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NEWSLETTER

ISSUE 04: AUTUMN / WINTER 2023



技產業創新研
國立臺灣師範大學

|| COVER STORY: INNOVATING AT THE INTERSECTION OF ACADEMIA AND INDUSTRY

|| FOCUS: GUARDIANS OF BIODIVERSITY

President's message



Cheng-Chih Wu

President, National Taiwan Normal University

In marking NTNU's centennial last year, we honored our legacy of shaping influential figures who have greatly impacted Taiwan's societal, democratic, and economic development.

This autumn, Taiwan President Ing-Wen Tsai joined us in celebrating the establishment of the College of Industry Academia Innovation (CIAI). Led by Professor and Institute of Electrical and Electronics Engineering (IEEE) Fellow, Wen-Chung Kao, CIAI harnesses the combined strengths of our College of Science and Engineering, College of Science, and College of Humanities and Social Sciences. With funding from the government and 12 industrial partners, CIAI has established two graduate institutes focusing on AI and green energy technologies. CIAI aims to enhance students' industry acumen and career prospects, nurturing essential talent in pivotal sectors.

NTNU excels in sustainability research. Professor Emeritus Kuang-Yang Lue's 30-year study of salamanders led to the discovery of two new species in Taiwan and insights into climate impacts on their habitats. Similarly, herpetologist Si-Min Lin and lepidopterist Frank Yu-Feng Hsu have identified several new species.

Additionally, NTNU faculty-led researchers are delving into AI applications such as assisted video interviews, dynamic marketing system updates, and automated agricultural robots, all of which aim to amplify production efficacy and spur industrial advancement.

These achievements underscore progress and innovation at NTNU in industry leadership, sustainability, and AI research. We remain committed to academic excellence as a leading comprehensive university.

National Taiwan Normal University
Newsletter

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ON THE COVER:
Taiwan President Ing-Wen Tsai attends the unveiling ceremony of the College of Industry-Academia Innovation (CIAI) at NTNU.



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College of Industry Academia Innovation, NTNU
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Artificial Intelligence



Uncovering the Effects of AI-Based Video Interviews on Applicant Impression Management Behaviors and Trust Attitudes in Technology

Hung-Yue Suen | Department of Technology Application and Human Resource Development

Launched in 2021, this two-year project aims to develop a deep learning model that predicts candidates' impression management strategies based on dynamic facial expressions during video interviews. Through this academia-industry collaboration, we seek to differentiate between honest and deceptive impressions, understand the AI's impact on technological trust, and improve AI interview solutions with innovative evaluation methods and user training.

Applying AI and Data-Driven Methods to an Agricultural Robot for Implementation of Harvesting Automation

Chun-Ta Chen | Department of Mechatronic Engineering

Work is underway to develop a smart agricultural robot that uses AI and data analytics to automate the harvesting of ripe tomatoes in greenhouses. Beyond addressing labor shortages, this innovation bolsters advancements in agricultural robotics and AI, driving industrial competitiveness and boosting sector-specific R&D.

A Real-Time AI Marketing System for Smart Retail

Chia-Jung Chang | Department of Business Administration

Enhancing OMO (online merges with offline) using a data-driven approach, the outcome of this project will provide dynamic customer segmentation for product recommendations by combining real-time monitoring and CRM (customer relationship management) data, integrating POS (point of sales) and ERP (enterprise resource planning) systems for continuous segmentation and restocking insights. This endeavor will pave the way for a smarter retail ecosystem, championed by AI-powered real-time marketing solutions.





Advertising Effects of Virtual Influencers

Hui-Fei Lin | Graduate Institute of Mass Communication

This exploration of AI influencer marketing contrasts human against AI virtual influencers to establish a foundation for AI advertising efficacy. The research hopes to offer insights for developers, marketers, and influencers who collaborate with AI personas, with discussions on societal and economic ramifications of these AI endeavors.

Integrating AI Speech Recognition Technology and Virtual Contexts for Chinese as a Foreign Language Learning in Oral Skills: System Development and Evaluation

Yu-Ju Lan | Department of Chinese as a Second Language

On-going research on the integration of AI speech recognition and VR in Chinese as a Foreign Language (CFL) education aims to enhance students' oral skills and intercultural awareness, offering benefits in humanistic qualities, academic references, pragmatic training, and economic prospects through intelligent instruction material collaborations.



Innovation and Entrepreneurship in the AI Industry: Technological Competence, Public Policy, and Mechanism of Knowledge Mobilization

Yu-Shan Su | Department of Industrial Education

This empirical study investigates innovation and entrepreneurship in the AI high-tech sector. We examine literature, patents, and various data sources in this study. Our study evaluates technological capabilities, public policies, and knowledge mobility's impact on entrepreneurial performance. Our outcomes are expected to aim to enrich insights for theories and management implications in managing innovation and entrepreneurship in the AI industry.



