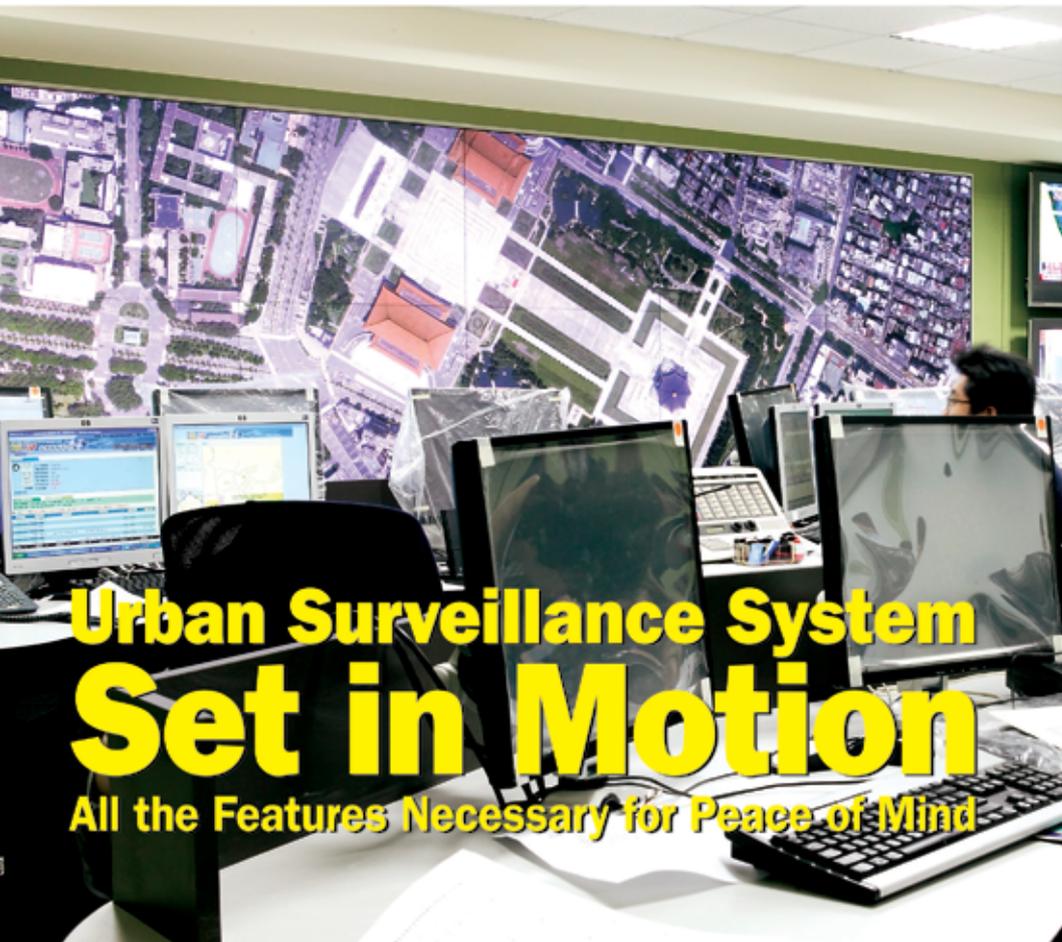


MyAdvantech

The Magazine for Global Advantechers and Partners

Spring 2009 No.4



Urban Surveillance System Set in Motion

All the Features Necessary for Peace of Mind



Get into the Spirit of
Everything Hot
Hospital Management
Welcomes New Blood



Innovative Applications in Embedded Storage Technology

Advantech has a unique take on storage installation developments, and focuses efforts on storage applications' own protection mechanisms.





Trusted ePlatform Services



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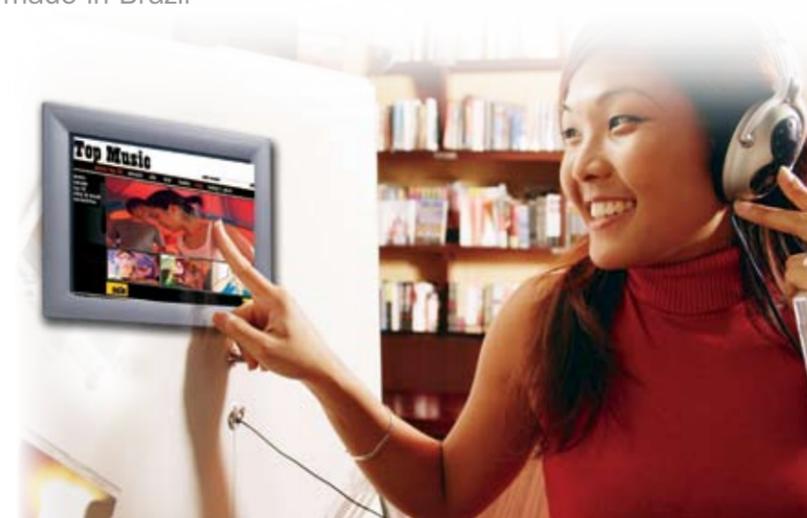
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The Quest for the Best Ensures Brand Architecture Excellence

Advantech has consistently devoted itself to industrial computing over the past 25 years, establishing itself as a leading brand in the IPC community. The strength of brand equity is that well-leveraged brands better ensure a company's corporate positioning, and are a means to measure trustworthiness and dependability. Superb brand architecture is commensurate to a seal of approval.

Brand leveraging is about "quality" and "label", creating something recognizable and trustworthy. Smart marketing strategies facilitate consumer brand recognition, and consistently positive perception and customer loyalty relies on quality affirmation and delivery of corporate promises.

Advantech's challenge is manufacturing industrial computers limited in quantity but wide-ranging in diversity, meeting customer demands of various scales. Industrial computers are mission-critical in areas including: telecommunications, traffic, railway monitoring, and military. Here, quality makes or breaks operational efficiency. We aim to deliver products that surpass expectation pleasing clients with Advantech's technological resourcefulness and developing a greater level of trust and identity in the brand.

During the mid-July company kick-off meeting, the operating teams reached an agreement that an effective internal administration mechanism was needed to increase employee awareness of quality concerns and improve production workflow. The Quality Re-engineering Committee was established to create a stringent management system to improve Advantech's product lines.

Two executive task forces were set up. The first one is the Quality Process & Technology Re-engineering Subcommittee, headed by Jeff Chen, CTO, and QA Director, IC Lin. They are responsible for integrating elements in the technology front, modularizing and regimenting manufacturing technologies, and rectifying shortfalls in workflow through group opinion and experience exchanges. The Education & Discipline Review Subcommittee, headed by Deryu and me, HR Vice President, is the second. We will organize training and workshops, where design and project engineers enhance skills, acquire resources

to improve work quality and workflow, and heed lessons learned. Quality gate-keeping will be executed through an intranet-based Quality Defect Report (QDR), that covers problem causes and steps taken. During monthly meetings, ten high impact quality-related concerns will be chosen among the assembled QDRs. Conclusions will be collated into a quality technology announcement and distributed within the company. These cases and their content are included in a Design Reference Pool, allowing manufacturing staff, R & D, quality control personnel, and front line application engineers to have access to the knowledge base when similar problems occur.

A decision-making body has been set up over the Quality Re-engineering Committee, Quality Process & Technology Re-engineering Subcommittee, and Education & Discipline Review Subcommittee. The team includes the CEO and senior management, and will address policies and advice from the committee and subcommittees as needed.

Quality enhancements come over time. To date the committee has encouraged engineers and technicians to improve quality awareness during production workflow, attributable to incremental countermeasures and a continuous tracking system. Shortfalls that cripple company workflow are dealt with bit by bit by accruing corrective measures, increasing quality, consistency, and customer trust.

Advantech offers corporate branding value to its Trusted ePlatform Services. "Trusted" refers to providing the most reliable quality and products. "ePlatform" to core industrial computing, and "Services" to offering total customer-oriented solutions. Advantech keeps improving its products and services, building consensus in quality assurance, and refining its core value to grow and create a well-leveraged, high-value brand. ■

Chaney Ho

Greater China, General Manager
Channel & Marketing Development Organization, Vice President

Medical Computing Platforms

Enabling Digital Healthcare

ADVANTECH Medical Computing

A Medical Computing Platforms to Count on

Advantech computing platforms are designed to enhance the quality and efficiency of healthcare. They match the performance of commercial PCs, and meet tough medical standards such as UL60601-1, EN60601-1 and 3C certifications, as well as having an IPX1-certified dust-and-water-drip-proof enclosures. They also have long term support, and a proven track record of reliability.



Point-of-Care Terminal



Mini PC and Medical Imaging Display



Mobile Clinical Assistant (MCA)



Patient Infotainment Terminal

Seeing the Embedded World the Same Way: Viewpoints on a Channel Partnership that Works

An interview with Tyler Moore, Arrow's Director of Supplier Marketing
By Russell Barber

With all the key ingredients a successful vendor employs to ensure that one satisfied customer follows another, it's unfortunate that the channel partner is often an oversight. However, after two years of working side by side to meet the needs of its established electronics customers, Arrow Electronics knows that Advantech is a company that understands the value of the channel. The premier worldwide electronics distributor first favored Advantech for its product breadth, but soon saw Advantech's emphasis on channel commitment, sustained success, and its strong customer centric values.

Close Teamwork Beats the Market

"Advantech came on board as part of Arrow's 'Intel Ecosystem' push that we were doing at that time," said Tyler Moore, Director of Supplier Marketing for Arrow Electronics. "Soon after meeting, it became apparent that Advantech had a firm belief in how the channel plays an integral part of filling customer needs in this market. One reason that we were very comfortable with the Advantech management team right from the start was that we saw the world the same way. That is, we had a very common view of the direction the embedded systems market was heading in North America. Advantech's respect for the channel became key as to how we would proceed as partners."

