MyAdvantech

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The Green Revolution

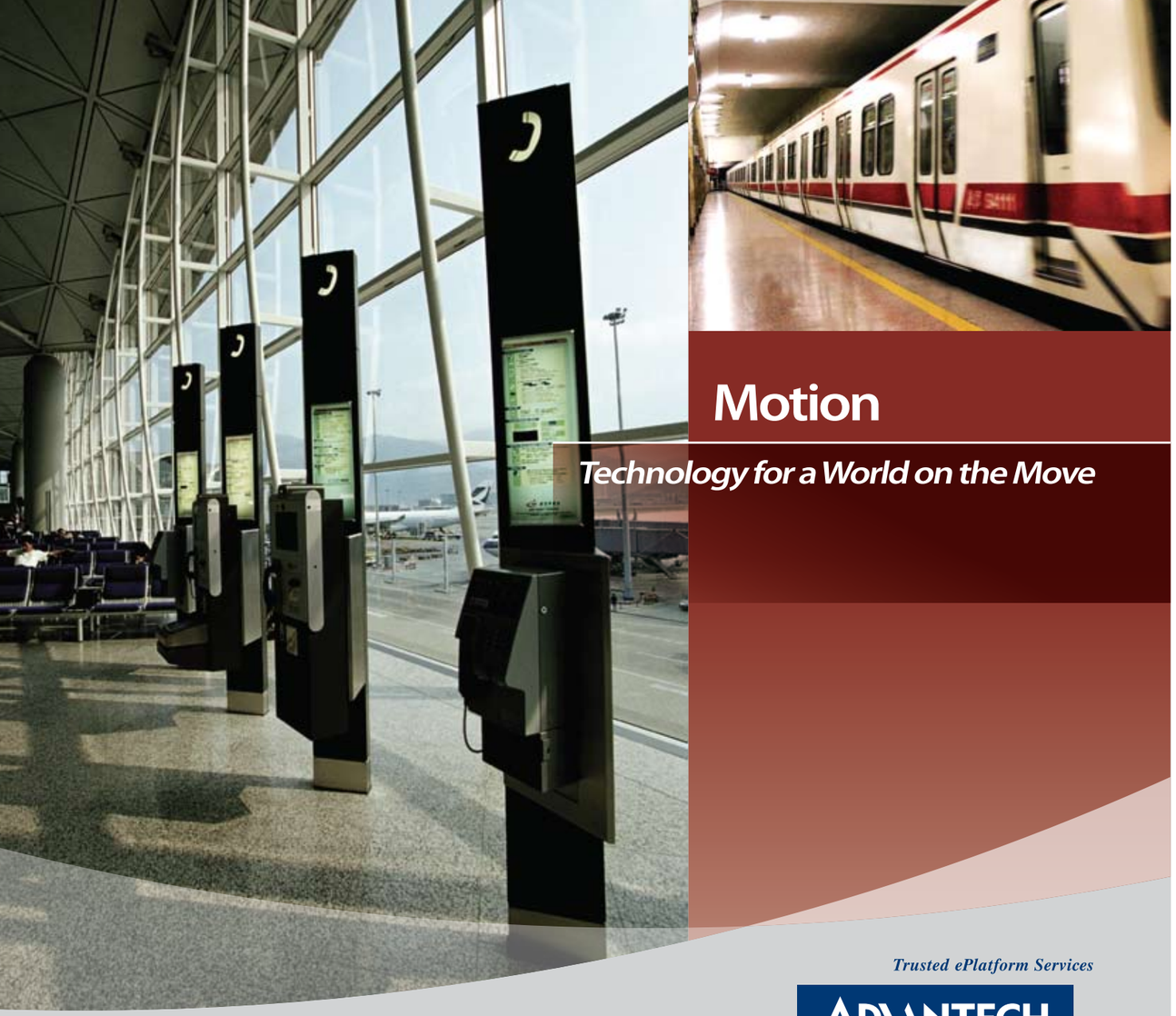
International Spotlight

Emergency Rescues Made More Efficient

The Advantages of Small Form Factor HMI

Best Practices for Networking Automation Computers

It is the performance of the network that is the critical path to optimal performance of the entire plant



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Open Business Model Opens the Door to Innovation Possibilities!

By Zheng Junzhong
Interview with Professor Chu Po-young, Department of Management Science, National Chiao Tung University

Corporate initiatives in pursuing – and maintaining – an innovative edge are necessary both to survive and to shine amidst fierce global competition. Companies need to rethink their product and technological strategies and make changes according to their operation formulas. Henry Chesbrough, Adjunct Professor at the Haas School of Business at the University of California, Berkeley, coined the term "Open Business Model" and painted the picture for the future corporate innovation landscape.

Previously, companies and enterprises operated a "closed" corporate philosophy of internal innovation and secretive knowledge hoarding, with no attempt to assimilate information from the outside. The premise of the "closed" business model was that the company had to internally research and design every aspect of the business, without outside help. Yet given the shortening product lifespan nowadays it's next to impossible over the long run to rely on product sales performance alone to balance costs. Nevertheless, through careful technology licensing, joint ventures, and spin-offs, IBM, Cisco, and P&G have reshaped their business models from "closed" to "open" by developing partnerships, and sharing resources and knowledge to grow their businesses.

Simply put, an "open" company assimilates technologies and resources from all channels possible to cut back development costs, while sourcing out other technical capacities to others to increase revenue and lower costs. This model increases benefits for the company as it unites different corporate value chains.

The biggest strength of an open business model, besides the financial gains, is that it consolidates international expertise in design, research and development, along with manufacturing and marketing capabilities from many multinationals. Some companies multiply their competitiveness through outsourcing and division of labor with other corporations. For example, instead of research and development (R & D), P & G now connects and develops (C & D) with outside designers or companies to create new, more marketable products and services.

Advantech has been a leader in the IPC industry since it was launched 25 years ago. But of course it isn't the only company in the IPC sector, therefore the challenge is to compete with others on more than just pricing advantage. Becoming more "open" is the only solution that innovatively combines ideas and resources for joint, mutual benefit from the diffusion of information.

For any company, there's another key factor when introducing an open business model into its corporate philosophy. That is finding the company's core competencies. An "open" corporation integrates other people's resources, and in some areas, its resources and talent may be integrated by others; therefore, a company should understand where its strengths lie.

Advantech's strengths lie in branding and marketing. So in order to grow continuously as a multinational, Advantech needs to be more customer-oriented. The open business model can help Advantech constructively think about its overall competitiveness from a customer's point of view, what its advantages are, what needs to be done to improve, and create a positive corporate ecosystem that is beneficial for the company, for its partners and consumers alike.

IPC has tremendous growth potential. An open business model promises a lot of room for fresh tactics and maneuverability as a company starts to grow. Therefore, Advantech needs to find its core strengths and embrace an "open" mindset as it secures its position as an integrator. This in turn will pave the way for more future success. ■

Chu Po-young

Emergency Rescues Made More Efficient

Intelligent Transportation Systems Enable Safety Management Immediacy

The quick-paced lifestyle of modern man has inadvertently led to a significant increase of road accidents. Even more troubling is that the bustling traffic caused by mass amounts of rushing commuters makes rescue work more daunting than ever before. Recently, advances in technology and Intelligent Transportation Systems (ITS) are lending a great deal of support to the teams who lead life-and-death rescue missions everyday.

