

My WISE-PaaS

An Advantech Magazine- Embedded Issue 2020

Advantech View

WISE-PaaS Platform for Hardware Promotes the Next Innovations in IoT
P.06

Application Story

New Human-Machine Interfaces in the IoT Era
P.22

WISE-PaaS

Through edge-to-cloud integration framework, Advantech helps enterprises realize AIoT blueprint
P.28

Customer Partnership

Advantech & China Unicom: Working Together for Success in China's Massive IoT Market
P.32

IoT Edge Intelligence: The New Industrial Revolution



SWAN Edge Intelligent Platform Heralds a New Era of Intelligent Solutions P.18



OTA



Device Management



WISE-PaaS/ DeviceOn



Data Management



Data Security

ADVANTECH



WISE-PaaS

AIoT Solutions & Marketplace



■ Power Insight
Two Major Trends in AI Development



■ Application Story
Making Digital Transformation Easier for Traditional Manufacturing Industries



■ WISE-PaaS
Through edge-to-cloud integration framework, Advantech helps enterprises realize an AIoT blueprint



22 New Human-Machine Interfaces in the IoT Era

CONTENTS

- Editor's Desk
 - 05 Co-Creating a New World of Internet of Things (IoT)
- Advantech View
 - 06 WISE-PaaS Platform for Hardware Promotes the Next Innovations in IoT
- Power Insight
 - 08 Two Major Trends in AI Development: Penetration into All Industries, and Movement toward Edge Computing
- Technology Forum
 - 10 WISE PaaS/DeviceOn Optimizes Device Management



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■ Application Story

- 14 From Robotic Automation to Smart City, Advantech is Bringing Real-time AI to the Edge
- 16 Making Digital Transformation Easier for Traditional Manufacturing Industries
- 18 SWAN Edge Intelligent Platform Heralds a New Era of Intelligent Solutions
- 20 LoRa Solution Improves Public Safety for South Korean Infrastructure
- 22 New Human-Machine Interfaces in the IoT Era
- 26 NextWarehouse Join Hands with WISE-PaaS IoT Cloud Platform to Establish a Fully Automated Intelligent Factory

■ WISE-PaaS

- 28 Through edge-to-cloud integration framework, Advantech helps enterprises realize an AIoT blueprint

■ Customer Partnership

- 32 Advantech & China Unicom: Working Together for Success in China's Massive IoT Market

■ Advantech News

- 34 Advantech's Co-Creation Partner Conference Events Strengthen IoT Ecosystem



WISE-PaaS/ DeviceOn



Power Up IoT Devices with 24/7 Operation Management



Enabling an Intelligent Planet

DeviceOn.Dev

Advantech's DeviceOn IoT device operation management solution gives users a transformational experience. DeviceOn's fast and simple setup helps provide intelligent edge connection, data acquisition, and status visualization. Power on/off are also available at the tap of a button for quick and easy access. Over-the-Air software updates itself securely by sending software patch, firmware, software, and configuration updates. This is designed to ensure maximum production efficiency in IoT device operation management.

DeviceOn.App

DeviceOn
OTA

- Software, firmware & configuration updates
- Advantech BIOS updates

DeviceOn
FaceView

- Facial recognition
- People counting
- Behavior detection

DeviceOn
E2I

- Protocol conversion
- Edge intelligence
- Real-time visualization

DeviceOn
ePaper

- EPD device auto-discover
- Fast transmission
- Device association



Co-Creating a New World of Internet of Things (IoT)

Commissioned by ARM, the “Internet of Things Business Index: A Quiet Revolution Gathers Pace”, is a survey report compiled by the British Economist Intelligence Unit (EIU). The report shows that as many as 75% of business leaders around the world are focusing on developing IoT business opportunities, and 61% of business owners believe that if the timing that they introduce IoT technologies and applications is too late, they will lag behind competitors in the market.

Indeed, IoT and 5G are setting off a change in all walks of life, especially when they are driven by technological trends such as artificial intelligence (AI) and edge computing. Through the integration of embedded systems, a large number of IoT and 5G programs are deployed around our life, such as far-reaching wireless network systems, smart applications, and disruptive innovative technologies, causing a huge impact on every industry and changing people’s lives at the same time. According to forecasts, 100 trillion devices will be connected to IoT by 2030.

The rapid deployment of IoT has also accelerated the development of embedded systems. In IoT systems, the embedded system and the cloud computing system work together with each other to complete huge data processing needs. In recent years, IoT has been combined with artificial intelligence to form AIoT (AI + IoT), which has played an important role in accelerating the intelligentization process and improved production efficiency in various industries. It has opened a new page for “Embedded-IoT”.

Edge computing is the embryonic extended development of AIoT. With an explosively growing number of users and smart devices of embedded systems connected to IoT, Embedded-IoT terminal

devices are upgraded to be AIoT smart machines, forming a new wave of applications. However, there is no standardization in the market yet. Every participating vendor is still exploring and developing through trial and error, thus giving Taiwan a good opportunity. In this edition we look at the new application trends in “Embedded-IoT”, and we invited experts and scholars and related software and hardware solution partners to present their personal opinions to help system operators successfully ride the wave of AIoT business opportunities.

Although the implementation of market education over the past few years has prompted companies in various fields to think about how to use the innovative applications of IoT to create smarter solutions and services for enterprises. IoT is so huge and the applications so fragmented that every different application requires its own special standards. So, the old industrial model in which a single vendor can provide all the solutions in the market does not exist any longer and has been replaced by a business environment co-created by manufacturers from many different industries.

To this end, Advantech has actively shifted its market position in recent years, transforming itself from an original hardware equipment provider to an AIoT service provider and co-creation platform promoter. In 2019, through the “Co-Creation Partner Conference (CCPC)”, held together with partners in multiple vertical fields, we hope to establish the IoT industrial ecosystem and spread the co-creation biz model everywhere to meet the needs of IoT in different vertical application fields. We hope that more and more industry partners will join us, so as to achieve the benefits of IoT in the shortest time. ■



WISE-PaaS Platform for Hardware Promotes the Next Innovations in IoT

Images provided by Advantech
Interview with Miller Chang, President of Embedded IoT, Advantech

IoT has facilitated the development of embedded systems. According to statistics, in 2018, 3 million boards, 1.7 million sets of intelligent systems, 260 sets of operating systems, and 1.6 million peripheral modules were sold worldwide. Although the sales of intelligent systems and software were not ranked as highest, they had achieved rapid growth for last two years which showed that IoT is no longer something far away in the future—but is here and now.

Focus on AI, 5G new technology and strengthen the expandability of intelligent systems

Miller Chang, President of Embedded IoT, Advantech said, “To fulfill the market demand of IoT, Advantech has developed various intelligent systems in recent years, strengthening the expandability of the system, in particular, development. For system integrators or enterprises, this means it will be easier and faster to integrate with their systems.

For example VEGA-300, the AI edge computing

acceleration module launched by Advantech this year can accelerate AI image computing and deep learning and reasoning capability of any system, simply by plugging it into the system. Since Advantech has combined Intel’s latest Movidius Myriad X VPU and OpenVINO tool package in advance, users can quickly develop AI applications to meet their own requirements.”

A foreign intelligent street lamp manufacturer has integrated Advantech’s VEGA-300 into a camera that can analyze and calculate images in real time to provide more immediate and innovative urban services to the public.

So, because the most important part of IoT applications are the wireless networking technologies such as WiFi, Bluetooth, NB-IoT, LoRa, etc., Advantech also provides a series of modules, sensors, antennas, and Design-in services so customers can choose appropriate solutions in accordance with their own needs and give intelligent systems the function of wireless networking.

Miller Chang gave one more example of wireless electronic paper to illustrate the importance of wireless technology in intelligent systems. He said, “Electronic paper has been on the market for more than 10 years and mostly used in e-books in the past. In fact, electronic paper has the advantages of low power consumption, simple installation, sunlight visibility, etc., which makes it very suitable for applications in various fields. Therefore, Advantech also integrates electronic paper and wireless modules and our ePaper manager controls or updates information remotely.”

Advantech’s Linkou Intelligent Campus complex has implemented electronic paper at bus stops, warehouses, street lamps, and conference rooms.” According to Miller Chang, wireless electronic paper has great potential. It may well replace traditional displays and become a new human-computer interface in the era of IoT in the near future.

Develop multiple software applications based on WISE-PaaS platform

In the era of IoT, customers will not only have requirements of new hardware, but also management. Because the number of devices has increased rapidly, an efficient device management tool is needed to effectively manage the devices connected to the network. Therefore, Advantech has launched the E2I (Equipment to Intelligence) device networking and intelligent management solution, so that the devices in all walks of life and all application fields can achieve intelligent management.