Arrow's many accolades, such as being named to FORTUNE Magazine's 2008 Most Admired Companies, aren't just from revenue figures. They consistently remain on the cutting edge of channel strategy, relying on sound relationships with solid, brand-reputable manufacturers. To be eligible for partnership, a manufacturer must be what Arrow calls 'channel-friendly'. For Advantech, it was important to demonstrate its commitment early on. "We expect a solid partner in the channel with Advantech, with

wide reach, good supply chain management and technical support expertise," Moore said. "Since the beginning we've come to learn that Advantech demonstrates best-in-class channel partner qualities including technical leadership and a flexible, customer-centric approach that allows us to succeed together."

Where other manufacturers may occasionally fall short, with insufficient technical support or in price structure inconsistencies, Arrow's view of Advantech is bolstered by a "culture of trust". Advantech's flexibility, technical support, and willingness to do what is needed, as well as its strong business values and a demonstrated commitment to the channel, further strengthen the relationship.

Crossover Collaboration Creates a Unique Business Model

Advantech is an Intel Premier Level Partner, a key attraction for Arrow. Arrow and Advantech both have a stake in Intel technologies, and the premier partnership has played a big part in how the two initially forged the relationship. Arrow also brings value to Advantech. With seventy years of industry experience, they advise new customers on ways to bring their products to market rapidly, streamline supply chain management, and make technology integration services available.

A part of Arrow's direction in maintaining world leadership in electronics distribution involves further incorporation of a service model approach aimed at satisfying customers. This further differentiates them as a full-service distributor that can achieve customer satisfaction and more progressive revenue, rather than sticking merely to a reactive, project-based approach. To maintain this direction, Arrow looks to expand their product offerings to include technical services and warranty plans - areas where Advantech is able to bring more to the relationship. "After

initial collaborations, it became apparent that Advantech had the technical support and the field resources that brought them up a notch," said Moore.

Arrow also satisfies Advantech's need in a channel partner. A Fortune 200 company with 12,700 employees worldwide, Arrow supplies a wide range of markets, including telecommunications, information systems, automotive and transportation, medical and life sciences, industrial equipment and consumer electronics. When it comes to "reach", Arrow Electronics has a base of more than 340 locations in 53 countries and territories, exactly the value Advantech was actively looking for. Ween Niu, Advantech VP of Sales & Marketing for North America, was there at the beginning of the partner formation two years ago and explains the similarities of each partner: "Some of what we'd been looking for in a relationship was our mutual understanding of business values, identical desire for long-term partnerships and our dedication and responsiveness to customers' demands. The ease of working within Arrow's business culture further clarifies that Arrow is the perfect partner for Advantech, and we look forward to achieving mutual success in the long term."

Breadth of Products is a Boon to the Relationship

Advantech's breadth of products in multiple markets continues to play a big role in Arrow's view. A distributor hopes that adding a new vendor will better meet customer needs, right down to the way its sales teams use the partnership to connect with current customers. Arrow's hope was that having Advantech on board would have an impact on their customer conversion, and they were glad to see the results. "There was one instance where Advantech's POC Panel PC series gave us the ability to approach a former medical customer that we could not easily have approached otherwise," said Moore. "We were able to re-engage by recommending an Advantech POC Panel PC

for their application, and we subsequently pulled other Advantech products along into more of the customer's solutions, and grew the account. Advantech's ability to be flexible and provide more technical support brought the positive results we needed.

"Some of the products that enhance Arrow's offering to its longstanding customer relationships are in the ARK series, which currently have a lot of play within our customer base. Another immediate fit were the POC Panel PCs, which are highly relevant to our customers in the medical space."

Building a Long-Term Partnership While Keeping Focus on Vertical Markets

"There have been successes as well within certain vertical markets in which Arrow has been well entrenched. Those would include medical, digital signage, and industrial control. Military and aerospace is in the early stages, but we see potential for Advantech there too," Moore stated.

Moore sees a bright, mutually successful future due to Advantech's breadth of resources, incorporation of a service-oriented approach, and strong dedication to the channel. Arrow is looking forward to benefiting from the intangible qualities that fuel a good relationship, related mostly to business values.

The culture of trust that Arrow cited in Advantech's people and business approach has shown itself in many ways, according to Moore. "We found out early on that Advantech possesses an obvious commitment to their own employees. Therefore, we became confident that this value would also be evident in the way Advantech treated its channel partners. This became even more clear when executive management would go out of their way to demonstrate their firm foundation in business ethics, openness, and assurances that we would be treated fairly." ■



Corporate Overview

Arrow Electronics is a global provider of products, services and solutions to industrial and commercial users of electronic components and enterprise computing solutions. A Fortune 200 company, Arrow serves as a supply channel partner for approximately 800 suppliers and 130,000 original equipment manufacturers, contract manufacturers and commercial customers through a global network of more than 340 locations in 53 countries and territories.



ARROW ELECTRONICS, INC.

Get into the Spirit of Everything Hot

Going Interactive at Hot Topic

Interview by Chen Yili
Photos by Advantech & Top Photo Group
Interview with Advantech's Industrial Automation Group Product Manager, Hector Lin

Advantech's rugged, flashy 15" touch-panel LCDs with resistant aluminum housings are the perfect complement to Hot Topic, reflecting their trendsetting style. Advantech's superb design and rugged displays provide cutting edge aesthetics while providing reliable, industrial-grade quality that can stand up to heavy consumer use.

Innovative & Interactive Displays

Merchandise in ordinary retail stores is usually displayed in a standard, linear rack. Hot Topic itself had used this system for years, before realizing that these displays fail to properly showcase the products and do little to attract the attention of teenage consumers. Additionally they had CD sampling areas (similar to the ones in large bookstores), that were large, black, boxy cases that could only accommodate a few CDs at a time. These cases were uneconomical space-wise, with limited sampling functions to satisfy consumers' needs for variety. Hot Topic, a trendsetter of hot fashions and accessory merchandise, wanted to revolutionize the cookie-cutter displays with advanced information technology and a bit of creativity. Hot Topic and Advantech partnered to launch a project to revamp the merchandise display system. The results have further propelled Hot Topic into the cultural zeitgeist as a unique retailer that teenagers can identify with.

For over 10 years Hot Topic has been America's place to shop for everything pop; from music, posters and t-shirts to jewelry, accessories and more. Introducing the latest in touch screen technology has allowed Hot Topic to provide their customers with an all-in-one interactive display, providing access to the latest billboard rock hits and the ability to browse through an entire catalog of fashion and accessory items at the same time.





TPC-1570 is designed with the Intel Pentium M/Celeron M CPU. It is Low power consuming with 1.4 GH z/1 GH z operating speeds.

Hot Topic enjoys a tremendous cult following among American teenagers, with 690 locations in the US that specialize in youth fashions. The company aims at driving their profit margin through the use of cross-merchandising and suggestive selling through vibrant, high-energy visuals, drawing consumers to sample music and browse clothes and accessories. Advantech recommended 15" large displays and high-performance, power-efficient, fanless industrial computing systems as their display platform. The company's TPC-1570 Touch Panel Computer was the optimum choice.

Versatile Touch Panel Applications

Advantech's TPC-1570 is designed with the Intel Celeron M 600 Mhz/1GHz processor at its core, which is a low-power consuming model. TPC-1570 supports built-in Windows CE.NET or Windows XP Embedded operating system, and many standardized communication interfaces, such as Gigabit Ethernet, Fast Ethernet, RS-232/422/485, USB, imbedded I/O and PC cards. These features define TPC-1570's enormous scalability. The spindle-free and fanless design also makes TPC-1570 highly stable and trustworthy, suitable for mission-critical, noise and dust-filled environments. The model's audio and visual processing is impressively improved thanks to the high-performance built-in Intel processor, so image and sound quality are optimized. Also, Advantech considered decoration and consistency issues when designing the

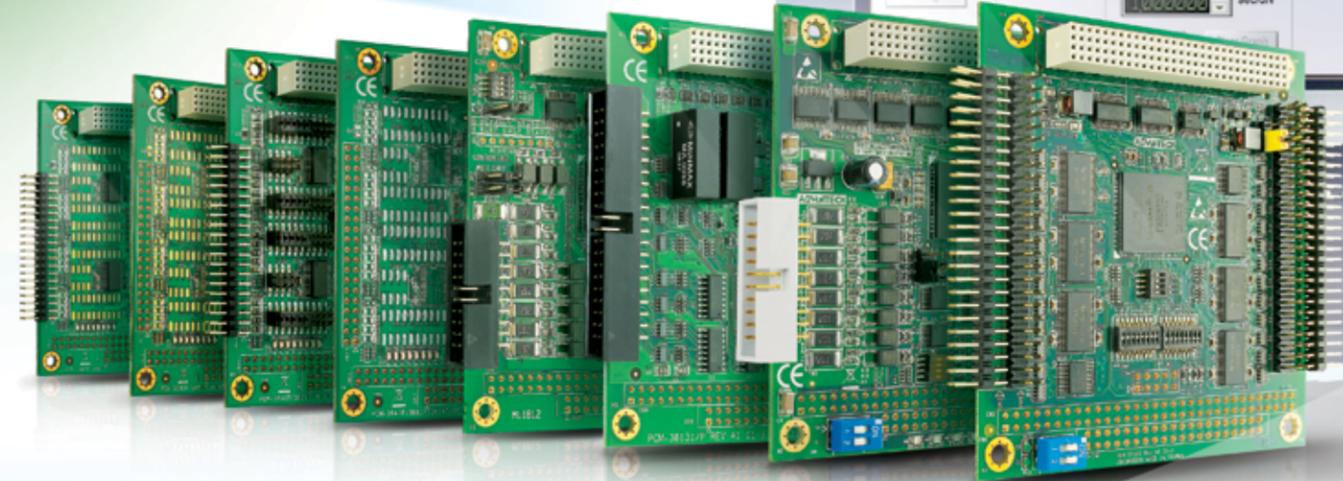
hardware, so the power cords are easily concealed inside TPC-1570's housing.

