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NATIONAL TSING HUA UNIVERSITY

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NTHU's University Development Advisory Committee met on December 4, 2017 and a number of leading scholars and experts were on hand to give suggestions.

MAPPING OUT THE FUTURE OF EDUCATION AT NTHU

NTHU's Development Advisory Committee met on December 4, 2017 and a number of leading scholars and experts were invited to offer suggestions and their vision on the future development of NTHU. After listening to the reports from each of the ten colleges, the committee discussed such matters as enrollment, internationalization, administration, and the developments which have taken place in the first year of the merger of NTHU and the National Hsinchu University of Education.

This year the committee adopted a new format whereby all the reports were presented to the entire committee; reports from the five colleges in science and engineering were presented in the morning while the other five colleges in the humanities and social sciences presented theirs in the afternoon. Afterwards, the committee members and university administrators engaged in a lively brainstorming session which NTHU President Hocheng Hong found to be highly fruitful.

Cultivating Talent by Increasing Student Diversity

Academician George C. Tiao, who has an honorary doctorate from NTHU, said that he hopes to see more emphasis placed on teaching young people how to think and to nurture their desire to learn. In response, President Hocheng pointed out that Dr. Hu Shih once said, "As you sow, so shall you reap," and indicated that by the same token student recruitment shapes the configuration of student population. He added that this is why, in addition to traditional admission channels, NTHU has been giving more emphasis to its special admission program as a way of increasing student diversity and recruiting creative students who know how to think independently. President Hocheng also said that students' learning motivation comes from studying a subject they really enjoy. Thus NTHU has set up a dual-major track for students with a high degree of initiative and motivation. Such flexible measures allow students to design their own program, so that those who are not yet sure about their future direction can acquire a core competence in two fields; providing them with more space to maneuver when it comes time to seek employment or further education.

Prof. Chu Yun-han, an Academician at the Academia Sinica praised the University's emphasis on teaching, as can be seen in the interdisciplinary curriculum offered by the Tsing Hua College, but also urged that more emphasis needs to be placed on students' acquisition of basic abilities, adding that the Tsing Hua College might want to give outstanding students more academic flexibility. Prof. Chu also indicated that the earliest

ⓐ NTHU President Hocheng Hong (standing) responded to the valuable suggestions provided by the Committee.
ⓑ Former President Frank Shu presenting his view.

universities were not divided into departments or majors, and that these divisions were a later development, but such era was long gone. We are faced with a changing society and if NTHU is to remain a top university, in the next 5 to 10 years it will have to have teachers who are sufficiently familiar with emerging areas of knowledge.

Former President of Huafan University, Prof. Jue Jien-Ming, said that the environment of higher education in Taiwan is hampered by shrinking resources as well as an over emphasis on short-term goals, adding that a school's long-term development largely depends on how well its president allocates these limited resources. Jue also said that today's teaching methods and classroom configuration are something passed down from the industrial age, and that it's now necessary to adopt new learning and teaching models in accordance with the technological and social changes that we are facing.

Integrating Interdisciplinary Resources

Prof. Chu suggested that NTHU should expand its vision beyond Taiwan. He also noted that the recent merger of National Hsinchu University of Education with NTHU has provided a new opportunity conducive to innovation. Although the Colleges Education and the Arts have been integrated, there is still room for improvement in the integration of the humanities and social sciences. He suggested that since NTHU already has an experimental primary school, the next logical step would be to make use of the resources of the College of Education and to establish an experimental high school which will contribute to the future development of Tsing Hua.

Former Minister of Education Huang Jong-tsun suggested that, in view of the recent merger, the College of Education should consider making use of NTHU's science education resources to promote the internationalization of primary and secondary schools in Taiwan, and that the College of Arts can make good use of NTHU's excellent strength in science and technology to carry out internationalization and interdisciplinary cooperation in art, music, and design.

Former NTHU President Liu Chung-laung said that the goal of higher education is not simply to help students succeed in the job market, but to cultivate their talent so that they can make a lasting contribution to society. Liu continued that the orientation of higher education should be aimed at

comprehensive education, basic education, and education which keeps pace with the times, and that these should not be merely slogans, adding that providing education that keeps up with the times means that teaching materials must be continuously updated. The most important thing is to encourage students to establish an international outlook through such means as curriculum development and providing

opportunities for studying abroad and international exchanges.

Drawing up a Development Map Informed by Core Values

Liu Chao-shiuan, also a former president of NTHU and the convener of this year's meeting, said that NTHU has a long tradition of academic excellence, and that in recent years it has been giving more attention to diversification and social service. Thus NTHU needs an innovative program that will have a major impact on Taiwanese society so that its academic status will not falter. Former President Frank Shu suggested that the executive in charge of administration should formulate a road map of school development and conduct annual reviews based on the suggestions put forward at the previous meeting of the committee. Academia Sinica Academician Huang Pien-chien said that NTHU should set its direction first and then do its best according to its ability. He also asked why NTHU seems to give more importance to recruiting students from Southeast Asia than to keeping talented people in Taiwan, and asked if it's worth all the resources invested when lots of these students can't even speak Chinese. Huang also pointed out that in addition to recruiting famous academics from abroad, it's also important to recruit up-and-coming young scholars.