With this goal, Advantech embedded the WISE-PaaS/DeviceOn platform into all standard products. Customers can manage devices through computers, tablets, and mobile phones which is simple and convenient. Miller Chang emphasized that Advantech has experience of nearly 10 years in device management software development which offers great help in developing the WISE-PaaS/DeviceOn platform and allows it to meet the needs of industrial IoT device management. With the WISE-PaaS/DeviceOn platform, the system can conduct remote control, management, software updates, and other operations as well as efficient data collection to the cloud platform.

Based on the co-creation of Advantech WISE-PaaS platform infrastructure with partners, a full spectrum of hardware and intelligent management tools were developed for vertical markets and industrial applications. Factory automation motor vibration analysis is good example of a Solution Ready Package (SRP) that integrated software and hardware and applied it to many IoT industries.

Miller Chang further explained the reason for the rapid replication of industrial SRP lies in the open and integrated features of Advantech WISE-PaaS platform. As WISE-PaaS platform has integrated the perception layer, communication layer downward, and also the private cloud or public cloud platform of the enterprise upward such as Microsoft Azure, Alibaba cloud, Amazon AWS, etc. It is easy for system integrators (SI) or enterprises to upload the data collected on site to the cloud for more analysis. Therefore SI can focus on how to meet the needs of industrial applications and does not worry about the information or system integration. As well as accelerating the pace of development, this SRP can be replicated into relevant enterprises within other industries.

Focus on co-creation and cooperation. Establish the ecological chain of IoT

Looking to the future, the development of Advantech’s embedded products will be divided into two levels: software and hardware. On the hardware level, Advantech will continue to focus on innovative technology research, development, and specifications; especially, the three aspects of high efficiency, low power consumption, and high integration. On the software level, it will develop in the direction of how to add value for hardware, like adding AI modules or software SDK into DeviceOn suite, so that the WISE-PaaS/DeviceOn platform could not only offer remote monitoring and management, but also further upgrade the AI computing and analysis platform.

Miller Chang stated that Advantech will also strengthen cooperation with IoT eco-chain partners. By cooperating with system integrators and software developers, we can create and share more IoT business opportunities. ■

Two Major Trends in AI Development: Penetration into All Industries, and Movement toward Edge Computing

Excerpt from Advantech Design-in Forum Speech

There will be two major trends in future AI applications. The first is the development of industrial infrastructure. In this, AI applications will be introduced into all industries, much as electricity was once introduced. The second is edge AI becoming commonplace. Due to considerations of bandwidth, cost, privacy and security, computing tasks for some AI applications will certainly be moved to the network edge in the future.

Artificial intelligence (AI) is currently one of the hottest topics, but it is not a new technology. From the 1950s to 1970s, researchers were already proposing artificial computing concepts. They hoped to embed human thinking processes within computers; but in the end, they failed, because deep thinking is too complicated and too difficult to express to a computer. This was the early period of AI logic reasoning.

Then, from the 1980s to 1990s, a second wave of AI development began. This focused on knowledge expression. Researchers hoped to imbue computers with knowledge. However, it is impossible to put a whole world of knowledge into a computer, even before we account for the fact that everyone knows different things. So, this wave of AI knowledge expression was a failure as well. The third wave started in 2010, when researchers switched to imbuing computers with human experience, rather than knowledge or thinking processes. This way, computers would be able to learn directly from human experience. This time, we succeeded. Since that breakthrough, AI has been developing rapidly, and is being adopted in many industries.

The Third Wave of AI: Imbuing Computers with Experience

The third wave of AI applications focuses on

machine learning. This is currently the world's most important technology and it is leading to the Fourth Industrial Revolution. Machine learning enables computers to extract regular algorithms from data - that is, to learn from experience. In other words, as long as we provide the data and the algorithms, the computer will find the rules by itself. This is a massive breakthrough in AI development, and is the key that will enable AI to take root in many industries and develop different applications.

To better explain AI development, take retinal image recognition as an example. During the first and second waves of AI development, when rule-based AI was used, the user had to clearly tell the computer how big and how many blood clots would need to be found to qualify as retinopathy. In the third AI wave, the doctor need only tell the system what the characteristic features of retinopathy are, such as the size of blood clots, the number of blood clots, and the width of the blood vessels, while also providing images of healthy retinas and unhealthy ones for the engineers to write the machine learning code. The computer can then discover the rules based on this data and these characteristic features.

Another AI technology that has been very hot for the last two years is Deep learning. With this extension of machine learning technology, a doctor need not provide the characteristic features. Instead,



Machine learning enables computers to extract regular algorithms from data – that is, to learn from experience. In other words, as long as we provide the data and the algorithms, the computer will find the rules by itself. This is a massive breakthrough in AI development, and is the key that will enable AI to take root in many industries and develop different applications.

they just provide a certain amount of image data, and tell the system to discover whether there are lesions in the retina images. Then, the engineers write the deep learning code, and based on this data, the computer discovers the characteristic features and rules necessary to identify retinopathy.

Bandwidth, cost and security considerations make AI essential in edge computing

In response to rapid development in machine learning and deep learning, AI has become a fundamental part of the industrial infrastructure. This trend has led to the rapid development of artificial intelligence in all walks of life in many countries. However, in Taiwan, it seems that there's been a lot of talking the talk, without walking the walk.

So in 2017, Professor H.T. Kung, Academia Sinica academician, several researchers, and I formed a team to personally visit a number of Taiwanese companies to learn about the challenges that they were facing in introducing AI applications. The results can be summed up by these major problems: a lack of AI talent with practical experience; a lack of information infrastructure; engineers who are good at tech development, but cannot understand the real problems that businesses are facing; and gaps in the industry-academia model.

Government, industry, academia, and the research institutes need to work together to solve these challenges, and need to encourage industry to introduce AI applications to solve problems. Within these efforts, Taiwan has the strongest competitive advantage in industries such as smart manufacturing and smart medical care. Moreover, Taiwan must promote the AI industry.

Like the electronics industry, AI will make Taiwan a powerhouse within the global supply chain for technologies and products; and this will drive Taiwan's economy to grow again. As far as current global AI development is concerned, I consider edge computing to be one of the major growth areas for Taiwan's AI industry.

When machine learning was first applied, information and data were still uploaded to the cloud. However, as development got faster and faster, companies began to consider bandwidth, computing costs, privacy, security, and many other issues. So, computing tasks for some AI applications will certainly be moved to the network edge in the future. This, in turn, will require very strong computing power at the network edge, to reduce inference latency and improve energy efficiency. Only then will the true benefits of moving AI from the cloud to the network edge be fulfilled.

Finally, I would like to discuss AI chips. In edge computing applications, the chip is a very important component. According to statistics, over the next 10 years, AI chips (that is, SoC system chips and SoM system modules) will show explosive growth and it looks likely that the market will grow to tens of billions of US dollars. However, there is no standardization in this market yet. Every participating vendor is still exploring and developing through trial and error. This gives Taiwan a good opportunity. If we can take the IC chips made by our electronics industry in the past as a foundation and work closely with relevant industry players, then in the future, we will have a good chance to achieve the goal of making our industries more intelligent through AI, and to form our own AI industry. ■

WISE-PaaS/DeviceOn Optimizes Device Management

Images provided by Advantech
Interview with Rison Yeh, Senior Software Manager of Advantech

WISE-PaaS/ DeviceOn



- Automated Device Connection
- Over-the-Air Software Updates
- Remote Monitoring & Control

Remote Monitoring & Control

Embedded Boards

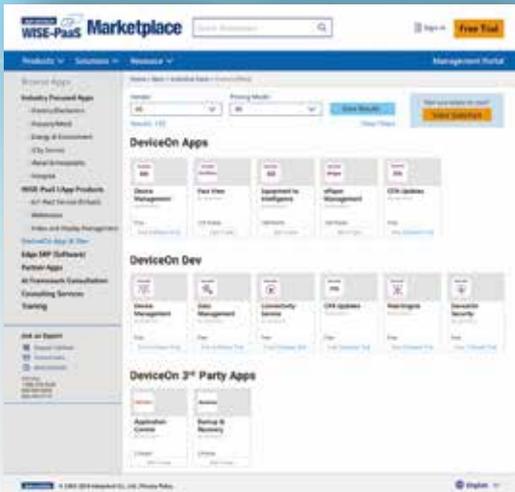
Over-the-Air Software Updates

Embedded PCs

Data Collection & Visualization

Wireless IoT Gateways

Embedded Computers



WISE-PaaS/DeviceOn apps are now ready on the Advantech WISE-PaaS Marketplace. WISE-PaaS Marketplace is the premier destination for customers to purchase licenses, subscribe to services, and customize their industrial software to facilitate personalized solution development.



