

Annual Report

# Central Taiwan Science Park



2018



Production, Living, Ecology, Lives





central  
Taiwan  
science  
PARK



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Smart Development · Innovation & Transformation  
Service Upgrade · Environmental Sustainability

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## 15-year-old CTSP Leads Central Taiwan Development

In the blink of an eye, Central Taiwan Science Park (CTSP) is already celebrating its 15<sup>th</sup> anniversary. This follows a 2018 when the continuing diligence, courage and strength of our team achieved brilliant results.

In response to AI (artificial intelligence) trends, with the goals of seizing AI opportunities at an early stage, developing innovation talent with multidisciplinary backgrounds, and enhancing the nation's competitive edge, CTSP has fully facilitated an AI Robotics Hub Program from 2017—CTSP's first year for AI — and into 2018— “CTSP's 15<sup>th</sup> Anniversary with AI-Led Development”. The Maker Space at the Hub, equipped with multifunctional advanced equipment, allows makers to turn their AI robotic innovations and creativity into reality, in the hopes of encouraging AI robot making and integrating robotics with cloud computing and AI. It is a space for innovative startups and hands-on activities. CTSP organizes a number of large competitions at this venue in cooperation with industry, government, academia and research institutes to diversify the AI ecosystem at CTSP.

We also have made every effort to promote international exchanges and collaboration, and assist our tenants in exploring business opportunities and soliciting foreign investment. In 2018, CTSP signed a quadrilateral memorandum of understanding (MOU) with three other parties from Taiwan and Germany, and a MOU with India's Karnataka State Government. In addition, CTSP signed a letter of intent with the Federation International Robot-sports Association (FIRA) and the U.S.-based For Inspiration and Recognition of Science and Technology (FIRST) headquarters, fully demonstrating its resolve to promote the AI industry.





2018 marks another successful year for CTSP. It can take pride in welcoming a total of 196 local and foreign high-tech companies with planned investment of over NT\$2.08 trillion and record revenues of NT\$724.882 billion, representing a significant growth of 28.56% from the previous year. The employee population also grew at a steady pace to hit the 48,000 mark.

2018 was also a critical year for CTSP. The environmental impact assessment (EIA) for Erlin and Chising science parks was passed at the Environmental Protection Administration's phase II assessment meetings, respectively on May 23 and June 13, 2018, setting a successful example of government cooperation with local communities to resolve EIA disputes. Chung Hsing Science Park has also been successfully transformed. In response to CTSP development of the government overseas talent recruiting policy, a Bilingual Division was set up (Preparatory Office established Oct. 26, 2018) and the establishment of other divisions (including Elementary School Division and Kindergarten Division, inclusive of a baby care center) was planned at National Experimental High School (NEHS) at Central Taiwan Science Park as an important incentive for the recruitment of overseas high-tech talent.

I expect CTSP to turn a new page with the following "sevens": 1) Helping maintain R&D and production of world-leading 7 nm fabrication technology at CTSP; 2) growing CTSP's annual turnover from NT\$700 billion to more than NT\$1 trillion; 3) seeing the employee population at the five parks under the CTSP umbrella hit an expected 70,000 mark. In addition, CTSP will continue to promote its Smart Science Park Project and AI Robotics Hub Project to achieve the goal of creating the world's most competitive green science park.



Director-General, CTSP Bureau

May 2019



# Building a Foundation —— A Central Taiwan Technology Leader



CTSP's Preparatory Office was established on Oct. 16, 2002 pursuant to the Interim Procedures for the Preparatory Office of Central Taiwan Science Park. On Jan. 26, 2007, CTSP was set up, pursuant to the Ministry of Science and Technology (MOST) Organization Act of the Central Taiwan Science Park Bureau, which was promulgated as a presidential decree. In 2014, the organization was reformed with six divisions and four offices—Planning Division, Investment Division, Environment and Labor Affair Division, Business Division, Construction Management Division, Land Development Division, Secretariat Office, Personnel Office, Accounting and Statistics Office, and Civil Service Ethics Office—established to meet the needs of business on Jan. 22 the same year in accordance with the Organization Act of the Central Taiwan Science Park Bureau and National Science Council, Executive Yuan.

## Park Overview

### Taichung \ Science Park

With an area of 466 hectares, Taichung Science Park is home to Taiwan Semiconductor Manufacturing Company's (TSMC) advanced 7 nm manufacturing process, safeguarding Taiwan's leading position in the semiconductor industry. Giant Manufacturing Co., Ltd. (Giant Bicycles) also established its global headquarters here. With Taichung Metropolitan Park, Taichung International Airport and the High Speed Rail (HSR) Taichung Station nearby, Taichung Science Park is situated in an important transportation hub and has brought about prosperity to the region.

### Huwei \ Science Park

Covering an area of 97 hectares, Huwei Science Park borders the HSR Yunlin Station designated area to the east. Most tenants here are in the biotechnology industry, with a few in optoelectronics and



**Houli Science Park – Micron Memory Taiwan**

communications. This science park, together with the surrounding HSR-designated area and National Taiwan University (NTU) Yunlin Campus, form a technology area that drives overall development in Yunlin County. Its Wastewater Treatment Plant is the county's first facility to provide wastewater treatment education.

#### **Houli \ Science Park**

Covering 246 hectares, Houli Science Park includes the Houli and Chising sites and is predominantly occupied by optoelectronics, semiconductor and precision machine manufacturers, with the aim of boosting economic prosperity through the integration of industrial resources in Houli. A Phase II EIA for the Chising Site was passed in 2018. The park hopes to exist in harmony with the local region as a model for achieving a balance between environmental protection and economic development.

#### **Erlin \ Science Park**

Erlin Science Park encompasses 631 hectares. Due to a low water consumption requirement at Erlin Science Park and the characteristics of central Taiwan industries, this park's tenant recruitment is targeted at the precision machinery industry, which consumes less water and emits less carbon dioxide. A Phase II EIA and

changes to the development project were passed in 2018. Currently, a number of companies are planning to build plants here and, upon completion of land lease procedures, construction and operations will begin.

#### **Chung Hsing \ Science Park**

Located in the South Core Area of Chung Hsing New Village, the 37-hectare Chung Hsing Science Park focuses on research and development without mass-production (with the exception of the cultural and creative industry). Many research institutes and high-tech companies, such as the Institute of Industrial Technology Research Institute (ITRI) and Institute for the Information Industry (III),

have already moved in and started operations in the park.

In response to the government's i-Taiwan 12 Projects, Chung Hsing New Village was originally designated as an Advanced Research Science Park. However, 90% of the park area (except for the South Core Area) was designated a cultural landscape by Nantou County Government via a cultural heritage review announcement, which blocked the development of the park in many ways. Based on instructions from former Prime Minister Lin Chuan following a debriefing on the "Future Development Planning and Progress Report," the preparation plan was modified by the CTSP Bureau and ratified by the Executive Yuan on Jan. 5, 2018, with the name changed to "Preparation Plan for Chung Hsing Science Park (Second Amendment)". The park area was reduced to the South Core Area (exclusive of other administrative agencies.)

Later, the Office of the Chung Hsing New Village Revitalization Project was set up by National Development Council (NDC) on July 20, 2018 to oversee the revitalization of Chung Hsing New Village. CTSP transferred operations and files to the Office on Dec. 17-18, 2018 and Jan. 15, 2019, respectively, and mailed a personnel transfer list to NDC on Dec. 22, 2018 to successfully complete a transfer of Chung Hsing New Village operations.



**Chung Hsing Science Park – CH Biotech R&D Co., Ltd.**



## A Good Harvest

### CTSP's Efforts Bear Fruit

#### EIA Approval to Boost Local Harmony & Prosperity

CTSP's Phase III Development Project in Chising Science Park on an area of 111.63 hectares was ratified by the Executive Yuan on Jan. 3, 2006. The Phase I EIA was passed twice and the Phase II EIA was passed at the EIA review meeting on June 13, 2018. During a Phase II EIA process that lasted more than four years, local residents and environmental groups concerned about the project were allowed to fully express their opinions during the scope definition and review meetings held for the sake of public participation. Subsequently, environmental monitoring was implemented and environmentally-friendly measures were taken according to the EIA report. In 2014, CTSP reconciled with the plaintiff in administrative proceedings, bringing 12-year-long dispute over the EIA for CTSP's Phase III Development Project to an end. In the future, Chising Science Park will develop in harmony with the local community and serve as an example to other science parks in striking a balance between environmental protection and economic development.

The environmental impact report for CTSP's Phase IV Development Project, on an area of 631 hectares in Erlin Science Park, was originally reviewed and passed by the EPA on Oct. 30, 2009. However, an administrative lawsuit was filed by citizens regarding the EIA process in this case and the EPA decided at an EIA meeting on June 11, 2014 that a Phase II EIA should be performed. In response to the court ruling and the EPA's resolution, CTSP subsequently organized a Phase II EIA and started to recruit precision



machine manufacturers that consume significantly less water and energy, rather than originally-planned TFT-LCD manufacturers. During the Phase II EIA, three scope definition meetings, one public hearing, and two project team review meetings were held. On May 23, 2018, the EIA was finally passed at a review meeting. The passage of the assessment is not only in line with local community expectations for creating more local job opportunities but also drives an industrial transformation and upgrade and eases a need for land by domestic entrepreneurs.

The environmental impact report for a 53.08-hectare expansion in Taichung Science Park (originally occupied by an ammunition depot on Dadu Mt.) was passed by the EPA on April 16, 2015. The semiconductor and related midstream and downstream industries and precision machinery industry introduced to this site, together with existing enterprises in the park, form a business cluster. Subsequently, due to changes made to the chemical items and quantities originally approved in EIA review for semiconductor manufacturers—resulting from manufacturing technology upgrades—an EIA change process was performed twice and passed at review meetings on Feb. 9, 2017 and June 27, 2018, respectively. The passage of the environmental impact review allowed semiconductor manufacturers to accelerate development of 7 nm fabrication processes and get a head start in the international semiconductor process race, pushing up the overall output value in central Taiwan, improving the national industrial competitiveness, and helping move CTSP into a new era.