Impact story

Synergy in Scholarship:

Tech Titans Fuel Academic Innovation





專業創新研究學院

臺灣師範大學

In today's era of rapid technological advancement, the once distinct realms of academic research and real-world industry applications are converging. The October 4 launch of the College of Industry Academia Innovation at (CIAI) at NTNU, attended by Taiwan's president, Ing-Wen Tsai, epitomizes the synergy between academia and industry, catalyzed by government initiatives.

Such academia-industry collaborations are gaining traction worldwide. Success stories abound in innovation ecosystems like Silicon Valley, with its proximity to Stanford University and the University of California, Berkeley; and the Greater Boston area, with 55 institutions of higher learning, has attracted companies such as Pfizer, Facebook, Twitter, and Amazon over the past decade.

CIAI's Dual Focus: AI and Green Energy

By integrating academic research with industry expertise, the CIAI has founded two key institutes: the Graduate Institute of AI Interdisciplinary Applied Technology and the Graduate Institute of Green Energy and Sustainable Technology.

The AI institute will explore areas like AI, IoT, and smart manufacturing, researching themes such as smart display technology, Metaverse 3D display, and Smart Information Security. Through industry partnerships, it aims to nurture talents meeting global market needs.

The Green Energy Institute, focusing on sustainable technologies, will study emerging energy solutions and smart grids, covering nano components, optoelectronics, and renewables like solar energy and cold-fusion.

The CIAI, NTNU's tenth college, was established in response to President Tsai's National Key Fields Industry-University Cooperation and Skilled Personnel Training initiative stemming from discussions with tech sector leaders. This initiative seeks to merge academic research



The tripartite mechanisms that facilitate cooperation between academia, government, and industry will enable students to better understand real-world needs.



Taiwan President Ing-Wen Tsai commends NTNU on the opening of the CIAI

“The CIAI sets a benchmark for industry-academia research cooperation that will empower Taiwan's next generation and further enhance Taiwan's global competitiveness.”

— Ing-Wen Tsai, Taiwan President

with industry needs, aiming to harness academic potential and industry demand to nurture innovators prepared for future challenges.

Industry partners participating in the program's inaugural year include Chant Oil Co. Ltd., E Ink Realtek Semiconductor, Konglin Construction and Manufacturing Co., Ltd., Coretronic Corp., Leadtek Research Inc., AU Corp., AcBel Polytech Inc., and EZ-AI Corp.

Towards National Prosperity

Partnerships between universities and industry are vital to developing talent and spurring innovation, which industries need to drive national economic growth. University president Cheng-Chih Wu noted that as a recently established comprehensive university, NTNU is uniquely poised for internationalization and interdisciplinary integration. "NTNU offers excellent programs in disciplines including music, art, sports, languages, education, the humanities, and social sciences," he said. "Additionally, the university is robust in its curriculum in the sciences, mathematics, technology, and engineering."

In her congratulatory remarks this October, President Tsai expressed the hope that NTNU would elevate industry-academia collaboration and inject new momentum into technological research. She lauded NTNU's proactive response to emerging global industrial trends with the establishment of research institutes dedicated to Artificial



NTNU President Cheng-Chih Wu

“As a recently established comprehensive university, NTNU is uniquely poised for internationalization and interdisciplinary integration.”

— **Cheng-Chih Wu, NTNU President**

Crafting Collaborative Pathways

Wen-Chung Kao, President of the IEEE Consumer Technology Society who serves as CIAI Dean, recalls the complexities in the process of establishing the college. While NTNU's liberal arts prowess is widely acknowledged, Kao said the university's exceptional science and technology faculties consistently punch above their weight. “Our potential in this domain has often been overshadowed due to the relative size of our departments,” he said, comparing NTNU's science and engineering department to that of larger institutions.

Balancing the diverse needs of academia and industry requires a keen understanding of industry demands and alignment with NTNU's academic strengths. Before developing the curriculum, the college actively engaged with industry stakeholders. Industries prioritize swift deliveries, regular progress reports, proprietary rights, and a skilled talent pool. In contrast, faculty members value better compensation, fewer meetings, and research autonomy. Students, central to this effort, aspire for scholarships, recognition, fair compensation, and academic freedom.

Dean Kao's unique dual perspective, as both an academican and former industry insider, offers invaluable insights into the benefits of a symbiosis between the frenzied tempo of the corporate world and the meticulous, measured stride of academia. “In the corporate realm,

Intelligence and Green Energy Technology, two pivotal sectors at the forefront of the technological industry. “The merging of academia and industry resources in a dynamic and innovative partnership will aggregate resources and cultivate talents for cutting-edge technologies,” she said. “The CIAI sets a benchmark for industry-academia research cooperation that will empower Taiwan's next generation in the Fourth Industrial Revolution and further enhance the nation's global competitiveness.”