Using Tsing Hua 3.0 Road Map to Respond to the Challenges

President Hocheng said that while the University has already been in Taiwan for 60 years, by international standards it's still in its adolescent stage, as can be seen in its continual expansion, with a new college being added about every ten years. He also said that each addition requires a review of NTHU's positioning and educational focus. Quoting the *Lantingji xu*, President Hocheng said, "As we of the present look upon those of the past, so will our posterity look upon what we do presently," and that it is very hard at present to foresee the future of NTHU. He also said that after reflecting on the past 60 years of constant change, the Tsing Hua 3.0 road map was adopted to facilitate the cultivation of people with cross-disciplinary expertise in science, technology, and the humanities, and to respond to the challenges posed by our changing environment.

ⓐ Former NTHU President Liu Chung-laung said that the goal of higher education is to cultivate talent so that graduates can make a lasting contribution to society.
ⓑ A wide array of scholars and experts attended the meeting and provided suggestions.
ⓒ Professor Lai Chih-huang (left), Dean of the College of Engineering addressing the Committee.

NTHU PRESENTED FOUR PAPERS AT THE ISSCC

From left: Prof. Liu Ren-shuo, Prof. Hsieh Chih-cheng, Prof. Chang Meng-Fan, and Prof. Tang Kea Tiong.

Faculty members and students of the Department of Electrical Engineering presented four papers on the usage of critical memory wafers in artificial intelligence (AI) at the 2018 International Solid-State Circuits Conference (ISSCC) held on February 11-15 in San Francisco—the highest number of papers of all EE departments in Taiwan and the sixth highest in the world, a distinction shared with the Department of Electrical Engineering at the University of California, Berkeley.

The Memory Design Lab led by Prof. Chang Meng-Fan of the Department of Electrical Engineering presented three papers, in comparison to one paper each presented by its counterparts at the Massachusetts Institute of Technology, Stanford University, and the University of Illinois.

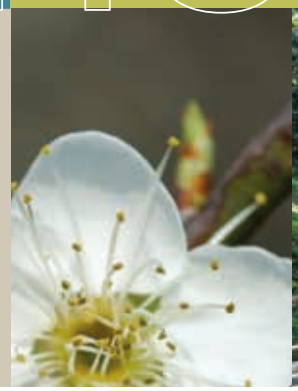
The Department of Electrical Engineering has four different research laboratories developing computer circuits in non-volatile memory suitable for use in AI. These labs are led by Professors Tang Kea Tiong, Hsieh Chih-cheng, Liu Ren-shuo, and Chang Meng-Fan. Two of their research papers were presented at the ISSCC.

"Non-volatile memory" refers to digital data that doesn't disappear when the current is turned off, and is now widely used in portable electronic products. According to Prof. Chang, in the past memory didn't need to have computing power, but memory which can simultaneously handle storage and computing is crucial to the development of next generation artificial intelligence. Prof. Chang explains that integrating the computer circuit into the memory allows the chips to simultaneously store data and carry out computing functions, thereby improving processing efficiency and saving energy, which is vital to the future development of AI products. For example, if a particular unmanned aerial vehicle (UAV) can currently fly for 6 to 10 minutes, when this kind of new computing chip is used to reduce its power consumption, it will be able to fly for about 60 minutes.

Together with TSMC, Prof. Chang's team has designed and produced a spin-transfer torque magnetic RAM (STT-MRAM) chip which is the fastest one ever been made, and is likely to become the next generation of memory material. Their research paper was presented at the ISSCC.

By improving the technology used for capacitor array slicing and multiple sampling, Prof. Hsieh's team has successfully translated sound, light, and smell into digital signals that allow online shoppers to sample the products they are interested in buying. Their research paper was presented at the ISSCC.

According to Chang, as the premier showcase for the latest advances in IC technology, the ISSCC gives priority to



papers presenting new technologies which are in or near the production stage; thus his team's cooperation with TSMC was especially important. Doctoral student Chen Wei-How, a member of Chang's research team, smilingly recalls how in the final stage of the project they were getting less than 6 hours of sleep each night, and that only by mutual encouragement were they able to carry through to the finish line.

Chang says that in response to the increasing importance of AI, his department has begun to offer a number of related courses, including Deep Learning, Big Data Analysis, Machine Intelligence, High-performance Computer Operation, and IC Chip Design in recent years.

Taiwanese researchers presented a total of 16 papers at the ISSCC; the only countries presenting more papers are the United States and South Korea. Among these 16, 9 are from academia (4 from NTHU, 3 from National Chiao Tung University, and 1 each from National Taiwan University and National Cheng Kung University), and 7 from industry (3 from MediaTek, 3 from TSMC, and 1 from eMemory Technology.)

The ISSCC is sponsored by the Institute of Electrical and Electronics Engineers (IEEE). With a history of 65 years, it is the foremost global forum for presentation of advances in solid-state circuits and systems-on-a-chip.

NTHU's Department of Electrical Engineering presented four papers at the 2018 ISSCC, the sixth highest in the world, a distinction shared with the Department of Electrical Engineering at the University of California, Berkeley.

