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Promoting Agricultural Digital Innovation: Taipei Tech, Fwusow, and NCHU Jointly Present R&D Achievements



To accelerate agricultural digital transformation, the Taiwan Gloria Center (TGC) facilitated a joint research and development partnership between Taipei Tech, National Chung Hsing University (NCHU), and Fwusow Industry Co., Ltd., a major player in the domestic agricultural circular economy. Funded by the National Science and Technology Council for Scientific Research Industrialization Platform, TGC is a cross-university platform for industry-academia collaboration. It held a presentation showcasing the agricultural digital transformation results from the partnership.

Attendees at the presentation included Presidential Senior Advisor Shen Jong-Chin; Director-General Secretary Huang Ya-Ping from the Administration for Digital Industries, Ministry of Digital Affairs; Special Committee Member Wu Hsin-Fei from the Department of Academia-Industry Collaboration and Science Park Affairs; and Dean Chen Ter-Hsin from the College of Veterinary Medicine at NCHU. A series of digital technologies and solutions were showcased, demonstrating technologies that produce healthy and safe products while ensuring sustainable agriculture and food industry growth, in line with environmental, social, and corporate governance (ESG) principles.

Taipei Tech President Wang Sea-Fu stated that Fwusow, with a century-long commitment to Taiwan, is a major driver of the agricultural circular economy in Taiwan, which is evident in its being honored with the Asia Responsible Enterprise Award in 2023. Taipei Tech, as a leading vocational school also with a century-long history, has been collaborating with Fwusow through Taipei Tech's Frontier Institute of Research for Science and Technology. The two partners have worked on projects such as the Digital Platform for Production and Management Center, Automated Feed Mills in Shalu District, Automated Factories at Taichung Port, and personnel training programs. Through these projects, the partners aim to utilize innovations devised by Taipei Tech faculty members and students in promoting sustainable food and agricultural development.

Fwusow's Chairman, Hong Yao-Kun, detailed the company's century-long dedication to safe, healthy food production and its commitment to sustainable operations and transformation into a "green enterprise." It has gradually integrated upstream and downstream industries, expanding businesses into human food, pet food, animal feed, agricultural materials, and meat processing, forming an agricultural circular economy. In recent years, the company has introduced digital transformation that includes AI-powered smart manufacturing and new Enterprise Resource Planning (ERP) systems. It has also engaged in programs such as

equipment replacement, processes improvements, labor rights protections, and social welfare projects. All of these programs aim at enhancing the overall operational effectiveness of the company and creating brand value.

Hong further pointed out that Fwusow has built a new generation of intelligent manufacturing and operation systems through the partnership with the Industrial Technology Research Institute and the Institute for Information Industry. Fwusow's Digital Development Office, established in 2018, spearheaded the partnership projects with the two institutes. The projects included automated packaging, Fwusow App sales management system, factory monitoring and disaster prevention system, and edible oil production monitoring and management. In 2022, Fwusow started partnership with Taipei Tech and NCHU on multiple projects, which further drove the company towards Industry 4.0 and digital transformation. This new partnership introduced projects such as precision production of commercial broiler, odor control in feed mills, and optimization of production processes. Hong hopes that the multi-party cooperation of industry, academia, research institute, and government will jointly carry out the value of local agricultural circular economy and expand the social impact of environmental sustainability.

Presidential Senior Advisor Shen Jong-Chin, a Taipei Tech alumnus, praised the collaboration between the two century-old institutions and the company, highlighting Taipei Tech's and NCHU's roles in advancing agricultural digital transformation. He encouraged more industry support for such partnerships.

Lin Chih-Che, Director of the Taipei Tech-Fwusow Joint Research and Development Center, stated that the Digital Production Management Center Platform utilizes the triple-tier network architecture that was developed by the school's information security specialists. The management platform enhances Fwusow's IT security and helps maintain stable, long-term output from the factories at Taichung Port. The Automated Feed Mills project in Shalu District uses AI machine learning and an odor detection system (commonly known as an electronic nose) to predict and suppress odor based on real-time data. The Automation Factories at Taichung Port project introduces appropriate oil pipeline management mechanisms to ensure the high efficiency of production process and the stability of product quality. According to Lin, more processes and projects can be introduced in the future to move towards more automated and intelligent factory operations, thereby increasing the Fwusow's capacity to quickly respond to market changes.