Expressing gratitude to NTNU for endorsing government innovation policies, President Tsai emphasized AI's role in transforming industries and reshaping human values. “Combining humanistic values with technological expertise is vital for AI's future,” she commented, trusting in NTNU's humanities foundation to nurture the necessary minds for AI advancement.

The green energy sector also demands visionary talents. “The global aim is net-zero emissions by 2050, a goal we're committed to. Smart grids, energy storage, and conservation will be key in developing Taiwan's green supply chains,” she stated.

President Tsai praised NTNU President Wu and the 12 partner enterprises for their leadership. “The collaboration between the two research institutes and the industry on interdisciplinary green energy solutions will bolster Taiwan's commitment to net-zero goals,” she said.

“ In the corporate realm, needs are immediate. As academics, our pace is methodical, often introspective. Bridging the two worlds requires patience, understanding, and flexibility.”

— **Wen-Chung Kao, CIAI Dean**



CIAI Dean Wen-Chung Kao



Vice President of E Ink J.M. Hung

needs are immediate. As academics, our pace is methodical, often introspective. Bridging these two worlds requires patience, understanding, and flexibility," he said.

For instance, Dean Kao said some industry participants initially requested weekly updates, but for professors for whom teaching and laboratory responsibilities were a priority, bimonthly discussions were more feasible. On the other hand, industry involvement can often speed up the acquisition of materials needed for research. "Suppliers prioritize corporate clients and academic institutions are often low on the totem pole," he observed. "Collaboration with industry can often open doors for academia in unexpected ways."

Kao recognizes academia's merit in fostering critical thought, but emphasizes the equally vital need for actionable outcomes. "Beyond scholarly articles," he said, "we need solutions that resonate with real-world challenges."

Industry Aims and Aspirations

Though students may seek broader career options, companies funding research at CIAI hope to cultivate talents from among the sponsored students. J.M. Hung of E Ink Holdings Inc., located in Hsinchu, Taiwan's tech center, says, "We collaborate with CIAI primarily for talent access. Even as the leader in ePaper technology, competing with global tech giants like TSMC and MediaTek for talented graduates is challenging. This is the reason we have chosen to partner with NTNU in Taipei to jointly cultivate and nurture new talents. "

The portfolios of two institutions at the college are both important to the future direction at E Ink. Sustainability is at the very foundation of ePaper technology. "ePaper requires significantly less power compared to LCD or OLED screens, rendering it an ideal choice for products or

technologies that utilize renewable energy sources or energy harvesting for power provision," he said. "We hope to develop technology that consumes less electricity and enables us to become an RE-100 company by 2030, and to accomplish net zero throughout our supply chain's cooperation by 2040."

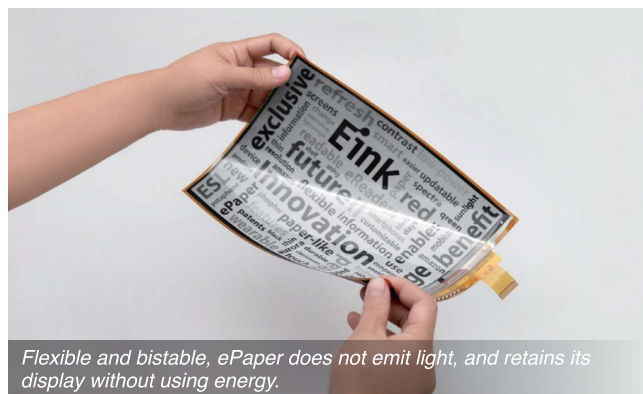
Hung mentioned AI research as integral to E Ink's future offerings. For example, an E Ink e-textbook product used by China's education leader, New Oriental Education & Technology Group, leverages AI to provide personalized supplementary materials. "AI analyzes each student's strengths and weaknesses to curate tailored content," Hung notes. "We aim to introduce similar technology nationally in Taiwan. Given NTNU's prowess in educating teachers, it's ideal for classroom-based proof of concept testing."

Hung highlights an additional advantage offered by NTNU: students benefit from resources across the National Taiwan University Alliance, which includes NTNU, National Taiwan University, and National Taiwan University of Science and Technology.

Stellar Start for CIAI

The recent Global University Rankings published by Times Higher Education, scored the NTNU in the "industry" metric at 92.7 percent. This put the NTNU almost on par with the University of Chicago (93.8 percent) and ahead of Cornell University (69.4 percent) in a criterion measuring knowledge transfer between the university and industry through innovations, inventions, and consultancy.

The opening of the new college, marked by 42 accepted master's candidates this fall, is a testament to CIAI's promising trajectory.