NTHU AWARDS HONORARY DOCTORATE TO FAN-CHENG TSENG

NTHU has recently awarded an honorary doctorate to Fan-Cheng Tseng, the vice chairman and co-founder of the Taiwan Semiconductor Manufacturing Company (TSMC), in recognition of his outstanding contributions to the development of science and technology in Taiwan. TSMC officers on hand at the conferral ceremony included Chairman Morris Chang and two other chief executive officers, Che-Chia Wei and Mark Liu.

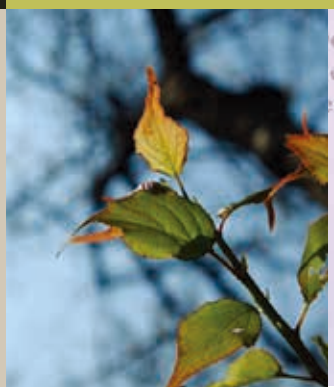
The Second Candidate Ever been Recommended for an Honorary Doctoral Jointly by Two Colleges

NTHU President Hocheng Hong conferred the Honorary Degree recommended by the College of Electrical Engineering and Computer Science and the College of Technology Management, along with a lifetime membership certificate from the Alumni Association. Tseng is the 38th person to receive an honorary doctorate from NTHU, and the second person in the history of the university to receive an honorary degree nominated by two colleges; the first was Eric Y.T. Chuo, chairman of the Hiwin Technologies Corporation.

During the conferral ceremony Tseng took the opportunity to express his gratitude to a number of people who have had a tremendous influence on his life. First of all, he thanked his father, who brought him from Guizhou to Taiwan during the Chinese Civil War, thereby giving him the opportunity to study and develop in Taiwan. Next, he thanked all the government policy makers who had the foresight to promote the development of semiconductor industry in Taiwan in the 1970s and 1980s, especially Mr. Sun Yun-suan, Mr. Pan Wen-yuan, and Mr. Li Kwoh-ting. He also expressed his appreciation to Morris Chang, "whose trust and encouragement gave me the opportunity to bring my ideas to fruition during my time

ⓐ F.C. Tseng and his wife, Chen Han.

ⓑ From left to right: Chuang Hwei-lin, Nen-Fu Huang, Morris Chang, Hocheng Hong, F.C. Tseng, Chen Han, Mark Liu, and C. C. Wei.



as the President of TSMC." Lastly, he acknowledged his wife, Chen Han for her dedication and support over the years, adding "My wife's support has allowed me to concentrate on my work. For decades, she personally prepares a lunch box for me every day to nourish my body and soul." Tseng also said the motto of NTHU, "Self-discipline and social commitment," exhorts us to steadily strive to reach our goals and that it reminds us that integrity and nobility stem from kindness and tolerance. He also said that he is honored to be a NTHU alumnus, and hopes that he will have an opportunity to make a significant contribution to NTHU.

a During the ceremony Tseng was presented with a piece of calligraphy written by Professor Shih Chin-tay.

b From left to right: Nen-Fu Huang (Dean of the College of Electrical Engineering and Computer Science), President Hocheng Hong, F.C. Tseng, Chen Han, and Chuang Hwei-lin (Dean of the College of Technology Management).

President Hocheng: F. C. Tseng—a True Gentleman

In his conferral speech, President Hocheng praised Dr. Tseng as a model gentleman in the Confucian tradition, and that it was Dr. Tseng's hard work and devotion that made TSMC one of the leading players in the semiconductor industry worldwide. President Hocheng also lauded Tseng for his efforts in promoting arts and education, stating "It is hard to imagine how dull the science park would be without the effort and investment made by Dr. Tseng and the TSMC Foundation." He then noted that one line in the NTHU school song goes, "When there is breadth of mind, literature and art follow," and that Dr.Tseng, whose avocations are history and poetry, is a fine example of this idea. He also invited Dr. Tseng to submit some of his poems for publication by the University Press.

Morris Chang: Dr. Tseng is My Best Comrade Over the Last Three Decades

In his speech, Morris Chang recalled the early days at TSMC and lauded Dr. Tseng as "my best comrade over the past 30 years." Chang said that TSMC started out rather small, and that its steady growth and eventual success in both the domestic and foreign markets are mainly due to the outstanding team led by Tseng, adding that owing to Tseng's expertise in hiring and management he never had to worry about TSMC's internal operations. Chang also said that amongst those who followed in Tseng's footsteps, moving from the Industrial Technology Research Institute to TSMC, 20 are still at the company.

Dr. Tseng in Semi-Retirement: Mountaineering, Poetry, and Lunchboxes

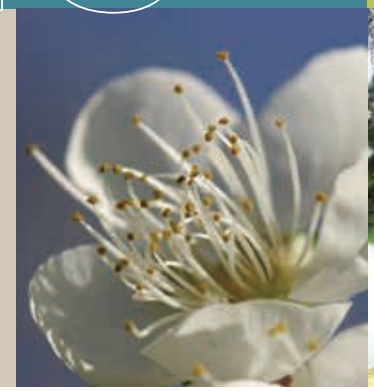
During the ceremony, Professor Shih Chin-tay of

NTHU's College of Technology Management, presented Tseng with a piece of calligraphy he wrote himself, which translates as "Eight ascents of Huangshan's Tiandu Peak, affording a view of the fragrant dogwood." Shih explained that Tseng has climbed Huangshan in mainland China eight times, and as a Tsing Hua alumnus he is sure to have a chance to appreciate the lovely dogwood adorning the NTHU campus.