Explore Now

According to a recent report published by KPMG, the Internet of Things (IoT) is considered a key to promoting growth in the semi-conductor industry. The number of interconnected devices currently in operation is estimated at more than 26 billion devices—a number that continues to increase. It is estimated that by 2025, the number of IoT devices will have increased nearly threefold. A related IDC report also highlighted that the global technology industry regards IoT as the next new growth stage of technology, and 73% of global enterprises are ready to develop IoT solutions (i.e., will actively conduct planning within the next 12 months). The findings of these two reports clearly indicate that IoT has become an essential driver to future business opportunities in various industries.

For the manufacturing industry, in order to maximize the efficiency, IoT infrastructure is required for connecting multiple devices, collecting comprehensive data, and enabling real-time control and management. In the past, when it comes to device management, it typically involved manual inspections and onsite troubleshooting. The only solution to an equipment failure or unexpected abnormality was to send first-line engineers to the location to diagnose and resolve the issue. Moreover, for software upgrades, engineers were required to manually update each device individually – a process that could take several days if there were numerous machines. Not surprisingly, this is neither a cost-effective nor efficient way for managing multiple connected IoT devices. In response to this gap in the market, Advantech has developed a device management software called WISE-PaaS/DeviceOn to provide an efficient and intelligent means for managing equipment.



Automated Device Monitoring and Control

Automation



ways

Automated Alert Notifications



Vertical Focused Solutions

DeviceOn.Dev Microservices Modules



Device Management

- Device Monitoring & Diagnostics
- Device Control & Updating



OTA

- Software & Firmware Updates
- Advantech BIOS Updates



Rule Engine

- Distributed Rule Monitoring
- Flexible Trigger & Action



Data Management

- Data Acquisition & Storage
- Secure Data Access



Connectivity Service

- Device Connectivity
- Plug-n-Play Peripherals



Data Security

- McAfee Threat Protection
- Acronis Backup Recovery

DeviceOn Management Solution Accelerates Development

Advantech's DeviceOn software solution was officially launched in 2018. Moreover, from Q4 of 2019, all Advantech products will be preloaded with DeviceOn to enable easy equipment connectivity and IoT device management.

The software allows operators to monitor and control devices, and conduct diagnostics, repairs, and even system restarts remotely. The provision of OTA (over-the-air) supports software updates, configuration updates, and remote BIOS updates. Plus, devices can be updated in batches.

Furthermore, with the inclusion of data analysis functions, WISE-PaaS/DeviceOn can be used to preempt equipment failures based on historical data. This facilitates preventative maintenance and minimizes unexpected disruptions and system shutdowns, greatly improving productivity. DeviceOn also provides DeviceOn.Dev development kit for system integrators or end users to develop time-to-market customized applications.

Overall, DeviceOn provides a ready to use application (app) and an easy to follow development kit for diverse IoT applications.

Offers Advantages for Diverse Industries

One of real cases in the medical industry, DeviceOn was adopted to facilitate remote management of assets' location tracking. A global medical equipment manufacturer integrated DeviceOn software with their automated external defibrillators (AEDs).

To ensure availability during any emergency, AEDs are widely distributed throughout locations. However, the scattered locations make managing these assets challenging. Damaged or malfunctioning equipment may cause delays in medical treatment and further serious consequences. In the past, they relied on just a

few people to inspect equipment one by one. To address this issue, the medical equipment manufacturer used Advantech's DeviceOn to remotely execute self-tests of AEDs daily with scheduled power on-offs, battery status, and automatic transmission of results back to the cloud for analysis and management.

Another real case is in the semiconductor manufacturing industry. Because of the high value of semiconductors, disruptions to the production line can cause massive financial losses. Therefore, equipment stability is a crucial factor.

To ensure the stable operation of vital systems, one of Taiwan's large semiconductor manufacturers adopted Advantech's DeviceOn solution for conducting daily device operation management and regular hard disk diagnostics and data analysis to enable preventative maintenance and eliminate unexpected system shutdowns. With DeviceOn, the invested production capacity will be maintained without any interruption.

By using the DeviceOn management platform, the semiconductor manufacturer was able to detect multiple machine disconnections before production had even begun and it therefore sent immediate alerts to responsible personnel. This enabled both the onsite technicians and Advantech's support personnel to promptly investigate the issue, identify the cause of the configuration error, and reset the entire system to restore machine connectivity. With WISE-PaaS/DeviceOn real-time detection functions, machine failures were isolated and quickly identified onsite, preventing potential system shutdowns and eliminating costly and time-consuming repairs.

As IoT applications continue to expand, device management has become a serious issue. Advantech's DeviceOn software provides an intelligent networking and AI-based detection solution for device monitoring and predictive maintenance to ensure stable operation and convenient management of IoT devices. ■

Accelerating AI Development with Edge AI Solutions



OpenVINO™ Toolkit

Pre-trained Models

Deployment Wizard

3rd Party AI SDK

ADVANTECH

Enabling an Intelligent Planet

To help customers jumpstart their AI deployment and realize AI's full potential, Advantech has developed hardware and software integrated solutions to empower AI from cloud-to-edge. Our solutions combine high performance AI engines, and optimized software with industrial reliability to enable deep learning across different industries such as drones, AGV, retail, medical imaging, traffic monitoring, and more.

Inference Systems



AIR-100

Low power, quad displays with one Intel Movidius Myriad X VPU



AIR-101

12-28VDC DIN-rail with two Intel Movidius Myriad X VPUs



AIR-200

Ruggedized, high performance with two Movidius Myriad X VPUs



AIR-300

Server-grade computing, supporting one GPU card

Acceleration Modules



VEGA-320

M.2 A+E Key, one Intel Movidius Myriad X VPU on-board



VEGA-330

MiniPCIe, two Intel Movidius Myriad X VPUs on-board



VEGA-340

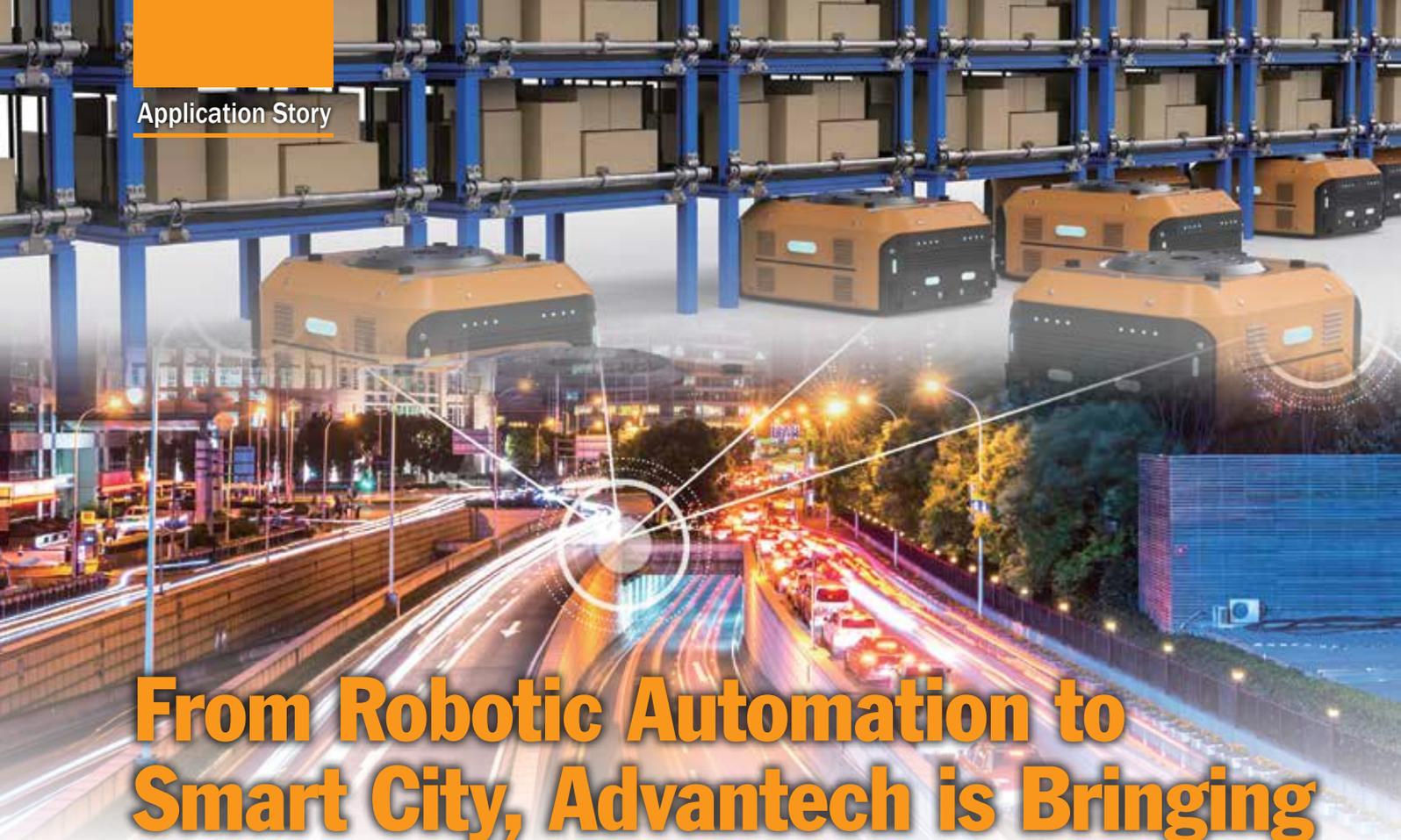
PCIex4, eight Intel Movidius Myriad X VPUs on-board

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IoT Solutions Alliance Premier





From Robotic Automation to Smart City, Advantech is Bringing Real-time AI to the Edge

Images provided by Advantech
Interview with Stephen Huang, Associate Vice President, Advantech Embedded IoT Group

When entering a warehouse of an e-commerce company, it is normal to see crowds moving and goods going between the rows of shelves. In this case, the employees were relying on the use of several automated guided vehicles (AGV) to do the work for them. At a glimpse, there weren't tracks on the ground, nor QR codes or bar codes nearby to guide the route. Each AGV knew how to get to the shelves at the nearest aisle because each AGV can detect if a barrier or person is near and can quickly detour or stop itself.

