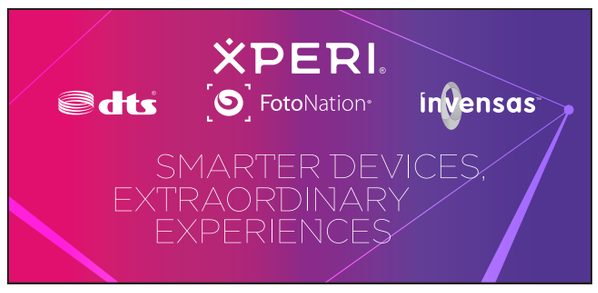

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Computex 2019 opens with more exhibitors

Staff reporter

Computex 2019, as one of the world's most important bridges connecting different parts of the global ICT ecosystem, opens in Taipei on May 28, with the edition this year focusing on the latest tech trends such as AI, IoT, 5G, blockchain, innovations, startups, gaming and XR.

This year, Computex combines artificial intelligence and Internet of Things (AI & IoT) across multiple exhibition areas such as "Systems and Solutions," "Industrial Internet of Things and Embedded Solutions," "SmarTEX," and "InnoVEX," displaying solutions ranging from smart homes, smart transportation, wearables, and health technology.

The 2019 show, which runs till June 1, attracts 1,685 exhibitors using 5,508 exhibition booths, growing 5.1% and 9.8%, respectively, from last year, according to the organizer Taiwan External Trade Development Council (TAITRA).

An extra venue

The TWTC Nangang Exhibition Hall 2 (TaiNEX 2) will be used for the first time this year, showcasing IoT, communication, 5G related products, and the future lifestyle of all things connected. After integrating VR (virtual reality), AR (augmented reality) and XR (extended reality) into Computex, according to the organizer, nearly 100 domestic and international manufacturers will present the latest e-sports developments and products, laying the foundation for Taiwan to become one the most important part of the global e-sports ecosystem.

The TWTC Exhibition Hall 1, which has been one of the major sites for Computex, will be dedicated this year to presenting InnoVEX, a major startup showcase in Asia that has entered its fourth year.

This year, InnoVEX will feature 402 startups from around the world. Among them, startups from Poland, Hong Kong, Hungary, and Brazil will form national/regional pavilions. They are joining 11 other national pavilions including the Netherlands, France and South Korea.

Keynotes

Senior executives from global tech giants such as AMD, IBM, Intel, Microsoft, Nvidia, and Qualcomm will talk about technological innovations and analyze the latest industry trends and development strategies at Computex.

Heavyweight speakers include AMD president and CEO Lisa Su, who will give a speech on "The Next Generation of High-Performance Computing," discussing the industry development and layout of high-performance computing, according to the organizer.

The Computex opening keynote will be delivered on the first day of the annual tradeshow by Gregory Bryant, Intel's senior vice president and general manager of the Client Computing Group.

The Microsoft Keynote Forum takes place on the second day of the exhibition.

5G

For the first time, TAITRA cooperates with the Ministry of Economic Affairs 5G Technology Program Office to organize the 6th Taipei 5G Summit. Experts from telecom manufacturer Ericsson, chip manufacturer Qualcomm, Asia Pacific Telecom, and Quanta will discuss how to integrate 5G with emerging IT technology to create a market of innovative applications and business models after the commercialization of 5G.

Computex Forum

Based on the theme of "Pervasive Intelligence," the 2019 Computex Forum will feature heavyweight speakers from leading firms such as IBM, Intel, Micron, Nvidia, SAP and Siemens to discuss in three sessions: "Disruptive Trends Session," "AI Session," and "AIoT Session."

The first session on May 28 will feature speakers from IBM, Qualcomm and AWS discussing trends such as quantum computing, blockchain applications, immersive experiences, digital twins, and autonomous cars.

The second session on May 29 will see speakers from Arm, Nvidia, Siemens, Micron, Alibaba Cloud and Google share their insights in various AI applications and how AI is gradually changing everyone's daily life.

The third session, also on May 29, will focus on AIoT, an advanced application that integrates two major technologies, AI and IoT. Speakers from Intel, Trend Micro, NXP, Advantech and Supermicro will show how AIoT is driving innovation and development in areas such as semiconductor, smart transportation, and smart cities.

Science minister Chen Liang-gee shows confidence and ambition in promoting Taiwan's entrepreneurships

Mark Tsai and Rodney Chan, DIGITIMES

Science minister Chen Liang-gee has been making a lot of efforts grooming Taiwan's startups, a clear example being his ministry's arrangement of a large delegation to Eureka Park at CES 2019. Taiwan has also been keen to promote its own edition of startup showcase, InnoVEX. Ahead of the annual event, which takes place in Taipei from May 29 to 31 this year, Chen talked about Taiwan's plans and visions for promoting its innovations and startup teams.

The 4 elements

There are four elements supporting entrepreneurships: Capital, talent, technology and market, according to Chen. Taiwan had seen a disruption in investments in startups since the dot-com bubble burst in 2000 and the migration of manufacturing operations to China – until recent years. Now more locally-groomed or overseas-educated talent is jumping onto the startup bandwagon, with government stepping up efforts to connect them with local and overseas accelerators.

Chen described the accelerators as the "table top" sitting on the "four legs" – his metaphor for the relationships between the funding programs and the four entrepreneurship elements.

He said the four elements need the accelerators to integrate them. The accelerators introduce technologies and industries which can inspire startup teams' innovations and connect them to the industries. Whether it is small fledging startups or more experienced enterprises looking for new opportunities and clients – they can rely on such help to wow the market with solutions that connect well with the ecosystem and meet what the market really needs.

Entrepreneurship and ICT prowess

Chen said Taiwan has done it differently from the US and Europe in terms of grooming its entrepreneurs. In the US, some start setting up their businesses while still in high school. In Taiwan, starting a business may be more about fulfilling parents' expectations. That is why young people in Taiwan have received little training or education that steers them towards entrepreneurships. Despite that, now there have been a lot more young people in Taiwan founding their own businesses with support from the Ministry of Science and Technology (MOST), receiving much attention and acclaims from many other countries, said Chen.

He noted the strong ICT technology prowess that Taiwan has built up over the years remains the core competitiveness of the country when providing support for worldwide businesses. Taiwan has a population of only about 23 million – accounting for 0.36% of that of the global total – but it has still been able to build a strong and globally-renowned ICT supply chain that the world relies on heavily. The science minister is very confident about Taiwan's global competitiveness, enabled by talented people in diverse fields who are able use their knowledge in cross-domain applications.

Exchange programs

Exchange programs with foreign institutions have allowed Taiwan researchers to see more of and connect with the rest of the world, such as the Stanford-Taiwan Biomedical Fellowship Program (STB) – which has entered its 10th year – and


Science minister Chen Liang-gee

the Berkeley-Taiwan Biomedical Fellowship Program (BTB) – which has entered its second year. Chen likened these exchange scholars to "potential seeds" that can inject new energy into Taiwan when they return home.

These seeds may grow into "big trees" by founding their own businesses, or become mentors of other startup teams. Chen said such interaction between different teams will enable creativity in multiple and diverse forms. He also noted that some programs have enabled one to three entrepreneurs to stay and learn in Silicon Valley for two to three months. But he said such exchange programs may be expanded to include 20 to 30 startup teams a year. These programs will let the startup teams get a quicker and clearer understanding of the resources and principles of entrepreneurships in other countries, and at the same time connect them to the innovative ideas of other communities.

Hardware-software integration

Taiwan must think hard how it can integrate its hardware prowess with software in order to catapult its innovations and startup teams to higher levels in a new wave of digital transformation – an integration sought after by those embracing the Fourth Industrial Revolution and attempting to fulfill demand for Internet of Things (IoT) applications.

Development of new products will have to cater to specific scenarios. The hardware-software integration must also provide multiple services and a link between those front-end services and devices. Chen cited Taiwan's precision machinery sector as an example. He said it is not the machines themselves that need to be upgraded; what is needed is that they have to come with multiple IoT sensors that connect and inspect each and every step of the procedure during the manufacturing process.

He said the key to future development is not just the hardware – namely the machines, but also the software that manages the machines.

In contrast to software development, hardware manufacturing and production capacity installation need much more capital investments. That's why many startups – usually short of funding – choose to focus on software development. Chen suggested the idea of "hardware accelerator." He said hardware alone may not create too much value, but if software development is based on extension from hardware, then the results would be more competitive.

Attracting foreign startup teams and accelerators to Taiwan

Chen said the Taiwan Tech Arena (TTA) plans to incubate 100 startups a year, with half of them to be foreign teams. This is meant to let local teams come into more contact with international counterparts, investors and experiences.

As to how Taiwan can attract foreign startups to come here instead of Silicon Valley or Europe, Chen said the key is let them have industry links and opportunities that they may not get in other countries. Their businesses will also be getting support from relevant government projects. That is to say, according to Chen, stationing in Taiwan will add to their competitiveness, which will naturally attract and keep them here.

The minister said introducing foreign accelerators into Taiwan will also be important. But he said running an accelerator needs a lot of investments in capital, time and human resources. The government offers a lot of help to diversify business risks and to build up ecosystems. Taiwan will also set up locations and connections in other countries in a bid to bring foreign accelerators to Taiwan.

Taiwan may be a small country with a small market, but Chen pointed out that Singapore is much smaller, and yet has been very active in the startup sector. He thinks Taiwan can work as a partner for startups from Singapore and other countries, facilitating the development of Taiwan's ICT applications and forming a more complete ecosystems enabled by international links and better technologies.

The 'national team' of startups

In order to let the world see Taiwan's innovations, MOST set up a pavilion at VivaTech in France. The MOST-led delegation of 40 startup teams to Eureka Park at CES 2019 was also a huge success. It means that startups in Taiwan no longer need to fight alone; they will receive support from the government, which is keen to promote the nation's startup scene as a whole.

Chen said Taiwan is well-known for its ICT manufacturing capabilities, but it is now time to shape a distinct image in the startup sector. He said it may be more efficient to work as a "national team," building a new image of Taiwan as a whole to attract investors and create opportunities for its startups.

Chen's ambition is to let Taiwan give birth to 3,000 new startups every year. Such a massive scene would create tremendous momentum for interaction and exchange of resources, technologies, talent and capital.

AI Grows to Become A Key Development Focus of Healthcare

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Artificial intelligence (AI) has grown to become a popular emerging technology that is able to significantly enhance the development of an industry and a particular industry that has been benefited dramatically by the technology is healthcare.

Since 2012, NVIDIA has seen increasing adoption of AI systems in the healthcare industry, especially by startups.

One of the major applications that AI can be implemented into in the healthcare-related field is the medical imaging, said Marc Hamilton, VP of Engineering and Solution Architecture at NVIDIA. Around 300,000 advanced medical imaging instruments such as ultrasound, magnetic resonance imaging (MRI) and positron emission tomography (PET) scan, are shipped every year within a total installed base of three million units at the moment. About 70% of medical imaging research and development today is based on AI technology.

The adoption of NVIDIA DGX-2 supercomputer by Taiwan's China Medical University Hospital (CMUH) was the first case of a healthcare provider in Asia to deploy and operate of the DGX-2 AI supercomputer, Hamilton noted.

NVIDIA DGX-2 is the world's first two petaFLOPS system that combines 16 interconnected NVIDIA Tesla V100 Tensor GPUs for the high levels of speed and scale from the GPU giant. Powered by NVIDIA DGX software and the scalable architecture of NVIDIA NVSwitch, the DGX-2 is the top-end choice that NVIDIA is currently having available for AI challenges and deep learning performance.

Hamilton pointed out that AI is a software program that is able to create new software. Running an AI system on the DGX-2, users are able to feed the system with data for it to write a new program based on the analysis it come out with the data.

The DGX-2's 16 GPUs are able to accelerate the data processing for users, helping them to achieve results more quickly and efficiently.

In addition to medical imaging, genomics

Marc Hamilton, VP of Engineering and Solution Architecture at NVIDIA shares how AI is growing to become a key development focus of healthcare

is another key area that AI is able to perform its potential. There have been increasing number of companies focusing on developing products using AI for genomics sequencing. Many of the related devices and equipment including small portable genomics sequencers that can be taken out for use in the field, and large multi-million dollar sequencing instruments that can generate several terabytes of sequencing data a day, are featured with NVIDIA's GPUs for processing and analyzing data via AI algorithm.

NVIDIA's role in the ecosystem is to cooperate with partners and assist them to develop end devices. To do that, NVIDIA has provided its Clara AI toolkit with many unique features, allowing researchers to easily begin an AI analysis with its pre-trained programs.

A decade ago, one of the earliest applications to take advantage of GPU computing was image reconstruction. Today, GPUs are found in almost all imaging modalities, including CT, MRI, X-ray, and Ultrasound. Clara Imaging brings together accelerated libraries and deployment frameworks allowing developers to create and upgrade intelligent imaging instruments.

Deep learning research in medical imaging is also booming with more efficient and improved approaches being developed to enable AI-assisted workflows. However, most of this AI research today is being done in isolation and with limited datasets which may lead to overly simplified models. Even when a fully validated model is available, it is a challenge to deploy the algorithm in a local environment. With the release of Clara AI now data scientists and software developers have necessary tools, APIs and development framework to train and deploy quality AI.

Using the AI system for medical imaging can also help reduce patient's radiation exposure, improve image quality and produce images in real time. Computational game-changers like CT iterative reconstruction and MR compressed sensing are able to reduce radiation exposure up to 90% and shorten the time it takes for an MRI image to be captured.

More recently, deep learning is dominating with more than half of new research in medical imaging applications involving AI.

Hamilton noted that a hospital may have a million of MRI images, but only a few of them were images of rare diseases. However, with deep learning, researchers are able to train the AI to go through only a small number of image data to recreate similar images of the rare diseases, so the images can be shared with other medical care workers without violating the patient's privacy.

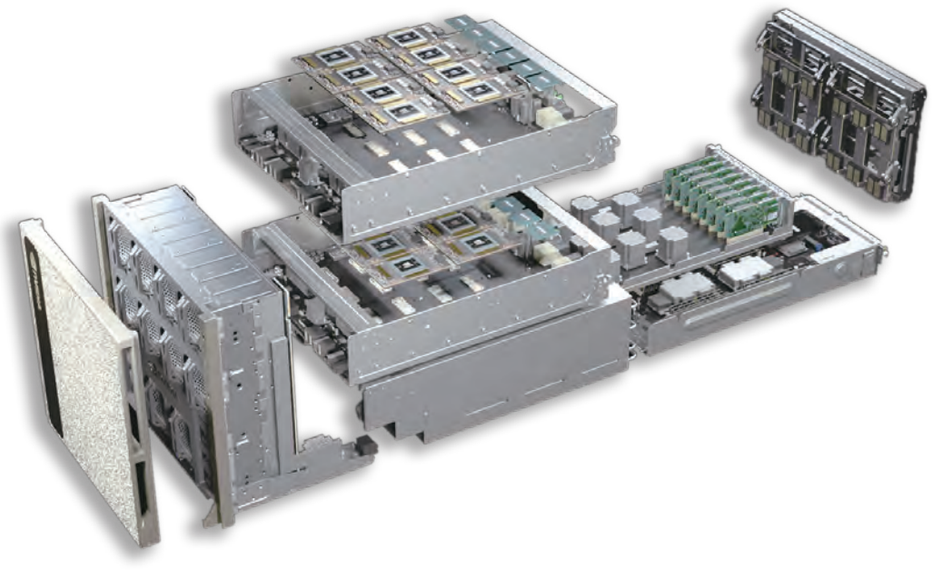
NVIDIA's Clara AI toolkits can be adopted by developers or vendors of medical imaging instruments, hospital researchers, third-party companies and startups. The toolkits will give them a head start in AI algorithm development, allowing them to build up new applications more efficiently.

Currently, a major part of existing AI research is led by medical equipment vendors, but NVIDIA has been pushing to nurture new talent via its AI startup program. Over 4,000 startups have currently participated in the program with several hundreds of them at least are developers of medical imaging-related applications. Through the program, one of NVIDIA's key works is to connect these startups with suitable hospital researchers or medical equipment vendors and providers to speed up their AI implementation, Hamilton said.

NVIDIA has also done multiple medical care-related investments and partnerships in Taiwan. During NVIDIA's cooperation with China Medical University Hospital (CMUH), the company has introduced the hospital several startups including local ones for AI R&D. In 2017, NVIDIA announced the cooperation with Taiwan's Ministry of Science and Technology (MOST) to accelerate the development of AI across Taiwan. MOST has allocated US$520 million for AI investments with one of the projects being the AI supercomputer TAIWANIA 2, one of the top supercomputers worldwide powered by a total of 252 nodes with each equipped with 8 NVIDIA Tesla V100 Tensor Core GPUs.

Taiwan government is providing the supercomputer to researchers of all fields in Taiwan to conduct development, and NVIDIA has been working closely with these researchers by providing the company's latest software and updates. The partnership is aiming to assist small to medium size enterprises or organizations that are not able to afford expensive AI hardware to still be able to use AI system through the government's supports.

For AI training, NVIDIA has established NVIDIA Deep Learning Institute (DLI) in Taiwan to train students and researchers how to resolve problems using NVIDIA's software and hardware and has a series of classes specifically for healthcare applications. Meanwhile, NVIDIA also has collaboration with many universities in Taiwan to establish AI labs, helping to incubate AI talent.


NVIDIA DGX-2 is the top-end choice for AI challenges and deep learning performance

Gaming market growing with more players: Q&A with Gigabyte's executive vice president of Aorus Brand Marketing

Joe Tsai, DIGITIMES

As Gigabyte Technology's premium gaming brand, Aorus has come to its fifth year of operation in 2019. Continuing its multi-product lineup strategy, Aorus is offering its latest gaming monitor series for 2019 featuring exclusive tactical advantages in games and a patented Active Noise Cancelling (ANC) technology to significantly improve users' experience in communication.

The gaming market is expanding every year with growing numbers of gamers joining. Aorus also sees the business opportunity and has been keen on participating in the communities, aiming to strengthen its brand recognition. To understand the strategies Aorus has adopted for the niche sector, Digitimes talked to Eddie Lin Gigabyte's executive vice president of Aorus Brand Marketing, about the gaming market's current status.

Q: What is Aorus ' view on the gaming market in 2019?

A: During our annual review last year, research reports and feedbacks from our social media groups and gamer communities all showed one prominent trend in the gaming market: it is gradually turning into an all-around entertainment phenomenon.

Many game developers have started partnering with streamers and video content creators such as Youtubers, looking to attract the attention of a new gamer group that we called the popcorn gamers: Watching someone playing games has already become a new way of entertainment similar to watching traditional TV programs.

The popcorn gamer group has already been included as part of the gaming market by many research firms studying the market.