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Shaping the Future

Insights from a Distinguished Alumnus on the Intersection of Education, Energy, and Artificial Intelligence (AI)

Q&A

Profile in Brief

Currently the Chairman of the CTCI Foundation, Dr. Pan's professional roles also include being the Chairman of Chinese Petroleum Corp. Taiwan (CPC), Chairman of Kuo Kuang Power Corp. and Chairman of Gintech Energy Corp.



*Dr. PAN,
Wennet P.*

What are some of your favorite memories and experiences during your time as an undergraduate chemistry major?

National Taiwan Normal University (NTNU) in the 1960s attracted many talented students with its offer of government-funded bursaries. Few were affluent among the down-to-earth student bodies. In the early morning, we'd often rush to secure library seats since the library was the best place to study after class. Despite the material hardships, our class, mainly aspiring to teach high school Chemistry classes, was focused and dedicated.

However, less than half of our graduating class of chemistry majors pursued advanced degrees abroad, compared to 90 percent of those of our rival National Taiwan University. My analytical and mathematical strengths not only allowed me to pursue graduate education but also guide my career trajectory.

Please share your insights on the current challenges, trends, and possible future of the energy industries based on your decades of experience in the sector.

With 36 years of experience in the energy sector, I've witnessed the trend shift towards energy conservation and carbon reduction. While actions are yet to match words, the intent is positive.

Renewable sources like solar, hydro, and wind have unique challenges, especially when it comes to storage and transportation. Tidal power is in its infancy in Taiwan and the desirable small-module reactors are at least a decade from maturity. To meet the zero emissions target by 2050, revisiting nuclear energy, now safer and efficient, appears vital.

As the CTCI Foundation Chairman, and host of many AI related conferences and seminars, can you highlight Taiwan's key contributions to AI?

Consumer-oriented AI, such as ChatGPT, has gained world-wide attention, but AI has long been vital in industrial and B2B contexts. Among the three key components of AI – namely computing power, algorithms, and data, Taiwanese firms currently dominate the server market, comprising over 90% globally.

TSMC produces about 90% of essential AI semiconductors. Taiwan is advanced in neural networks and AI chips, with some firms developing Application Specific Integrated Circuit (ASIC) for better efficiency. Taiwan excels in AI for manufacturing, improving yield, safety, and reducing costs. With 28 years of National Health Insurance medical data and cutting-edge information and communication technology (ICT), Taiwan can offer unparalleled digital healthcare services, elevating the quality and efficiency of patient care.

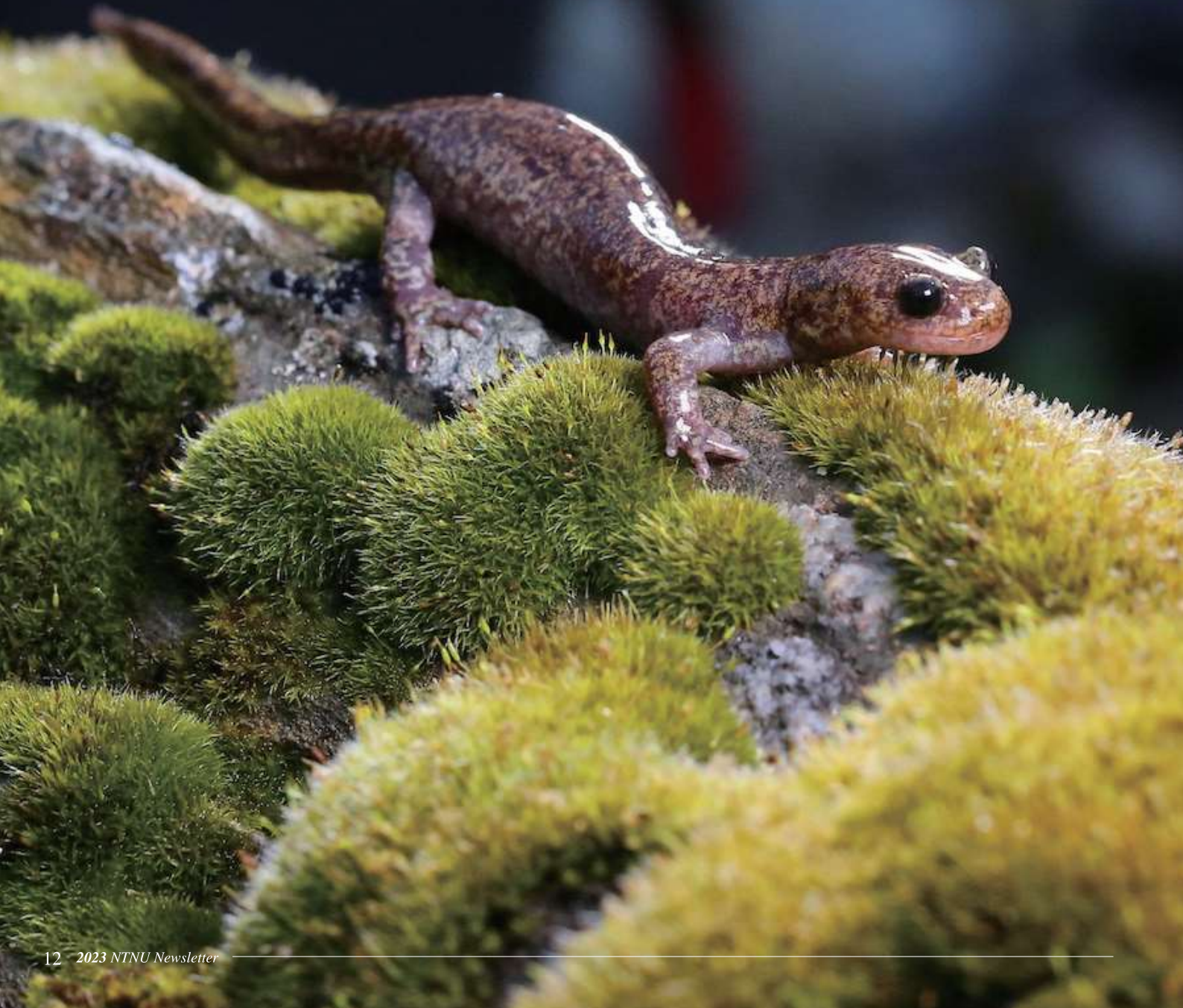
How can NTNU adapt to the changing AI landscape and ready its students for AI careers?