Advantech's eAutomation Product Manager, Hector Lin, recalls that Advantech spent a mere 6 months to install over 420 displays in Hot Topic's chain stores. Shoppers can easily see the wall-mounted TPC-1570 display when visiting a Hot Topic store, which showcases 40 singles from various musicians. Visitors can choose their preferred album or singles on the touch panel and listen to them through the TPC-1570's connected headset. Meanwhile shoppers can also check out the newest T-shirts, accessories and merchandise through the same TPC-1570 touch panel, enticing them to shop. TPC-1570 is connected to Hot Topic's intranet system so the music singles and merchandise info can be flexibly updated.

Rocking America's Malls

Mr. Lin explains that a majority of Hot Topic stores are located in regional shopping malls, and storeowners must make their shops and products stand out amid the dazzling array of brands and labels to attract mall-goers. Hot Topic Inc's fresh thinking and innovative approach with the music display are now rocking malls across the US. Advantech's offering of high-performance, dependable touch-panel computers, with professional, precision-based installation services make it the perfect partner for creative retail marketing. ■

High-density PCI-104 Cards for any Application



ADVANTECH
eAutomation

Empower Embedded Systems with Advantech's Complete Line of DAQ and Serial Communication Cards

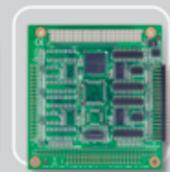
Intended for specialized automation applications that depend on reliable data acquisition and serial communication, these cards are rugged enough to operate in extreme environments, and support multiple operating systems. Additionally, Advantech provides ActiveDAQ Pro software, featuring a user-friendly graphic user interface which allows users to easily develop customized programs.



PCM-3753I
96-ch Digital I/O
PCI-104 Module



PCM-3761I
8-ch Relay and
8-ch Isolated Digital
Input PCI-104
Module



**PCM 3614I/
CPM-3618I**
4/8-port RS-232/
422/485 PCI-104
Modules



**PCM-3641I/
PCM-3642I**
4/8-port RS-232
PCI-104 Modules



ActiveDAQ Pro
ActiveX Control-
based Software for
Data Acquisition

Remote Surveillance Enhances Robotic Efficiency

Easy Monitoring and Maintenance

At the production frontline, industrial robots can be monitored remotely to reduce maintenance time and costs, and enhance production efficiency to improve business performance.

Interview by Chen Yili
Photos by Advantech & ABB
Interview with Advantech's Industrial Automation Group Product Manager, Hector Lin



Robots play an important role on routine operations in many sectors, and thanks to recent advancements in automation technology these robots are entrusted with important tasks on production lines in many sectors, including automobile, packaging, warehousing, processing and more, and have proven to substantially promote production and cost efficiencies. One of the most pressing issues for modern-day factory/plant operating environments to prevent industrial hazards and upgrade production competency lies in the monitoring of robotic operation precision. It's also a critical juncture for automation service providers. ABB, a global leader in power and automation technologies, saw the importance of precision robot monitoring and thereby devised a remote robot monitoring program, choosing Advantech to provide the necessary platform.

Minimizing Maintenance Work Equals Productivity Upgrades

Advantech's eAutomation Product Manager, Hector Lin, says that traditionally when ABB clients encountered automation failures or problems they informed the company via email or phone for tech and maintenance support. Delays therefore ensued and production came to a halt, causing productivity drop and financial losses. With that in mind, the company set up ABB Remote Monitoring to assist clients in diminishing operating risks, and built a system connecting the Robot Control with the ABB Technical Support Center, offering prompt remote monitoring, diagnosis and maintenance services via broadband internet and mobile phones. The implementation has successfully lowered automation maintenance time and costs. For



ABB has installed UNO-2170-added remote monitoring systems for the 50 robots working on clients' production lines.

clients, the Mean-Time-Between-Failure (MTBF) and Mean-Time-To-Report (MTTR) have been curtailed to better assure the Overall Equipment Effectiveness (OEE) on the production lines. This is translated into an extraordinary increase in operating competency.

ABB's wireless remote monitoring program features Advantech's fanless industrial PC, UNO-2170, installed into automation production robots as a remote platform. UNO-2170 is an Embedded Automation Computer with Intel Celeron M processor that supports Windows XP Embedded SP2 and Linux-ready solutions. It conducts instant status monitoring and keeps track of various statistics. UNO-2170's PC-based model also provides various I/O interfaces (PC/104 expansion slots, 4 communication ports, 2 Ethernet ports and 2 USB ports), facilitating diverse applications and maintenance at lower costs. Statistics taken during monitoring can be used for WiFi communication with intranet via phone. Furthermore, its fanless architecture functions smoothly in dust-filled factory environments, its thermal design promotes system stability, and its DC power construction complements factory's power management systems to simplify power distribution.

Added Product Value – Customer-Oriented Commitment

UNO-2170 launches specific surveillance tasks to monitor every robot's operation depending on the nature of assignment. When breakdowns or errors occur, UNO-2170 uploads the figures to the ABB Remote Monitoring Center

via the internet and mobile phone network. ABB alerts the client accordingly, assesses the cause of failure, and assists engineers at the client-end in maintenance work. The client would receive a breakdown cause analysis to prevent recurrent failures. ABB also dispatches engineers in the nearby office for follow-up services if the client needs further support. All the issues will be tackled in the shortest time to restore operation. Again this cuts down the amount of time wasted, plus maintenance costs spent in transporting technicians back and forth.

As an example, we can examine a typical ABB client. The client's inauguration of a remote robot monitoring system has raised the Overall Equipment Effectiveness (OEE) by 10 percent, and drove an increase of US\$9.3 million into revenue. All in all, the client has to raise product's unit price by 6% or shrink over 95% of maintenance expenditure to get the result. This signifies the competitive edge the remote robot monitoring system accrues.

ABB has installed UNO-2170-added remote monitoring systems for the 50 robots working on clients' production lines. ABB is planning to use UNO-2170 to continuously improve automation process's added value, and recommending the system to clients' industrial robots to enjoy a boost in productivity and drop in cost. ABB's acceptance of Advantech's technological offerings furthers industrial automation's reliability and helps the company fulfill its promise to create profit for the clients. ■

Industrial Video Surveillance Solutions with Information On-Screen



Provides Valuable Real-time Field Data to Fulfill Rigorous Security Demands

- Advantech's DVR solutions integrate SCADA HMI & I/O information to provide valuable field data and real-time video (Information On-Screen)
- DVX-4100 series provides advanced event action to notify users of any abnormal occurrences through email, alarms, and SMS
- DVP series capture cards provide SDKs for easy customization



**DVX-4100 Series/
DVX-4370**

16-ch Information-enabled DVR System/ Intelligent Video System

- DVX-4100: MPEG-4/ H.264 real time recording
- DVX-4370: 6 video contents analysis, including object tracking, virtual fence, etc.



PV-2100E

8-ch Real-Time H.264 Video Capture Card with PowerView

- 8-channel video & audio input
- Display & recording rate: 240/200 fps (NTSC/PAL)
- Adjustable resolution: CIF/Half D1/D1



PV-800

16-ch MPEG-4 Video Capture Card with PowerView

- 16 channel composite inputs
- 120/100 fps (NTSC/PAL) at D1 resolution
- Conexant fusion 878A video capture chips on board



DVP-1412E

1-ch USB MPEG-4 Video Capture Module with SDK

- Supports NTSC/PAL MPEG-4 hardware
- 30/25 fps (NTSC/PAL) at D1 resolution
- 16 x 16 OSD text of up to 96 characters



PowerView 6000

Digital Video Surveillance Software

- Real time status display and notification
- Flexible scheduled recording modes and intelligent eMap function
- Advanced event action plan

Hospital Management

Mobile Medical Care – Functional Beauty, Convenient Portability

Interview by Wen Run, Photos by Advantech

Interview with Mr. Chung Peilung, Chief Technology Support, Shin Kong Wu Ho-Su Memorial Hospital,
Lin Eugene, Advantech ePlatform, Taiwan Seles Engineer



While most people might be strangers to the term, mobile medical services already pervade our life, including the familiar ambulances we see around town, and the mobile medical services that circulate in remote areas, to the less familiar Panel PC medical carts in hospitals. The introduction of mobile medical care carts in Shin Kong Wu Ho-Su Memorial Hospital, Taiwan, drastically improved manpower efficiency and patient treatment. Patients' files can be accessed instantly on the carts' Panel PC's, saving time and cost. This is just one of the small benefits – diverse applications for these carts are being quickly invented and improved. These new mobile care systems allow the physician in charge to promptly locate the patient's data in full, and they help medical care professionals to focus on assisting the physician.

The Prerequisites – Anti-seismic, Low-noise and Durable

Lin Eugene, Vice Project Manager of Advantech Taiwan's ePlatform Group says that mobile medical care programs comprise of two elements: those used inside the hospital, and those operated outside the hospital premises. Systems within the hospital include the mobile medical care carts taken along on doctors' inspection rounds and nurses' checkup routines. As implied by the name, Mobile Medical Care Carts, these devices are functionally portable and provides multiple care services. In the early days, most of the hospitals in Taiwan opted for PDA-based systems when they started installing mobile medical care systems within the premises, but the drawbacks of commercially produced PDA's were soon exposed: they were too small, and too difficult to operate, and the size of the screen

Welcomes New Blood

severely limited the view of data. Also, the PDA's were RISC-based, making operation, software design, design revision, and maintenance all more complicated.

After the PDA's were superseded, hospitals turned to notebook computers that were a size larger. Yet in the end these computers were deemed unsuitable for mobile medical care purposes also because they couldn't withstand the constant jolts when placed atop moving carts—the jolts caused hard-drive breakdowns. Also, nursing workers in a hurry tended to spill medication and other liquids on the computers causing breakdowns—which ultimately impeded treatment.