Taipei Tech and Taiwan Rolling Stock Co. (TRSC) launched a new joint research center to collaborate on talent cultivation and smart railway technology advancement

Taipei Tech and Taiwan Rolling Stock Co. (TRSC) announced a partnership and the launch of a joint research center on March 17, joining forces on talent development and advancing smart railway technology. Notable attendees at the launch ceremony included Tsai Huang-liang, Chairman of TRSC; Hsu Shun-jung, General Manager of TRSC; Hu Hsiang-ling, Deputy Minister of Transportation and Communications (MOTC); Ho Nuan-hsuan, Chairman of Chung-Hwa Railway Industry Development Association; Yang Zheng-jun, Deputy Director of Railway Bureau, MOTC; Feng Hui-sheng, Deputy Director of Taiwan Railways Administration; and Sun Guo-hua, VP of China Steel Corporation.

TRSC Chairman Tsai Huang-liang expressed optimism about the collaboration between Taipei Tech and TRSC, emphasizing its potential to greatly benefit the local railway industry. He stated that the new research center will prioritize industry-academia cooperation and talent cultivation, providing students with hands-on experience and practical skills through collaborative projects.

Wang Sea-fue, Taipei Tech President, revealed that the Joint Research Center for Railway Vehicles and Smart Technology will be housed in Taipei Tech's new Pioneer International R&D Building. Wang said, "We will develop smart applications and solutions for multi-track vehicles, including Train Control and Monitoring Systems (TCMS), to enhance train dispatching and repair efficiency."

Yao Leehter, director of the joint research center, explained that TCMS is equivalent to the train's brain and central nervous system, controlling and connecting subsystems such as traction and braking. The center aims to create a smart rail maintenance and disaster-prevention platform that is enabled by TCMS. The platform will establish detection systems for inter-station passenger flow, circuit abnormalities, axle vibration abnormalities, and train drive systems. The data collected through all these systems will provide reference points for rail train scheduling and maintenance, achieving the goal of smart rail transportation.

Taipei Tech and TRSC Unveil Joint Research Center to Drive Smart Railway Technology and Talent Development

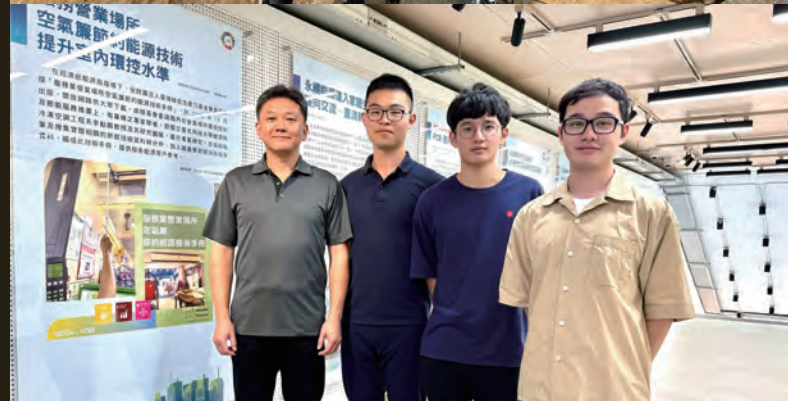
Taipei Tech Holds Sustainability Exhibition, Features the Yehliu Coastal Landscape Preservation Project



Taipei Tech took part in the Yehliu Coastal Landscape Preservation and Fishing Village Cultural Sustainability Project as part of the school's university social responsibility (USR) outreach program. The program involved faculty members and students from various fields including material sciences, resource engineering, civil engineering, environmental engineering, and cultural development. One of the aims of the project was to strengthen the mushroom rock structures along the Yehliu coast using the sandstone reinforcement techniques. Another project goal was to transform pumice, a type of floating volcanic rock that is typically harmful to the environment, into usable resources. Plans were also devised to revitalize local fishing village culture to attract young people to assist in preserving precious natural landscapes. This preservation initiative ultimately seeks to enhance the international tourism appeal of the area through sustainable thinking, and the documentation of the process is currently being showcased at Taipei Tech's SDGs x USR Achievement Exhibition - Sustainable WeCan.