Making Factory AGVs More Efficient and Safer with AI-based Navigation

"The secret lies in the edge AI solutions," said Stephen Huang, associate vice president of Advantech Embedded-IoT group. Each AGV integrates VEGA-330, Advantech's edge AI acceleration miniPCIe module. It can recognize and process images captured from the camera, and AI navigation allows it to decide the best route in real time, boosting each AGV's runtime efficiency. As cameras are the eyes of AGVs, Advantech edge AI acceleration modules act as the engine of vision analytics and optimize image signal processing and inference on-

device to help each AGV execute better route-planning and auto-stop before a collision occurs. They can also self-learn in real time. For e-commerce, logistics, and the warehousing industry, AGVs with AI-based navigation improve efficiency up to 20%. It also enhances the safety of operation as people or other vehicles are detected and possible collisions can be avoided.

Stephen pointed out that Advantech is helping customers to transform their traditional AGVs to AI-based AGVs with better space utilization and optimized battery life while using less development resources.

Improving Metropolis Traffic with AI-powered Street Lighting

Next, let's change the scene from the warehouse to a corner of the city. Thousands of street lights illuminate the city helping drivers and pedestrians find their way home safely. These street lights not only light up the city. They can also provide city services including air quality, humidity/temperature monitoring, and traffic and parking management. Imagine if people could know the information of the parking spaces on the roadside from their mobile phones. They could drive directly to an

available parking space without searching. To make it possible, we need to leverage the power of edge AI.

Stephen explained that the customer already implemented Advantech's edge computing platform. Sensors and surveillance cameras were installed in the street lamps to collect 24/7 information such as temperature, humidity, air quality, and roadside conditions. Information was then uploaded to the cloud for operational analysis. Now, Advantech edge AI acceleration modules (VEGA-320), which are embedded into the cameras can analyze video data from multiple streams and handle real-time tasks such as locating open parking spaces in urban areas. The customer estimated that the utilization efficiency of roadside parking was increased by at least 10-15%. In addition to roadside parking space management, other metropolitan-wide services including real-time traffic flow analysis, real-time traffic accident reporting, and traffic law enforcement could be created.

Diversified Edge AI Solutions Meet Needs in Different Fields

Although the scenarios in the two cases above are quite different, they both use the VEGA-300 edge AI acceleration module of Advantech for its small size, low power consumption and scalable architecture. Powered by Intel Movidius X VPU (Vision Processing Unit), Advantech VEGA-300 series has a small foot print in only 8.1mm x 8.1mm, and less than 3W power consumption, making it the best fit for edge AI applications. In addition, since the number of Intel Movidius X VPU units onboard can be expanded, system integrators could either add or reduce VPUs in accordance with different computing needs. Therefore, both AGV and smart street lighting projects could easily adopt VEGA-300 without significant changes in the original design.

The movement of real-time computing, data security, bandwidth capacity, and energy saving, has allowed edge AI to become a powerful new technology. Advantech has launched multiple solutions to fulfill such market needs. In addition to edge AI acceleration modules, there are requirements for embedded platforms and edge computing systems with AI capabilities. For example, to achieve the needs of vision inspection in a factory production line, the performance of the edge AI system would need a server grade Xeon processor to support its real time operation. An additional high power GPU card acceleration engine would also be necessary. Advantech's AIR-300 is the ideal solution for this project because it is equipped with an Intel Xeon E3 processor and ECC memory support. One 260W NVIDIA high performance GPU card can also be installed into AIR-300. This can ensure high-density image processing and inferencing in real time and help keep production highly efficient.

Furthermore, Advantech also provides Edge AI Suite software that works with Intel OpenVINO toolkit. System integrators can easily install Edge AI Suite in just a few clicks and experience the power of Advantech's AI solutions. It incorporates ready-to-use programs such as facial recognition and human pose detection. It also provides CPU, GPU, and VPU usage information.

Stephen Huang, from Advantech Embedded-IoT Group, stated that Advantech provides not only software or hardware, but also a one-stop solution which can meet the needs of targeted industrial applications. System engineers from Advantech can help you with embedded devices, edge AI computing, and WISE-PaaS industrial IoT cloud platform. The development experience of Advantech over the past decades means it can fully meet the needs of manufacturing, retail, transportation, and other industries and provide the most suitable choices of edge AI computing systems for system integrators and enterprises. ■



Making Digital Transformation Easier for Traditional Manufacturing Industries

Images provided by Sunstige

Equipment monitoring is regarded by most manufacturers as the first step of intelligent transformation. However, most old equipment in factories is not equipped with sensing and communication functions. Manufacturers are often unwilling to shut down the production line for long periods to install sensing communication modules because they want to maintain their production capacity. This makes it difficult to promote the installation of intelligent equipment in these enterprises, and hinders them from taking their first step towards digital transformation. Advantech and Sunstige have created a machine monitoring system for plastic molding plants with non-invasive external designs that won't interfere with operations of the production system. This way, the back-end management platform can be in full control of the operational status of the machines in the plant. Consequently it can calculate the production line speeds and assist the smooth transformation of this traditional manufacturing industry.

The main business of Sunstige is to provide mechanisms such as visualized production management, sustainable data preservation, and decision-making analysis, as well as assist traditional manufacturers to optimize production processes. Sunstige also has high-

level expertise in plastic injection molding processes and related equipment. The plastic injection molding industry has developed for many years, and the technology is now quite mature. Most of the equipment used is old machines without online functionality. In order to be in full control of the operational status of production lines, the production management department usually has personnel record the relevant data and then calculate the operation ratio. However, the management department sometimes has doubts on the accuracy and authenticity of the data recorded by hand. Furthermore, it can be difficult to integrate handwritten data with other forms of information to provide added value. Therefore, Sunstige and Advantech have collaborated to design an equipment networking system for plastic injection molding machines that uses sensors to record the light signal information from the tricolor lights of the machines, to calculate the equipment's operation ratio.

In this particular case, taking into account the fact that the equipment in the factory tends to be older models without digital control units to connect to external communication networks, and the fact that the production line must keep operating for the installation of the relevant modules, Advantech and Sunstige decided to





start with the existing tricolor lights of the machine. The color and time information of the lights were captured through the sensor and communication module. Then the decision was made whether to use wired or wireless communication modes to transmit data to the server at the edge in accordance to the situation on site. The edge server would need to integrate, calculate, and process all the data in the plant, and then send the processed data to the back-end management platform. Therefore, the servers at this level need sufficient computing capacity as well as multiple I/O interfaces and small database functionality.

In response to the requirements above, Advantech chose its EIS-D150 High Performance Edge Intelligent Server. The EIS-D150 is equipped with Intel's sixth generation U-series i5 central processor, 4GB of RAM and a 64GB solid-state hard disk, which can quickly process a large amount of data in the plant. In terms of communication ports, the EIS-D150 uses an external data acquisition module, with the wired Ethernet network and Wi-Fi being used simultaneously. The former adopts an ADAM-6050 module, and the latter uses a WISE-4051 module. Through the above two remote data acquisition platforms, Advantech and Sunstige used only a small number of edge intelligent servers to integrate the tricolor lights data of all machines in the plant area to quickly create a comprehensive industrial IoT architecture.