In a media interview after the ceremony Tseng said that now that he is semi-retired, he often goes hiking, and has already climbed 52 of Taiwan's highest peaks. Chen Han said that after nearly 50 years of being married to Tseng, she has come to admire him as a kind and honest man who works hard and always does his best. When asked about the lunchbox she personally prepares for her husband every day, Chen said with a smile, "How could I do anything less? After all, he's such a handsome guy."

ⓐ From left to right: Nen-Fu Huang, Hocheng Hong, F.C. Tseng (holding honorary doctorate diploma),and Chuang Hwei-lin.

ⓑ President Hocheng conferring on F.C. Tseng a lifetime membership certificate from the NTHU Alumni Association.



NTHU GARNERS THREE OUTSTANDING MOOC AWARDS

On January 15, the Ministry of Education (MOE) held its Outstanding MOOC Award Ceremony, with Chu Nan-Shyan, the Secretariat of MOE personally presenting the prizes to each winning team. The award ceremony is held every four years, and this time three NTHU courses received the prize—the highest number among all the universities in Taiwan. The award-winning courses were: *Sensation and Perception, A Close Reading of Eileen Chang's Works,* and *Introduction to Computer Networks*.

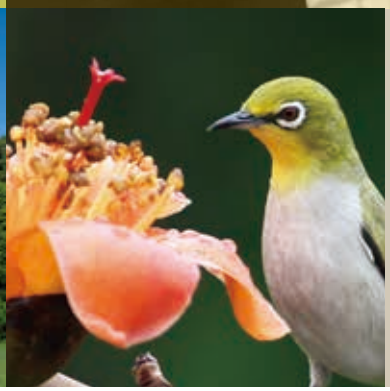
Ever since the MOE established the MOOCs (Massive Open Online Courses) program four years ago, it has received a total of 1,303 proposals for course funding, of which only 341 were approved. A total of 63 schools entered the contest, and 22 courses at 15 schools received the prize this year.

According to NTHU's Vice President for Academic Affairs, Prof. Tai Nyan-hwa, NTHU has long been striving to remove the learning barriers, and that's why it has put so much effort into developing MOOCs and interdisciplinary education—both of which are now seen as essential among top universities. He also said that receiving the prize is a strong affirmation

a Left to right: Nen-Fu Huang, Chung Pao-choo (Director of the MOE's Department of Information and Technology Education), and An-Chi Liu (director of the MOOCs Office).

b Left to right: Award recipients Chiao Chuan-chin, Nen-Fu Huang, and Yang Chia-hsien.





of NTHU's online courses as well as its overall educational philosophy.

Taught by Professor Chiao Chuan-chin of the Department of Life Science, *Sensation and Perception* was NTHU's first "mobile MOOC." The course had 14,450 participants, and was highly popular with students in mainland China. At the award ceremony Chiao's course was commended for its liveliness, high information content, and interesting examples.

A Close Reading of Eileen Chang's Works was taught by assistant professor of the Department of Chinese Literature Yang Chia-hsien, who is also a well-known writer, poet, essayist, and literary critic. Her course had over 220,000 students, was also well received on both sides of the Taiwan Strait, and won the award of the 2016 New Curriculum Prize in China.

Taught by Professor Nen-Fu Huang of the College of Electrical Engineering and Computer Science, *Introduction to Computer Networks* was amongst the 50 most popular MOOCs worldwide for two consecutive years. What made this course really unique was that it was both a MOOCs and a SPOC (small private online course), which greatly facilitated learning.

In his acceptance speech, Huang emphasized that making a successful MOOCs requires both the enthusiasm of the instructor and the school's strong support. He said that in addition to helping students to learn more efficiently, the online course platform is also an effective forum to expand continuing education, and thus exemplified NTHU's commitment to interdisciplinary studies and academic excellence.

Nen-Fu Huang (right) and Chu Nan-Shyan.

THE ENTREPRENEURIAL SPIRIT BLOSSOMS AT NTHU

"The Fifth NTHU Entrepreneur Day" competition to encourage young students to innovate and start their own businesses recently got underway. This year over 100 teams participated—more than twice as many as last year—including teams from as far away as Hong Kong, India, Thailand, and Beijing, and the event has quickly become one of the most watched innovation and entrepreneurship contests in Taiwan. This year's keynote speaker was Tu Yi-chin, the founder of the PTT Bulletin Board System and former chief of artificial intelligence (AI) research and development at Microsoft. In his speech on the topic of "The Netizen's Wisdom and AI Innovation" he encouraged students to start by solving the problems around them, "since that's what you're already very familiar with!"

ⓐ Tu Yi-chin, the founder of the PTT Bulletin Board System, was the keynote speaker of the Fifth NTHU Entrepreneur Days.

