

MyWISE-PaaS

An Advantech Magazine - Transportation 2020-2021

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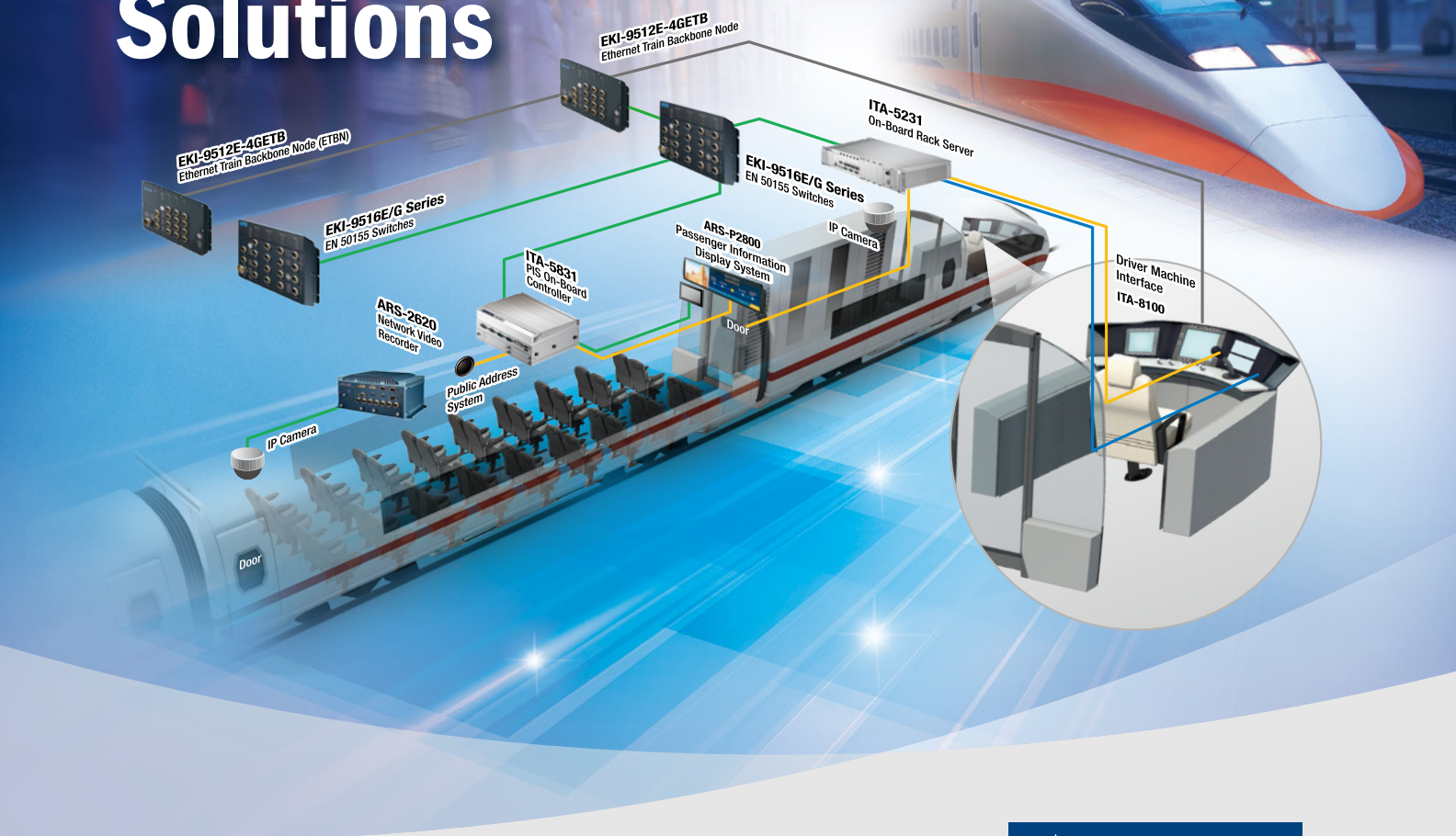
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Advantech Rolling Stock Solutions



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Advantech's Rolling Stock solution provides fully customization and CTOS service to fulfill a wide range of applications as it guarantee reliable performance under railway harsh environment for passenger information and display system, train-to-ground communication, on-board infotainment and IP surveillance systems.



ITA-5231

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Server



ITA-5831

Intel® 6th Generation
Core™ i Processor
EN 50155 Controller



ARS-2620

Intel® i7 Fanless Railway
Box PC with 4-port PoE



ARS-P2800

28" EN 50155 Fanless
Railway Panel PC



ITA-8100

10.4" EN 50155 Fanless
Railway Touch Panel PC



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EN 50155
Managed/Unmanaged
Ethernet (PoE)
Switches and Routing
Switch (ETBN)

Advantech Smart Transportation Solutions Turn Over a New Leaf

Driven by cutting-edge technologies such as 5G, edge AI, and cloud computing, the transportation industry is fast evolving from automation to autonomous transportation operations. The application of concepts like the internet of vehicles (IoV) that optimize transportation and logistics, zero-emission electric vehicles, and autonomous self-driving cars has become more feasible and cost effective. Advantech is a global leader of IoV solutions and sits right at the center of this transportation industry transformation. We develop innovative solutions with global partners that are revolutionizing the transportation and logistics industries.

The theme of this issue of MyWISE-PaaS focuses on the evolution of technologies and the trending smart applications in smart transportation. Several industry professionals have shared their opinions and analysis covering the practical aspects of application development. We have gathered application stories about nine co-creation projects between Advantech and its global partners, so readers can learn more about some of the latest development trends within smart transportation.

In Advantech's view, Van Lin, Director of Intelligent Mobile Solutions of Service IoT Group, and Kunhong Chen, Business Development Manager of Advantech's Industrial IoT Group discuss the changes and innovations that 5G, edge AI, and cloud computing will bring to the development of intelligent bus and rail transportation solutions.

In the Power Insight section, professionals from

industry, academia, and research backgrounds were invited to in-depth discussions on the future of smart transportation and how Taiwan can build a complete industrial IoT ecosystem and the vision and trends in smart transportation.

In the Customer Partnership section, we look at OmniEyes and Advantech's cooperation on computer vision for smart fleet management and the co-creation of Cittatti, Harman, and Advantech for São Paulo's Sustainable Urban Mobility project.

This issue also features several insightful articles covering smart transportation applications from around the world. Transportation authorities — such as Transport for New South Wales, Nanjing Metro Group Company, and Ho Chi Minh City Metro — are all very revealing about their latest smart transportation solutions. Smart bus fleet management systems deployed in Bangkok and Taipei helped to improve operational efficiency and road safety.

Their successful stories reflect the innovative technologies that are key to smart urban mobility, as well as the answer to safe, sustainable, and convenient urban living.

Smart transportation solutions have not only revolutionized the transportation and logistics industries but also the way we live, work, and travel. Venturing into the world of autonomy, Advantech and global co-creation partners seek to solve issues derived from urbanization by introducing the latest smart transportation solutions to all the major cities in the world. ■

Enabling the Future of Smart Transportation with AI, 5G, and Edge Computing

Advantech has years of experience assisting the transportation industry with implementing automation and smart development. By collaborating with vehicle manufacturers and system integrators (SIs), Advantech has created complete solutions that integrate people, vehicles, the environment, and equipment. These innovative solutions allow vehicles to be connected to everything and usher in a future of vehicle-to-everything (V2X) communication.

Photos provided by Shutterstock

Interview with Van Lin, Director of Intelligent Mobile Solutions of Service IoT Group, Advantech; Kunhong Chen, Transportation Sector Manager of Industrial IoT Group, Advantech

In recent years, edge computing, AI, 5G, and LiDAR have advanced in combination with the IoT. The aim of smart transportation is to raise safety while improving passenger comfort. The benefits of smart transportation are becoming increasingly evident in both highway and railway transportation systems. In keeping with this trend, Advantech has leveraged its extensive smart transportation experience to build a co-creation platform in collaboration with its partners. This facilitates the development of smarter applications and new innovation for urban transportation.

Accelerating V2X communication

Vehicle-to-everything (V2X) communication is the passing of information from a vehicle to any device that may affect the vehicle, and vice versa. According to Van Lin, Director of Intelligent Mobile Solutions of Service IoT Group at Advantech, “The realization of smart transportation involves not just the development of buses, metros, and railways, but also people, the environment, and other related equipment. The combination of 5G, AI, edge computing, LiDAR, and IoT is key to realizing this development. Advantech and its clients will implement and benefit from the smart future of V2X communication.”

Mr. Lin explained that equipping vehicles with sensors and cameras has been a growing trend for some time. Until recently, these devices were primarily used for recording trips. The information acquired by these devices

was used to assign accident causes and accountability. This trend is changing with the maturing of edge AI computing applications. Vehicles can acquire and analyze information to dynamically make meaningful judgments during trips. In the future, 5G’s high-bandwidth and low-latency capabilities will upload decisions and information to a cloud platform instantaneously. This technology can be utilized to help administrators manage situations in real time, and aid in the development of various smart applications.