Interdisciplinary knowledge is crucial in the AI era. A robust AI curriculum should cover computer-human interaction, data processing, decision-making, and AI's impact on human rights and privacy. AI developers need to combine technology with a breadth of knowledge across sectors, while professionals should understand AI applications in their respective fields.

“A robust AI curriculum should cover computer-human interaction, data processing, decision-making, and AI's impact on human rights and privacy.”

Guardians of Biodiversity:

Scientists at NTNU
Champion Endemic
Species Conservation
in Taiwan





Spurred by global industrialization and explosive human population growth, human activity over the past two centuries has accelerated the extinction of the Earth's species through climate change and habitat loss. This rapid decline in biological diversity disturbs the equilibrium of existing ecosystems, jeopardizing the survival of remaining species, including humans. The recently concluded 15th Conference of the Parties (COP15) set forth ambitious biodiversity goals that safeguard the planet's natural heritage, targeting the urgent issue of global biodiversity loss.

In Taiwan, three faculty members from the Department of Life Science at National Taiwan Normal University (NTNU) are at the vanguard of these goals, not only by identifying new endemic species and studying their habitat, but also by educating both the public and the next generation of scientists, as well as by consulting with government bodies to propose new legislation that will safeguard Taiwan's delicate ecosystems.

Herpetologists Kuang-Yang Lue and Si-Min Lin, together with lepidopterist Frank Yu-Feng Hsu, have all made significant contributions to scientific knowledge and conservation. Their unwavering dedication and advocacy are crucial in preserving Taiwan's unique biodiversity and in advancing global conservation efforts.

Taiwan's Salamanders: From Obscurity to Limelight

NTNU, originally a college specializing in teacher training, has been at the forefront in the study of Taiwan's endemic species for over three decades, spearheaded by Professor Emeritus Kuang-Yang Lue. An

avid naturalist and dedicated educator, Lue attributes his interest in Taiwan's endemic species to his students. "My academic background was in ecological science, specializing in biological magnification," he says. "But I wanted to be able to advise my students on their research so I kept notes on where different species could be found in Taiwan and how to get there."

Lue's fascination with Taiwan's biodiversity and commitment to his students lead to his landmark achievement with his student-turned-colleague, the late Dr. June-Shiang Lai. Together in 2008, they identified the *Hynobius glacialis* (found in the high mountains of northeastern Taiwan) and the *Hynobius fuca* (found in the mountains of southern Taiwan) – two new species of salamander endemic to Taiwan, bringing the total number of known endemic *Hynobius* species to five, including *Hynobius formosanus*, *Hynobius arisanensis*, and *Hynobius sonani*.

Taiwan's *Hynobius* populations, according to Lue, exist at the fountainhead of little alpine creeks in a disjunct distribution pattern, with populations separated by expanses of dryland. Uniquely, these seemingly isolated populations are theorized to traverse the inhospitable dry terrain by traveling underground in order to breed.

"The discovery of new vertebrate species is rare," says Professor Si-Min Lin, a fellow herpetologist at NTNU whose own team successfully identified the endemic *Pareas atayal* snake species in 2015. Currently, only five percent of all known living species on the planet are vertebrates.

The Hynobius formosanus is an endangered species endemic to Taiwan.

