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FIVE OUTSTANDING ALUMNI WILL BE HONORED AT THE ANNIVERSARY CEREMONY

NTHU has selected five alumni as the recipients of the Outstanding Alumnus Award for 2021. There are Mr. Wang Chao-liang, class of 1980, Mr. Jerry Lu, class of 1981, Mr.Ken Chen, class of 1982, Mr. Chris Lin, class of 1984 and Mr. Y.L. Wang a graduate of the Department of Physics in1988.

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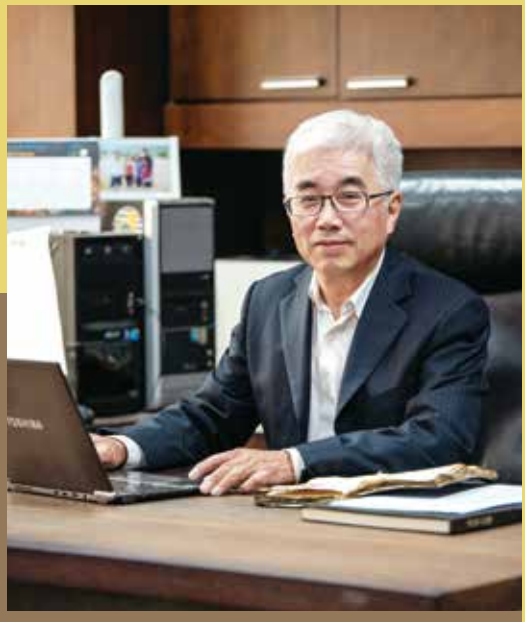
A leading figure in the development and production of automated machinery, Wang Chao-liang (王朝樑) graduated from the Department of Power Mechanical Engineering in 1980. In 1987 he joined forces with several classmates and friends to raise NT$3 million to establish Argosy Research Inc. (ARI), now a leading developer and producer of electronic connectors and automated system products. Since 1990 ARI has been manufacturing memory modules and cards for the US market; in 1994 ARI introduced the world's first PCMCIA external optical disc drive to the Japanese market; in 2000 ARI began to design and produce Chinese e-books; and since 2002 ARI has been cooperating with American storage equipment manufacturers IOMEGA and HP in the design and production of external hard drives and multimedia audio-visual players, attracting contracts from major manufacturers in both Europe and the US. In 2009 ARI shifted its focus to connector design and manufacturing, and since 2017 has been a leading manufacturer of M.2 and SO-Dimm connectors for use in notebook computers.



Wang Chao-liang（王朝樑）

The remarkable success of ARI is largely the result of the expertise in electronics Wang gained during his studies at NTHU, coupled with his knowledge of automation technology acquired while working at the Industrial Technology Research Institute. What's more, Wang's capable leadership has been a key factor in the company's consistent profitability over the past three decades.

In addition to his successful business career, Wang has long been an enthusiastic supporter of his alma mater, and in 2005 he received the College of Engineering's Outstanding Alumni Award. For many years he has been sponsoring a training program for the NTHU badminton team, which he always cheers on at the annual Meizhu Tournament. In 2011, in response to an appeal from the Club One Hundred fundraising campaign, he provided a major donation for the construction of the Alumni Gymnasium; he is also a member of the curriculum committee of the College of Engineering. Apart from supporting the Department's capstone practicum course and serving several times as a judge for its annual research competition, over the years Wang has been one of the main sponsors of the student groups DIT Robotics and NTHU Racing; during the 2016–17

school year he served as the advisor of DIT Robotics.

At the 2021 NTHU anniversary event, Wang is serving as the convener of the fundraising campaign appealing to alumni who graduated 40 and 41 years ago to support the Department of Power Mechanical Engineering's plan to build a "smart manufacturing teaching laboratory".

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A leading figure in the development and production of high-purity chemicals for the semiconductor and optoelectronic industries, Jerry Lu（呂志鵬） graduated from the Dept. of Cheminstry in 1981. In 1991, when the Taiwan Semiconductor Manufacturing Company (TSMC) built its F2 factory to produce 1M products, Jerry Lu went to Japan to negotiate with Kanto Chemical on behalf of the German multinational science and technology company Merck, resulting in the establishment in Taiwan of a joint venture between the two companies named Merck Electronic Chemicals, with Lu as the general manager. The newly established company soon built the first factory in Taiwan producing the high-purity chemicals used in the manufacture of semiconductors and flat-panel displays in dust-free factories, and its profits soon began to skyrocket.

In 2003 Lu founded the ProsperChem company, with Kanto Chemical as the second largest shareholder. In 2012, when a major earthquake severely disrupted Kanto Chemical's production capacity, the company decided to reduce the risk of such disruptions by shifting some of its production overseas, with ProsperChem as its main partner in Taiwan. The resulting entity is today's Kanto-PPC, a winning combination of Japanese technology and Taiwanese skill and materials, which has become a major manufacturer of semiconductors, optoelectronics, and green energy products.

Having earned a strong reputation for high-purity electronic chemicals, Kanto-PPC won the TSMC Excellent Supplier Award in 2018 and 2019, with special mention being made of its Yunlin plant and Lu's capable leadership. Having already become a major supplier in the Greater China market, Kanto-PPC is now making the most of Kanto's overseas facilities to expand its presence in the Asian market, especially in South Korea and Southeast Asia, with the long-term goal of becoming a leading player in the global semiconductor supply chain.