By Ming, photos by Topphoto Group and Advantech
Interview with Industrial Automation Group Product Sales Manager, Jonney Chang

Surging flames threatened to swallow an apartment complex as the wailing sirens approached. Several fire engines arrive on scene and surround the site while fast-moving firemen begin piling out of the trucks to begin rescue efforts. Firemen uncoil hoses and quickly attach them to valves on the fire engine as a lone fireman rushes about filling in accident details on a handheld tablet PC. When he has completed his report, he transmits the data back to the fire department via a control panel within the truck. This simple act will inform the entire department of all the accident details, which is useful for assessing the severity of the situation, providing adequate support, and analyzing the rescue efforts when the situation is reviewed later.

What takes center stage in this example is the Intelligent Transportation System, a combination of high-tech platforms that Advantech has spent years researching and developing; and in turn garnering critical industry acclaim for doing so. Advantech has successfully marketed and implemented products for Emergency Management Systems (EMS) – a subsystem of ITS – for many years. Fire engines in the Netherlands are one of the first organizations which have adopted Advantech's ITS in-vehicle platforms.

Fleet Management Made Easy

In-vehicle platforms are primarily used for fleet management in ITS systems. The earliest fleet management technologies relied on in-vehicle radios for audio communication with the management centers. IT advances have brought about the integration of GPS, GPRS, WLAN and the popular RFID with fleet dispatch capabilities, facilitating motorcade deployment and distance monitoring. This allows companies to easily conduct fleet management with limited manpower and costs.

While fleet management services are common in the private sector, public organizations such as fire and hospital rescue vehicles demand specific fleet dispatch services which are categorized as Emergency Management Systems in ITS. EMS includes Automatic Vehicle Location (AVL), Vehicle Route Guidance, a Geographic Information System, Highway Traffic Reports, and Automatic Event Surveillance capabilities.

In an interview with Jonney Chang, the Industrial Automation Group's Product Sales Manager, he noted that ITS can be divided into two product categories, "infrastructure" and "in-vehicle". Infrastructure products have the most output value in the industry, claiming 80% of the overall ITS market, while in-vehicle devices for fleet computer controls account for the remaining 20%. Despite the lower output value, in-vehicle devices are better suited to directly improve rescue efficiency.

System Stability Guarantees Efficiency

Advantech's EMS is focused on providing quality in-vehicle platforms to enhance service and safety. Fire engines sold in the Netherlands include Advantech's UNO-2182, FPM-3060G, and MARS-3100 series products. The UNO-2182 is an in-vehicle platform that integrates GPS and WLAN telecommunication systems, and the FPM-3060G is a human-machine interface platform. These two are mounted in front of the driver's seat and provide optimal route and location information with transmission assistance. The MARS-3100 is a handheld device similar to a tablet PC, fit for easy field operation through unique, user-friendly designs.

The different capabilities allow these products to focus on specific operation purposes. When the fire engine is en route to the accident site, UNO-2182 handles computation processing and shows the results on FPM-3060G. The built-in GPRS and WLAN relay vehicle position and related messages back to the control center. Upon arrival, rescue workers bring MARS-3100 with them, film the site with a built-in video camera, and then connect the data to UNO-2182, which will transmit the site information and accident details to the emergency center.

From a capabilities perspective, these three pieces of equipment are no different than ordinary IT products, but this doesn't mean that any ordinary electronics manufacturer is equipped to build reliable products. Emergency Management Systems are directly responsible for public safety, and device stability and durability are key. Serious repercussions could ensue if emergency management equipment breaks down in life-and-death events.

Rugged & Feature-Rich Platforms

Harsh environment resistances have to be fortified to increase product stability. Extreme temperatures, impact and vibrations in vehicle EMS are measured according to certain criteria. Take the fanless UNO-2182 for example; its wide range of operating temperatures, anti-shock, anti-vibration, and impedance against outdoor glare make it suitable for outdoor use and dependable enough to trust with emergency use. Advantech's screen interface incorporates transflective LCD technology to prevent strong ambient glare from compromising picture clarity, reflecting the ambient light passing from the LCD cell and utilizing the reflected light beams as illumination. This technology reduces product wear and tear and improves display luminance.

For the I/O ports, Advantech products come with versatile communication interfaces. UNO-2182 is equipped with a PCMCIA slot and wireless WLAN connectivity to communicate with MARS-3100. Advantech is also experienced in designing I/O modules connectable with other vehicle control devices. Mr. Chang explained that high-performance solutions and integration capabilities are one of Advantech's strongest advantages. Another strength lies in Advantech's comprehensive product line, allowing system integrators to take advantage of a one-stop shop with guaranteed cross-compatibility between products.

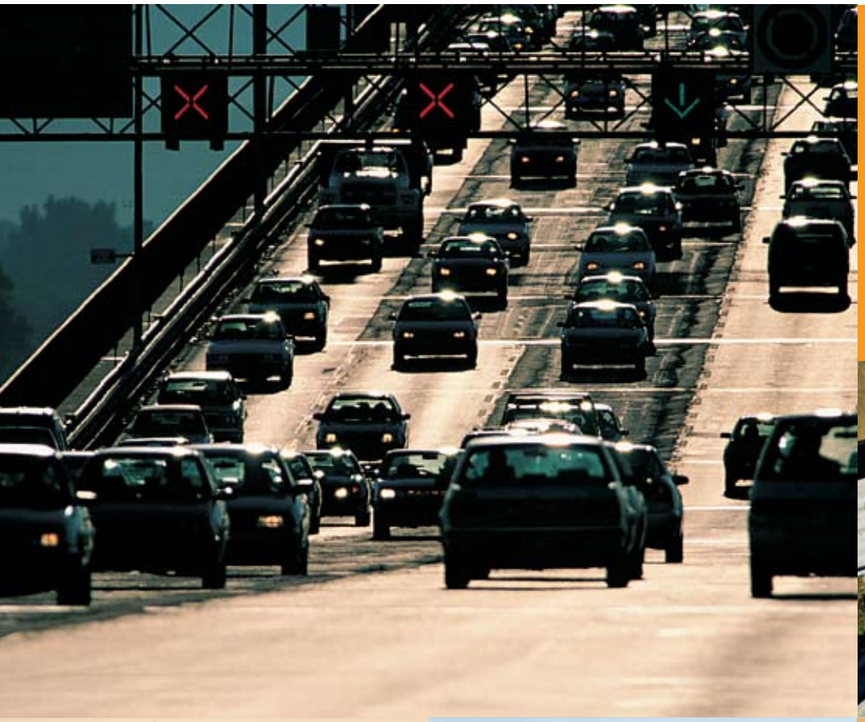
Life and property can be better protected with the ready assistance of Advantech's emergency rescue products, and emergency service personnel can rely on Advantech's solutions and platforms in times of need. ■

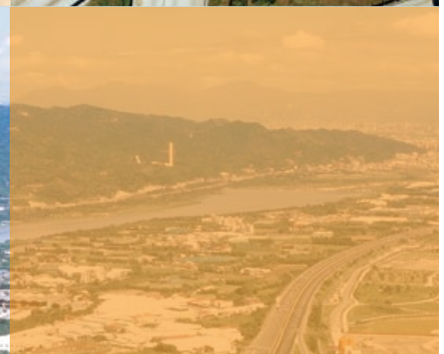
Exploring Intelligent Transportation Systems

Improving Roadway Safety and Efficiency

Taiwan's National Highway No. 1 has faithfully served the people of Taiwan for decades as the island's main artery. At 372.7 kilometers in length, the highway relies on a dependable information system to expedite smooth vehicular traffic flows. Advantech's Intelligent Transportation Systems (ITS) have made that possible, ensuring drivers are always provided with a safe way home.