In highway transportation, edge AI can be used in forward-collision/lane departure warning, blind-spot detection, and driver behavior monitoring systems. In urban areas, preventing drivers from running red lights used to be impossible. But now, with the use of edge AI and 5G, it is possible to monitor vehicles, traffic lights, and driver behavior in order to reduce the running of red lights.

Smart development of railway transportation focuses on safety and service quality

The rise of 5G and AI has facilitated diverse smart railway transportation applications, leading to increased demands for system upgrades. Kunhong Chen, Transportation Sector Manager of Advantech’s Industrial IoT Group, pointed out that the Taipei Metro’s past operational goals focused on increasing passenger capacity. This has shifted to improving safety and

service quality. The development of smart operations is driving this change. Accordingly, Taipei Metro is actively engaged in upgrading its systems—in particular its driving and signaling systems. Consequently, the assessment of safety-related electronic systems (Safety Integrity Level, SIL) has been upgraded from SIL 2 to SIL 4. Likewise, the signaling and processing system (European Train Controlling System/ETCS) has been upgraded from ETCS 2 to ETCS 4. These upgrades contribute significantly to improving safety. Additionally, using AI and LiDAR applications and automatic train operation (ATO), operators can build management models that center around smart operations.

Advantech continues to deliver innovative software/hardware solutions and platform services at every stage of development. Mr. Chen emphasized that Advantech initially focused on developing passenger-related systems and solutions, including CCTV and integrated supervisory control systems. This focus shifted toward developing safety-related solutions, such as interlocking systems, dual backup platforms, GPU-based ATO solutions, and train-to-ground high-speed transmission technologies. Presently, Advantech is enhancing railway safety by utilizing AI, LiDAR, and real-time wireless communication technologies to create smart solutions for obstacle detection, pantograph inspection, and train coupler remote monitoring.

Advantech connects global transportation industry partners

Advantech will continue to promote the integration

of 5G, edge AI, and smart transportation. Mr. Lin emphasized that Advantech is dedicated to developing industrial computers explicitly for transportation. In the future, Advantech plans to integrate 5G and edge AI technologies into its hardware products. Advantech has collaborated with sensor manufacturers, system integrators, and other partners to create AIoT solution-ready packages (AIoT SRPs) via its WISE-PaaS platform. To accelerate the implementation of AIoT SRPs in various transportation sectors, Advantech has further subdivided its product features. Advantech also launched its range of co-created I.App products onto Marketplace site to enable domain-focused system integrators to download and deploy rapid build solutions for various sectors.

Mr. Chen added that Advantech has long been a part of the global railway transportation ecosystem. Together with vehicle manufacturers and large international contractors, they have co-created advanced products from the initial design phase. Advantech selected key partners from various sectors to deliver innovative solutions for railway transportation smart applications. With co-creation in mind, the company has comprehensively embraced the changes cutting-edge technologies have brought to smart railway applications.

With more than 30 years of industrial automation experience, Advantech plans to leverage its WISE-PaaS platform and global resources to connect all partners in the smart transportation industrial chain. By integrating 5G, AI, edge computing, and LiDAR into AIoT applications, Advantech continues to promote and accelerate smart transportation. ■



Advancing Smart Transportation through Cooperation Among Government, Industry, and Academia

The development of smart transportation must be integrated at all levels through cooperation between central and local governments, the transportation industry, network service providers, hardware manufacturers, system integrators, and AIoT solution providers. This will enable the establishment of a complete ecosystem that realizes the full potential of smart transportation.

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Interview with Tsung-Pao Chou, Secretary-General, Taiwan Telematics Industry Association (TTIA); Meng-Fen Wu, Chief Consultant, Taiwan Telematics Industry Association (TTIA); Dr. S. K. Jason Chang, Board Member, ITS World Congress and Professor of Transport Systems, National Taiwan University



Door-to-door smart transportation services can be realized through MaaS—Mobility as a Service. For instance, if commuters want to travel from point A to point B, all they need to do is to use a smartphone to connect to the smart transportation network platform. Based on existing data, the system will provide the

most efficient route in terms of time, cost, and energy.

The era of smart transportation is upon us. Tsung-Pao Chou, Secretary-General of the Taiwan Telematics Industry Association (TTIA), Meng-Fen Wu, Chief Consultant of the TTIA, and Jason Chang, Professor at the National Taiwan University and Vice President

of ITS Taiwan Association, concurred that CASE mobility—connected, autonomous, shared, and electric mobility—is a key trend in transportation. This trend will revolutionize transportation modes, creating both challenges and opportunities. Taiwan’s government, industry, and academia must collaborate and utilize innovative technologies and solutions to establish common standards in order for Taiwan to become a global leader of smart transportation development.

Realizing smart transportation with MaaS

Following the rapid evolution of the Internet and ICT, governments and industries began developing automation and intelligence for the transportation industry as early as 2000. “After 20 years of hard work, smart transportation is now contributing to energy efficiency and emission reductions, while improving safety,” said Prof. Chang. With international organizations and governments recognizing the importance of smart transportation, and the development of the Internet of Vehicles and self-driving technology continuing to mature, smart and seamless transportation is just around the corner.

Prof. Chang explained that MaaS utilizes data analytics tools and ICT to integrate diverse road data provided by transportation systems, operators and travellers in order to build a seamlessly integrated transportation service platform. Commuters wishing to travel from point A to point B can use a smartphone to check all possible routes. The integrated transportation system will automatically calculate the route that is most economical and efficient in terms of cost, time and externalities, such as energy use, emissions, congestion, noise and safety risk. This is expected to significantly increase urban residents’ willingness to take public transportation, drastically reducing the use of cars and motorcycles in metropolitan areas. Additionally, local governments can use the data collated by the system to formulate green transportation policies that optimize public transportation networks, reduces energy consumption, and lowers carbon emissions.

However, smart transportation using the MaaS model is very broad. It involves central and local governments’ policy formulation, integration into the

smart transportation industry chain, and changes to people’s lifestyles. Everything must be synced and integrated, and the concept of co-creating an ecosystem must be firmly established to realize the vision of smart transportation.

Close industry collaboration is critical to success

“Cross-domain integration is imperative for promoting the national smart transportation industry,” said Wu, concurring with Prof. Chang’s view. Wu pointed out that in the past, the promotion of large smart transportation projects in Taiwan, including freeway electronic toll collection (ETC) systems and the integration of multi-card electronic payment systems for all city and intercity buses, railways and public bikes in Taiwan, were all initiated by the central government (they all later become world class through public private partnership). Moreover, these projects required all sectors to work together and collaborate with local governments, and to integrate and utilize resources from both upstream and downstream sectors of the industrial supply chain in order to realize the vision of smart transportation.

“Looking ahead, the Taiwanese government should respond to the trend of CASE mobility by promoting co-creation with government, industry, and academia; thereby accelerating the development of the smart transportation industry and enhancing the industry’s competitiveness,” said Wu. According to Wu, we



Tsung-Pao Chou, Secretary-General, Taiwan Telematics Industry Association (TTIA)



Meng-Fen Wu, Chief
Consultant, Taiwan Telematics
Industry Association (TTIA)

are in the process of realizing connected and electric mobility, but it remains uncertain when autonomous mobility will become a reality. Nevertheless, it is worth noting that with the introduction of advanced 5G and AI edge technologies, development will be accelerated and the focus will be mainly on improving safety. Moreover, MaaS—serving as a combination of connected, shared and sustainable mobility—will be gradually realized in many countries around the world within the next few years.

Wu emphasized that, whether we want to seize business opportunities associated with connected and shared mobility or pursue the full realization of MaaS, the integration of networks, operations, ticket rates, and information must be complete. Therefore, the smart transportation industry in Taiwan must build a complete ecosystem. In such an ecosystem, software and hardware solution providers like Advantech, network service providers like Chunghwa Telecom, transportation operators, and system integrators must embrace the concept of co-creation to formulate the optimum solutions and services. If successful, consumers will change their current lifestyles willingly, thus accelerating the development of the smart transportation industry.

Importance of formulating standards

“One of the most crucial parts of collaboration and co-creation within an ecosystem is the establishment of industrial standards,” Chou added. A large-scale smart transportation system covers numerous dimensions that are extremely complex. Unified and standardized interfaces are necessary for data integration as well as software and hardware integration. Since its establishment 10 years ago, the TTIA has been devoted to promoting the standardization of public transportation smart development. TTIA developed the world’s first smart

bus industrial standard in 2010 to provide a solution to overcome the challenges inherent in the introduction of smart bus systems. They proposed the concept of the “Integrated Smart Bus” to assimilate the many systems into vehicles from a single hardware platform. With regard to the multi-card electronic payment system, for example, the TTIA assisted the government in completing the standardization of intercity bus onboard devices, multi-card electronic ticket modules, and smart driving application systems.

Meanwhile, Zhou stated that to accelerate the integration of ticketing services and advance the development of public transportation, the Ministry of Transportation and Communications is promoting a QR code data format standard and test specification for mobile ticketing in transport. The industry, together with the TTIA and the Institute for Information Industry, has established a smart telematics system team and QR code system team to begin revising commercial bus telematics and peripheral industry standards. They are attempting to accelerate Taiwan’s development of a QR code for mobile ticketing by formulating a series of industry specifications or standards, creating a competitive advantage and paving the way for the export of Taiwan’s transportation payment solutions.