In 2016 Lu received the College of Science's Outstanding Alumni

Jerry Lu（呂志鵬）

Award, in recognition of his active participation in various NTHU activities, including numerous science and technology forums; he has also been actively networking with fellow alumni from all walks of life. Amongst his many contributions to the development of NTHU, Lu has played an instrumental role in the formation of the NTHU Alumni Golf Club and the Club One Hundred, and has served as the chairman of the NTHU Shuimu Chemistry Foundation. As for his contributions to the wider society, Lu is also a major sponsor of the Madame Curie High School Chemistry Camp, the Rising Sun program, and the Department of Chemistry's History Museum.

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A leading figure in the design of customized integrated circuits and the provision of advanced technical services, Ken Chen（陳超乾） is a graduate of the Department of Materials Science and Engineering in 1982.

From 2003 to 2010 Ken Chen served as the senior director of business development at TSMC, where he was responsible for the company's networking and consumer electronics segments. Between 2012 and 2016, while serving as the senior director of TSMC's Market Strategy Office, he developed a strategic analysis system taking into account the company's current and future global production capacity, yield, cost analysis, and customer service. Since 2016 Chen has served as the president of the Global Unichip Corporation (GUC). Specializing in the design of integrated circuits for customers using wafers produced by TSMC, he has transformed GUC into one of the world's leading providers of customized integrated circuit design.

Ken Chen（陳超乾）

Chen is highly adept at adopting appropriate strategies by analyzing changes in the business environment. As a result, GUC has repeatedly reached record profit levels. In recent years GUC has developed such cutting edge products as a high bandwidth memory IP using TSMC's 5nm technology and suitable for use with TSMC's advanced packaging technology CoWoS. In 2020 GU released an IP which can bridge two high-speed chips; marketed as GLinkl, this IP is highly energy efficient, and can be used in a die-to-die IP measuring 7nm x 5nm.

In 2017 Chen received the College of Engineering's Outstanding Alumni Award. His many contributions to his alma mater include serving as the president of the Tsinghua Entrepreneur Network and the Alumni Association of the Department of Materials Science and Engineering; he has also served as an advisor and industry mentor for students of the Department of Materials Science and Engineering. As a member of the Club One Hundred, Chen has made a major a donation for the construction of the Alumni Gymnasium; he has also played a leading role in setting up the Double Club One Hundred for the Department of Materials Science and Engineering, to provide financial rewards for outstanding teachers and students of the Department.

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A leading figure in the field of IC design and chip development, Chris Lin（林鴻明） is also distinguished for his many outstanding contributions to NTHU and society at large. Graduated from the Department of Electrical Engineering in 1984, Chris Lin is currently the chairman and president of ASPEED Technology. Specializes in IC design and chip development, Chris Lin holds 19 patents worldwide. In 1993, while working at Silicon Integrated Systems (SiS), Lin set up and led a team working on multimedia product R&D; in May 2003, together with former members of SiS's product division, he established XGI Technology, focusing on the development of graphics chips, and served as the general manager. In 2004 Lin founded ASPEED Technology, now the world's largest supplier of broadband management controllers (BMC), and currently focuses on management and sales. In 2016, with the acquisition of Broadcom's Emulex Pilot business, ASPEED became the world's

Chris Lin（林鴻明）

largest supplier of remote server management chips, and continues to develop new PC and AV extension niche products. In 2018 ASPEED unveiled Cupola360, the world's first 360-degree spherical image processor. In recent years Lin has been actively sharing his entrepreneurial experience as a way of making an even bigger positive contribution to society.

A past recipient of the College of Electrical Engineering and Computer Science's Outstanding Alumni Award, since 2013 Lin has been providing merit-based scholarships for students in fields related to electrical engineering. In 2015 he served as a mentor for budding entrepreneurs at NTHU, in which capacity he used the Line app to interact with students on a regular basis, arranged field trips to various enterprises, and provided summer internship opportunities at ASPEED Technology. In addition Lin has also been one of the featured speakers in the Department of Electrical Engineering's TEEN Lecture Series. Since 2020 he has been making major donations to the Rising Sun program and the Department of Electrical Engineering's Young Professor Award.

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A leading figure in technology management and semiconductor research and development, Y.L. Wang（王英郎） is also distinguished for his many outstanding contributions to his alma mater and society as a whole.

When Y.L. Wang became the vice president of fabrication operations at TSMC, he was the youngest person to ever hold that position. He joined TSMC in 1992, progressively gaining responsibility in various production management roles at TSMC's fabrication plants during his early tenure, and was appointed vice president of technology development in 2015. In his more than 20 years of service at TSMC, Wang has been instrumental in bringing about major improvements in the company's 0.35-micron, 0.25-micron, 0.18-micron, 0.13-micron, 90nm, 65nm, 40nm, 20nm and 16nm process technologies, which has significantly improved productivity and reduced defect density. He has also played a key role in the development of the advanced 10nm, 7nm, and 5nm technologies being used at TSMC.

Between 2005 and 2011 Wang won the National Invention Award five times, and between 2000 and 2011 he won the Ministry of Economic Affairs' Golden Tower Award six times. Currently he has 283 patents, including 136 U.S. patents.

Wang has also made significant contributions in the area of education. In addition to managing recruitment and training at TSMC, over the years he has shared his knowledge and experience with countless students, and is a regular guest speaker at numerous universities, including NTHU, National Chiao Tung University, and National Cheng Kung University. In recognition of his outstanding contributions in the field of industrial research, Wang was awarded the College of Science's Outstanding Alumni Award.