## A Fruitful Year in 2018

In 2018, CTSP welcomed another 20 tenant companies, bringing the total number of tenants to 196. Among

these, 143 have registered in the park. Revenues are NT\$724.882 billion, indicating a growth of 28.56% from 2017.

Revenues generated by all industries in 2018 hit a record of NT\$724.882 billion, representing a growth of 28.56% from NT\$563.826 billion in 2017. These record revenues were mainly attributed to the success of high-end production processes in the semiconductor makers and increased demand for AI, high-performance computing, Internet of Things, automobile electronics, mobile devices, and servers, as well as a memory supply shortage. Strong demand also boosted revenues in the semiconductor industry supply chain, including wafer foundries, memory manufacturers, and packaging and testing. Furthermore, the increased demand for high-end process equipment and automation equipment in semiconductor, panel, and aerospace manufacturers also drove the need for related automated machine tools, helping to push up revenues.

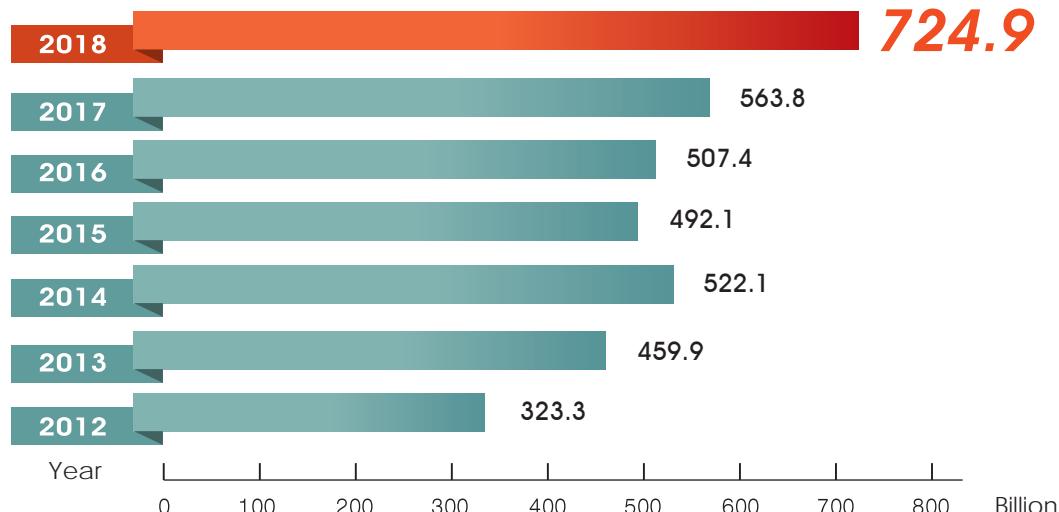
The IC industry contributed to the largest share of the Park's revenues in 2018, accounting for approximately NT\$514.738 billion (71.01%), followed by optoelectronics with approximately NT\$170.986 billion (23.59%), precision machinery with approximately NT\$29.217 billion (4.03%), and other industries with approximately NT\$9.94 billion.

## Imports / Exports Hit Another Record High

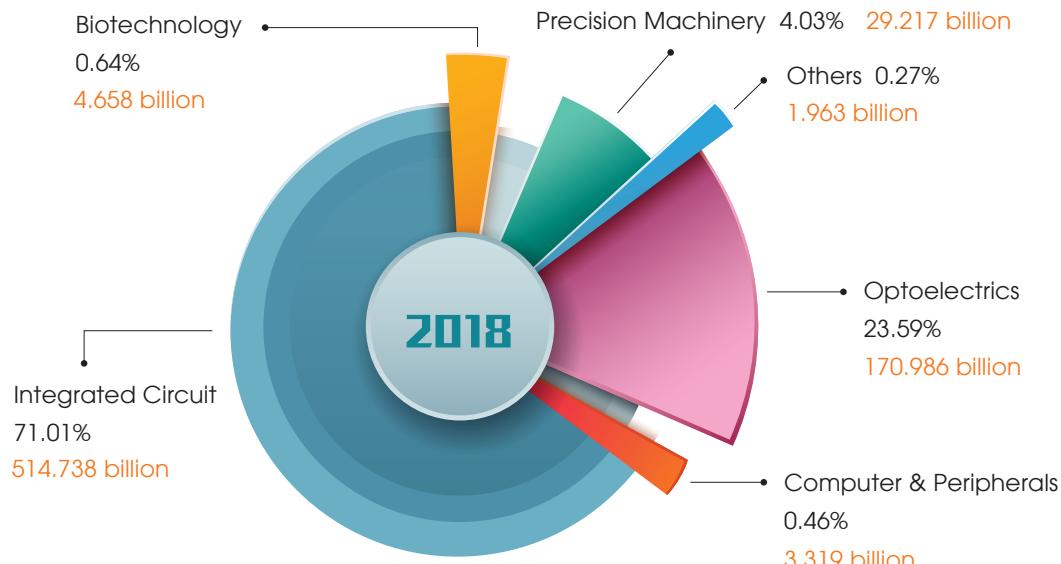
In 2018, CTSP's total imports and exports reached NT\$537.577 billion. Exports were approximately NT\$347.891 billion, for a year-on-year growth of 13.50%, while imports reached NT\$189.686 billion, for a year-on-year decrease of 32.66%. Overall, exports exceeded imports by NT\$158.205 billion.

**Statistics of CTSP Revenues**

Unit: NT\$ Billion



### Statistics of 2018 Revenues by Industry



### Comparison and Analysis of 2018 CTSP Exports & Imports

Unit: NT\$ Billion

Industry	Exports		Growth (%)	Imports		Growth (%)
	2018	2017		2018	2017	
Integrated Circuit	196.791	147.326	33.58	154.117	233.131	-33.89
Optoelectrics	128.862	138.584	-7.02	31.165	43.722	-28.72
Precision Machinery	17.463	16.316	7.03	3.216	3.701	-13.11
Computer & Peripherals	2.452	2.234	9.74	0.567	0.636	-10.75
Biotechnology	2.323	2.058	12.88	0.340	0.405	-16.09
Others	0.00	0.00	-	0.281	0.081	246.67
Total	347.891	306.518	13.50	189.686	281.675	-32.66

Thanks to an increase in orders for wafers and memory from sales channels resulting from the launch of numerous international-brand smartphones and wearable devices, and the continued expansion of emerging smart technology applications in AI, automobile electronics and 5G communications technology, IC makers accounted for the largest share of exports with NT\$196.791 billion, representing a growth of 33.58%.

In 2018, the growth in exports from a year earlier came as a result of an increase in wafer foundry and DRAM exports brought on by the growing demand for smart mobile electronics produced by Taiwanese manufacturers as the high-tech products saw steady growth around the world. In addition, the demand for the Internet of Things, cloud computing, automobile electronics, and industrial

control applications led to a strong demand for memory and thus benefited the relevant supply chains. Driven by diversified applications, photoelectric panel makers are also undergoing an industrial transformation and upgrades by continuously improving their technology with research and development, expanding capacity, and moving toward high value-added products such as commercial displays industrial control, commercial and automobile products to remain profitable.

In 2018, 20 new manufacturers entered CTSP with a total investment of NT\$7.69 billion. One expansion project was completed with added investment of NT\$250 billion. In addition, 11 companies increased their capital by approximately NT\$1.027 billion.



## High-Tech Industry Presence

CTSP has been incredibly successful in soliciting both local and foreign high-technology enterprises. As of the end of 2018, 196 tenant companies had been approved, including 36 companies in the optoelectronics industry, 77 in precision machinery, 40 in biotechnology, nine in integrated circuits, 15 in computers and peripherals, one in communications and digital content, and 18 in park services. Thus, a highly competitive industry cluster has taken shape. In addition, 15 research institutes and incubation centers in the Park provide a strong pipeline for R&D capacity. The Emerging Smart Technology Research Center of III, Central Taiwan Industrial Innovation R&D Campus of ITRI (Central Taiwan Innovation Campus, MOEA), Allion Labs, Taiwan Mother Cosmo, Hsinnyi Industrial and CH Biotech R&D have all established a presence in Chung Hsing Science Park. CH Biotech R&D's headquarters & research and development center were also inaugurated on June 19, 2018.

Newcomers in 2018 included 11 companies in the precision machinery industry, four in the biotechnology industry, three in optoelectronics, one in integrated

circuits, and one in computers and peripherals, with a total investment of NT\$7.69 billion. Eleven tenants increased capital by a total of NT\$1.027 billion. Among the 20 newcomers, domestic enterprises include China Fineblanking Technology (CFTC), INTAI, Globaltek, Provitae, and Chum Power, while foreign investments include Japanese company Tokyo Electron Limited, Cayman Islands company Newmax Technology, and American businesses Echelon Material Technologies Corp. and StemCyte Taiwan. It is obvious that CTSP's rapid development has benefited the economic growth in the Greater Taichung area and Taiwan's overall employment rate.

## Diverse Development with Technology Orientation

As of the end of 2018, CTSP has welcomed 36 optoelectronics enterprises, including benchmark companies such as AUO, Corning Taiwan, Nitto Taiwan, JSR Micro Taiwan, EPISTAR, Genius Electronic Optical, H.PB. Optoelectronics, Taiwan Ohara Optical Material, Taiwan Color Optics, Raystar Optronics, and Glorytek, with a total planned investment of NT\$881.6 billion.

As these giant local and international optoelectronics manufacturers and upstream material suppliers have established their presence in CTSP, a comprehensive optoelectronics industry supply chain—upstream, midstream and downstream—has taken shape.

Precision machinery has always been among CTSP's key industries. With 77 precision machinery manufacturers in the Park so far, this industry has the largest presence among all industries with a planned investment of NT\$61.4 billion.