By Ming, photos by Advantech
Interview with Industrial Automation Group Sales Engineer, Zhu Huangwei





"Ubiquitous" has been an omnipresent buzz word in the IT industry in recent years, used to represent both products and solutions. Ironically, as these evolving technologies become more integrated in our lives, their existence becomes less noticeable; such as in the case of mass transit systems in major cities worldwide. As pedestrians and drivers go about their business, their commutes are becoming much more efficient, with improved stoplights and information displays.

Automated Traffic Management Systems

Mr. Zhang works as a driver for a freight shipping service. One morning he left for work and walked to his usual bus station. The overhead ticker display showed that his bus would be arriving shortly, providing him enough time to grab a coffee and still catch the bus. While he was dozing off on the ride, the vehicle came to an abrupt halt – a stoplight had broken down, it seemed. Soon the authorities arrived on scene with a set of wireless backup signal lights to direct traffic and get all the vehicles moving again.

When Mr. Zhang arrived at his office he was informed that a cargo owner needed an urgent delivery to Kaohsiung. Mr. Zhang went online to look up the highway traffic conditions, got information on the quickest route to Kaohsiung, quickly loaded his truck and got started on his way. As his truck pulled onto the highway, the highway interchange picked up infrared signals sent from the radio in his truck and recorded his departure time and planned route. Later during the trip, an LED display in his truck informed Mr. Zhang about an accident up ahead on the road. This allowed him to take an alternate route to arrive in Kaohsiung on time.

Through this anecdote, we learned about the information ticker at the bus station, wireless backup stoplight signals, traffic condition displays, and the highway interchange information system. These installations are already a part of Automated Traffic Management Systems today, and very much "ubiquitous" in our life.

Traffic Regulations – A Walk in the Park

In an interview with Industrial Automation Group Sales Engineer, Zhu Huangwei, he explains that Advantech's highway applications are categorized into three types – gateway control, display controllers, and highway traffic condition messages. The platforms which made the Automated Traffic Management Systems mentioned in Mr. Zhang's case possible included Advantech's UNO-2172, UNO-2171, and ADAM-5000. The UNO-2172 offers optimized onboard device drivers for large LED displays, while the UNO-2171 provides excellent control efficiency for VGA LED displays. The ADAM-5000 can accurately calculate signal light durations at an interchange using DI/O and COMport interfaces to control traffic flows on the highway.

Controllers used for highway traffic management have to withstand critical conditions, monitoring traffic streams and vehicular speeds that are both heavier and faster than those on regular roadways. To provide service that commuters can depend on, they also have to be extremely resistant to heat and dust

Designed for such use, Advantech products can meet the extreme requirements of highway control. Zhu notes that Advantech's market edge in this area is built on its reliable offerings to system integrators. Clients can purchase all sorts of traffic control products from Advantech's one-stop shop, and experience quality post-sale services.

Information display systems are beginning to appear on highways across the world, providing safer and more efficient traveling, while Advantech's successful collaboration with system integrators is improving these systems everyday. ■

Biometric Identification Facilitates Personnel Management

BioAPI Systems Simplify Machinery Operations

The modern high-tech age is abuzz with security and human lifestyle concerns. The marriage of information technology and BioAPI (Biometric Application Programming Interface) has become one of the hottest security developments. BioAPI can be powered with secure, highly reliable IPC hardware using fingerprint and palm vein recognition technology, and is already well used among a range of industries.

By Lin Ping
Interviews with Morgan Wen, Deputy Product Manager, Advantech eServices & Applied Computing Group, and James Young, Chief Operating Officer, Sunvision
Photos by Advantech and Sunvision Technology

Joyce works as a product line director for a prominent pharmaceutical company. At the start of her workday, she inserts her finger tip into the fingerprint reader at the pharmacy packaging plant. The reader verifies her ID, and Joyce immediately accesses the system's User Interface; she then formulates the day's manufacturing procedures. When afternoon comes, Joyce again activates the fingerprint reading setup, switches to another product line operation, and records the changes. She used the same fingerprint reader to access and download the day's production report before wrapping up the day's work.

Fingerprint authentication is arguably the most mature and widely used of biometric technologies. Its ability to distinguish individuals and its security capabilities render it widely popular among financial, government, military, law enforcement, and factory establishments. Biometrics has now extended into the corporate world, residential complexes, mobile devices, USBs and other daily applications. Advantech combines BioAPI with its diverse IPC experience and integrates the technology into its panel PC series to provide innovative IPC applications.

Staff Management Simplified

A host of facilities and services depend on positive and accurate identification of personnel, clients, applicants, and anyone who seeks or needs access to sensitive information, equipment, or facilities. These include membership to corporations, government centers, military, medical facilities and many other organizations which require high security. Before the advent of biometrics, quite a bit of labor was required to meet all the demands for positive identification. But now, thanks in part to BioAPI, much of this burden is on its way to being automated. The adoption of biometrics promises to expedite operations and also to minimize one of the common problems in conventional access management-the forgetting of passwords.

Morgan Wen, Advantech's eServices & Applied Computing Group Deputy Product Manager, notes that Advantech currently has adopted several BioAPI solutions, including Digital Persona's U.are.U, AuthenTec's slide fingerprint sensor, vein-recognition technology from Hitachi, and palm vein technology from Fujitsu. Adding BioAPI software support from global partners, Advantech's tablet PCs come alive with biometric functionality to meet industrial demands. Mr Wen said that Advantech's tablet PCs have comfortably secured a pioneering position in the vertical industry's innovative application niche, and in light of the maturing fingerprint authentication technology, over 80% of notebook computers are projected to possess such capacities in 2009. Advantech has also moved to integrate BioAPI into its panel PCs to help address corporate management issues.

Wider Application Prospects

James Young, COO of Sunvision, Advantech's BioAPI partner in Taiwan, asserts that his company's BioAPI software, complemented by high-tech fingerprint sensors, can assist Advantech in meeting the system integration demands in industrial circles for biometrics technology. An Advantech/Sunvision alliance has enabled the introduction of BioAPI for a burn-in room at a plant belonging to a well-known Taiwanese LCD maker to authenticate staff ID and clearance control. This system prevents inadvertent intrusion into the room, and helps reduce operation errors while ensuring plant safety; it can even trace employees' operational status for efficient management.

The consolidation of Advantech's software, modules and components and system integration partners facilitates a global supply chain network that follows Advantech's three-stage plan. Firstly, clients may sample a single fingerprint scanner to experience its strength for themselves; secondly, Advantech will embed the all-in-one BioAPI into the tablet PC for clients' application purposes. And lastly, Advantech can develop an automated, one-piece mini-kiosk, packed with biometrics functions for home care purposes, self-service personnel management, or automated service facilities in the banking and financial sectors.

Wen envisions wider and more serviceable BioAPI applications in personal, corporate, and governmental sectors in the next few years, and expects that the technology will move from a "nice-to-have" addition to a "must-have" feature. Advantech's hardware offerings and software support from its global partners paves the way for initiating BioAPI into versatile applications for clients, giving the IPC landscape a new outlook. ■

What is BioAPI?

BioAPI is an internationally recognized set of standards for biometric enrollment and verification systems (biometric ID systems), and is intended to assure the interoperability of modules from independent vendors. BioAPI includes the latest ID authentication technology using measurements of physical characteristics – namely facial features, fingerprints, iris or retina modalities, and palm patterns. Traditional password setups and IC card identification systems can create problems if passwords are forgotten, or cards are lost or stolen. BioAPI requires no passwords, no ID badges, and is free of theft troubles.

