



ntu beats

National Taiwan University Official Bimonthly

June 2023 . ISSUE 01

Post-Pandemic Faculty Training

- NTU iNGO Academy to Boost Int'l Engagement
- New Method to Improve Resilience Management
- Unearthing the Past to Save the Present



GIS Taiwan: Emergent Paradigm of Healthcare

Hosted by NTU's Office of Student Affairs and organized by its student organizing committee, Global Initiatives Symposium Taiwan (GIS Taiwan) held its 14th Annual International Academic Conference for five days early this year at NTU.

GIS is dedicated to promoting academic research and creating a platform for interdisciplinary exchange.....

READ ONLINE



ntubeats.ntu.edu.tw



FEATURES



**Prof. Hung-Jen Wang, VP for Academic Affairs:
A Learning Environment Like No Other**

NTU Office of Academic Affairs has been vigorously advancing the Future NTU program for several years, with the objective of establishing a learner-centered open university. A primary aim of the program is to transcend the barriers between various academic disciplines, thereby affording students a flexible learning environment. As part of this initiative, NTU launched the nation's inaugural Specialization Program Certificate and University-Level Interdisciplinary Bachelor's



[...more](#)

HONOR



Dr. Yueh-Feng Wu Men-Wei Lin Shang-Wei Hung

Japan E×S Challenge Award Winning Team Led by Prof. Sung-Jan Lin

Distinguished Prof. Sung-Jan Lin of the Department of Biomedical Engineering leads the Lab of Tissue Engineering and Regeneration at NTU as Principal Investigator. His lab members, Postdoctoral ...

[...more](#)

GLOBAL OUTLOOK



Explore Democratic Resilience with Czech Delegation

On March 28, Speaker of the Chamber of Deputies of the Czech Republic, Markéta Pekarová Adamová, led a delegation of over 30 Czech delegates to visit NTU and attend the Taiwan-Czechia Forum on Democratic Resilience.

[...more](#)



NTU's First-Ever iNGO Academy Boosts International Engagement

Nongovernmental Organizations (NGOs) play an important role in advancing Taiwan's relations with the international community and realizing its sustainability goals. To foster talent with the competencies and skills to ...

[...more](#)



Navigate Sustainability and Employability in Higher Education with QS

Early this year, NTU and Quacquarelli Symonds (QS), a British company that analyzes higher education institutions worldwide, co-hosted a seminar, "NTU x OS Workshop: Navigating Sustainability and ...

[...more](#)



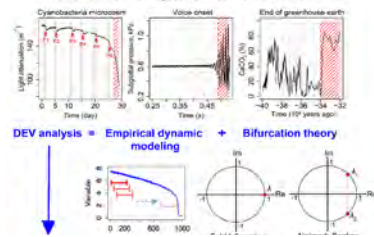
Fragments of the Future — GIS Taiwan 2023

Energy Reform, New Paradigm of Healthcare, Currency Remodeling, and Metaverse

Hosted by NTU's Office of Student Affairs and organized by its student organizing committee, Global Initiatives Symposium ...

[...more](#)

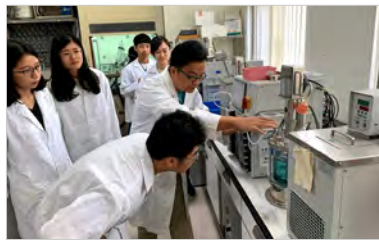
ACHIEVEMENTS



Key to Resilience Management Provided by Novel Method

An international research team led by Professors Chih-Hao Hsieh and Chun-Wei Chang of NTU's Institute of Oceanography and Institute of Fishery Sciences, have developed a new technique that predicts the occurrence and type of various critical transition events. This novel methodology, known as Dynamical Eigen-Value (DEV), leverages early warning signals obtained from real-world systems to differentiate types of critical transitions and identify the ...

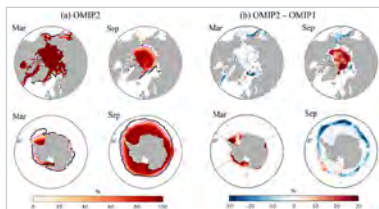
[...more](#)



Metabolites from Solid-State Fermentation of Djulis Sprouts in Bioreactor

Chenopodium formosanum (Djulis), a pseudo cereal plant, native to Taiwan, is known to possess numerous nutrients and antioxidants. A research team at NTU's Institute of Biotechnology has demonstrated that the nutritional values of Djulis could be enhanced by bioconversion.

[...more](#)



Participation in Coupled Model Intercomparison Project 6 Taiwan Multi-Scale Community Ocean Model's First Global Engagement

During the past decade, Prof. Yu-Heng Tseng of the Institute of Oceanography, College of Science, has led a local research team in developing the high-efficiency Taiwan Multi-scale Community Ocean Model (TIMCOM). His ...

[...more](#)



Unearthing the Past to Save the Present: Conservation Paleobiology

Conservation paleobiology may not be a household term, but it is a field of great importance for present-day conservation efforts. This field is not just about conserving and studying the fossil remains of extinct species but also using the information gathered from these materials to assist in conserving modern-day species and ecosystems. ...

[...more](#)



Queenless Beehive Box Solution to Pollination in the Greenhouse

Prof. En-Cheng Yang and his research team at NTU's Department of Entomology have developed a new technology for pollination by replacing queen bees with their pheromones, which can solve a long-standing problem faced by ...



[...more](#)



Interaction at Intersection: Post-Pandemic Faculty Training

Although NTU is a research university, it also continues to attach great importance to the overall quality of instruction. Even during the pandemic, NTU has continued to prioritize the professional development of its faculty through a workshop called “T+ Camp.” Because student demand for and ability to take charge of their own learning significantly increased during the pandemic, ...

[...more](#)

PEOPLE



Virtual Reality and Real-Life Charm: 2023 Azalea Festival

Spring has arrived and the NTU campus is awash with vibrant hues of pink as her signature azaleas burst into bloom. It's time for the highly-anticipated annual NTU Azalea Festival, a celebration of the campus's unique charm and vitality that draws aspiring young students from all over the country.



[...more](#)



Cultural Exchange: Winning Big at Mahjong Night

Olivia, an international student in Taiwan from California, had a special treat—her first “Mahjong” night at NTU. Cautiously reaching for the tiles in front of her, Olivia soon grasped the game under the watchful eye of Claire, a local NTU student. “The tension is mounting!” shouted Katelan, a spectator. ...

[...more](#)



The Mastermind behind Meta AI Speech Translation

Last year, Mark Zuckerberg, the CEO of Meta, demonstrated the company's latest translation technology, a system that translates speech-to-speech in real-time between English and multiple languages, making it a real game-changer in the field of translation technology. In a video Zuckerberg posted on Facebook, ...



[...more](#)

| Features

Prof. Hung-Jen Wang, VP for Academic Affairs: A Learning Environment Like No Other

Share:     



| Intro Video of Prof. Hung-Jen Wang, Vice President for Academic Affairs.

NTU Office of Academic Affairs has been vigorously advancing the Future NTU program for several years, with the objective of establishing a learner-centered open university. A primary aim of the program is to transcend the barriers between various academic disciplines, thereby affording students a flexible learning environment. As part of this initiative, NTU launched the nation's inaugural Specialization Program Certificate and University-Level Interdisciplinary Bachelor's Degree Program, thereby actualizing its goal of integrating "interdisciplinarity" and "autonomous learning" within the curriculum.