1. President Ing-wen Tsai paid a visit to Sunspring Metal Corporation to realize the industrial development in CTSP.
2. PharmaEssentia Corp's new plant in CTSP was inaugurated.
3. AeroJones Aviation in CTSP is Taiwan's only company that produces the light sport airplanes.



1. Abroad and home high-tech businesses located in CTSP have formed a highly competitive industry cluster.
2. CTSP AI Robotics Hub makes various making equipment available to makers.
3. CTSP AI Robotics Hub Achievement Exhibition.
4. CTSP hosted the 2018 FIRA RoboWorld Cup & Congress with great success.

Manufacturers include giant players in optoelectronics, IC machinery equipment and machine tools. A proximity to suppliers significantly reduces costs and improves competitiveness, making central Taiwan a top global precision machinery cluster.

In the IC industry, nine companies have entered CTSP, including TSMC, Winbond, Micron Memory Taiwan, SPIL, Applied Materials Taiwan, Hermes-Epitek and MIC, with a total planned investment of NT\$1,116.4 billion. Among these, mass production has been launched in a total of eight 12-inch wafer fabs operated by TSMC, Winbond, and Micron Memory Taiwan. In addition, TSMC is continuing to construct three new fabs in CTSP, including one 10 nm process fab, where the mass production has begun, and two 7nm process fabs, which are respectively currently under construction and in the installation stage. With such developments, CTSP will undoubtedly stand tall among global IC industry leaders.

A total of 40 tenants are in the biotechnology industry, including Orient Pharma, Yung Sheng Optical, Adimmune, Yushen Biotech, GeneReach Biotechnology, Singen Animal Health, Microware Precision, isRed Pharma & Biotech Research, Minima, and CH Biotech R&D, with a total planned investment of NT\$11.8 billion. Products

include vaccine pharmaceuticals, medical devices, and test reagents. As central Taiwan enterprises are effectively united, a biotech industry cluster is being formed.

In order to provide operational, management and technical services, 18 public utility companies such as Road Ahead Technologies Consultant, Balazs Asia and several gas suppliers have established operations in the Park. Gas is supplied by four suppliers, including Air Liquide Far Eastern, United Industrial Gases, Air Products, and Lien Hwa Commonwealth Corporation. Warehousing and logistics services are provided by Central Taiwan Science Park Logistics. Canon Semiconductor Equipment Taiwan set up a service site in the Park to provide production equipment maintenance and repair services to IC and flat panel display manufacturers. Solar power is provided in the Park by Sungen Power Corp, TronGen Power Corporation, and Sunrise PV Electric Power Two. Semiconductor and photovoltaic-specific material precision analysis services are provided by Balazs Asia.

Fifteen tenant companies, including Fomex, Fulltech, Bolymen, WFE, GKB, Orange Electronic, and Bigbest, are engaged in the computer and peripherals business. Tenants engaged in communications and digital content include INPAQ.



1. The AI Robotics Hub at CTSP was formally opened.  
2. The Minister without Portfolio Tsung-tsung Wu visited the AI Robotics Hub at CTSP.



## AI Robotics Hub Connects Technology and Innovation

With the advent of its first AI year, an AI Robotics Hub at CTSP was planned and established with funds from the Forward-Looking Infrastructure Plan to solicit international makers and maker communities, in the hope of equipping makers and talent with problem-solving capabilities by providing various services such as development of product prototype in small batches, accelerated counseling and incubation for startups, and patent, intellectual property and financial management, technology research and development services, plus collection and analysis of big data from drones.

## Talent Development Thru Experiential Learning

CTSP and central Taiwan industrial, academic, training and research sectors planned and formed a maker alliance to provide training courses through experiential learning. The courses include NVIDIA basics, open source software, image processing and hands-on advanced skills, DGX applications, FRC assembly, FIRA and PICKATHON contests, and an AI robot forum. More than 20,000 participants have attended these courses to date. In addition, the FRC event, launched in 2017, has been well received and successful in attracting more robotics students, boosting the number of participating teams from three to 20 in the FRC regional event.

## Subsidy Program Achieves Better Effectiveness

Resources from 33 satellite bases were consolidated to

develop professional talent and intelligent technologies, including special purpose robots (including a multi-axis smart robotic arm, polishing and grinding robot, underwater 3D reconstruction AI robot, and smart surgical glasses combined with a surgical robot). Visual and tactile sensor modules have also been developed for various types of robots in order to greatly improve the technologies required for smart robotics. The development of practical technologies helps to advance industrial technology to achieve better results.

## Establishment of a Sustainable Innovation Ecosystem

CTSP aims to establish a central Taiwan-based intelligent mechanical automation and intelligent development ecosystem. It works with the Smart Robot Industry Alliance through the AI Robotics Hub to identify problems facing the industry. In the future, CTSP will introduce an incubator function to achieve the goal of autonomous operations by 2021, and coach startups to establish a sustainable innovation ecosystem.

## Enhancing International Links to Deepen Influences

As of the end of 2018, memoranda of cooperation had been signed between the Bureau and 16 foreign science parks, including those in the United Kingdom, Spain, Russia, Japan, South Korea, Vietnam, China, India, Thailand, and Germany, as well as the Asian Science Park Association (ASPA). CTSP has joined three international science park associations – ASPA, IASP, and AURP – and the Federation International Robot-sports Association (FIRA). Technology exchanges with foreign science parks are undertaken on an ongoing basis to explore potential cooperation opportunities. In April, 2018, CTSP joined a delegation organized by the Allied Association for Science Park Industries to visit the International Investment and Trade Fair in Henan Province, China. In early July the same year, a quadrilateral memorandum of understanding was signed between Fraunhofer-Gesellschaft, or Fraunhofer Society for the Advancement of Applied Research, Friedrich-Alexander-Universität Erlangen-Nürnberg, Feng Chia University, and CTSP in Germany. Later, in mid-July, a trilateral memorandum of understanding was also signed between Karnataka Innovation and Technology Society (KITS), Hsinchu Science Park (HSP) Bureau, and CTSP in India. And, in late July, the Bureau visited the Hi-Tech Park and startup incubators in Beijing and Shanghai, China.

The Bureau also receives visitors from all over the world

in order to gain international perspectives via a variety of exchanges, injecting these fresh ideas into CTSP operations and management.

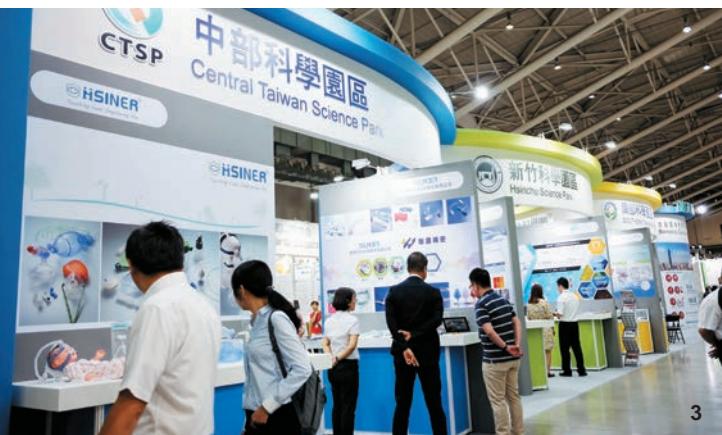
The CTSP Bureau actively participates in events and technology-related conferences organized by international science park organizations. In May, 2018, the Bureau, accompanied by CTSP tenant company DEH LAB, attended the International Forum and Startup Presentation, organized by Northern Science Park (NSP) in Chiang Mai, Thailand. The Bureau was invited to present our science park and AI Robotics Hub, while helping its tenants explore “New Southbound Policy” markets. In October, CTSP attended the 22<sup>nd</sup> Annual Conference of the Asian Science Park Association (ASPA) in Vladivostok, Russia to discuss ways that science parks can promote technological innovations and economic development with various science park representatives from all over the world. The Bureau is committed to strengthening ties with other science parks around the world to enhance its influence and visibility in the international community

## Continuous Efforts to Attract Investment

In 2018, the Bureau visited Germany in July, the United States in April and September, and Japan in December to solicit high-technology investment from overseas. We are keeping a close eye on other potential investment opportunities by foreign businesses.

1. *The Bureau visits science and technology-related institutes in Thailand.*
2. *A quadrilateral MOU was signed between 4 parties from Taiwan and Germany in Nuremberg.*
3. *Delta Electronics announced to invest more in CTSP at a press conference.*
4. *The launch of Japanese Yaskawa Electric Corporation's investment project in CTSP.*





**1. Haitian President paid a visit to the Bureau.**  
**2. Distinguished guests from the society gathered to celebrate the 15<sup>th</sup> anniversary of CTSP.**  
**3. BioTaiwan Exhibition 2018.**  
**4. Opto Taiwan 2018 – CTSP Pavilion.**

At home, six business presentations were held in 2018 to solicit businesses. One of these occurred at National Formosa University's Innovation Incubation Center on June 28. On July 13, enterprises approved for entry and prospective tenants were invited to visit Erlin Science Park. On Aug. 28, a business solicitation presentation was made at Forte Hotel in Changhua. On Sep. 17, a briefing was held for members of the Industrial Development & Investment Promotion Committee of Changhua County to recruit businesses for Erlin Science Park following an Erlin Park Development Project groundbreaking ceremony. On Dec. 12, a business recruitment briefing was held at Linkou Industrial Park Service Center to attract businesses from northern Taiwan. On Dec. 15, another business recruitment briefing was held at the Industrial Development & Investment Promotion Committee of Taichung City.

## Higher Visibility to Promote an Outstanding Image

With the slogan, "CTSP's 15<sup>th</sup> Anniversary with AI-Led Development", the Park celebrated its 15<sup>th</sup> anniversary on July 27 along with its tenants and residents from the surrounding neighborhoods. Awards were presented to

tenants for innovative products and excellent performance in the "Innovation Technology Development Plan for High-Tech Equipment", and to the Park's incubation center for nurturing outstanding startups.