Public Exposure: A Double-Edged Sword

Lue and Lai's research on the Taiwan salamander gained public attention with the 2023 release of a commercially successful documentary film, "Good Morni, MIT," by acclaimed wildlife filmmaker Arthur Mai. The film documents the scientists' physically demanding research expeditions over the course of 17 years, traversing precarious alpine terrain at elevations above 2,100m to study the salamanders in their natural habitat. Tragically, during the filming, Dr. Lai lost his life in a mountain climbing accident, highlighting the risks these researchers undertake in their pursuit of understanding these endangered species.

The film not only documents this devastating loss but also honors Dr. Lai's legacy by continuing to spotlight the life stages of the Taiwan salamander, including rare images of its ootheca – eggs protected by a transparent froth, that the salamander conceals in the underflow of streams away from sunlight. Professor Lue notes that these alpine salamanders exhibit unique parenting behaviors not seen in other amphibians. It is the only member of the *Hynobiidae* family that completes metamorphosis with endogenous feeding throughout the entire larval period. The scarcity of resources at these high elevations challenges the survival of *Hynobius* offspring. "The salamander produces fewer and larger eggs than other species in the family," Lue says. "And so, we see parenting behavior not seen in other amphibians like frogs who produce large quantities of eggs."



Professor Emeritus Kuang-Yang Lue's work has been featured in several documentaries.

“*Hynobius* salamanders produce fewer and larger eggs than other species in the family and exhibit parenting behavior not seen in other amphibians.”

— Kuang-Yang Lue



Unique in the *Hynobiid* family, each female *Hynobius formosanus* lays her eggs into two ootheca (egg sacs), pictured here. These range from 45 to 130 mm in length.

Breaking box office records for a documentary film, and garnering a nomination at the Taipei Film Festival, attention from the film has catapulted the Taiwan salamander into a "celebrity species," a phenomenon which Professor Lue sees as a double-edged sword. The film has increased public interest and support for conservation of its habitat, but it has also prompted inexperienced mountaineers to attempt the dangerous climb. Professor Lue is concerned that an unsustainable influx of inexperienced campers will damage the delicate habitat of *Hynobius formosanus*, currently on the Red List of Threatened Species, published by the International Union for Conservation of Nature.

"Biologists take extraordinary care to restore the environment and erase our footprint. We put back every rock we look under," Lue says. Unaware campers washing camping gear or toileting near the dwindling pristine alpine water sources will destroy the already endangered habitats that these salamanders depend on for life.

Conservation through Public Education

While public exposure may unintentionally cause detrimental environmental impact, it can also spur positive policy changes and human behaviors. For example, public education and interest in the Formosan black bear (*Ursus thibetanus formosanus*), listed as an endangered species since 1989, has resulted in conservation legislation which has had a significant impact on the bear populations and its habitat preservation.

Professor Si-Min Lin, a fellow herpetologist at NTNU and a former student of Lue's, has seen how changing public attitudes toward one species can benefit other species in the ecosystem. Lin, a longtime animal welfare advocate who co-founded and currently chairs the Raptor Research Group of Taiwan, says his conservation efforts in Taiwan initially focused on advocating for the breeding of exotic pets in captivity by the pet industry rather than hunting them. This was met with reluctance from the industry. "The shift requires a financial and time investment upfront," he notes. "But gradually the industry is seeing the return on investment." Lin's current policy focus is on animal welfare in captivity.



Herpetologist Si-Min Lin



Freshwater turtles *Mauremys sinensis* were found to be able to discriminate numerical information.

"*Mauremys sinensis* turtles can discern numbers up to 9 or 10. While fish, birds, mammals, invertebrates, and amphibians show quantitative skills, it's less understood in reptiles."

— Si-Min Lin

Lin's recent work includes the study of animal intelligence, a field that seems to influence animal welfare, having recently discovered that the *Mauremys sinensis*, an Asian freshwater turtle, can discriminate numerical information.

"We found that these turtles have the ability to discriminate a magnitude of difference or discrete numerical information up to 9 or 10." Lin notes that quantitative ability has been documented in fishes, birds, mammals, and in previously unstudied invertebrates and amphibians, but is still poorly understood in reptiles.

Similarly, Professor Frank Yu-Feng Hsu, a distinguished lepidopterist, has shown how researching insect behaviors can spark public interest in species typically overlooked. Hsu gives a captivating account of the symbiotic relationship between specific butterfly species and ants, where caterpillars secrete a sugary nectar to enlist the help of ants to guard and protect them from predators such as wasps or spiders. Hsu has recently led an interdisciplinary, intercollegiate, and international collaborative study which found that the caterpillar of the silverline butterfly emits three distinct sound vibration signals, inaudible to human ears, to communicate with their ant bodyguards.