Digital Signage Establishes Open Framework

Industrial Collaborations Bolster Market Niches

The establishment of open standards for the digital signage industry is arguably the most important impetus for securing and advancing the industry's future development. A successful Digital Signage Standards Committee hinges on contributions from all sectors to expedite the inauguration of a common protocol that will pioneer the digital signage industry into a new era.

By Lin Ping
Photos by Advantech

Newspapers, magazines, and outdoor billboards play their parts in traditional media, but thanks to advances in LCD display technology and certain growing price advantages, digital signage is now widely applied in displaying full-motion video, animation, still images and text to provide information, entertainment, and advertisements. This increasing popularity has enabled digital signage to replace posters, traditional signage, and billboards to become the contemporary adfotainment platform. The wide adoption of digital signage in diverse applications with full-motion video and its compatibility with interactive technologies have helped it surmount traditional advertising limitations and win over marketers as the new-generation advertising superstar.

There's No Stopping Standardization!

Digital signage products today are mostly closed, proprietary systems without a uniform communication protocol. Suppliers have their own server TCP/IPs, display sizes, specifications, and software frameworks, and the lack of interoperability means digital signage is seen as an inferior medium to nationwide advertising agencies. Yung Yu, Senior Director of Advantech, indicates that the shortage of open standards presents the greatest hindrance to unleashing digital signage's potential; the setup of such standards will only spur the medium's future growth.

John C. Wang, CEO of IAdea Corporation, says that industry organizations such as POPAI (Point-of-Purchase Advertising International) have moved to establish the Digital Signage Standards Committee, pooling resources from Scala, LG, Samsung, Cisco, and PRN to jointly set up the necessary protocol. IAdea and Advantech are the only two Taiwan corporations on the committee.

On the Horizon: Industrial Value Chain Ensures Prospects

Mr. Wang says that the Committee has drafted communication protocols for different servers, the goal being interoperable

News summary

Exchange Server Standardization	The inauguration of a uniform, interoperable online booking system. The defining of a uniform digital signage time slot. The setup of an instant message bulletin board.
Interoperable Player Standardization	The reference to the SMIL player markup standardization structure. The establishment of a uniform digital signage player interface.
Content Standardization	The initial definition of the 3-level player content: Level 1: Audio and video files supporting MPEG format at 480p. Level 2: Audio and video files supporting MPEG and H.264 format at 1080p. Level 3: Interactive content.

Note: All the standardization protocols are currently in the process of being drafted.
The information listed above is for the preliminary standardization procedure.

broadcasts across different internet media to minimize network blockades by certain media; meanwhile, interoperable players and screen specifications are also being mapped out to introduce consistency of display resolutions and dimensions. The measure will scale back time and effort wasted on developing broadcast content to accommodate various players and displays.

An online booking system will be in place that allows clients to determine a desirable broadcast hour. The World Wide Web Consortium's SMIL (Synchronized Multimedia Integration Language) will be mapped onto the digital signage communication protocol in order to unify the player interface modules. Next, digital signage screen formatting will be defined by a three-level specification protocol: level 1 being MPEG at 480p; level 2 being MPEG+H.264 at 1080p; and level 3 being defined by the screen's interactive module in the future. Mr. Wang says the drafts will be completed next year, and put into practice upon the committee members' consensus. He also notes that digital signage marketability should expand as system suppliers are willing to develop interoperable systems.

Yung Yu concurs that open standards would increase rivalry in the digital signage market, yet such rivalry is constructive for the development of high-performance, high-efficiency, and high-quality products and services; and quality developers will certainly triumph in the client-centric digital signage market.

This is an inevitable evolution in digital signage that weeds out sub-par products while encouraging suppliers to improve their technical edge. Backed by their extensive market and customer service experiences, Advantech and IAdea are duty-bound to be the Taiwan's representatives on the Committee, and they are hoping to enlist greater industrial participation from Taiwan to help expedite the standardization process and establish a sound supply chain that ushers in the wealth of prospects in the digital signage market. ■

The Advantages of Small Form Factor HMI

A Thinner, Reliable, Portable Product, Made with Green Materials and Lower Cost

Now that the small form factor HMI is a fully functional PC, this inherent flexibility and universality greatly increases the small form factor HMI's application in multiple vertical markets. These HMI are thinner, more reliable and portable, and use more environmentally friendly materials ever than before.

By Hector Lin, Advantech Corporation, Industrial Automation Group

Strictly speaking, any mechanism for a human being to "interact" with a machine is an HMI. The touch-panel on your microwave is an HMI, the dial on your washing machine, and even your standard TV remote control is an HMI.

Originally, transmitters and sensors had no HMI, and many didn't even have a display. These are considered 'blind', with only an output signal. Some had a rudimentary HMI: a single or dual line ASCII display with a set of arrows for programming, or a 10 key keypad. Very few field instruments, sensors or analyzers ever had HMI panels that could actually provide good graphics, with an easy way to understand how to enter data and commands, let alone provide a high resolution window for the process.

Early HMIs that used full computers or display screens were limited to control rooms because of the fragility of early computer circuitry, screens and disk drives. Enclosures were developed that would allow a computer-based HMI to be located out on the plant floor, but these were very large, bulky and prone to failure from heat, moisture, dust, and other environmental hazards.

Early computer-based HMIs also operated at very high temperatures and were significant power consumers. A typical "desktop" computer in the 1980s required as much as 200W.

Small form factor HMIs coupled with small form factor embedded computers have revolutionized the use of HMIs on the plant floor. But what features should a modern HMI have?

Can be used in space-limited areas

More and more PCs and embedded PCs are being used in manufacturing applications for networking and shop or plant floor controls. Many of these devices are of limited utility unless accompanied by some sort of HMI. A small form factor HMI provides increased capability for operator interface for recipe management, alarm management and operational control. Small form factor HMIs can be installed on a wide variety of devices and tools, in addition to the traditional control desk or panel mounting.

In fact, HMIs can now be so small that they can be installed in the same space that would have previously consumed by a single push button and a single indicator light. So in less space than a typical Hand-Off-Auto station would have required in the panel, the operator can have a fully featured small form factor HMI, with an infinite number of push buttons and indicators.

In addition, the modern small form factor HMI has common programming languages and operating systems.

Thin client or embedded PC

The modern equivalent of a 'dumb' terminal, thin clients are used in many distributed networking applications where either the program and operating system are loaded from a network server, or a "light OS" such as Windows CE or Windows XP Embedded is provided in flash memory for a specific purpose computing system.

Thin clients can often be used instead of full PCs for embedded computing applications. Thin clients are often combined with an HMI, and when the HMI has a small form factor, the entire product, HMI and thin client processor, may be physically only as large as the HMI display itself. This of course makes it possible to use an integrated thin client/small form factor HMI in locations where a traditional HMI and associated PC would not fit or be functional.

While a traditional PLC operator station has a proprietary operating system, the use of Windows CE, or Windows XP Embedded, or even Linux as HMI operating systems means that required operator training is less, and, even more importantly, the number of available programmers who can work in that common commercial environment is much larger, making embedded PC HMIs easier and less costly to use than traditional operator stations.

Lower power consumption – green products

Increased power usage worldwide has given rise to the need for computing devices with much lower power requirements. Typical HMI products, including CRT displays and even LCD displays, along with PCs that have cooling fans, hard drives and other moving parts are known to be power intensive.