Vice President Thomas C.K. Yang highlighted Taipei Tech's commitment to global sustainability trends such as net zero transformation, underscoring the faculty's extensive contribution of 555 research papers on sustainability topics in international journals in 2022. These papers mainly focus on three of UN's Sustainable Development Goals (SDGs): affordable and clean energy; good health and well-being; and industry, innovation and infrastructure. Taipei Tech's active fieldwork efforts in areas such as Wanli, Yingge, Fengyuan, Houtong, and Quri Tribe also demonstrates the school's dedication in the preservation of cultural heritage and traditional craftsman skills.

Director of Secretariate Wu Chien-Wen discussed the establishment of the Institutional Research and Sustainability Development Center last year. The center sets goals in water conservation, energy saving, carbon reduction, and zero waste for the university and tracks progress. Highlighting sustainable research advancements, Wu mentioned a notable project led by Professor Lee Kuei-Peng from the Department of Energy and Refrigerating Air-Conditioning Engineering. This project focused on improving air curtain efficiency in semi-open business spaces such as convenience stores, banks, and restaurants. It was commissioned by the Energy Administration at the Ministry of Economic Affairs and the Taiwan Green Productivity Foundation, resulting in the Handbook of Energy-Saving via Air Curtains in Service Industry Business Places.



Additionally, to address the intermittent power supply drawback of solar power generation, Professor Huang Ming-Hsi and his team from the Department of Electrical Engineering developed a power grid-connected energy converter that facilitates the integration of direct current from lithium batteries with alternating current grid and vice versa. The converter enables flexibility of energy source during peak hours and thus reducing supply pressure on the grid. During power outages, the converter can also supply electricity for critical equipment such as food refrigeration and long-term care instruments. This innovation, produced through industry-academia collaboration, won the Taiwan Excellence Award last year and is marketed globally.

Moreover, Professor Walter Chen from the Department of Civil Engineering led the Project to Apply Eco-friendly Slope Stabilization at Quri Tribe. Chen and a team of students introduced modern soil and water disaster prevention techniques into the tribe's traditional natural farming methods. They also suggested strategies to prevent rockfalls and promote vegetation and soil conservation that aim at soil erosion reduction and biodiversity maintenance, resulting in a sustainable approach to agriculture within the community.



The 67th United Nations Commission on the Status of Women (UNCSW) was held in New York from March 6 to 17, 2023. The Ministry of Foreign Affairs led a delegation to the event and co-organized a series of activities for Taiwan Gender Equality Week with Taiwan's Foundation for Women's Rights Promotion and Development. Taipei Tech Metaverse XR R&D Center was invited to take part in the event, for which interaction design students created projects that demonstrated the strength of Taiwan's technological education and women's empowerment.

"Taiwan Night: Celebrating Women in Tech," the first event of Taiwan Gender Equality Week, took place in New York on the evening of March 7. Tsao Hsiao-yue, Chair of Taipei Tech Department of Interaction Design, opened the event with a video titled "Taiwan Women's Innovative Power." Taiwan Digital Minister Audrey Tang appeared in the video and was virtually fitted with multiple outfits using metaverse technology. The video was produced by Pan Li-hsuan, a graduate student in interaction design. Pan processed the 3D scanning and modeling of Tang and did the video post-production, demonstrating the diverse technological capabilities of Taipei Tech students.

The "Multiverse Fashion Show" followed, featuring virtual models and real models walking the same runway. The show was organized by Claudia Wang, fashion designer and interaction design graduate student at Taipei Tech. It demonstrated the fusion of fashion and technology and presented a vision of the future of fashion design. The show was exhibited again at Taipei Fashion Week at the end of March.

After joining the Metaverse XR R&D Center, Claudia Wang demonstrated abundant creativity and drive. Wang pointed out that initial investment in fashion industry is typically very high, for a single outfit usually requires preparation in three to five different sizes. This often leads to unnecessary waste. With the help of virtual reality technology, the fashion design industry can quickly "tailor-make" clothing in the latest fashion trends for each customer. Through 3D avatars, customers can provide immediate feedback and modifications, significantly improving the clothing production process and quality.