Eventually, hospitals realized that mobile medical care systems required more than just buying ready-made IT facilities and uploading medical program applications. Different specifications and specific designs were necessary depending on the hospital and nature of the requirements. Shin Kong Wu Ho-Su Memorial Hospital's Tech Support Director Chung Peilung points to the prerequisites for inside-the-hospital mobile care systems: most importantly they must be anti-seismic. Panel PCs are erected atop the carts and sustained jolts are to be expected, which puts the hard-drives to the test. Next, the systems have to be low-noise and fanless to minimize discomfort for the patients. Robustness is the third prerequisite, with two aspects: one is that the casing must be built to withstand occasional crashes; the other is being corrosion and water-proof. Medical equipment is frequently disinfected, so casings have to be tested for ethanol and liquid exposure, and must achieve IPX1-level conformity. Finally there must be sustainable equipment availability. The medical and manufacturing sectors share this similarity, that is, they both have stringent demands for system stability. It's necessary that all peripherals, software and hardware all come with a long lifespan, and dependable suppliers have to be relied upon for consistent component replacement and maintenance services.

In 2007, Shin Kong Hospital submitted its request and



mobile medical care specifications for order, and decided to partner with Advantech, looking to the company to design and integrate the essential software and hardware systems for its mobile medical care units. The systems were officially launched in early 2008. To date 153 mobile medical care carts are in commission, with 53 used by physicians on their inspection rounds and the remaining hundred used by nurses and medical care professionals.

Shin Kong Hospital's on-premise system is divided into two parts. All the case history data is stored in the mainframe, and is connected by WLAN to terminal displays installed in the Panel PCs. Panel PC's for Shin Kong Hospital are made-to-order, with the hard-drives specified as 1G anti-seismic designs. Fanless PCs are specified to maintain quiet noise levels, and special materials are incorporated in the casings to help withstand impact and improve alcohol resistance. Advantech also worked together with Cisco to produce medical-grade communication modules for the hospital. Although WLAN is a less-stable communication technology, the hospital needed it for convenient, wireless transmissions. Advantech was able to establish a seamless installation with assured signal integrity and security features.

Manpower Efficiency, Eco-Friendliness, and Service Quality

Post evaluation of these mobile care systems summarized three types of benefits since the launch of the units: manpower benefits, eco-friendly benefits, and service quality benefits. Reduced labor costs and reduced paper use have been quantifiably reflected in hospital overheads, but concrete results in the service quality area have yet to be shown—this requires more feedback.

In Taiwan, electronic case history documents have yet to be fully implemented as medical care organizations and government units maintain that all such cases be documented on paper first and a document digitization program is underway, but all other reports, receipts and statements have been uploaded to the system, saving time and cutting paper costs substantially. Many hospitals in Taiwan have already adopted mobile medical care units, the specifications and design of which vary, depending on differing hospital conditions and operating workflow. In the near future, you'll no longer see nurses and health care professionals scurrying around with piles of documents in their hands; rather, they'll be manning mobile medical care carts with mounted Panel PCs, promptly and efficiently delivering top-quality medical care. ■



Urban Surveillance System – Networks International

Security Needs to Forge Global Consensus

Text by Wen Run

Photo by Top Photo Group

As many countries enjoy growing wealth and affluence, a need for a predictable, orderly society emerges as a foundation that underpins prosperity. The rule of law and security form the backbone that enables continued development. Many countries devote significant resources developing relevant security infrastructures, progressively forming an urban security surveillance network serving the public and maintaining social stability.

American psychologist Abraham Maslow's hierarchy of needs theory is determined in order of importance. There is a pyramid of five levels: the lower level is associated with physiological needs, while the top levels determine growth needs associated with psychological needs. Once the needs on lower levels are met, humans seek to satisfy the growth needs of higher levels that drive personal growth. Since WWII the number of conflicts has dropped overall, and in many regions of the world as the basic physiological needs

for food and water were satisfied, quality of life, safety and security issues gained prominence. These particular demands were highlighted following the 9/11 terrorist attacks in 2001, heightening awareness for robust crisis and security measures across the world. Using advanced IT technologies to upgrade public security has become an irreversible trend.

Police Administrations - Providing Urban Surveillance Systems

Governments globally are setting up surveillance cameras in public venues, with European and North American countries making the greatest headway. The UK government activated an airtight security measure during the 2005 G8 summit in Gleneagles Scotland, to safeguard attending world leaders. They amplified surveillance systems at Glasgow Prestwick Airport.

Independently operated entrances, security procedures and fire alarm installations were interconnected through the internet, providing a successful networked surveillance system.

In Taiwan, the first generation of urban surveillance installations started out as the responsibility of towns and local district administrators. Due to limited budget resources, the cameras were not always reliably functional. The specifications didn't necessarily meet requirements, and because follow-up maintenance work was in short supply, these cameras were eventually rendered useless. In 2007, the National Police Administration (NPA) earmarked NT\$800 million to kick-start a digital surveillance program, and a "neighborhood watch" system began to offer a valuable public service.

Statistics released by the NPA showed a total of 11,076 cameras set up in 2,327 locations in Taiwan with crime rates dropping tremendously as a result. In total, 1,927 criminal cases were successfully solved in 2005 before the program kicked off. That number rose to 3,715 in 2007, a 92.97% increase, or 1,788 cases. During the same year, the surveillance system also tracked down 518 hit-and-run traffic incidents, making big strides in traffic security.

But it's not just cameras that make up an integrated security system. At Glasgow's Prestwick Airport in the UK, entrance security, surveillance and fire alarm systems were integrated into one system. In Taiwan, information and communications technologies were integrated to launch an intelligent community security structure. In addition to the surveillance cameras at key intersections, NPA information systems, central servers at the duty command center, and M-Police projects were also connected to complete a systematically integrated network and a remote surveillance application. This "integrated surveillance and public safety" program has effectively improved the security of many communities through the combination of electronic monitoring, heightened public awareness, and security integration programs.

Surveillance System Online

Previously, surveillance systems consisted of a video camera connected to DVR by cable modem. Nowadays, surveillance systems are digital and integrated with the internet. Internet connectivity has infused a fresh dimension into surveillance work, identification, tracking and search technologies. With terrorism on the rise, "surveillance" alone no longer suffices to ensure national security. Next-generation security surveillance programs will become more intelligent after integrating automatic control devices that take precautionary measures to minimize risk, in addition to the existing identification and tracking functions.

The three components in surveillance application

technologies: identification, tracking and search, have yet to mature in urban use. Internet technologies, however, have benefited from the modern metropolitan broadband infrastructure and have been pervasively utilized in urban surveillance. Glasgow Prestwick Airport is a good example. The vast airport is installed with a large quantity of detectors. There are 40 internet servers, 6 video frequency decoders and a speed dome at work, powered by internet surveillance software. The design permits centralized management, control of entrance/exit monitors, and various CCTV and fire alarm programs—simultaneously.

Wireless Transmissions Keep City Connected

In addition to cable-connected, front- and backend systems, wireless transmissions have emerged as a replacement to address the challenge in network wiring in-city, and on large campuses and highways. WiMAX is widely employed in various countries as an image surveillance transmission medium. Canada's Alberta province used WiMAX to build an education network, extending 220 kilometers from end to end. One-way transmission reaches 30.6 kilometers. The whole system covers a total of 14,978 square kilometers.

Indonesia is using 5.7 - 5.8 GHz-frequency WiMAX for street surveillance purposes. The connection runs up to 12 Mbps, permitting point-to-point, or single-point-to-multiple-points access. Other than urban internet and network management work, this system is also being used for building surveillance.

Highway I-496 in Detroit is equipped with a surveillance system using WiMAX, with 17 cameras and 22 radar detectors in operation for every 15-km-stretch. Images and data captured on these facilities are wired back to the control center through WiMAX. These installations are placed at elevated positions, a distance from the highway, requiring high-performance cameras to capture the license plates of speeding vehicles at hi-definition. WiMAX's high-bandwidth transmission proved to be the perfect technology to implement the system.

Both Guangzhou and Singapore use integrated WiMAX and security surveillance at docks and harbors to control and monitor vessels. Surveillance at harbors requires single-point-to-multiple-points access. Though vessels are large in size and slow in speed, the distance between cameras, ships and containers is greater, so high-performance and hi-definition cameras are still a must.

With terror attacks and street crime a fact of life, effective security measures are in the forefront in a myriad of national issues. Recent technology has successfully transformed old surveillance systems. Many governments are taking steps to build up their infrastructures. With the maturing of urban surveillance systems, national security can truly become "watertight." ■



Urban Surveillance System Set in Motion

All the Features Necessary for Peace of Mind

Interview and text by Wen Run, Photo by Interculture Custom Media/Conde Nast
Interview with police officer, Gao Yusong at Keelung City Police Bureau, and Ming-Tao Hsieh, Advantech Taiwan Business Manager

Urban security surveillance is one of the most pressing issues for police around the world. Such systems prevent criminals and burglars from “trying their luck”. UK’s CCTV (closed-circuit television) comes with visual monitoring and tracking, plus peripheral warning signs. Statistics show that installation of the devices has kept crime in check and raised social stability and public safety. A similarly robust, comprehensive program has been launched in Taiwan.

The world has faced terrorist attacks in recent years, starting with attacks upon the US on September 11, 2001. On July 7, 2005, a series of bomb explosions occurred on London’s public transport network. In late November, 2008, Mumbai was attacked by a group of Islamic terrorists. Demands for urban surveillance followed these tragedies. In Taiwan, surveillance work has been carried out for years, with recent improvements in implementation and official

consolidation into the police administration.

Taiwan’s Interior Ministry has proposed relevant formulas following increased public security concerns and growing demand, budgeting NT\$70 million. The system, starting in Keelung, will roll out to 23 other counties and cities in 2009.

Keelung Moves Ahead on Public Safety

Keelung City Police explain that automatic monitoring has actually been implemented in the community for years. Installations safeguard people’s lives and interests. Yet with increased awareness of privacy protection, the police administration must also consider people’s rights to privacy. The administration therefore commissioned professional organizations to oversee urban surveillance construction to prevent infringement upon people’s personal space.