According to a research report, the worldwide gaming market has a value of US$134.9 million in 2018 and the value has been picking up by around 10% almost every year for the past several years. And it increased by about that rate in 2018. The major driver that supports the gaming market's double-digit value growth is this phenomenon that turns the sector into a new entertainment ecosystem.

Eddie Lin, Gigabyte's executive vice president of Aorus Brand Marketing

G2 Esports won 2019 League of Legends Mid-season Invitational in Taiwan

The business opportunity of popcorn gamers also offers a new career route for e-sport players after retiring from e-sport competitions. In Asia, a couple of e-sport players have been recruited by companies to become streamers or Youtubers.

Another area in the gaming market that has been rising in the past few years is the mobile game. Because of smartphones' increasing hardware performance, game designers have started bringing intense games such as Arena of Valor and PlayerUnknown's Battlegrounds (PUBG) to the mobile platform, attracting a wave of new gamers into the mobile game sector.

Because of the games' friendly user interfaces and the fact that gamers only need to spend a short amount of time to complete a match, these games have been able to attract some popcorn gamers to join and play themselves, relatively expanding these games' overall player bases. Their participation also boosts demand for gaming peripherals and hardware rigs as they try to become more competitive in the games.

As the number of gamers continues expanding and more diverse groups of gamers join the sector, we expect the market to stay on the growth track for the next couple of years.

Q: How does Aorus introduce itself and handle branding?

A: Since 2017, Aorus has been focusing on raising its brand recognition in the gaming market. Most resources have been spent on participating at worldwide major gaming events such as North America's Penny Arcade Expo (PAX), Germany's Gamescom, France's Paris Games Week, China's ChinaJoy, Russia's IgroMir, South Korea's G-Star and Brazil's Brasil Game Show (BGS).

In Taiwan, we have mainly participated at Wirforce and Taipei Game Show (TGS).

We now participate at an average of 10 shows at least a year and by showing our brand images via booth decorations and product innovations, Aorus is confident it will promote its brand recognition.

Aorus has also been sponsoring e-sport teams that share the same passion and values with us. After one year of sponsorship activities in 2018, Aorus has slightly adjusted its strategy and instead of directly handling all the sponsorships via the headquarters, Aorus has passed down some of the work to local offices in places where the e-sport teams come from, as Aorus' local staff should have better understanding of how to promote Aorus brand products with the e-sport teams in the market.

Aorus' headquarters are now primarily focusing on handling the promotions with e-sport teams that are more globally renowned. Just a couple weeks ago, one of our sponsored e-sport teams, G2 Esports, won the 2019 League of Legends Mid-season Invitational in Taiwan.

Aorus has also started creating video content for promotions in social media such as Facebook and Instagram and through these sites' management tools, the company is able to get more information about where its customers come from and what kind of content its followers are interested in.

Q: How does Aorus provide better gaming experience for gamers?

A: We are aiming at building an ecosystem for gamers, and the gaming monitor is the final piece to fill the last gap in its PC gaming lineup.

Although the Aorus brand has often given consumers the impression that its expertise mainly lies in motherboards and graphics cards, the team believes if the brand is looking to make products that meet customers' demands, a strategy of developing multiple product lines is necessary.

The tactical gaming monitor is the latest product line that Aorus has come up with for the brand. Before creating the monitor, Aorus conducted a lot of market research to identify really exclusive and unique features, looking to differentiate from competitors' products, since we are looking to redefine the meaning of gaming monitor, not just a spec comparison.

The unique feature of Aorus' tactical gaming monitor is its Active Noise Cancelling (ANC) functionality. By connecting a headset to the monitor, the technology can cancel out environmental noises and sounds and pass on players' undistorted voice to their teammates, giving users of the monitor an advantage over opponents in communication, while not violating any of the rules.

Aorus' latest 25-inch monitor also features a 240Hz refresh rate and a specially designed setting to adjust user OSD interface, allowing the user to make adjustments to the monitor via a mouse or a keyboard. Users simply need to connect their monitors with PCs using USB for the functionality to work.

In addition to the monitor, with Aorus' expertise and strong R&D capability in PC components, it has come up with the world's first Gen4 SSD memory solution, which can dramatically enhance data transmission speed to shorten users' processing time.

Aorus is looking to build an ecosystem for customers, a new service to fulfill that goal is currently underway as we are trying out the Xtreme Combo bundle to provide top-of-the-line hardware combos that satisfy customers' demanding needs.

Starting with information security certification services, Bureau Veritas brings added value to 5G/IoT customers

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With 5G communication increasingly catching public attention in recent years, a small number of 5G-ready phones are finally making debut on the market beginning in 2019. However, in general, there are still quite a few issues and challenges to be overcome as the world ushers in the 5G era.

As a matter of fact, for 5G communication to become widely available, it not only requires joint efforts on the part of IC developers, telecom operators and OEM manufacturers but testing and certification labs also play an essential role. Spectrum allocation by governments around the globe and device certification mechanisms for regional markets worldwide are fundamental work amid the imminent advent of the 5G era. To the Taiwan high-tech industry that focuses on exports, testing and certification labs serve as the critical final checkpoint ensuring their products meet the requirements of different countries.

Information security problems may be hidden in a diversity of 5G challenges

Commenting on 5G developments and challenges, Pascal Le Ray, general manager of Bureau Veritas Consumer Products Services, Electrical & Electronic / Automotive / Wireless in Taiwan, notes 5G communication aims to satisfy a wide range of applications, wherein complexity is one of the major challenges. As 5G enables a platform for multiple wireless technologies to cooperate, suppliers of 5G technologies have to overcome a myriad of challenges including signal spectrum, transmission protocol, network compatibility, MIMO technology, device-to-device communication and potential network security and privacy issues that may arise.

To meet the strong demand for smart network communication, 5G development is advancing faster than previously anticipated. According to market analysts, fully operational 5G network will come in 2020.

Le Ray further comments 5G development will advance in three major directions - enhanced Mobile Broadband (eMBB), massive Machine Type Communication (mMTC) and ultra Reliability and Low Latency Communication (uRLLC). With 4G network already up and running, 5G development will run into plenty of challenges, as mentioned above.

Data encryption technologies become critical with IoT connecting millions of nodes

5G communication supports a wide range of applications with IoT being one of the major use cases addressed by mMTC. As to the challenges, Le Ray points out IoT and 5G both face information security issues. Hackers can break into the central system from an edge node to steal or tamper with data. IoT uses diverse networking technologies, encompassing Bluetooth Low Energy, Wi-Fi, LoRa WAN and ZigBee among others. A single edge node may not be equipped with strong computing power but the network as a whole must be able to simultaneously handle multiple technologies and issues such as gateway and network compatibility and have adequate computing power to process massive amounts of data. To address information security concerns mentioned above, data transmitted from millions of devices across the cloud need to be encrypted with robust algorithms to guarantee secure data exchange between edge nodes and the central system.

Going forward, the market will see more devices and sensors supporting a variety of new wireless communication standards every year. Network expandability will be an innovation that is instrumental for IoT to accommodate massive add-on devices and emerging technologies.

Starting with information security, Bureau Veritas brings more added values to customers

Accumulating years of experiences in testing and certification services, Bureau Veritas focuses on solutions targeting electric and electronic devices, automotive electronics and wireless technologies. Bureau Veritas' services and solutions cover wireless communication standards including NFC, Bluetooth, Wi-Fi, DSRC, CBRS, LoRa, Sigfox and 2G/3G/4G, a lot more than what its competitors can offer. For 5G testing and certification, Bureau Veritas assists customers with 5G NR conformance testing and operator network acceptance tests as well as 5G NR mmWave power density testing using DASY, notes Le Ray. He has also observed that Taiwan is engaged in eMBB, automotive electronics and IoT development. As an export-oriented economy, Taiwan needs its products to meet wide-ranging certification standards implemented by regional markets around the world, which is exactly Bureau Veritas' expertise.

Pascal Le Ray, general manager of Bureau Veritas Consumer Products Services, Electrical & Electronic/Automotive/Wireless in Taiwan

To help address information security concerns, Bureau Veritas offers IEC-62443 and IEC-27001 testing, a unique service that distinguishes Bureau Veritas from other testing and certification labs. Bureau Veritas strives to bring added values to Taiwan customers on top of its existing services and solutions.

New business model to build IoT-ready solutions, SECO accelerating smart edge computing development

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With the rapid development of artificial intelligence (AI) and Internet of Things (IoT) applications, the smart edge technology will be a major enabler for the evolution of the digital business, creating new business model and value through dynamic interactions between people, business and things. The smart edge systems will complement cloud computing by providing services with faster response, greater quality, more immersive interactions and more intelligence at the front end, closer to where people and things exist. The impressive use cases include autonomous vehicle, autonomous retail store and more factory automation systems.

Founded in 1979, SECO is an Italy-based leading embedded system and industrial solution provider with complete control over the entire design cycle to mass production of embedded solutions. For a strong brand presence in European market, the company has successfully introduced various medical solutions covering the computation modules of ultrasound equipment to complete healthcare tablets in recent business development. The Computer on Module (COM) is one of the most popular product series of SECO. It offers cross-platform features with a modular design aiming to provide flexibility to switch different CPUs between X86, ARM and FPGA-based architectures with the same form factor standards. SECO maintains long-term partnerships and offers product lines powered by AMD, Intel, NXP, Nvidia, Qualcomm and TI embedded processors.

Gianluca Venere, SECO SVP, Strategy & Business Development, explained the company's new business model and global strategies for developing embedded system market sectors. Venere is very positive about the smart edge technology development. With AI on more energy efficient hardware, people will see more and more autonomous things that proactively create new business opportunities through immersive interactions with people. Edge computing brings massive compute to the data locally and only forwards analytic data or metadata that makes sense to the cloud data center. The machine learning technology and trained algorithm to the edge enables business automation to generate value, especially when the algorithms and data are very location-specific.

In the consumer electronics sectors, the AI-enabled devices get more attention including smartphones, smart speakers and smart earbuds. These smart devices are leveraging the improvement of photo quality or manage the acoustic beam-forming to optimize the noise cancelling for sound effects. Meanwhile, in the embedded market, there is growing adoption of machine learning algorithms to do predictive maintenance, object recognition and manage sensors to prevent machine down time or accident.

Gianluca Venere, SECO SVP, Strategy & Business Development

The embedded systems and industrial PC industries are looking at various vertical solutions and technologies to increase manufacturing productivity and foster industrial growth. SECO, in particular, has developed an ad hoc software suite to optimize and guarantee the maximum performance of a low power and energy efficient hardware integrated in its modular single board embedded systems. Taking computer vision for example. SECO has developed optimized edge solutions with dedicated accelerators leveraging OpenCV for convolutional neuronal networks and inferential methods.

New Edgehog platform helping customers to build IoT-ready solutions

For predictive maintenance, SECO is releasing a dedicated firmware that runs in the background in dedicated edge gateway acting like an immune system of human body for detecting system failure to isolate the extraneous processes in the CPU and RAM, sending an alert to the IIoT cloud service created by SECO product development teams. SECO names these software stacks and cloud services as Edgehog platform. With the unique strength of cross-platform technology to provide customers with flexible and fast time-to-market solutions, SECO has been servicing the fast growing embedded system markets for 40 years. Through Edgehog platform support, SECO creates an innovative business model transforming the product into a service and helps customers with its design efforts to be a market leader in the Industrial IoT (IIoT) sector.

Venere noted that the IIoT trend enables new business models transforming products into services, but that requires a deep process of transformation and innovation in the company. For achieving this challenging objective, SECO needs a completely new approach to the embedded market. That's why it is designing its products with a customer-centric approach applying agile methods moving the attention to the software and firmware development and implementation.

SECO built its innovation center – separate from its hardware R&D unit – many years ago in order to have the freedom to create an innovative use case without any sales and financial pressure. After several years of development, SECO has launched Edgehog platform and is able to provide the services of "hardware as a solution," with which customers can get the benefits of its technology as a service, Venere added.

The commercial offerings of Edgehog platform will be divided into three service models. In the first model, which involves product prototyping, there is a fast and free of charge access to the Edgehog portal allowing customers to setup their proof of concept. It is very critical when the customer has first developed a business use case and identified ecosystem partners who will be capable of building solutions in time. So providing zero cost and fast access service will be the key for this service model.

The second model is "pay-per-use" helping customers minimize the risks of smart solution deployment and early stage services. SECO's software, firmware and hardware-based services enable customers to bundle product offerings, services and feature sets in new and creative ways that generate incremental revenue streams in the form of pay-per-use models.

In the third model, SECO provides "solution-as-a-service" to help customers quickly scale up the services and accelerate operator revenue. These three unique value propositions enable customers to differentiate their products and services in the market leveraging an ad-hoc design through a standard and flexible platform of SECO product offerings.

During Computex 2019, SECO will showcase at its booth a full range of products at Nangang Exhibition Hall 1, booth no. K1015. The live demonstration will include the solution of Qseven, COM Express and SMARC product lines to allow visitors to have a good chance to have real experience to see the advanced solutions powered by a leading European embedded

Edge-based inference acceleration

By Andrew Grant

AI is on the edge; or to be more precise, neural network acceleration is moving to the edge at a rapid pace. What used to require racks of cloud-based compute to run neural network inferencing can now be run on embedded devices such as cameras, smartphones and within vehicles.

With the evolution of dedicated hardware bringing greater compute power, networks are increasingly being optimized to run specifically at the edge. Markets such as smart camera surveillance, advanced driver-assistance systems (ADAS), autonomous vehicles, and mobile all have a need for data-driven decision making, based on input from real-time events. An autonomous vehicle has multiple cameras for computer vision, object recognition, lane warning, driver monitoring for fatigue as well as other sensors (e.g. thermal imaging, radar and LiDAR) for sensor fusion. By processing at the edge, this minimizes the bandwidth required to move data around the vehicle.

The advantage of dedicated IP for edge devices is in its compute density, exponentially more than other less specialized offerings. Neural networks have high bandwidth and computation requirements, but specialized design allows for optimal power, performance and area (PPA), maximizing inferences per second with minimal silicon area. This has the benefits of reduced latency and increased privacy (only sending relevant information through and not that of bystanders), with low power and bandwidth requirements thanks to the experience gained from the exacting PPA demands for the mobile space.

To deploy neural networks at the edge requires an understanding of the hardware on which they will run and the software frameworks that need to be extended, converted or designed for these edge-based deep learning accelerators. Converting to a fixed-point format offers a reduction in model sizes, compute and bandwidth. Tensorflow Lite is an example of this. Neural networks originally ran on CPU only. Some companies have used DSPs or FPGAs whilst others have focused on GPUs.

Pros and cons of deep learning inference-based computer vision processing

Although GPU acceleration can be 10 or more times faster than a CPU, the compute density offered by a dedicated accelerator in hardware can be exponentially faster than CPU and GPU.

Pros:

• Small but powerful, reaching the performance of cloud

• High performance per area and therefore lower silicon cost

• Low incremental cost for density making it ubiquitous for IoT devices

• Does not necessarily require connectivity, making it ideal for standalone devices, or low power, low bandwidth

Cons:

• Can execute tasks but models must be compiled for target hardware

• Not suitable for training

• May still require significant power depending on configuration

• Flexibility of task-specific solutions

What processing role does 'the cloud' play in such a scheme?

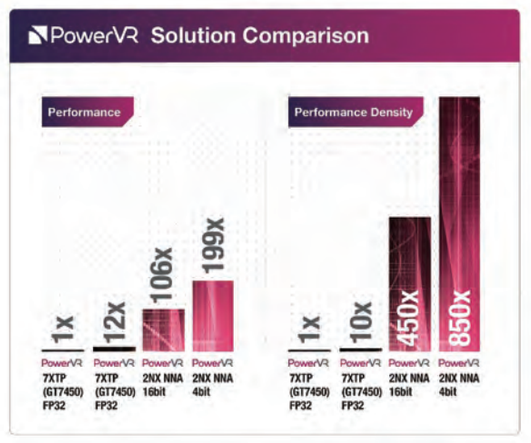
The cloud plays a complementary role to embedded edge processing – indeed they are symbiotic. Training, validation and retraining are often best run in the cloud as these are "big tin" tasks, requiring thousands of processing units. Meanwhile, the edge can run a network that is task-specific, or multiple devices can run a series of neural networks – for sensor fusion for example. So, it's not "either or"; it's "both and."

Whenever there are challenges to be overcome about latency, transmission, security or cost, edge devices can help. By running inferencing on a device with a neural network accelerator smaller than a pinhead, these tiny devices have big applications across the entire world of markets – including, but not limited to, security, retail, connected homes, education, agriculture and health.

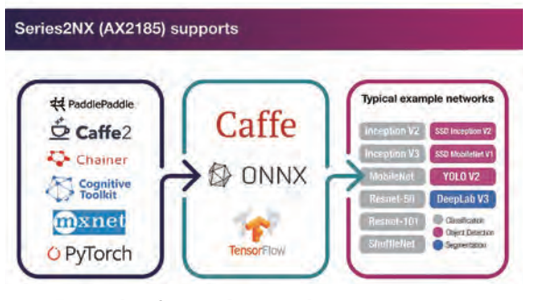
Looking to the future

Looking ahead, requirements for edge device capability are likely to increase. This will be complemented by the 5G rollout, enabling devices to "phone home" to update their neural network models and of course, to transfer important findings to the central computer – vital for effective ambient/pervasive computing.

Performance, power consumption and memory implications are all the focus of ongoing work, with companies vying to produce the optimal device at the lowest possible area cost. We are on the edge of a future in which devices "see"and importantly "recognize" – as a step forward towards a data-driven future. So, the fourth industrial revolution won't be in the datacenters; it'll be in the streets, the fields, the shopping malls and the factories, in devices, robots and vehicles. It will be all pervasive and all but invisible – but it will be ubiquitous. **(Andrew Grant is senior director, PowerVR AI, Imagination Technologies.)**



Compute density



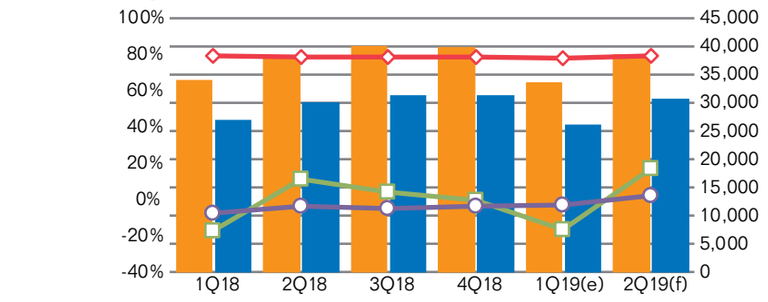
Example of neural networks

DIGITIMES Research: Mobile Device Tracker – 1Q 2019

Taiwan notebooks

Introduction

Notebook shipments, 1Q18-2Q19 (k units)



	1Q18	2Q18	3Q18	4Q18	1Q19(e)	2Q19(f)
Shipments	27,071	30,145	31,440	31,409	26,297	30,791
WW Shipments	34,072	38,207	40,056	39,916	33,770	38,731
Q/Q	-17.1%	11.4%	4.3%	-0.1%	-16.3%	17.1%
Y/Y	-7.4%	-3.3%	-4.7%	-3.8%	-2.9%	2.1%
WW share	79.5%	78.9%	78.5%	78.7%	77.9%	79.5%

Source: Digitimes Research, April 2019

Taiwan's notebook shipments were weaker than expected in the first quarter of 2019, down 16.3% sequentially and nearly 3% on year to come to 26.3 million units, as Intel's CPU shortages remained serious and some vendors such as Hewlett-Packard (HP) had cut their notebook shipments to focus on digesting their channel inventory. (Note: Unless otherwise indicated, all figures and tables in this report refer to output from Taiwan makers.)