Smart transportation is an essential national development policy for many countries, including Taiwan. Based on experiences accumulated over the past 20 years, government, industry, and academia in Taiwan continue to collaborate, with the aim of reaching new milestones in the evolution of Taiwan’s smart transportation. ■



Dr. S. K. Jason Chang, Board Member, ITS World
Congress and Professor of Transport Systems,
National Taiwan University

PoE++ (IEEE802.3bt) Technology for Video Surveillance



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To achieve an effective transportation solution that maintains safety, but also permits better traffic throughput, accurate monitoring is needed.

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- Video detection systems can — with the help of artificial intelligence (AI) — generate essential traffic metadata.
- Information such as vehicle numbers, direction, waiting times and more can easily be acquired using video.



EKI-7712G-4FMPI

6G PoE + 2G Mega PoE + 4G SFP
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Industrial Mega PoE Switch



EKI-2701MPI

IEEE802.3bt Gigabit 90W
PoE Injector



EKI-2701MPI-R

HDBaseT Gigabit 60W
PoE Extender

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Advantech Provides Trusted Vehicle Control Solutions for Australian Intercity Trains

Advantech's rolling stock solutions comply with EN 50155, EN 50121-4, and IEC 61373 international standards and have helped deliver safe and reliable train operations in New South Wales (NSW), Australia. The implementation of these solutions has made travelling more accessible, comfortable, and convenient for intercity travelers.

Photos provided by Bigstock



Today, train users enjoy the convenience of intercity rail links and easy access to scheduled and real-time information when they travel between cities. Unknown to most people, the passenger information system (PIS) and video surveillance system on trains are crucial to ensuring safe and reliable railway services. Accordingly, railway authorities around the world have all endorsed strict standards to safeguard the quality and reliability

of such systems. In Australia, a contractor for intercity trains in NSW deployed Advantech's in-vehicle controller solutions to deliver an efficient and reliable system that meets the needs of 21st century travelers.

Intelligent transportation enhances passenger satisfaction

To provide a new level of comfort and convenience for

customers who travel between Sydney and other major cities in NSW, Transport for NSW released a tender to replace old intercity trains by 2022. One key objective was to facilitate system management and maintenance using new technology. Another objective was to improve service quality by providing real-time information and monitor passenger safety.

A Japanese contractor was granted the tender to provide the train control and management system (TCMS), which included a PIS and video surveillance system. The system needed to provide real-time arrival times and a route network map, as well as real-time live video streaming and recorded video. During the planning stage, the contractor realized that in-vehicle controllers and industrial managed Ethernet switches with PoE injector functionality were required to control several 28-inch stretched bar LCD panels and IP cameras. The in-vehicle controllers had to be embedded computers with a height of no more than 90 mm and equipped with rugged and durable design features for reliability. They also had to be capable of receiving real-time commands to adjust the backlighting of the PIS LCD screens to ensure arrival and departure times would be clearly displayed despite environmental interference and glare.

Moreover, the entire system had to comply with international standards for equipment intended for use on rolling stock, as well as standards for operating in diverse environments. This is because equipment installed in moving trains must overcome harsh environmental conditions such as varying temperatures, humidity, shock, and vibration. The system also needed to be capable of processing multiple signals and large volumes of video streaming data.

Advantech's in-vehicle control system overcomes harsh environmental conditions

Intercity railways in NSW run along coastlines, through open fields, and over mountains. Cities linked by the NSW railway network enjoy over 300 sunny days a year. Temperatures in NSW can exceed 40 °C in the summer and approach 0 °C in winter. To cope with changing operating environments, the contractor chose Advantech's ITA-5831 fanless in-vehicle controller and EKI-9516P managed industrial PoE switch for the PIS and video surveillance systems. These units comply with EN 50155, EN 50121-4, and IEC 61373 international standards.



According to the layout of the new trains, three ITA-5831 in-vehicle controllers were installed in every passenger car. Two of the controllers were used on the dual-controller PIS and connected to the stretched bar LCD displays—one was used as the main controller and the other as a backup. The ITA-5831 controller features M12 locking connectors to ensure that vibration and temperature variations do not interfere with signal processing and data transmissions. However, because temperatures can reach a blistering 60 °C under direct sunlight, if the main controller fails, the backup controller is engineered to automatically take over operations in order to prevent pauses, delays, or failures regarding the delivery of real-time information.

When the ITA-5831 controller receives real-time passenger information from the PIS or traffic control center, the information is shown on the LCDs via display distributors. Thus, real-time arrival times and route maps are provided in all passenger cars via the LCD monitors.

The third ITA-5831 was connected to four IP cameras through an EKI-9516 managed industrial Ethernet switch, which features M12 connectors to prevent signal and data losses and PoE injector functionality to reduce the amount of wiring in passenger cars. Real-time surveillance video is live-streamed from all IP cameras to the ITA-5831 controller for recording, and to the train driver's compartment for monitoring passenger safety.

The ITA-5831 controllers combined with EKI-9516 switches provided the backbone of the train manufacturer's new system and complied with strict environmental regulations for rolling stock applications. This meant that hours of painstaking system maintenance could be avoided in the future. Advantech's technical team possesses considerable professional competence and vast in-field experience of rolling stock applications. Their expertise enabled the contractor to solve all software and hardware integration difficulties and ensured successful deployment of the train control and management system for NSW. ■

Advantech IP-Based Networking Solution for the Boston Subway

A renowned train manufacturer is utilizing Advantech's IP-based network solution to help the Boston subway provide its passengers with greater comfort and safety.

Photos provided by Bigstock



As passengers enjoy the speed, comfort, and convenience of sitting in the carriage of a clean, modern, rapid transit train, the last thing on their mind is safety. Fortunately, because subways are a vital part of a city's integrated transportation system, more operators are moving towards IP-based networking – a system that makes them safer and more reliable than ever. For example, after implementing Advantech's train-to-ground wireless communication IP-based networking solution, Boston's subway has delivered greater safety and comfort to its passengers.

Taking convenience, comfort, and safety to the next level

The Boston subway underwent a train refurbishment project to provide passengers with greater comfort and safety when traveling. The bid was won by a single company – a world-renowned train manufacturer and solutions provider.

To balance the efficiency and safety of subway operations while providing convenience and comfort for passengers, the train manufacturer was required to meet more than 100 strict standards regarding vehicle

structure, safety control, and quality management. Among these standards, networking requirements posed the greatest challenge for the train manufacturer.

Train manufacturers have historically used different hardware products from various suppliers to build trains. For this networking project, they experienced constant issues during consolidation and testing processes. This forced the developers to spend a considerable amount of time and effort overcoming these issues. To simplify the project's development, the train manufacturer decided to focus on a sole supplier to provide all the necessary hardware for integration.

The customer had many criteria for choosing a top-tier supplier. First, the supplier had to use railway-certified wireless routers and Ethernet switches to build the required vehicle-mounted network.

Second, they had to be able to provide railway-certified panel computers used as human-machine interfaces (HMIs), and video surveillance displays for CCTV.

Third, the supplier's hardware needed to be compact for easy installation in limited spaces on the train carriages, while also having a design that could withstand a wide range of temperatures given Boston's fluctuating weather conditions.

The hardware also had to support SIM cards, LTE, Wi-Fi, and automatic network switching to ensure uninterrupted data transmission so as to meet the needs of multi-network and transnational networks. Advantech became the sole provider for the train manufacturer, as the company's train-to-ground wireless communication solution satisfied all the aforementioned criteria.

Transforming the subway system with a train-to-ground wireless communication solution

Advantech's train-to-ground wireless communication solution consisted of three products: the ITA-8100 10.4" fanless HMI; the EKI-9502G LTE router, installed in the locomotive; and EKI-9516 managed Ethernet switches, installed in each train carriage. With this configuration, all video and data related to the train and its passengers could be downloaded and uploaded via LTE or Wi-Fi networks in real time.

For downloads, traffic control center data was transmitted to the EKI-9502G via the network, received by the ITA-8100, and then transmitted to the EKI-9516 and passenger information display system (PIDS) in each

car to show real-time passenger information. For uploads, a network video recorder (NVR) in each car transmitted data to the HMI via the LTE router. In the event of any abnormality, the system would actively upload data to the traffic control center. The traffic control center and dispatching room can also actively access video data through the network.

These three Advantech products are designed for railway applications and therefore have many equivalent specifications. For example, the products have passed the EN 50155 international standards. Anti-vibration, anti-shock, and anti-interference capabilities also make them highly suitable for railway applications, especially the M12 connectors with locking thread that prevents loosening due to vibration. The compact size of the products also saved on installation space and made it convenient for deployment in train compartments. The wide operating temperature range (-40~70°C/-40~167°F) ensured the system would function properly in both high- and low-temperature environments. This point was particularly important as trains due for maintenance operate without air conditioning/heating. By using this wide temperature system, operators need not worry about Boston's low winter temperatures affecting system operation. Additionally, the EKI-9502G supports multiple communication modules to ensure stable data transmission.