Y.L. Wang（王英郎）

GRASSROOTS SUPPORT FOR THE PROPOSED DEPARTMENT OF MEDICAL SCIENCE

Local support for NTHU's proposed department of medical science is on the rise. Science Park director-general Wayne Wang (王永壯), Hsinchu mayor Lin Chih-chien (林智堅), Hsinchu County magistrate Yang Wen-ke (楊文科), and several former chairmen of the Taiwan Science Park Association have recently signed a joint petition calling on the government to approve NTHU's plan to establish a post-baccalaureate program in medicine, pointing out that doing so will attract leading medical professionals to Hsinchu and stimulate the growth of the Science Park's budding biomedical sector.

The pepition points out that the Science Park, with about 150,000 employees and an output value of more than NT$1 trillion, is one of the mainstays of Taiwan's high-tech economy, but, the Hsinchu area has insufficient medical resources. In fact, it has the lowest concentration of Western doctors in the entire nation, creating considerable inconvenience for Science Park employees, who often find it necessary to travel considerable distances to seek specialized medical treatment unavailable locally.

The appeal also points out that the establishment of a top-notch department of medical science will provide the opportunities for research and advanced training essential for attracting leading senior physicians to Hsinchu.

In addition, the appeal states that the existing programs and high educational standards at NTHU place it in an excellent position for providing advanced education in high-tech medicine, and that the establishment of a local post-baccalaureate program in medicine will also improve the medical standards of the entire Hsinchu area, which is home to Taiwan's largest science park.

Attracting leading physicians

According to Director-general Wayne Wang, there is a pressing need to increase the availability of high-quality medical resources in Hsinchu, as evidenced by his observation that Hsinchu Science Park employees and their dependents often choose to go to Taipei or Taichung when they require specialized medical treatment, which consumes considerable amounts of time and energy.

Magistrate Yang said that amongst Hsinchu's strengths are its vibrant technology and biomedical industries, and that while it already has a number of good hospitals, including the Biomedical Park branch of the National Taiwan University Hospital, it lacks a university medical program to provide advanced training. The establishment of a post-baccalaureate program in medicine at NTHU would go a long way in addressing this lacuna, and would also dovetail nicely with the increasing importance of high-tech medicine in Taiwan and abroad.

As Yang put it, "For the past 40 years, NTHU has been making major contributions to Taiwan's high-tech industry, and is now in a position to also play a leading role in the development of the nation's budding high-tech medical industry."

Yang also said that top physicians need to be proficient not only in providing clinical treatment, but also in research and teaching, and that the establishment of a post-baccalaureate program at NTHU will benefit all hospitals already in Hsinchu by attracting additional excellent physicians to the area. What's more, it will save local residents the trouble of having to travel to Taipei or Taichung for specialized medical treatment.

Mayor Lin said that Hsinchu City is the core city in the Hsinchu - Miaoli area, and that while the City government already provides various types of support to local children's hospitals, the establishment of a local department of medicine would provide much-needed impetus for upgrading the medical services available in this area of 1.58 million residents.

Using R&D to stimulate the biomedical industry

C.K. Lee (李金恭), the current chairman of the Taiwan Science Park Association, said that due to the booming technology industry, Hsinchu's population is steadily growing, yet statistics published by the Ministry of Health and Welfare reveal that the area comprised of Hsinchu, Taoyuan, and Miaoli has the lowest concentration of Western doctors in the Taiwan. Thus the establishment of a department of medicine by a prestigious university would help to remedy this situation by attracting highly qualified physicians to the area.

Hsieh Chi-chia (謝其嘉), the former chairman of the Taiwan Science Park Association, said that NTHU's long history of excellence in science and engineering has already provided much impetus to the development of the high-tech industry in the area, and that in the next wave of the Science Park's development precision medicine is sure to play a leading role, as evidenced by the current flurry of interest in developing treatments and rapid screening tests for coronavirus.

"The establishment of a post-baccalaureate program in medicine at NTHU, which is set to become a leading player in the field of precision medicine, will be a major boon for the Hsinchu region and the entire country," summed up Hsieh.

Alumni support

Tsai Neng-shian (蔡能賢), an alumnus of NTHU and the CEO of the TSMC Charity Foundation, said that semiconductor production has been the mainstay of Taiwan's science parks for the past 40 years, the growth of which has stimulated economic development throughout the nation. As for the future direction of Taiwan's industrial development, Tsai believes that medical technology is bound to play a leading role, and the establishment of a post-baccalaureate program in medicine at NTHU will ensure that the Hsinchu Science Park will become the center of the medical technology in Taiwan.

President Hocheng Hong thanked the local leaders and representatives of the Science Park for coming out in support of the school's application to establish a post-baccalaureate program in medicine. He said that the establishment of the Hsinchu Science Park 40 years ago was enthusiastically supported by Shu Shien-siu (徐賢修), the president of NTHU at that time. Since then, the Science Park has become the locomotive of Taiwan's booming economy, the long-term vitality of which is essential for the nation's next phase of economic development.

Hsinchu Science Park director-general Wayne Wang, Hsinchu mayor Lin Chih-chien, Hsinchu County magistrate Yang Wen-ke, and several former chairmen of the Taiwan Science Park Association have recently signed a joint appeal calling on the government to approve NTHU's plan to establish a post-baccalaureate program in medicine.

PLUMBING THE DEPTHS OF THE CUTTLEFISH'S LEARNING PROCESS

Supposed you're delighted to have just received a big raise. But if you then discover that a colleague also got a raise, and it's twice as big as yours is, your glee is likely to be short-lived. This is because in many cases, a thing's value is relative rather than absolute. In fact, such a sense of relative value is not unique to humans, as Prof. Chiao Chuan-chin (焦傳金) of the Department of Life Sciences has recently shown in a series of experiments in which cuttlefish were trained to choose one shrimp instead of two.