A small form factor HMI built to be used with a fanless embedded PC or thin client requires significantly less power than a traditional HMI/PC combination. For example, the power consumption of Advantech's newly released 3.5" QVGA TFT LCD Xscale PXA270 Touch Panel Computer is only 8W.

The use of lower power consumption HMIs and embedded PCs and thin clients permits the use of more devices for the same power load, or, conversely, overall lower power consumption and thus lower cost of ownership than previous generations of HMIs and computers provided. Plus, lower power consumption small form factor HMIs and embedded computers are a contribution to the "greening" of manufacturing technology wherever they are used.

Portability when required

One of the greatest benefits of the lower power consumption necessary to run small form factor HMIs is the ability to operate on small batteries. This, plus the very size of the small form factor HMI has made it possible to produce industrial grade portable HMI devices that are far superior to commercial grade laptops and touch-pads.

In some cases, these portable devices can be entirely wireless, providing an HMI, computing capability, and data acquisition capacity that is able to roam wherever the operator wishes or needs to go in the plant.

Increased reliability

Lower power devices like small form factor HMIs are also designed with very high levels of component integration and VLSI circuit boards. Fewer components and lower power requirements improve the overall reliability of the computer. Mean times between failures (MTBF) are lengthened when this combination of lower component counts running at lower power levels is extended to small form factor HMIs.

Reduced costs

High level integration and small form factor makes the modern HMI less costly, both to manufacture and to purchase. Higher reliability makes the total cost of ownership (TCOS) lower than older designs, as well.

Better cost-benefit ratio

A modern small form factor HMI can be purchased for about the same cost as a dozen push buttons and indicator lights, but provides better control, easier operator interaction, easier maintenance and support, and much greater operational utility for the same cost.

Fits a broad range of vertical markets

Small Form Factor HMIs can be found in a wide variety of applications in a large number of vertical markets, not only in industrial automation. They can be found in commercial applications; HVAC applications such as zone controllers and data acquisition systems; machine control applications; environmental monitoring applications; telecom applications; automotive applications; and many more. Because the small form factor HMI is a fully functional PC, not just a PLC operator terminal, this inherent flexibility and universality greatly increases the small form factor HMI's applicability in multiple vertical markets. ■

Best Practices for Networking Automation Computers

Whether you are operating a conventional process plant DCS or using a set of automation computers as networked controllers in a discrete automation plant, it is the performance of the network that is the critical path to optimal performance of the entire plant. But how do you find the best practices for networking automation computers?

By Mike Berryman, Advantech Corporation, Industrial Automation Group

Automation computers are everywhere, and have many purposes. Modern automation computers are connected to networks that may be interconnected with other networks throughout the plant, and via TCP/IP to the entire world.

This is far different from the early days of automation, in which many systems were "islands of automation" in the plant. The operation of the controller was fundamental, though there was little or no need to connect the controller to the rest of the control systems on the plant floor. What data was being collected was collected manually, using the operator-and-clipboard method.

Nowadays, an automation computer is almost always a network node on a network that connects the operation of the entire plant, and connects the plant floor to the enterprise. The network that connects those automation computers is sometimes more important to the operation of the plant than the individual automation computers it connects, and even the enterprise systems it interfaces with.

How can this be? Aren't the programs in the automation computers critical to plant performance? Aren't they critical to the manufacturing process?

Well, yes, but because of the fact that control of plant processes is significantly distributed, whether you are operating a conventional process plant DCS or using a set of automation computers as networked controllers in a discrete automation plant, it is the performance of the network that is the critical path to optimal performance of the entire plant.

Following the "Yellow Brick" Ethernet Road...

Throughout the 1990s, the path toward true plant interconnectivity appeared to wander around a lot. There were lots of false starts and dead ends before Ethernet finally became the global standard for networking in the enterprise. Finally, it became the global standard for networking on the plant floor as well. Industrial Ethernet is robust, deterministic, flexible and resilient enough to perform in the harshest of environments, including the plant floor.

Getting there hasn't been easy. In fact, it has been like the journey down the Yellow Brick Road. An Ethernet network that works just fine in an office environment is almost certainly not robust enough for the plant floor. The plant floor has hazards that simply do not exist in an office, like electrical and electronic noise, power surges, power failures, and the like. When we begin to look at the Ethernet environment that is recommended for the factory floor, one thing is certain. "We're not in Kansas anymore!"

The only way back to Kansas is to get the network done right. For that you need a guide. You got an Ethernet "Wizard of Oz?" If not, you better get one...

Ethernet to the North and South

In most plants, there are actually multiple Ethernet networks. There are the device networks on the plant floor. They connect sensors and fieldbus networks and devices to controllers and connect controllers to area controllers and control systems. There are the area-wide networks that group together device level networks and pass data up to higher level networks and computers, and pass data and instructions down to the device level networks.

These networks need to be deterministic, and capable of handling high traffic loading. Most of them require not just a typical Ethernet router, but an Ethernet switch, and in many cases, multiple Managed Ethernet Switches to interconnect the controls networks and connect the Control Network to the MES/ERP/Plant enterprise network.

Plant Ethernet systems don't just carry information to and from the device networks either. Often, plants now have VoIP communications networks that also run on Ethernet, and many plants have video inspection and surveillance systems that are also running on the same or co-existent Ethernet networks that the device networks run on.

Sometimes, an automation computer being used as an HMI or a controller is also being used as a router between networks.

A network consists of several parts. There are, of course, the automation computers that make up the nodes that we usually think of: the devices and controllers. There are also the automation computers that make up the routers, switches and servers that route the data and keep the network running. Finally, there is the cable, or media, that the network runs on.

Redundant Networks or Redundant Paths?

Industrial networks need robust architectures. Typically, several LAN switches are connected together in a ring, and the Ethernet devices connect to the ring. Standard Ethernet rings are not a fully redundant topology, and are less robust than is required on the plant floor, in either discrete or process industries.

A fully redundant ring topology protocol is usually available from the switch vendor, such as the dual X-Ring topology from Advantech that provides users with an easy way to establish a redundant Ethernet network with ultra

high-speed recovery time of less than 10ms.

Thus, there are two ports, two cables, and duplicated LAN switches with duplicate IP addresses for each Ethernet switch in a truly redundant system. The switch protocols make sure that all the devices on the ring use the same application layer protocol and LAN redundancy mechanisms. This redundant ring topology prevents a single network break from impeding the network path, while permitting "best x of y" voting for synchronization.

Even though the ports, cables and switches are duplicated, this provides the application with certain simplicity, since the redundancy is essentially transparent to the user of the network.

Gigabit or Bust!

The proliferation of high bandwidth applications in the plant environment has caused a major migration from standard Ethernet (10/100) to Gigabit Ethernet. Gigabit Ethernet, once only used for major trunks or rings, is becoming the standard for network speed. Some of these high bandwidth applications include VoIP communications, wireless backhauls, high bandwidth surveillance video, and machine vision applications.

VoIP communications carried on the plant network mean that operators and other plant floor personnel do not need to carry a plethora of communications devices (cell phone, PDA, walkie-talkie, etc.) and can carry a single phone or PDA device which handles all their communications needs. The burgeoning market for wireless devices in the plant and on the shop floor has already required increased bandwidth from the wireless gateway to the control systems (the backhaul). More and more, plants are concentrating their security systems into the same networks that carry plant data and the VoIP communications network. This, too, is requiring Gigabit Ethernet. AIDC applications like automatic barcode readers and active or passive RFID readers have also increased the required bandwidth on the plant floor. Finally, advanced sortation and control algorithms have been developed for machine vision systems that make them even more useful in many applications than they have already been.