Intel has done little to fulfill demand for its Atom and older-generation i5 processors - the segments that have seen the worst shortages - but instead is shifting its capacity to manufacture high-end and new-generation CPUs that have better profitability.

Taiwan makers' shipments are expected to grow 17.1% sequentially and 2.1% on year to return above 30 million units in the second quarter of 2019.

More AMD-based notebooks will be shipped to fill the supply gap created by Intel's CPU shortages in the entry-level sector, while Chromebook shipments in the second quarter of 2019 will perform stronger than those in the same quarter a year ago in both education and consumer sectors.

Taiwan's share of worldwide shipments will pick up to 79.5% in the second quarter of 2019 as Lenovo will increase outsourcing to Taiwan makers.

Worldwide notebook shipments were also weaker than expected in the first quarter of 2019 with the volume slipping 15.4% sequentially and 0.9% on year.

Intel's CPU shortages remained at around 5% in the first quarter of 2019.

The shortages have given notebook vendors headaches: Some CPUs they have procured do not meet their machines' target markets; and some of them do not have corresponding components such as chipsets or panels to assemble products with the CPUs they have received. Such issues prevented notebook shipments from picking up in the first quarter of 2019.

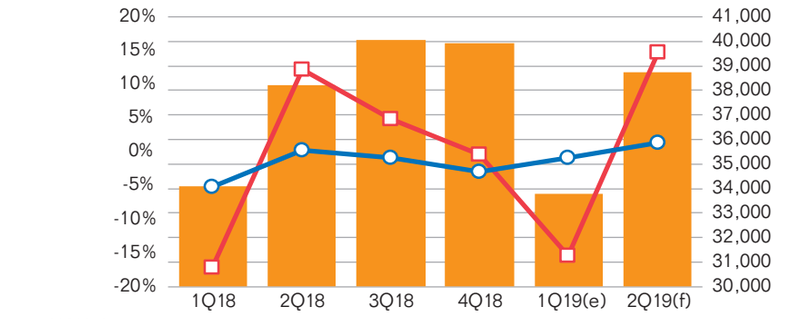
The shipments will rise 14.7% sequentially and 1.4% on year in the second quarter of 2019, as some vendors have begun restocking inventory after spending the whole first quarter depleting their excess channel inventory.

Although the consumer sector in general will continue experiencing shipment declines in the second quarter, emerging markets and Europe's enterprise sector will both witness growths in shipments.

Dell and Lenovo are both pushing up their Chromebook shipments for the second quarter of 2019.

Microsoft has started promoting its AMD-based consumer notebooks in Europe and North America to fill the supply gap created by the Intel CPU shortages.

Global notebook shipments, 1Q18-2Q19 (k units)



	1Q18	2Q18	3Q18	4Q18	1Q19(e)	2Q19(f)
WW shipments	34,072	38,207	40,056	39,916	33,770	38,731
Q/Q	-17.2%	12.1%	4.8%	-0.3%	-15.4%	14.7%
Y/Y	-5.2%	0.3%	-0.9%	-3.0%	-0.9%	1.4%

Source: Digitimes Research, April 2019

Shipments breakdown

Clients

Taiwan's shipments to Dell shrank only 9.3% sequentially in the first quarter due to strong replacement demand from the enterprise sectors in emerging countries and Europe.

Apple's orders dipped 33% sequentially in the first quarter as demand for the vendor's new high-priced MacBook Air decreased dramatically after entering the slow season.

Though it had raised the proportion of outsourcing to China-based makers, Huawei became the seventh largest client of Taiwan makers in first-quarter 2019, surpassing Xiaomi, which cut its orders by 38.6% sequentially in the quarter.

Dell's shipments are expected to grow 20% sequentially in the second quarter, stronger than HP's 14.3% growth, as Dell will outperform HP in Chromebook shipments, and will witness rising demand from the enterprise sector, which contributes over 60% of the vendor's notebook shipments.

Lenovo will see its share of Taiwan notebook shipments rise to 9.4% in the second quarter of 2019 as it has increased the proportion of its outsourcing to Taiwan partners.

The first quarter of 2019 was the traditional slow season for the consumer sector, but North America's enterprise sector also had worse-than-expected demand. Dell, which relies heavily on the enterprise notebook business, managed to see a decline less steep than the market average, thanks to replacement demand from emerging countries and Europe's enterprise sectors.

HP's shipment decline was sharper than the market average in the first quarter as the vendor primarily focused on digesting its excess channel inventory.

Acer is expected to return as the fifth-largest vendor worldwide, leapfrogging Asustek partly thanks to its mass shipments of Chromebooks to the education procurement market.

Samsung will see its shipment performance affected by seasonality. The first quarter of 2019 was the traditional peak season for South Korea's consumer sector.

Xiaomi's shipments are expected to rise to 300,000 units in the second quarter as the vendor is planning to host a promotion campaign for its products during the season.

Of the top-3 vendors, Lenovo will be the only one with on-year growth in the second quarter.

HP's new notebooks and Chromebooks began mass shipments in the second quarter of 2019, but weak market demand will affect their overall volumes.

Lenovo will see rising demand from emerging countries' enterprise sectors in the second quarter of 2019 and for the consumer sector, the vendor will mainly promote its light-gaming products.

Apple will see a smaller supply gap for Core i5 processors in the second quarter than in the first, allowing its product shipments to stablize.

Acer also has begun mass shipping its new notebooks and Chromebooks in the second quarter of 2019 and has released many AMD-based models, which will boost its shipment growth.

Asustek will see only limited growth in the second quarter of 2019 due to seasonality and strong competition in the gaming market and China's consumer sector.

CPUs

AMD's share of Taiwan shipments fell short of expectation and only reached 14.6% in the first quarter of 2019.

Digitimes Research originally expected AMD-based Chromebooks shipments to pick up in the quarter, but the education and enterprise sectors have shown rather low acceptance for the products.

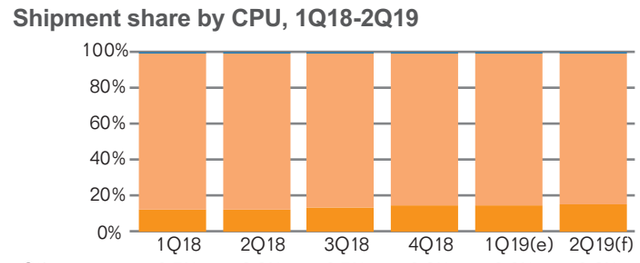
However, AMD's shipment share will rise to 15.4% in the second quarter as vendors will release more AMD-based Windows notebooks. Microsoft has launched a campaign promoting its AMD-powered products in North America and Europe during the quarter.

Screen size

Shipment shares in terms of screen sizes did not change much sequentially in the first quarter of 2019.

With the strong shipments of Chromebooks, which commonly adopt either an 11- or a 14-inch screen, Taiwan's 14-inch notebook shipments will increase 18% sequentially in the second quarter. But shipments of sub-12-inch notebooks will only see a limited contribution and grow only 14.3% sequentially, as most 11-inch Chromebooks are using Intel's entry-level processors that are currently in serious shortages.

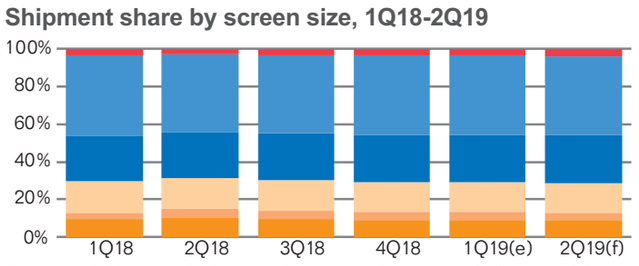
Shipment share by CPU, 1Q18-2Q19



	1Q18	2Q18	3Q18	4Q18	1Q19(e)	2Q19(f)
Other	0.7%	0.8%	0.7%	0.8%	0.6%	0.6%
Intel Mobile CPU	87.1%	87.0%	85.6%	84.5%	84.8%	84.0%
AMD	12.2%	12.2%	13.7%	14.7%	14.6%	15.4%

Source: Digitimes Research, April 2019

Shipment share by screen size, 1Q18-2Q19



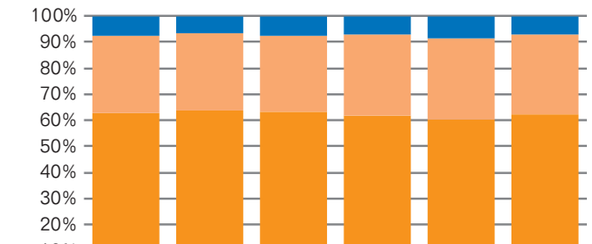
	1Q18	2Q18	3Q18	4Q18	1Q19(e)	2Q19(f)
≧16"	3.2%	3.1%	3.4%	3.7%	3.7%	3.8%
15"	43.3%	41.3%	41.4%	41.9%	42.0%	42.0%
14"	23.9%	24.2%	24.9%	25.1%	25.2%	25.4%
13"	16.9%	16.2%	16.3%	16.0%	15.9%	15.8%
12"	3.0%	4.9%	4.6%	4.3%	4.3%	4.2%
<12"	9.7%	10.3%	9.4%	9.0%	8.9%	8.8%

Source: Digitimes Research, April 2019

Makers

Compal Electronics remained as the top maker worldwide in the first quarter of 2019, shipping nine million notebooks thanks to stable orders from Dell and increased orders from Lenovo. *Continued on page 8...*

Shipment share by maker tier, 1Q18-2Q19



	1Q18	2Q18	3Q18	4Q18	1Q19(e)	2Q19(f)
Non-top 5	7.3%	6.7%	7.3%	7.1%	8.4%	7.1%
Top 3-5	30.1%	29.5%	29.3%	31.2%	31.4%	30.7%
Top 2	62.6%	63.8%	63.4%	61.6%	60.2%	62.1%

Source: Digitimes Research, April 2019

Synaptics voice-enabled smart home devices perform without internet

Sponsored content

Synaptics develops Human Machine Interface solutions for smartphones, PCs, automotive and a variety of smart home devices that are increasingly being adopted by consumers to simplify their daily lives. The company creates the silicon chips featuring touch, display, audio and video technologies that enable products to enhance the user experience and help make our digital lives more productive, secure and enjoyable.

While combining Internet of Things (IoT) and Artificial Intelligence (AI) technologies usually implies connectivity to the Internet or cloud, there is an increasing demand for more local, or edge-based processing capability to enable Consumer IoT devices to help improve performance, usability and security, as well as complement cloud-based functions or services.

This Smart Edge technology extends powerful data processing and machine learning to billions of edge devices, so they can act on the data from their sensors in real time and predict outcomes locally. This saves on bandwidth between edge devices and cloud servers, as well as shortens latency where possible. It also reduces the issue of digital packet loss during data transmission and enhances data security.

At COMPUTEX Taipei 2019, Synaptics is showcasing a new product family that includes single silicon chip solutions and software stacks intended to widen the adoption of Consumer IoT products by enabling secure inferencing capability at the edge. Synaptics calls its technology platform Smart Edge AI™ which is an umbrella term for its AudioSmart and VideoSmart SoC families, software stacks, AI models, data encryption algorithm and inferencing engines. Smart Edge AI provides AI driven neural networks, processed at the edge, addressing all the key challenges in performance, robustness and privacy concerns, that stand in the way of wider adoption of Consumer IoT.

Smart Edge AI for wider adaption of Consumer IoT devices

In this interview with Synaptics, Mr. Saleel Awsare, Senior Vice President & General Manager of IoT Division, Corporate Marketing & Investor Relations, and Mr. Vineet Ganju, Vice President of Voice & Audio Marketing, talk about Synaptics Smart Edge AI technology and their unique product portfolio. These HMI technologies enable edge devices that can understand and respond to what we do, speak, or touch without a constant connection to cloud, Awsare highlighted.

Smart Edge AI is well-positioned for voice-enabled Consumer IoT devices such as smart hubs, smart speakers, TV set-top-boxes, home appliances, Wi-Fi routers and sound bars and is a necessity for other mainstream use cases like autonomous vehicles. However, with the continuing improvement of Smart Edge AI processing capabilities and growing spread of applications, new use-cases and services have been growing in the electronics industry.

Enhanced voice at the edge with AudioSmart SoC

Synaptics's new AudioSmart SOC product line features fully integrated neural network acceleration to support customized wake words and highly-advanced far-field voice processing.

The new AS3xx AudioSmart family is the introduction of fully integrated and purpose-built far-field voice processing and wake word technology. These features help system makers to further improve voice pick-up in noisy, real-world conditions and barge-in capabilities even during very loud playback.

For supporting even more advanced enhanced user experience through better response times and robustness, Synaptics uses a new machine learning engine with its own Neural Network Acceleration and Processing engine. Features such as

Mr. Saleel Awsare, Senior Vice President & General Manager of IoT Division, Corporate Marketing & Investor Relations

performing Automated Speech Recognition (ASR) and Natural Language Understanding (NLU) locally on-device provides a powerful value-add for OEM/ODM vendors or system integrators to build high performance voice control for consumer devices even when there is no internet connectivity.

In addition, the AudioSmart Smart Edge AI SoCs fully support existing voice assistants from global brands, such as the Line, Alibaba, Tencent, Baidu, Google, Amazon and other voice assistant platforms or service providers in different regions or countries. The AudioSmart Smart Edge AI SoCs are now shipping in millions of units to Synaptics customers and will be available on well-known consumer brands before the end of the year.

Consumer IoT HMI technologies become multimodal

Today, Synaptics offers a range of HMI capabilities from touch, voice, audio and video, expanding far beyond the company's traditional strengths in touch. With notable security features at the edge, Synaptics Smart Edge AI product offerings are more advanced technology with secure inferencing and enterprise grade encryption for edge systems. These technologies use encrypted data in which the privacy data is stored at the edge. The most significant value of this approach is that it could allow user's data to only be processed by application processors and the accelerator and not in the cloud.

Awsare claimed that with its near-term product deployments and highly integrated AI solutions at the edge, Synaptics is ushering in a new age for Consumer IoT sectors and looking to expand market share and business opportunities. As the global leader of HMI SoCs and with more than 35 years providing the solutions in Taiwan OEM/ODM and ecosystem, Synaptics has a strong presence in this important market.

ECS to present IoT and AI solutions, featuring LIVA mini PC live demo

Press release

Elitegroup Computer Systems (ECS) is showcasing its products at Computex 2019 at Nangang Exhibition Center Hall 1, L0118 (4F), from May 28 to June 1. ECS will present its advanced IoT and AI solutions and new LIVA mini PC to provide a preview of the total solution.

LIVA mini PC

The energy efficient multi-functional mini PCs are designed for various smart solutions. The mini PC family includes mini-size Q series, cost-efficient X series, energy saving Z series, AI built-in M series and high-performance LIVA One series for different applications, such as smart retail with facial recognition for digital signage, smart conferencing for business intelligent, edge computing for AI solutions and home entertainment for light gaming demands.

The new LIVA SF-110 A320 is designed for home entertainment and light gaming. Moreover, as digital signage is a fundamental component of corporate relations and business in the workplace, LIVA offers a wide range of 4K display solutions to meet the needs of applications that require the high pixel density. It can integrate with digital signage, and used in smart retail solution, transportation, warehouse, and others.

The LIVA edge computing PC with Intel OpenVINO

ECS will also present multiple LIVA mini PC smart solutions. LIVA mini PC features an environmentally friendly design that improves energy savings. The new generation of LIVA PC with AI engine Intel OpenVINO built-in features low power consumption design, 802.11ac Wi-Fi connectivity to provide the live-streaming analytics solution through real-time artificial intelligence. It supports CNN-based deep learning inference at the edge and data execution across computer vision accelerators.

LIVA mini PC Z3 plus with Amazon Alexa

ECS will also launch its first Amazon Alexa built-in mini PC Z3 plus with premium voice activated experience. It comes with ECS Sirocco, a battery-powered voice access point that wirelessly extends voice in entire space. Sirocco will respond to users instantly by connecting Amazon Alexa. It allows the user to instantly play music, get practical information such as the personal calendar, news, radio, and weather. Through the smart connection, the voice smart device can control the lights, home automation systems and smart devices.

ECS smart charging solutions

With the electric vehicle market growing fast, how to satisfy the increasing need of EV charging is also a focus of ECS's services. ECS will showcase its LIVA Smart Charger, which can be deployed as a standalone unit or in a cluster of many chargers sharing the same power source with intelligent load management via IoT. LIVA Smart AC Charger features plug-n-charge, and secured payment via multiple truncation methods, central management for a range of advanced features for the site or fleet owners, and integration with renewable energy sources.

AIoT intelligent edge in logistics and energy

From increasing fleet productivity and sustainability to improving the efficiency of operations and optimizing energy utilization, ECS offers AIoT intelligent edge solutions in logistics and energy domain.

ECS's solutions include smart edge gateways which fetch the IoT data and communicate with its cloud system. Moreover, the pre-installed industrial ECS Edge Builder enables the customized industrial microservices. Digital twins' technologies are helping overcome vertical adoption challenges and deliver new benefits.

ECS will showcase two main applications: one is Real-time Asset tracking solution in collaboration with Intel connected Logistics Platform. This monitoring could involve knowing if perishable goods - such as food and flowers - or pharmaceuticals were exposed to heat that could spoil the product, or if excessive vibration on the road has damaged sensitive equipment. Another is Solar Management System which can monitor the renewable status and visualize the energy consumption, which can help site owners allocate the sustainable power with existing power source.

ECS connected mobility solutions for EVs

ECS offers various connected mobility solutions to optimize the driving experience and safety of the EV with more efficiency, sustainability and cost-effectiveness. Smart Cockpit Solution integrates the advanced technologies and driver oriented human machine interface to create a seamless connection between the human (driver and passenger), vehicle and road with much consideration about safety, connectivity, information and entertainment while on the road. ADAS Solution is a camera-based passive driver assistance system solution which includes basic wide-angle HD 6ch BSV camera box to 360 surround view with DVR system, FCW/LDW/PCW also available.