ⓑ Tu gave a talk titled "The Netizen's Wisdom and AI Innovation."

The Pearls of Interdisciplinary Education

During the opening ceremony NTHU President Hocheng Hong said that the theme of this year's Entrepreneur Day is "Interconnecting and Integrating Networks," and that for the past decade NTHU has been promoting interdisciplinary studies, with the result that in the past two years one quarter of its graduates have a double major. He also emphasized that having a dual specialty is not only a career advantage, but also helps spur innovation, similar to the way in which ecological diversity is greatest where land and water meet.

Reflecting on the school's various phases of development since being founded in Beijing at the beginning of the last century, Hocheng pointed out that the merger of NTHU and the National Hsinchu University of Education resulted in the addition of the College of Arts and the College of Education, and that "innovation and entrepreneurship are the pearls of interdisciplinary education!"

Using New Experience Will Create a New Value Chain

Tu told the many entrepreneurial teams that the lack of resources to start a business is usually due to the fact that

you want to enter a highly competitive field, such as auto-drive vehicles or unmanned shops, but a true entrepreneur doesn't necessarily have to follow recent trends. Instead, you can begin by solving a problem which is close to you, since by doing so "You have information that no one else has, so it will be easier to succeed. Also, don't do something just because everyone else is doing it!"

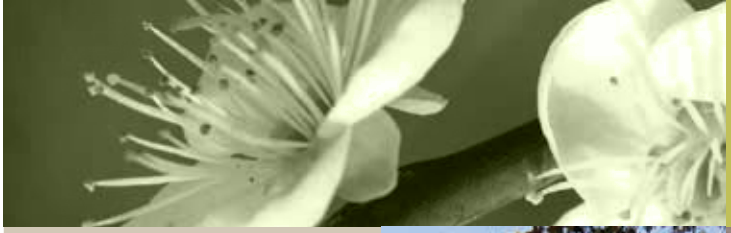
Tu said that he established PTT during his sophomore year, and afterwards one of his senior classmates asked him to design Yam, Taiwan's first search engine. At the time, they were students who had little knowledge of entrepreneurship, so they simply started with what would be useful in their own daily lives.

Tu urged students to use new technology, find new problems, and figure out ways to solve them, and that in the process a new business might emerge. He also said that the business model of the future will no longer focus on traditional order taking, but rather on finding innovative solutions and using new experience to create a new value chain.

"The netizen's spirit is the entrepreneurial spirit!" Tu said. "Some people are only good at talking, but it's the local person who takes the initiative and makes something new—not really for the money, but for fun!"

Tu gave five suggestions to young entrepreneurs. First, approach it in the

Tu with students after his speech.



spirit of play, since it's in play that our imagination and creativity are at their best. Second, challenge authority, ask questions and define the problem based on your own experience. Third, start small, while collecting relevant data for solving problems. Fourth, establish a team with cross-domain expertise. Fifth, think outside the box.

Fostering the Entrepreneurial Spirit on Campus

Tu also mentioned that universities are the best environment for abandoning traditional business models, daring to play and building interdisciplinary teams because "the diversified admission mechanism picks up the best people for you."

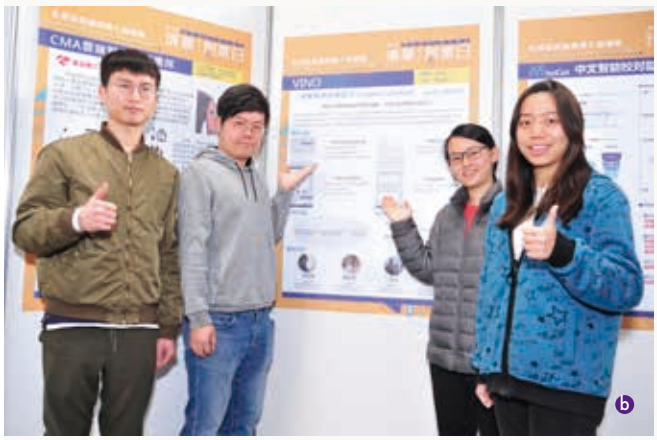
To illustrate his approach to problem solving, Tu described how the late documentary filmmaker Chi Po-lin once said that he took the risk of personally shooting from a small aircraft because the camera mounted to a drone is unable to properly select the scene and move the lens. So after Chi died in a helicopter crash last year, Tu's AI Lab teamed up with the Tainan City Government to use AI to train drone-mounted cameras so that it can automatically select scenes and move the lens in conformity with Chi's aesthetics. It worked so well that they are planning to make aerial footage of the entire Tainan City.

Tu, referred to as "The Creator" by netizens, used open source software to create PTT in the dormitory during his sophomore year, which soon became the largest BBS in Taiwan. Tu said that PTT's P stands for panda, because during his college days he had dark circles around his eyes due to lack of sleep, making him look like a panda, which also happens to be the NTHU mascot.

Innovators from Near and Far

The Fifth NTHU Entrepreneur Day competition is divided into two categories. The "Tsing Hua Innovation Competition" is limited to NTHU students and emphasizes creativity, while the "T-Union Entrepreneurship Competition" is open to university students worldwide and stresses commercial feasibility.