In order to market CTSP, attract businesses and promote industries, the Bureau is eager to join large exhibitions and events at home and abroad, including the Photonics Festival in Taiwan, Bio Taiwan, and Taiwan Expo 2018 in Malaysia, to showcase its business performance and establish and strengthen its image as a high-quality science park.

When it comes to multimedia promotional materials, the Central Taiwan Science Park's 2017 Annual Report was published as an effective guide to the Park, providing CTSP information to high-tech enterprises around the world and helping attract businesses. The Central Taiwan Science Park Newsletter was first published on Aug. 5, 2004 and 171 editions have been published as of December, 2018. Each edition covers the latest CTSP news in order to publicize recent Park developments to the world. The publication is also simultaneously posted on the CTSP website.



# Building a Base Talent

## Innovative Startups Attract

### Diverse Learning at an Exemplary School

National Experimental High School (NEHS) at Central Taiwan Science Park was founded in 2010 with its Senior High Division and Junior High Division respectively opening in 2012 and 2018. In response to the growth of CTSP, the government's overseas talent recruitment policy and the need to develop bilingual, multicultural talent, the establishment of a Bilingual Division was approved by the Ministry of Education and students (grades 7 to 12) are expected to be enrolled from the 2019 academic year.

1. Excellent achievements in school admission: Among last year's 119 graduates who took the Taiwan General Scholastic Ability Test (GSAT), the average score for the school's top 25% performers was 67. The average score of the Mathematics Experimental Class was an outstanding 70. The average for the school's top 50% performers was 64, higher than the average of the nation's top 25% performers (63). The average for the school's test-takers was 61, higher than the average for the nation's top 50% performers (56). Over 80% of the school's students performed better than the average for the nation's top 75%, and more than half of students scored higher than 60. According to NEHS statistics for university admissions through the Star Plan, individual applications, and registration and placement, those admitted to the School of Chinese Medicine (Division A), national universities and overseas universities represent almost 70% of graduates.
2. Science and technology promotions and achievements:
  - (1) The Bureau implements a Subsidy Program for Satellite Bases to Promote AI & Robotic Technologies in CTSP to help achieve the MOST's goal of developing talent in schools. The school received two Best Poster Awards from Kanagawa International Science Forum (KISF) 2018 and Tsukuba Science Edge.



(2) Funded by the High Scope Program, students achieved great success in the Red Dot Award event in Germany. A study on piezoelectric power generation using self-made pressing units by our student team was selected (among three teams selected nationwide) to attend the 2018 Super Science High School Students Fair in Japan. The paper also won first prize at the Taichung City Primary & High School Science Fair and a Distinguished Honor Award at the National High School Essay Contest.

(3) NEHS students performed exceptionally well in various competitions, winning the Third-Class Award in the biology finals, fifth place in biology, and sixth place in the mathematics semi-finals at the National Mathematics, Sciences, and Communications Competition. They also brought home a gold medal from the World Mathematics Invitational (WMI), and earned first place in the Business Group at the Science and Business Fair organized by British University of Surrey and Lancaster University.

### 3. Reading, humanities and art:

(1) NEHS hosted the National High School English Debate Competition and organized the second foreign language experience activity in collaboration with Providence University to develop specialty courses on foreign languages. Its students won the Third Class Award at the National Senior High School English Vocabulary Test finals and the Junior High Division earned third place at the Taichung City Junior High School English Song Competition and Junior High School English Speech Contest.

(2) The school performed astonishingly well in various competitions, earning second, third and fourth places in the Taichung City essay, writing and mandarin reading competitions; 10 Honorable Mention Awards in the Calligraphy, Graphic and Comic categories at the National Students Art Competition preliminaries in Taichung City; Excellence Awards in the Computer Drawing Category for the Senior High School and Junior High School groups at the Taichung City Information Application Competition; a Class A Award (2<sup>nd</sup> place) at the High School Brass Quintet Competition; and a High Distinction Award and Excellence Award at the High School Student Book Report and Essay Contests.

4. International and community exchanges and interactions: NEHS teachers and students visited a partner school in Germany for short-term exchanges. Teachers and students from Hyogo Prefectural Toyooka High School, Kumamoto Prefectural Uto Junior and Senior High School, and Osaka Prefectural Senri Senior High School visited NEHS for cultural exchanges and the presentation of scientific papers. NEHS also hosted the "CTSP-Community Connection and Exchanges Concert" planned by the Bureau.

5. Exchanges with visiting groups: Groups included teachers from Guannan County in China's Jiangsu Province, the Center for Teacher Education at Da-Yeh University, an educational exchange group from Guangzhou No. 6 Middle School in China, teachers and students in Tunghai University Department of Architecture, and National Chi Nan University's Center of Teacher Education.

The sciences and humanities were taken into consideration in campus planning in the hope of enriching student's thinking and practices in all aspects via a cultivation of the humanities, thereby creating an ideal, high-quality academic institution with its own unique attributes.

- 1. The small, intensive German class helped students gain basic German speaking skills quickly and get an in-depth understanding of German culture.**
- 2. NEHS students attended the Kanagawa International Science Forum (KISF) in Japan.**
- 3. The unveiling of NEHS Bilingual Division.**



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## Industrial-Academic Cooperation:

### *CTSP Academia-Industry Consortium*

Since its founding in August, 2008, CTSP Academia-Industry Consortium has organized forums, academic lecture and large-scale job fairs. In recent years, it has united industrial, government, academic and research resources to tackle topics such as "innovation venture", "smart machines" and the "Internet of Things", continuously facilitated central Taiwan industrial development, and participated in innovation activities hosted by industry and academia. In an indirect way, it brings academia and industry together while enhancing the international competitiveness of central Taiwan's high-technology industries.

In 2018, the Bureau organized the "Information & Communications Technology Hands-on Competition", "Seminar and Competition on Creative Smart Flying Robots" and "Seminar and Competition on Creative 3D Printed Robots" in April; the "AI Master Forum Series—AI Forum" and "AI Master Forum Series—Smart Manufacturing Technology" in September; the "AI Master Forum Series—AI + Robot Technology Forum", "Precision Machine Tools & Automation Technology" Hands-on Competition and "2018 Seminar on Entrepreneurship" in October; and "AI Master Forum Series—Industrial AI" in November, all in the hopes of establishing a cooperative platform between CTSP, industry, schools and research institutes and enhancing industrial-academic links.

### *CTSP's Professionals & Technology Talent Development Program*

The Bureau annually organizes talent development and related management courses to provide CTSP employees with varied learning resources, promote Park workforce quality and develop outstanding professionals, thereby forging core and key capabilities of Park employees. Continued from the previous year, 13 physical courses in five categories were organized in 2018 with 439 participants. Digital learning courses were launched with a focus on "Business Operations in the Technology Industry",



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1. The "Multi-Axis Robotic Arm Application Practices" course allowed participants to actually operate the robotic arm.
2. The CTSP Director-General Chen Ming-huang presented the Innovative Product Award.



2



**From IP to IPO (FITI) Program – Picture of the startup team.**

providing Park personnel with a convenient, efficient education option.

#### *Strengthening Regional Cooperation – Advancement Project for Smart Machinery and Aerospace Industries in Central and Southern Taiwan*

In alignment with the Smart Machinery Policy and Aerospace Industry Upgrade Policy, the Strengthening Regional Cooperation—Advancement Project for Smart Machinery and Aerospace Industries in Central and Southern Taiwan was implemented in 2018 to close the talent gap in high-tech industries, bridge differences between industry and academia, assist local governments in promoting the “Capital of Smart Machinery”, and boost precision machinery industry output in central and southern Taiwan. Four demonstration production lines were installed in 2018 and attracted visitors from 60 companies. Two seminars on innovative ventures were arranged, letters of intent were signed with 11 research institutes, counseling was provided to 14 tenants, and NT\$64,400,000 was granted via six subsidies (including four research & development projects, one innovation project, one local connection project). The amount invested by companies was approximately NT\$99 million, 17 patents were filed domestically and 12 patents were filed overseas. Thirty-seven papers were released domestically and internationally, and nine research reports were published at home and abroad. A total of 102 people were directly employed and 68 R&D professionals and 67 masters and doctorate holders were trained.

#### *R&D Advancement Program*

The CTSP encourages its tenants to cooperate with schools and research institutes through the R&D Advancement Program in order to differentiate themselves from their peers, create high-added value and

cultivate the R&D talent required by the industry. In 2018, six subsidies were approved with approximately NT\$13 million granted, stimulating business investment of NT\$32 million in R&D. Ten patents were filed domestically and internationally, and 27 papers were published domestically and internationally. Fifty-nine people were directly employed and 19 masters and doctorate holders were trained. The scientific achievements of schools and research institutes can thereby also be commercialized.

#### *Leaders in Future Trends Program*

Talent recruited via the Leaders in Future Trends (LIFT) Program will primarily be placed in HSP, CTSP, and Southern Taiwan Science Park (STSP), including tenant companies, research institutes, academic institutes and hidden champions that do not have a presence in any science park, serving as a talent pool to attract overseas Taiwanese. In this way, the fresh thinking of overseas talent will stimulate local enterprises to develop industrial innovations and technological advances, while



**Picture of the FITI Entrepreneurship Development Camp.**



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1. 2018 CTSP Job Fair.
2. The job fair was attended by a large amount of job seekers.
3. Resume digitization and printing services were available at the job fair.



2



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connections between overseas talent and domestic industry, schools and research circles can be established to bring more talented individuals back to Taiwan.

#### *Science Park Talent Cultivation Plan*

The CTSP Bureau encourages colleges and area enterprises to jointly organize module courses and internships to help meet technology industry talent requirements. Internships allow students to gain practical experience, minimize the gap between theory and practice, and help fill job openings. In the 2018 academic year, subsidies for a total of 11 module courses at nine schools were granted with estimated 1,365 participants.