Subsequently, numerous departments have introduced their respective specialization programs, and students can obtain certification upon completing the requisite 12 to 15 credit courses. Presently, Future NTU offers approximately 237 programs, spanning topics such as artificial intelligence and cybersecurity. Moreover, the University-Level Interdisciplinary Bachelor's Degree Program combines courses from Specialization Programs and Credit Programs, enabling students to create personalized course plans and foster novel insights



Prof. Hung-Jen Wang is the Vice President for Academic Affairs as well as a professor of the Department of Economics, specialized in productivity and efficiency analysis, empirical macroeconomics, and monetary policy.

through interdisciplinary studies. Upon completion, students receive a degree commensurate with their course plans. A recent example involved a student who, recognizing Taiwan's aging population trend, selected courses from three distinct Specialization Programs and Credit Programs—robotics, elderly care, and long-term care—ultimately creating a bespoke human-robot interaction degree program. This degree could serve as a template for preparing students with the requisite knowledge and skills to address the challenges facing Taiwan's aging society. As a result, students interested in this significant subject can now pursue this degree.

Additionally, the Office of Academic Affairs is developing exploratory credits, providing students with the opportunity to attend six credit courses from different departments or fields of study. Upon completion, students can choose whether to include these six credits on their transcripts based on their performance. This option encourages students to venture beyond their comfort zones and explore various interests. Grades should not deter students from exploring new subjects, and this design aims to foster interdisciplinary talent to meet society's multifaceted needs. Beyond the wide array of programs and action plans, NTU Office of Academic Affairs actively promotes digital learning on campus, including online learning platforms such as Massive Open Online Courses (MOOCs) and Open Course Ware (OCW). Several departments, for example the School of Forestry and Resource Conservation, the School of Nursing, and the Department of Athletics, have already integrated Virtual Reality equipment into their courses. Other departments are also planning to incorporate this technology to augment their students' learning experiences. Regarding international exchanges, NTU has been co-hosting online study groups with leading universities in the United States and Japan to enhance students' communication, teamwork skills, and ability to collaborate with individuals from diverse backgrounds. NTU has also made significant progress in internationalizing its campus, offering 2,500 English-instructed courses to attract international students. The university plans to launch additional English programs to reduce language barriers for international students arriving in Taiwan. The goal is to recruit outstanding international students and enhance campus competitiveness. To achieve this objective, NTU Office of Academic Affairs hosts workshops and training sessions for faculty and teaching assistants, enabling them to conduct courses in English and foster internationalization.

The Office of Academic Affairs' efforts are ongoing, as its mission is to continually refine the existing educational system and campus programs. The next phase will involve promoting the NTU curriculum reform project and exploring potential future developments.

<https://ntubeats.ntu.edu.tw/enews/001>



Wang hopes to improve the current Future NTU program and promote more comprehensive reforms of department and college-level courses.



Click or Scan the QR code to visit NTU Center for Teaching and Learning Development x Digital Learning Center to learn about NTU's Teaching Innovations.



Click or Scan the QR code to learn about the Specialization programs.



Click or Scan the QR code to learn about NTU MOOC x Coursera Courses.



Click or Scan the QR code to learn more about Future NTU.

| Honor

Japan E×S Challenge Award Winning Team Led by Prof. Sung-Jan Lin

Share:     

Distinguished Prof. Sung-Jan Lin of the Department of Biomedical Engineering leads the Lab of Tissue Engineering and Regeneration at NTU as Principal Investigator. His lab members, Postdoctoral Fellow Yueh-Feng Wu and master students Men-Wei Lin and Shang-Wei Hung, formed a team and won the School of Engineering E×S Challenge Award at the 2nd Engineering School E×S Challenge organized by Tokyo Institute of Technology.

The E×S Challenge encourages students and young researchers to propose feasible business ideas based on engineering sciences and technologies that could help create a sustainable society. The competition focuses on realizing goals that make sustainable development a reality by exploring the most innovative and creative ideas and assisting the teams in bringing their proposals to fruition—the feasibility of the proposals is the evaluation criterion.

The E×S Challenge consists of three stages, including PITCH, STORM, and LAUNCH. Prof. Sung-Jan Lin's team entered the competition with a proposal to develop a drug that prevents corneal endothelial cell loss, winning the first prize in the PITCH stage. In the STORM stage, the team collaborated with students from Tokyo Institute of Technology and proposed a project on "AI image diagnosis of cataracts and drug development to prevent complications of cataract surgery." The team stood out in the LAUNCH stage and won the School of Engineering E×S Challenge Award and prize money totaling 1 million Japanese Yen among the 12 teams. The team's research was also supported by the Innovative Translational Research: Novel Targets in Human Health and Diseases Program of the National Science and Technology Council.



The team of Prof. Sung-Jan Lin at the Department of Biomedical Engineering worked together with students from the Tokyo Institute of Technology to submit a proposal on "AI image diagnosis of cataracts and drug development to prevent complications of cataract surgery," aimed to provide one-stop services for the diagnosis and treatment of cataracts.



Dr. Yueh-Feng Wu Men-Wei Lin Shang-Wei Hung

Members of the E×S Challenge first-prize award-winning team. Left to right: Postdoctoral Fellow Yueh-Feng Wu, masters students Men-Wei Lin and Shang-Wei Hung at the Department of Biomedical Engineering.



Click or Scan the QR code for more information on the second E×S Challenge.

| Global Outlook

Explore Democratic Resilience with Czech Delegation

Share:     



| Czech Delegation and NTU participants at the Taiwan-Czechia Forum on Democratic Resilience.

On March 28, Speaker of the Chamber of Deputies of the Czech Republic, Markéta Pekarová Adamová, led a delegation of over 30 Czech delegates to visit NTU and attend the Taiwan-Czechia Forum on Democratic Resilience. The event, co-hosted by NTU and the European Values Center for Security Policy (EVC), gathered experts in the field to share information and engage in serious discussions regarding the furtherance of democratic resilience.



| Wang hopes to improve the current Future NTU program and promote more comprehensive reforms of department and college-level courses.

The Czech delegation was warmly welcomed by NTU President Wen-Chang Chen and Vice President for International Affairs Hsiao-Wei Yuan. The event kicked off with opening remarks by President Chen and Ministry of Foreign Affairs Deputy Minister Roy Chun Lee. In his remarks, President Chen highlighted NTU's academic connection with the Czech Republic through its long-standing partnership with Charles University, Speaker Adamová's alma mater.



| Vice President for International Affairs Hsiao-Wei Yuan (right) welcoming Speaker Adamová (left).

During the forum, Speaker Adamová expressed her appreciation for the warm reception and highlighted the numerous common democratic values cherished by both Taiwan and the Czech Republic. The event featured two panels that were moderated by EVC Taiwan Office Head Marcin Jerzewski and NTU Hu Fu Center for East Asia Democratic Studies Director Min-Hua Huang. The panelists included speakers from the Czech Republic and Ukraine, such as Jakub Janda, Pavel Stepanik, Benedikt Vangeli, Mariia Makarovyh, and Mariia Kovach-Butsko,

as well as local speakers, including NTU Graduate Institute of Journalism Director Chen-Ling Hung and NTU's College of Law Associate Professor Hui-Chieh Su.

The forum generated great interest among NTU students and faculty who engaged in lively discussions with the panelists. The event concluded successfully, setting the stage for future dialogues and academic opportunities between NTU and the Czech Republic. Without a doubt, this visit is a vital testament to the ongoing collaborations between both parties in advancing democratic values and academic exchanges.