For the equipment monitoring management software,

Advantech used the WISE-PaaS/DeviceOn IoT equipment maintenance and management software. This software suite was officially launched at the beginning of 2019, and will be built in all the EIS edge intelligent servers in advance, including the EIS-D150. With the help of WISE-PaaS/DeviceOn, managers can upgrade software and restart it remotely, so that the production management personnel can easily and effectively manage all EIS-D150 servers in the plant. The development kit of the software can help system manufacturers design plug-in peripherals, and transform different communication standards in the manufacturing site into the common language of the Internet of Things, so that the edge server can be used as a gateway in addition to computing. Additionally, Advantech also provides instrument generators. System manufacturers can design their own visual interfaces according to the needs of customers. As for the small database needs of the plastic injection molding plant, the WISE-PaaS/DeviceOn stores the operation records of the machine using its temporary storage function, and after the data is analyzed and sorted out, it will transmit meaningful information to the back-end system or cloud. What's more, the system can connect with other IT management systems in the plant and provide information that will assist in decision making for management personnel to optimize the equipment operation and improve the production capacity of the plant.

Advantech and Sunstige have integrated software and hardware platforms such as the EIS-D150, ADAM-6050, WISE-4051 and WISE-PaaS/DeviceOn to capture signals from equipment operation through non-invasive external designs. Advantech and Sunstige helped traditional manufacturers quickly build a machine monitoring system, lowered the threshold of intelligent manufacturing, and assisted them in taking the first step of digital transformation, all without affecting the operations of the production line. The automatic output of machine data by the system means that the possible errors and disadvantages of making records manually can now be avoided. The data therefore can truly reflect the status of the manufacturing site in real-time and accurately analyze the equipment operation ratio. The management personnel can also use it to correctly evaluate production capacity as a reference when considering the acceptance of orders, thus reducing the opportunity loss caused by inaccurate data in the past, and maximizing the profits of the enterprise. ■



SWAN Edge Intelligent Platform Heralds a New Era of Intelligent Solutions

Images provided by SWAN and Advantech

Air compressors are essential pieces of equipment in virtually all engineering operations. When an air compressor fails, the work on site will stop too—affecting project completion dates and potentially running up costs while harming an enterprise’s reputation. In order to reduce risk, manufacturers are developing a new generation of air compressors. This is done through IoT mechanisms that can master machine status, schedule maintenance before failures, and notify users regarding the internal consumables warranties in order to maximize equipment utilization rates. SWAN Air Compressor recently cooperated with Advantech to

launch intelligent air compressor products.

SWAN Air Compressor is a top air compressor brand in Taiwan. SWAN’s products have been on the market for more than 50 years—both at home and abroad. SWAN decided to collaborate with Advantech to introduce Industrial IoT (IIoT) architecture and add value to its products. This was done by taking machine data and selecting and processing it through terminal equipment after the first screening of the edge operation mechanism. Useful data was transmitted to the upper cloud platform, stored and accumulated to master it, then used to analyze the internal operation and health status of different parts

of the machine. Data could be presented in real time through a visual interface so that the system was capable of sending out warnings before an air compressor failure. The system installed a countdown mechanism to remind users before the warranty period of consumables or the service life of products expired.

The first step of operation in IIoT architecture is collecting machine data. At present, Reciprocating air compressors and screw air compressors are the most common models. SWAN collected the relevant data through these two types of products. The screw air compressor is an advanced type designed with a digital controller inside. It can be connected with the controller and the computer by simply connecting the lines and then the equipment data can be observed through the communication network. The reciprocating air compressor is a primary model with controllers. It needs an external module to capture machine data and then transmit it to the back-end platform for analysis.

Advantech EIS-D210: Rapidly Building a Cloud Management Platform

Advantech met SWAN's demand for intelligent air compressors with its EIS-D210 edge intelligent server. Due to its small size, EIS-D210 could be built inside the screw air compressor and connected to the control unit. SWAN did not need to change the size and exterior design of existing products. EIS-D210 also offered the ability to connect equipment and collect data. In this case, the wireless network was used to establish an online connection with the air compressor control unit, as well as obtain equipment operation information, quickly build the first line of Industrial IoT, and complete data serializing between the foreground and background of the system. In addition to its Wi-Fi functionality, EIS-D210 also provided a serial communication port allowing SWAN to connect to the network and the electrical meter with wires. The latter obtained the voltage, current, power, watt per hour, and other key electrical information from the machine. It transmitted this data to the back-end platform to control the state of the machine's electricity, formulate energy strategies, and achieve savings.

In order to speed up the establishment of IoT for device manufacturers, Advantech started the WISE-PaaS/DeviceOn service in the beginning of 2019. All Advantech products, including EIS-D210, are built with this function in the factory. With WISE PaaS/DeviceOn, whatever



Useful data was transmitted to the upper cloud platform, stored and accumulated to master it, then used to analyze the internal operation and health status of different parts of the machine. Data could be presented in real time through a visual interface so that the system was capable of sending out warnings before an air compressor failure.

kind of industrial communication language the machine or interface device applies will be converted into an IoT communication format. By using edge computing and cloud platforms, the status of the machine is analyzed so that users can remotely manage field equipment, monitor air compressors in different locations, upgrade software, or restart machines remotely. This functionality reduces the workload of machine maintenance personnel and achieves a transformation of the overall service mode. WISE-PaaS/DeviceOn provides various APIs to empower system manufacturers developing data dashboards according to customer needs so that the operational status of air compressors can be easily visualized.

With Advantech EIS-D210, SWAN established a complete cloud management system for air compressor preventive maintenance which monitored internal temperature status, pressure, air, oil and gas separation filters, drive belts, and bearings. It helped inform maintenance personnel to change consumable items before failures occurred. Intelligent system design eased the process of selling hardware to consumers, aided in providing leasing services to expand SWAN's business scope, created new market opportunities, and improved overall revenue. ■



LoRa Solution Improves Public Safety for South Korean Infrastructure

Images provided by Shutterstock

The development and application of IoT technology has enabled intelligence in the field of public security. With sensors and wireless communication, the government or related operators can now remotely monitor the health status of buildings and public facilities, to prevent dangerous/hazardous conditions.

Kolon Benit, a system integrator in South Korea, has basically initiated, developed and implemented the much talked about predictive maintenance.

Intelligent bridge monitoring minimizes risks to the public

A bridge structure will be affected by the following factors, drastic temperature changes and natural

disasters such as earthquakes, rainstorms, and typhoons. The potential impact on a bridge structure could result in catastrophic accidents due to structural failures or even the collapse of the bridge. So, regular monitoring of the health of bridges is crucial.

In the past, the Seoul Facilities Corporation would entrust engineers to measure and record any structural issues. But human negligence and difficulty in correctly analyzing issues, compounded by the non-existence of real-time data, is another determining factor in bridge safety.

The company appointed Kolon Benit to build a set of intelligent facility security management systems, which featured LoRa wireless sensors in the bridge facilities to collect and upload data to the cloud platform 24 hours a

day. The Seoul facility company can then analyze changes in each sensor's data in real time, which not only reduces the site workload of engineers and maintenance costs, but could also combine with external environmental information to establish a prediction model that achieves the goal of real-time risk prevention and management, thus ensuring safety of the bridge.

Advantech private LoRa solution meets the dual requirements of data security and transmission quality

In this system, Kolon Benit chose Advantech's private LoRa network solution and Arm Pelion. The platform includes IoT connectivity technology, device management, and data management, which is equipped with the key function of remote device monitoring, which can improve management efficiency and reduce operational costs.

The Advantech Private LoRa solution provides the WISE-LoRa development platform, which includes a WISE-LoRa gateway, WISE-3610, and WISE-LoRa Node with sensors (WISE-1510 Private LoRa M2.COM module), but also offers software and hardware integration services; one for the integration of ARM Mbed sensor, the other for the integration of two different cloud platforms—ARM Pelion and Advantech's own cloud WISE-PaaS / Device-on.

Because Advantech's Private LoRa solution has inherited the advantages of traditional LoRa technology; low power consumption, large transmission range, and high stability, its data transmission distance can be more than 10km. Each gateway can support up to 500 nodes, each of which can use LoRa for data transmission.

At the same time, it also combines SPS and AES-128 encryption technology to reduce the risk of data loss and ensure data security. This was an issue for LoRaWAN in the past, but that has now been addressed.

Inspection of concrete setting provides better surfaces for the public

In addition to bridge monitoring, Kolon Benit also applied the same IoT system to provide real-time concrete maintenance monitoring services to ensure the quality of concrete after curing.

There is a very important step called "curing" between the process of pouring to the complete setting of concrete. During curing, the concrete is kept wet all the time to avoid cracking after hardening due to the rapid evaporation of surface moisture, so as to improve the strength of concrete after hardening. In the process of curing, temperature is the most important factor. Water

evaporates faster in a relatively warm environment, and the curing time of concrete will be shorter.

In the past, the operators at the construction site will measure and record the temperature regularly, and then by spraying water, burning charcoal and other methods to maintain the curing quality of concrete. However, this manual management could not react sufficiently to the temperature changes.

Kolon Benit introduced a temperature sensor to measure the temperature during curing, which then uploads the data to the cloud platform in real time through LoRa. The system then monitors the temperature changes to ensure the quality of concrete curing and reduces the risk of cracks after solidification.