For the project, two ITA-8100s were installed in the locomotive, serving as an HMI for drivers as well as a CCTV system for viewing each car via NVR. A useful feature of the ITA-8100 HMIs is automatic brightness adjustment, which prevents flickering when trains enter and exit stations. This allows drivers to remain comfortably focused on the screen without needing to make manual adjustments, thus preventing driver distraction.

Advantech's train-to-ground wireless communication solution has successfully helped the train manufacturer concentrate focus on its expertise in making trains. It also accelerated the refurbishment of Boston's subway trains without the hassle of searching for and compatibility testing individual products. The completion of Boston's subway project has given the train manufacturer the confidence to continue collaborating with Advantech on future transportation in other U.S. cities and in Europe, ensuring safer, more comfortable, and more convenient travel for passengers. ■



Advantech Develops a Reliable Urban Railway Solution for Ho Chi Minh City's Metro System

To ensure operational safety and efficiency, Ho Chi Minh City Metro (HCMC Metro) adopted Advantech's comprehensive solutions for their metro line signaling system and control center. These solutions encompass everything from control center servers to wayside controllers; all of which comply with relevant international standards.

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Following years of rapid economic growth, traffic congestion in major Vietnamese cities has become an increasingly serious challenge. Ho Chi Minh City, with

a metropolitan population of over 13 million, is the economic and financial center of Vietnam and home to the country's largest international airport. More than

80% of people in Ho Chi Minh City use motorcycles for transportation. Reliance on motor transport, coupled with an influx of foreign tourists, has significantly worsened traffic congestion. To address congestion problems, protracted journey times, and extreme pollution, the HCMC government plans to build a metro system comprising eight metro lines.

Utilizing metro lines to manage rapid urban expansion problems

In an effort to ease traffic congestion as well as growing accident and fatality rates caused by the 8.5 million motorbikes and 630,000 cars on the roads, the government is launching HCMC Metro Line 1. This urban metro transit system is expected to transport 160,000+ passengers daily, with forecasts indicating an increase to 635,000 passengers by 2030.

Because each train has three passenger cars, the Japanese contractor responsible for Line 1 decided to use moving block signaling systems. Moving block communication-based train control systems allow trains to run closer within the required safety margins, thereby increasing the line's overall capacity. However, this solution requires continuous communication between signaling systems installed in stations, waysides, and trains. This ensures the accurate and dynamic creation of blocked zones around trains at all times.

To ensure communication quality and stability, the contractor needed to install durable wayside controllers, on-board controllers, Ethernet switches, and control room servers capable of 24/7 operation. As the metro lines would be in long-term operation, the continuous supply of hardware as well as the provision of localized after-sales services were key considerations for the contractor.

Advantech's top-to-bottom solutions for HCMC Metro Line 1

The first phase of the HCMC Metro Line 1 project comprised 14 stops. With most of the line being elevated, the metro line would be exposed to substantial sunlight and rain in Ho Chi Minh City's tropical climate. The contractor chose Advantech's ITA-2231 fanless wayside controller, EKI-9728 and EKI-7712 managed Ethernet switches, and SKY-4311P industrial-grade servers to handle the heavy workloads and harsh operating conditions.

Like many metro lines, HCMC Metro Line 1 will

be equipped with automatic train operation safety-enhancement devices. The ITA-2231 controller, which offers excellent performance in harsh environments, complies with the EN 50121-4 international standards, and was therefore selected for several subsystems—station signaling units, wayside signaling units, and point machines. Additionally, ITA-2231's backup functionality and dual power modules mitigate system interruption concerns. Advantech's EKI-7712 switches comply with EN50121-4 and NEMA TS2 standards and feature PoE PSE functionality to eliminate unnecessary wiring. This lack of wiring helps prevent signal and data losses caused by shock and vibration.

The SKY-4311P servers, which feature multi-core processors and hot-swappable 2.5" NVMe/SATA drives, are designed for critical applications that necessitate zero downtime, such as automatic train supervision and train detection systems. Meanwhile, the EKI-9728 switches ensure system stability with the provision of dual power inputs, and are connected to the SKY-4311P servers for transmitting data from subsystems to the control center. EKI-9728 switches also allow the control center administrator to send instructions to moving trains and signaling systems in real time.

The second phase of the HCMC Metro Line 1 project and the construction of seven other lines will soon be finalized. The metro system's modular design allows flexible planning and maintenance of future expansions. This design also eliminates the need to reestablish specifications when purchasing new computers and performing compatibility tests. Moreover, using the same hardware architecture will hasten development and make it easier and more convenient for engineers to perform future maintenance operations.

For this project, Advantech's overall product quality and professional service were highly trusted by the Japanese contractor. The metro signaling system, automatic fare collection system at stations, network video recorders in passenger cars, and CCTV surveillance systems were all built using Advantech products.

Most importantly, Advantech's Vietnam office is capable of providing immediate localized service for the entirety of the product lifecycle. For the HCMC Metro, which is expected to have a service life of at least 25 years, Advantech's industrial-grade products and trustworthy brand guarantee safe and stable operation for the foreseeable future. ■

Advantech's Integrated Supervisory Control System Increases the Efficiency and Safety of Metro Services in China

In recent years, the Nanjing Metro has undergone rapid development and become an essential mode of transport for many of the city's commuters. In their efforts to ensure operational safety, efficiency, and high-quality service, Nanjing Metro deployed Advantech's integrated supervisory control system (ISCS) to provide real-time information and assist staff with decision making. The Nanjing Metro subsystems and facilities equipped with Advantech's ISCS are complex and geographically dispersed. Accordingly, to enable comprehensive monitoring, diverse communication protocols must be integrated to facilitate unified supervision and management.

Photos provided by Fotolia



"The doors on platform 3 at the Olympic Sports Center metro station did not close. This seems to be because of power supply issues," said Mr. Zhang nervously pointing at the alert notification flashing on the large monitoring screen. "Pull up the video surveillance view of platform

3, quickly," requested the control center supervisor while responding to the accompanying warning message he had received. Just a few clicks later and they were viewing the live video stream for platform 3.

This type of everyday scenario demonstrated how

Nanjing Metro's new supervisory control system benefits passengers in terms of safety, punctuality, and services. With the implementation of Advantech's ISCS, Nanjing Metro has been able to realize smart supervision and management. The system was first deployed on the Metro's Line 1 route, including the Line 10 and Line 3 extensions, and provided a solid foundation for the recent upgrade of Line S7.

Tackling the complexity of modern metro operations

With a population of more than 10 million people, Nanjing is the second largest city in China. Located at the start of the Yangtze River, Nanjing has been a major traffic and commercial hub for hundreds of years. The Nanjing Metro system comprises 173 stations across 10 lines, serving an average of 3.16 million passengers daily. The sheer scope of the Metro system provides unique challenges in terms of managing all the facilities and subsystems and responding to unexpected events that occur every day. Nearly 10 years since the launch of Line 1, Nanjing Metro decided to adopt intelligent technologies to address the growing complexity and safety issues.

Advantech's ISCS is a comprehensive monitoring system that connects all subsystems via front-end processors (FEPs) and managed Ethernet switches installed in centralized equipment monitoring rooms, metro stations, service centers, and even car parks. The ISCS enables centralized and local control as well as supervision of all electrical and mechanical subsystems, including building automation systems (BASs), power supervisory control and data acquisition (PSCADA) systems, passenger information systems (PIS), and public address (PA) systems. Data visualization on the software dashboards provides admins with an overview of operations to facilitate efficient management and operational optimization.

Advantech's railway solutions connect subsystems to the control center

FEPs are used to collect and transmit system data to local and centralized control centers via Ethernet switches. Then Advantech's WISE-PaaS cloud platform, WebAccess/SCADA software, and I.App products are used to visualize the data and provide real-time analysis and notifications. Station staff and centralized control center admins are able to send real-time instructions to the FEPs to ensure smooth operations.



When a train arrives at a platform, the FEP connected to the PA system executes audio alerts, signals, and announcements. The FEP also sends a notification to the platform barrier control system to open the barriers. Should a fault occur during this process, the FEP will send an alert notification to the local and centralized control centers immediately. This allows station staff to take prompt action to handle the situation without needing to wait for instructions from the centralized control center, greatly improving safety, operational efficiency, and passenger services.

Systems for railway and metro line applications must be certified to EN-50121-4 standards to ensure safe and reliable operation in diverse environments with harsh conditions. Additionally, every system integrated with ISCS must support 24/7 operation to ensure the communication of critical information and emergency responses.

In addition to satisfying the usage requirements and complying with international safety standards, Advantech's ITA-2231 rugged industrial computers feature a modular design, multiple interfaces, protocol converters, and high-speed connectivity options. Their high processing power and support for diverse subsystems and future expansions allow them to serve a critical function as FEPs. In compliance with EN50121-4 and NEMA TS2 standards, the EKI-7712 managed Ethernet switch features PoE injector functionality, which eliminates unnecessary wiring. Their compact design allows EKI-7712 switches to be flexibly installed without the constraints of typical rackmount systems. Finally, Advantech's PSCADA systems were equipped with power and network redundancy and deployed to facilitate remote monitoring and management of power substations along the rail lines.