President Chen and Vice President for International Affairs Hsiao-Wei Yuan receiving the Czech delegation (from left to right: Director-General of European Affairs Vincent Yao, Vice President for International Affairs Hsiao-Wei Yuan, Speaker's spouse Tomáš Pekara, Speaker Markéta Pekarová Adamová, NTU President Wen-Chang Chen, Ministry of Foreign Affairs Deputy Minister Roy Chun Lee, Czech Economic and Cultural Office in Taipei Representative David Steinke, and European Values Center for Security Policy Director Jakub Janda).

| Global Outlook

NTU's First-Ever iNGO Academy Boosts International Engagement

Share:     



Youth Development Administration Director-General Hsueh-Yu Chen, and Deputy Director-General of the Ministry of Foreign Affairs' Department of NGO International Affairs Elvie Wu attending the ceremony. NTU President Wen-Chang Chen, NTU Executive Vice President Shih-Torng Ding, Vice President for International Affairs Hsiao-Wei Yuan signing agreements with NGO founders and CEOs, officially inaugurating the iNGO Academy. By joining hands with civic groups, NTU hopes to cultivate talents who can connect Taiwan to the world.

Nongovernmental Organizations (NGOs) play an important role in advancing Taiwan's relations with the international community and realizing its sustainability goals. To foster talent with the competencies and skills to participate in NGOs, NTU hosted the orientation and signing ceremony of the "NTU iNGO Academy" in January. This program not only offers all-English courses so students will acquire the necessary knowledge and language skills, but also a 16-week internship with local NGOs, ensuring that the participants are competent and have the hands-on experience to make valuable contributions to global issues.

According to NTU President Wen-Chang Chen, the NTU iNGO Academy collaborated with Impact Hub Taipei and introduced students from five countries and nine colleges to different types of NGO internship programs. The participating NGOs included international organizations in Taiwan, such as Good Neighbors and Jane Goodall Institute Taiwan, Taiwanese organizations with international outreach, such as Noordhoff Craniofacial Foundation, Step30,



NGO representatives who attended the ceremony, including Director Kuan-Hsiung Hsieh of Good Neighbor Foundation, Founder of Step 30 Yu-Jen Yang, Co-founder of One-Forty Kevin Chen, Jane Goodall Institute Taiwan Executive Director Kelly Kok, and Noordhoff Craniofacial Foundation CEO Yi-Ling Chen.

The Garden of Hope Foundation, and The Mustard Seed Mission, and NGOs focused on Taiwan's international relations, such as the Center for Asia-Pacific Resilience and Innovation (CAPRI), One-Forty, and Digital Diplomacy. It is hoped that students in the program will develop a passion for NGOs and be motivated to work for the realization of Taiwan's sustainability objectives through their internships and academic endeavors.

Besides attending the NTU iNGO Academy, NTU students may voluntarily form charity clubs to support people in rural areas locally and internationally and utilize their expertise to provide services to communities. One especially prominent student club is the World Volunteer Society, which is dedicated to serving the public, connecting Taiwan's volunteer team with the world, and increasing the participation of Taiwanese youth in NGOs and Non-profit Organizations (NPOs). In all these ways, they aim to enhance Taiwan's international visibility. The University has recognized the remarkable performance of these dedicated students with the NTU Social Contribution Award.



Click or Scan the QR code to visit iNGO Academy's website and learn more details.



Click or Scan the QR code to visit NTU World Volunteer Society's Facebook page to learn more about them.



| Global Outlook

Navigate Sustainability and Employability in Higher Education with QS

Share:     



The speakers of the event (left to right) : QS Senior Ranking Research Manager Andrew MacFarlane, NTU Office of Sustainability Assistant Chief Executive Officer Yi-Huan Hsieh, Chung Yuan Christian University Vice President, Dean of Research and Development, and Distinguished Prof. of the Dept. of Electrical Engineering Prof. Ying-Yi Hong, and Covestro Head of Communications and DEI Promoter Renee Chen.

Early this year, NTU and Quacquarelli Symonds (QS), a British company that analyzes higher education institutions worldwide, co-hosted a seminar, “NTU x OS Workshop: Navigating Sustainability and Employability in Taiwan’s Higher Education.” The seminar brought together industry and academic experts to discuss the sustainability and development of higher education in Taiwan.

From academia, NTU, Chung Yuan Christian University, and National Taiwan University of Science and Technology showcased their efforts and results in sustainability and talent development. Industry representatives from Covestro and CakeResume shared their experiences of collaborating and co-working with higher education institutions and their views on potential future collaborations. Staff members from the International Affairs Office, Research and Development Office, and Academic Affairs Office of universities across the country attended the seminar.



Associate Vice President for International Affairs Jiun-Haw Lee (right) conversing with Chung Yuan Christian University Vice President Ying-Yi Hong.

The seminar was a forum for identifying Taiwan’s best practices in this area and sparking discussion on new possibilities so as to increase awareness among the institutions of higher education in Taiwan on this important topic as well as encourage the incorporation of enterprise perspectives in developing effective collaboration plans between industry and academia. NTU chose QS as the co-host of this event due to the organization’s extensive experience in global sustainability and employability, as well as its deep understanding of Taiwan’s higher education landscape.

Talent cultivation is pivotal to industry-academia collaboration. In recent years, NTU has launched the “2023 NTU International Mentorship Program” and “NTU iNGO Academy,” to facilitate collaborations with foreign trade councils in Taiwan, government units, NGOs in Taiwan, civic groups, and research institutions and build a mentorship program for international students in Taiwan. By developing such programs, NTU aims to increase the retention of outstanding international talents, enhance Taiwan’s connection with international society, and realize its sustainability goals.



Group photo of Associate Vice President for International Affairs Jiun-Haw Lee with speakers and attendees.

| Global Outlook

Fragments of the Future — GIS Taiwan 2023

Energy Reform, New Paradigm of Healthcare, Currency Remodeling, and Metaverse

Share:     



| NTU President Wen-Chang Chen delivering a speech at the opening ceremony of GIS 2023.

Hosted by NTU's Office of Student Affairs and organized by its student organizing committee, Global Initiatives Symposium Taiwan (GIS Taiwan) held its 14th Annual International Academic Conference for five days early this year at NTU.

GIS is dedicated to promoting academic research and creating a platform for interdisciplinary exchange. For this year's conference, GIS took great pleasure in inviting established leaders and professionals from various fields to participate, including Guatemala's Ambassador to Taiwan, Oscar Adolfo Padilla Lam, NTU medical scientist, Pan-Chi Yang, and Managing Director of STMicroelectronics Taiwan, Giuseppe Izzo. Additionally, NTU President Wen-Chang Chen, Vice President for Student Affairs Shi-Wei Chu, Vice President for International Affairs Hsiao-Wei Yuan, and President Jia-Yush Yen of National Taiwan University



| Group photo at the opening ceremony of GIS 2023.

of Science and Technology, also participated, showing strong support for the conference. Notably, conference goers included nearly 200 student delegates from 11 countries around the world!