In Keelung, surveillance mainframe numbers have

increased from 70 to 232, and video cameras from 64 to 1,957. The devices are installed at key intersections and crowded public venues. The bureau says that these facilities require very particular specifications and consistent quality. These surveillance systems, and the mainframes, are linked to the Bureau’s electronic case alert system. When the “110” alert system receives a call, it calculates where the cases are reported. Police can easily access the camera in the area and mobilize the necessary manpower to go to the scene.



Performance consistency and sturdiness are essentials for surveillance systems installed in adverse environments because they have to run for prolonged periods. This makes follow-up maintenance and service quality assurance all the more important. The integration of surveillance devices and case alert systems allows no room for mistakes.

Image Quality Determines System Performance

High image quality is a must in surveillance system specifications, particularly urban surveillance. Police work can be hamstrung if the video cameras fail to capture distinguishable images of suspects at crime scenes. The images provided by the early, 100,000-pixel cameras were blurry and sporadic. The processing of these images was time-consuming, and the ultimate value of such video cameras was minimal.

Image technology has enjoyed big advancements in the past couple of years. With the mounting number of areas with surveillance facilities, the demand for improved image definition has also increased. Mainstream specifications have been upgraded from Motion JPEG to MPEG 4 and H.264. Keelung Bureau’s system uses H.264 at 30-frames-per-second, a powerful model. These images are invaluable in convicting the guilty. Most European countries have legalized the use of camera-captured images as evidence in court. Urban surveillance is becoming an effective extension of the authority of law.

Kaohsiung Rapid Transit System Made Safer

Surveillance systems at key intersections and public venues are a vital link in urban surveillance work. The setup of these devices at MRT and subway networks is another application. Take Kaohsiung Rapid Transit Corporation (KRTC) for example. Quality facilities make crime prevention and detection more thorough improving passenger safety.

Advantech is the provider for the KRTC surveillance system. Since 2004, Advantech has provided 200 DVR sets, covering tracks, stations, and bike parking areas surrounding the station premises. Image surveillance is the core of the latter two installations. Monitoring systems set atop the tracks come with a detector to keep watch of objects accidentally dropped on the rails.

Advantech says originally no locking platform gates were installed in the Taipei MRT system, so incidents of fallen passengers and objects frequently occurred. In response Advantech outfitted the system with DVR-integrated motion detectors. When foreign objects are detected, the sensors alert the control center and evaluate the nature of the article through DVR. The finding is sent to the train operator as an alarm. The systems have effectively improved MRT security. The newly-inaugurated KRTC was modeled after Taipei’s MRT systems, and took a further step to build locking gates around all the platforms and tracks, minimizing accidental drops and injuries.

Surveillance devices for the city and the rapid transits require a high level of consistency. This was a given requirement when companies and government agencies come to Advantech for help. As a specialized, professional supplier, Advantech spares no effort in securing the durability and reliability of its products. The company also ensures that all the systems are functionally excellent, that integration between systems, follow-up component supplies, and maintenance are all far superior to the all-purpose IT offerings. The freshly installed urban surveillance devices by Keelung Bureau attest to the multiple effects and benefits of a professional, performance-based collaboration that ensures public security. ■

Enabling IP Surveillance



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The Next Generation of Embedded Computing Platforms

It has no moving parts, no fans, and has components that require low power

Text by Hector Lin, Advantech Corporation,
 Industrial Automation Group
 Photo by Advantech



A Bit of History

It all started with Moore's Law, of course. In the April 1965 issue of Electronics Magazine, Intel co-founder Gordon E. Moore described the doubling of electronic capabilities as, "The complexity for minimum component costs has increased at a rate of roughly a factor of two per year ..." he wrote. "Certainly over the short term this rate can be expected to continue, if not to increase."

Even though there were (and still are) pundits who believe that Moore's Law will finally be exceeded, the cost and power of electronic products continues to follow his law to this day. Costs drop by half and power increases by a factor of two, every two years. This has now been going on for almost 43 years. Every time it looks like there will

be a slowdown, new processes are developed to continue to make more and more powerful electronics less expensively.

So, what does this mean? Manufacturing, indeed all of society, has been radically changed by the applications of Moore's Law. In 1965, manufacturing was done with paper routers and instructions. Machining was done by hand, to drawings. The drawings themselves were done with pencil or India ink using draftspersons that did nothing else all day while engineers used slide rules.

Machines were controlled by electromechanical relays, mechanical timers, and human operators. If a new product was required, the production lines needed to be shut down, redesigned, rewired, and restarted, often at the cost of months of lost production.

To put in perspective just how far we've come in 40 years, the computers that put man on the moon in 1969 had far less processing capability than the average cell phone does today.

In 1968, Dick Morley, of Bedford Associates, designed a computer-based replacement for hardwired relays that he called a Programmable Logic Controller, or PLC. The first generation PLCs had 4 kilobytes of memory, maximum. They revolutionized industrial production, both in the discrete and in the process fields.

In 1976, Robert Metcalfe, of Xerox, and his assistant, David Boggs, published "Ethernet: Distributed Packet-Switching for Local Computer Networks." Most computers and PLCs today use some form of Ethernet to move data. The patents, interestingly, were not on the software but on the chips to produce hubs, routers, etc., which had become practical because of Moore's Law.

In 1981, Moore's Law permitted IBM to release their first Personal Computer. It ran with 16 kilobytes of RAM memory on an Intel 4.88 MHz 8088 chip.

By 1983, Moore's Law had progressed to the point where a joint venture of Yamatake and Honeywell produced the first "smart transmitter." This was a field device: a pressure transmitter, which had an onboard microprocessor

transmitter—a computer inside a field instrument, that could communicate digitally and be programmed like it was a computer. Other companies quickly followed suit.

In 1996, Fisher-Rosemount Inc. (now Emerson Process Management), changed the definition of a Distributed Control System by combining a COTS (commercial-off-the-shelf) PC made by Dell with a proprietary field controller and a suite of integrated proprietary software, running over standard Ethernet networks and called it Delta V. This was only possible because Moore's Law had made the PC powerful enough to replace the "big iron" proprietary computers used in previous DCS designs, both from Fisher-Rosemount and other vendors.

And in 2002, Craig Resnick, an analyst with ARC Advisory Group, coined the name "Programmable Automation Controller" for an embedded PC running either a version of Windows or a proprietary RTOS (real time operating system).

From then until now, Moore's Law has continued to drive down costs and while processing power and speed increase with no sign of let up. This has led to the development of new embedded computing platforms, such as the PAC.

Embedded computing platforms, of course, aren't limited to PACs. They are used universally for

many different tasks. From Ethernet switches and routers, analytical instrumentation, machine control and vision control systems to washing machines, stoves, gaming machines, and a wide variety of other applications. It is difficult, in fact, to think of an industry which does not use embedded computing platforms.

The Next Generation Embedded Computing Platform

What does the current iteration of Moore's Law hold for embedded computing? Not only have speed and computational power gone up exponentially, and cost dropped the same way, other improvements have increased, too.

The original 8088-powered IBM PC of 1981 used over 150 watts to operate. The Pentium PCs of the early 2000s used over 300 watts to operate. They generated enough heat that many of those watts went to operate cooling fans. Because cooling fans pull dirt and debris into the enclosure, this made PCs a questionable tool on the plant floor. Making an embedded computer that can be operated without internal cooling apparatus is a critical advance.

The next generation of embedded computing platform has no moving parts, no fans, and has components that require low power. Low power computing also saves energy, and makes the embedded computing platform greener than computers that require fans for cooling.

Among those non-moving parts can be a "diskless" drive. Many of the remaining watts of an early computer went to run the hard disk drive. Recent advances in flash memory have made it possible to use flash memory as replacements for hard drives. Flash memory drives up to 16 Gigabyte are common, 32 Gigabyte are expensive but available, and according to Moore's Law, by 2010, users should be seeing 64 Gigabyte flash drives in sizes and at prices that are economical enough to be used in embedded computing applications.

Where the original PC used a single core 8088 processor, the next generation of embedded computing platform uses high performance multi-core processors, with larger shared L2 caches, and delivering better power efficiency and performance than similar systems did only a few short years ago. Moore's Law strikes again. Another example are the Core 2 Duo CPUs in Advantech's UNO 2182 and 3182 embedded PCs, making them thousands of times more powerful than the original PC.

The fact that the next generation embedded computing platform has no moving parts, and is designed to be a low power, low heat dissipation system means that they can also be designed for a very wide operating temperature—wider, for example, than a rotating hard disk drive can tolerate.

Since they don't need to allow space for cooling fans, or large heat sinks, or a hard disk drive, the footprint of the

next generation embedded computing platform can be very small, and the entire system can be very light.

Fanless computing platforms can easily be used on more critical applications than traditional PCs with fans and rotating hard disks could not be used on in the past—power substations, trains, maritime applications, and hazardous areas in industrial applications.

In addition, like any PC, the next generation embedded computing platform is fully capable of running operating systems like Windows or Linux, or proprietary embedded OS, as the user chooses. The next generation of embedded computing platforms can be powerful enough to run full implementations of Windows XP, or Linux. They can also run embedded versions of Windows or Windows CE, and Embedded Linux.

Like any PC, the next generation of embedded computing platforms has many communication options that were not available to the original industrial PLCs. The next generation, thanks again to Moore's Law, will even have Gigabit LAN capabilities. This means that they can be used for even the most data and bandwidth intense applications, like real-time vision systems, or motion control.

They will also have high speed graphics capabilities through their PCI Express (PCI-e) application interface. Introduced by Intel in 2004, PCI-e is intended to replace the original PCI local bus, the AGP graphics interface, and even the PCI-X high speed bus. This will make possible HD (high definition) video graphics on an embedded computer!

The very high speed capabilities of the PCI-e channels also give the embedded computing platform the ability to operate very high speed communications, such as 10 Gigabit Ethernet, and to perform in RAID (redundant array of independent disks) applications.