The success of this project not only increased passenger safety, comfort, and convenience, but also enabled Nanjing Metro to optimize their services and operational efficiency. ■

Advantech Helps Langfang-Zhuozhou Expressway with Real-Time Monitoring and Management System

IoT technology has allowed smart application development become a vital part of any transportation infrastructure. Recently, the Langfang-Zhuozhou Expressway implemented new system upgrades and optimization using Advantech's solution for centralized real-time monitoring and smart management.

Photos provided by Bigstock

Constructing intercity high-speed railways and urban rail transit systems are a vital part of China's new infrastructure policy. Another aspect of this policy is the implementation of smart technologies aimed at improving expressway transportation and management. On the Langfang-Zhuozhou Expressway in Hebei Province, China, Advantech's solution was implemented to create a centralized monitoring and management system. This significantly improved the efficiency of expressway traffic flow while also reducing congestion. The project's success is one of the best examples of leveraging smart management technology to improve transportation infrastructure in China.

The future of expressway transportation and management

The Langfang-Zhuozhou Expressway was completed in 2008. However, with recent advances in technology leading to new regulations, some features of the expressway system have become inadequate. The management team encountered numerous issues, such as insufficient network bandwidth, which ultimately affected system performance. Moreover, the lack of a backup mechanism put the network at high risk of interruption, while manual fee collection at toll gates contributed to traffic congestion. Of particular concern was the fact that low-resolution CCTV footage proved unusable for analyzing traffic incidents. As these issues persisted, the management team became increasingly eager to solve them. To build an updated centralized

monitoring and management system, they needed new high-resolution surveillance cameras, a contactless toll collection system, and a traffic incident analysis system. These requirements prompted them to implement a smart transportation solution.

To achieve their goals, the management team commissioned a systems integrator (SI) to build a centralized real-time monitoring and management system that met their needs for monitoring various field sites, such as operation control centers, roads, tunnels, toll gates, and rest areas. In order to facilitate monitoring of these diverse locations, the SI needed a variety of hardware and software products that could be seamlessly integrated. It was therefore an obvious choice for the SI to go with a single one-stop-shop supplier to provide all the products required for this project. Among several outstanding suppliers, Advantech was chosen for its strength in terms of hardware quality and software offering. By providing a comprehensive smart solution that included high-quality industrial computers, network switches, serial device servers, and an industrial IoT platform, Advantech helped reduce the complexity of the project, which allowed the SI to focus solely on meeting the customer's needs.

Transforming expressway monitoring and management with IIoT technology

For this project, the SI needed to develop five management systems for the traffic control centers and tunnels along the expressway, while integrating existing



systems in order to establish a centralized real-time monitoring and management system.

To achieve this, Advantech's solution comprised of WISE-PaaS industrial IoT cloud platform, HPC-7442 server-grade rackmount chassis, IPC-610 rugged industrial computers, EKI-9728 L3 managed switches, EKI-7710 managed Ethernet switches, and EKI-1524 four-port serial device server.

This one-stop solution allowed the SI to easily collect equipment data for centralized real-time monitoring and management. The data was then visualized on a user-friendly dashboard for easy and convenient data management and onsite equipment maintenance. In the traffic control center, where most vital decisions are made, Advantech's HPC-7242 server-grade rackmount chassis was installed to facilitate the operation of multiple toll management, video recording, surveillance management, and traffic incident analysis systems. At the toll gates, Advantech's IPC-610 industrial computers were deployed for collecting onsite data, including electronic toll collection, surveillance, vehicle speed

measurements, and image capture data.

In the tunnels, serial devices and programmable logic controllers were used to control signals, jet fans, surveillance cameras, LED signage, broadcasting systems, and alarms were connected to Advantech's EKI-1524 serial device server. The EKI-1524 server performs serial-to-Ethernet conversions of data collected from serial devices to facilitate centralized management and remote control. Furthermore, both the EKI-9728 and EKI-7710 managed switches support a wide operating temperature range to ensure uninterrupted and reliable networking in harsh environments.

Advantech's collaboration with the SI to provide a complete solution for expressway and tunnel transportation management satisfied the Langfang-ZhuoZhou Expressway project requirements, while significantly reducing integration time and implementation costs. In the future, this solution could also be used to rapidly develop other smart expressways in order to provide more cities with safer and more efficient transportation. ■

Taipei City Public Transportation Office Implements Advantech's ADAS Solution to Increase Public Safety

To reduce the likelihood of bus accidents, the Taipei City Public Transportation Office implemented Advantech's smart in-vehicle advanced driver assistance system (ADAS) solution. The solution not only detects driver fatigue but also manages driving behavior in real time, improving service quality on public buses and ensuring public safety.

Photos provided by Shutterstock

Interview with Thalese Tsai, Product Manager Intelligent Mobile Solutions of Service IoT Group, Advantech; Xian-Wen Guo, Section Chief, Taipei City Public Transportation Office (TCPTO)

According to statistics from the Traffic Division of the Taipei City Police Department, the number of accidents involving public buses in Taipei City has increased in recent years. From 2012 to 2016, such traffic accidents numbered 1401, up from 1091 for the previous five years. Furthermore, up to 82% of these accidents were the result of human factors. To address this issue, the Taipei City Public Transportation Office (TCPTO) launched a project in 2018 to deploy Advantech's ADAS driving safety solution in buses of varying type and size. Thus far, 70 buses have been equipped with the solution. Because of the project's remarkable results, the TCPTO applied to the Directorate General of Highways of the Ministry of Transportation and Communications for permission to expand the deployment. Their aim is to implement the ADAS solution on another 80 buses by the end of 2020.

Xian-Wen Guo, Section Chief of the TCPTO Inspection Section, said that the TCPTO analyzed the driving violations and accident rates of buses in Taipei and then calculated the ratio of violations, accidents, and mileage for each bus operator. Based on this data, transport operators can create schedules that ensure drivers with frequent violations drive buses equipped with the ADAS solution in order to reduce accident rates.

ADAS reduces risks associated with distractions and fatigue

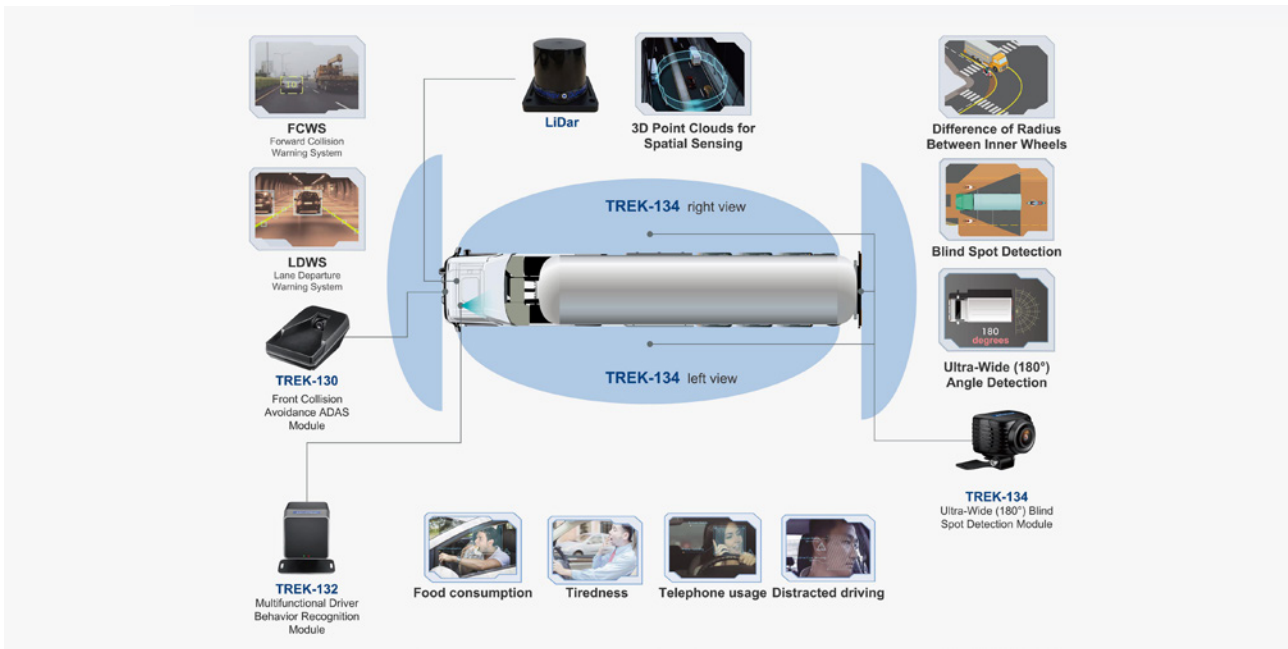
According to Thalese Tsai, Intelligent Mobile Solutions Product Manager of Service IoT Group at

Advantech, its ADAS offering is an integrated hardware-software solution that utilizes in-vehicle AI computers, smart in-vehicle displays, surveillance cameras, sensors, and a cloud platform for real-time monitoring of driving behavior. All collected data is transmitted to the backend management center in real time. This allows supervisors to monitor drivers and issue warning alerts to reduce the likelihood of traffic accidents resulting from driver fatigue, distracted driving, or not noticing blind spots, thereby enhancing driving safety.