All of these applications have made it necessary for the typical Ethernet switch to be capable of gigabit speeds, as well as robust redundancy.

Legacy Networks / Device Integration

Notwithstanding the huge gains and the standardization of most of the plant networks on Ethernet since the 1990s, there are still many devices on the plant floor that are not directly able to use Ethernet for communications. Many are serial devices, using RS-232, RS-422, or RS-485 communications. Others use proprietary communications networks, like Modbus, or Profibus or Foundation Fieldbus. Some Modbus devices can connect to an Ethernet LAN using Modbus/TCP protocol. Others need a Modbus-to-Ethernet Gateway.

Serial devices are ubiquitous, as well. They, too, require gateways to be able to connect to an Ethernet LAN. These devices can be field mounted, for ease in connection to a single device like a barcode scanner or an analyzer, or they can be part of the network architecture and mounted in rack or panel configurations. Having the ability to convert serial data to be carried on Ethernet networks to serial data servers in PCs mounted remotely makes it possible to utilize many of the existing assets in a plant network.

Profibus and Foundation Fieldbus networks require gateways, as well, except for FF HSE, which is an Ethernet protocol specifically for Foundation Fieldbus devices, and Profinet, which performs the same function for Profibus devices and network nodes.

As wireless networking grows in popularity, wireless network gateways are also being required to connect the wireless sensor networks to the infrastructure. So what should an "industrial strength" automation computer that is being used as an Ethernet network appliance look like?

They can have many different physical shapes and construction. They can be designed for mounting in the field, such as Advantech's EKI serial device servers. They can be designed for rack or panel mounting such as Advantech's UNO embedded automation computers. They can be designed for mounting in Ethernet ring structures, such as Advantech's EKI Ethernet switches.

They need to have industrially-hardened circuit boards, wider-than-commercial operating temperature specifications and industrial mounting to prevent damage from shock and vibration. In other words, they need to be as robust as the plant floor devices they are networking.■

The Green Revolution–
International Spotlight

Eco-friendly Energies Step It Up!

By Lu Mingfang , Photo by Advantech

Energy from the sun supports almost all life forms on earth. In the beginning, the planet's atmosphere was laden with carbon dioxide and hot as a fireball. Several billion years of history have affected atmospheric compositions, and helped fashion a life-form-friendly equilibrium system. Yet, the balance of this biological system suffered unprecedented havoc after the Industrial Revolution as humans heavily exploited the earth's fossil fuel energies, deforested woodlands, and overused CFCs (chlorofluorocarbons) to generate a growing amount of carbon dioxide and methane, gases that are of specific wavelengths that trap the Earth's heat in the atmosphere, namely, the greenhouse gases. Human activity has released carbon-based fossil fuel energies to excess, and the Earth is unable to counter balance them, so temperatures are rising at an alarming rate.

Studies by the Worldwatch Institute showed that by 2000, the atmospheric CO2 concentration had reached 370 ppm, a rise of 32 percent from pre-industrial levels of 280. According to the Statistics Division of the United Nations, the three largest national producers of CO2 emissions since 2006 have been China, followed by the US, and then Russia. However, if calculated by per capita carbon emissions, Taiwan follows the US as the world's third largest producer.

With 80% of the world's energy supplies reliant on coal, petrol, and natural gases, issues over global warming have become a decidedly intricate international political challenge as carbon dioxide productions are directly linked to every country's energy structure and national economic development, despite widespread qualms about fossil fuel production contributing to global warming. Wanton squandering of fuel resources will not be possible for much longer however; the International Energy Agency forecasted that energy consumption will double in two decades; supply will deplete in 50 years. This is a global crisis, and has forced scientists to hunt for diverse renewable energies.

Green Energy Development Gets Going

The 19th century was an era of coal–the 20th of petroleum. Now, other possibilities are coming to the fore in the 21st century, including wind, hydro, solar, tidal, and geothermal powers, which are reliable, yet diverse energy prospects. These inexhaustible natural resources produce few contaminants during energy transformation and are collectively called Renewable Energy Technologies.

The substitution of renewables for traditional fossil fuel resources is no longer pie in the sky. Substantial capital, research, and technology have been pooled from many nations for further research & development, and governmental actions are in place to map out eco-policies. For the U.S., the federal and state governments will devote more than $7 billion into energy efficiency programs in the next five years. BP in the UK is studying alternative methods of fuel, including solar and wind, and forming strategic alliances with other energy firms to develop carbon sequestration technologies for greenhouse gas repository. Taiwan's Economics Ministry lists photovoltaic, solar water-heating systems, wind power, biofuels, and hydrogen technologies as key agenda items in the green energy industry development program, hoping to raise the green energy industry output value to US $20 billion by 2015. Green energy technology expansion will also spawn new opportunities, while eco-friendly lifestyles move to define humanity's future.

The Green Earth Mission

The Earth's long term survival depends more than ever on mankind's actions in the 21st century. The Kyoto Protocol went into effect as of May, 2008, after 181 countries ratified the agreement in a move to reduce greenhouse emissions to a level 5.2% lower than the amount produced in the 1990's. In the just-concluded East Asia Summit, 16 countries including: China, Japan, Korea, India, and Australia signed and released the Singapore Declaration on Climate Change. The agreement sets targets for building an effective, comprehensive and just multilateral mechanism to tackle the challenges of climate change, collaborating on low-emission technologies and raising fuel consumption efficiency, while adopting concrete measures on introducing renewable and alternative bio-fuels.

The Green Consumerism Movement in the private sector also facilitates and affirms the values of these eco-aware actions and renewable technology services, in addition to governmental and corporate policy shifts. Consumer actions can influence eco-friendly behavior, guiding and changing industrial production and marketing approaches, thereby scaling back negative environmental impact. Energy efficiency and eco-protection span political, economic, and national frontier concerns across the board. People's lifestyle and dietary choices directly and indirectly affect the environment, and energy production and climate change affects all life forms on the planet. ■

Safeguarding Energy and Environmental Sustainability

Advantech Taps Into Diverse Energy Saving Applications

By Lu Mingfang , Photos by Top Photo Group
Interview with Industrial Automation Group's Planning Deputy Manager -Tiger Yeh

Advantech's energy saving products are being applied in a wide range of industrial applications, from energy development and power substations, to energy efficiency and pollution-free power storage. The combined energy saving effort of all Advantech products is significantly contributing to the preservation of our Earth.

Global demand for renewable biofuels is booming as our depleting fossil fuels continue to become more expensive. As the authors of *The Natural Advantage of Nations* expound in their book, sustainability through green technologies is the nexus of improving energy efficiency and energy demand management

The Wind and the Sun

In two years' time, the 70-floor Freedom Tower will soar above Lower Manhattan in New York City at the former World Trade Center site. This new centerpiece of the Big Apple will be powered with a 6,000W small wind turbine, which is projected to supply 80% ~ 95% of needed power to the tenants, a measure that will cut back over 6.2 tons of carbon dioxide emissions.

Wind power is one of the fastest-growing renewable power generation technologies. According to a survey by World Wind Energy Association (WWEA), worldwide installation and capacity between 1997 and 2006 grew by ten-fold. Although wind currently produces just over 1% of worldwide electricity use, it's estimated by 2010, 160GW of capacity will be installed worldwide, up from 73.9GW at the end of 2006.