Smart classroom solution

ECS's smart classroom solutions combine collaborative learning technology with diverse mobile devices, which promote interactive exploration of learning concepts and foster critical thinking and deeper understanding.

The smart classroom solutions include student devices, teacher devices, wireless access points and interactive whiteboards for deploying intuitive and technology enhanced learning spaces that ensure more streamlined planning and efficient reform. With purpose-built education features of student devices, 76cm drop resistance, IP52 dust/water resistant, retractable carry handle, rotational camera and stylus, ECS's smart classroom solutions help students improve their active learning.

ECS will also present its CMAP (Content Management Access Point), a WiFi storage device that allows up to 50 simultaneous connections in classroom to stream huge numbers of video files, documents and data, allowing students to access them anywhere, anytime before class, so they can have more time to do hands-on activities in class.

Clientron showcases the latest POS system and IoV intelligent in-vehicle driving solution

Press release

Clientron Corp., a global leading provider of thin client, POS , automotive electronics and embedded systems, is introducing its latest product innovations at Computex Taipei 2019.

The products demonstration include the latest POS terminals and self-service kiosk for the retail and hospitality industries and industrial panel PC with IP69K protection against high temperature, dust and water.

In addition, Clientron will debut the brand new IoV intelligent in-vehicle driving solution, which refers to the intelligent driving center console as the core system, and functionality is fully integrated with the in-vehicle infotainment system, the digital driving instrument display, the digital console control, the advanced driver-assistance systems (ADAS), augmented reality display (ARD) and IoV interactive functions.

It shows the innovative technology and system integration capabilities of the tier-1 professional automotive electronics supplier. The complete product series of Clientron are on exhibition at booth R0827 in TWTC Nangang Exhibition Hall 2.

Intelligent in-vehicle driving platform: Yulon Luxgen Think in-vehicle center console solution

"Seizing the trend of the Internet of Vehicles, Clientron has made great achievements in the development of the automotive electronics industry," Kelly Wu, pesident and CEO of Clientron, states."Bcom Technology, the subsidiary of Clientron, has been deeply involved in the Great China market for many years. It is a professional tier-1 supplier of automotive electronics. In addition to driving the infotainment system in the commercial vehicle market in China, its solution also covers the passenger vehicle market with original equipment of automotive electronics. Based on years of design know-how and integrated resources in automotive electronics industry, we create the opportunity to work with the Hua-chuang Automobile Information Technical Center (HAITEC) and design the brand new Think in-vehicle center console solution for Yulon Motor (Luxgen), the leading Taiwanese automobile. It tells that Clientron is the core-player in automotive electronics design, manufacture and system integration. In the meantime, we welcome all alliance partners and customized projects." The automotive electronics product line includes the latest Luxgen Think in-vehicle center console solution.

Clientron is also going to demonstrate a self-service kiosk, featuring a 32-inch multi-touch display and supporting a variety of payment mechanisms, and peripherals including NFC, barcode scanner and receipt printer for self-ordering kiosk applications.

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• Closed Loop System Throttling

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• Support PMBus 1.2
• Full Digital Power Supply
• High Power Density 72 W/in³
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Leadtek AI solutions fully upgraded

Press release

Leadtek has upgraded its AI solution lineup this year, focusing on smart manufacturing, smart healthcare and health ecosystems. A wide array of top AI workstation solutions, server for data center solutions, VDI products, professional graphics cards and e-sports graphics cards will be on display at the SmartTex AI & Robotics Zone - S0813 booth.

WinFast RTX data science and deep learning workstation

Leadtek exhibits workstations tailored for AI, data analysis, machine learning and deep learning. Powered by the Nvidia Turing-based Quadro RTX GPU, WinFast RTX Data Science Workstation series leads AI and data science workflows to a new level. Certified by Nvidia and designed for high-end market, WinFast RTX Data Science Workstation series carry Nvidia Quadro RTX 8000, RTX 6000 or GV100 professional graphics cards with up to 96GB GDDR6 memory, and Nvidia CUDA-X AI software to accelerate deep learning frameworks such as RAPIDS, TensorFlow, PyTorch and Caffe, which can handle the largest data sets and compute-intensive workloads.

In addition, to satisfy different demand in each country and assist small and medium-sized enterprises to adopt AI application easily, Leadtek has launched the WinFast RTX Deep Learning Workstation series which is suitable for entry, medium and high-level use. Its high efficiency and stable computing performance are essential tools for data processing and AI model training. With very high compatibility and stability, WinFast workstations series have been extensively tuned for software and hardware development, allowing developers to start AI development as soon as they get the workstation, eliminating the complex work for environment preparation and debugging.

AI development environment with multiple information security protection

In order to fully utilize centralized server resources and collaborate and share communication through various networks, organizations must strictly protect all kinds of highly sensitive and confidential information stored in the data center. Leadtek's desktop virtualization solution, which combines zero client and thin/ultra-thin client multi-security protection mechanisms, has emerged to help users efficiently build highly secure AI development environments, such as built-in smart card verification, non-replaceable soldered memory, etc.

Smart health + smart medical + smart care ecosystem with AIoT

Recognized by Taiwan Excellence Award, Leadtek continues to push the limit by introducing two next-generation health bands, amor H2 Pro and amor H2+. Amor H2 Pro inherits all of H2 features and adds eBP index. Different from the traditional sales model that only targets at end users, amor health band also provides a business system solution, including health promotion management services for members of different groups. Amor H2+ is positioned for professional medical use. It has ECG record and AF detection (atrial fibrillation) functions, which is an essential preventive tool for people who care about cardiovascular health.

From the perspective of the overall product development strategy, Leadtek combines artificial intelligence and Internet of Things technology to provide solutions for operators in smart health, smart healthcare and eco-systems. In response to demand by clinics, health centers, hospitals, remote care centers, health maintenance centers, community care bases, corporate workplaces and homes, Leadtek has developed terminal equipment such as DxPatch ECG Electrocardiograph/Phono Recorder, autonomic nerve detector, oximeter, health band, medical band, health station kiosk and wireless physiological measurer, plus cloud member health management app, health management platform web, video diagnosis and treatment platform app, providing end users with one-stop service of hardware and software cloud and big data, including health examination, disease diagnosis, precision medicine and long-term care.

In Taiwan, half of medical centers have been working with Leadtek on smart medical programs; there are successful cases from the initial screening of health examination, outpatient diagnosis, and even to post-discharge remote care.

In terms of smart care, it has helped health care institutions, remote areas, and outlying islands to successfully adopt scientific care. Next, Leadtek will replicate Taiwan's experience in China, the UK, Thailand and other countries.

The world's best 8K glasses-free 3D TV display

Leadtek and partner Stream TV have launched new 8K Glasses-Free 3D products at Computex. At the exhibition, StreamTV's proprietary Seecube 3D technology delivers virtually no loss of brightness and resolution, while Seecube 3D technology enables instant conversion, instantly converting 2D or 3D images into glasses-free 3D effects, which is easy for consumers to use Seecube 3D technology to instantly convert all TV shows, Blu-Ray, photos, iPad, smartphones, Xbox, PS4 games, or even home videos, set-top boxes and more into stunning glasses-free 3D effects, meaning that consumers can fully enjoy the new viewing experience in glasses-free 3D without any restrictions on contents.

Liyitec showcases competitiveness in surface coating for large-size products

Press release

Liyitec has advanced its products' competitiveness with various kind of surface treatments, such as anti-glare (AG), anti-reflection (AR), anti-fingerprint (AF), anti-bacteria (AB) and anti-condensation features to meet customers' diversified needs for new product development.

At the same time, in response to customers' expectation for large-size products, Liyitec is expanding its production facility to accommodate large-size product manufacturing. Dedicated to touch screen and cover glass for industrial applications, Liyitec is headquartered in Guishan Industrial District with two factories to satisfy customers' one-stop shopping requirement, from front-end process such as glass cutting, polishing, surface treatment to rear-end process such as touch screen module manufacturing and lamination.

Liyitec currently serves customers from Japan, Europe, the US and Taiwan, covering areas of industrial, automotive, aviation, marine navigation, medical, education, outdoor digital signage and gaming applications. The company is capable of satisfying various kinds of applications with diverse specifications and quantities. This competitiveness is a result of Liyitec's commitment and extensive experiences in serving highly-customized and fragmented customers. The development of industrial products is different from that of consumer products. In order to ensure the reliability and quality of industrial products, the design, manufacturing and approval of industrial products are much more complicated, taking much more time than consumer products. All these efforts ensure that once the product is designed-in, it will be less likely to be replaced by other competitors. Although the characteristics of industrial products normally see lower quantities than consumer products, they are long-term and stable. Being able to provide long-term support and reliable products are key factors for building persistent customer relationship especially in the industrial supply chain. Liyitec's 30 years of track records has inevitably proved its enduring commitment to this principle.

Liyitec products are touch screen modules and cover glass. They can be further divided into flat type, curve type and shaped type sized from 5-inch for handheld device to 65-inch for outdoor digital signage or white board applications. Liyitec is the market leader of curved type touch screen and cover glass. The curved type products can be single or multi-curvature according to customer's design. Besides, to satisfy customer's anti-explosive and anti-shatter requirement, Liyitec also offers laminated safety glass like automotive windshield to avoid glass shattering into sharp pieces hurting users under tremendous external impact. The laminated safety glass also has anti-UV and anti-IR property which is essential for outdoor applications.

As the touch technology is gradually entering its mature stage, Liyitec, in addition to continuously penetrating the touch screen market, has further expanded its product lines into cover glass and surface treatment segment in the past few years. Via building in-house coating capability, Liyitec can now provide touch screen and cover glass products with anti-glare, anti-reflection, anti-fingerprint, anti-bacteria, and anti-condensation features. This strategic move further enhances Liyitec's competitiveness and irreplaceability by satisfying customers' one-stop shopping demand.

Liyitec will exhibit its products at Computex 2019, Nangang Exhibition Center, Hall 2, booth#S0224, including medium- to large-size flat, curved, shaped, surface-coated, and anti-explosive touchscreen as well as cover glass to satisfy all kind of customization needs.

65-inch large size touch screen and surface treatment

BenQ/ Qisda Grand Fleet Introduces Intelligent Qube

Sponsored content

This year, BenQ/ Qisda group continues to lead a grand fleet of 10 industry top performers including DFI, Partner Tech, AEWIN Technologies, Aplex Technology, Data Image, Alpha Networks, La Fresh and D8AI to showcase innovative AIoT systems and solutions featuring advanced hardware, software, cloud computing and edge devices all under the theme - "BenQ Intelligent Qube."

Peter Chen, Chairman and President of Qisda, said: "Qisda Corporation has been uniting Taiwan's unsung champions through a grand fleet of alliances since 2014 to bring value-adding solutions to the market. The 6 emphases of BenQ Intelligent Qube each represents a vertical of intelligent solutions and showcases the competence of our strategic partners. By combining technical capabilities of our strategic partners, we hope to improve the diversity and competitiveness of our product portfolio, and set sail BenQ/ Qisda's 6 vertical solutions strategy through a coordinated effort."

Exhibition venue: 4F, Hall 1, Nangang Exhibition Hall, Booth No. L0617a

■ **Smart Retail –Reservation with AI and next-generation meal delivery:** This fully automated restaurant front-end solution is the first of its kind across the restaurant industry in Taiwan. It aims to address the common pain points of the restaurant industry (i.e. high material cost, labor cost, and rent cost with low margin) and integrates online and offline services to provide customers a brand new self-serviced dining experience. Through the integration of hardware, software and AI technology across Qisda, Partner Tech, La Fresh and D8AI, a next-generation food & beverage services solution has emerged.

The solution incorporates: an AI voice robot developed by La Fresh and D8AI that allows customers to make restaurant reservations, a self-serviced KIOSK for meal ordering and payment, a KDS system for order-tracking and preparation at the kitchen, a RFID-based Real Time Locating System (RTLS), and automated tracks for meal delivery. Meanwhile, transactional data is collected and analysed for continuous service quality enhancement and restaurant operation efficiency improvement.

■ **AIoT "Smart Factory" – Realising human-machine collaboration and low-volume high-diversity production:** With conventional factories' struggle to meet the modern production demands, manufacturers are transforming by adopting automated solutions to optimise manpower, improve production efficiency and quality, elevate factory safety, and reduce production cost and downtime through AIoT big data analytics. The BenQ/ Qisda grand fleet offers comprehensive AIoT solutions for smart factories in this respect by incorporating the following: DFI's complete product line-up of industrial motherboards and embedded systems, Alpha Networks' 5G private network solution, and AEWIN Technologies' network security offerings. Furthermore, Qisda's AGV, AMR and smart forklift solutions contribute to the efficiency and safety of an automated logistics system.

■ **3-screen "Smart Digital Boardroom" – Instantaneous issues identification and effective decision-making:** Smart Digital Boardroom introduces a 3-screen setup to overcome the misconception that a control center needs to have countless screens displaying information at the same time. According to BenQ/ Qisda, 3 touchscreens are all that are needed to display relevant data for timely management and resource coordination. The triple touchscreen solution can also be configured to accommodate multiple layers of management. The solution incorporates an integrated dashboard and active alert system for intuitive and immediate response as well as timely decision-making by controllers and decision makers.

■ **Featured Products: 3Plus2 durability, network security and 5G Network:** In the Featured Products section, members of the BenQ/ Qisda grand fleet will be showcasing durable products with water-proof, shock-proof, explosion-proof, extreme temperature resistance, and corrosion resistance features. Data Image's navigational display operates under extreme weather conditions, and is therefore required to deliver high brightness and high clarity while being able to resist moisture, rain, shock, dust, and saltwater corrosion. Aplex Technology and DFI are showcasing their explosion-proof solutions for industrial PCs operating under hazardous environment, such as oil refinery.

As the network security hardware expert, AEWIN Technologies presents a variety of Network Appliance and Security Hardware Platform models – from entry-level models to high-end servers developed for industry applications – with various NIC modules and via flexible CPU and expansion card/accessory options to meet all networking/security requirements from all kinds of clients. Alpha Networks, on the other hand, will be demonstrating how its "5G private network solution" uses mobile edge computing (MEC) to create a secure, fast and efficient 5G corporate network.

...Continued from page 5

Quanta saw its shipments slip 28% sequentially in the first quarter primarily due to order cuts by Apple and HP.

Wistron's shipments shrank to only 3.38 million units in the first quarter. Its lead over fourth-place Inventec was narrowed to only around 300,000 units.

Inventec's shipments only went down 5.2% sequentially in the first quarter due to HP's strong enterprise notebook orders.

Compal's shipments are expected to return above 10 million units in the second quarter because of Dell's increased orders.

Quanta will enjoy a 22% sequential increase in second-quarter shipments.

Chromebooks

Chromebook shipments were better than expected in the first quarter of 2019, slipping only 16.9% sequentially and up 37.5% on year.

Despite the slow season, some vendors still enjoyed strong shipments in the first quarter of 2019. Dell and Lenovo even achieved sequential shipment growths.

Dell shipped over 750,000 Chromebooks in the first quarter of 2019, leapfrogging Acer and HP to the top. Acer was in second place with over 600,000 units and HP in third with around 550,000 units.

Lenovo, Asustek and Samsung each shipped around 100,000 Chromebooks in the first quarter of 2019.

Worldwide Chromebook shipments are expected to rise to a new high at 4.15 million units in the second quarter of 2019, growing 67% sequentially and 5.3% on year.

Most education Chromebooks have used entry-level processors from Intel. Although the CPU giant has increased its supply for Chromebooks, the product line is still experiencing a single-digit percentage supply gap in the second quarter of 2019.

Important factors

Components

Intel CPU shortages did not improve and were around 5.5% in the first quarter of 2019 and the percentage is expected to be around 5.3% in the second quarter of 2019.

Intel's Atom and mainstream Core i5 processors are having the worst shortages. A few of the CPU models are even seeing prices increase.

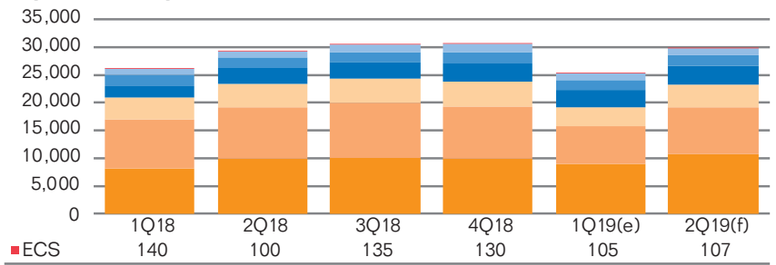
Because of the Atom series' low margin, Intel is unwilling to devote capacity to producing them. Therefore, Atom processors' shortages are expected to worsen in the second quarter.

Most entry-level education Chromebooks are powered by Atom processors and demand for non-Intel-based Chromebooks from the education procurement market is not very high.

However, Core i5's shortages will improve in the second quarter of 2019, as Intel has allocated more capacity to its new-generation Whiskey Lake-based Core i5 CPUs. Supply of previous-generation Kaby Lake Refresh processors has slipped dramatically and their prices are rising.

Panel and memory prices remain stable in the second quarter and should help partly offset the rising costs from CPUs.