PCI-e isn't the only option for expansion in the next generation of embedded computing platforms, either. PC/104, PCI-104, PC/104+, PCI, and PCMCIA connections are also available. This provides an embedded system with openness to third party devices using a variety of standard bus interfaces.

In addition, some suppliers will integrate industrial I/O (including isolated digital I/O, RS232/422/485, and perhaps even analog I/O) directly on the board so the embedded computing platform can be used as a single board controller for industrial applications.

It is doubtful that the industrial controls user of 1965 would be able to imagine the changes that Moore's Law would bring. As Moore's Law continues to operate, its effects will continue to be felt on the next generation embedded computing platform, and the next, and the next. ■



Innovative Applications in Embedded Storage Technology

Exploring New Application Territories, Defining Embedded Storage Technology

By Chen Yili
Exclusive Interviews with Embedded Core Service Assistant Manager, Miller Chang and Embedded Core Service Product Manager, Ethan Chen

Data storage applications have traditionally been thought to be of limited use, and regular users typically ignore their presence. But when damage occurs it's often too late for any remedy. Advantech has a unique take on storage installation developments, and focuses efforts on storage applications' own protection mechanisms. Its newest storage installations are powered with a self-monitoring capability that fires an alarm when storage hardware fails. This mechanism prevents the serious losses that can be triggered by these breakdowns.

Unexpected breakdowns on computer storage devices cause users many headaches. Critical damage can occur, be it due to lifespan-related issues or flat out failure. Data security is of the utmost concern, both for automatic controls at factory facilities and for computers used by software proprietors; it is an absolute necessity for maintaining smooth operations.

An Application Forerunner

Advantech has always valued computer dependability and durability, and that inspired Advantech's Embedded Core Service to prioritize customer data security in its R & D efforts. Embedded Core Service Assistant Manager, Miller Chang says that previously, companies looked to the market for existing storage technologies and products during project development.

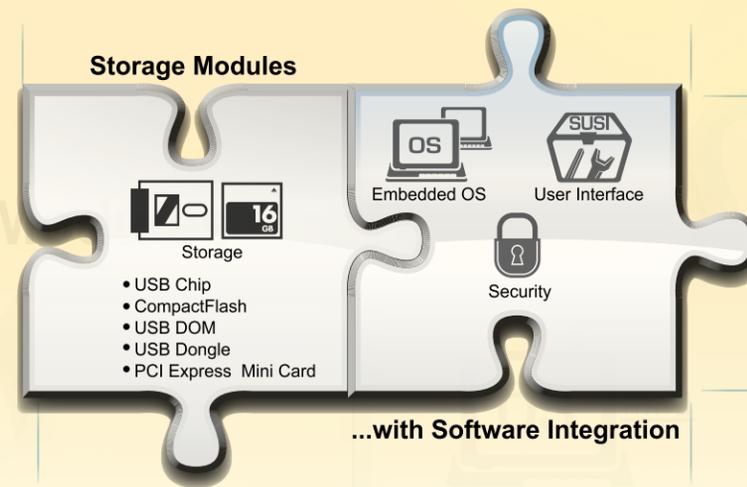
They incorporated these technologies and products into their projects as long as they fitted the bill. But oftentimes storage facilities bought under these circumstances could

never fully meet the project specification demands, and these products and technologies more often than not limited application possibilities.

Embedded Core Service Product Manager, Ethan Chen notes that Advantech wanted to develop a set of products that would be self-monitoring, secure, easy to restore, and competitively priced. But such industrial-grade products were next to impossible to find. Advantech saw the potential opportunity and began to do research and development toward a device that integrated the embedded core into the storage facilities. The system became more stable, the application more flexible, and data security and reliability were further enhanced.

The concept was great, but was unfamiliar to project development personnel. The Embedded Core Service team began a campaign to advertise the advantages of embedded storage technologies to the design staff, encouraging them to incorporate the cutting-edge storage facility into the products. Meanwhile they sought to understand the needs

- Certificated high compatibility storage
- S.M.A.R.T. technology to prevent crashes
- Tool for data backup & recovery
- Hidden security-zone for application protection



of the design team and develop custom solutions for specific product features. The Embedded Core Service team took part in many meetings and the advantages of embedded storage installations became more widely known. These new products and technologies successfully upgraded Advantech products' competitive edge.

Excellent Secure Storage Module

The industrial computing community also began to use NAND flash memories for storage as they become more affordable, lightweight, shock-absorbent, and power-efficient, with faster read circuitry. Nevertheless, despite an influx of such products very little had been done to meet data security and self-monitoring demands.

Embedded Core Service Product Manager, Ethan Chen provides an example: the client sells a multi-million dollar piece of equipment overseas. Operating data of that equipment is stored in a NT\$2,000 hard-drive. Working conditions are harsh, the hard-drive fails, and the equipment is out of commission. But with Advantech's mission-critical storage device, this problem never occurs. The module is shock-absorbent, and is also installed with Advantech's embedded software SUSI that self-monitors (S.M.A.R.T). The monitoring mechanism keeps close watch on the state of the memory modules, and alerts the system manager when device performance begins to drop, therefore dramatically minimizing sudden breakdowns. This is just one of the many features of Advantech's embedded memory modules.

Miller Chang says that data is the lifeline for any software development team. All their research efforts could go up in smoke if their storage device were lost or stolen. Advantech's embedded storage appliance is outfitted with a security mechanism that allows the memory data to be



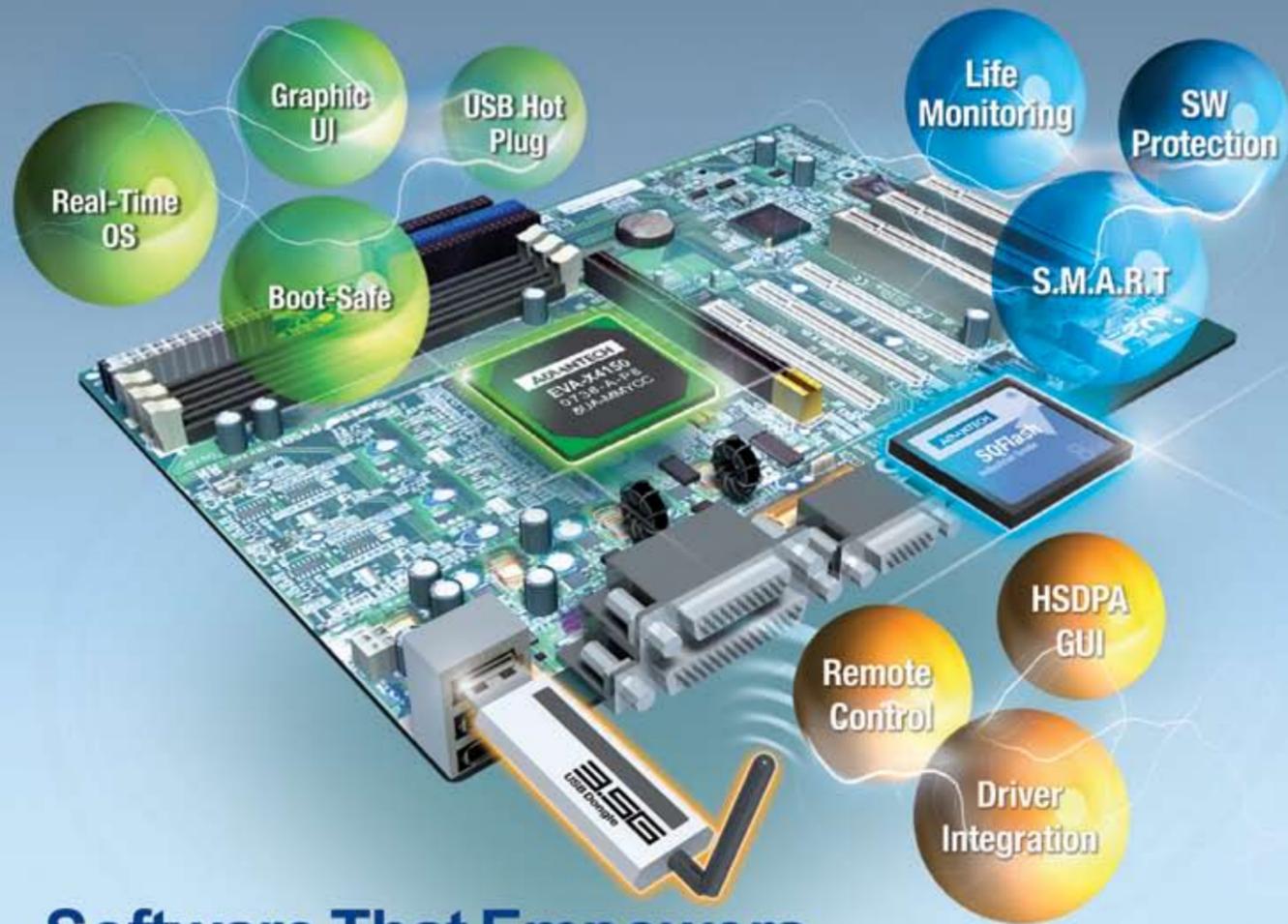
accessed if lost. The authorization mechanism is embedded inside the device, and users can "stash" the data in a hidden area. The SUSI software package provides Product Keys for each user, and users can apply access codes from Advantech to design-in unique security features.

When the application program is activated, the storage device fires up the protection key. A user won't be able to access data in storage unless they pass the security identification process. Advantech's storage technologies therefore become a safe haven for storing important data; they're the gatekeepers guarding customer data. With those technologies in place, the embedded storage devices are more than just a "safe"; they form a total solution with key, functional capabilities.

Prospects

In addition to advances in capacity and read/write speed, Advantech will focus on greater data security and hardware self-monitoring features. Embedded Core Service Group is probing the options for protecting storage data through BIOS activation. These devices can only be activated on equipment that has passed security certification - even the reader itself won't be able to access the data. So in the event of theft, the data couldn't be read, as long as Advantech's embedded software was properly activated. On the other hand, as hardware prices drop, Advantech is also studying the possibility of executing RAID on NAND flash.