Wind-generated electricity is powered by wind turbines, and a reliable computer system is necessary to record, monitor and store data when the wind turbines are in operation. Because the power-generating wind farms are installed in harsh environments where strong winds are constantly present, the monitoring facilities have to be highly reliable, with shock and noise resistance, supporting wide operating temperatures. The deployment of the operating system introduces another key factor: the computer must be fanless. The installation of a fan in the system could compromise its reliability over long-term operation.

A large wind power generator in Germany uses Advantech's fanless, embedded automation computer, UNO-2160 as its distance monitoring system, which uses an Ethernet Optical Network to connect every individual monitoring node. The system is economically effective, and can control and inspect turbine functions and integrate information for databank storage. Another wind power company in the US followed this template and included an embedded automation computer, UNO-2170, to be paired with an Advantech EKI-7000 series Ethernet switch to monitor a 328-foot high, 163.3-ton wind turbine, whose distance between blades measures an astounding 231 feet. The strengths of the UNO series fully satisfied the needs of the wind power generation facilities, offering a fanless, diskless and rugged design.

Solar power is another popular form of alternative energy and estimated to account for 10% of the world's electricity generation by 2030. A system maker in the US wanted to create a simple status terminal to monitor solar power usage, and they chose Advantech's ADAM-4019+, Universal Analog Input Module for the SCADA systems. This streamlined the I/Os needed for every system down to two, and lowered the overall manufacturing cost.

Advantech does not stay complacent with its current service applications, but is very active in extending corporate energies into other areas, such as sponsoring the University of Cincinnati to join the prestigious Solar Decathlon, by donating the ADAM-5550KW Programmable Automation Controller for use as the core framework. The team built an 800 square foot residential house that relies solely on solar energy for power.

Integrating Web-based Solutions into Substation Management

In addition to renewable energy development, one also needs to be judicious with energy consumption, which can be done in two ways: one is to retrench on power, and the second is to improve energy consumption efficiency. One of the most practical approaches to enhancing

power performance is to conform all substations to the IEC61850 criteria.

As a benchmark for the design of substation automation, IEC61850 is a part of the International Electrotechnical Commission's (IEC) Technical Committee 57 (TC57) reference architecture for electric power systems. In addition to implementing automation, the new architecture also settles issues with interoperability of IED devices from different vendors. Through Web-based technologies and secure interconnected web applications, efficient remote management of the substation is possible. Advantech's UNO-4678 incorporates an EKI-7000 series Ethernet switch, and an ADAM Remote Data Acquisition module to create an ideal solution for power substation applications by providing advanced surge protection and optical isolation technology.

Economical Energy

Energy efficiency is economically constructive; it can save consumer expenses and industries expenditures. A celebrated chain store in the US recently implemented an Advantech solution to successfully scale back on 8%~15% of power consumption costs by controlling the air conditioning and lighting across 1,400 branches. Furthermore, a number of international metropolises in the Asia Pacific region are decked out in dazzling lighting arrangements, such as in Tokyo, Taipei, and Shanghai; Advantech's UNO, ADAM and EKI series products are helping create these amazing displays while ensuring that they remain energy efficient.

Hospitals, broadcast media and factories are enormous energy consumers; and in addition to power-saving monitoring systems, these establishments also require considerable Uninterruptible Power Supplies (UPS), yet batteries in traditional UPS systems are most vulnerable to breakdown. Advantech's UNO family has been successfully applied in an innovative rotary UPS that is independent of lead-acid batteries, so there'll be no issues with lead pollution, marking a giant leap from the traditional UPS.

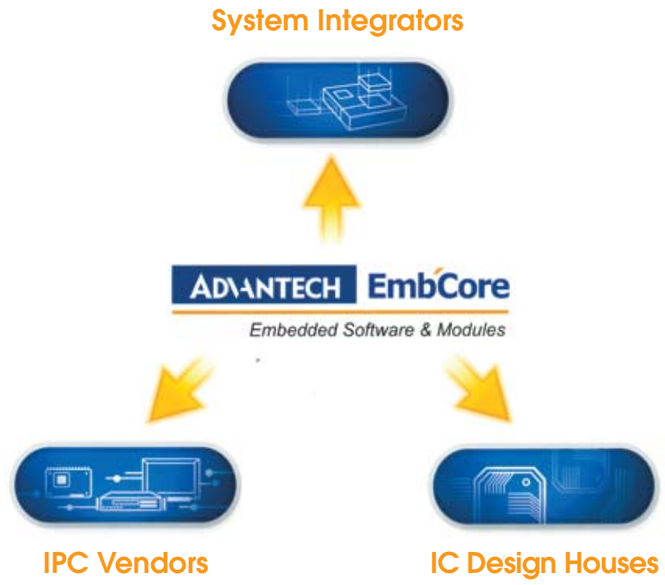
From renewable power generation, power transmissions, and substation management to the energy-sustaining UPS, Advantech is applying environmentally-conscious platforms to every sector possible, securing a creative, sustainable "take nothing, waste nothing" corporate approach, which is blazing a bright green trail in the energy market. ■

Evolutions in Embedded Services

Integrated Software/Hardware Modules Improve Embedded Service Value

Advantech's Embedded Core Services provide integrated custom software/hardware module solutions for embedded computing customers, including IPC manufacturers, IC design houses, and System Integrators. The services are designed to provide flexible and reliable solutions that speed up application development, strengthen system efficiency, and offer market differentiation.

By Lin Pin
Interview with Embedded Core Service Director, Miller Chang
Photos by Advantech



Powerful software and application integration helps Advantech to provide competitive hardware modules to the IPC industry. Integrated custom software solutions are the key to improving product value and market differentiation through a successful union of quality software and hardware.

In a move to support its overall software development strategy and incorporate industry-oriented software development resources, Advantech set up Embedded Core Services last June. These services provide quality, integrated embedded software and hardware module solutions to the company's various business groups and partners in the IPC sector, and bring Advantech's service potential into full play.

Effective Resource Integration

Embedded Core Services Director, Miller Chang, says "Advantech has amassed software development talent and hardware resources dispersed within the Advantech organization to build up four major core development engines that will drive efficient application development and stimulate efficiency within our major business groups and customer-centric partnerships."

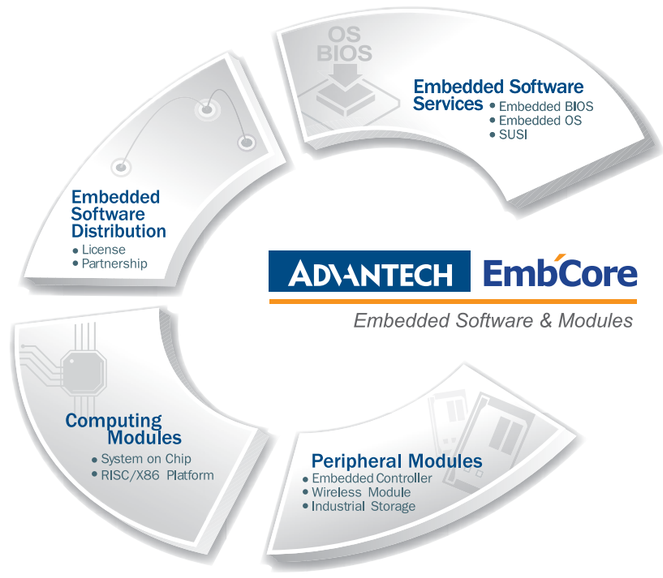
Miller Chang gave further details about the four major core development engines in Embedded Core Services: The first one is Embedded Software Services including embedded BIOS, embedded OS, and SUSI (Secure and Unified Smart Interface). The second is Embedded Software Distribution, characterized by Advantech's licensed embedded OS and Database software provision to provide customers one-stop shopping services. The third and fourth combine computing modules and peripheral modules that offer Advantech's SoC and (RISC)/x86 platforms, and wireless and storage peripheral modules that create superior turnkey solutions. These solutions will help clients shorten system development time and increase system value to underpin their clients' competitive edge in the vertical market.