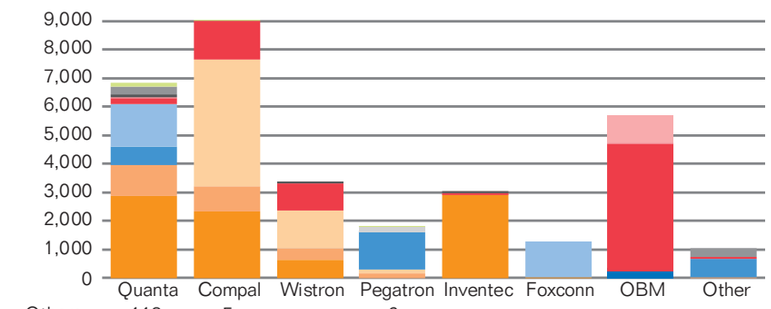
Top maker shipments, 1Q18-2Q19 (k units)



	1Q18	2Q18	3Q18	4Q18	1Q19(e)	2Q19(f)
ECS	140	100	135	130	105	107
Foxconn	997	1,072	1,306	1,416	1,268	1,241
Pegatron	2,085	1,826	1,748	2,112	1,811	1,937
Inventec	2,118	2,859	3,005	3,230	3,061	3,447
Wistron	3,938	4,204	4,455	4,468	3,383	4,079
Quanta	8,751	9,283	9,882	9,493	6,827	8,333
Compal	8,197	9,957	10,044	9,865	9,005	10,798

Source: Digitimes Research, April 2019

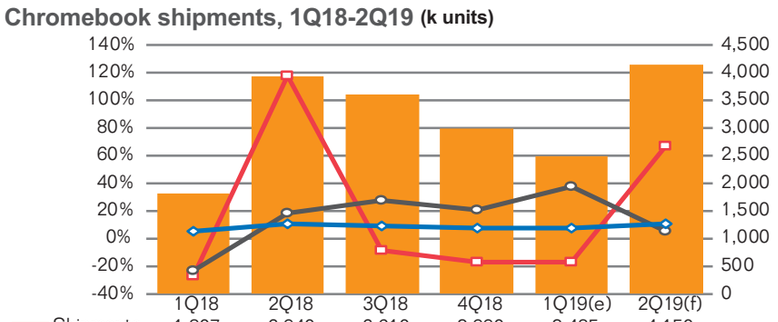
Vendor-maker partnership, 1Q19 (k units)



	Quanta	Compal	Wistron	Pegatron	Inventec	Foxconn	OBM	Other
Others	118	5		6				
Microsoft				165				
Huawei	287			9				312
Xiaomi	76		65		85			
Samsung							950	
VAIO	63						8	
Lenovo	191	1,350	938		59		4,496	62
Apple	1,488					1,250		
Asustek	654			1,341				645
Toshiba							225	
Dell		4,440	1,320	130				
Acer	1,080	890	420	160	10			25
HP	2,870	2,320	640		2,907	18		

Source: Digitimes Research, April 2019

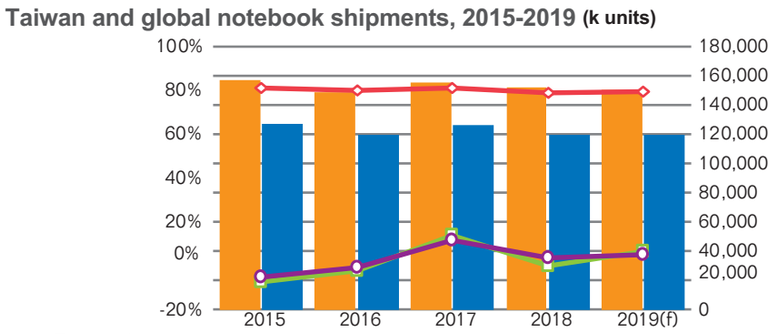
Chromebook shipments, 1Q18-2Q19 (k units)



	1Q18	2Q18	3Q18	4Q18	1Q19(e)	2Q19(f)
Shipments	1,807	3,940	3,610	2,990	2,485	4,150
Q/Q	-27.1%	118.0%	-8.4%	-17.2%	-16.9%	67.0%
Y/Y	-23.8%	18.1%	27.7%	20.6%	37.5%	5.3%
Share in NB	5.3%	10.3%	9.0%	7.5%	7.4%	10.7%

Source: Digitimes Research, April 2019

Taiwan and global notebook shipments, 2015-2019 (k units)



	2015	2016	2017	2018	2019(f)
Taiwan shipments	127,606	119,373	126,063	120,065	120,170
Worldwide shipments	157,613	149,142	155,601	152,251	150,845
Taiwan Y/Y	-10.4%	-6.5%	5.6%	-4.8%	0.1%
Worldwide Y/Y	-8.9%	-5.4%	4.3%	-2.2%	-0.9%
Taiwan share	81.0%	80.0%	81.0%	78.9%	79.7%

Source: Digitimes Research, April 2019

Notebook vendors and ODMs brace for trade war impact

DIGITIMES Research team

Notebook vendors and their ODMs are changing their strategies trying to cope with the shockwaves of the trade war between the world's two superpowers, which has now seen the US kick off procedures for imposing extra tariffs on notebooks imported from China.

Of the US$325 billion worth of Chinese goods that the US is ready to impose 25% of import duties in the next round of punitive tariffs hike, notebooks account for about US$38.7 billion, or more than 10%, next only to smartphones.

Notebook vendors and ODMs coming up with short- and long-term countermeasures

As notebook production capacities available beyond China are quite limited, major vendors have, for the short term, asked their ODMs to boost shipments from plants in China – ahead of the imposition of the extra tariffs – to meet demand in the second half of the year.

For the medium- and long-term, all main Taiwanese ODMs see their production in Taiwan as only contingent support rather than a main solution, now that their assembly lines in Southeast Asia can start volume production in the third quarter at the earliest.

Processor shortages may affect shipment momentum

It will take around three months for the US to complete all the procedures for levying the extra tariffs on the US$325 billion worth of Chinese goods, including announcing the lists of commodities, holding public hearings and processing applications for customs duty waiver for specific products. Accordingly, the levy is not expected to start until mid-August at the earliest, when notebook production capacity outside China will remain as significantly insufficient as ever, and there is little they can do at present except for increasing their output, trying to ship more to their clients ahead of the levy.

HP, Dell and Lenovo have all adjusted upward their shipment projections for the second quarter of 2019. But as Intel CPU supply remains short of demand, production expansion momentum at ODMs will be limited as a result.

The US market demand for notebooks is estimated at 45-46 million units a year. HP is the top vendor with shipments of 15 million units, followed by Dell (11 million), Lenovo (seven million) and Acer (three million).

Over 90% of the shipments are delivered from assembly plants in China. In case the 25% tariffs are imposed on China-sourced notebooks, HP and Dell will bear the brunt of the impact, making them most active in pushing their ODMs to move production out of China.

Inventec and Quanta

HP now maintains Inventec and Quanta Computer as its top-2 ODMs. Inventec's plant in Daxi, northern Taiwan is dedicated to producing notebooks and other PCs to fulfill US government or military procurement orders won by HP.

Inventec still has no plan to set up new overseas notebook production lines, but it will boost the annual production capacity at its Daxi plant by three times to over one million units in the third quarter of 2019.

Neither does Quanta have plans for overseas capacity expansion. But the company is building a new plant in Linkou, New Taipei City, with the new capacity mainly for producing servers and smartwatches, and partly for supporting notebook production when needed. HP is negotiating with Quanta over possible options.

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GREGORY M. BRYANT
Senior Vice President and General Manager of the Client Computing Group, Intel Corp.

Gregory Bryant, senior vice president and general manager of the Client Computing Group, alongside special guests will deliver the opening keynote demonstrating how Intel and industry partners, together, will power every person's greatest contributions today and in the future. Join him as he discusses Intel's evolution to a data centric company, the PC's role as the human touchpoint, and the opportunities for the ecosystem to partner with Intel to build powerful PC platforms.

英特爾資深副總裁暨客戶運算事業群總經理 Gregory Bryant，將於 Computex 開幕主題演講中，與貴賓共同展示英特爾與業界夥伴將如何透過科技讓不同的使用者都能充分發揮潛能，為人類及社會現今與未來的發展貢獻所長。Bryant 將闡述英特爾轉型為以資料為中心之企業的發展歷程，電腦在協助人類拓展不同領域時所扮演的角色，以及產業生態系夥伴透過與英特爾合作建構強悍電腦平台時所開創的發展機會。

COMPUTEX 2019
INDUSTRY OPENING KEYNOTE
DATE
MAY 28TH, 2019
TIME
13:30-14:30
VENUE
Plenary Hall, 3F,
Taipei International Convention Center (TICC)
(No. 1, Hsin-Yi Road, Section 5, Taipei City, Taiwan)
台北國際會議中心三樓大會堂（台北市信義路五段一號）

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The startup challenge and opportunity

TH Tung: Taiwan's startup sector must build up its characteristics

By Mark Tsai and Rodney Chan, DIGITIMES

TH Tung, chairman of Taipei Computer Association (TCA), likens the startup scene – whose fundamental elements are capital, talent, technology and market – to wine making, which depends on the sunshine, rainfall and terroir. Apart from these, the type and quality of the grapes are also very important. That is to say, the characteristics are very important in raising the added-value. There have been so many different wines using various types of grapes around the world, but Burgundy winemakers have been sticking to one single grape for their red wine, and yet they still manage to stand out in the industry. This is because the wine from this appellation has its characteristics and clear market target.

Tung takes his analogy further to the watchmaking industry. Electronic watches are the mainstream of the market, and the popularity of the Apple Watch and other smartwatches has been rising. But the Swiss makers of mechanical watches have never lost their appeal to consumers of the high-end market segment.

Tung noted that Taiwan does not lack capital, but the concern is how to direct these investment funds into startup businesses that may stand out from their international competitors. He disagrees with the idea that the government should make a policy to encourage a massive influx of capital into Taiwan. He said that without a clear set of regulations to implement such policies, a lot of the funds would end up not in the tech sector, but rather in the real estate market, shooting up housing prices in Taiwan and creating a bubble in the stock market.

Taiwan's characteristics

In the face of growing competition from Southeast Asia, Tung said Taiwan, with limited land and a small population, is very similar to Israel, Singapore and the Netherlands, and it needs to develop its own characteristics and focuses on specialized services in order to stand out from the global IT ecosystem, and create a "Taiwan brand." The road to innovation will lead Taiwan to see fast growth again in the future, Tung believes.

The government plays an important role in economic and technological developments. The developments in Japan and Singapore are examples. Singapore is high in the rankings of countries with a free market economy. But its government has been embracing a planned economy, having successfully turned the country into an important petrochemical hub in the area. It has also become a financial center, thanks to government policy support.

Singapore has a large population of migrant workers, all of whom stimulate developments of various business sectors that provide services and support for the workers. The city state may not be much bigger than Taipei, but it is the destination of an annual volume to 15 million tourists. To boost its tourism, Singapore has made policy changes that were unthinkable in the past, such as legalizing gambling. Tung said the lesson to be learned from Singapore is that there must a balanced development. Taiwan should not rely too heavily on its ICT exports; it must maintain a balanced development.

Japan may not be as open to foreign workers as Singapore, but the Abe government has already introduced a new policy trying to attract more foreign workers.

For Taiwan to attract foreign talent and create an optimal environment for startups, it must introduce ways to relax the restrictions on foreign investment, such as easing the visa requirements.

AI and 5G: The 'magical' innovations

While 5G and IoT promise explosive growths of the next generation, Tung noted that every era has its own "magic" that boosts the economy. Japan relied on washing machines, refrigerators and TVs to get out of the economic doldrums in the post-World War II era during the 1950s. And in the 1960s, the "magical" products were cars, color TVs and air conditioners.

Tung said the color TV fad that Sony created at the time was comparable to what we feel about the trendsetter, Apple, of the present time. The birth of air conditioners gave people more comfort on hot summer days. Tung said such changes that increase value and solve problems are what tech innovation is all about. But he thinks management of innovative technology is as important as the hardware and software technology itself.

ICT vendors have been able to make a living as long as there are customers buying their products. But in the AI and 5G era, things may work differently for businesses. With so much R&D going on and so many innovative ideas emerging, it is the infrastructure of smart city that will be necessary to materialize the R&D and innovative ideas of businesses. That means that businesses' efforts alone will not be sufficient; it will need strong government support – from the national to local levels – to upgrade and rebuild the cities in order to materialize the AI and 5G applications.

Continued on page 2

Science minister Chen Liang-Gee shows confidence and ambition in promoting Taiwan's entrepreneurships

By Mark Tsai and Rodney Chan, DIGITIMES

Science minister Chen Liang-Gee has been making a lot of efforts grooming Taiwan's startups, a clear example being his ministry's arrangement of a large delegation to Eureka Park at CES 2019. Taiwan has also been keen to promote its own edition of startup showcase, InnoVEX. Ahead of the annual event, which takes place in Taipei from May 29 to 31 this year, Chen talked about Taiwan's plans and visions for promoting its innovations and startup teams.

The 4 elements

There are four elements supporting entrepreneurships: Capital, talent, technology and market, according to Chen. Taiwan had seen a disruption to investments in startups since the dot-com bubble burst in 2000 and the migration of manufacturing operations to China – until recent years. Now more locally-groomed or overseas-educated talent is jumping onto the startup bandwagon, with government stepping up efforts to connect them with local and overseas accelerators.

Chen described the accelerators as the "table top" sitting on the "four legs" – his metaphor for the relationships between the funding programs and the four entrepreneurship elements.

He said the four elements need the accelerators to integrate them. The accelerators introduce technologies and industries which can inspire startup teams' innovations and connect them to the industries. Whether it is small fledging startups or more experienced enterprises looking for new opportunities and clients – they can rely on such help to wow the market with solutions that connect well with the ecosystem and meet what the market really needs.

Exchange programs

Exchange programs with foreign institutions have allowed Taiwan researchers to see more of and connect with the rest of the world, such as the Stanford-Taiwan Biomedical Fellowship Program (STB) – which has entered its 10th year – and the Berkeley-Taiwan Biomedical Fellowship Program (BTB) – which has entered its second year. Chen likened these exchange scholars to "potential seeds" that can inject new energy into Taiwan when they return home.

These seeds may grow into "big trees" by founding their own businesses, or become mentors of other startup teams. Chen said such interaction between different teams will enable creativity in multiple and diverse forms. He also noted that some programs have enabled one to three entrepreneurs to stay and learn in Silicon Valley for two to three months. But he said such exchange programs may be expanded to include 20 to 30 startup teams a year. These programs will let the startup teams get a quicker and clearer understanding of the resources and principles of entrepreneurships in other countries, and at the same time connect them to the innovative ideas of other communities.

Attracting foreign startup teams and accelerators to Taiwan

Chen said the Taiwan Tech Arena (TTA) plans to incubate 100 startups a year, with half of them to be foreign teams. This is meant to let local teams come into more contact with international counterparts, investors and experiences.

As to how Taiwan can attract foreign startups to come here instead of Silicon Valley or Europe, Chen said the key is let them have industry links and opportunities that they may not get in other countries. Their businesses will also be getting support from relevant government projects. That is to say, according to Chen, stationing in Taiwan will add to their competitiveness, which will naturally attract and keep them here.

The minister said introducing foreign accelerators into Taiwan will also be important. But he said running an accelerator needs a lot of investments in capital, time and human resources. The government offers a lot of help to diversify business risks and to build up ecosystems. Taiwan will also set up locations and connections in other countries in a bid to bring foreign accelerators to Taiwan.

Taiwan may be a small country with a small market, but Chen pointed out that Singapore is much smaller, and yet has been very active in the startup sector. He thinks Taiwan can work as a partner for startups from Singapore and other countries, facilitating the development of Taiwan's ICT applications and forming a more complete ecosystems enabled by international links and better technologies. He said France is also stepping up efforts grooming its startups, and Taiwan may send its startup teams to France, Israel, Boston, Singapore, and San Diego – places and countries that are known for their startup developments – for short-term exchange. Chen thinks such exchanges can inspire Taiwan startups' innovations.

Continued on page 2

Startup insights from Tung and Chen

AI, 5G, unicorns and disruptive business models

The directions for Taiwan's startups

Tung

Tung thinks 5G, AI, edge computing all offer good opportunities for Taiwan's startup sector. For example, it is much easier to implement self-driving in Taiwan than in Australia, where the vast territory and sparse population makes it cost-inefficient to make intensive and extensive deployments to enable self-driving.

For 5G, China and South Korea are looking to begin commercialization in 2020, but it may take Taiwan two to three more years to catch up, Tung said.

He said 5G development involves a lot of investments. The costs for 5G licenses and infrastructure constructions are key to whether smart city and self-driving cars can succeed. If the operators have to spend big in deploying their networks, consumers will have to pay expensive rates, undermining the popularity of 5G. But if the operators have to sacrifice their profits in order to boost the number of users, it will leave them with few resources to continue building and improving their networks.

Unicorns and disruptive businesses

According to Taiwan's government figures collected between 2007 and 2014, the survival rates of startup businesses from the first to fifth year of operations are 89%, 78%, 69%, 62%, and 57% respectively. They are similar to those in the US, Germany and other countries that are known for their startup scenes.

Tung said it is not easy for Asian startups: The risk of investment is high, and it is very difficult for one to last beyond 10 years. Startups may all want to become unicorns – privately owned businesses whose market cap is estimated at more than US$1 billion – but Tung pointed out that few unicorns have been able to make a profit. He said the aim of incubating a unicorn should therefore focus on what value and service it can bring to society.

The mentality of investors has changed. In the past, a company that wanted to get listed on a stock market would have to make profits for several years before it could stand a chance of submitting an application for listing, according to Tung. But now investors look for companies with potential, allowing them to go public before making profits. Google and Facebook are examples. Google offers Google Map, Gmail and Android, with skeptics initially asking how it could make money by offering so many free services. But these companies have now become giants whose market cap and revenues are among the top of all IT firms in the world. Their operations have also changed fundamentally people's life and disrupted all business models and supply-demand patterns.

But different countries have their own unique situations and progress of development, Tung said, disclosing that some governments in this world may still require their suppliers to provide PCs that can support floppy disks – which still function as a main storage format of their data.

If Taiwan wants to play a leading role in the next wave of IT development, it must create a friendly and diverse environment, making the best use of its talent and resources, according to Tung. It would then be able to help its enterprises and startups compete with international companies on an equal footing.

Tung thinks 5G, AI, edge computing all offer good opportunities for Taiwan's startup sector.

Chen

AI and automation

Chen identifies three major directions for Taiwan's AI development in the next five to 10 years: voice database; information security; self-driving cars and digital medical care.

Chen noted that voice is still the fastest and most intuitive way of communication between people, and therefore AI-enabled technology for dialogue will be very important. MOST and various other institutions, such as Public Television Service (PTS) and National Education Radio, have been working together to build up a voice database.

A total of almost 2,000 hours of Chinese voice data has been collected, with plans to expand to a database of 5,000 hours – presenting a significant collection of various languages and dialects that are used in Taiwan, Chen said. As for use of the database, Chen said big ICT firms may choose a relevant field where they can make use of the voice data and incorporate it into their chips. With the local database, Taiwan firms would not need to get licenses from Google or other international IT firms when putting their voice technologies into practice, Chen said.