Delayed gratification in the animal kingdom garners widespread interest

Chiao's research has recently been published in the internationally renowned journal *Royal Society Open Science*, and has been featured in two New York Times articles, including the "Lesson of the Day" column designed for high schools students in the United States.

Chiao's experiment was modelled on a self-control experiment conducted at Stanford University half a century ago, in which children were offered a choice between one small but immediate reward, or two small rewards if they waited for a short period of time; now considered a classic of psychological experimentation, it's often referred to as the "marshmallow experiment," after one of the rewards given to the participants. The New York Times article titled *"Cuttlefish Took Something Like a Marshmallow Test"* reported that these molluscs perform complicated mathematical operations, have a sense of relative value, and are "complex creatures, capable of using their brains in ways that may surprise us."

When one is better than two

Prof. Chiao, who specializes in cephalopods, pointed out that cuttlefish have the most developed nervous system amongst all invertebrates, and that their level of intelligence is comparable to that of a human being at the age of one or two. Indeed, previous studies have found that cuttlefish have advanced cognitive functions, and this is what sparked Chiao's interest in their ability to learn and exercise self-control.

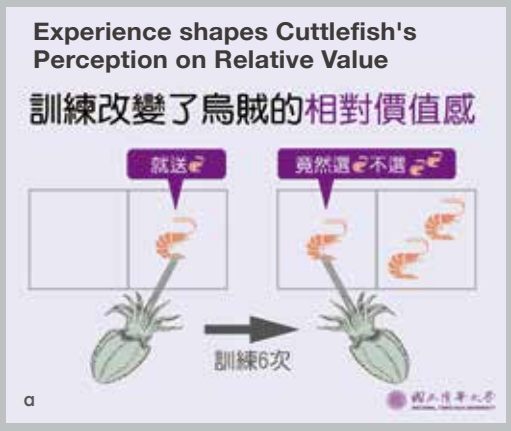
Prof. Chiao explained that when given the option of entering one of two chambers, one containing one shrimp and the other containing two, a cuttlefish will normally choose the latter. Thus his central research question was whether or

Chiao (right) and Kuo's research demonstrates that cuttlefish have a sense of relative value.

not this default feeding behavior could be altered by training.

In the first stage of the experiment, the cuttlefish were given the option of entering one of two chambers, one containing one shrimp and the other none, and they invariably chose the former, whereupon they were given an additional shrimp (about one-fifth the size of the bait) as a bonus. After the cuttlefish were rewarded six times in the same way, they were presented with the option of entering a chamber with either one shrimp or two, and, surprisingly, most chose the chamber with only one shrimp.

This unexpected feeding behavior was conditioned by the reward provided in the first stage of the experiment



a. Diagram illustrating how the cuttlefish were trained to choose one shrimp rather than two.
b. Chiao (right) and Kuo analyzing the results of their experiments.

Impressions left on the brain by past experience

Back in 2016 Chiao published a research showing that cuttlefish have a rudimentary mathematical ability, whereby they know, for example, that five is greater than four, and that they require relatively more time to deal with relatively larger numbers. In a follow-up experiment, Chiao's research team found that when cuttlefish are faced with a choice between one large shrimp or two small ones, if they are hungry, they usually take the riskier course of preying on the one large shrimp, but when they are only slightly hungry, they are more apt to feed on the two small shrimp, demonstrating that they engage in a simple kind of risk-assessment strategy.

While conducting similar experiments over the course of several years, Chiao came to understand that the cuttlefish's decision-making behavior is not entirely rational, since it is also affected by such factors as appetite and experience, and that past experience leaves a lasting impression on its brain, forming the physiological basis of what might be regarded as "intuition." Such studies have increased our understanding of how the brain works and what factors affect the decision-making process.

Nursemaid in the laboratory

Amongst Chiao's research assistants is Kuo Zi-hsin (郭子新), a doctoral student of the Institute of Molecular Medicine. Drawn in by her penchant for cuttlefish, when she began working in Chiao's lab during her junior year, it so happened that all of the other lab assistants had already graduated or were spending a semester abroad, leaving the responsibility to take care of the lab's 200 cuttlefish entirely on her shoulders. During this time, she even spent the Chinese New Year in the lab, scooping up the new-born cuttlefish, so that they wouldn't collide with the unhatched eggs.

Kuo said that the lifespan of cuttlefish is about one year, and that taking proper care of them is not so easy, since they only thrive in seawater which has the right temperature and pH level; what's more, they are quite finicky about their diet. She also smilingly recalled how it took a while to learn how to keep them happy, prior to which they sprayed her with their defensive ink every time they got nervous, so often that she resorted to wearing the same ink-smeared lab coat whenever she was taking care of them.

NTHU RESEARCHERS TAKE ROBOTICS TO THE NEXT LEVEL

Although widely used in manufacturing, robots require much more agility for use in nursing and rehabilitation. With this in mind, an interdisciplinary research team led by Professor James Chang (張禎元) of the Department of Power Mechanical Engineering has recently applied the latest advances in AI, biomechanics, and human-factor engineering to develop a robot that can imitate the meticulous movements of a human hand. Endowed with sharp senses of vision and touch, the robot's hands are nimble enough to catch a ball and pull out a tissue.

Completely designed and manufactured in Taiwan, this dexterous two-handed robot has been dubbed the "Tsinghua Gentleman" by President Hocheng Hong, who said that it's destined to play a leading role in the field of medical care.