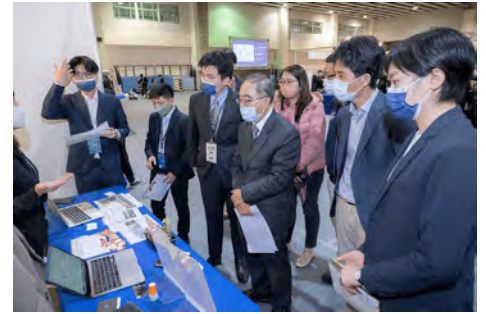
Aimed to spark the participants' imaginings of possible future worlds by exploring the present one, "Fragments of the Future" was the theme of GIS 2023. There were four related academic subtopics: "Energy Reform," "New Paradigm of Healthcare," "Currency Remodeling," and "Metaverse." During such conference activities as the Keynote Speech, Critical Sprout, and Impact Project, student participants had ample opportunity to interact and exchange ideas with the guest speakers, who are noted pioneers in their fields.

GIS stresses cultural exchanges as well as academic activities, so the Cultural Festival was a major highlight of this year's event. Featuring such activities as cultural exchange booths, cultural performances, and the like, the participants had the opportunity to explore the distinct beauty of various cultures around the world. Representatives from the American Institute in Taiwan, New Zealand Commerce and Industry Office, and Czech Economic and Cultural Office also shared their professional advice about exchange programs as well as valuable related experiences in presentations and discussions with the student participants.

By hosting such high-quality international student symposiums, GIS Taiwan hopes not only to broaden the horizon of university students in Taiwan but also to leave a deep impression on the participants from abroad, increasing Taiwan's visibility in the world and letting it shine on the international stage.



Mexican dance performance at the Cultural Festival of GIS 2023.



President Chen and Vice President for Student Affairs Chu visiting the carnival of GIS 2023.



Click or Scan the QR code to visit the 2023 GIS website for more information.

Achievements

Key to Resilience Management Provided by Novel Method

Share:     

An international research team led by Professors Chih-Hao Hsieh and Chun-Wei Chang of NTU's Institute of Oceanography and Institute of Fishery Sciences, have developed a new technique that predicts the occurrence and type of various critical transition events. This novel methodology, known as Dynamical Eigen-Value (DEV), leverages early warning signals obtained from real-world systems to differentiate types of critical transitions and identify the quantitative threshold for critical transition, overcoming numerous research challenges. The team's discovery also provides a way to effectively monitor changes in system resilience, such as catastrophic shifts in socio-economically significant systems, and suggest early prevention measures. The research was published in *Science Advances* (Jan 2023).

In many real-world systems, there are critical thresholds or tipping points at which the system suddenly changes to different and usually undesirable states. These sorts of unpredictable occurrences, called critical transitions or regime shifts, are triggered by local bifurcations in nonlinear dynamical systems. They can cause significant damage and loss in the environment, economy, and public health. It is therefore crucial to accurately forecast their occurrence and potential effects through various scientific fields and applications. The team's DEV method differs from previous early warning signals in providing a quantitatively defined threshold for predicting critical transition events. The method has been proven successful in both theoretical models and real-world systems (Figure 1).

Unlike existing early warning signals (EWS) that can only signal potential critical transitions based on a qualitative rising pattern, without specifying how significant the increased EWS could be, the DEV provides a specifically defined threshold, enabling predictability of different critical transitions. This discovery will significantly improve humanity's ability to foresee potential losses and devise suitable strategies to avoid or ameliorate the effects.

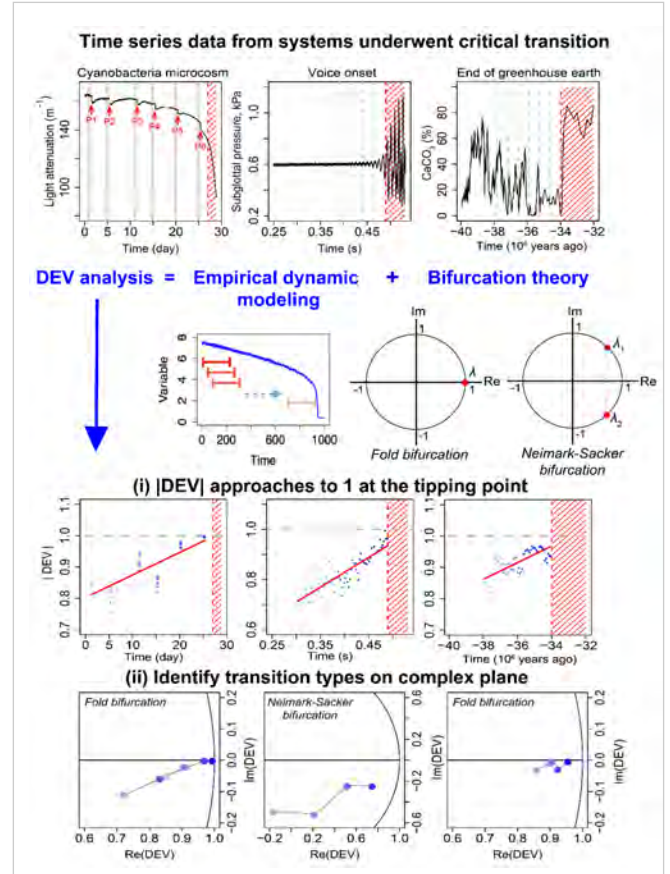


Figure 1. The study proposes a new technique called Dynamical Eigen-Value (DEV) analysis, which can anticipate critical transitions and determine their type. The study presents three examples of how the DEV method has been used, including predicting the occurrence of critical transitions in 1) cyanobacteria microcosm, 2) voice onset, and 3) the end of the last greenhouse earth. The DEV method is based on empirical dynamic modelling and calculates a quantitative measure called DEV that serves as a proxy for the dominant eigenvalue of Jacobian in mathematical bifurcation theory. The occurrence of a critical transition is predicted by tracking the temporal dynamics of DEV, and critical transition types are identified by examining the location of DEV on the complex plane. The study shows that the DEV method successfully predicted fold bifurcation in systems 1) and 3) and Neimark-Sacker bifurcation in system 2).