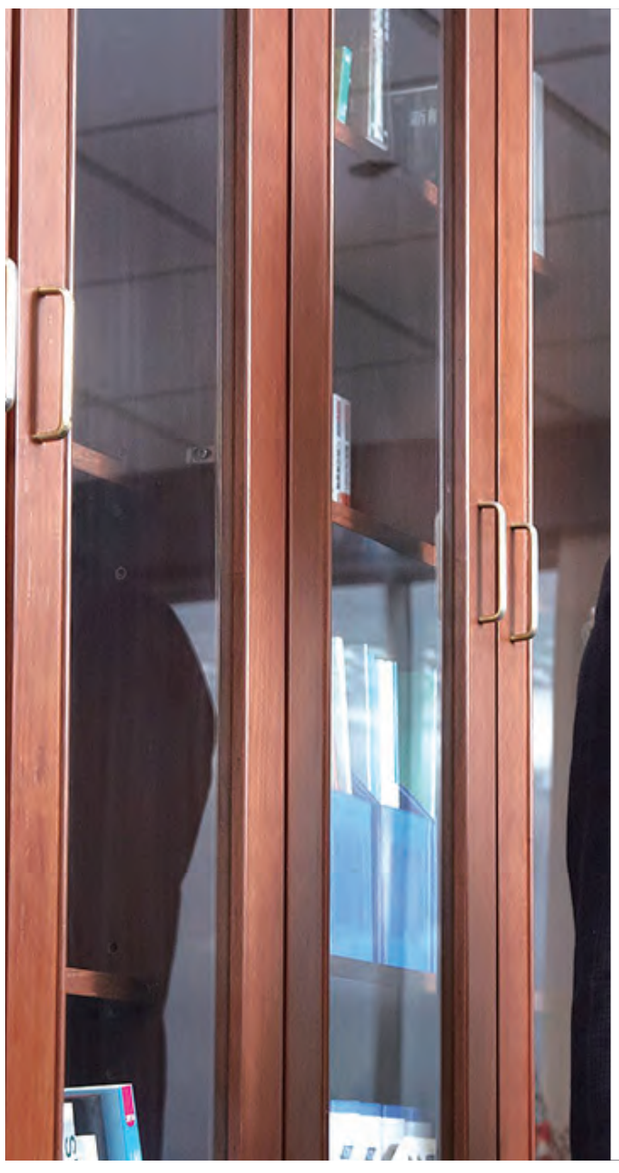
Many businesses have been keen on adopting new technologies to increase their values, solve problems, and cut costs. Chen noted that a lot of the conventional industrial sectors are introducing AI, big data analytics and predictive maintenance to enable their manufacturing. He thinks AI applications will see explosive growths in the next five to 10 years, particularly in the form smart manufacturing, such as using IoT technology, cloud-based control and robots. The smart medical care may grow more slowly because the laws will be stricter in order to protect human lives.

AI chip development is key to Taiwan's future IT industry. The age of the Internet is one where the winner takes all. But the AI age of the future needs domain-focused applications that integrate software and hardware. And this is exactly where Taiwan stands a chance of giving birth to its own unicorn businesses. He cited a few examples where services are built on hardware: electric scooter vendor Gogoro; AI application provider Appier; and AR/VR-based shopping platform iStaging.

Ambition: 3,000 startups a year

Chen's ambition is to let Taiwan give birth to 300 new startups every year. Such a massive scene would create tremendous momentum for interaction and exchange of resources, technologies, talent and capital.

Chen said he began promoting startups in 2007 when he was still at National Taiwan University, and since then he has seen a lot of changes to people's mentality – changes that are positive for entrepreneurships. Back then people were afraid of failures, but now more investors and enterprises accept the fact that it takes time for startups to grow. They also accept the idea that it is worth taking the chances as long as a certain proportion of the startups will succeed.



Chen thinks AI applications will see explosive growths in the next five to 10 years, particularly in the form smart manufacturing.

Dtalk 10 rising startup stars demonstrating Taiwan's innovative power

Ambrose Huang/DIGITIMES

Digitimes started D Forum in 2006 for the purpose of creating a platform to facilitate the exchange of technologies and solutions among corporations. More than 200 sessions have been held with participation from over 700 firms and 60,000 people. The forum has enabled a large number of partnership deals between businesses. Eyeing the technological strength of Taiwan startups, Digitimes began to organize D Talk in connection with D Forum in 2018 and has held more than 10 sessions with different themes and participation by many startup firms. The technologies and solutions presented by the startups with strong R&D capabilities have impressed forum attendees from different industries. Digitimes has selected 10 startups from those that have participated in D Talk based on technological strength, development potential and market potential to demonstrate Taiwan startups' vibrant energy in developing cutting-edge solutions and expanding into global markets.

D talk startups are applauded for their technological strength

Being a platform enabling business-to-business collaboration and communication has always been Digitimes' core competence and value. Accordingly, for the startup scene, Digitimes actively builds up solid news content on startup teams and development, a startup database Dtalk base and the offline communication forum D Talk. The aim is to create a platform where startups and corporations can engage in collaboration and communication to exchange their technologies and solutions.

The Startups + Innovations page (https://www.digitimes.com.tw/iot/startup_comp.asp) of the IoT section on the Digitimes website already has reports on over 100 startup teams. Dozens of startup firms have been invited to D Talk sessions.

Digitimes' D Talk platform encompasses Dtalk base containing news reports and startup database and D Talk, an offline communication and collaboration forum. Through these, Digitimes has complete confidence in and looks forward to enabling partnerships and business development among startups and corporations, which will not only expand opportunities and growth for Taiwan startups but also help Taiwan become Asia's startup hub. More detailed information on the D Talk 10 teams is available by searching for them on Dtalk base.

Startups

Visualizing your heart rate: Biosignal monitoring made easy by FaceHeart

By Fisher Yu, DIGITIMES

After the iWatch became all the rage, wearable devices have suddenly become the most popular IT product. Companies in the market rushed to introduce various devices, such as smart watches, smart wristbands, and even smart necklaces and earrings, all of which can detect biosignals through built-in sensors. However, most wearable devices share common drawbacks. In addition to inaccurate detection under vigorous exercises like jogging, some medical devices require users to change their lifestyle, which significantly reduced their use rate. FaceHeart Inc., led by Professor Bing-Fei Wu of National Chiao Tung University (NCTU), has developed a vision-based physiological signal management system to measure and detect vital sign through visuals without contact. The system's accuracy is higher than that required by medical standards and can be applied in medical and financial sectors.

The application of wearable devices in the medical sector started early, then the IT industry launched related products, including all kinds of smart wristbands, glasses, and watches. These wearable devices use built-in sensors to detect biosignals, but they lose their accuracy if not aiming at certain parts of the body (i.e. pulse). As for medical grade products that require a high standard on precision, some need to be worn over long periods of time, such as heart rate detectors worn by cardiac disease patients at home or devices for detecting sleep apnea. These devices affect users' daily living. In light of this, Professor Wu focused on precision and easy application as the two major principles when conducting research and development. His vision-based physiological signal management system can accurately detect vital sign without users feeling anything.

This system first obtains facial information through a camera and then shows the heart rate, HRV and blood pressure after the analysis by special algorithms developed by FaceHeart Inc. Accuracy can reach 2-3 bpm when users are inactive, not worse than the medical standards. It can still be use even during jogging on the treadmill. Also, users don't need to purchase a high-precision camera.

Professor Bing-Fei Wu of National Chiao Tung University

Heart rate detection only requires cameras with a frame speed of 30 fps, whereas the detection of blood pressure will require cameras with higher specs, but Taiwan suppliers are capable of making both kinds of cameras.

The vision-based physiological signal management system of FaceHeart Inc. has diverse applications. It is for users who need to detect vital sign without making contact with the device itself. The system is most commonly seen in elderly care. To take care of elders in the family, some people will purchase devices like smartwatches for them to wear, but the elderly are not familiar with electronic products, which are eventually cast aside without being used. The system from FaceHeart Inc. can have a camera set up in front of the television so the elderly can have their heart rate and blood pressure detected while watching TV.

In addition to the medical sector, financial institutions are starting to use the vision-based physiological signal management system. In 2017, Professor Wu's team at NCTU won first prize in the smart financial system competition by the Shanghai Commercial and Savings Bank, Ltd. (SCSB). They then worked with SCSB to integrate it into the Know Your Customer (KYC) system, which companies use to identify customers. Scams are on the rise in recent years. In the past KYC tried to prevent dummy accounts by relying on questionnaires to conduct background checks on customers applying to open new accounts. But SCSB uses the vision-based physiological signal identification system, allowing employees to immediately determine whether the applicants passes the KYC procedures, reducing the employees' workload.

Both the hardware and software of this health management system are independently researched and developed by Professor Wu's team at NCTU. Even the microprocessing chip comes from the cooperation with Taiwan's MediaTek Inc. It is an AI system that is completely self-made in Taiwan. Professor Wu pointed out that the system is extremely convenient to use, but they encountered many challenges during research and development. For example, they need to figure out how to ensure accurate measurement under circumstances without ample light, such as nighttime or in a dark room. Also, cameras on the market automatically adjust the aperture and shutter. This image also affects the analysis of AI. The R&D team spent 5 years overcoming all challenges and smoothly commercialize this new technology.

As for the business model, Professor Wu says that technology will have two directions: One is to authorize the core software to companies so the system can be built into cameras. FaceHeart Inc. can customize the software to suit customer products. The other direction is to partner with existing camera companies. For instance, cameras from security monitoring companies can combine FaceHeart's AI system to have more added functions. Professor Wu expressed that incorporating AI into visuals has become a trend in the industry, but FaceHeart does not delve into mass facial recognition but a rather accurate biosignal identification to differentiate its market from competitors and aim for high-value business opportunities in a new territory.

New Taipei City
Smart City Pavilion

NO 5/29 – 5/31
Hall 1 of Taipei World Trade Center A0505a

New Taipei City sets up the New Taipei Pavilion for the first time at InnoVEX this year. With the theme of smart city, the exhibition will help startups win the favors of the venture capitals, accelerators, and enterprises at home and abroad. Moreover, to link up to international startup resources, New Taipei City will reach cooperation with incubation institutions「Startup GO! GO!」from Fukuoka, Japan, acceleration program「QBO Innovation Hub」from the Philippines and E-commerce platform「OurHub Europe」from Netherlands during the InnoVEX exhibition, creating more opportunities for startups, and strengthening the startup ecosystem of New Taipei City .

Participating Startups :

Toii Inc.	SoftChef	ORDERLY	TEVOFY Technology
LESSDO	MemePR	FuelStation	Beseye Cloud Security
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Startups • CV

OmniEyes builds a search engine for the real world, allowing people to stay on top of city dynamics with real-time images

By Fisher Yu, DIGITIMES

Today people use their computers or smartphones to access digital maps, find a parking space, street view or check out restaurant recommendations. This is part of people's everyday life now. However, many people may also have had the experience wherein the vacant parking space indicated on their phone was already taken when they got to it or the restaurant of interest to them had closed down six months before their visit. In other words, the city video information people have access to is all outdated. In contrast, OmniEyes - Next-Generation Mobile Video Platform enables the creation of a city's real-time image data though the easiest and ready-to-use approach.

Founded by the team led by Chun-Ting Chou, Associate Professor, Graduate Institute of Communication Engineering, National Taiwan University, as well as Ai-Chun Pang and Shou-De Lin, both professors of the Department of Computer Science and Information Engineering, National Taiwan University, OmniEyes set the goal to bring its research results to reality within three years from the time when it decided to join the Ministry of Science and Technology's Startup program in December 2017. Both the team's devotion and the fact that they have a highly feasible business plan allowed their research to reach maturity in late 2018. Then backed by venture capital investments, the team established a startup firm to commercialize their research.

OmniEyes - Next-Generation Mobile Video Platform makes city image information more up-to-date and valuable resources more readily available through fog computing. According to Pro. Chou, AI has become the most critical trend for the Information Technology (IT) sector and images are the most diversified and richest data today. With dash cameras installed on virtually every vehicle nowadays, the amount of video data is massive. If we are able to make good use of the video data based on AI technology, the possibilities of innovations are endless and we may even be able to reshape digital map data.

Chou takes Google Maps for example. It is the most widely used digital map and collects and updates the traffic-related data, based on the crowd-sourcing technology, more rapidly. However, the street view available on Google Maps is updated every 1 to 2 years. In other words, what users see from Google Street View on their mobile phones is old information. OmniEyes, on the other hand, gathers images captured by cameras installed on buses, taxis and delivery trucks on the road such that image data on the back-end platform is refreshed once every five minutes or even faster. The information is kept up-to-date so that users can stay on top of city dynamics in real time, rather than fall out of sync with outdated and static information.

It is not easy to achieve OmniEyes' goal. Prof. Lin points out dash cameras, which just have the weak capabilities of computing and communication, currently on the market mostly only have recording function. Even if they are added with communication modules to transmit the recorded images to the back-end platform in real time, the transmission of the video files can consume a lot of bandwidth due to their large sizes. Furthermore, 99% of the video footages captured by the vehicles on the road are not useful data. The biggest challenge is how to add lightweight AI capability to dash cameras with limited functionality so that they can filter out useless images data before transmitting the valuable images and videos to the back-end platform to save bandwidth.

Prof. Pang pointed out that fog computing and the increasingly popular edge computing work by having the terminal equipment handle a certain amount of the system computing, reducing the system latency and the workloads of the cloud platform and bandwidth. But in contrast to edge computing where the terminal equipment must possess computing power, fog computing extends the scope to include handsets and even dash cameras that offer very low computing capabilities. The coverage of fog computing is therefore much wider. For OmniEyes, dash cameras are its major terminal devices.

OmniEyes was nominated and won the trophy in CES Innovation Award 2019.

To address such a challenge for academic research purposes only, a high-caliber dash camera may be the solution, notes Chou. However, OmniEyes set its heart on designing a practical and marketable product so it insisted on making use of compatible dash cameras or smartphone on the market and equipping them with AI capability by implementing size-reduced models. Through a year of R&D efforts, OmniEyes has enabled dash cameras on 100 buses, 40 taxis and 10 delivery trucks to send image data collected on road trips of up to 10,000 kilometers daily to the back-end platform, making city information available in real time.

Chou proposes a three-phase plan for OmniEyes going forward. For phase 1, OmniEyes endeavors to make its technology ready to use. For example, using cameras already installed on a variety of vehicles is a viable way for OmniEyes' technology to create values. For phase 2, OmniEyes looks to license its technology to manufacturers for them to integrate OmniEyes' software on their automotive devices. For phase 3, OmniEyes will make its image data platform available through a mobile phone app, which consumers can download to access city information in real time. Chou envisions OmniEyes - Next-Generation Mobile Video Platform as a search engine for the real world. Anyone can contribute information to the platform while enjoying access to it. The model of data sharing and co-creation enables more effective use of city resources.

Tax incentives for startups

By Daisy Kuo, Hazel Chen and Vivian Ho, special to DIGITIMES

The Global Entrepreneurship Monitor (GEM), co-issued annually by the US-based Babson College and London Business School since1999, has been the world's largest entrepreneurship research project, with its research results serving as important references for nations to formulate entrepreneurial policies. According to the 2018/19 GEM report, 9.5 out of every 100 adults in Taiwan are engaged in early-stage entrepreneurial activities, and the ratio has risen for two consecutive years, indicating Taiwan's growing awareness of startups.

Compared to the 2017/18 report, Taiwan has made progress in the Entrepreneurial Framework Conditions of Government Policies, Entrepreneurial Finance, and Commercial and Legal Infrastructure, indicating the government is actively improving the entrepreneurial environment, such as helping startups obtain early-stage operating funds through the Business Angle Investment Program enforced by the National Development Fund. This article will discuss the government's tax incentives for startups and its efforts to attract international startup talent.

Based on KPMG's experiences in advising startups, the issues most concerned for their early-stage operations are mostly associated with taxation. For instance, when a startup is smoothly proceeding with fundraising, the tax efficiency for investment paths taken by its domestic and overseas investors have to be assessed. In addition, if a new venture wants to obtain technologies it needs by allowing the technologies to be converted into shares, then the technology-based shareholders will also face the tax payment issue. Even if a new business seeks to retain quality employees by allowing them to become shareholders, they still have to deal with taxation.

But there are substantial tax incentives or preferences stated in the Statute for Industrial Innovation and the Act for Development of Small and Medium Enterprises (SMEs). Moreover, in order to continue promoting the establishment of innovative startups, the government is amending and expanding the SMEs into the Act for Development of SMEs and Startups, highlighting the government's efforts for advancing innovations and startups. The "taxation environment" chapter in the expanded bill may cover tax incentives for knowledge innovation and digital transformation, including tax credits for investments in the segments of smart machinery, IoT, AI and system integration. Also, in view that being acquired is one of the exit strategies for startups, the government is also revising the Business Mergers and Acquisitions Act to allow individual shareholders of a startup to defer tax payment for the shares they purchase at premium prices from the surviving company after the startup is acquired, so as to spur M&A of startups.

Furthermore, the government has spared no efforts recruiting international startup talent. The newly enforced revisions to the Act for the Recruitment and Employment of Foreign Professionals mark the largest opening-up for international talent, sharply relaxing regulations governing their work permits, resident visas and residence applications and offering them pension protection and tax preferences. The biggest highlight of the revised bill is that a foreign professional in a special sector may apply for a four-in-one Employment Gold Card that combines work permit, resident visa, alien resident certificate and re-entry permit. The card will be valid for one to three years, and can be renewed upon expiration, which is quite convenient for some foreign professionals. Moreover, in case a foreign "special" professional has for the first time been approved to reside and work in Taiwan, then within three years starting from the tax year in which the professional meets the conditions of residing in Taiwan for a full 183 days of the year and scores annual salary income of over NT$3 million, the part of the professional's salary income above NT$3 million in each tax year shall be halved in amount in the calculation of total income for the assessment of individual income tax liability in that year, with his or her income earned abroad not having to be incorporated into basic income tax statement. This is a highly attractive tax preference scheme for high-tier foreign professionals.

Despite a growing practice in Taiwan, creating startups is not an easy job. Besides difficulties in raising funds, entrepreneurs have to face complicated taxation and legal issues. The government's high regard for startups can be evidenced by its growing relaxation of relevant regulations. Besides devoting more efforts to R&D or business development, entrepreneurs can well capitalize on diverse resources provided by the government to accelerate their startups' advances on the road to success.

(Daisy Kuo, Hazel Chen and Vivian Ho are accountants from KPMG Startups and Innovation Taskforce)

Dtalk10

DIGITIMES selects 10 outstanding startups based on criteria about techno-logical strength, team potential, market prospect and others.

Smart manufacturing

TAO Info Co. Ltd.

TAOInfo

By doing consulting projects with high-tech fabs (semi, TFT-LCD, LED, and IC packaging), TAO Info helps clients to find a solution to overcome manufacturing or engineering problems. And using these solutions as prototypes of our prod-ucts.

We develop core algorithms and analytic skills in house and outsourcing non-key elements to our partners. Moreover, to extend our sales force, TAO Info is willing to join strate-gic alliances hosted by renowned global IT firms, and is currently a strategic partner of CISCO fog computing platform in manufacturing.

CV

Beseye Cloud Security Co., Ltd.

Beseye

Beseye specializes in AI Video Analysis Platform for security cameras, which provides stores or public area automatic safety analysis, and at the same time provides business intelli-gence that allows users to understand customer demographics. This AI platform helps decrease manpower and potential cost for video monitor-ing and video retrieval.