The Impact of Discovering Endemic Species

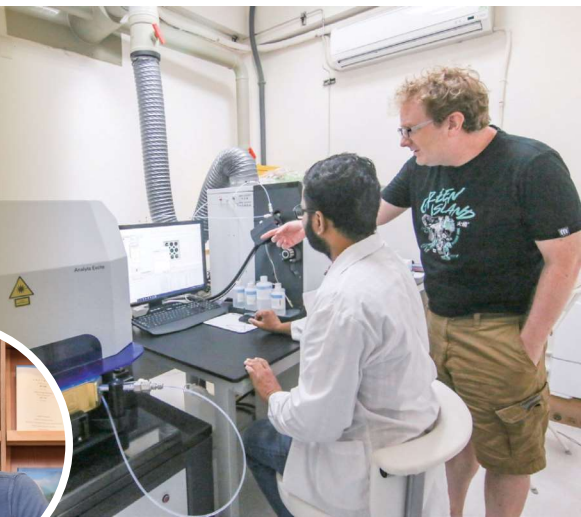
As the first Taiwanese recipient of the Butterfly Society of Japan's Hayashi award, Hsu has identified 16 butterfly species, with six endemic to Taiwan, and named 30 foreign *Lepidoptera* species. Their research aids conservation efforts benefitting multiple species.

Hsu's significant discovery, the Taiwan Beech Hairstreak (*Sibatanozephyrus kuafui*), began during his teen years, inspired by Japanese lepidopterist Takashi Shirozu. He connected with Shirozu through then- NTU forestry professor Jih-Ching Liao's assistance, and a conversation between the forester and the lepidopterist discussing potential discoveries in Taiwan's beech forests stuck with him.

During his studies at National Taiwan University and seven years at the University of California at Berkeley, Hsu pursued this species. His breakthrough came when visiting Taiwan's beech forests during a summer break. He learned the species mated during sunny respites in Taiwan's rainy season.

Between Rocks and a New Place

Dr. J. Gregory Shellnutt
Faculty of Earth Sciences, NTNU



When asked about the motivation that prompted him to journey more than 12,000 kilometers from his Canadian homeland to Asia in the early 2000s, and why he chose to remain, NTNU's Distinguished Professor J. Gregory Shellnutt states unequivocally, "It was the geology."

The burgeoning globalization trends of the early 1990s also influenced his decision. Shellnutt recognized, as did many of his contemporaries, the expanding horizon of international career opportunities. After earning his M.Sc. degree from the University of Western Ontario, Canada, in 2000, Shellnutt embarked on an internship at the Instituto de Geología, Universidad Nacional Autónoma de México. This move marked the start of his international career. Following this, he was offered an opportunity to pursue his doctorate under the esteemed Professor Mei-Fu Zhou at Hong Kong University.

"Coming to Asia was the best decision I've made in my adult life."

A recipient of the Mineralogical Association of Canada Young Scientist Award, the Geological Society of Taiwan Ma Ting Ying Award, and a two-time laureate of the Ministry of Science and Technology Outstanding Research Award, Shellnutt emphasizes that his continued stay in Taiwan, since arriving as a research fellow at Academia Sinica in 2007, is rooted in the institutional support and abundant research opportunities.

Noting that his colleagues in other countries spend a significant amount of their time writing grant proposals, Professor Shellnutt lauds the Taiwan's government's research funding structure, which allows scientists to focus on science. He further points out that, un beholden to corporate interests, Taiwan's public research funding enables scientists to share their findings without bias. "Corporate-funded research exerts subtle pressure that reflects favorably on the benefactor, or to withhold publication for their benefit," he observes. "In Taiwan, government, industrial, and academic pursuits can coexist."

While no system is perfect, Shellnutt values the meritocratic environment at NTNU where productivity and excellence are cherished. Tenure is not permanent, just contracts and renewals. "There is no 'gate-keeping' here," he asserts.

Shellnutt commends Taiwanese academics for their outstanding research, international ties, and respect. However, he also acknowledges the language barrier, which sometimes obstructs their ability to publish and receive proper recognition.

Currently, there are 75 international faculty members at NTNU, with an additional 46 holding dual nationalities. Shellnutt mentions that, as an international faculty member, he feels appreciated and supported by the university administration. "While I may not be fully assimilated into Taiwanese society, I always feel welcomed," he shares. "Science transcends cultural boundaries. I face few, if any, cultural barriers when working with colleagues,

be it in Taiwan, India, or elsewhere."

He further praises the Taiwanese university system for its provision of equipment and funding to graduate students, contrasting it with his own experiences as a graduate student in Canada. He urges students to leverage these assets. "The labs at NTNU are well-equipped, with expert technicians supporting students," he points out. "Though Taiwan is small, the resources are plentiful. Students should seize these opportunities."