#### *CTSP Innovative Product Award*

The Innovative Product Award was established by the Bureau in an effort to encourage tenants to actively research and develop innovative products. On July 27, 2018, during CTSP anniversary celebrations, this award was presented to AUO for its 85-inch 8K/4K bezel-less ALCD TV display, and Nugentek Life Science Ltd. for its Liver Favor® Capsule and GeneReach Biotechnology Corp. for its POCKIT™ Micro Series Nucleic Acid Analyzer.

#### *From IP to IPO (FITI) Program*

To build an innovation economy and bring about transformation in the science parks, the “From IP to IPO” (FITI) Program was launched by the MOST and sponsored by National Applied Research Laboratories (NARL) in 2013. All science park bureaus provide internal and external resources and prepare various venture spaces and counseling and training services, including venture offices, consultations by successful Park business owners,

instruments and equipment from academic institutes, and related testing and verification services.

The program includes biannual competitions. In each competition, 40 teams are selected to move into one of the three science parks to receive counseling from the science park bureau. In 2018, 23 teams selected from the competition chose to be counseled by the CTSP Bureau, and three of them entered CTSP. In the innovation startup group, a total of seven teams set up companies. Another eight startups were introduced to CTSP. The Bureau helped these teams and firms understand business operation models and financial planning. To obtain counseling from mentors and industrial resources, six discussion sessions and coaching were held in 2018, and a business matching conference was held for allied science parks and startups in October. As of the end of 2018, the CTSP Bureau had coached 123 FITI selected teams, and 30 of them had launched businesses.

#### *Connecting Talent to Work*

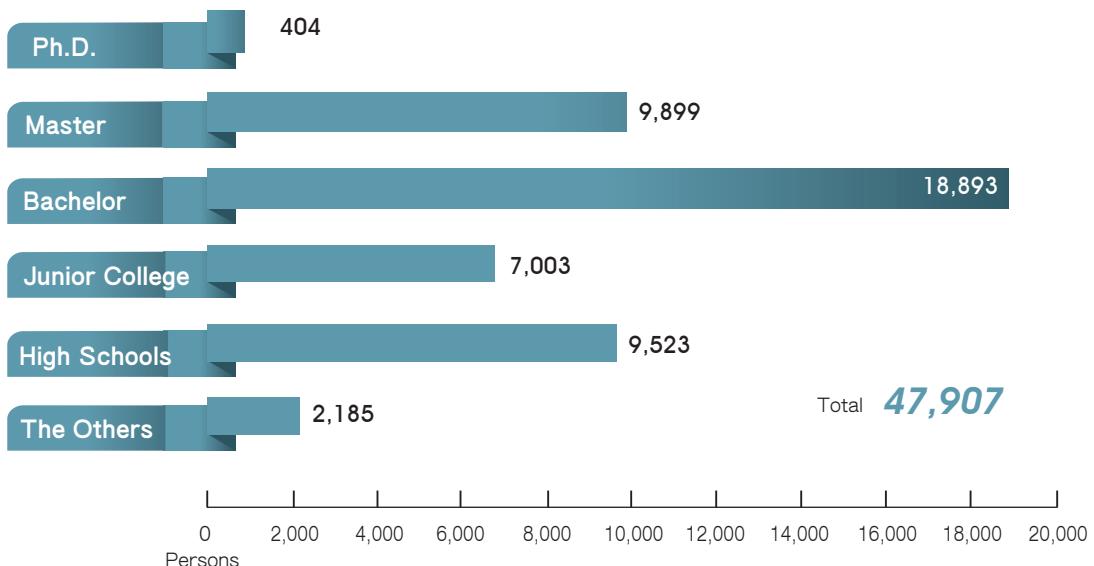
CTSP's ever-growing number of employees reached 47,907 in December, 2018 for a year-on-year increase of 4,377 (10.06%). The optoelectronics industry accounted for the largest share (40.44%), followed by the semiconductor industry (35.58%). When analyzed by education level, 75.56% of employees in CTSP have a college degree or higher. When analyzed by gender, the male-female ratio is 65.91% to 34.09%.



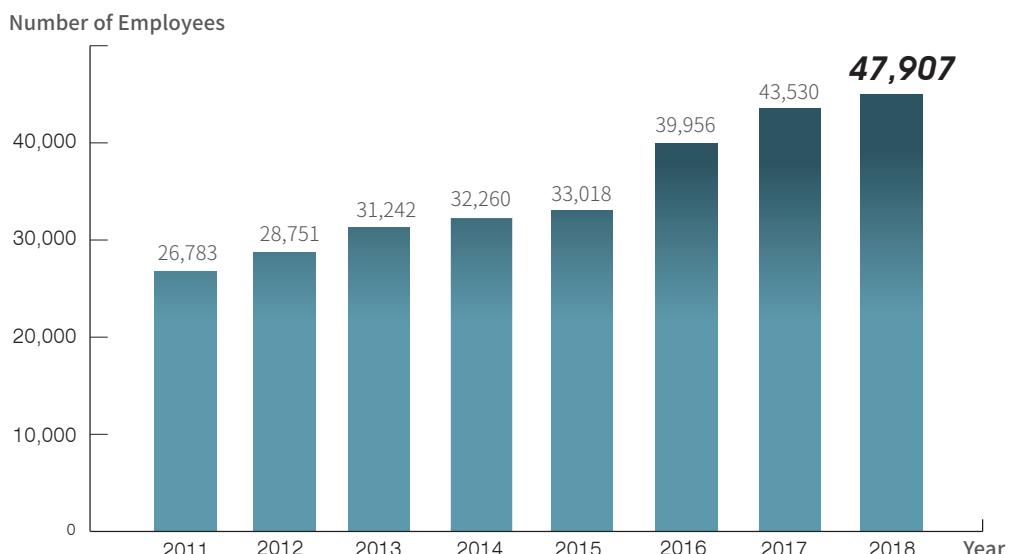
To assist CTSP tenants in recruiting top talent and local residents in finding employment, the CTSP Bureau collaborated with central and local governments to supply job matching services by arranging job fairs at Taichung City Employment Service Center (TCESC) on April 21 and Aug. 4, 2018, with 3,057 job openings provided by 57 enterprises. The matching rate at these events reached 45%. The CTSP Bureau also assisted

the Taichung-Changhua-Nantou Regional Branch of Workforce Development Agency, Ministry of Labor (MOL), and TCESC at two job fairs by encouraging its tenants to recruit employees at the events. In addition, the Bureau worked with the Yunlin-Chiayi-Tainan Regional Branch of the Ministry of Labor's Workforce Development Agency and with TCESC to host 63 recruitment events to meet the requirements of individual companies.

### Statistics of education level of employees as of December 2018



### Statistics of CTSP employees





# Profound Cultural Background

An Eco-Friendly, Humanistic, Quality Park

## A 10-Year Plan with A Broad Vision

To meet the development needs of new industries and the main Generation Z workforce in 2030, the Park will focus its efforts on promoting interdisciplinary, sustainable and intelligent attributes. In accordance with the "10-Year Plan for Science Parks," CTSP's developments will focus on the following:

1. A park of industrial clusters—Enhancing strengths and transforming in future industries  

With its advantages of existing business clusters in the precision machinery, biotechnology and aerospace industries, CTSP will develop smart automation system integration services and introduce smart healthcare technology, low-carbon emitting, lightweight and energy-saving industries.
2. A science park with demonstration spaces—Creating demonstration spaces, supporting emerging technologies, and leading industrial development  

The international-standard AI Robotics Hub at CTSP will serve as a co-working space for smart robot makers and startups. The Hub will help connect the R&D achievements and technologies developed by industrial, academic and training institutes with central Taiwan intelligent robot and precision machine manufacturers to lead development of Taiwan's AI industry.
3. A low-carbon green science park—Sustainable environment and a model green science park  

CTSP will develop itself to become a sustainable green science park in line with



innovations in its five major tenant industries. Measures include installation of solar photovoltaic panels and the Smart Street Light Project in Taichung Science Park. Smart wastewater treatment plants are also planned to achieve a goal of creating a smart, low-carbon, green, sustainable science park.

4. A model science park for the world—Creating ties with other science parks to drive exchanges for innovation startups and technology

For the last two years, CTSP has actively promoted international exchanges and cooperation by building partnerships with five science parks, joining international robot organizations, organizing international tournaments, and other efforts. CTSP and the U.S. FRC signed a letter of intent on Sep. 6, 2018 to develop domestic AI talent through competitions.

### **Preservation of Precious Files and History**

Founded in 2003, CTSP marked its 15<sup>th</sup> year in 2018. In the development stage of the first five years, Dadu Mt. was transformed from “soil to gold”, as sugarcane fields were turned into a high-tech community that scored many records. In order to fully preserve the history and evolution of CTSP, the Bureau had its five-year history compiled and printed (*History of Central Taiwan Science Park, 2008 edition*).

During the second five years, CTSP's development was documented with the “Oral History”, featuring objectively recorded interviews with 23 individuals from the CTSP Bureau, National Science Council (today known as the Ministry of Science and Technology), county and city heads, and leading tenants. Due to lack of funds, this history was not published until 2018 in the form of a book titled *The Oral History of Central Taiwan Science Park*.

During the third five-year period, CTSP saw reforms, expansion of Taichung Science Park, completion and



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1. *History of Central Taiwan Science Park and Dictation of Central Taiwan Science Park History* were compiled and printed to preserve the history of CTSP.
2. The business service platform app integrates business information, making it easier to search for information.
3. Modern electronic information technology is employed to provide convenient services.

operations of TSMC's 10 nm fab, promotion of AI robotics, and the Smart Science Park Project, all moving the Park into a fresh stage. In 2018, the “Compilation of the History of the Third Five Years Project” was commissioned (i.e. *History of Central Taiwan Science Park, 2019 edition*).