For operators in the construction industry, the concrete maintenance monitoring system not only improved the reliability and quality of concrete production, but also reduced unnecessary personnel, thus effectively reducing overall construction costs. IoT technology has clearly shown that it can significantly improve the quality of bridge structural safety and industrial concrete setting, so Kolon Benit will continue to develop its construction applications in the future, hoping to improve public safety in South Korea well into the future using innovation and intelligence. ■

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New Human-Machine Interfaces in the IoT Era

Images provided by Advantech
Interview with Wireless ePaper Display Solutions Product Manager, Sabrina Li
Advantech Taiwan Service Center Senior Manager, Jonhan Wu

In a time of increasing globalization, maintaining accurate inventory across different regions is essential for controlling costs and upholding efficiency in the manufacturing industry. Accordingly, Advantech has developed Wireless ePaper Display Solutions for visualizing data in an ultra-low power consuming way.

In this case study, we are going to introduce how 2.9-inch wireless ePaper devices (EPD-023) empower

warehouse operators to easily locate goods, verify components according to ordering instructions, and automatically update all data via the ePaper Manager software with the existing RMA inventory management material control system, thereby greatly improving the efficiency of global inventory management.

When implemented at Advantech's RMA center, the EPD-023 wireless ePaper display solutions not only



increased picking efficiency and reduced human errors, but also improved inventory accuracy with the automatic deduction function. This solution enables Advantech to effectively manage material inventories at 15 repair centers around the world.

Wireless ePaper Display Solutions Transform Warehouse Operations

According to Jonhan Wu, Senior Manager of the Advantech Taiwan Service Center, the Advantech RMA center is equipped with 10 rows of two-way storage cabinets that contain an inventory of more than 5000 repair materials/components. Previously, when picking was conducted manually, warehouse operators had to rely on the storage coding logic and inventory organization to locate the correct components. Moreover, inventory information had to be manually updated after picking, increasing the likelihood of missed updates or data errors.

With the implementation of EPD-023 wireless ePaper display devices, warehouse operators can now pick materials quickly and efficiently. Similar to the way intelligent parking lots use lights to indicate empty parking spaces, the RMA center is equipped with indicator lights on each aisle that indicate the exact location of specific materials. By this installation, when the components picking requests have been imported into the inventory management system, the orders will be transmitted to EPD-023 wireless ePaper devices. Then, all the warehouse operators need to do is follow the aisle lights to track down the correct location without needing to memorize it. After they fetch the correct box item and follow quantity information on the EPD-023 wireless ePaper device to collect, warehouse operators will use the QR code scanner to scan it on the EPD-023 wireless ePaper device to turn off the indicator light while also automatically updating the inventory data.

Jonhan Wu reported that the advantages provided by EPD-023 wireless ePaper display solution are the visualization of inventory data and more convenient picking. In the past, manual locating, verification, and inventory update processes were extremely time consuming and lead to numerous inaccuracies due to human error. Moreover, because previously the materials needed to be organized and stored according to a specific logic, only experienced picking personnel were allowed to retrieve materials. These personnel were also responsible for receiving, counting, and restocking all inventory materials, which meant that picking tasks were delayed, with requested materials distributed only once every 15 minutes.

The current solution featuring LED lights as location indicators and automated verification and inventory updates has greatly improved operational efficiency and accuracy. With the guidance of the aisle lights and the EPD-023 wireless ePaper devices, engineers can now retrieve materials by themselves, which eliminates the need for specific picking personnel. In less than a minute, engineers can collect the material and return to their tasks, greatly reducing down time for increased productivity. Additionally, because the EPD-023 wireless ePaper devices have three built-in indication lights, three engineers can collect materials at the same time by following the specific light color. Thus, the solution not only accelerates repairs, but also enables more accurate inventory management, which realizes the goal of “centralized planning, global execution”.



Jonhan Wu explained that inventory planning and management involves consideration of product sales, field-based wear and tear, failure rates, lead time, etc. Managers with sufficient experience are very important to ensure adequate inventory and avoid over or understocking. Consequently, Advantech hopes to extend the implementation of Wireless ePaper Display Solutions to its 15 overseas repair centers. This will enable managers at headquarters to understand the inventory situation at each repair center, and based on the cumulative stock levels organize a centralized material replenishment plan. If all the repair centers follow the centralized plan, local supplies of materials will be sufficient and the risk of global inventory stagnation will be eliminated. In this way, Advantech improves the operating efficiency of its repair centers around the world by effectively reducing repair times caused by material shortages. This ensures a consistent global repair service and ultimately, increases customer satisfaction and loyalty.

Wireless, Battery-Powered ePaper Display Provides an Innovative IoT Interface

In addition to the RMA center, the Advantech Linkou Campus features many other applications of the Wireless ePaper Display Solutions. For example, as smart bus stop information displays, conference room door signage, production line logistics trolleys, and external information billboards. Sabrina Li, Product Manager of the Wireless ePaper Display Solutions believes that these devices can be used for any application that involves displaying information where color displays are unnecessary. Sabrina Li also emphasized that ePaper

devices are lightweight and readable in direct sunlight, making them ideal for IoT applications.

Advantech developed its Wireless ePaper Display Solutions by leveraging over 30 years of experience to design a series of products that could satisfy the needs of diverse industries. Once installed and activated, all the ePaper devices automatically connect to the network without complex setup procedures. Back to the star product of this story, the EPD-023 ePaper device is equipped with a built-in battery that supports up to 3 years of operation, eliminating the hassle of frequent recharging.

Regarding software and hardware product design, EPD-023 ePaper device has three features that are created to improve application flexibility. First, the solution supports three LED indicator colors that have a corresponding physical button. When these buttons are pressed, the information is displayed on the EPD-023 ePaper device. Second, using a RESTful API, system integrators can easily integrate other equipment with the Wireless ePaper Display Solutions. Third, it features a visualization interface that allows systems integrators to simply drag and drop graphs for easier template design. This key feature allows the ePaper display image to be dynamically customized for diverse data.

In this era of widespread IoT development, Advantech's Wireless ePaper Display Solutions, with their advantages of simple installation, wireless control, ultra-low power consumption, and sunlight readability, are set to become the new HMI solution for networking devices, creating innovative, intelligent IoT applications for a wide range of industrial sectors. ■

Wireless ePaper Display Solutions

Enable Battery-Powered IoT Display Applications



ADVANTECH

Enabling an Intelligent Planet

Advantech provides hardware and software integrated wireless ePaper display solutions: wireless ePaper modules, gateways, server and ePaper Manager CMS software to accelerate the implementation in a wide range of applications such as shelf labelling, digital signages in smart warehouses, factory, and public spaces. The ePaper Manager software package enables easy management over the whole system locally or remotely over the Internet using the MQTT protocol. System integrators and developers can focus on their own application development and use their application to control EPD by sending RESTful API to ePaper Manager.



2.9"

- Supports IEEE 802.15.4 / 2.4 G networks
- Low power consumption, up to 5 years
- Multiple I/O control with 3 buttons & 3 LEDs for more interactive behaviors
- Integrated with RTOS, supports OTA



5.65"

- Supports IEEE 802.15.4 / 2.4 G networks
- Low power consumption, up to 3 years
- 1 button & 1 LED for flexible usage scenarios
- Integrated with RTOS, supports OTA



9.7" & 13.3"

- Supports IEEE 802.11b/g/n + Bluetooth 4.1 standard
- Rich control I/O : expansion pin header & I2C
- Integrated with RTOS, supports OTA



32" & 42"

- Supports IEEE 802.11 ac/b/g/n, LTE Cat.1
- Multiple I/O connections
- Supports OTA, 16-levels gray scale & 2560 x 1440 pixels resolution
- Supports 4096 Color filter & 1280 x 720 pixels resolution

NextWarehouse Join Hands with WISE-PaaS IoT Cloud Platform to Establish a Fully Automated Intelligent Factory

Images provided by Advantech

Interview with John Kuo, CEO of NextWarehouse



Introducing Advantech’s WISE-PaaS IoT Cloud Platform and NextWarehouse – a system integrator/distributor of information technology (IT) and Industrial Operational Technology (IOT) who completed the last mile of industrial input and output (I/O) by connecting a cloud network for real-time local monitoring and optimization. Using this technology, their customer were able to build a fully automated intelligent factory.

The barrier for most traditional factories in entering Industry 4.0 is that the appropriate technology is not readily available. However, NextWarehouse’s (founded in 2005) solution fits the mold by helping traditional factories establish relevant architecture, enhance their IoT infrastructure, and streamline production automation. And when paired with Advantech’s WISE-PaaS platform, it not only created a complete data computing platform, but also provided solutions to problems that traditional factories encounter on a regular basis.