Every computer-technology-related industry does everything possible to avert hardware failures, and welcomes any type of data security protection system. Mechanical breakdowns are one of the worst nightmares for this industry. Advantech may be the pioneer that designs revolutionary software into computer hardware, software that gives a wide array of durable and reliable solutions to clients. An engineer working in the Embedded Core Service Group said it best: "Advantech provides trustworthy, robust hardware, and invigorates that hardware with more intelligent software." ■



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High Availability Architectures for Ethernet in Manufacturing

Written by: Paul Wacker, Advantech Corporation, Industrial Automation Group



Outside of craft manufacturing it is no longer possible to create any product in large quantities without automation. In some cases, such as semiconductor manufacturing, it is not possible to create products without automation at all. But Automation is not, by itself, enough. The machine, batch recipes, and procedure-based controls all have to be interconnected, first to the control system and then to the enterprise systems. This requires networking of a specific type, different than the typical office or home networks that are commonplace today.

Gartner Group and other analysts have estimated that the cost of a single hour of downtime in a modern advanced manufacturing plant may be as high as \$1.6 million. When those costs are traced backward and forward through the supply chain, they may in fact be larger. Opportunity costs, idle workers, lost orders due to unavailable products, and other non-quantifiable costs simply cannot be estimated.

In some cases, network downtime can cause machine

failures, which, in turn, can cause dangerous conditions to exist. People can be injured, products can be mangled, and more losses incurred.

What is High Availability?

High availability is a design methodology that ensures a high degree of uptime reliability (as opposed to downtime) in a system like a plant level network. Systems which are designed for high availability are architected to produce availability far greater than 90%. A system which has 90% availability has 36.5 days per year when it is not available. A plant floor network that is only 90% available would not be acceptable.

Generally, the acceptable level of high availability begins at 99.9% (“three nines”). Other commonly acceptable

statements of high availability include the well known 99.99% (“four nines”), 99.999% (“five nines”) and 99.9999% (“six nines”). At “three nines” the plant network would be unavailable for 8.76 hours per year. At “four nines” unavailability would be 52.6 minutes per year. At “five nines” system unavailability is 5.26 minutes per year, and at “six nines” it is only 31.5 seconds per year. Clearly, a high availability system is designed to produce nearly continuous uptime.

When you look at how to design a high availability network, you must immediately think in terms of designing in redundancy. Redundancy does two things to dramatically improve high availability; first, it eliminates or dramatically reduces the potential for downtime from malfunctioning equipment and disconnected or broken cables, or cut wires. And secondly, redundant power connections eliminate downtime from power loss. Another important design element is to minimize the mean time of repair. Even a “five nines” or “six nines” design is a probability of availability, not a guarantee. Thus, it is important to minimize what downtime will occur by providing deep diagnostics and network troubleshooting tools as part of the system architecture.

High availability systems exist in many types of networks, but in manufacturing, there are special reasons (and serious cost avoidance) involved in designing high availability networks. Acceptable downtime in an office environment, especially unplanned downtime, is variable. In a conventional office, unplanned downtime in the evening or on weekends is perfectly understandable, and planned downtime is entirely acceptable. Not so in the manufacturing environment, where downtime reduces production which is often ongoing 24/7. Networks simply cannot be down for even minutes in the manufacturing environment—where response times are measured in milliseconds.

Early Ethernet networks were put together using shared bus and later hub architectures. These were fine, and worked well in a simple network with few nodes—say, under 30 to 50. Above that number of nodes, data collisions, packet loss, and vastly reduced network speeds resulted.

The Role of the Ethernet Switch

Avoiding this problem, and permitting the upscale of Ethernet networks was made possible by the invention of the Ethernet switch in 1989. An Ethernet switch is actually a network bridge that routes data at the OSI models layer 2 (the data link layer), connecting network segments. The purpose of laying out networks using switches to route data from switched segment to switched segment is to reduce or remove the likelihood of packet collisions and bus contention. This means that data travels through the network at “wire speed” without delays caused by network congestion.

Switches perform an operation called “store and

forward,” as well. Using packet switching techniques, Ethernet switches buffer, store and perform checksum tests on packets before sending them on to their destination. This ensures data integrity during transmission, and makes the network more fault-tolerant.

Redundancy in Network Design

In industrial Ethernet networks, redundancy is critical to achieving proper uptime. A network in a factory, as we have seen, requires at least “five nines” availability and one of the best ways to achieve very high availability is to design the network architecture to be redundant. However, just connecting ports in parallel between switches creates a loop—data gets caught in the loop and traffic continues to build, leading to overwhelming traffic that can bring down a network.

The solution, simply enough, is a “managed” Ethernet switch. This is a switch with a secondary processor that provides manual part settings, services like DHCP server for automatic IP address assignment of connected devices, remote monitoring and diagnostics, and advanced traffic control, including management of multiple connection paths to other managed switches. That is, we connect our devices with managed switches that are able to detect a redundant path thus, preventing data loops and the resulting traffic congestion.

Network redundancy is independent of topology (star, ring or mesh). There are four of these protocols: Trunking, Spanning Tree (STP), Rapid Spanning Tree (RSTP), and Proprietary Rings.

Port trunking (LACP, 802.3ad), which is also known as link aggregation, provides two or more parallel paths between device ports for redundancy. Trunking has the advantage of increased bandwidth and throughput, since it provides dual paths for data transmission between each switch. Port trunking uses multiple CAT5 copper, or sometimes fiber connections, instead of just one. It produces point to point connections from switch to switch.

For applications with more than two switches, port trunking has some serious problems. The cables need to be routed separately so that physical damage to one cable does not affect both. Loss of power to a single switch results in loss of connectivity to all the switches and devices that are downstream—in other words, port trunking does not improve redundancy of the entire network, just between two switches.

Spanning Tree Protocol, or STP was the first protocol to be developed based on the IEEE 802.1D standard. It provides for a mesh network of connected switches that automatically disables redundant paths, leaving a single active path between any two network nodes. Rapid Spanning Tree (RSTP or IEEE 802.1w) is a modernization of the STP protocol which, as its name

implies, operates significantly faster than its older predecessor. Both protocols are well understood, and adopted within enterprise IT, and are moving toward the plant infrastructure quickly. The problem with both spanning tree protocols in the industrial environment is that in the event of a change in network topology (such as a disconnected cable) both protocols take far too long to recover. STP takes 30 seconds to a full minute to converge, while RSTP takes between 2 to 6 seconds. Either is far too long in a manufacturing environment.

The answer has been the use of Proprietary Ring protocols, such as Advantech’s X-Ring. A proprietary ring protocol is a combination of a topology and protocol that ensures communication even when one of its segments is broken. A master switch is set up to monitor and control packet traffic in a proprietary way. X-Ring networks are simple to understand and set up, and they are fast, recover well, and provide excellent redundancy.

Using the X-Ring

Like all proprietary ring technologies intended to be used in the industrial market, X-Ring was designed specifically to meet the needs of manufacturing. The topology is a ring connecting all switches. The media the ring uses for connectivity can be copper cable (CAT5) or fiber optics. Fiber is used increasingly in the industrial environment because of increased noise immunity and total isolation.

The topology of X-Ring encourages routing cables separately. This topology makes it difficult or impossible for a single physical accident to destroy both cables—providing cable redundancy to the system as a whole.

The X-Ring is flexible, and can be overlapped. This means that one switch connects two X-Rings. Multiple switches can connect two X-Rings, as well. With managed switches that support both X-Ring and RSTP, it’s easy to connect plant and factory floor systems. Most importantly, X-Ring recovers from a cable disconnection or network topology change in less than 10ms for a 30 switch network - this is the fastest recovery time of any commercially available product.

With all switches set to be ring master, the one with the lowest MAC address becomes the ring master by default—this saves the network architect substantial setup time. In addition, the switch can send an SNMP trap or email notification on a network topology change. So, if a cable breaks, you can set the switch to send you an email telling you what happened. X-Ring also enables use of an SNMP to for centralized performance and availability monitoring.

SNMP is part of the suite of tools created by the Internet Engineering Task Force (IETF). Called Simple Network Management Protocol, it is among the basic protocols that operate the Internet. SNMP provides a methodology and

a protocol for monitoring the performance of Internet and Ethernet networks. A SNMP network consists of managed devices, software programs running on the network devices called “agents” and network management systems. Network devices, which can be almost any type of device on the network, include routers, switches, host computers, and more, and are monitored by the agents, who report to the network management systems. SNMP is used to monitor and determine network health.

Mitigating Power Loss

The most common cause of communications failure in industrial Ethernet networks is power supply failure. Power supply failures can be caused by component mortality, over-voltage, line spikes, and breaks in the power cable. It is incumbent on the network designer to mitigate this potential common mode failure by designing the network using infrastructure products with redundant power inputs.

It also helps to use two different power input types. For example, if you use a switch or other network infrastructure device with redundant 24 VDC power inputs, one power input can be 24 VDC instrument or network power, and the other can be a 24 VDC battery harness with a trickle charger, or a UPS device.

Redundant and high reliability industrial Ethernet network design is more expensive than the standard Ethernet designs common in the enterprise and the office environment. In order to maintain “five nines” or “six nines” availability, it is necessary to plan and build for redundant communications pathways, redundant switching and redundant power supplies.

The question for the designer is: can the cost differential be justified in the name of decreased downtime? One incident of downtime per year in an industrial plant environment caused by loss of network connectivity can easily cost significant multiples of the cost of designing and installing a high availability network. Consider the true cost of downtime in your network planning exercise, including lost production, mean time to repair, and lost opportunity cost in the marketplace and the value of high availability networks increases even more.