Aside from being the winner of multiple interna-tional awards, safety and business intelligence service of Beseye is already adapted by Japa-nese railway companies, top 3 mobile brands in the world, Taiwan's two largest telcos –Chunghua Telecom and FET, and major department stores in Taiwan.

Arisan Inc.

ARISAN

Arisan Inc. is an IoT cloud service startup found-ed by Druker School of Management and University of Washington Alumini in 2015.Fund-ed by Taiwan government on research and development, the goal of Arisan Inc. is to build out an ecosystem with all the partners via our Cloud Platform in order to serve world-wide clients.

We are currently have Clio- Video management Platform for security service company in Taiwan, and property management company oversea to management all the CCTV and IOT device in the same platform with unlimited quantity. Also, our Edge computing device Faceta camera help a lot of system integrator design the face recogni-tion related solutions for their customers like “Access Control”, “Attendance management“ and “VIP/ notification” with affordable pricing range.

InnoVEX, innovation hub of Asia ministry of science and technology's TTA's theme exhibition demonstrates the energy of Taiwan's tech startup

By Ambrose Huang, DIGITIMES

Launched by the Ministry of Science and Technology, Taiwan Tech Arena (TTA) at the InnoVEX Exhibition integrates the seven innovation and startup Program resources of the Ministry of Science and Technology to bring TTA Program, FITI Program, TITAN Program, TIEC Program, Trust-U Program, iCAN plan and Germination Program together, assisting the exhibition teams in linking the potential funders for the ecosystem.

In the Exhibition, there are a total of 78 teams at home and abroad called upon to participate. The theme of the exhibition is divided into three major trend themes: Smart Healthcare, Living Future, and Tech Startup. In addition, there is a joint exhibition of the four world-class accelerators: IAPS, BE Capital, Spark Lab Taipei, and MOX at the TTA's Accelerator Startup Zone. It shows the world the energy of Taiwan's startups while gathering international resources to drive the teams to move forward to the Asia-Pacific region and march towards the international.

ELECLEAN's Portable EleClean Disinfection Sprayer

Integrating AI Technology Helps Handling of Depression Screening

Established with investments by Compal Electronics and the Research Team of Liu, Yi-Hung, Vice Dean of Research and Development Office, Professor of Department of Mechanical Engineering and Graduate Institute of Mechanical and Electrical Engineering, "Hipposcreen NeuroTech" adopts brain wave signal processing and artificial intelligence assistant diagnosis technology as the core, aiming at the development of brain wave assistant diagnosis medical services. Among which, the Depression EEG Assistant Diagnosis Core Algorithm has been clinically proven with medical evidence through the top medical centers at home and abroad, with an accuracy of over 80% for discrimination of depression using EEG.

The prevalence of depression in modern society is rising. Hipposcreen NeuroTech combining brain wave sensing, artificial intelligence, brain science, and other technologies is the pioneer to develop the brain wave assistant diagnosis system which can output the pressure tendency index. The results of such neural signal discrimination can be used as an important reference for physicians in clinical diagnosis, with the advantages of high accuracy (> 80%), high speed (only two minutes needed in a short measurement time) and high availability (with a short lead time). It is expected to be launched as soon as early 2021 as a competent AI assistant for professional medical personnel in mental health screening and clinical practice.

In addition to depression, it continuously introduces early Alzheimer's dementia and Attention Deficit Hyperactivity Disorder (ADHD) brain waves assessment and other functions to seize smart healthcare business opportunities. The Hipposcreen NeuroTech team has won many academic and startup awards at home and abroad, including the "Excellent Entrepreneur Award", the First Award of 2017 From Invention to Innovation (FITI) Program Competition and the excellent team counseled by 2018 Taiwan Tech Arena (TTA) Prototyping Program of the Ministry of Science and Technology.

DuoGenic StemCells Strides into the International Market by Providing Stem Cell Technology Services

In its commitment to developing the stem cell culture medium, the startup company "DuoGenic StemCells" has now developed embryonic stem cells and mesenchymal stem cells Xeno-free culture base. The company expects to launch to the market from the fundamental research on the front end while building a mass production system from 2D culture solution to 3D suspension culture, providing stem cell culture technical services and going further towards the international market. In the future, it will develop medical class culture solutions for clinical trials in the hope of making direct inputs to the cell therapy market.

The main products of DuoGenic StemCells are Xeno-free pluripotent stem cell medium and Xeno-free mesenchymal stem cell medium, both of which have been certified as national Class I medical devices. Currently, its main market focuses on Taiwan, Japan and, the U.S. Furthermore, sales in China, South Korea, the EU, and other countries will be planned for the next.

FaceHeart Implements Elderly Home Care with Technologies Making Life More Smart

In the Startup Exhibition Zone this time, FaceHeart mainly develops artificial intelligence (AI) technology. In 2018, FaceHeart was founded by National Chiao Tung University Electronic Control Distinguished Professor Wu, Bing-Fei. The company was set up through the support of the Ministry of Science and Technology, with its core technology of human face identification physiological information measurement, including heartbeat, heart rate variation and blood pressure.

Compared to other contact measurement products on the market, FaceHeart provides non-contact measurement to detect changes in the face by image and then retrieves the heartbeat value. This method not only reduces the inconvenience of the user keeping in mind wearing the bracelet and the inaccuracy caused by the interference during exercise, but the measurement is more flexible in use. At present, the main areas it has started to expand are intelligent care, intelligent finance, intelligent security, and so on.

In recent years, more and more people have given high focus and attention to care issues when getting old themselves or the demand for long-term care due to illness and accident. In addition, the issue of long-term care remains of considerable importance for social stability. This year, FaceHeart focuses on plowing the intelligent care market and developing the "Face A-Ma Intelligent Health Care System" to allow the system to take care of grandpa and grandma at home.

"Face A-Ma Intelligent Health Care System" relieves discomfort that is easily originated from traditional wearable devices so that the elderly do not need to change their living habits while the system makes a health record of 24 hours for the elderly and provides physicians health log for reference. It also brings family members some breathing space, enabling family members and children to care about the health of parents from long distance.

Transforming the World's Disinfection Pattern ELECLEAN Creates New International Business Opportunities

Established by the Industrial Technology Research Institute, ELECLEAN develops the EleClean Disinfection Sprayer using water as raw material, with the four advantages in terms of safety, effect, cost, and convenience, which is also the world's first machine with water and electricity only to make fresh disinfectant fluid out of running water! EleClean Disinfection Sprayer takes advantage of prospective electrochemical technology to rearrange the molecular structure of water into strong oxides such as hydrogen peroxide (H2O2) and hydroxyl radical (OH). Through the principle of strong oxidation force, it destroys the protein structure of viruses and bacteria with strong sterilization effect on killing enterovirus, H1N1 influenza virus, Bacillus pneumoniae, Escherichia coli, salmonella, Staphylococcus aureus, mold, Pseudomonas aeruginosa and other bacteria and viruses while passing the skin safety test and gaining certifications of a number of third-party impartial units as well as the Epidemic Prevention Award of the Symbol of National Quality (SNQ).

ELECLEAN currently has more than 30 patents, and it creates the simple DIY disinfectant fluid value, which is transforming the world's disinfection pattern from the pharmacy pattern, discards pattern or consumable pattern into the disinfection application pattern that is made in real time. Not only has it successfully developed portable and table-type products, but it is also being actively developed kitchen applications, laundry applications, air conditioning applications and other derivative applications in appliances, making ELECLEAN a well-known brand of disinfection in the world.

AR Smart Helmet Creates New Technology for Riders - JARVISH Can Get You Home Safely

Founded in 2014, JARVISH was made up of a new product core team of the former Hon Hai Communication & Network Solution Business Group. JARVISH has developed Smart Helmets for several years. Combining AR, AI and communication technology, the entire helmet including electronic parts all passed global helmet key safety logos--CNS, DOT, ECE, and NCC and FCC Requirements for electronics. The Team's strength of hardware and software is absolutely not underestimated. Smart Helmet has a built-in camera, Bluetooth, Wi-Fi, microphone and earphones. By giving voice instructions, various functions can be operated, such as photography, answering the phone, intercom, remote group chat, etc. The helmet has built-in artificial intelligence (AI) calculation, which in case of an emergency will automatically record and save data, link auto fall detection to accurately locate the accident location and carry out the real-time road rescue service.

JARVISH Smart Helmet also extends special applications for special areas, such as real-time audio and video streaming, which sends the captured images to back-end platforms for license plate identification as the law enforcement authorities conduct a patrol. JARVISH will subsequently add GPS positioning function, providing commercial units for performing more efficient task assignments. In addition, JARVISH will make its AR product debut in Taiwan at the Innovex Exhibition, allowing riders to get the information they need without changing their viewing angles to improve driving safety.

OmniEyes Builds a Real-world Search Engine

"OmniEyes" was established by National Taiwan University Graduate Institute of Communication Engineering Associate Professor Chou, Chun-Ting with Department of Computer Science & Information Engineering Professors Lin, Shou-Te and Feng, Ai-Chun. The "OmniEyes--Next-Generation Mobile Video Platform" of OmniEyes, through the concept of fog computing, makes urban information more real-time and further revitalizes the value of image resources.

Chou, Chun-Ting pointed out that AI has become the most important trend in the IT industry. Indeed, images contain the richest and most diverse information. Compared to image updates to Google maps taking 1-2 years, OmniEyes, on the other hand, uses the cameras built on buses, taxis and logistics vehicles to send back the images taken during traffic at any time, enabling the back-end platform to update the platform maps once every five minutes and keeping the information in the most real-time state. Users will be able to get access to the city's Instant messages, which will extend to a variety of surprisingly creative applications, and even turn the existing network electronic map information around.

Now OmniEyes has installed it designed driving cameras in 100 buses, 40 taxis, and 10 logistics vehicles, which send back the images taken during traffic every day, about 10,000 kilometers, to the Platform, enabling the real-time urban information. Chou, Chun-Ting said that the ultimate vision of the OmniEyes - Next-Generation Mobile Video Platform is to become a "real-world search engine" where all people can provide and use all information at any time to revitalize mobile image resources through co-creation and sharing of data.

Dtalk10

DIGITIMES selects 10 outstanding startups based on criteria about technological strength, team potential, market prospect and others.

IoT

STARWING Technology Co

天奕科技 STARWING

STARWING, Taiwan's largest indoor positioning system provider, the main product – SiPS (STARWING Intelligent Indoor Positioning System), which equipped with high accuracy (tolerance 10~30 cm) and advanced A.I. analysis engine. Capable of various analysis such as path tracing, behavior mode, heatmap analysis, and social interaction…etc.

Support customer's field intellectualization, various application including indoor navigation, automatic guidance, personnel & asset management, behavior analysis and safety surveillance…etc. SiPS provides total solution with both hardware and software, highly compatible with existing system, create the most convenient application environment.

P-Square Inc.

恆準定位 Precise Positioning

Hengzhan Positioning Co., Ltd. was established in 2014, focusing on the development of high-precision positioning algorithms. The company's algorithm is characterized by an innovative multi-dimensional multi-directional sample alignment algorithm to solve the complex environmental positioning problems of indoor environment compartments, which can accurately determine the regional location of the characters to provide managers with the best decision, and With dynamic compensation algorithm to solve the signal difference of many different antenna characteristics.

In addition, the company's algorithm does not need to use expensive hardware, just use the mass production of hardware devices such as WiFi Bluetooth to achieve high Accuracy positioning provides a cost-effective solution and the company's positioning system has several success stories.

Startups • IoT

Seven-second leukemia cell test — AHEAD improves leukemia diagnosis efficiency with AI

By Fisher Yu, DIGITIMES

Leukemia is one of the most common cancers. Initial diagnosis and follow-ups are based on the interpretation of flow cytometry results — a gold standard in clinical evaluation of the presence of residual cancer cells — performed by doctors laboriously checking and correlating many combinations of the biomarkers detected on the surface of cell samples taken from a patient, taking up precious time that could be spent on more critical clinical tasks and patient care.

Machine learning provides a framework to efficiently identify features — for example, biomarker expression on cell surface — or combination thereof to enable the interpretation of flow cytometry results. AHEAD's flow model leverages historical clinical data to dramatically reduce the time required by physician to perform an evaluation of test results — from 20 minutes to 7 seconds ! at 90% concordance rate with physician — providing immediate feedback, leveraging the experience and knowledge of many physicians, which take years to acquire. Through cloud computing, this service can be provided to hospitals and clinics which do not have the expertise in interpreting flow cytometry results.

The learning doesn't stop here! Deep learning models are also being developed, combining both treatment history and past clinical examination data, to provide more accurate prognosis prediction which will guide the course of treatment with greater confidence. This is a substantially more complex problem which must examine and take into account different types of clinical data simultaneously — a task difficult to visualize by human.

The AI engineers and data scientists of the AHEAD team

Founded in 2017, AHEAD is led by key opinion leaders in hematology and experts in artificial intelligence and data science in Taiwan. The A.I. team is led by Dr. Chi-Chun Lee, Associate Professor at the Department of Electrical Engineering of National Tsing Hua University (NTHU). The data science team is led by Andrea Wang at National Taiwan University (NTU). NTU and NTHU are both top research universities in Taiwan.

Dr. Ming Yao and Dr. Bor-Sheng Ko at the Division of Hematology and Oncology of National Taiwan University Hospital (NTUH), led by Dr. Jih-Luh Tang at the Tai Cheng Stem Cell Therapy Center of National Taiwan University (NTU), form the medical team providing clinical hematology expert guidance.

NTUH, founded in 1895, is a world-renowned medical center and leader in Taiwan's health care industry. With nearly 40 years of experience in practicing bone marrow transplant, it has accumulated considerable amount of clinical treatment experience and data on leukemia. AHEAD was born out of this environment.

Taiwan's healthcare industry is renowned for its comprehensive population coverage, high quality healthcare and was ranked 9th in the Bloomberg Healthcare Efficiency Index in 2018. Moreover, high quality AI talents pools and AI research performance in Taiwan are also highly recognized among multiple tech giants such as Microsoft, Google and Amazon.

Taiwan is also in a particularly privileged position, given its tradition in medical research and public health, to play a leading role in bringing smart medicine to the world. AHEAD, drawing its strength from a multidisciplinary team, is actively participating in the vibrant AI healthcare startup scene, further contributing and supporting Taiwan to become the global leader in the smart medicine industry.

BBox: The first 5G development kit in the world

By Fisher Yu, DIGITIMES

TMYTEK solved two critical issues in 5G development: lack of R&D tool and expensive OTA testing in the production line with their unique mmWave beamformer product, BBox.

The flexibility of BBox empowered itself as an excellent R&D tool for antenna designer and protocol researchers. Leading institutes and universities had already used BBox to demonstrate promising technologies such as beam tracking algorithm optimization.

More than that, BBox can also be a cost-effective 5G OTA testing solution. As an RF probe, beam steering can be easily achieved in BBox to characterize the beam profile and the steering angle of the DUTs.

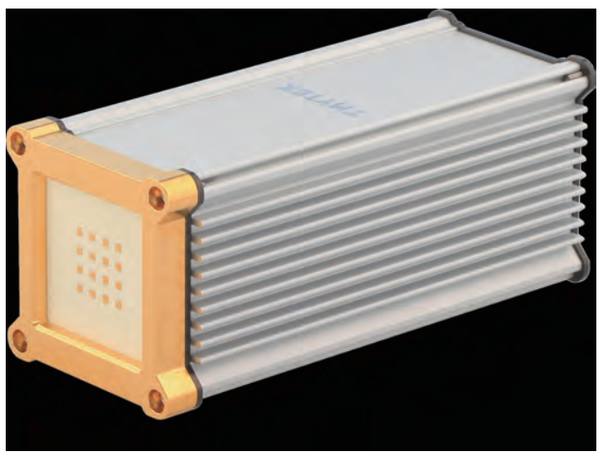
"We have talents rarely found in Taiwan startup team. By solving the above issues, TMYTEK believes we can contribute to the World with the proud of our technology. In addition to mmWave experts, brilliant embedded software and firmware engineers are also in our team. That's the reason we can build out mmWave beamforming technology for 5G communication." Ethan Lin, vice president of TMYTEK said.

5G NR mmWave Challenging

5G is going to change how people work and live. Innovative applications such as 8K video streaming and V2X primarily based on the success of 5G. The significant enhancement in 5G communication is the use of mmWave to benefit from its abundant spectrum resources and massive bandwidth. The short wavelength of mmWave, however, has severed loss path issue and beamforming technology would be the best solution to address this problem: use an antenna array to form a directive beam and gain better transmission distance.

About TMYTEK

TMYTEK, founded in 2014, has been focusing on mmWave active/passive components and system development.



BBox: The first 5G development kit in the world

Phase array, mmWave circuits, beam control logic, beam shaping & tracking algorithm, and even baseband chipset integration are all in TMYTEK's scope. Last year, TMYTEK won the first prize of CIAT accelerator program with BBox ,a 5G mmWave Beamformer product, and received recognition from 13 venture capitals.

New Taipei City's Smart City Pavilion exhibits at InnoVEX to assist startups in connecting with domestic and overseas industries

By Fisher Yu, DIGITIMES

New Taipei City is a city bursting with creative talents and innovative energy. At present, New Taipei City has promoted a number of youth startup policies, and successively established bases including InnoSquare, New Taipei Social Enterprise and E-commerce Base, and New Taipei City E-sports Base. Moreover, New Taipei City government worked with Amazon AWS to establish NTPC-AWS Joint Innovation Center, providing various resources such as venue space, mentor counseling, professional courses, industries connection, capital placement, and international links, to help emerging enterprises and startups grow and upgrade.

In the future, New Taipei City will continue to create a more friendly environment on a sound foundation and build a one-stop solution to assist the startup industries with development, creating a comprehensive ecosystem of innovation and entrepreneurship.

New Taipei City sets up the New Taipei Pavilion for the first time at InnoVEX this year. With the theme of smart city, the exhibition will use the activities such as displays, forums, and exchanges to help the startup teams win the favors of the venture capitals, accelerators, and enterprises at home and abroad. The results of this New Taipei City exhibition include Muro Box of TEVOFY Technology, GO+ earphone of FuelStation, the home soap-making machine of LESSDO, the car service platform of IGCAR, the e-commerce data decision making platform of ORDERLY, the AI marketing platform of MemePR, the smart home appliances of Cloudmii, the financing placement platform of GateWeb Information, the augmented reality game of Toii, the AI security camera image analysis platform of Beseye, the IoT B2B overall solution of SoftChef, and the smart healthcare platform of Asia-Pacific Intelligent.

Moreover, to link up to international startup resources, New Taipei City will reach exchanges and cooperation with startup and incubation institutions such as the acceleration program Startup GO! GO! from Fukuoka, Japan, and QBO Innovation Hub from the Philippines during the InnoVEX exhibition. Soft landing solutions will be provided to each other, allowing the New Taipei startup teams to create more opportunities for international collaboration.