Advanced robotic agility

What makes this robot unique is that one hand provides strength, while the other is highly nimble. Chang said that a nimble hand is required in most work in medical applications, such as in covid-19 test where a hand should be nimble enough to gently operate a cotton swab in-and-out of a person's nostril or throat. Overcoming limitation of six-jointed robotic arms, Chang's robotic arm has seven joints, enabling agile movements, even in ways that human arm can't. The robot developed by Chang's team closely imitates those of the human hand, with level of dexterity reached by digitizing a human hand's motion, making the robotic hands nimble enough to hold a baby or turn over a bed-ridden patient.

Human-like perception

Chang explained that this nimble hand imitates the design of human fingers, utilizing pneumatic transmission to control its movement with a US-patented precise pressure sensing device that responds to changes of magnetic force. Comparing to

An interdisciplinary research team led by Distinguished Professor James Chang (張禎元)of the Department of Power Mechanical Engineering has recently developed a humanoid robot that imitates the meticulous movements of a human hand.

a. The humanoid robot that imitates the meticulous movements of a human hand.
b. Prof. Chang and his research team
c. Prof. Chang and his assistant showing the robotic hands

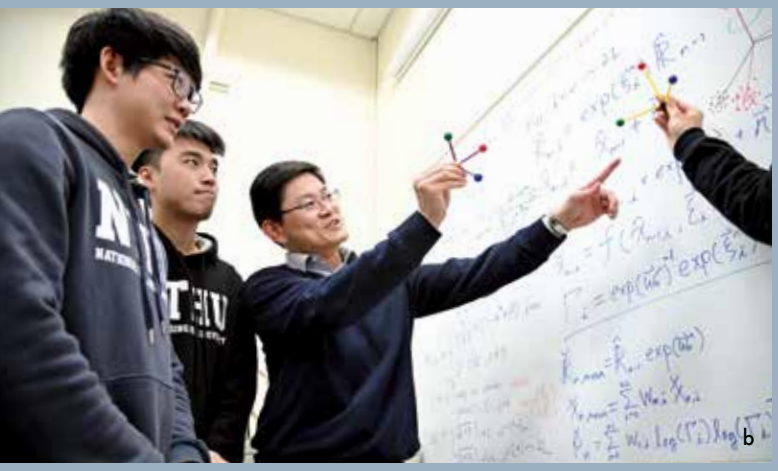
robots requiring a separate sensor for each direction, Chang's robotic hand has only one sensor for multi-direction sensing, making it more like a human hand. With a 3D visual system to scan surrounding objects over a wide range, this robot possesses sense of space and ability to use AI to identify objects.

Inspiration

A Ph.D. from Carnegie Mellon University, Chang previously worked at IBM, specializing in mechatronics and robotics. After returning to Taiwan, he met and collaborated with his primary schoolmate Yu-Cheng Pei (裴育晟), a rehabilitation physician at Chang Gung Memorial Hospital, under support from Ministry of Science and Technology to develop assistive devices for use by patients with impaired hand function.

Chang's initial impetus for developing this robot came from his wife seeing a robot on TV that could cook food. "I told her it was just an animation, but her request was so earnest that I promised to invent a real robot that could really cook for us," Chang said with a smile.

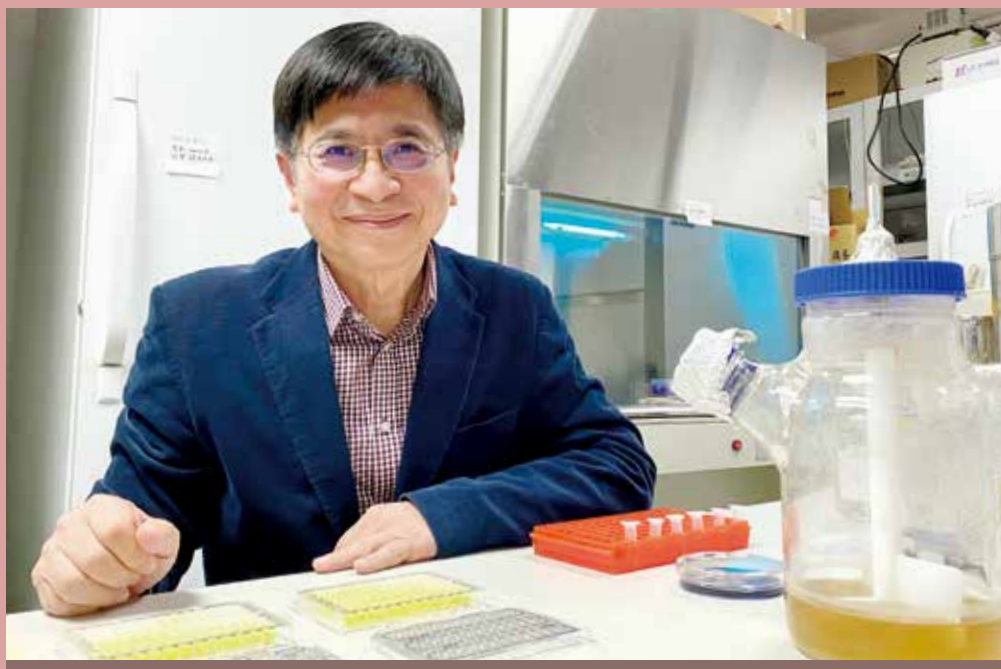
Taiwan will become a super-aged society by 2025. Thus, Chang is aiming to develop a robot capable of performing a wide range of services required by the elderly, and, of course, cooking and washing the dishes.