### **Convenient Services Available Online**

To provide a variety of business services to tenant firms and employees in the Park, the Bureau introduced related service companies as follows:

1. Industrial and Commercial Service Building: As of the end of December, 2018, a total of 32 firms had established a presence in the Park, bringing the occupancy rate to more than 90%. In addition to financial, healthcare, employment, postal, transportation, catering and related services, the Allied Association for Science Park Industries, Commercialization and Industry Service Center, ITRI Central Region Campus, Taiwan Laser Application Development Association, and Taiwan Optics/Optronics Manufacturers' Association were all introduced to the Park to reinforce business service efficacy. The “Business Service Platform” website was set up to provide information regarding 400-plus enterprises and integrate catering, financial and traffic apps, making it easy to search for information on mobile devices.
2. The Bureau visited CH Biotech and nearby service-industry businesses in Nantou County's Chung Hsing Science Park to observe and learn, with the goal of expanding and optimizing business services provided by the Bureau.





**Banks set up a presence at the Industrial and Commercial Service Building to provide banking services.**

3. To assist investments by returning overseas Taiwanese business people, a seminar on applicable tax law changes and optimized income taxes for these individuals was held. Representatives from the National Taxation Bureau of the Central Area (Ministry of Finance) Fengyuan Branch and Ernest & Young provided insights regarding international taxation issues, tax law changes and optimized income tax packages. In addition, the Bureau and National Taxation Bureau of the Central Area jointly created a "Joint Taxation Counseling Service for Returned Overseas Taiwanese Business People", staffed with personnel offering customized services and instant consultations.
4. Storage and transportation center: Warehousing, import/export warehousing, customs declarations, transportation, and logistics integration services are available to help Park businesses clear customs efficiently.

### Festival Fair and Sale for 'Win-Win-Win'

To meet CTSP employees' shopping needs during major festivals, the Bureau teamed up with the Allied Association for Science Park Industries, Taichung Bakery Association, Taichung Gift Association, and Taiwan Chief Executive Officer Club for Social Benefit to organize a Lunar New Year Fair and Mid-Autumn Festival Sale that included vendor booths on the first floor at the Bureau. Both events attracted a large number of CTSP tenants, employees and local residents with free food samples, special offers and raffle drawings for those making purchases.

At the Lunar New Year Fair and Mid-Autumn Festival Sale, the Bureau invited local vendors, promoted goods produced by local and charitable groups to employees and employee welfare committees at Park companies, and provided convenient shopping options to create a "win-win-win" situation.

The Bureau also offers efficient business registration services, including company and factory registration, tax



**Shuttle buses travel between science parks to provide convenient transportation.**

exemption, chattel mortgage, foreign professional work permit, annual financial statement review and legal advice assistance.

The Bureau has added more functions to its customs clearance system to provide comprehensive import/export customs clearance data and issue export/import licenses required for strategic high-tech goods and general goods. This has helped forge a quality trade environment with one-stop services, thereby saving time and money for tenant companies clearing customs.

The CTSP Bureau accepts bonded warehousing to reduce the financial burden of import duties. It also offers electronic handling of contracted processing for the bonded goods, the issuance of exit certificates, scrapping certificates and other tasks for better efficiency. Quarterly briefings are held to inform tenant companies of laws and regulations regarding foreign trade and bonded businesses, and information sessions are held to promote the Park's customs clearance system. The CTSP's customs clearance and bonded goods management systems simplify processes to improve tenants' overall efficiency and competitiveness.

Electronic services such as the "Common Purpose Information Service Systems in Science Parks", "Modification of Functions in Billing Business Management System" and "Science Park Customs Clearance System" are promoted with the use of modern information technologies to provide integrated applications,



management, review and money transfer information.

To save time and money, a dormitory and public space application platform was added to the CTSP Bureau's official website, allowing its tenant to apply for accommodations in Taichung and Chung Hsing Science Parks online without the hassle of mailing a written application form. Park maps and information regarding public facilities/services such as bike paths and free shuttle buses are also available online. An email account is provided for public suggestions and communications. In addition, a Facebook fan page was established for Bureau announcements in a bid to communicate, share and exchange information with the public.

In compliance with the policy to collocate the IT equipment of the MOST and Taiwan's three science parks and set up a large internal network, the CTSP Bureau's network framework was modified to better implement information security monitoring and safeguarding mechanisms. The Bureau also provides the following services to its tenants to facilitate the sharing of Park information security details and develop key information infrastructure protection mechanisms: consultations regarding technologies required to collect, analyze, and share domestic and international information on information security; vulnerability assessments; emergency response assistance; digital forensics; introduction of foreign technologies and applicable regulations; arranging or assistance with technology training, personnel training and seminars; and assistance with information security drills.

In collaboration with the MOST's "Development of Smart Science Parks with ICT Technologies Program", public Wi-Fi hotspots were set up and iTaiwan certification was launched to provide convenient Internet access.

1. Quizzes with prizes for movie showings at CTSP.
2. Houli Science Park invited its neighbors to visit Micron Memory Taiwan as part of its "Good Neighbor Program."
3. The 3x3 basketball games held in Huwei Science Park.



## Smart Disaster Prevention to Reduce Damage

CTSP's Intelligent Disaster Prevention System has been set up in Huawei Science Park and Chung Hsing Science Park. Based on the "Internet of Things for Disaster" concept, a flood forecast system employs various sensors such as rain gauges and water level gauges installed at key locations together with a big data processing platform to provide the latest status updates and six-hour and 72-hour forecasts for the Park in a timely manner to reduce potential flood damage.

### Automatic Monitoring of Wastewater Management

The "Smart Sewer System Operation and Management Plan" and "Smart Wastewater Discharge Emergency Response and Control Plan" are implemented with equipment installed to automatically monitor biological acute toxicity and sewer interceptions, issue real-time warnings when required, and monitor power for critical facilities such as the NEHS Water Treatment Pilot Plant and Wastewater Treatment Plant, so that Wastewater Treatment Plants can be managed intelligently through an artificial neural network, AI and professional management with the help of big data analysis.

## A Good Neighbor

To provide an understanding of the Park among our neighbors, borough wardens from communities surrounding Taichung Science Park were invited to visit



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1. The clean-up event in Huawei Science Park.  
2. CTSP Employee Clinic takes care of the health of employees in the Park.

the CTSP AI Robotics Hub. In 2018, borough wardens and elected officials from communities surrounding all parks under the umbrella of CTSP were also invited to visit our tenant companies, including CH Biotech in Chung Hsing Science Park, Micron Memory Taiwan in Houli Science Park, and Taiwan Ohara Optical Material in Huwei Science Park, for an overview of CTSP industrial development. Such interactions also boost employment opportunities and drive local development, while helping to make CTSP a good neighbor.

To promote healthy leisure activities, foster harmonious labor relations and facilitate exchanges between tenants and neighboring communities, a host of recreational activities, such as movie showings and Huwei Science Park's 3x3 basketball games, were held in 2018 for the physical and mental health of Park employees. The well-received CTSP movie-watching activities were first held nine years ago and a total of 16 film screenings took place at all parks in 2018. A huge 350-inch screen attracted CTSP employees, as well as over 2,000 residents from neighboring communities, to enjoy a feast of audio-visual entertainment.

To accomplish its goal of being a good neighbor, CTSP organized a clean-up event in 2018 to tidy up neighboring streets and beaches with participation by Park tenants, borough wardens and local residents, with the goal of raising public health awareness. Moreover, to maximize the benefits of the Good Neighbor Program, environmental clean-ups are always held alongside other efforts and activities such as waste recycling, greenification, energy saving, carbon reduction and environmental education. During special holidays, folk events are also organized to attract more participants, making CTSP truly a good neighbor to the community. Such events were organized seven times in 2018 and attracted a total of 500 participants.

## Transfer of Chung Hsing New Village with Phased Goals Completed

Since its takeover of Chung Hsing New Village on Jan. 1, 2011, the Bureau has actively launched various construction projects and maintained the original cultural landscape. To date, it has also completed its phased goals. In accordance with a decision made in Sep. 4 and 7, 2018 coordination meetings between multiple agencies regarding Chung Hsing New Village revitalization progress, all North Core Area and Central Living Area operations and staff were to be transferred to the NDC as of Jan. 1, 2019.

When the Bureau took over Chung Hsing New Village, 93 employees were transferred to CTSP. More recently, 35 staff members from the Public Property Management Division were transferred to the NDC. To express gratitude to these employees, a farewell party was held on Dec. 22, 2018. During this event, Bureau Director-General Ming-huang Chen thanked them for their efforts on behalf of Minister of Science of Technology Liang-gee Chen and expressed the hope that they would continue safeguarding the park as they always had.

## Various Events to Improve Labor Health

To foster a labor safety culture in CTSP and strengthen self-management capabilities among tenant companies, the CTSP Bureau actively provides assistance to the CTSP Industrial Safety & Health Promotion Association (ISHPA). Quarterly meetings are held to communicate safety and health regulations, exchange disaster prevention information, and share safety and health management experiences.

Eleven labor law seminars were held in 2018 to provide information regarding the Labor Standards Act, labor relations, Act of Gender Equality in Employment, workers'



retirement preparation funds, and employee benefits. In addition, meetings regarding gender equality in employment are regularly convened to solicit input for building a friendly LOHAS workplace. The CTSP Bureau also organizes various labor inspections in compliance with Ministry of Labor regulations, handles labor complaints in the Park, and continues to improve Park labor conditions to safeguard labor rights. When it comes to Park labor disputes, the Bureau actively mediates between employers and employees to reach settlements with appropriate solutions in accordance with the law.

In 2018, occupational safety and health inspections and counseling were undertaken on a project basis, with a total of 16 project inspections carried out. In addition, 616 labor supervisions and inspections, 15 information sessions, a visit to companies with great practices, and one seminar were conducted. The "Occupational Disaster Prevention Exhibition on National Tour" was also hosted in partnership with the Institute of Labor, Occupational Safety and Health (ILOSH) to raise public awareness of occupational safety and health hazards through entertaining games.