The startup team SoftChef

At InnoVEX 2019, New Taipei City's Smart City Pavilion is located at Booth A0505a, Hall 1 of Taipei World Trade Center from May 29 to 31, 2019. Startups, venture capitals, accelerators, and enterprises, domestic and overseas, are welcomed to visit and exchange ideas.

Dtalk10

DIGITIMES selects 10 outstanding startups based on criteria about technological strength, team potential, market prospect and others.

IoT

FaceHeart Inc.

鉅怡智慧 FaceHeart

AI software company founded by Dr. BING-FEI WU's research team from NCTU. FaceHeart focuses on the advanced AI technology, deep learning and video-based vital sign measurement, which are applied to the product fields of Smart Traffic, Smart Healthcare, Smart FinTech and Smart Security.

FaceHeart contactless vital sign measurement technology detects people's heart rate, HRV and blood pressure simply by a camera. The result accuracy is proved medical-level compliant. Contactless measurement is convenient for users, motion robust and most flexible for product applications.

Spatial Topology Technology Co., Ltd.

STO 司圖科技

An Indoor Map Platform with solid system integration skills possesses extensive experience in the field of IPS, Robotics, AIoT, and Business Intelligence.

At Spatial Topology, we have been passionate about leveraging unlimited possibilities between maps and our customers. That's why we specialized in indoor positioning for people/robot, and data analysis for business intelligence. As a map platform, we not only serve competitive navigation module for robot, but also provide number of public indoor maps with peripheral signal-based IPS in Taiwan and other cities in Asia. This platform has already been adopted by Taipei Main Station and several large indoor parking lots as a mobile users' guidance.

Poor eyesight? Fear no more with the CMU-developed eye drops for treating myopia

By Fisher Yu, DIGITIMES

The overall myopia rate among Taiwanese people is 85%, one of the highest in the world, where 30% of them are short-sighted with 6 diopters. Among those with high myopia, many of them suffer from retinal detachment, glaucoma, cataract and macular degeneration, which are the main causes of blindness. However, there is only one effective drug to treat myopia, atropine, but it causes side effects. The myopia-treating eye drops developed by China Medical University Professor Dr. Suh-Hang Juo and his team inhibits myopia without causing any side effect and it can stop myopia progression in children and can prevent myopia-complications.

China Medical University Professor Dr. Suh-Hang Juo

Dr. Juo explained, myopia is not a fatal disease but can severely affect life quality. Myopia is very common in Asia. Although eyeglasses can easily correct the vision, it cannot stop or slow down the myopia progression in children. The previous investments in myopia prevention or treatment technologies have long been scarce. Since myopia damages eye structure, 2% of people with high myopia (130,000 of Taiwan's population), will become blind. Meanwhile, with the continuous extension of human life span, thanks to advancements in the medical field, the elderly people experiencing severe vision impairment or even blindness due to high myopia will rise.

To identify genetic factors contributing to myopia, Dr. Juo began his long journey in myopia research since he was faculty at the Columbia University in the US. Later, he discovered one important risk factor, which is microRNA. He identified over-expression of microRNA-328 in the eye leading to myopia development. Dr. Juo published the first ever finding in 2011 to demonstrate a microRNA can cause myopia, while the second paper reporting microRNAs as a risk factor for myopia was published by scientists from University of Wisconsin and Columbia University in 2016. To translate the scientific finding to something useful for human being, Dr. Juo and his team began developing myopia-treating eye drops. By neutralizing the excess microRNA-328, Dr. Juo was able to show that his novel eye drops slow down myopia progression or even cure myopia in animal studies.

This novel anti-myopia eye drop is the first eye drop thoroughly developed by Taiwanese scientists and physicians. This patented eye drop also won several awards including the National Innovation Award given by the Institute for Biotechnology and Medicine Industry in 2017, Future Technology Award by Ministry of Science and Technology (MOST) Taiwan in 2018. With the help of Taiwan Startup Institute Program initiated by MOST, more extensive preclinical studies were conducted. All of these preclinical studies provide more solid evidence to support the safety and efficacy of this novel eyedrop. Besides, this eye drop is very convenient to use as only one drop is required every day, and its effect is far more superior than that of long-acting mydriatic eye drops. This eye drop is expected to enter the phase I clinical trial soon to confirm its effect in humans.

For the marketing of the eye drops in the future, Dr. Juo pointed out that new drugs require international channels, but global channels are currently controlled by large pharmaceutical companies. Several big pharms have started to discuss with Dr. Juo for potential collaborations. The global market size for myopia eye drops is 67 billion USD per year. And the major market is in the Asian developed countries.

With T2B2C to become a mainstream business model, Taiwan startups should capture rising opportunities

By Ryan Huang, special to DIGITIMES

Drastic changes in the global business environment, regional politics, trade tension and rapidly evolving technology innovations are making it more and more challenging to do business in recent years. Disruptive iABCD technologies (IoT, artificial intelligence, blockchain, cloud computing, big data analytics) are coming on strong, ready to reshape the business world. Although these new technologies may bring unlimited opportunities, they also cause increasing concerns in security, privacy, regulations and social trust in the industries that make use of them. Businesses today not only have to cope with the competition in products and services but more importantly, they need to build up their abilities to protect sensitive customer data so as to maintain customer trust as they expand into new territories. With these new developments come more challenges and opportunities as well.

According to PwC's Global Digital Operations 2018 Survey, PwC interviewed 1,155 manufacturing executives in 26 countries to develop an index that ranks companies by digital operations maturity, from Digital Novices, Digital Followers, Digital Innovators to Digital Champions. Some of the key findings include:

1. Only 10% of the companies can claim the distinction of being called Digital Champion. Two thirds of the companies have not started digital transformation or only have undergone moderate digital transformation.
2. Asia-Pacific is leading the way to digitization. Asian companies have introduced digital products and services at a much faster rate than their counterparts in the other areas. This is the result of the enthusiasm of the region's young, tech-savvy corporate managers to embrace digital technologies, as well as soaring production costs that are forcing Asian companies to digitize key operation processes to maintain competitiveness.
3. Digital Champions create value through integrated Customer Solutions ecosystems.
4. Digital Champions serve customers by integrating Operations, Technology, and People ecosystems to serve customers with competitive, end-to-end solutions.

From these findings, we can see that integration, new technology and ecosystem are undoubtedly the most critical key words to industry competitiveness going forward.

With these key words in mind, what is the next step for Taiwan's digital transformation? The Taiwan manufacturing sector has been coping with many challenges, including trade barriers, rising costs, labor shortage, global competition, supply chain transformation, environmental protection pressure, labor law changes and tax law changes. Almost all business executives find it difficult to maintain operation. Only by continuingly upgrading themselves, refining their management skills and strengthening their competitiveness can they make breakthroughs and thrive in a highly competitive environment.

According to PwC's 22nd CEO Survey: Technology trends report 2019, 50% of tech company leaders were "extremely concerned" about finding the talent and skills they needed. Creative talent is hard to find and that has become tech leaders' top concern. With the whole world aggressively engaging in digital transformation and industry upgrade, what opportunities are there for Taiwan firms and startups?

To answer the question, let's first look at market changes. Before a startup sets up shop, the question to ask is whether they will sell products or services to businesses (B-side) or consumers (C-side). According to PwC China's New Trends of Technology Enabling To-B Services Whitepaper, the market in the Internet era has little room for startups (T) with innovative technologies to grow from C-side. In other words, most of the topics or business models have been explored by other startups. Furthermore, with medium and large corporations taking hold of marketing and channel resources of the consumer market, it will be very risky for startup firms to insist on creating a blue ocean market through a To-C model.

We can foresee the trend that future startups will likely be operating on the mainstream T2B2C model but they will need to search for upstream opportunities. Tech startups should think about how to apply their strength to provide B-side customers better solutions. In the high-tech era, with IoT and smartphones being widespread, the T2B2C model has become popular and has developed in depth across upstream and downstream industries, which has reshaped user experiences of services and products and further created ecosystems combining various platform systems, igniting possibilities in many aspects for the business environment.

What does the T2B2C trend mean to Taiwan startups and firms? Taiwan has fostered a complete supply chain and premium workforce with its focus on ICT industry development over the years. This is certainly Taiwan's biggest advantage. Many international corporations have chosen to set up their R&D or procurement centers in Taiwan, mostly eyeing Taiwan's strong supply chain and engineering talent. This is proof that Taiwan with such unique advantages still appeals to global conglomerates.

Taiwan can build on top of its current advantages. As part of the local industries' urgent efforts to upgrade and transform, medium and large corporations can invest in or acquire startup firms as a way of external innovation management. This approach will allow them to save the costs of having to employ in-house R&D engineers or work with startup firms to jointly develop product technologies and commercial applications to grab preemptive market opportunities. To Taiwan startup firms, they need to leverage their existing strength and technologies to develop To-B solutions based on iABCD technologies. They can first develop products in Taiwan, including all steps of the processes from idea, design, product research, testing and small-scale pilot run. Then, the products can be launched into other regional markets or the global market. Furthermore, with medium and large corporations encountering an innovation bottleneck for To-B or To-C model, startup firms boasting their creative power stand a good chance of discovering additional opportunities.

Amid the time when all industries are actively pursuing digital innovations, the T2B2C model is exactly what Taiwan startups need to transcend national boundaries and compete on the world stage. What their development strategies are and how they can collaborate with large enterprises are the challenges to startups' strategic planning ability and vision.

(Ryan Huang is the leader of PwC Taiwan's Innovation and Entrepreneur Services)

Dtalk10

DIGITIMES selects 10 outstanding startups based on criteria about technological strength, team potential, market prospect and others.

5G

TMY Technology Inc.

TMYTEK 稜研科技

TMYTEK is a young and enthusiastic team with big dreams. We begin as mmWave experts. Small team but very motivated. As we grow, we become mmWave and software integration experts. Not only can we provide mmWave products and services, we are able to integrate them with software control which makes it very user friendly. But that is not all.

Our journey moved on, as we have a mission. TMYTEK's mission is to contribute and to realize internet everywhere with our mmWave technology. So we strive to make this dream not only a dream but a reality. Today, we are the world's leading 5G beamforming solution provider.

Smart healthcare

AI Explore

AIExplore

Super fast AI HPC platform provides the AI infrastructures for smart healthcare, smart manufacturing and smart city, enabling real-time analysis of gigabyte images and building customized AI model in a short time.

In addition to the amazing speed, its accuracy is outstanding, defeating 373 teams worldwide, including 49 AI company, and outperforms the AI systems by world leading AI teams in the United States, the University of Maryland, Russia SKYCHAIN, London St. Mary's University and other top European and American AI teams.

Within only two weeks AI training time, AI Explore system won the world top eighth place in the International AI Competition 2019 IEEE ISBI ACDC Automatic Cancer Detection and Classification in Whole-slide Lung Histopathology challenge.

aetherAI, CO., LTD

aetherAI 雲象科技

aetherAI is dedicated to bring benefits of digital workflow to pathologists by providing end-to-end enterprise solution for adoption of digital pathology and AI-powered image analysis workflow. Having strong connections with top medical centers and hospitals, aetherAI is aiming to improve productivity, quality and consistency of pathology diagnostic process.

We provide end-to-end service including slides scanning service, digital pathology viewer, radiology viewer, annotation interface and integrated deep learning pipeline. Our idea is to streamline the process of making medical image AI and fast track the development.

Startup report

AgriTalk creates green and intelligent farming system by integrating AI, IoT, and biological science and technology

By Fisher Yu, DIGITIMES

Improving the overall value of agriculture is a challenge that Dr. Wen-Liang Chen, an associate professor at the Department of Biological Science and Technology at National Chiao Tung University, has been thinking about. To this end, the AgriTalk team led by Senior Vice President Dr. Jason Yi-Bing Lin and Dr. Wen-Liang Chen integrated their expertise and created the AgriTalk Platform, a green and intelligent agricultural management platform, which not only monitors the environment in real time but also enhances agricultural production value. This intelligent agricultural system has been recognized by many countries that plan to adopt it.

AgriTalk developed a non-toxic agricultural pest and disease monitoring system: AgriTalk Platform. It employs IoT, A.I., big data analysis, and biological science technology, collecting various environmental data through sensors, including the number of pests, soil conductivity, and information such as temperature, humidity, and ultraviolet light. It provides pest and disease prediction while at the same time establishing a control system, and serves as a complete agricultural operation that covers automatic irrigation, spraying of biological inhibitors, control of insect repellent lamps, and fertilization.

For example, with the fertilization system, Dr. Chen's team started with microbes: they obtained microbial data in agricultural land, analyzed the bacteria distribution through Next-Generation Sequencing (NGS), and then conducted training with the fertilizer system algorithm and adopted Reinforcement Learning (RL). This way, only minimal training data is required to achieve precise fertilization. The first version of the AgriTalk Platform was launched in 2017. It was tested on a total of 3.595 acres of farmland located in Longtan District in Taoyuan City, Baoshan Township, and Wufeng Township in Hsinchu County, and on crops such as turmeric, white strawberry, and tomato. According to their data, with the implementation of this Platform, soil acidification can be minimized and turmeric can be planted without fallow. Compared to the current planting techniques that require two-year cultivation, the AgriTalk system shortens turmeric planting time to one year, and demonstrates that the highest dose of curcumin can be produced through precision fertilization technology to increase production capacity.

The founder of AgriTalk Tech - Wen-Liang Chen

In addition, for farmers, pesticides have always been a double-edged sword. On one hand, they can quickly suppress pests and diseases at a low price, but on the other hand, they cause acidification and deterioration of agricultural land. For the environment and ecology, the latter causes permanent damage. Consequently, in recent years, the global agricultural and biotechnology industry has been looking for effective and natural non-toxic control methods. The AgriTalk team improved the disease and pest control rate by 20% in a completely non-toxic way.

AgriTalk's special inhibitors were selected by Dr. Chen's team from more than 5,000 spider venom proteins collected to target different species and covers 80% of common agricultural pests, including Lepidoptera, Orthoptera, Diptera, Coleoptera, to achieve pest control. As spider venom protein not only decomposes but also becomes fertilizer after doing so, completely non-toxic control can be achieved.

Dr. Chen emphasized that AgriTalk offers an integration of IoT technology and the preventive science of agriculture. Whether it is pests or diseases, resistance develops rapidly. As a result, cost increases while efficiency decreases over time. Conversely, if prevention and treatment measures are taken at the earliest signs of infection or even before the onset of the disease, damage is minimized allowing for maximum prevention effectiveness. In the initial stage of prevention, there are more options for the applications, including physical methods such as setting up net racks or removing diseased leaves, without the use of chemical practices that cause serious damage to the environment.

However, Dr. Chen states that, regrettably, the practice of spraying pesticides has become the norm. Although the AgriTalk Platform is highly effective, the farmers' entrenched habit can only be gradually changed. In this initial stage, the company has decided to focus on two groups in the current market: one group consists of farmers who intend to upgrade their current farming systems, which mostly facilitate semi-automatic farming; and AgriTalk Platform will assist them with transforming into fully automatic, implementing real intelligent agriculture. The other group is made of customers who require customization. Usually, such customers have long-term distribution channels and the scope of cooperation is for specific crops. Through this system, planting SOP will be established and optimized, and the quality and quantity of crops will be improved. In addition, A.I. quickly analyzes the data sent by the sensors set in the local soil and also helps customers manage the quality of the contractual farming at the same time.

Both the hardware and software of the AgriTalk Platform has been developed by the National Chiao Tung University team. with the assistance of people and companies in different fields in Taiwan. Dr. Chen indicated that IoT requires a sophisticated sensing network and the sensors account for a relatively high proportion of system cost. Because different applications require different types of sensors and production quantities are small, sensor production cost remain high. AgriTalk's sensors are manufactured in small batches in production lines specially designated by Quanta Computer.

Since agriculture is a passive market, results are critical in encouraging cooperation with other countries and increasing export potential. AgriTalk will use Taiwan as a demonstration field to promote the system to overseas markets. Currently, AgriTalk is corresponding with Asian countries including Japan, the Philippines, and Vietnam, who all show strong interest. After they demonstrate the efficacy of their system, AgriTalk hopes to expand and replicate their results overseas, creating a non-toxic agricultural business opportunity that is more environmentally friendly.

www.GLORIA.org.tw

More Info

MOST GLORIA in COMPUTEX TAIPEI 2019

May 28 - 31, 9:30 AM - 5:30 PM June 1, 9:30 AM - 4:00 PM

Taipei Nangang Exhibition Center, Hall 2,4F. S0524 MOST GLORIA

(2, Jingmao 2nd Road, Taipei)

Global Research & Industry Alliance (GLORIA) program, launched by the Ministry of Science and Technology, aims to accelerate the process of interlinking academic research achievements and domestic industrial development with the global trend and to establish an innovative collaborated ecosystem comprising universities. We cordially invite you to participate in COMPUTEX 2019 from May 28th - Jun 1st at Nangang International Exhibition Center, Hall2, 4F. We hope that the GLORIA can enter the international innovation system by cooperating closely with their international partners.

MOST GLORIA AGENDA

TIME	5/28	5/30	5/31	6/1
10:00 - 11:00	Application of private cloud medical server in medical education and clinical application	Floating Image by Light Field: Innovate the Technology of Vision and Interaction	Candlelight OLED Triggering Lighting Renaissance	Technical publication of "Arc Ves"
11:00 - 12:00	Medical AI for Precision Skin Care	Technical publication of "Novel Lab-on-Chips with Multiplex Detection for Point-of-Care Testing of Drug Residues in Foods"	Novel evolutionary learning platform for AI medicine	Intelligent IoT Aquaculture Monitoring and Management Information
13:00 - 14:00	Infrared thermal image sensor for smart poultry application	Ttechnology publication of Multi-application of Lipoplex Delivery System platform and business matchingsService	Ttechnology publication of anticoagulation nano drug and business matchingsService	
14:00 - 15:00	Deep Learning and Broad Learning with Applications to Smart Robots and Machinery	From Green Energy to Smart manufacturing. The Future Between Us.	Smart Manufacturing& Smart Living (1) Smart Construction (2) A demonstration of PHM for Machining machines. (3) Industrial 4.0 application on shoe manufacturing	
15:00 - 16:00	Artificial Intelligence and the Future of Humans	Minimally Invasive Surgery Device	Super industrial Real-time Communication Platform	
16:00 - 17:00	Media Conference for the New Developed Gastric Cancer Drug	Publication and match meeting of green disinfectant technology	Link all industrial software interactions in a blink	

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DTalk

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If your team is interested in the topics of Smart Manufacturing and Smart Health-Tech, please contact us. We will be happy to help you.

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