NTHU RESEARCH TEAM DEVELOPS GROUNDBREAKING INFLUENZA VACCINE

Winter is the beginning of the annual influenza season, and every year, in its efforts to prepare the required vaccinations, the World Health Organization (WHO) has to predict which strain of influenza will be most wide spread. With this situation in mind, a research team led by Professor Wu Suh-Chin (吳夙欽) of the Department of Medical Science has developed a vaccine providing protection against all strains of influenza. The vaccination can be administered in the form of a nasal spray instead of by injection.

The team's innovative research has been published in scientific journals, and was awarded the Ministry of Science and Technology's Future Tech Award in 2019 and 2020.

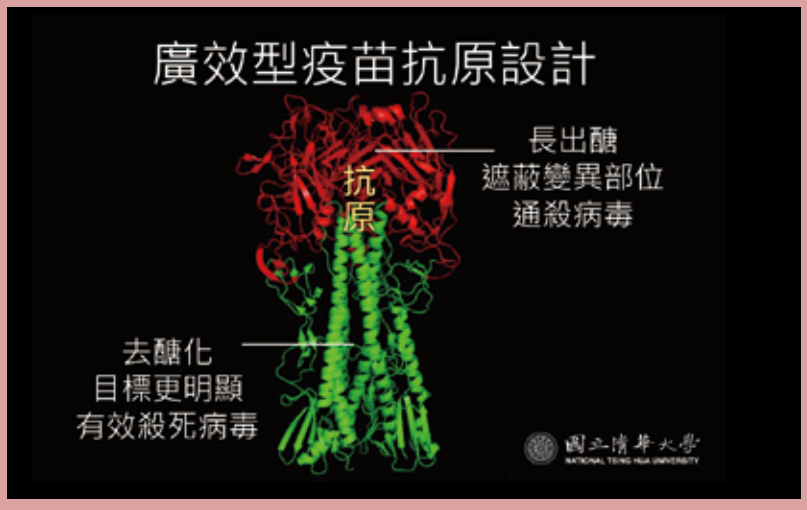


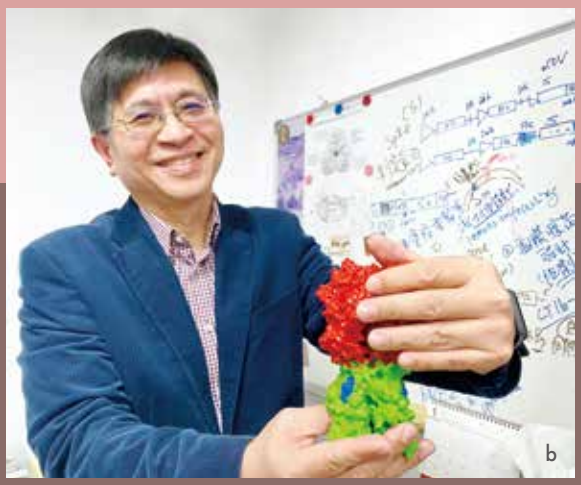
A research team led by Professor Wu Suh-Chin (吳夙欽) of the Department of Medical Science has developed a mucosal vaccine providing protection against all strains of influenza, and is currently planning to develop a mucosal COVID-19 vaccine.

A vaccine with universal effectiveness

Since the prevalence of influenza and the strains involved differs from year to year, deciding on which vaccines to prepare for the next influenza season is challenging, and a wrong guess can lead to a low vaccine efficacy. Wu said that this is mainly because the hemagglutinin of the influenza virus is constantly changing, making it difficult for our immune cells to recognize it.

The hemagglutinin antigen is mainly composed of a globular head and a stem region, and it' s the globular head which makes each strain of a virus unique. Wu' s team has used genetic engineering to make





Wu and his research team.

the globular head grow a layer of carbohydrates; these mask its unique features, thereby refocusing the immune cells to make antibodies to whatever type of influenza virus they encounter.

Wu's team also deglycated the stem region of the hemagglutinin antigen, making it easier for immune cells to recognize and eliminate the virus. Wu said that deglycating the hemagglutinin increases the elicitation of stem-specific antibodies, allowing for the development of an influenza vaccine with universal effectiveness against different antigenic subtypes.

Fighting virus with toxin

Since influenza viruses are mainly transmitted through the respiratory tract, Wu's team invented a nasal spray influenza vaccine that is more effective than an injection. Since breathing and eating inevitably introduces foreign antigens into the body, the mucous membranes in the respiratory and oral-fecal tract have a mucosal tolerance to pathogens, making it difficult for vaccines to elicit mucosal immunity. This is what makes developing a mucosal vaccine more challenging than developing an injection.

To overcome the immune tolerance of mucosal systems, one approach would be to "fight virus with toxin," and the team decided to use a bacterial toxin known as "heat-labile enterotoxin A subunit" with antigen, thereby forming a self-adjuvanting vaccine. The self-adjuvanting vaccine made in this way are good at eliciting mucosal and systemic immune responses.

The team has already used the self-adjuvanting vaccine platform, now patented in Taiwan and the US, to develop a vaccine for avian flu, and initial experiments have confirmed that chickens which inhale the mucosal vaccine produce neutralizing antibodies in their serum. Spurred on by the encouraging results, the team is currently planning to develop a mucosal vaccine against COVID-19.