In 2018, the CTSP Bureau partnered with Winbond Electronics Corp. to organize a disaster prevention drill at CTSP with the participation of relevant units. The objective was to establish proper coordination and communication mechanisms between rescue teams and tenants through regular disaster prevention and joint drills that will enhance the overall safety protection and response in the Park.

When the CTSP promotes labor safety and health, and counsel and implement labor inspections, mechanisms such as one-stop services, prior safety assessments and counseling, and information technology are adopted to enhance tenants' autonomous management and participation by all tenants. Disaster prevention resources are employed in diverse ways to reinforce overall safety and health, facilitate labor health, and improve the efficacy of labor inspections in the Park.

## Eco-Friendly Construction Protects the Environment

### *Protecting the Environment for Sustainable Development*

To improve the autonomous management of wastewater effluent quality, the Wastewater Treatment Plant in Houli Science Park was certified by Taiwan Accreditation Foundation (TAF) for its testing lab in September, 2013 and also certified by the EPA's National Institute of Environmental Analysis (NIEA) as an environmental measurement institute in July, 2017. There are a total of 28 certified items, including sampling, conductivity, suspended solids, total dissolved solids, water temperature, true color (chromaticity), hexavalent chromium, villiaumite, dissolved oxygen, hydrogen ion concentration index, total phosphorus, orthophosphate, biochemical oxygen demand, chemical oxygen demand of industrial wastewater, sampling personnel qualifications, biological acute toxicity of pseudorasbora parva and water fleas, and heavy metals (12 items). In addition, the Wastewater Treatment Plant in Huwei Science Park was certified by TAF on Nov. 21, 2014 and the Wastewater Treatment Plant in Taichung Science Park was certified by the NIEA on Feb. 15, 2016.

### *Enhanced Nitrogen Removal in Wastewater Treatment*

The Wastewater Treatment Plant in Taichung Science Park has a total capacity of 145,000 CMD. As of the end of 2018, the ammonia nitrogen concentration in the effluent had fallen within the regulatory standard (30 mg/L). Regarding the Wastewater Treatment Plant in Houli Science Park, the ammonia nitrogen concentration



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1. Experiencing how to prevent falls from scaffold.  
2. 2018 annual joint disaster prevention drills.

in effluent in 2018 averages 0.63 (ND~8.68) mg/L which is much better than the effluent standard.

#### *Total Pollutant Discharge Control*

Since all parks under the umbrella of the CTSP Bureau are EIA-approved areas, controls on total pollutant discharges are required. Before entering the Park, incoming tenants must submit forecasts for business pollutant discharges to the CTSP Bureau for review and approval. When moving into the Park, all businesses are required to apply for air, water and waste discharge permits. Permits for stationary air pollution sources must be reviewed by both the Bureau and local authorities.

#### *Comprehensive Sewer System*

Rainwater drainage systems are kept separate from sewer systems constructed in every park. Domestic wastewater and business-generated industrial wastewater are all collected by the sewer system and treated in three stages to meet national effluent standards and strict EIA standards before being discharged. In 2018, such controls extended to 147 tenants in Taichung Science Park, 16 tenants in Houli Science Park, one in Chising Science Park and eight in Huwei Science Park.

#### *Enhanced Monitoring for Environmental Protection*

Within all parks under the umbrella of CTSP, environmental monitoring is implemented annually in accordance with the environmental monitoring plan specified in the EIA report. In addition, random, parallel sampling is undertaken to ensure the data accuracy. In 2018, a total of 3,363 items were inspected.

#### *Environmental Inspection Meetings*

EIA tracking is performed on a quarterly basis in a science park selected by the MOST from HSP, CTSP and STSP. In 2018, a total of 10 environmental inspection team meetings

were convened in all parks, with one preparatory meeting held in Houli Science Park and one discussion session regarding an establishment guidelines correction for Erlin Science Park organized. The EPA also arranged eight on-site environmental assessment inspections and four meetings for the Development Project EIA review monitoring team.

#### *Transparency of Data*

In 2018, data from real-time air quality monitoring stations, results of the Environmental Monitoring Plan, Houli Science Park Environmental Protection Monitoring Team-meeting minutes, and the science park occupational safety and health management information system were all publicly available via the CTSP Bureau website.

#### *Environmental Education with Impressive Results*

Taichung Science Park's Wastewater Treatment Plant was certified as an environmental education facility on July 30, 2018. Two courses, "Introduction to Waste Water World" and "Adventure in Wastewater World", focusing on water resources and the wastewater treatment process are offered to promote the importance of water conservation. In 2018, a total of 13 environmental education sessions, 18 visits to the plant by foreign visitors, and one "Good Neighbor" event campaign were held and attracted approximately 1,200 participants.

Huwei Science Park's Wastewater Treatment Plant was certified as an environmental education facility on May 10, 2016. As of 2018, a total of 34 visits to the plant had been taken by 864 visitors.

Houli Science Park's Wastewater Treatment Plant was certified as an environmental education facility on Feb. 16, 2017 as the first Taichung Wastewater Treatment Plant to receive such certification. As of 2018, a total of 95 visits to the plant had been taken by 3,360 visitors.



*Environmental monitoring in Houli Science Park.*



*Environmental education given in the Wastewater Treatment Plant in Huwei Science Park.*



**1. Solar energy generation in the Wastewater Treatment Plant in Taichung Science Park.**

**2. The public construction of the Phase II Expansion Project in Taichung Science Park – distribution reservoir.**



## Science Park Construction Moves Toward Completion

### Phase II Public Construction

The Phase I Expansion Project in Taichung Science Park was completed in September, 2016 to meet the operational requirements of tenants by setting up public facilities such as roads, water lines, wastewater and telecommunications. TSMC concurrently constructed its new 10 nm fab and began operations as well as mass production after various tests were passed.

As a continuation of the earlier development project, Phase II public construction was launched in 2016 by the Bureau. Replicating construction methods carried out in the previous phase, temporary drainage facilities surrounding the development site were first built and connected to the drainage system built in the previous phase to reduce the risk of mishaps during construction.

As Phase II public construction and construction of TSMC's P6 and P7 fabs were carried out in parallel, areas under construction were enlarged and less space was available. The newly constructed fabs also brought in a tremendous number of personnel and vehicles after operations started. This meant that construction in this stage was no easier than in the previous phase. Thanks to previously-built communication mechanisms and cooperative experience, challenges such as construction interfaces and overlapping traffic routes were progressively

coordinated and solved through cooperation between the public and tenant construction teams. With Phase II public construction completed as planned in December, 2018, the road network in the expansion area has been brought to perfection and future water demands can be met. Furthermore, newly completed support facilities and landscaping in the west area will drain water to prevent flooding and help create an attractive Park landscape and ecology.

### Water Conservation for Sustainable Water Resources

To tackle water shortages in Taiwan, the government actively advocates water conservation, effective management, flexible allocation and diversified development of water, as solutions to Issue 2, "Water and Development – Water Conservation for Sustainable Water Resources", raised at the 2016 National Water Forum to improve water efficiency. To reach the national goals of industrial energy saving and carbon reduction set out in the "National Guidelines on Green Energy and Low Carbon", the CTSP's goals are to promote greenhouse



- 1.** Thanks to landscaping in the surrounding area, the detention ponds function as both a disaster prevention facility and recreation space.
- 2.** The inauguration of an environmental education facility was attended by the CTSP Bureau, Environmental Protection Bureau of Taichung City Government and Environmental Professionals Training Institute.



gas reduction and counsel Park tenants regarding such reductions.

In 2007, the CTSP Bureau launched a water-saving technology counseling program, promoting water conservation methods helping CTSP firms increase water recycling rates, and identifying water-usage problems to develop solutions. In 2014, an energy-saving technology counseling program was initiated to offer recommendations regarding optimal power models and assessment of strategy to enterprises in various industries to assist them in saving energy and reducing carbon emissions.

#### *Industry, Government, Academia and Researchers Work Together to Save Energy*

In partnership with academic institutes and ITRI, CTSP produces data on water usage and has established water efficiency assessment mechanisms. Through on-site diagnosis, businesses develop an optimal water-saving strategy after bilateral participation of and communication between counseled enterprises and advisors in order to improve water efficiency, keeping abreast of Park water usage while simultaneously establishing water-saving target management mechanisms.

When it comes to energy saving, expert assessments and recommendations regarding improvement of energy conservation in the power system and architecture, energy usage and conservation are sought to further save power, reduce carbon emissions and maximize the sustainable effectiveness of energy saving and carbon reduction.

#### *Sharing Experiences to Upgrade Technology*

Each year, CTSP informs its tenants of the government's latest water and power policy through experience-sharing lectures and educational training delivered by water and energy saving experts and scholars. CTSP is keen to introduce new measures and thinking regarding water and energy saving to enhance the Park's competitive edge, and constantly promote the reduction of greenhouse gas emissions. The Bureau also coaches its tenants to achieve the national energy and carbon reduction goals CTSP endeavors to implement. The focus of 2018 lectures was "The Ideal and Reality of Reclaimed Water Utilization",



"Green Power Certification" and "Solar Photovoltaic System and Energy Saving Technology".

## Public Art Invites Public Participation

Musical and performance groups/clubs are invited to perform in collaboration with resources from local schools to encourage citizens to join "Public Participation in Public Art" Project initiated and implemented by the Bureau to gain deep understanding of public arts.

In 2018, the content of this project was predominantly performances, including stage plays (by Open Theater Group), western music (by NEHS), Chinese music (by Wen Shao Xuan String and Woodwind Indoor Orchestra and Golden Melody Award laureate Johnny Yin), and dance (by Mad Theater), taking place in the Bureau's Meeting Room 101 on weekend evenings. In addition to providing entertainment for Park employees and local residents, these well-received performances created a diverse artistic environment for both the school and Park, effectively fulfilled the intended purpose and effect of public art, and brought the Park, school and community closer together.