Having published over 120 scientific research papers and held multiple editorial roles in esteemed journals like *Lithos*, *Geology*, *Journal of Asian Earth Sciences*, and *Frontiers in Earth Sciences*, Shellnutt is particularly proud of establishing two cutting-edge laboratories in his department: the WD-XRF (Wavelength Dispersive X-ray Fluorescence) laboratory, and the LA-ICP-MS (Laser Ablation Inductively Coupled Plasma Mass Spectrometry) laboratory. The inception of these labs has not only ushered in new methodologies and data but also encouraged interdisciplinary collaborations, both locally and internationally.

Shellnutt credits the successful procurement of lab funding to NTNU's President Wu and Dean Shu of the Department of Earth Sciences. "The lab is just embarking on its journey. The potential is immense," Shellnutt concludes.

PICTURED ABOVE:
Professor Shellnutt and post-doctoral researcher Sam Uthup demonstrate equipment in the newly established LA-ICP-MS/MS laboratory, the first of its kind in an academic institution in Taiwan.



Leading Universities Gather at NTNU

For Forum on Internationalization of Higher Education



Global issues require global solutions. As one of four universities initially chosen to be a Bilingual Benchmark University by Taiwan’s Ministry of Education, NTNU has been at the forefront of Taiwan’s internationalization initiatives at the university level. The UNESCO Science Report (2021) highlights growing international academic collaboration. From 2015 to 2019, international scientific collaboration in publications rose from 22% to 24%. Such internationalization in higher education benefits students, institutions, and the global community, as experts collaboratively address sustainable development, climate change, and human rights.

Delayed by pandemic restrictions, the university marked its 2022 centennial by hosting the NTNU Forum on Internationalization of Higher Education on March 21-22. The event attracted over 300 attendees, including representatives from top global and Taiwanese universities, foreign educational institutions in Taiwan, and experts in internationalization.

President Cheng-Chih Wu emphasized the importance of face-to-face interactions. “Although we maintained online communications despite pandemic challenges, I am grateful to representatives from our international sister schools for traveling to Taiwan to be with us on this occasion.”

Wu noted the forum’s objective of providing a platform for international dialogue and exchange on international strategy partners, global academic exchange, online education, global alumni networks, and international student recruitment.

Yi-De Liu, Vice President for International Affairs stated the forum’s goals: to reinforce relationships with sister schools; to celebrate NTNU’s centennial; and to strategize for the future. “We hope that NTNU can achieve even greater internationalization through this forum,” he said.

Sessions on the first day of the two-day forum focused on internationalization and international

academic exchange in higher education in the United States, Europe, and Taiwan. A forum on day-two focused on topics including international strategic partnerships, online teaching, global alumni networks, international student recruitment strategies, transnational education and internships, all-English teaching, and overseas Chinese-language teaching.

Fifteen international speakers from Pennsylvania State University, University of Texas at Austin, University of Burgundy in France, University of Glasgow in the UK, Sungkyunkwan University in Korea, Fulbright Taiwan, the British Council, Bureau Français de Taipei, and the German Academic Exchange Service (DAAD), participated in the forum. Representing NTNU's partner universities in the National Taiwan University System, Vice Presidents of International Affairs from the National Taiwan University and the National Taiwan University of Science and Technology took part as moderators.

Gregory Wegmann from the University of Burgundy spoke about internationalization in European higher education, highlighting the Horizon 2020 program. Ralph Rogers from the British Council praised NTNU's dedication to English proficiency and noted the uptick in Taiwan-UK academic collaboration. Josef Goldberger of the German Academic Exchange Service underscored the lasting benefits of internationalization. Roger Brindley and Gregory Wegmann stressed the influence of alumni networks. Konstantinos Kontis from the University of Glasgow emphasized integrating global subjects into exchange activities, while Sonia Feigenbaum of the University of Texas underscored the potential of innovative online teaching methods.

The Forum on Internationalization of Higher Education exemplifies NTNU's initiative in the new phase of the Ministry of Education's Higher Education SPROUT (Sustained

Progress and Rise of Universities in Taiwan) Project, seeking to encourage multi-faceted development and to elevate international competitiveness at Taiwan's universities and leading research centers. To this end, NTNU has outlined ten areas for internationalization to strengthen students' international perspectives and competitiveness. These include strategic partnerships, international academic exchanges, transnational education and internship opportunities, international student recruitment, English Medium Instruction (EMI) courses, global virtual exchange programs, overseas Chinese language teaching, overseas alumni associations, localization of internationalization, and administrative measures to support the localization of internationalization.

For more information on the Forum, please visit
<https://bds.oia.ntnu.edu.tw/bds/en/web/2023forum>



Over 300 attendees attended the forum, which featured fifteen international speakers, including Roger Brindley of Penn State University, Sonia Feigenbaum of the University of Texas, Randall Nadeau of Fulbright Taiwan, Gregory Wegmann of the University of Burgundy, Konstantinos Kontis from the University of Glasgow, with Yi-De Liu and Cheng-Chih Wu representing NTNU.



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