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61

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2 Global

NSF-Funded Student Group Visited Taipei Tech, Learning Next-Generation Display Technology Development

3 Taipei Tech Hosted International PBL Camp for Eighty Students from Five Countries

4 New Jersey Delegation, Led by Governor Murphy, Visited Taipei Tech and Signed Partnership Agreements

5 Excellence

Taipei Tech's Collaborative International Research with the U.S. and Japan Featured in Renowned Academic Journals

6 Achievements

Students' XR Project Actualities Won the 2023 ACM SIGGRAPH Best in-Show Award

7 Collaboration

Taipei Tech and Taipei Medical University Showcased Innovative Smart-Healthcare Technologies

8 Taipei Tech and Fulbright Invited Five Schools to Share EMI Experiences

NSF-Funded Student Group Visited Taipei Tech, Learning Next-Generation Display Technology Development



Fourteen graduate students from various American universities participated in the Advanced Studies Institutes (ASI) program funded by the U.S. National Science Foundation (NSF) and organized by Pennsylvania State University (Penn State) and the University of Dayton. The purpose of the program was to conduct research exchange in the field of next-generation display technology. The student group visited Taipei Tech from July 13th to 19th and met with 16 graduate students from Taipei Tech and National Yang Ming Chiao Tung University with an optoelectronics background. Together, they learned about innovative display technology and discussed future research cooperation.

Taipei Tech President Wang Sea-Fue expressed his honor in welcoming the NSF student group to Taipei Tech for the first time. The one-week itinerary arranged by Taipei Tech included core courses on new generation display technology, group laboratory experiments, and the sharing of experimental results. President Wang stated, "The student group will also have a chance to visit our industry partners, AU Optronics (AUO), and PlayNitride Technology, allowing both Taiwanese and American students to gain insights into the latest industry technologies and display manufacturing processes."

Vincent Meunier, the head of the Department of Engineering Science and Mechanics at Penn State, delivered a video speech praising Taiwan for its leadership in the field of display technology. He said, "The NSF's ASI program aims to cultivate talent in next-generation display technology. This cooperation provides students with the opportunity to expand their professional knowledge and establish academic and industry networks."

Taipei Tech Vice President Jen Yi-Jun pointed out that the intensive courses prepared for the students focused on diffraction and wave optics, as well as display technology. Students from Taiwan and the United States were grouped together to collaborate on laboratory experiments. Vice President Jen said, "The goal was to nurture students' teamwork spirit and provide them with international collaborative opportunities."

During July 17th to 19th, the NSF student group was invited to visit AUO and PlayNitride Technology. AUO is one of the world-renowned companies in the display industry, where they observed advanced display technology products and applications and learned about flexible display technology and intelligent manufacturing. PlayNitride Technology is Taiwan's first publicly-listed company on the Innovation Board, showcasing various MicroLED display applications, especially transparent displays and ultra-high-resolution full-color micro-display technology used in the metaverse.



Taipei Tech Hosted International PBL Camp for Eighty Students from Five Countries

Taipei Tech hosted the first large-scale international Problem-Based Learning (PBL) camp after COVID from August 9th to 16th. Eighty students from Taipei Tech's sister schools in Japan, Vietnam, Thailand, and the United States were invited to join their international peers, creating a multi-cultural, in-depth learning experience for the participants.

"This PBL camp is not only the first international contest hosted by Taipei Tech after the pandemic, but also the largest PBL camp in Taiwan," said Taipei Tech President Wang Sea-Fue. Participants included students from Tohoku University, Osaka Institute of Technology, Kyushu Institute of Technology, Ho Chi Minh City University of Technology, University of Greenwich, the University of California at River Side, California Polytechnic State University, Thammasat University, Taipei Tech, and Zhonghe Senior High School. The main purpose of the camp was to encourage logically thinking and group problem-solving in an international environment using English as the means of communication.