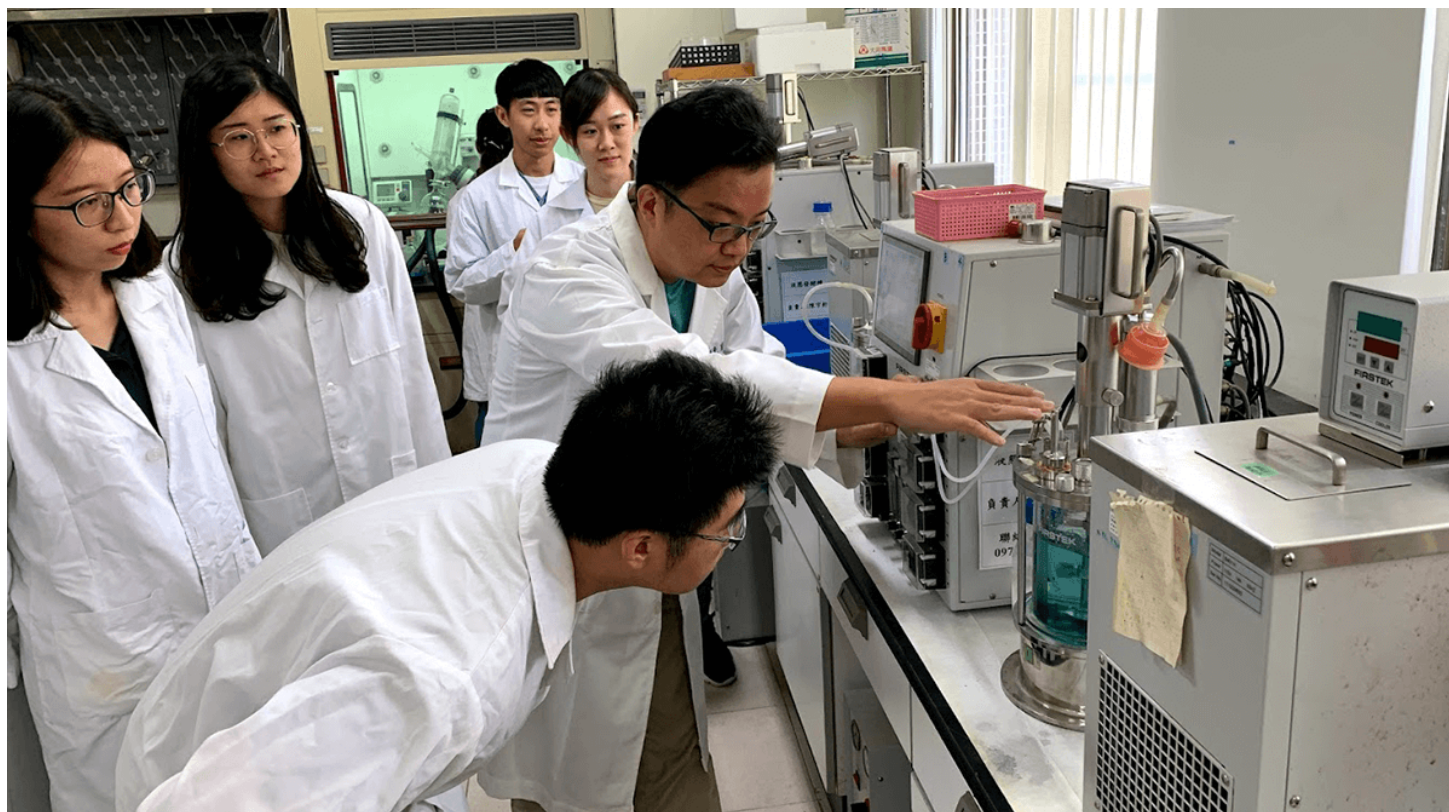


Click or Scan the QR code to read the journal article in *Science Advances*.

| Achievements

Metabolites from Solid-State Fermentation of Djulis Sprouts in Bioreactor

Share:     

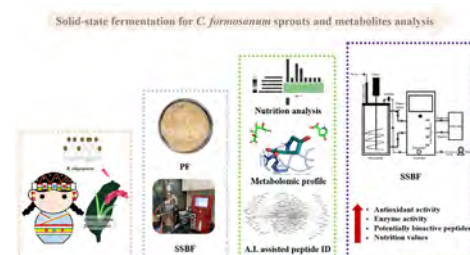


| Precision Fermentation – Prof. Cheng (center, pointing).

Chenopodium formosanum (Djulis), a pseudo cereal plant, native to Taiwan, is known to possess numerous nutrients and antioxidants. A research team at NTU's Institute of Biotechnology has demonstrated that the nutritional values of Djulis could be enhanced by bioconversion.

The team led by Prof. Kuan-Chen Cheng and Prof. Shu-Han Yu, together with Ph.D. candidate Chen-Che Hsieh, successfully designed a solid-state fermentation system to induce large-scale fermentation of Djulis sprouts. By utilizing the fungus, *Rhizopus oligosporus* as the fermenting agent, the team compared bioactive and nutrient components obtained from both a traditional plate fermentation and a bioreactor.

Using untargeted analysis techniques, such as HPLC-DAD and UHPLC-ESI-MS/MS, the team evaluated many small molecular metabolites from fermented



| Abstract graph.

Djulis sprouts. Additionally, two-dimensional gel electrophoresis and LC-MS/MS (Orbitrap Elite ETD) were employed to isolate and characterize the proteomics of the samples. Upon identifying peptides in the fermented products, the team used AnOxPePred and BIOPEP-UWM to screen for antioxidant properties and other potentials.

Ph.D. candidate Hsieh found that fermentation in a bioreactor produced more nutrient composition, free peptides, phenolic compounds, isoflavones, antioxidant capacity, and enzymatic activity than did traditional plate fermentation. Additionally, over twenty new metabolites were discovered in the bioreactor compared to its plate fermentation counterpart.

Prof. Yu consolidated her academic expertise and industry experience by analyzing proteomic patterns of samples from the bioreactor system and identified seven different peptides after blasting with the Uniprot database. Using her approach, the team was able to identify dipeptidyl peptidase IV (DPP IV) and angiotensin-converting enzyme (ACE) inhibitor, the two peptides that showed high free radical scavenging scores and bioactive properties.

Prof. Cheng integrated 20 years of research experience in microbial processing to develop a fermentation system that can enhance the antioxidants and nutritional values of Djulis sprouts as well as other food products. He concluded: “A scale-up fermentation system like a bioreactor offers many advantages compared to plate fermentation. Using this technique, we can obtain products that can be utilized as food supplements and other nutraceutical compounds. This is the future of food production.”



BF Fermentation – Prof. Cheng (first left) and Ph.D. candidate Hsieh (first right).



Fermented Djulis sprout in the solid state bioreactor.



Members of the Precision Fermentation Lab.



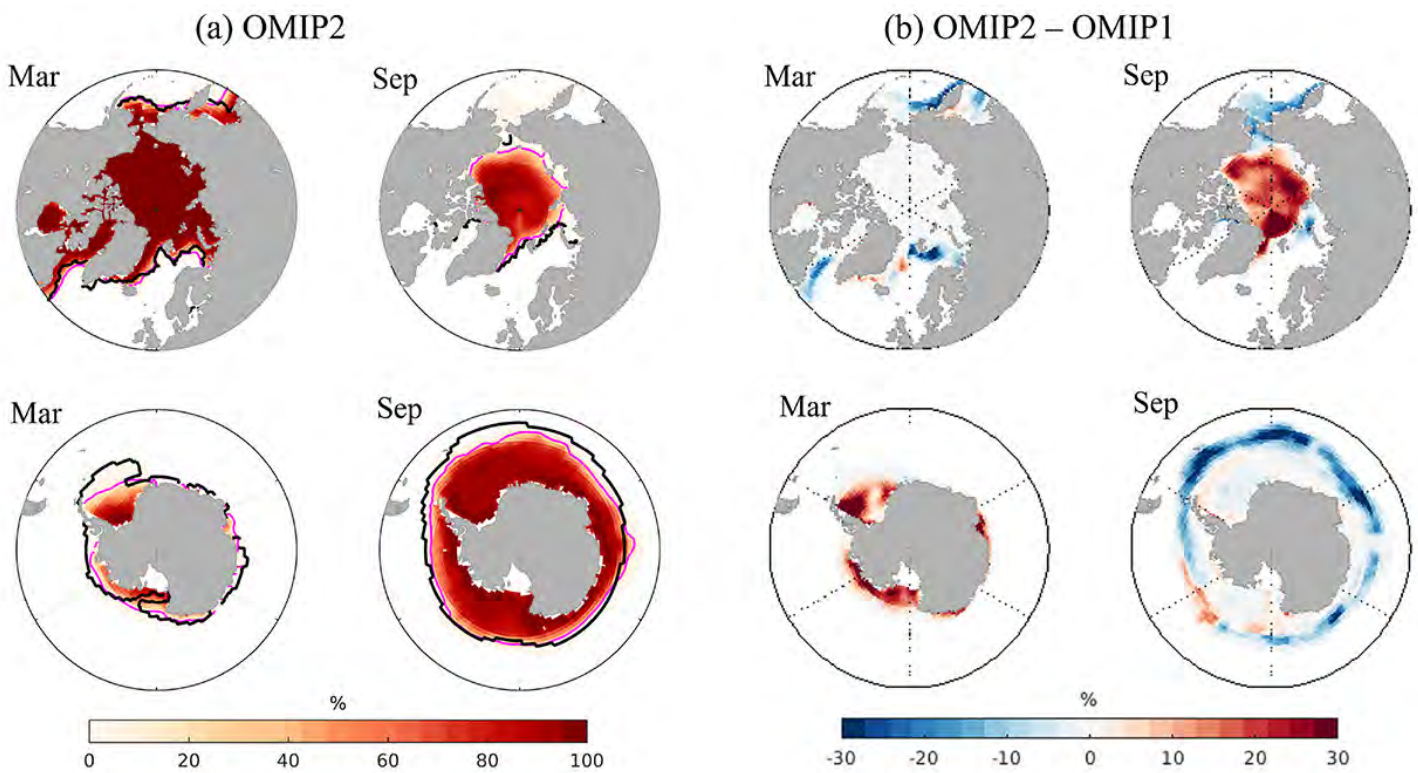
Click or Scan the QR code
to read the journal article
in *Food Research International*.

