandability for developing extended functions at lower cost.
- Gateway software helps to convert all data sources into a unified data transmission protocol standard for IoT communication.
- Ready-to-run platform solution saves system development effort and speeds up time-to-market.
- Easy reproduction of IoT framework saves programming effort in developing new projects, allowing system integrators to focus their time and attention on their core business in developing customized functions that satisfy their customers' requirements, or creating new functions to add to their selling points.
- One-stop shopping with solid technical support to assure your success.

Remote Healthcare Services

Introduction

With an ageing population and rising incidence of obesity, diabetes, and coronary heart disease, concerns are increasing about medical events that represent a new set of challenges for patients as well as medical professionals. Caretakers and clinicians need to keep tabs on vital signs and changes in behavior patterns so they can provide timely and accurate care.

Application Requirements

Our customer was looking for an integrated solution that could improve the lives of elderly and vulnerable people by providing a medical monitoring system that gave reassurance, while enabling early intervention with minimal intrusion. The platform needed to be highly reliable, with a long life cycle. It should include capabilities for communication both with sensors in the home and also with the cloud.

System Solution

The Advantech UTX-3115 was designed from the beginning as a gateway product for IoT applications, and it proved ideal for this remote health care application. This fanless, wide temp gateway offers serial ports that can connect to control devices or to sensors for data aggregation. It also includes Mini PCIe slots that support Wi-Fi and 3G /4G proprietary WWAN networks. Patients take an active role in deciding what information they want collected, and then the specified data is sent to the cloud in real time through the UTX-3115.

UTX-3115 provides two Mini PCIe slots, which can take either a Wi-Fi module or a Bluetooth module to communicate with vital sign, environmental, or behavioral sensors. It also has an RS-232 port and an RS-422/485 serial port that support ZigBee interface sensor devices. Powered by an Intel® Atom™ E3826 dual core processor operating at 1.46GHz, the UTX-3115 offers significantly reduced power consumption compared to previous generations. The reduced 12V power consumption cuts total cost of ownership. The unit also includes Wind River IDP image, and McAfee security functions to protect system efficiency and reliability. Advantech's UTX-3115 is not just a gateway; it was developed specifically with IoT in mind, and integrated with Intelligent Systems Framework (ISF) from Intel®, and Wind River Intelligent Device Platform (IDP) solutions for a total, IoT-ready platform solution.

Advantech also provides WISE-PaaS/RMM for data and device management software. WISE-PaaS/RMM helps collect data from devices, sensors and equipment with different interfaces. And we also provide RESTFul APIs for integrating with hospital/ home care applications. IBM® Node-RED login engine is also integrated for intuitive data and action design flows.

Capable of 24/7 indoor or outdoor operation, this IoT gateway is a robust and efficient solution for remote health care services. UTX-3115 boasts palm-size dimensions and three kinds of mounting kits for easy installation, even on irregular surfaces. With wide temperature support, from -20 ~ 60 °C, the fanless, low-maintenance UTX-3115 solution is nearly silent in operation.

Benefits

- Totally IoT ready platform solution with Intelligent Systems Framework (ISF) from Intel®, and Wind River Intelligent Device Platform (IDP) solutions.
- Built-in WISE-PaaS/RMM software for IoT data and device management.
- Includes Mini PCIe slots that support Wi-Fi and 3G /4G proprietary WWAN networks for wireless communication
- High Expandability and Efficient Operation
- Palm-size, with Wide Temperature Range Support (-20 ~ 60 °C)