System Value Increased

Mr. Miller Chang explained that the Embedded Core Services team has years of experience in video game machines, medical information, and self-service kiosks, and has therefore developed high-quality embedded software solutions. Embedded Core Services are now widely applied in gaming machines developed by Advantech, adding hardware encryption/decryption functions to enable authentication of passwords, data classification and account management and other security features. These new functions now provide gaming system integrators with more versatile, reliable options that help them speedily complete gaming design and development. In medical applications, Embedded Core Services offered embedded BIOS that promptly fire up medical apparatus during emergency rescue treatment to help save lives. Lastly, in automation service consoles, Embedded Core Services answered energy efficiency demands that helped vendors develop software packages that combined light source detection components to monitor ambient lighting in order to adjust LCD luminance accordingly.

Mr. Miller Chang stressed that "software will no longer be just 'added value' in embedded systems, but a 'key value' that underpins its future marketing prospects. Advantech's Embedded Core Services are a software-oriented service, and they are poised to develop more versatile software blueprints to meet the needs of various application sectors. Meanwhile, the services will conduct product orientation seminars for Advantech's business groups and clients to inspire fresh collaboration effort with other business divisions and partners. The services primarily support Advantech's internal business units, but have also successfully expanded their service to other IPC industries, and collaborated with IC designers to develop component drivers for specific application requirements. The collaboration endeavor with up- and downstream suppliers, plus the formation of strategic alliances with those in the business, ensure a bright future and further extend Advantech's market visibility in the embedded system sector." ■

Embedded Core (EmbCore) Business



25th Anniversary Advantech Story

The Competition Winner

Tomasz Malewski
RMA Engineer
Country: Poland
Company/RBU: Advantech Poland Service Center
Date of Birth: August, 29, 1984

Evolving Contours

I believe that the series of events in any person's life happen for a reason. And as I myself and Advantech both celebrate our 25th landmarks, I can see the series of dots that connects my life's many events to my Advantech milestone.

My name is Tomasz Malewski; I work in the Advantech Poland Service Center as an RMA engineer. I was born in 1984, and I'm privileged to be a member of the Advantech community as the company celebrates its 25th anniversary. As I connect the dots of my life, I can see that there's a reason for me to be an Advantecher, and that I'm here with a mission.

Library

In secondary school I started working as a library volunteer. As someone who values order and discipline, I felt I was coming into my own there. During my stint as a library volunteer, among other things, I took initiatives to correct erroneous indexing arrangements. And it was there I first tasted the sweetness of success. While there, I designed my first PHP-based web application – it still works like a charm today. It was at the library that I learned how to be an effective organizer, and this experience was invaluable to me when I came to Advantech.

Entrepreneurship

Enterprising and inquisitive, I went on to start my own restaurant-pub, and built further experience in corporate workflows, even though the two seemed unrelated at the time. The venture got off to a bumpy start, but after six months it showed a positive balance for the first time, and we discovered something that was more rewarding than profit - many local customers began to defect to our establishment because we really put our hearts into bringing quality service. A lot of our customers were tourists from nearby hotels, and they opened my eyes to the riches this world has to offer. It was during this time that I applied for a job with Advantech. Working with people gave me a perspective in putting myself in other people's shoes, and again, this experience now proves invaluable when I interact with customers at Advantech.

Advantech

I work as an RMA engineer in the Advantech family, and to me, my job means the world, because it's the right there at the front line of customer service. I have the gravest responsibility to care for the needs of my customers – I feel a sense of duty to them because they deserve nothing but the best. When any item leaves our service center, it has a repair report card attached. This card includes: 1) the Advantech logo, and 2) the RMA engineer's name. These two things require the people and engineering skills that destined me to be an Advantecher who can offer more. I also find great joy in e-mails that come from happy customers, telling how pleased they are with our service.

Advantech products are designed for mission- and space-critical conditions, and all trouble-shooting efforts can be improved when customers provide fresh ideas. During such brainstorming sessions, a rapport is formed, and I can attest that over time every Advantech customer will see us as a confidant, just as the company's logo – "Trusted ePlatform Services" declares. And I think this is how Advantech can rival – and better its competitors in the market by a wide gap.

This is also a special year for our young service center; we have just received our ISO 9001:2000 certification, and this is a great reward that I, as an Advantecher, can be proud of. Here I'd like to thank Advantech's customers for helping to build this company, and for letting me be part of this great enterprise. And I look forward to many productive 25-year anniversaries to come! ■

Event Calendar

September 2
Embedded Development Day
Sydney, Australia

September 11
Embedded System Seminar
Singapore, Singapore

September 17
Hospimedica Asia
Singapore, Singapore

September 24
Micro TCA Summit, UK 24 September 2008
Reading, United Kingdom

September 25
Sign Asia 2008
Muang Thong Thani , Thailand

September 25
RTECC
Phoenix, AZ, USA

September 25
Automation 2008
Mumbai, India

September 30- October 3
ICT & Logistics 2008
Utrecht , The Netherlands

October 7
Advantechs Channel Partner APLICA auf der Vienna-Tec
Wien , Österreich

October 7-10
Incheon International Logistics & Materials Handling Exhibition
Incheon , Korea

October 14
Embedded System Conference - India
Bangalore , India

October 14-16
ISA Expo 2008
Houston, Texas

November 4
IAS 2008
Shanghai, China

November 14-16
The World of Health IT
Copenhagen , Denmark

November 11
Electronica 2008
Munich, Germany

November 18
G2E Expo
Las Vegas , USA

November 19
Medica
Dusseldorf, Germany

November 19-21
InfoComm Asia
Hong Kong , China

November 20
Metalex 2008
Bangkok , Thailand

November 25
SPS/IPC/DRIVES 2008
Nuremberg, Germany

December 2
SCS PARIS 2008 - Systèmes Composants Solutions
PARIS NORD VILLEPINTE, France

December 3
Manufacturing & Industrial Automation Indonesia
Jakarta, Indonesia

2009 March 18
Automatisierungstreff
Boeblingen , Germany

Advantech Call Center

US	1-888-576-9668 (ePlatform) 1-800-205-7940 (eAutomation)	**Taiwan**	0800-777-111 (ePlatform) 0800-55-77-99 (eAutomation)	**Brazil**	0800-770-5355
Europe	00800-2426-8080 (ePlatform) 00800-2426-8081 (eAutomation)	**China**	800-820-2280 (ePlatform) 800-810-0345 (eAutomation)	**Japan**	0800-500-1055 (ePlatform) 0800-500-1077 (eAutomation)
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Harmony

Technology for a Vibrant Planet

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Combining Human with Nature

From Beijing to Brunei, Monterey to Munich, Advantech develops optimized environmental monitoring tools tailored to customers' unique needs. We understand that getting the most out of technology is critical for maximum protection of our environment and achieving true harmony between humans and nature. Partnering with Advantech is partnering with our planet.

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