| Achievements

Participation in Coupled Model Intercomparison Project 6

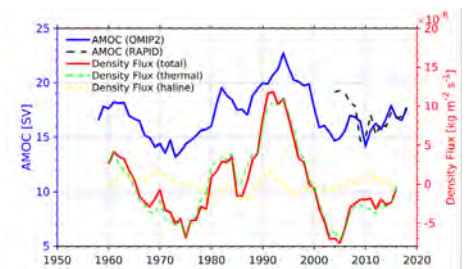
Taiwan Multi-Scale Community Ocean Model's First Global Engagement

Share:     



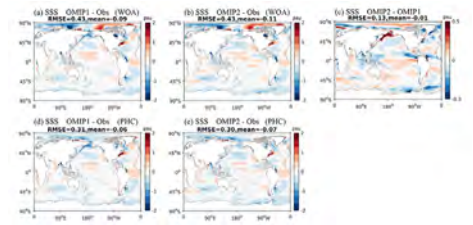
(a) Spatial pattern of March and September SIC (%) in OMIP2 during the last 30 years (1980–2009) of the OMIP1 experiment. Pink lines are contours of 15% ice concentration (observations are superimposed as black contours). (b) Differences between the OMIP2 and OMIP1 experiments.

During the past decade, Prof. Yu-Heng Tseng of the Institute of Oceanography, College of Science, has led a local research team in developing the high-efficiency Taiwan Multi-scale Community Ocean Model (TIMCOM). His team originally developed TIMCOM in Taiwan as a accurate regional ocean model to simulate the regional circulation in the western North Pacific. More recently, advanced features, including the meso-scale parameterization, vertical turbulent mixing and a sea ice model, were incorporated within TIMCOM to simulate the global ocean and sea ice changes. TIMCOM was the first major contribution in Taiwan to the Ocean Model Intercomparison Project (OMIP) under phase 6 of the Coupled Model Intercomparison Project (CMIP6) for IPCC assessment reports.



AMOC transport at 26.5°N in the last cycle of the OMIP2 experiment (blue) and RAPID observations (black) (units: Sv). The 5-year running mean of the annual mean density flux over the North Atlantic (45–65 °N) is superimposed (red). The total density flux is separated into thermal (green) and haline (yellow) components.

TIMCOM is participating in OMIP experiments as part of CMIP6. This project compares the results of two ocean–sea ice model experiments: (a) OMIP1, forced by the Coordinated Ocean–Ice Reference Experiments Phase II data (1948–2009), and (b) OMIP2, forced by JRA55-do data (1958–2018). The observed annual means and the interannual variability of physical states are well captured in the TIMCOM results of both experiments with much improved mean temperatures and salinities in OMIP2. The weaker winds and stronger freshwater discharge in the OMIP2 forcing were responsible for some of the differences between the OMIP1 and OMIP2 simulations. Many patterns and biases were found to be similar to those found in other modeling efforts, confirming the common systemic biases. However, this study disclosed several unique features, such as the recent increase in Atlantic Meridional Overturning Circulation (AMOC) that has been observed during the last decade and a generally higher Drake Passage transport. The enhanced AMOC can be explained by a recent cooling event over the North Atlantic, which thermally increased surface density flux. The higher Drake Passage transport compared to observations was possibly linked to a stronger bottom cell of meridional circulation and a smaller Antarctic sea-ice extent.



Spatial pattern of (a) OMIP1 SSS biases (psu), (b) OMIP2 SSS biases (psu), in terms of the deviation from the WOA13 climatology. The last 30 years (1980–2009) of OMIP1 are used for a fair comparison. (c) The difference between OMIP2 and OMIP1 SSS biases. (d) OMIP1 SSS biases (psu), and (e) OMIP2 SSS biases (psu) but the model outputs are compared to the PHC2 climatology.



Click or Scan the QR code to read the journal article in *Ocean Modelling*.

| Achievements

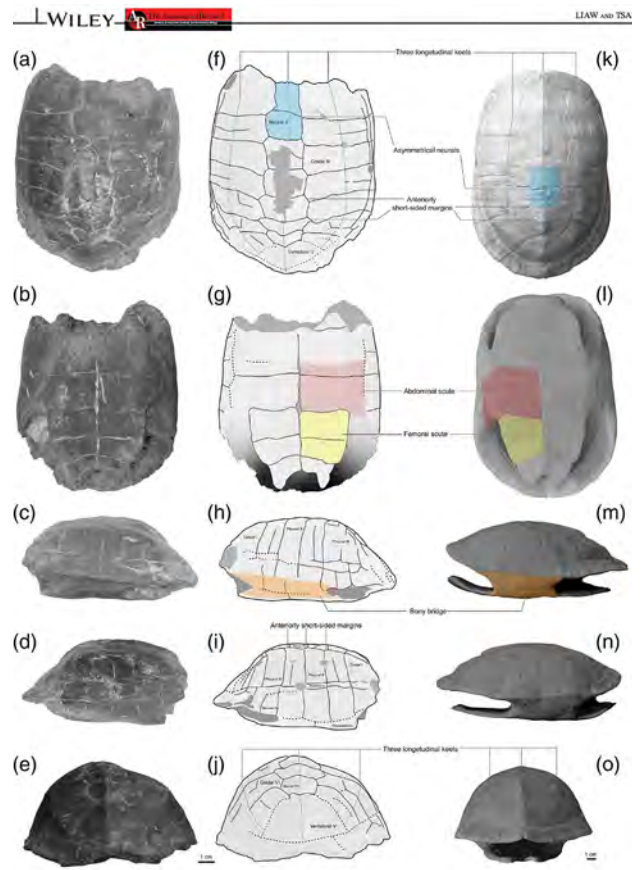
Unearthing the Past to Save the Present: Conservation Paleobiology

Share:     

Conservation paleobiology may not be a household term, but it is a field of great importance for present-day conservation efforts. This field is not just about conserving and studying the fossil remains of extinct species but also using the information gathered from these materials to assist in conserving modern-day species and ecosystems. Such studies involve the use of fossil records to gain insight into how species and ecosystems responded to environmental changes in the past. By understanding how they adapted, conservation paleobiologists can predict how present-day species might respond to present and future changes in the environment and the climate. Such knowledge is crucial in developing effective conservation strategies, particularly for endangered species and ecosystems.