Metaverse XR R&D Center and Design Students Curated Multiverse Fashion Show at Taiwan Gender Equality Week, Celebrating Women in Tech



Tsao stated that "Taiwan Night: Celebrating Women in Tech" is the culmination of a decade's work by the Taipei Tech Department of Interaction Design, which educates designers while highlighting women's role in technological development. She further pointed out that Taiwan's technological prowess is world-renowned, but the contributions of Taiwanese women in technology often go unnoticed. She is proud that Taipei Tech students of all genders can bravely face challenges, collaborate, and showcase their strengths.

Taipei Tech Design Student Exhibition Highlights Social Issues and Sustainability



Eleven projects crafted by Taipei Tech design students garnered a spot as finalists in different categories in this year's Golden Pin Design Awards. Dubbed as Taiwan's premier annual design competition, the Golden Pin Design Awards saw nearly five thousand submissions from design schools throughout Taiwan this year. Three of the eleven Taipei Tech projects made their way into the "Best of the Year" shortlist, with one entry making it to the final round of the "Recycled Design" category. Moreover, seven Taipei Tech projects entered the final round of the Young Pin Design Award, Golden Pin's award that celebrate upcoming designers.

The projects that entered Golden Pin were part of the Taipei Tech industrial design graduation exhibition. Reflecting on the theme of the exhibition—"The Double Wave"—Taipei Tech Vice President Yang Shih-hsuan commented that it symbolizes gusts of wind that elevates the graduates towards their dream. "Their designs not only reflect on some critical social issues but also underscore the importance of sustainability," Yang said. He expressed hope that the graduates would continue to stay inventive, articulating their unique perspectives through design.

The industrial design graduation exhibition was hosted in the Taipei Tech Art and Culture Center until May 15. The exhibition is also hosted online and can be found through the link <https://www.behance.net/ntutid108>. The designs were then showcased in the 2023 Yodex, Taiwan's annual exhibition for young designers, from May 19 to 22.



Huang Si-yu and Chuang Wen-yu conceptualized the "FAREWELL" service to dispose roadkill properly and respectfully

Among the projects this year, "FAREWELL" is the project conceptualized by students Huang Si-yu and Chuang Wen-yu that address Taiwan's ten thousand roadkill incidents each year. Huang and Chuang found that the way the roadkill remains are handled have not been sanitary nor respectful. "FAREWELL" tackles this issue by having QR-code-enabled cardboard boxes available in partner convenience stores that anyone can use. After putting the animal in the box, the operator scans the QR code on the box to register this incident, which automatically informs the local sanitation team, ensuring the prompt retrieval of the farewell box for the cremation process.

Another project, named "Yung Shang" by Hsieh Yu-lun and Tang Chun-wei, fuses together memorial and ecological restoration. "Yung Shang" introduces a local adaptation of reef burials. Different from the conventional method of blending cremated remains into pH-neutral concrete, Hsieh and Tang propose using a titanium urn to hold the ashes, which is then placed atop an artificial reef made from recycled oyster shells. They also envisioned an underwater memorial hall for loved ones to pay their respects.



Combining memorial and ecological restoration, Hsieh Yu-lun and Tang Chun-wei's project "Yung Sheng" reimagines reef burials

The exhibition featured various other innovative design projects, such as sustainable footwear made from repurposed tea grounds, tree bench that helps to protect tree root systems, and a bookstore designed to allow exploration and develop concentration.



Leung Sze-pui designed sustainable footwear, "Teagee," made from repurposed tea grounds

Taipei Tech and Taipei Medical University Showcased Innovative Smart Healthcare Technologies



Taipei Tech and Taipei Medical University presented their new collaborative results on smart healthcare during the 2023 BIO Asia-Taiwan event. The two universities are long-term partners in the University System of Taipei, and have collaborated for over a decade in the field of medical engineering, jointly developing innovative applications and nurturing advanced research talents.

Taipei Tech Vice President Yang Shih-Hsuan noted that the two universities have established a joint research center, bringing in an annual investment of NT\$10 million to seek new creative projects in areas such as artificial intelligence, biotechnology, medical equipment, and information and communication technology. The innovative technologies created through the research center will be integrated into Taipei Medical University's medical system, strengthening the quality of medical services.

Taipei Medical University Vice President Wu Chieh-Hsi indicated that the joint research center has already presented significant achievements in two years, employing AI technology for prevention, diagnosis, monitoring, and assistance in treatments. The center has also facilitated the establishment of one startup company, initiated technology transfers across universities, submitted four patent applications, applied for three IRB projects, and produced seven prototype products for conceptual verification.