When you add in the operational benefits of high availability network architectures, like advanced traffic management, remote diagnostics, troubleshooting, and increased network data throughput speed using managed switches with X-Ring or RSTP support, the value of high availability networks continues to increase. For very high speed network requirements, the designer of a high availability network should consider X-Ring, because of its recovery time—faster than any other industrial Ethernet protocol. ■



David Liu
Engineering Manager,
Advantech Irvine

It has been over 12 years since I joined Advantech in 1996. During the job interview, I told the interviewer that I'd like to become an international person. I was ready to sail, but my destination was still unclear.

In the following six years at headquarters, I advanced in technical knowledge, and fielded many challenges from my R&D and PM mentors. We usually discussed projects till midnight. Their discipline and broad knowledge brought me to a whole new level, which still benefits me today.

In 2001, I was assigned to Europe to manage certain products lines. I remember one day my heart was touched when the Italian general manager tapped me on the shoulder after I had finished an important presentation at a channel conference in Holland, and he said "You did a very good job." It was very encouraging to me, especially under such challenging circumstances.

In 2003, I was transferred to the US to start another journey. The mission was to re-organize the existing technical support team, and advance that team's capability to a higher level. It has been such a blessing to work with these excellent engineers, even though the mission was tremendously challenging to me. I learned a lot, and grew fast with the team, through both laughter and tears. In the course of several years, we

gradually turned the technical support team into an engineering service division, which is now providing very significant contributions to the company's revenue. Throughout these past years, my journey's ultimate destination has gradually become much clearer, and I can now take the blessings that I have received and pass them on to others. I really enjoy and cherish the opportunities to work with and develop people's talents. Seeing their faces full of confidence, I know that they will also pass the blessings on when they get the chance. I appreciate the opportunities Advantech has given me, which have allowed me to experience so many wonderful things. The journey is still ongoing, and still full of blessings.



Lynette Andersen
Global IAG Marketing Manager,
Advantech Cincinnati

I'm Lynette Andersen. I grew up in a small Midwest City in the United States called Appleton, Wisconsin. I have an undergraduate degree from the University of Wisconsin and am currently pursuing my MBA in global management.

My first real job was in television broadcasting. In this job I did everything from directing the news to producing the stations special events. After 2 years in this job, I decided to move to Monterey, CA where I worked for a division of National Geographic as an Advertising and Promotions Manager.

In the winter of 1999 I got married and moved to San Diego, CA. This move brought me to Advantech. I began my career with Advantech in 2000 as the Senior Marketing Specialist for the Network Computing Group. In 2003, I transferred to Advantech's Industrial Automation Group in Cincinnati, OH. I am currently the global marketing manager for this Group.

My career at Advantech has been very rewarding both personally and professionally. Over the past nine years I have had the opportunity to travel to multiple Advantech locations worldwide. I have also had the opportunity to learn different marketing strategies and practices from many talented

Advantech professionals. Thanks to Advantech, I now have friends from all over the world.

When I have free time I enjoy spending it with my 2 year old son Tyler, my husband Bryan, and my dog Sputnik. I also enjoy riding my horse. Another passion of mine is scuba diving. Unfortunately since I moved to Ohio I do not have the opportunity to enjoy this activity often. However, I have plenty to keep me busy, and now I just make sure I go on holiday to warm locations that offer good scuba diving!

When leaving school, I decided to join the British Army "Parachute Regiment", rather than going to university. The thought of jumping out of airplanes and learning the latest weapon systems was more appealing, and I have to say that the two years spent in the army were some of the most physically and mentally challenging days of my life.

After leaving the army I started work as an Integration Engineer at an Intel distributor called Metrologie. My role was to integrate Intel Multibus 1 & 2, Intel 101 & 102 systems, and also Wyse terminals. After a year and a half, I was able to move into sales.

Like a duck to water, I loved computer distribution from the very first foray, starting with what I knew best, Intel and Wyse. After a short period of time I was able to widen my experience to include mainstream commercial business computing with IBM, Unisys, EMC and my first exposure to embedded technology with Radisys.

Now at Advantech my focus is on the medical and general embedded markets. This is a big change from my background in telecoms, but I feel it is good to challenge oneself, to look at new markets and expand one's experience and knowledge.

Since working for Radisys and Advantech my travel diary reads like a foreign correspondent - USA, Italy, Sweden, Taiwan, Singapore, Germany, France, Holland, Norway, Finland - some days I wonder just how I fit it all in - must be that 28-hour Advantech day that makes it all possible! Along the way I have also collected my very own support team that keep me motivated: one wife, two children (one of each configuration), and one pet dog!

I still find a little time for my passion which is ice hockey, and I also like to raise money for charity by doing at least one main event per year. This year my wife, Claire, and I will compete in the "Three Peaks Challenge" - I must be mad to do this at my age!



Mike Fay
Key Account Manager,
Advantech UK

I was born in 1976 and grew up in Malaysia, then moved to Taiwan for college, where I majored in MIS (Management of Information systems). It is not easy for a fresh-graduate foreigner to get a job in Taiwan, but with great help from my professor and a bank IT manager, I finally got the needed work permit.

Before Advantech, I worked in the banking field in an MIS department and got to work closely with the local IBM banking team. During that experience I learned Java (and also learned to love it), as well as UNIX systems, ASP platforms, and web programming. I was PMI certified as a PMP (Project Management Professional) at that time as well.

I joined the Advantech HQ IT department in July 2006, then transferred to AASC (USA) in September, 2007. Actually, I used to be an intern for Advantech some thirteen years ago, when I worked on the OLAP project with my professor. By 2007, when it was time to move to the US, I had a wife, originally from Taiwan. We were happy to make the move together.

I have been with Advantech for about three years now. In the first year, I initiated the single sign-on project for customers, and was in charge of the CTOS portal implementation in ACL. Since August 2007, I have been fully dedicated to the eStore project. With five team members in Taipei and Kunshan, we support Advantech's global eStores.

Badminton is my favorite sport; I played in high school and on my college team; it is a terrific game where I can sweat totally and keep my brain clear. Now I play two or three times a week. I also love to play golf; walking across the green and enjoying the fresh oxygen is fantastic. I golf with Advantech's golf club once a month. Advantechers are talented, humble, and hardworking. They have perfect core values, so I really enjoy working with my Advantech friends around the world.



Edward Keh
eStore IT team leader,
Advantech USA

IT made in Brazil

Advantech is leader in the industrial computer market and attracts great customers, such as Petrobras



Brazil is one of the fastest developing countries in Latin America and the world, and it is quickly gaining recognition in the ICT (Information and Communication Technology) field. The annual per capita expenditure on computers, software and cell phones is more than \$400 dollars. Advantech Brazil (ABR) is the leader in this niche market in Brazil and has operated directly in the country since 2000 and as a distributor since 1990.

The person responsible for bringing the company to Brazil is mechanical engineer, Mario Franco Neto, the regional branch office manager, who coordinated the joint-venture with Brazilian investors. Graduated from the Federal School of Engineering of Itajubá, one of the most traditional in the country, he has helped turn Advantech into the market leader for PC-based high quality, performance industrial equipment. “When I brought Advantech here, Brazil was lacking in such solutions and yearned for a high-tech product like the ones Advantech provides”, recalls Franco.

As a result of this successful venture, Advantech Brazil has become a healthy and expanding company, with two thousand customers, 28 direct employees, 30 indirect collaborators among sales channels and constantly growing revenue. In 2008, the Brazilian subsidiary earned R\$ 15 million, 35% more than it earned in its previous year. The forecast for 2009 is to achieve R\$ 20 million.

Advantech operates from its commercial and administrative area based in São Paulo, the major commercial capital of Brazil. It's from this rich city that the greatest players in the international IT market define their strategies for the whole country, such as Microsoft, Intel, IBM, HP, Dell, Apple, Google, among others.

The logistics and after-market departments of Advantech were placed strategically in Itajubá, a small town in the state of Minas Gerais, the second most populous state of the country and responsible for 56.5% of the national GDP (Gross Domestic Product). It is no coincidence that this location is nationally known as the Silicon Valley of Brazil, since it holds a large number of companies, research centers and also highly trained man power from its important universities. It is precisely here, a place full of brilliant minds in the electronics field, that Advantech Brazil keeps its supplies of parts and pieces, assembles the final products and also offers after-market services.

Advantech Brazil works with a complete and segmented portfolio. It offers industrial computers for different applications, such as production lines, hospitals, buses, transportation, and commercial automation among others. This is how Advantech satisfies the needs of all industry sectors, especially the steel industry and mining sectors, as well as transportation and energy. “We provide industrial computers for toll booths to complex camera systems and road signalization”, tells Franco.

The Brazilian public sector is considered a major IT investor and Advantech has adapted solutions to offer this market, which helped attract customers such as Petrobras—a Brazilian giant and one of the world's largest producers of oil and gas. Today, Advantech has hardware solutions spread throughout Petrobras refineries, platforms and distribution terminals. Advantech was chosen for offering products with features that meet the customer's technical specifications and environmental conditions, such as temperature and vibration absorbance.

Advantech's products are successful because they combine several features and functions in a compact presentation, with adaptable specifications, industrial reliability and operator friendly interface. All products are developed in cooperation between partners and customers and are supported by dedicated engineering teams.

The Advantech ABR business model contemplates partnerships with representatives, distributors and system integrators spread throughout the country. The system integrators are an important part of Advantech's success in Brazil, since they use their hardware to build complete solutions for the customers. Nowadays, there are approximately 400 system integrators, including Siemens, that use Advantech's technology in Brazil. ■

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Trusted ePlatform Services



Trusted ePlatform Services

ADVANTECH

Crossover Collaboration Promises Successful Customer Partnerships

At Advantech, crossover collaboration means exploring new paths to growth through ventures that develop new kinds of partnerships and opportunities. Today, in the connected business world, new customer requirements are always emerging and branching out into a diverse range of industries.

Advantech is committed to empowering visionary computing and fostering innovation, and crossover collaboration is leading Advantech and our customers and partners, toward the ultimate sustainable competitive advantage.