Associate Prof. Cheng-Hsiu Tsai and his PhD student Yi-Lu Liaw of NTU's Department of Life Science have introduced a new research project in conservation paleobiology—demonstrating how the study of fossils can provide valuable insights for conservation policy decision-making. For example, by conducting a revision of the taxonomy of the Pleistocene geoemydid turtle found in Taiwan, they confirmed the existence of the Pleistocene *Mauremys reevesii*. This finding has significant implications for conservation paleobiology and indicates that even though the present population of *M. reevesii* may have been recently introduced by humans, it should be recognized as a native species of Taiwan.

This discovery offers a new perspective on the possibility that such a secondary-invasion population could rebuild its natural habitat and restore the vanished ecological niche of Pleistocene *M. reevesii* in Taiwan. Moreover, this pioneering practice of conservation paleobiology in Taiwan also sheds new light on the decision-making of conservation policy and offers new insights into the origin of modern biodiversity.



The Pleistocene *Mauremys reevesii* of Taiwan (left); anatomical interpretations of the Pleistocene *M. reevesii* (middle); and the shell of modern *M. reevesii* (right).



Reconstructed ecological scene with *Mauremys reevesii* in the Pleistocene Park (illustrated by Yi-Lu Liaw).



Click or Scan the QR code to read the journal article in *The Anatomical Record*.

| Achievements

Queenless Beehive Box

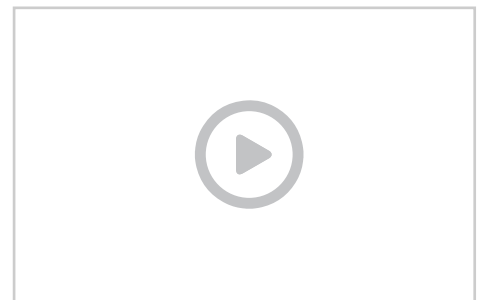
Solution to Pollination in the Greenhouse

Share:     



Prof. En-Cheng Yang and his research team at NTU's Department of Entomology have developed a new technology for pollination by replacing queen bees with their pheromones, which can solve a long-standing problem faced by farmers—the lack of bees to pollinate their crops.

Prof. Yang has significantly improved on the traditional method of indoor pollination in greenhouses, which often involves using overcrowded beehives, which can lead to bee attacks on farmers when feeding the bees. He achieved this result by leaving only one honeycomb in the hive with pheromones to replace the queen bee, then placing the beehive in greenhouses to pollinate the plants. The study found that by populating the honeycomb with worker bees and pheromones is sufficient to create a stable bee colony for pollination. In further tests conducted in 0.19 hectares of muskmelon greenhouse, the team found that just a few bees were needed to pollinate the area. The test also showed that a single pheromone can keep the colony stable and viable for up to three months.



Team members demonstrating how to place the queenless beehive box in the greenhouse. It has been proven to keep the colony stable and viable with one single pheromone for three months. The box has been patented and commercialized.

The beehive design has been patented and commercialized. It is now used in 88 greenhouses where 12 crops are raised, including muskmelon, mino melon, strawberry, sponge gourd, bitter melon, cucumber, jujube, zucchini, blueberry, nectarine, and Peruvian groundcherry with promising results. Besides increasing crop yield and quality, Prof. Yang's innovation also fosters the development of the pollination industry while avoiding the potential ecological crisis of relying on the import of bumblebees. This innovation demonstrates the potential for combining academic research with practical applications in agriculture.



The queenless beehive box developed by Prof. En-Cheng Yang and his research team at NTU's Department of Entomology replaces the queen with its pheromone. Once industrialized, it will solve the farmers' long-standing problem of bee shortage.

| Teaching & Learning

Interaction at Intersection: Post-Pandemic Faculty Training

Share:     



| Teaching Mandala - Interdisciplinary Peer Exchange. The activity is aimed to boost interdisciplinary cooperation based on the spirit of “Interaction at Intersection” by discussing and reflecting on how to seek diversity and innovation in the courses from the perspectives of faculty, students, and teaching units.

Although NTU is a research university, it also continues to attach great importance to the overall quality of instruction. Even during the pandemic, NTU has continued to prioritize the professional development of its faculty through a workshop called “T+ Camp.” Because student demand for and ability to take charge of their own learning significantly increased during the pandemic, traditional teaching methods and long-standing curricula can no longer meet the learning demands and needs of students today. In response to this wave of teaching reform, T+ Camp is focused on the theme of “Retreat, Relax, Restart” and the concept of “diverse learning modalities,” opening the way for faculty members at the forefront of teaching to reexamine and adjust their teaching by observing and reflecting on their actual teaching experience. Additionally, this workshop provides teachers with the opportunity to explore new generation teaching platforms and cutting-edge teaching aids, such as VR, leading them to innovate their teaching practices through the integration of technology.



| VR experience: Exploring the Metaverse of Teaching.

Observing the changes and development of the faculty's teaching styles at domestic and foreign universities before and after the pandemic, more attention is being paid to the physical and spiritual balance of faculty and students—their well-being—since the pandemic. In response to this trend, NTU's faculty improvement policy has also evolved from just improving teaching skills before the pandemic, focusing on digital teaching and tools during the pandemic, to seeking physical and mental balance after the pandemic. Teaching development is no longer limited to static academic learning and discussion. Faculty can also relax and inject new energy into their teaching through such activities as team sports and exploration bazaars.



Exploration Bazaar: Learning to Create a New Experience. NTU responded to societal changes during the pandemic by innovating and promoting a variety of learning reforms, such as field expertise, academic advising system, and future classrooms.

| People

Virtual Reality and Real-Life Charm: 2023 Azalea Festival

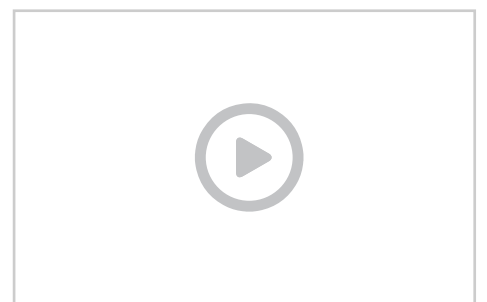
Share:     



Spring has arrived and the NTU campus is awash with vibrant hues of pink as her signature azaleas burst into bloom. It's time for the highly-anticipated annual NTU Azalea Festival, a celebration of the campus's unique charm and vitality that draws aspiring young students from all over the country.

This year's festival was especially grand, since visitors could experience the University's charisma and vitality in person. The two-day event kicked off with a mesmerizing performance by the NTU Juggling Club and the NTU Wind Band, following a warm welcome from President Wen-Chang Chen.

Festival attendees had the opportunity to explore the booths at the NTU Sports Center to learn about the cutting-edge research and studies at NTU's wide range of academic departments. They could also visit the student club expo and witness first-hand the incredible diversity of interests and talents of the NTU students.



The opening ceremony and behind-the-scenes of the 2023 NTU Azalea Festival.

Besides the in-person festivities, the opening ceremony and department and student club expos were also livestreamed online, allowing the NTU family and the general public from every corner of the world to participate in the event and observe the breathtaking beauty of the azaleas on campus.