Cloud Data Integration, Connecting Traditional Production Data and Digital Networks

Many problems in establishing IoT connection still exist due to the difference between traditional and technological industry methodologies. John Kuo, CEO of NextWarehouse said, “Everyone in this industry is aware of the importance of IoT, but when asked, ‘is there any IoT plan?’... the answer is usually ‘No.’” Automation control technology has been widely applied in factories, but there are still many roadblocks in traditional factory operations that limit the adoption of IoT. Take data conversion for example. Common factory machines can not directly connect with WiFi. A machine that is expected to be used for several or tens of years would not be able to keep up with the rapid iteration of different communication

protocols. Therefore, the general I/O module in the factory cannot directly connect with the digital network.

“The standard protocol of many machines does not support wireless transmission, and no one will make this specific support format for them”, John Kuo said. He continues on to explain that since a group of industrial machines and tools may be used for 20 years, the protocol must be rewritten almost every three years, if the machines need to be connected with the newest transmission technology all the time. Regarding stability and universality, the new communication specifications are difficult to enter the field of industrial application.

The advantage of WISE-PaaS is that it can automatically integrate the collected data for the application and docking of all types of machines, and the factory does not need to deal with the different data protocols of different machines.

Kuo says, “We originally needed to send engineers to the factory to help them solve protocol problems; now we can just teach them to use the WISE- PaaS platform and related solutions, so that they can make their own interfaces.” He thinks that the biggest advantage of the Advantech WISE-PaaS platform is that it enables data to successfully enter the IT level from OT, and solves the most difficult link in data processing.

Provides the Most Suitable Solution for All Types of Hardware and Machines

After years of data accumulation, WISE-PaaS proves it can provide the most suitable solutions for different types of machines. Therefore, traditional factories are more willing to try new production methodologies.

In the past, traditional factories were reluctant to accept orders with special specifications even if the hardware conditions were good enough, because automated processes were so precise that even slight differences could easily lead to poor production quality. Kuo points out that if setting a customized system is compulsory to deal with a special process, the rate of return on investment is bound to be uneconomical.

What traditional factories really need is a system that can be quickly installed and applied immediately to the production line. Which is what the WISE-PaaS platform can provide; it can not only send back the status of the production line, but also gives specific recommendations for improvement. “WISE-PaaS provides a lot of detail, which is very impressive”, Kuo said with appreciation.

Convenient for Team Work Division, and Members Can Get Hold of It Quickly

From the perspective of service suppliers, the biggest problem for NextWarehouse’s move towards Industry 4.0 is personnel turnover. John Kuo pointed out frankly that the cultivation of OT engineers is not easy. Although most IT engineers are very familiar with the program, they don’t know the connection mode of I/O in the factory. It’s difficult for them to take over the task of OT directly. He also stressed that, “A qualified OT engineer needs a long-time training. If he job-hops to another company, the new engineer has to be trained again, which is not what we like to see.”

The WISE-PaaS platform can solve the talent shortage problem for NextWarehouse, as well as many service suppliers. It allows the team to work under certain a framework, which not only makes the division of labor more clear, but also makes the transfer easier. On one hand, it reduces the inconvenience caused by personnel turnover. On the other hand, it makes the existing framework more applicable to new projects. The work that an experienced engineer handles from beginning to end, now under the WISE-PaaS framework, can be distributed to several engineers. It not only makes it easier for team members to get started; it greatly reduces the cost of debugging in the middle of the process.

“Advantech has implemented a complete and practical IoT scheme, which I think is a very successful attempt,” says Kuo. Through the WISE-PaaS platform, NextWarehouse successfully shows the possibility of IoT adoption in traditional factories. John Kuo praises Advantech highly for this, and regards it as a milestone for the whole industry.

John Kuo repeated that the key to choosing partners for NextWarehouse is not the price, but the corporate culture and expertise of the team. During the communication with Advantech, he noticed that Advantech always provides corresponding solutions to the needs of their partners. “In particular, Advantech has been engaged in the IoT field for many years, and also has a lot of experience in serving customers. They integrate every link perfectly and know how to respond to customers’ problems and needs. Therefore, I have every faith in the products and teams of Advantech,” he states. He is also very confident in the future cooperation between the two sides. ■

Through edge-to-cloud integration framework, Advantech helps enterprises realize AIoT blueprint

Images provided by Advantech
Interview with Alan Kao, Product Manager, Advantech Embedded-IoT Group
Sam Chuo, Business Development Manager, Advantech IoT.SENSE



Manufacturing



Industrial Equipment Manufacturing



En

Industrial Applications

WISE-PaaS/EnSaaS
Industrial PaaS Solution

WISE-PaaS/Dashboard
Data Visualization

WISE-PaaS/APM
Asset Performance Management

WISE-PaaS Cloud Services



WISE-PaaS/DeviceOn
IoT Device Operation Management

 Device Management

 Monitoring & Control

 Update Management



EIS-D150
High Performance



EIS-D620
RISC-based



EIS-D210
LPWAN Connectivity



EIS-D120
Multiple I/O



EIS-D110
Wireless

Wireless
IoT Devices

Wired
Industrial Protocols



Controllers



IoT Devices



Sensors



Motors



Workstations



Robots

Edge Intelligence

In order to establish the AIoT link, enterprises need to invest a lot of resources, manpower and time in order to carry out complex integration and development.



Energy Management

WISE-PaaS/AFS AI Framework Service



10 Connectivity

VEGA-300
Acceleration Modules

C Controllers



NC Machines

The growth of (Artificial Intelligence IoT) AIoT is at an all-time high. High-tech manufacturing industries and traditional manufacturing industries, are eager to establish an industrial IoT with AI as the core. However, the ultimate goal of AIoT is to realize the value of data, which entails a complex process from end devices to the cloud. Alan Kao, Product Manager, Advantech Embedded-IoT Group, pointed out that the starting point of AIoT is data collection and integration, followed by visual presentation of big data on screen. These steps might seem easy to complete, but in fact, these steps are full of complexity. This includes consideration for different fields, equipment and needs; which means different data integration modules are needed, not to mention the following requirements of visualization such as; asset performance management, analytic models and algorithms, and edge computing.

In order to establish the AIoT link, enterprises need to invest a lot of resources, manpower and time in order to carry out complex integration and development. In order to simplify the process of edge-to-cloud AI-powered industrial IoT application, Advantech integrates its Edge Intelligence, WISE-PaaS, AI and other solutions into an overall framework.

EIS+ AI + DeviceOn, ensure the stable and intelligent operation of the devices

According to Alan Kao, the edge of the device includes several key components. Firstly, the hardware part is based on Edge Intelligence Server (EIS). It not only provides common RISC, Intel Atom and other architectural options, but also models with Intel Core I 3 / 5 / 7, Xeon and other high-level processors; as well as related software components of data integration and device management. Thus, making it the first set of edge computing systems in the market that support an advanced x86 architecture. It is also worth mentioning that EIS supports Modbus, OPC UA, ODBC and other communication protocols by default, meeting 70-80% of equipment data integration requirements. For other communication formats, it provides SDK (example code and original code) to help user's quickly complete development and integration.

Another important software component is WISE-PaaS/DeviceOn for collecting and visualizing the operating status of each EIS device, and use OTA upgrades for EIS software, firmware and BIOS. In addition, EIS is embedded with the Node-RED logic engine, which is used to edit the edge devices effectively. As for the introduction of artificial intelligence into the edge of the device, Advantech has cooperated with Intel and loaded Intel's Movidius X VPU into Advantech's VEGA module. This can be embedded in EIS, to produce more powerful AI acceleration effects combined with Edge AI Suite. Edge AI Suite is a software tool for AI development. Directing the users to quickly realize AI functions in application scenarios.

One-stop service for end to cloud and the implementation of AI applications

Sam Chuo, the business development manager of Advantech IoT.SENSE, added that Edge Intelligence can further connect WISE-PaaS Cloud, forming a one-stop AI service from end to cloud. For example, Everest Textile Co., Ltd. at the beginning, it only introduced EIS and WISE-PaaS/DeviceOn to collect the data of membrane manufacturing machine. Which met the demands of production line management. When Everest learned that the WISE-PaaS industrial IoT cloud platform not only provided the WISE-PaaS/Dashboard to meet the demand of data visualization, but also the

WISE-PaaS/APM for I/O point management of machine parameters. The WISE-PaaS/AFS for AI prediction and analysis, it cooperated with Advantech in POC. Which can upload the data of the membrane manufacturing machine to WISE-PaaS to monitor the key parameters, master the change of yield, and even develop AI predictive quality analysis model. Then it can put it in EIS for real-time computing to predict whether the quality of each batch of membrane meets the yield target. This example fully demonstrates the application value of the framework of EIS+DeviceOn+WISE-PaaS=Edge-to-Cloud Intelligence & AI.