According to Professor Tseng Fan-gang, Vice President for Research and Development, 23 teams at NTHU have signed up for the Entrepreneurship Competition, in comparison



ⓐ Students of the College of Technology Management presenting their entry in the Innovation Contest titled "*Lei Cha*."

ⓑ The team titled VINO developed a virtual currency investment application.

to 12 last year. There are another 26 teams signed up for the Innovation Competition, and nine of them are overseas teams, including teams from India, Thailand, Hong Kong, and China.

Pet Collars and Tea Culture

The 26 teams signed up for the Tsing Hua Innovation Competition were recommended by their practicum teacher, 12 of which entered the finals. All finalists received assistance from NTHU and are required to have a finished product within six months. The top two teams will receive NT$150,000 and an internship in Israel.

"MAO-Pairing Accessory Design for Furkids™," one of the teams in the Innovation Competition, is the brainchild of Lin Xinyu, an M.A. student in the Department of Arts and Design. The team's entry consists of a series of matching collars and jewelry for cats and their owners. The series includes both casual and party designs for men and women. Moreover, each collar for the cat is fitted with a tracking device so the owner can easily keep track of their tabby.

Another team participating in the Innovation Competition was "*Lei Cha*," consisting of Tsai Jiashin, Chen Shumei, and Huang Yuting, undergraduate students of the College of Technology Management. *Lei cha*, or "grounded tea," is a favorite drink amongst Hakka communities in Taiwan and elsewhere, and the team has come up with a variety of new food products featuring *lei cha*, including bread, cheese, and milk. They've also produced a *lei cha* recipe book, and would like to see *lei cha* become a part of international culture, like Japanese *matcha*.

A Virtual Currency Investment Application

This year 73 teams from 16 universities participated in the T-Union Entrepreneurship Competition in three categories: technology

VIPs at the Fifth NTHU Entrepreneur Day.

entrepreneurship, social entrepreneurship, and micro-entrepreneurship. Nine teams in each category were chosen for the semi-finals, out of which five teams in each category will be chosen to compete for the grand prize in June this year.

The first place team in each category will receive a venture capital prize of NT$300,000 provided by the TIX Institute, the Tsing Hua Entrepreneur Network, and the Liu Zhentao Fund for Innovation and Entrepreneurship.

ⓐ Tu Yi-chin (left) and NTHU President Hocheng Hong.
ⓑ One of the entries in the Innovation Competition was Lin Xinyu's MAO-Pairing Accessory Design for Furkids ™, featuring a series of matching collars and jewelry for cats and their owners.

The team titled VINO consisting of NTHU students Wu Junlin, Claire Ting, and Fanjiang Liangyu, and Yang Ming University student Chien Chunan developed a virtual currency investment application "CryptoCoinAsst." Wu said that through his experience of investing in such virtual currencies as Bitcoin and Ethereum, he realized that there was a need for an application like those used with stocks.

After listening to Tu's speech, Wu decided to change the team's revenue model from B2C (business to consumer) to B2B (business to business).

Mentoring Expertise

According to Li Tianjian, the Division of University-Industry Collaboration, and the lead planner of this year's Entrepreneur Day event, each of this year's competitors can choose a mentor to help them develop their final product in the next three months.

The 15 mentors include AIPTEK chairman Mike Hsu, Dot Design director Lance Han, iiiNNO co-founder David Kuo, and Ting Changwen, the Secretary-General of Taiwan Social Enterprise Innovation and Entrepreneurship Society.

David Kuo said that most of what he knows about starting a business comes from his two failed attempts. Also, one of the students he formerly mentored said that Kuo has a knack for accurately assessing a plan's weak points.

Another mentor is NTHU alumnus Chuang Kaiyung, the founder of BigHillNorthMoon, a well-known restaurant housed in an abandoned primary school in Hsinchu.

AT THE VANGUARD OF HIGH-TECH AGRICULTURE

Applying emerging technologies to agriculture can not only make up for labor shortages, but also create huge business opportunities. Professor Nen-Fu Huang, Dean of the College of Electrical Engineering and Computer Science, is leading a team developing various technologies used in "precision agriculture," including drones, satellite aerial photography, and image analysis, which together can be used to determine the best harvesting period and accurately predict the size of the harvest. Their technologies have been successfully tried out in Pingtung, Yilan, Tainan, and Yunlin, with such crops as dragon fruit, spring onion, jujube, and coffee. Moreover, NTHU has recently signed a memorandum of cooperation with the Taiwan-ASEAN Business Council (TABC) to introduce this cutting-edge agricultural technology to various ASEAN (Association of Southeast Asian Nations) countries and India.