Tsai explained that Advantech's ADAS solution comprises the TREK-132 multifunctional driver behavior recognition module, TREK-134 ultra-wide (180°) blind spot detection module, TREK-303 vehicle display system, and the WISE-PaaS backend cloud platform. The ADAS solution provides a variety of safety functions, including blind spot detection, front vehicle distance detection, lane departure warnings, and driver fatigue warnings.

TREK-134 is a blind spot detection module with an





ultra-wide 180° detection angle. All collected data is transmitted to the backend management center for real-time monitoring of driver behavior and vehicle status. One bus driver involved in the project reported that after his bus was installed with Advantech's solution, the system was able to detect vehicles to the left and right of the bus and emit audio alerts when necessary, reducing the likelihood of blind spot accidents. These functions are tremendously helpful for drivers of large vehicles.

The ADAS solution also monitors whether the vehicle is maintaining a safe following distance to the vehicle in front and staying within the driving lane. In regards to distracted driving detection, if a driver yawns, turns around to speak, answers the phone, or starts eating, the ADAS system will promptly emit a warning alert for the driver and notify the backend management center.

Tsai highlighted that the in-vehicle computer is able to collect all types of vehicle information, including engine startup, emergency braking, and traveling speed data. This data is then transmitted in real time to the backend cloud platform for statistical analysis. With the integration of management and reward-penalty systems, transport operators can effectively guide the driving behavior of employees.

In addition to guiding driving behavior, transport operators can use the available data to define the types of behavior that constitute dangerous driving and identify dangerous route sections. Once enough data has been gathered, AI-based analysis can be performed to obtain operational insights. Managers can then use these

insights to develop appropriate mechanisms to prevent traffic accidents resulting from human factors.

Advantech's highly integrated solutions enable smart fleet management

However, in order to realize the benefits described above, in-vehicle computers must have a smart, highly integrated, and open platform. Unfortunately, most of the systems currently installed on public buses are independent. In other words, each system is linked to its own host, making it difficult to consolidate data on a single platform.

Having recognized this issue early on, Advantech developed a smart in-vehicle computing system that uses a single platform and host to support a variety of vehicle safety functions. The flexibility and scalability of the ADAS solution's in-vehicle system enable transport operators to control costs while achieving smart management. Tsai emphasized that Advantech not only offers a highly integrated in-vehicle driving safety solution, but also leverages its extensive on-site deployment and integration experience to provide comprehensive technical support and facilitate implementation and integration.

With Advantech's ADAS solution providing driving safety assistance and prompt guidance to modify driving behavior, a genuine reduction in the number of human-induced traffic accidents can be achieved. This will in turn increase public safety and improve the service quality on public buses. ■

Advantech's Smart Bus Fleet Management System Enhances Transportation Safety

One of Thailand's top 10 companies adopted Advantech's smart transportation solutions and, through consultations with an SI partner, successfully implemented an AI-based smart bus fleet management system. With the integration of Advantech's embedded in-vehicle computer and management software, the safety and efficiency of the company shuttle buses were improved and bus fleet costs were minimized.

Photos provided by Advantech, Shutterstock

Bangkok, the capital city of Thailand, is the country's economic and transportation hub, as well as home to the headquarters of all of Thailand's major companies. As a result of the city's rapid growth in the 1980s,

the population and number of motor vehicles in the metropolitan area have dramatically increased. On average, about half a million new commercial vehicles are sold in Thailand every year, which is ten times that



in neighboring countries like Vietnam and Malaysia. According to TomTom's traffic index, Bangkok is ranked the worst among Southeast Asian cities for traffic congestion, with an average daily congestion level of over 50%. Moreover, the World Health Organization has reported that 66 people die on Thai roads every day, one of the highest traffic fatality rates in the world.

For businesses located in the Bangkok metropolitan area, managing commercial fleets and avoiding road accidents caused by traffic congestion present considerable challenges. However, with the assistance of Advantech, the end customer improved the transportation safety of its company shuttle buses and minimized bus fleet costs by deploying an AI-based smart bus fleet management system.

Solving fleet management pain points with a rugged flexible solution

This end customer is one of the largest companies in Thailand, with more than 4,000 employees. Every year, its employees take approximately 8,000 trips between offices, factories, and service centers in the company's in-house fleet of cars and vans. Despite their best efforts, the company's fleet supervisor struggled to manage the hundreds of company vehicles and drivers. They needed a system that combined AI facial recognition capabilities with video and data analytics to maximize shuttle bus usage rates, generate analytics reports, and monitor the real-time status of buses and drivers.

The company was searching for a solution that could satisfy all their requirements, which included having power management, remote system diagnosis, vandalism protection, software customization, and future expansion capabilities. However, none of the suppliers or devices they considered were able to handle the harsh field conditions in Thailand.

After wasting a lot of valuable time, the company finally turned to Advantech for assistance. Advantech recommended its ARK-2250V fanless embedded in-vehicle computer because of its rugged, anti-vibration, and stackable extension design. Powered by a 6th generation Intel® Core™ i7 processor and Intel® HD Graphics GPU, ARK-2250V supports a wide operating temperature range and is e-Mark certified. To facilitate power management and IP camera installation, ARK-2250V supports PoE injector functionality, eliminating unnecessary wiring. ARK-2250V also features a power

on/off/delay timer that protects the system from sudden fluctuations in voltage caused by ignition and power surges. Moreover, its stackable design allows additional Wi-Fi and CAN bus modules to be integrated for data collection to facilitate vehicle maintenance scheduling, fuel theft detection, and other management tasks.

Meets demands and exceeds expectations

In terms of driver behavior and fatigue detection, ARK-2250V is built with parallel processing capabilities to handle complex AI tasks, such as driver identity verification and distraction detection. With the high-performance Intel® Core™ i7 processor and HD Graphics GPU, the in-vehicle computer can process IP camera live video streams in real time. To ensure safety, ARK-2250V is equipped with technology that recognizes abnormal driver behaviors, such as using a cell phone, distracted driving, fatigue, and speeding, and sends notifications to the control center, allowing supervisors to request immediate corrective action. ARK-2250V was also installed with Advantech's DeviceOn software for monitoring equipment health, conducting diagnostics and repairs, and initiating system restarts remotely.

Advantech provided industry knowledge, software solutions, and system integration consultations to help the customer develop its control center software. This allowed the customer to skip the testing stage, resulting in an accelerated time to market. Moreover, Advantech's technical support team not only provided several software installation packages, but also demonstrated how to build a user-friendly control center dashboard.

In the future, Advantech plans to upgrade the system by integrating its VEGA-300 AI acceleration modules powered by the latest Intel® vision processing unit. This will reduce the system's power consumption, accelerate the edge AI processing speed, and free the processor resources for other edge applications. ■



Advantech Launches Machine-to-Intelligence Solutions on the WISE-PaaS 4.0 Platform for Cold Chain Logistics Applications

Advantech has developed three application framework services based on its cloud-native WISE-PaaS 4.0 platform: Visualization, InsightAPM, and AIFS. These services are designed to encourage global partners to co-create with Advantech in order to accelerate the intelligent innovation of temperature-controlled logistics.

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Interview with David Yang, Product Manager, Intelligent Mobile Solutions of Service IoT Group, Advantech; Yu Wang, WISE-PaaS Solution Architect, Advantech

Sensors for temperature and humidity data loggers have been used in the temperature-controlled logistics market for many years. Because of the continuous advancement of IoT and cloud computing technologies, the logistics, factory, retail, pharmaceutical, warehousing,

agricultural, and food and beverage industries are demanding more proactive, efficient temperature monitoring solutions.

However, to develop comprehensive end-to-end temperature monitoring solutions, three main



aspects must be considered: personnel, equipment, and operations. For example, because the performance of transport refrigeration equipment is unstable, temperature readings vary at different locations inside a refrigerated cabin. Moreover, warehouse staff often leave goods outside before transferring them to temperature-controlled warehouses, potentially compromising the quality of goods.

WISE-PaaS enables the ongoing evolution M2I solutions

According to David Yang, Intelligent Mobile Solutions Product Manager at Advantech, in order to address temperature monitoring issues across different industries, Advantech provides on its WISE-PaaS 4.0 cloud platform various industrial apps (I.Apps) and services for integration with domain-focused solutions. WISE-PaaS 4.0 also offers the flexibility and scalability to co-create I.Apps with domain-focused system integrators (DFSIs) in order to better serve market demands.

Yu Wang, WISE-PaaS Solution Architect at Advantech, explained the evolution of WISE-PaaS from 3.0 to 4.0. Advantech's WISE-PaaS is now a Kubernetes-based cloud-native platform that allows data to be exchanged between cloud services, supports a greater number of

framework services, and enables a low-code development machine-to-intelligence (M2I) architecture. The three most used application framework services on the WISE-PaaS 4.0 platform are 2D/3D dashboard visualization, InsightAPM, and AI framework service (AIFS). These services enhance the accuracy of real-time temperature monitoring and enable more intelligent services for temperature-controlled field applications, such as monitoring refrigeration equipment in retail stores, or controlling temperatures in refrigerated trucks carrying vaccines and medicines.