So far, "EIS+DeviceOn+WISE-PaaS" has not only been used for yield prediction within the plant, but also for the production end of the device, said Alan Kao. Tong Cheng, whose reputation in the industry for its SWAN air compressor, has embedded EIS and WISE-PaaS on its sold machines. This enables its customers to read the air compressor status information, as well as external data such as; voltage, current, temperature, air tight valve pressure, etc. Thus, achieving the first stage of software service added-value. For the second and third stages, the company expects to upgrade from passive repair to active service. Then gradually promote business mode transformation, from an equipment provider to a service provider.

Now, semiconductor manufacturers begin to introduce Intelligence & AI integrated solutions. The main reason for this is that the semiconductor factory needs to test the components, and then send the test data to the background for analysis. Originally, the commercial computers were used to collect data, but there was a problem with the stability. Then, the EIS was introduced to collect the data, and with WISE-PaaS/DeviceOn to monitor its mainframe, network transmission and software operation. All of these make the semiconductor factory the group with the greatest demand for WISE-PaaS/DeviceOn.

To sum up, by combining WISE-PaaS Edge Intelligence and AI, Advantech forms the most complete edge-to-cloud AIoT solution framework at present. And it even uses high-level EIS models to handle complex edge computing and AI reasoning tasks. So now enterprises can quickly apply AI into the field of intelligent manufacturing. ■



Simplify IoT Deployment from Edge to Cloud

Cloud Applications

IoT Connectivity

Operation Management

Edge Analytics

Data Integration



WISE-PaaS/ DeviceOn

DeviceOn.App

3rd Party App



ADVANTECH

Enabling an Intelligent Planet

Advantech edge intelligence servers accelerate IoT implementation by providing integrated solutions that include edge computers, WISE-PaaS/DeviceOn IoT device operation management software and industrial app, IoT development tools, and pre-configured cloud services. Advantech provides Kubernetes-based data service servers as scalable data management platforms for private cloud solutions. Our servers facilitate IoT connectivity, light edge analytics, and cloud integration, thus offering high availability and scalability. They are flexible enough to fulfill a diverse range of edge-to-cloud IoT applications.

Data Service Server

Edge Intelligence Server



EIS-S230

High Availability

- Intel® Xeon® E3-1275 V6
- Kubernetes(Ubuntu)/ Windows Server
- PCIe, COM, GbE



EIS-D620

RISC-based

- Rockchip RK3399
- Debian
- COM , GbE
- Wi-Fi, 4G



EIS-D210

LPWAN Connectivity

- Intel® Celeron® N3350
- Win 10 Enterprise
- COM , GbE, iDoor
- Wi-Fi, LoRa, Bluetooth



EIS-D150

High-Performance

- 6th Gen Intel® Core™ U-series
- WES7E/ Win 10 Enterprise
- COM , GbE, iDoor



WISE-PaaS/ DeviceOn

Device Operation Management

- Centralized IoT device HW & SW status management
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- up to 1000 device connections





Advantech & China Unicom: Working Together for Success in China's Massive IoT Market

Images provided by Advantech

Interview with Angus Hsu, General Manager of Advantech's China IoT Embedded Business Group

The IoT market in China is growing rapidly. According to an IDC Research Report, global IoT expenditure is projected to reach roughly 1.2 trillion USD by 2022. The scale of China's market is soon expected to reach 255.2 billion USD—accounting for 24.3% of the global market and running second only to the United States. Over the past two years, many Chinese enterprises have been eager to development

IoT solutions. Among the country's three major telecom operators, China Unicom is the most active in this field.

Advantech and China Unicom Unlock Synergies with Strategic Partnership

By proactively committing to research, business development, business model innovation, and product capacity in building out their IoT capabilities, China

Unicom utilizes a wide range of sales channels and draws upon a large number of customers. Founded in 2009, China Unicom has now established branches in 31 provinces across China, Hong Kong, the UK, and other overseas regions. It is the only telecom operation enterprise listed in Shanghai, New York, and Hong Kong simultaneously. It draws on a massive customer base across different industries such as government, education, finance, and logistics.

In order to expand their customer base and provide superior services, China Unicom actively partners with companies in both upstream and downstream industries in developing new applications. Advantech is one of those partners. Advantech and China Unicom boast numerous advantages in their respective fields; with both enjoying prestigious reputations and considerable resources. Angus XXX, General Manager of Advantech's China IoT Embedded Business Group, points out that Advantech has strong technical abilities in IoT software and hardware. It has established the WISE-PaaS platform and uploaded Embedded-IoT (EIoT) solutions to the cloud. These factors make it an ideal partner for China Unicom.

The two sides have closely interacted since 2018, when Advantech began pursuing joint CCPC activities with China Unicom. This allowed Advantech to publicize its business philosophy and strategy for the IoT market: attracting more SI partners then further expanding the scope of cooperation to sales by the end of 2019 with an expectation of jointly promoting the launch of IoT industry applications. For example, joint participation in the "Industrial Internet Solution Promotion Conference," sponsored by the Shanghai Economic and Information Technology Commission and the Science & Technology Commission to promote IoT solutions, helped introduce Advantech's industrial IoT applications to the Chinese market.

IoT Solution Modularization and Rapid Replication

In order to fully support over 60,000 business operators, Advantech has been actively devoted to modular design solutions and provides professional technical support and services to integrate Unicom 5G with network applications. Relying on vast sales channels, Advantech promotes different modular

solutions for smart cities and various industrial IoT markets. Innovative cooperation not only maximizes the respective resource advantages of both sides, but also makes it easier for the end-user market to understand and quickly adopt relevant solutions for quicker IoT implementation.

As Angus mentions, Advantech's product range is quite wide. However, catering to popular demand is a complex and diverse undertaking. With the help of modular design, customers can understand Advantech products more easily and China Unicom salespeople can anticipate consumer trends more accurately. In the future, Advantech will clearly define its application markets and target customers for each module to save on communication time between China Unicom and Advantech businesses and customers. Angus emphasizes that modularity allows IoT solutions to be copied quickly to both reduce costs and attract investment in IoT from medium and large-scale enterprises. The Chinese government's "Made in China 2025" plan further outlines ways in which the state will provide subsidies and establish reward mechanisms in encouraging enterprises to rapidly introduce IoT applications.

Centralized IoT Resources Focus on Specific Fields

In recent years, Advantech's China EIoT Business Group has changed its strategy of promoting multiple applications to one focused on certain application fields such as sewage treatment, equipment networking, image identification, store management, and Edge AI solutions. Through cooperation with China Unicom, the results are expected to show in the first quarter of 2020.

For China Unicom, Advantech provides a complete package of IoT solutions for installation on its cloud platform. In turn, Advantech benefits from expanded market awareness and can now reach a much larger customer base to promote its applications. Through partnering with China Unicom, Advantech now better understands the relationship between Chinese government policies and the telecom operator—something that will influence future product planning and marketing decisions to unlock win-win outcomes in China's massive IoT market. ■



Advantech's Co-Creation Partner Conference Events Strengthen IoT Ecosystem

In order to accelerate the popularization of IoT and ensure the smooth implementation of Advantech's Edge Intelligence Solution, the Advantech Embedded IoT business group has held a series of "Co-Creation Partner Conference (CCPC)" events since January 2019. So far, 3 online webinars and 11 offline events have been held in Taiwan, China, Europe, and Japan. With the active participation of industry professionals, more than 2,000 people registered for the CCPC events, resulting in leads for more than 1,500 potential new customers. The atmosphere at the events was lively with many customers joining the WISE-PaaS Alliance as VIP members.

KC Liu, CEO of Advantech, highlighted how extensive efforts to educate the market over the last few years have successfully increased the popularity of the IoT. However, due to the massive scale and fragmentation of IoT applications, the industrial model in which a single manufacturer provides total solutions to the market is no longer viable. Instead, this model has been replaced by a co-creation business environment that comprises various types of manufacturers. Accordingly, CCPC events are the best platform for enterprises to enter the IoT industry.

The primary focus for CCPC events is the embedded technology of industrial IoT. With diverse functions and features for specific industries, Advantech's WISE-PaaS cloud platform can satisfy the requirements of various vertical IoT applications. In addition to products, Advantech also offers design and development assistance as well as global services to shorten the development period for system integrators and accelerate the time-to-market.

In March 2019, an online CCPC conference was held in China with a substantial amount of advance promotion that attracted professionals from many different cities. During the conference, speakers and audience members had lively online interactions, and the whole process was recorded for subsequent viewing by attendees and speakers. Regarding the offline seminars held in different cities around the world, in addition to Advantech professionals who introduced technology trends and shared successful application stories, the onsite booth displays attracted many visitors. The seminar attendees were impressed with demonstrations of the introduced technologies, such as the DeviceOn embedded device management software and Edge AI solutions, and were receptive to follow up from Advantech's global marketing teams. ■

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Acronis McAfee

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