Last year, the festival was held entirely online, with an innovative VR interface that created an immersive experience. Even though the festival was held in person this year, the online department expo still offered plentiful information on NTU's various programs, such as the University-Level Interdisciplinary Bachelor's Program, the College-Level Interdisciplinary Bachelor's Program, the Trans-Disciplinary Bachelor Degree Program, as well as information about overseas admissions from the NTU Office of International Affairs, for those who couldn't attend the event in person.

Whether you are a prospective student or simply wish to learn more about NTU, the festival's webpage provides up-to-date information on the University latest academic achievements and offerings. Don't miss your chance to experience the incredible beauty and vibrant energy of NTU!



The opening ceremony of the 2023 NTU Azalea Festival, the Department and Student Club Expos. National Taiwan Normal University President Cheng-Chih Wu, Taipei Mayor Wan-An Chiang, NTU President Wen-Chang Chen, and National Taiwan University of Science and Technology Jia-Yush Yen (from left to right).



NTU President Wen-Chang Chen at the Department Expo, trying the milk produced by NTU Department of Animal Science & Technology.



Click or Scan the QR code to visit the virtual Department Expo for more details.



Click or Scan the QR code to visit the Overseas Student Admissions website for more details.



Click or Scan the QR code to visit the NTU Azalea Festival website for more details.



Click or Scan the QR code to visit NTU Juggling Club's Facebook page.



Click or Scan the QR code to NTU Wind Band's YouTube channel.

| People

Cultural Exchange: Winning Big at Mahjong Night

Share:     



| ISIE Club President Kai-Chun Wu (first left) observing the game, explaining the rules, and facilitating the game.

Olivia, an international student in Taiwan from California, had a special treat—her first “Mahjong” night at NTU. Cautiously reaching for the tiles in front of her, Olivia soon grasped the game under the watchful eye of Claire, a local NTU student. “The tension is mounting!” shouted Katelan, a spectator. As Olivia revealed a triplet on the table, cheers erupted from everyone around her—“She won!”

Around the room, members of the NTU Mahjong Club expressed surprise when they saw four international students seated at each of the 12 mahjong tables in the room. “Is this an activity of an international student mahjong club?” they whispered to each other in amazement, observing 50 local students patiently teach 50 foreign students how to play mahjong—in fluent English.



| ISIE member Cassandra teaching the mahjong rules in English.

ISIE: Bridging cultures

Mahjong Night, is an exciting event hosted by NTU International Student Information Service (NTU ISIE), where the excitement begins. “We want to help our international students learn local Taiwanese culture in the most amusing and interesting ways,” affirmed ISIE President, Kai-Chun Wu. Wu had noticed that international students tended to flock together, so he strived to create more opportunities for them to interact with local students. Activities such as Mahjong Night, one-day trips in Northern Taiwan, and culture workshops have been organized by NTU ISIE to help international students integrate with the local student community.

This year’s Mahjong Night attracted an unprecedented number of applicants. “We received more than 100 applications within the first two hours,” exclaimed Wu; “Finding enough mahjong tables and chairs was also a huge problem, but thankfully we managed to borrow them from the Mahjong Club with the help of the Student Activity Division, Office of Student Affairs.” ISIE even purchased a few sets of tables and chairs to ensure that all students could participate.

A game without borders

“Playing mahjong involves a lot of thinking and strategizing, but it was truly fun!” said Olivia, who had beginner’s luck in her first attempt. She gave all the credit to her table leader, Claire, for teaching her how to play.

ISIE assigns a “table leader” to every table to instruct the players and explain the rules of mahjong in English. “at first, we borrow terms, such as round, house, and pair, from poker, so learners can pick up the game faster. Once they are familiar with the rules, we teach them the terms in Chinese so they can play smoothly with their Taiwanese friends,” explained Wu.

For many students like Olivia, it was a successful night of exploration and interdisciplinary learning in an environment that only NTU can offer. Who would have guessed that a game of mahjong could bring people from different parts of the world together to have fun and learn about each other’s cultures?



Twice as many students participated in this year’s Mahjong Night compared to last year. ISIE members setting up the mahjong tables for the event.



Participants learn more about local culture through mahjong.



Click or Scan the QR code to visit NTU ISIE’s Facebook page to learn more.

| People

The Mastermind behind Meta AI Speech Translation

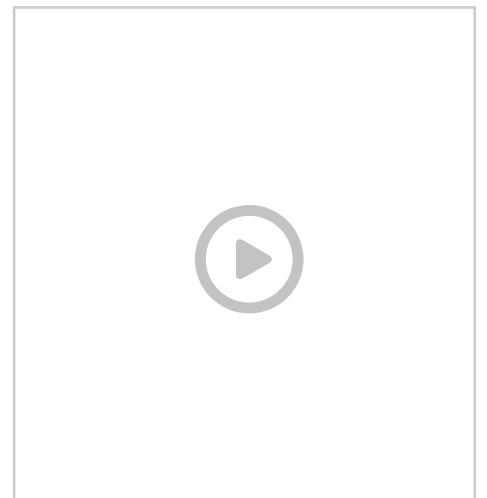
Share:     



Peng-Jen Chen inspires students at NTU to boldly venture into different subjects, research projects, and internships. He urges that embarking on such journeys would help them discover their passion and the significance of their professional knowledge. Such experiences can offer invaluable help for students to define their goals and increase their motivation to study.

Last year, Mark Zuckerberg, the CEO of Meta, demonstrated the company's latest translation technology, a system that translates speech-to-speech in real-time between English and multiple languages, making it a real game-changer in the field of translation technology. In a video Zuckerberg posted on Facebook, he introduced Taiwanese engineer Peng-Jen Chen and they spoke in their respective language, English and Hokkien, through the speech-to-speech translation system. The successful translation of their conversation in real time showcased the creation of the world's first-ever speech-to-speech translation system for unwritten languages, such as Hokkien.

The mastermind behind this technology is Taiwanese engineer Peng-Jen Chen, an alumnus of NTU's Department of Computer Sciences and Information Engineering (NTU CSIE). Chen shared his journey of discovering his passion for



The demonstration video of Meta Universal Speech Translator which Meta Founder and CEO Mark Zuckerberg released on his Facebook page.

machine learning and speech translation as a college student, which has led to his current role in developing Meta’s Universal Speech Translator (UST). He recalled that at college he was deeply interested in AI and machine learning and besides taking course in these areas he joined his professor’s laboratory.

A speech-to-speech translation system for unwritten language

Meta UST uses speech recognition, text translation, and speech synthesis to translate speech to speech. Unlike most speech translation systems that require a corresponding written text in the source language, Meta’s UST doesn’t require any written text, making it the first speech-to-speech translation system developed for an unwritten language. Chen had originally intended to develop a speech system that would help people overcome communication barriers and make translations increasingly real-time.

Using Taiwanese soap opera dialogues as the training material

Chen chose Hokkien to be the first language to test the system because it shares many translation difficulties in common with other unwritten languages. Its writing system is not commonly used or fully standardized, making it extremely difficult to find suitable training materials. To train Meta’s UST, the research team processed 30 thousand hours of Taiwanese telenovelas, 80 thousand hours of English electronic books, and 100 hours of English to Hokkien speech translation. The result proved that the system can and does translate Hokkien seamlessly into English in real-time, offering a solution to the speech translation of unwritten languages and significantly contributing to its promotion.



Chen urges students to boldly explore, intern, and collaborate with peers on campus; such experiences may prove crucial in shaping their future careers. (Photo credit: Peng-Jen Chen)



Chen discovered his interests and met many friends by participating in student club activities, such as coffee making, cycling, and table tennis. (Photo credit: Peng-Jen Chen)