To address the challenges of temperature-controlled field applications, Advantech has long been developing intelligent end-to-end monitoring systems. From WISE-PaaS 3.0 to 4.0, several innovative edge computing solutions aimed at temperature-controlled applications have been created. This has increased the capabilities of edge devices, making WISE-PaaS a more efficient and purpose-built platform solution for the cold chain industry.

WISE-PaaS application framework services for cold chain management

Advantech looks forward to co-creating more I.Apps with its ecosystem partners and DFSIs. By leveraging the





Visualization, InsightAPM, and AIFS WISE-PaaS cloud framework services, it hopes to provide more dedicated services for the cold chain industry.

David pointed out that the Visualization service includes WISE-PaaS/SaaS Composer and WISE-PaaS/Dashboard tools, which allow system integrators (SI) or management to map equipment to locations on a visualized 2D/3D warehouse overview, to interact with field equipment in real time, and to generate custom data visualizations. If faults are detected, the corresponding locations are tagged in real time on the 2D/3D overview. For example, in a plant factory equipped with temperature and humidity sensors for ensuring environmental stability, the intuitive dashboard overviews enable supervisors to easily identify environmental issues and take remedial actions.

According to Yu, InsightAPM is the cornerstone of every solution. The service is designed to reduce unplanned downtime, improve equipment availability, minimize operating costs, minimize equipment failures, and gather data from edge devices. With WISE-PaaS/InsightAPM, users can freely define parameters and performance indicators, such as scheduled asset evaluation, event alert, and utilization rate reports, without worrying about the type of edge device installed. The field equipment configuration on WISE-PaaS/InsightAPM can be applied to other devices in the event of replacement or upgrade.

Using cold chain management as an example, supermarket chains typically have several edge sensor devices installed in their warehouses, refrigerated trucks,

and retail stores for end-to-end environmental monitoring of stored food products. WISE-PaaS/InsightAPM allows monitoring of edge devices as well as surveillance cameras installed at different sites and on trucks via a single unified platform.

WISE-PaaS/AIFS is a service that facilitates AI model training and deployment. While working on a project for a large retail chain in Taiwan, Advantech developed a unique AI-based defrost training model for the cold chain industry. Defrosting is a regular maintenance procedure for retail businesses. During the defrosting process, temperatures rise and incorrectly trigger alarms. By deploying the AI-based defrost training model, the time required to defrost different types of refrigeration equipment can be determined, reducing false alarms and optimizing maintenance.

These cold chain applications demonstrate the value of Advantech's WISE-PaaS 4.0 solutions and cloud services. I.App products are available for download from Advantech's WISE-PaaS Marketplace. WISE-PaaS 4.0 promotes more open and flexible co-creation business models because of its ability to support multiple cloud platforms.

With WISE-PaaS 4.0, co-creation partners can deploy I.Apps developed by Advantech to their cloud platforms. Furthermore, the I.Apps developed by co-creation partners can be integrated into WISE-PaaS 4.0 and listed on the WISE-PaaS Marketplace. This demonstrates Advantech's commitment to co-working with global partners on the development and promotion of intelligent solutions for various industries. ■

Hardened Technology for Mission-Critical Traffic Management



ADVANTECH

Enabling an Intelligent Planet

Advantech's Intelligent Transportation System (ITS) solutions aim to provide cutting-edge LTE technology to further assist transportation operators to better manage transportation applications.

LTE technology helps facilitate secure and seamless communication for vital ITS applications, such as dynamic digital signage and passenger communications.



ICR-3241

Industrial 4G LTE Router & Gateway for NAM region



BB-SR30508120-SWH

Modular LTE Router with SmartWorx Hub (5xETH, USB, 2xI/O, SD, 2xSIM, PSE, SL)



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Modular LTE Router with SmartWorx Hub (3x ETH, 1x RS232, 1x RS485, WIFI)

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OmniEyes Connect SI and Hardware Partners to Meet Global Fleet Management Demands

OmniEyes and Advantech are working together to co-create a smart fleet management system. This system, which provides fleet managers with an overview of their commercial fleets, helps improve driver behavior and is based on AI vision, Edge AI computing, AI visual recognition, and cloud technology.

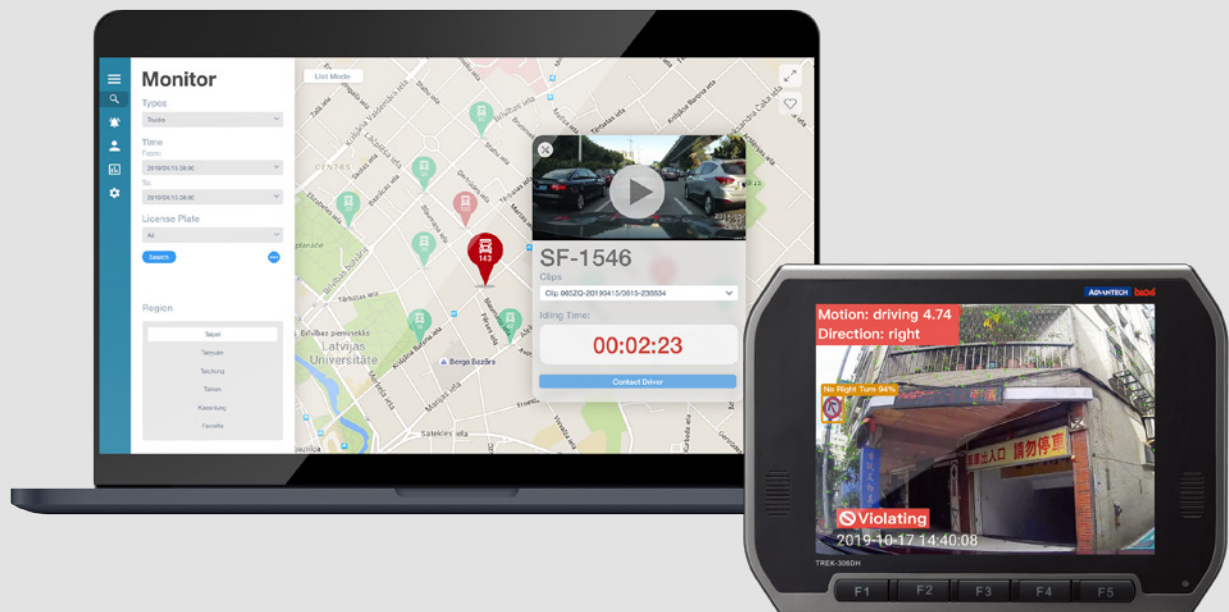
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Interview with Chun Ting Chou, CEO, OmniEyes; Van Lin, Director of Intelligent Mobile Solutions of Service IoT Group, Advantech

In 1905, the Wright Flyer III successfully flew for 38 minutes. Despite a century of advancements, fully autonomous take-offs and landings are rare and difficult. Similarly, autonomous road vehicles have been designed to navigate even more complicated environments than

aircraft in the sky with mixed success. This is why Chun-Ting Chou, CEO of OmniEyes, questions the chances of creating a 100% autonomous vehicle.

“The future development of smart transportation must incorporate three elements – infrastructure, vehicles,



and drivers. However, the present fixation on autonomy has hindered the development of smart transportation,” said Mr. Chou. He believes developing future smart transportation solutions requires viewing technology as more than a simply a tool. He posits that people (driver) centric smart applications provide the best avenue for developing smart transportation. Changing user habits is the only way to shift from drivers in cars to the coordination between intelligent cars and people—and, eventually, to the mass use of fully autonomous vehicles.

Collecting vertical market dynamic video data

From the beginning, OmniEyes has maintained a human-centric approach. They have been using video and image technology to solve a variety of dangers found on the road. Chou pointed out that almost every car presently on the road in Taiwan (and in many other regions) has a dashcam. Groundbreaking smart applications could feasibly be developed from these dashcam videos if incorporated into a massive dynamic database.

The OmniEyes entrepreneurial team were aware of the capital requirements and the scale of operation needed to access the mass consumer market for such an ambitious vision. To address these restraints, they entered the fleet management vertical market. OmniEyes solved the, “who pays for the service” problem and collected dynamic video from different global fleet databases. They also developed intelligent applications aimed at addressing transportation issues from these databases.

Using image capture and AI analysis technologies, the OmniEyes system can monitor real-time road conditions from moving vehicles. If a driver runs a red light, the system immediately sends 20 seconds of video from before and after the event back to the control center. Using this information, fleet managers can gradually modify driver behavior through a reinforcement system. Chou mused, “Punitive measures are the most common enforcement method used by fleet managers—however, in our opinion, rewarding drivers with good records is more effective”. To this end, OmniEyes provides monthly cash rewards that incentivize desirable behaviors.

Co-creating with Advantech to develop future smart transportation

Affordable AI vision technology usage fees is another

of OmniEyes competitive advantages. Chou said that, AI as a Service (AlaaS) cloud computing is coming despite being expensive. To address cost issues, the OmniEyes system uses Edge AI technology. When the fleet deploys the OmniEye system, existing equipment can be used with edge computing solutions, to avoid cloud service supplier costs. In the end, the total deployment and operation costs accrued by customers was much lower than comparable cloud AlaaS options.