MYSTERIOUS RADIO SIGNALS IN THE UNIVERSE ARE NOT FROM ALIENS

Astronomers have recently discovered that the sky flashes frequently in radio wavelengths. These 'fast radio bursts' are happening more than a thousand times a day. Nevertheless, their origin has been a mystery for more than a decade, partly because they disappear very quickly. No one knew about the origins of such signals. Could the signals be from aliens? Dr. Hashimoto (橋本哲也博士) and his collaborative team at the Institute of Astronomy, recently discovered the origins of such mysterious 'fast radio bursts' for the first time. The research team believes that the "alien origin" is not likely, but celestial objects are likely the ones that emit these radio signals.

There appear to be two types of FRBs: non-repeating and repeating FRBs. Non-repeating FRBs show a one-off radio signal while repeating FRBs repeat their radio signals. At first, some people thought the radio signals were sent from aliens in some distant galaxies. Therefore, revealing the origins of FRBs has been a hot topic in both astronomy and the interest of the general public for more than a decade.

Previous research tried to investigate the locations of FRBs and was not successful in revealing the origins of FRBs except in one case. Thus, the research team changed their viewpoint and focused on the history of FRBs because such history could tell us what they are. They, for the first time, found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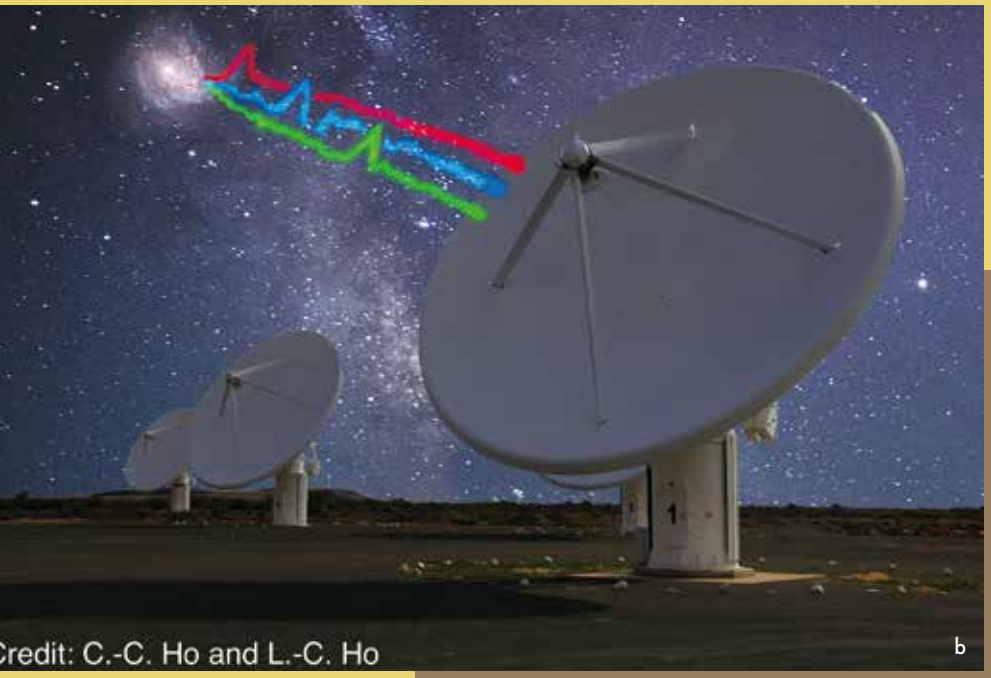


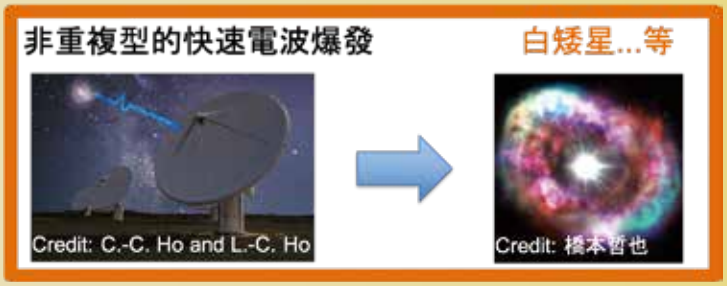
b

a. Dr. Tetsuya Hashimoto receives 2020 MOST Best Research Paper Award for Postdoctoral Fellow.
b. Artistic image of mysterious fast radio bursts (FRBs) being detected by a radio telescope.

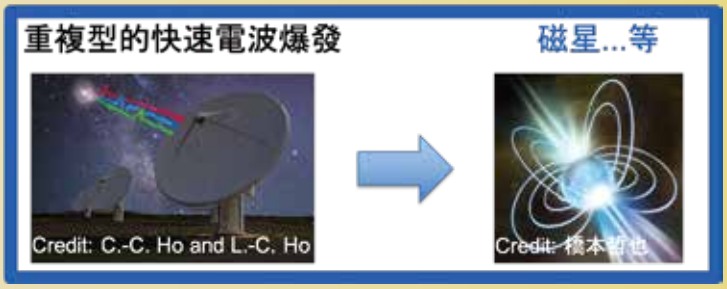
that non-repeating FRBs almost constantly happen over the last 10 billion years. In contrast, repeating FRBs occur 10 times more in the past (10 billion years ago) than at present. These trends of non-repeating and repeating FRBs are similar to that of celestial objects such as white dwarfs and magnetars. White dwarfs are the remnants of less-massive stars. Magnetars are neutron stars with extremely strong magnetic fields.