Agricultural Diplomacy

NTHU President Hocheng Hong recently signed a memorandum of cooperation with TABC President Lu Risheng. The signing ceremony was attended by Robert James Bintaryo, the head of the Indonesian Economic and Trade Office in Taipei, Sridharan Madhusudhanan, Director General of the India-Taipei Association, Tran Duy Hai, Representative of the Vietnam Economic and Cultural Office in Taipei, and Datuk

a NTHU President Hocheng Hong and TABC President Lu Risheng displaying the memorandum of cooperation.

b Right to left: Nen-Fu Huang, Hocheng Hong, Lu Risheng, and Wu Wenhui

Adeline Leong, President of the Malaysian Friendship and Trade Centre. Also present were Chang San-Cheng, the honorary President of the TABC, Yu-Chin Hsu, the Deputy Minister of the Ministry of Science and Technology, Huang Chin-Cheng and the deputy chairman of the Council of Agriculture and Legislators Su Chih-Feng and Hsu Yu-Jen.

During the ceremony Hocheng said that combining technology with agriculture helps conserve limited resources such as land and water while increase management efficiency, and that the farmer of the future will need to be familiar with these developments.

He added that NTHU is looking forward to making these new technologies available to farmers throughout Asia.

According to President Lu, the combined population of India and the ten member states of ASEAN (Indonesia, Vietnam, Laos, Brunei, Thailand, Myanmar, the Philippines, Cambodia, Singapore, and Malaysia) is around 2 billion people, over half of whom are engaged in farming. Moreover, these nations have ample arable land, making the region well suited for large-scale production, and this is why the TABC is eager to promote the latest agricultural technology.

Making Agriculture More Efficient

Huang said that the agricultural technologies being developed by his team include sensors which collect data on soil moisture, soil conductance, air temperature and humidity, light intensity, water pH, and carbon dioxide, and then instantly transmit the data back to the farmer, who uses artificial intelligence (AI) and remote control technology to automatically

ⓐ Nen-Fu Huang addressing the Forum.

ⓑ VIPs at the Taiwan Smart Agriculture Partnership with ASEAN & India Forum.

make whatever adjustments may be necessary, from watering and applying fertilizer, to turning on lights or fans. All these save manpower and material, while improving quality and output.

By integrating such tools as the Internet of Things, AI, data analysis, and drones, Huang's team has been cooperating with agricultural experts and technology companies to propose comprehensive solutions for a number of domestic farms producing high-value crops. For example, ordinary dragon fruit sells for about NT$40 per piece, but monarch dragon fruit produced with precision agriculture can sell for as much as NT$200 per piece in the international produce market.

A Man with a Mission

Huang and his wife grew up in Rueisuei, Hualian, where his wife's parents still grow pomelos and coffee beans. Because he returns home every year to help with the farm work, he knows well the many difficulties faced by Taiwan's aging farmers, such as typhoons, labor shortages, and low returns. Thus it was with a strong sense of mission that Huang went about setting up his research team two years ago.

Farmers have to closely monitor the growth of their crops and constantly check for the presence of pests and diseases. Traditionally, these were all done on foot, but precision farming makes it possible to monitor the fields by using drones, satellites, and fixed cameras. For example, the steep terrain of the coffee plantations in Gukeng, Yunlin makes it quite difficult to keep close watch on the growth of the coffee beans. But now it's possible to send a drone to take photos and send back the data which the farmer can use to instantly determine the optimal time for harvesting.

Drone-assisted Agriculture

Huang's team has assisted dragon fruit farmers to send drones to take pictures of the blossoms, which are then processed using AI to accurately predict the output and harvest date. This allows the farmers to

ⓐ A dragon fruit orchard at night photographed by a drone.

ⓑ A dragon fruit orchard at night.

optimize their plans for storage, sales, and shipping.

Liu Shichuan, owner of the Monarch Dragon Fruit Farm in Pingtung County, said that since the rainy summer in southern Taiwan makes it difficult to grow dragon fruit, he switched to a winter crop, but had to install artificial lighting to supplement the weak sunshine during the winter. Following the switch, he had to inspect his 26-acre orchard every night, and this took two hours, even with the help of a motorcycle. But by using a drone he can now perform the same task in a mere 20 minutes. Best of all, the price of dragon fruit grown in winter is twice as high as that grown in summer.

Less Input and Higher Value

Wu Wenhui, the founder of Hannong Organic Farm, set up a produce cooperative of more than 300 guava, wax apple, and litchi farmers in eastern and southern Taiwan. Wu said that each crop needs different nutrients at different stages of growth, and that photographs taken by a drone allows the farmer to use the appearance of the crop to determine what kind of fertilizer should be applied and when to apply it.

Wu elaborated with an example. If a dragon fruit farmer receives an order for 1,200 kilograms to be shipped 15 days later, he can use photographs made by a drone to easily determine how much fertilizer is required to fill the order, and which area to harvest first. Doing things this way saves 15 percent on the cost of labor and fertilizer, and by improving the quality of the fruit, the crop can be sold at a 15% higher price.

A studious monarch dragon fruit grown using precision agriculture.

A NEW WASTE-OIL TREATMENT SYSTEM

A research team led by Prof. Ling Yong-chien of the Department of Chemistry has developed a wet smelting process for removing arsenic from the waste cutting oil produced in semiconductor manufacturing, as well as a process for converting the waste oil into valuable carbon quantum dots (CQD), thereby making a major contribution to the reduction of industrial pollution.