One of the noteworthy research projects is the collaboration between Professor Fang Hsu-Wei from Taipei Tech's Department of Chemical Engineering and Dr. Chen

Chih-Yu, an orthopedic specialist at Shuang Ho Hospital. Their team is developing three formulations of polysaccharide-based anti-adhesion products in powder, gel, and dressing forms. This new product can be widely applied in orthopedics, plastic surgery, gynecology, improving effectiveness and safety, and it is currently ready for commercialization, mass production and distribution.

In response to the current limitations of highly invasive cystoscopy for bladder cancer screening, Professor Pai Tun-wen of Taipei Tech's Department of Computer Science and Information Engineering and Dr. Liu Ming-Che, the head of the Urology Department at Taipei Medical University Hospital, are working together to employ biomedical big data combined with AI algorithms to screen and analyze DNA methylation biomarkers in urine. Their product is also advancing towards commercialization, serving as an effective solution for non-invasive bladder cancer detection.

Dr. Wu Meng-Huang, head of the Taipei Medical University Hospital's Spinal Orthopedics Department, is working with Professor Chang Cheng-Chun from Taipei Tech's Department of Electrical Engineering on developing smart spinal endoscopes. By utilizing AI image analysis technology to interpret real-time surgical images, it can accurately locate the bleeding spot and reduces surgical risks. This research project has been funded by the National Science Council and the Ministry of Economic Affairs.



Reimagining Resources and Preserving Memories: Taipei Tech Works with Elementary School in Sustainable Woodcraft Camp

In the summer of 2023, due to safety concerns, the Affiliated Experimental Elementary School of National Chengchi University (NCCU) cut down a number of blackboard trees. However, the faculty and students wished for these trees, which had grown alongside the children, to remain a part of the campus in some form. Responding to this, the Taipei Tech USR team, as part of the Wood Culture Rooting Innovation Project II, joined forces with the NCCU Affiliated Elementary School and Learn by Space (LBS), an organization promoting children's architecture education, in hosting a five-day woodwork summer camp. This camp fostered interdisciplinary and intergenerational collaboration, aiming to advance sustainable woodcraft education.

The theme of the camp centered around the sustainability of forest resources. It started with teaching participating children to understand sustainable forest management and planned thinning. It then transitioned to design thinking, allowing students to observe the campus and brainstorm ideas to repurpose the felled trees. Under the guidance of Taipei Tech woodcraft teachers and teaching assistants, fifteen students learned craftsmanship techniques and developed an awareness of sustainable resource use, including material selection, processing, and creation.

At the camp's conclusion, the students presented their collaborative projects, such as the Wooden Mat. They envisioned the fallen trees as a bench next to the playground, with Wooden Mats fixed onto the tree, providing comfortable seating. Other projects included the Xiaomi Fence for play area safety, the Waiting Parents' Chairs for parents waiting to pick up their children, bamboo dragonflies, and wooden whistles, all crafted from the school's own trees.

Guo Zong-de, teacher at the NCCU Affiliated Elementary School, expressed his gratitude for the opportunity to work with Taipei Tech and LBS members. He highlighted the enriching experience of introducing craft education into elementary school and the benefits of engaging students in a five-sense learning process. He found it rewarding to see students interact positively and support each other in the class. Although it is now easy to buy any woodcraft product online, he noted that students' collaboration and problem-solving experiences from this camp were priceless.

Hao-Jhe Li, the camp leader and USR project manager, who also serves as a lecturer in the Department of Industrial Design at Taipei Tech, stated that "Imagination and creativity are like two parallel lines, and woodworking brings them together." He hopes that through the efforts of Taipei Tech's USR team and the engaging power of woodcraft, imaginative ideas can be realized through intergenerational cooperation. In doing so, he believes, we can collectively become sustainability practitioners.

Thomas C.K. Yang, Taipei Tech Vice President and USR Office Deputy Director, remarked that Taipei Tech has been engaged in the Wood Culture Rooting Innovation Project II, funded by the Ministry of Education, for four years. Taipei Tech is committed to collaborating with elementary schools to develop a new generation of woodcraft instructors. The initiative aims to instill woodworking skills in primary education and beyond, fostering creativity and sustainability in young minds for the future.