### Flying AI in Blooming Flowers

CTSP's Phase III Public Art Installation Project is based



*The performance of NEHS Orchestra and Butterfly Orchestra gave the audience a great time.*

on the CTSP's Houli Science Park, with "Green Energy, AI, Sustainability" as its theme. Its aim is enhancing the harmony between the artwork and environment as well as incorporating the CTSP development goals of "Smart CTSP, Innovation Driven, Low-Carbon Science Park, and Co-prosperity with the Community" into a piece of art. The artwork, by Blue Dragon Art Company in partnership with a French artist, was selected in an open selection in June, 2018. Presented with an original "Flying AI" flower metaphor fused with local cultural elements, the piece creates an artistic landmark replete with Houli features and represents CTSP's vision and spirit of linking the land with dreams and connecting the future with happiness.



*"CTSP's Phase III Public Art Installation Project - Flying AI - One".*

# Macro View | Prospects for 2019



With its 2018 success in revenue and employment and tenant numbers, CTSP will focus its 2019 efforts on the following:

## 1. Building an innovation startup ecosystem

- Building an innovation startup ecosystem in CTSP: The Bureau will focus its efforts to help AI and robotics startups grow into technology firms with the equipment and space of CTSP AI Robotics Hub in the same way that accelerators cultivate startups, in order to keep the advanced technology as well as boost output and employment opportunities in the Park.
- Promoting industry-academia cooperation to drive the industrial research and development: The CTSP Bureau will continue promoting the "Strengthening Regional Cooperation – Advancement Project for Smart Machinery and Aerospace Industries in Central and Southern Taiwan", "Biochemical Industry Innovation Accelerating in Central Taiwan Program" and "Research & Development Advancement Program" to sharpen its industrial competitive edge.
- Helping to develop startups in accordance with the Act for the Establishment and Administration of Science Parks: The limit on incubation periods and requirements for entry will be eased to encourage diverse industrial innovations.
- Promoting the Academia-Industry Consortium in CTSP in partnership with advantageous industries in central Taiwan and enhancing cooperation and exchanges between industries and schools: CTSP will actively promote collaboration between industries, government, schools and research institutes through innovative technology or innovative entrepreneurship



forums, as well as business or industry-academia matching conferences and exchange meetings between industries, government, schools and research institutes.

## 2. Moving toward a Hub for the Multi-Trillion High-Tech Industry

- Accelerating development and business recruitment in Erlin Science Park: CTSP will complement public infrastructure, build industry clusters, and create a favorable investment environment for both software and hardware to create job opportunities locally.
- Building a sound investment environment, improving living functions in the Park, and attracting businesses and talent: CTSP aims to forge a quality science park through initiatives such as "Stable Supply of Water and Power", "Friendly Public Services" and "Convenient Transportation".
- Creating a smart CTSP through the Smart Science Park Program: The Bureau plans to optimize Park management and maintenance with smart technology to make it a highly efficient facility.

## 3. Exploring New Opportunities for the Park by Connecting to the World

- Establishment of the NEHS Bilingual Division in line with the National Bilingual Policy: The school will introduce internationally-certified courses and teachers to create an

international campus, making it the leading international science school in central Taiwan.

- Establishing ties with more science parks in line with the New Southbound Policy and maintaining involvement with international organizations: CTSP will establish partnerships with science parks in New Southbound Policy countries to increase its international visibility.
- Connecting startups with international exchanges: CTSP will help startups to create international links via CTSP's international cooperation platform.

## 4. Creating a Model Green Science Park for the World

- A sustainable park: A science park with sustainable energy will be developed through green transportation, green building and water-reuse initiatives.
- An eco-friendly park: The science park will promote eco-friendly development with low environmental impact through the "Eco-Friendly Community", "Park Greenification" and "Water Conservation Demonstration Zone" projects.
- Green energy, circular economy industries and solar power generation: CTSP will continue to assist its existing tenants in installing solar photovoltaic equipment and introduce green energy industries to create a sustainable green industry innovation ecosystem.



# Milestones in 2018

## Jan. 5

The "Preparation Plan for Chung Hsing Science Park (Second Amendment)" was approved in official letter Yuan-Tai-Ke No.1060042990, with the original name "Advanced Research Park at Chung Hsing New Village" revised to "Chung Hsing Science Park".

## Feb. 9

Japanese manufacturer Yaskawa Electric Corporation announced its CTSP investment project at a press conference attended by Minister of Science and Technology Liang-gee Chen, CTSP Bureau Director-General Ming-huang Chen and Taichung City Mayor Chia-lung Lin. The company's plant construction project in Taichung Science Park—evidence of CTSP's appeal to high-tech manufacturers—has been launched.

## Feb. 9

The inauguration of the AI Robotics Hub Exhibition Center at CTSP marked the official launch of the Hub's exhibition space.

## April 13

FIRA President Jacky Baltes presented a FIRA membership certificate to CTSP Bureau Director-General Ming-huang Chen at the 2018 FIRA RoboWorld Cup Flag and Membership Presentation press conference, which included remarks by Minister of Science and Technology Liang-gee Chen.

## April 25-28

CTSP Chief Secretary Mei-xiu Lin led a delegation to the 2018 FIRST Championship venue at COBO Center in Detroit to discuss the possibility of Taiwan hosting the 2020 Regional Competition with FIRST President Donald E. Bossi and head of FIRST Robotics Competition (FRC) Daniela Rus.

## May 4

A press conference was held by the MOST to announce a plan by Delta Electronics, Inc. to establish a Robotic R&D headquarters in CTSP. The press conference was hosted by Minister of Science and Technology Liang-gee Chen and attended by CTSP Bureau Director-General Ming-huang Chen, Delta Electronics President Yancey Hai and other guests.

Jan

Feb

Mar

Apr

May

Jun

Jul

## May 22-27

CTSP Bureau Director-General Ming-huang Chen led a delegation to visit science and technology related institutes in Bangkok and Chiang Mai, Thailand and reinforce connections between science parks and industries, schools and research institutes in Taiwan and Thailand in accordance with the government's New Southbound Policy.

## May 23

The EIA for the Phase IV Development Project in Erlin Science Park was passed in the 331<sup>st</sup> EIA Review Meeting held by the EPA.

## May 30

Haitian President S.E.M. Jovenel MOÏSE led a delegation to visit CTSP and was received by Bureau Director-General Ming-huang Chen.

## June 13

The Phase II EIA for the Chising Science Park was passed in the 332<sup>nd</sup> EIA Review Meeting held by the EPA.

## June 19

The opening ceremony of CH Biotech's Global R&D Center and Headquarters was held in Chung Hsing Science Park. Deputy Minister of Science and Technology Yu-chin Hsu and CTSP Bureau Director-General Ming-huang Chen were guests at the ceremony.

## July 9-15

CTSP Bureau Director-General Ming-huang Chen visited India to sign a trilateral Memorandum of Understanding with the Innovation and Technology Society in Karnataka, India and Hsinchu Science Park Bureau to establish a Taiwan-India technology exchange platform.

## July 27

CTSP celebrated its 15<sup>th</sup> anniversary with the slogan "CTSP's 15<sup>th</sup> Anniversary with AI-Led Development".



## Aug. 4

The 2018 CTSP Job Fair took place with over 2,000 participants and 1,521 resumes submitted. The job-match rate was about 48%.

## Aug. 6-11

2018 FIRA RoboWorld Cup was hosted by the CTSP Bureau. The grand opening was jointly officiated by Minister of Science and Technology Liang-gee Chen, CTSP Bureau Director-General Ming-huang Chen, Taichung City Mayor Chia-lung Lin, FIRA President Jacky Baltes and guests from the government and academia. A record-breaking number of 1,208 participants in 277 teams from 12 countries participated in the tournament.

## Aug. 21

The EPA agreed that the (second) environmental impact comparative analysis report (final version) for Taichung Science Park Expansion Project be preserved for future reference.

## Sep. 6-17

Deputy Minister of Science and Technology Yu-chin Hsu led HSP Bureau Director-General Wayne Wang, CTSP Bureau Deputy Director-General Wen-fang Shih, and STSP Bureau Director-General Wei-cheng Lin to Silicon Valley, San Francisco and Boston to hold seminars regarding business recruitment for Taiwanese science parks and discussion sessions with venture capital firms from Silicon Valley, North America Taiwanese Engineering & Science Association (NATEA), and Monte Jade New England (MJNE).

## Sep. 6

A letter of intent signing ceremony between CTSP Bureau and FIRST and a sharing session were held. Witnessed by Deputy Minister of Science of Technology Yu-chin Hsu and the ESUN Robot Association, CTSP Bureau Director-General Ming-huang Chen and FIRST President Donald E Bossi signed the letter of intent. This was followed by a keynote speech delivered by Mr. Bossi.

## Sep. 17

A joint groundbreaking ceremony for Erlin Science Park Development Project and construction of its tenant(s) was officiated by Premier Eric Lai and Bureau Director-General Ming-huang Chen, Changhua County Magistrate Ming-ku Wei, Allied Association for Science Park Industries Secretary-General Chih-yuan Chang and tenant representatives. A seminar on business recruitment for Erlin Science Park took place soon after the ceremony.

Aug  
Sep  
Oct  
Nov  
Dec

## Oct. 16

Industry, school and research institute experts from Germany and the U.S. were invited to share insights on the latest AI developments and future trends at the 2018 International AI Robotics Forum.

## Nov. 15-17

The first Pickathon, an AI-controlled robot arm contest, was held by CTSP Bureau at the AI Robotics Hub.

## Dec. 4-5

The 2018 CTSP AI Robotics Hub Joint Achievement Exhibition took place at the AI Robotics Hub, showcasing advanced AI technologies and achievements from more than 50 enterprises and institutes nationwide.

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