The research team, for the first time, narrowed down the FRB origins. Non-repeating FRBs are likely to have originated from celestial objects such as white dwarfs, whereas repeating FRBs from objects such as magnetars. This is a breakthrough discovery of the origins of the mysterious FRBs, revealing an answer to a key question in astronomy for more than a decade.

The explosion of non-repearting FRB->white dwarfs.



The explosion of FRB-> Magnetars



Origins of fast radio bursts (FRBs) revealed by this research.

A PODCAST IS LAUNCHED FOR PROSPECTIVE STUDENTS

Listening to podcasts is a common way to make use of downtime, especially amongst young people. With this in mind, NTHU has recently launched a podcast for prospective students titled "Knock Knock NTHU" featuring teachers from various departments. In addition to introducing their respective subjects, the guest speakers also cover such topics as how they first got interested in their subject and what to do if your choice of major doesn't agree with your parents' expectations. Each program is 20 minutes long, and the entire series provides high school students with lots of useful information for making informed decisions when applying to university.

Knock Knock NTHU is available on the free mobile app Sound On, and will be broadcast for four seasons, with 15 episodes in the first season. The first broadcast consisted of four episodes aired back-to-back, and the subsequent episodes are being made available every Thursday. The opening music was composed and performed by Charlie Wu (吳承澐), a visually impaired student at NTHU who won the Presidential Education Award.

Functioning like an audio-only version of YouTube, podcasts can be played at any time. By subscribing to a podcast,

The first episode of the Knock Knock NTHU podcast. From right to left: Prof. Chiao Chuan-chin of the Department of Life Sciences, NTHU president Hocheng Hong, Student Recruitment Center director Jane Wang, and Associate Prof. Lo Shih-lung of the Department of Chinese Literature.

whenever a new episode is released, it will automatically appear in your podcast list, and can be downloaded and listened to offline.

Jane Wang (王潔), director of the Student Recruitment Center, said that the way today's high school students acquire knowledge is changing. In addition to learning about a university through its official website, many also search social media for additional information. Thus the program adopts a lively conversational format while catering to the interests of contemporary high school students.

Opening the door to higher education

During each episode of Knock Knock NTNU, a different faculty member "opens the door" to his or her department, giving special attention to correcting any common misperceptions. In addition to high school students, the program addresses the concerns of parents and high school teachers, and amongst the guests in future episodes will be representatives of various educational organizations.

In the second episode, Wang addressed a number of misconceptions dissuading students from applying to NTHU, including the widespread impression that Hsinchu is a gourmet desert, citing as evidence a number of local specialties, such as tofu pudding topped with brown sugar.

a


b

a. Student Recruitment Center director Jane Wang debunking the legendary "five reasons for not applying to NTHU" .
b. Prof. Lo Shih-lung of the Department of Chinese Literature revealing the secret to becoming an excellent writer.

Wang has a PhD in materials science and engineering from the Massachusetts Institute of Technology, and currently teaches in the Department of Chemical Engineering at NTHU. But her parents wanted her to become a medical doctor, and she shared with listeners what she learned about dealing with such tensions, emphasizing the importance of Chinese society gives to parental opinion, and the need to begin discussing the matter well in advance, rather than waiting until the night before the deadline for making the fateful decision.

Standing out from the crowd

Amongst the first guests on Knock Knock NTHU was Prof. Chiao Chuan-chin of the Department of Life Sciences, concurrently the vice president for academic affairs, who spoke on how to write a biographical statement which stands out, even if you haven't received any prestigious awards.

Beginning from last year, applicants to NTHU are required to write an autobiographical statement focusing on their interests, unique abilities, outlook on life, and study plans. Chiao advises applicants to begin by assuming the perspective of a member of the admissions committee, who will be on the lookout for signs of academic potential, such as a positive attitude and intellectual curiosity.

Chiao's main area of research is cephalopods, including the cuttlefish and octopus, and he said that he has always liked the sea, so he majored in marine resources at university, and he has been studying marine life ever since. He said that curiosity is an important element of scientific research. Many people get interested in marine life while visiting a big aquarium, but only a few eventually become marine biologists. As Chiao put it, "The accidents of life may be what brings a particular subject to one's attention, but it's perseverance and hard work that makes your dreams come true."

On the cutting edge of interdisciplinary and experimental education

Pointing out that NTHU's wealth of educational resources encourages students to pursue their various interests and to cultivate expertise in multiple fields, Chiao said that each college at NTHU has an undergraduate interdisciplinary program which allows its students lots of flexibility in selecting courses, changing majors, and choosing a minor.

Comparing university education to agriculture, Chiao said that Tsinghua goes to great lengths to ensure that every student has all the nutriments required for growing a successful career, for which purpose NTHU has set up Taiwan's very first Experimental Education Program for students who want to design their own curriculum so as to meet their interdisciplinary interests.

Chiao also encouraged freshmen to join a student club or sports team, and to discuss with their teachers about their studies and career goals. He also pointed out the importance of acquiring good time management skills, since university students have more free time than high school students do.

Learning to write starts with imitation

Another guest on the first episode was Associate Prof. Lo Shih-lung（羅仕龍）of the Department of Chinese Literature, who emphasized that writing is a kind of skill, and suggests starting out by trying to imitate the writing style of your favorite writer.

"If you find this to be too difficult," advises Lo, "then simply start out by making a verbatim transcription of a passage you find particularly well-crafted or meaningful."
Lo said that he discovered this technique while making hand-written copies of rare French manuscripts while he was a student in France, adding with a smile that at the very least it will improve your handwriting.

NATIONAL TSING HUA UNIVERSITY WELCOMES INTERNATIONAL STUDENTS

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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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