This combination of competitive advantages has won OmniEyes many smart transportation solution projects from large domestic logistics fleets. It has also helped them enter the US market – the most saturated fleet management market. Chou emphasized that based on the experience gained from several smart fleet management projects, OmniEyes has positioned itself as a, “Software-defined sensing beyond physical metrics” company. OmniEyes primarily delivers dynamic map data and video capturing services aimed at monitoring fleet vehicles. By using such services and customer feedback, OmniEyes creates the smart applications needed by drivers and fleet managers.

From the perspective of software, OmniEyes must collaborate with partners from various fields to rapidly expand its global market. “The group cooperation business model can deliver the vision of smart transportation faster.” Chou said. OmniEyes views open co-creation favorably, and is actively seeking cooperation with manufacturers, suppliers, system integrator (SI) resources, and a global hardware sales/service provider like Advantech.

Echoing Chou’s views on open co-creation, Van Lin, Director of Intelligent Mobile Solutions of Service IoT Group at Advantech commented, “Co-creation remains Advantech’s core corporate value. Advantech has been vigorously cooperating with global SI, transportation industry operators, and software companies such as OmniEyes. We continuously develop smart applications for the transportation industry that meet market demands and have the ability to constantly evolve with current circumstances.”

Through future co-creation with companies including Advantech, Chou is confident OmniEyes’ vertical market will expand globally. As OmniEyes makes more contributions to the future of smart transportation, opportunities will arise to shift from the B2B to the B2C mass transportation markets. ■

Cittati Tecnologia and Advantech Deliver Intelligent Transportation System for Sustainable Urban Mobility

Cittati Tecnologia, HARMAN International, and Advantech joined forces to create an Intelligent Transportation System (ITS) in response to São Paulo Transports' (SPTRANS) Sustainable Urban Mobility Plan. This system was aimed at improving the operational efficiency of bus companies (and their 15,000 buses) in São Paulo, Brazil.

Photos provided by Shutterstock

Interview with Julien Renaut, CTO, Cittati Tecnologia; Iuri Gomes, Sales Manager, Advantech Brazil

In 1950, the world's urban population was just 746 million. As of 2014, it had grown to 3.9 billion. As cities develop, problems caused by traffic have become increasingly challenging. São Paulo, the world's 4th largest city, faces social, economic, and environmental issues, as well as severe transportation difficulties. São Paulo's Sustainable Urban Mobility plan was set up to enhance urban mobility by reducing congestion, accidents, and pollution.

Addressing urban mobility challenges with Cittati Tecnologia's solutions

SPTRANS, a Brazilian technological pioneer, established a bus central monitoring center (CMS) in 2008. Using GPS technology, this system tracks and monitors busses to improve safety. Advancing technological growth, decreasing ridership, and the desire to deliver safer bus services forced SPTRANS to upgrade outdated monitoring systems in 2015. A new CMS and certification process was installed in buses simultaneously.

This high-level certification required a CMS, operational control centers (OCC), unified databases, vehicle computers, surveillance cameras, real-time passenger information systems, electronic ticketing systems, and driver displays. Additionally, SPTRANS

certification requires the continuous supply and service of hardware products.

Since its founding in 2008, Cittati Tecnologia has been dedicated to urban mobility solutions. Cittati Tecnologia strongly believes improving transportation systems through the use of technology will better serve people. Their software solutions cover many aspects of public transportation.

Cittati's technological strengths led them to become the first fully compliant and certified provider of SPTRANS' CMS and OCC. Cittati built a cloud-based platform that offers a unified database and a multi-tenancy ecosystem. This ecosystem assigns different levels of authorization to SPTRANS, bus operating companies and drivers. Having the highest authority, SPTRANS can analyze the performance of operating companies and ridership data. They use this data for future urban mobility planning strategies.

Cittati Tecnologia, HARMAN and Advantech built a full ITS

In an effort to establish a future-ready business model, Cittati worked with co-creation partners who share similar sustainable visions. This remained Cittati's key business strategy throughout the process of participating in the SPTRANS' urban mobility plan.

Cittati, HARMAN, and Advantech joined forces to meet all tender and certification requirements. Julien Renaut, CTO at Cittati Tecnologia said, “SPTRANS, the city’s transit authority, require bus operation transparency. There were about 300 software and hardware items that needed to be field tested for the ITS. Cittati, HARMAN, and Advantech, were the first and only team to meet certification requirements without negative feedback. Because of this success, we started selling ITS solutions to bus operators in São Paulo.”

Advantech established local support, supplied robust industrial grade products, and offered after sale support for 15 years. For these reasons, Cittati and HARMAN chose Advantech as a partner. Before entering the certification process, Cittati was satisfied Advantech’s TREK in-vehicle solution performance. After reviewing the certification criteria, Advantech proposed a best ROI custom solution. This solution was the TREK-570 robust in-vehicle computer. It was paired with Cittati Tecnologia’s CittaGeo software to integrate all bus systems. TREK-570’s trusted in-vehicle design capabilities gave CittaGeo an excellent platform for handling complex algorithms related to driver behavior, dynamic headway calculation, and event-triggered live video streaming.

Co-created ITS yields future business opportunities

Advantech has solutions that can help Cittati develop video telematic solutions aimed at road safety and driver behavior in the future. Julien added, “The highly specific ITS and CMS used in São Paulo demonstrates growing market potential. Because of its modularized design, both CittaGeo and the CMS can be customized to work with other Advantech models. Because the operating companies understand they need to provide better services, improve operational efficiency, and keep their costs in check, I can see us providing a lower cost solution to other cities or projects that want to benefit from ITS grade capabilities but not necessarily the full scope designed by SPTrans. Cittati Tecnologia and Advantech it’s already certified to provide this ITS Solution to Londrina City too and is in discussion with authorities in other cities for deploying the ITS co-created. Apart from on-going projects in Brazil, Cittati Tecnologia, acquired by Volaris Group in 2019, has plans for exploring markets in Latin and North America. The commitment and professionalism displayed by Advantech’s Brazilian team during the last 5 years has strengthened the partnership between Advantech and Cittati. This commitment provides a solid foundation for future projects. ■



Advantech and VinBus in Strategic Cooperation to Develop Intelligent Electric Buses Management System

Photos provided by Advantech

In Dec 2020, Advantech Vietnam Technology Co., Ltd. (Advantech VN) and VinBus Ecology Transport Services Limited Liability Company (VinBus) held a signing ceremony for a strategic cooperation contract on the development of the intelligent electric bus management system. With AIoT solutions, VinBus' electric buses will be the first public passenger transport equipped with AIoT technology to improve safety as well as providing convenient services to customers.

VinBus and Advantech Vietnam will work together to promote business cooperation activities and support each other in terms of technology platforms and technical facilities in the intelligent electric bus management system, including solutions such as: fleet management, depot management, route management, passenger information system, fleet safety system, driver behavior management, battery management, passengers Wi-Fi service and more. All the related features are implemented by Advantech

trusted TREK eBus solution by in-vehicle edge AI computing with intelligent camera ADAS system, industrial communication system and also vehicle grade advertisement system.

Mr. Nguyen Van Thanh - Deputy CEO of VinBus affirmed: "When choosing a partner for the project, VinBus always puts quality and efficiency first. VinBus believes that Advantech, a company with around 40 years of experience in the development of operation management solutions, is capable of providing a comprehensive solution for the operation management of VinBus' intelligent electric bus management system".

The Advantech and VinBus project will install in the first phase of intelligent electric buses from Hanoi, and in the future will also apply this solution across Vietnam. In addition, this case is also the first one intelligent electric bus in Southeast Asia, and it is expected to be replicated throughout Asia and worldwide in the near future. ■



2020 Taiwan Cold Chain Summit Highlights Taiwan's Strengths

Photos provided by Taiwan Cold Chain Association

The 2020 Taiwan Cold Chain Summit hosted by the Taiwan Cold Chain Association (TCCA) was held on August 18 in Advantech, allowing representatives of the Asian Taiwan Chamber of Commerce, related units and industry players to better understand the development of cold chain logistics and the professional strength of Taiwan's cold chain with successful cases. TCCA hopes to let the world see the strength of Taiwan's cold chain when promoting the development of Southeast Asia. ■



Advantech Conducts Advanced Course on IoT Application Planning

Photos provided by International Ocean Freight Forwarders and Logistics Association Taiwan (IOFFLAT)

In July 2020, Advantech and the International Ocean Freight Forwarders and Logistics Association, Taiwan (IOFFLAT) jointly began an advanced training course on IoT application planning at Advantech's Linkou Smart Campus. The seven-week course focused on operational applications in supply chains—in particular IoT sensing and intelligent recognition technologies in harbor administration, customs affairs, fleet management, and retail—the aim was cultivate more talent for the Taiwanese smart transportation industry.

The course used Advantech's WISE-PaaS cloud service platform as a core element and combined it with IoT, AI, block chain, cloud computing, big data, edge computing, and other technologies to integrate every aspect of logistics and retail technology for innovate

smart applications aimed at business owners, vehicles, environments, goods, and smart ports. Participants learned about new business models for platform services and strengthened their knowledge and technical skills in AIoT. ■



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■ Elite 100 Internship

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