This patented technology has already attracted the attention of the local semiconductor industry. Last week the Taiwan subsidiary of SEI Electronics Materials, one of the top five manufacturers of electronic materials in Japan, signed a contract with the Department of Chemistry and will soon begin using this new technology to clean its cutting oil.

The main material used by SEI to produce semiconductors is gallium arsenide (GaAs), but dealing with the waste cutting oil produced during the manufacturing process is a big headache for manufacturers. SEI's general manager said that his company attaches great importance to environmental protection, but it's not easy to find a waste disposal company qualified to deal with the used cutting oil. With this new technology, however, SEI will be able to handle its own waste oil, and in the future can also help other manufacturers facing the same problem. Knowing that SEI was searching for a solution to this polluting problem, Prof. Ling and his research team at the Green Chemistry and Mass Spectrometry Analytical Laboratory spent 3 months designing their wet smelting process, which takes only one hour to remove the arsenic from 500ml of waste oil. The cleaned oil can then be turned into CQDs—a fine example of waste recycling. Prof. Ling said that his research team will assist SEI in setting up a plant-scale system for the treatment of waste cutting oil, and that this will help SEI reduce its operating costs.

ⓐ Prof. Ling of the Department of Chemistry (right) and SEI's general manager recently signed a contract for setting up a waste-oil treatment system.

ⓑ Used cutting oil before (left) and after (right) the treatment process.

ⓒ The SEI-NTHU joint project is a fine example of recycling the waste material and turning it into something useful.

a NTHU students holding up the Meichu trophy.
b The women's basketball team celebrating victory.
c Celebrating victory!

NTHU WINS MEICHU TOURNAMENT

This year's Meichu Tournament between NTHU and National Chiao Tung University (NCTU) came to a dramatic conclusion on the evening of March 4th, with NTHU winning the Meichu trophy for the first time since 2009. As purple ribbons celebrating the victory fell from the sky, the NTHU gymnasium erupted with fervent cheers and even tears of joy. In this year's ten official competitions, NTHU won six: table tennis, baseball, women's basketball, chess, bridge, and women's volleyball. The victory was especially meaningful since this was the 50th anniversary of the Tournament, and was broadcast live for alumni who couldn't attend in person.

Throughout the Tournament, NTHU President Hocheng Hong was on the sidelines cheering for his teams. After the women's volleyball team made a decisive comeback in the final match, thereby bringing the coveted Meichu trophy back to NTHU after an eight-year hiatus, Hocheng made a heart gesture and declared, "That's the Meichu Spirit! What a tremendous effort! Let's keep it up for another 50 years!"

The last two competitions were men's and women's volleyball. Although the men's volleyball team put up a good battle, they lost the match, leaving the final outcome of the Tournament to the women's volleyball match. After losing the first set, the women's volleyball team quickly recovered and won the second and third sets.

By the fourth set, the Tsing Hua Women's Volleyball Team was in top form, winning the set, match, and trophy, whereupon the entire stadium was shaken by the screams of NTHU's overjoyed fans.

ⓐ The Meichu Preparatory Committee.
ⓑ NTHU President Hocheng Hong leading the cheers.

Results of the 2018 Meichu Tournament

Date	Match	Score		Winning school	Official match tally	
		NTHU	NCTU		NTHU	NCTU
March 2	Billiards (exhibition match)	3	0	NTHU	-	-
	Women's table tennis (exhibition match)	3	0	NTHU	-	-
	Soccer (ordinary) (exhibition match)	1	7	NCTU	-	-
	Kendo (exhibition match)	7	4	NTHU	-	-
	Table tennis	4	1	NTHU	1	-
	Badminton	2	3	NCTU	-	1
	Men's badminton (exhibition match)	1	1	Tied	-	-
March 3	Bridge	21	14	-	-	-
	Go (exhibition match)	5	6	NCTU	-	-
	Women's tennis (exhibition match)	2	1	NTHU	-	-
	Tennis	2	3	NCTU	-	1
	Baseball	12	2	NTHU	1	-
	Women's basketball	55	37	NTHU	1	-
	Men's basketball	53	62	NCTU	-	1
March 4	Bridge	51.73	28.27	NTHU	1	-
	Darts (exhibition match)	9	13	NCTU	-	-
	Chess	4	2	NTHU	1	-
	Soccer (open) (exhibition match)	1	7	NCTU	-	-
	Softball (ordinary) (exhibition match)	10	8	NTHU	-	-
	Softball (open) (exhibition match)	8	9	NCTU	-	-
	Men's volleyball	0	3	NCTU	-	1
	Women's volleyball	3	1	NTHU	1	-
Official match totals					6	4

NTHU

NATIONAL TSING HUA UNIVERSITY WELCOMES INTERNATIONAL STUDENTS

For information on Admission and Financial Aids, please visit our website at http://oga.nthu.edu.tw/index.php?lang=en# or contact
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Application Timeline:
Degree Student
Fall Semester Application Graduate Program: January 1~March 15
Undergraduate Program: November 15~February 15
Spring Semester Application: August 15 to October 16

Exchange Student
Fall Semester Application: February 1~ April 15
Spring Semester Application: September 1~November 1

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