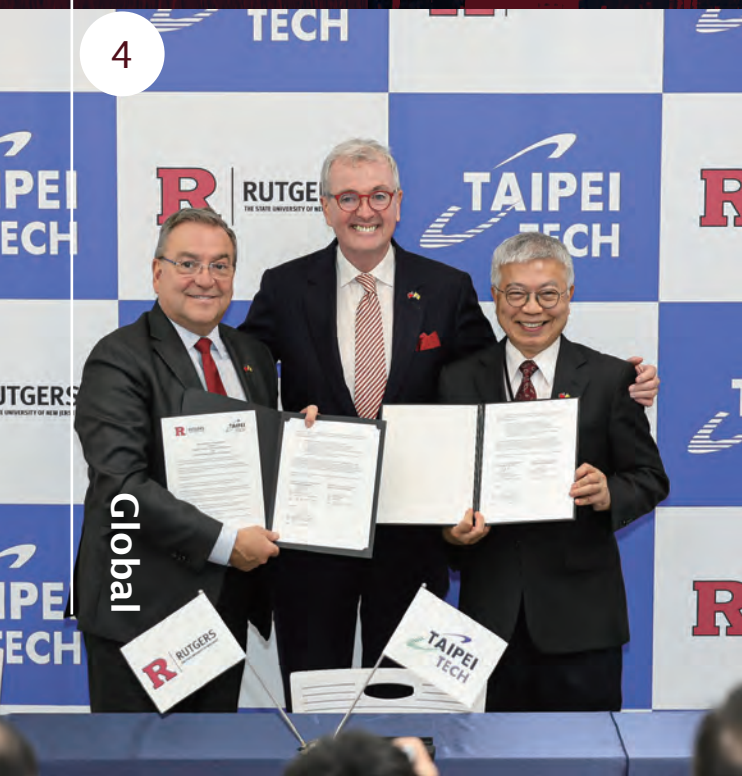
Professor Zhou Hong from Osaka Institute of Technology indicated that Osaka Tech has been doing PBL camp with Taipei Tech since 2013. He was glad to see that the event has become multinational this year. Zhou particularly thanked Taipei Tech for its contribution and dedication in hosting this camp, as it involves both workshops and contest that encourage team problem-solving. There are twelve Osaka Tech students participating in the camp, only second to Taipei Tech. "It is good to see everyone showed the best of themselves, enjoyed the activities, and made friends from aboard," said Zhou.

Taipei Tech Dean of Research and Development Chuang Ho-Chiao welcomed students from his alma mater Zhonghe Senior High School. The participation of high school students shows that international collaboration is taking root in Taiwan's secondary education. In the camp, participants were divided into ten groups, each consisting of eight members. Their objective was to produce a vehicle that is capable of autonomously grabbing and releasing a red ball in specified areas. The eight-day camp involved prototyping, testing, material shopping, and assembling. It was a team effort that required every member's full dedication and cooperation.

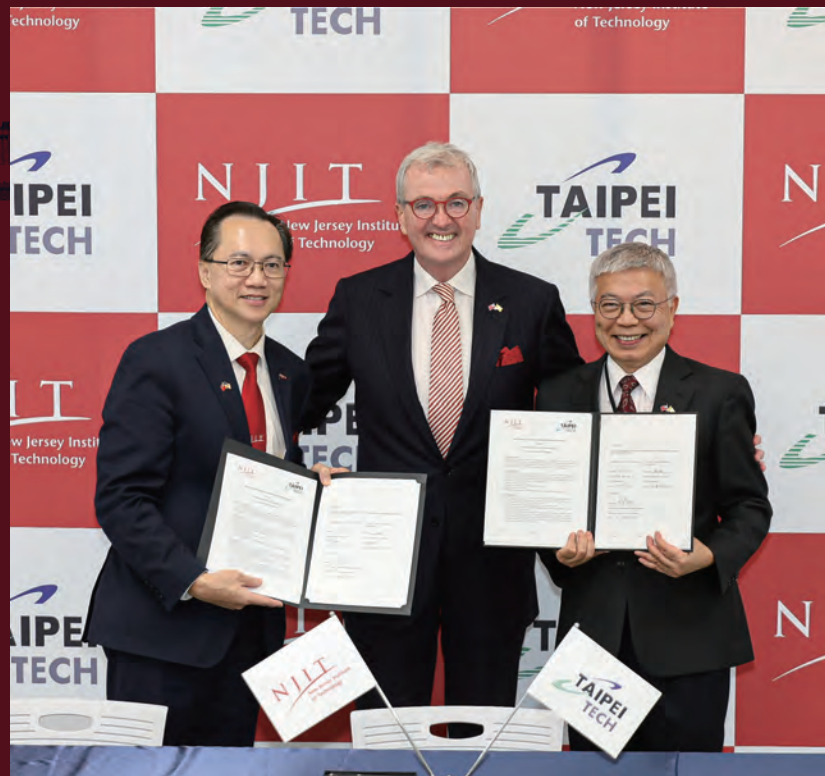


During the closing ceremony, Kamiya Tohru, the International Vice President of Kyushu Institute of Technology, noted that this was the first participation of Kyutech in an international PBL camp. He expressed his gratitude to Taipei Tech for arranging this meaningful event, as "the obstacles the students encountered during the camp have become experiences to drive them forward," said Kamiya.

Taipei Tech Vice President Jen Yi-Jun indicated that Taipei Tech has been focusing on practical research and hosting PBL workshops to nurture student's problem-solving and cross-cultural communication abilities. For the past ten years, there have been about 300 students who participated in PBL workshops. Taipei Tech is looking to host PBL camps with more international institutions that share the hands-on, craftsman spirit.



Taipei Tech and Rutgers signed an MOU to strengthen partnerships between the two universities



Taipei Tech signed partnership agreement with NJIT

New Jersey Delegation, Led by Governor Murphy, Visited Taipei Tech and Signed Partnership Agreements

On October 20th, 2023, Taipei Tech President Wang Sea-Fue welcomed a New Jersey delegation, led by Governor Philip Murphy. The New Jersey Institute of Technology (NJIT) and Rutgers University signed partnership agreements with Taipei Tech during the visit, marking a step forward in academic cooperation.

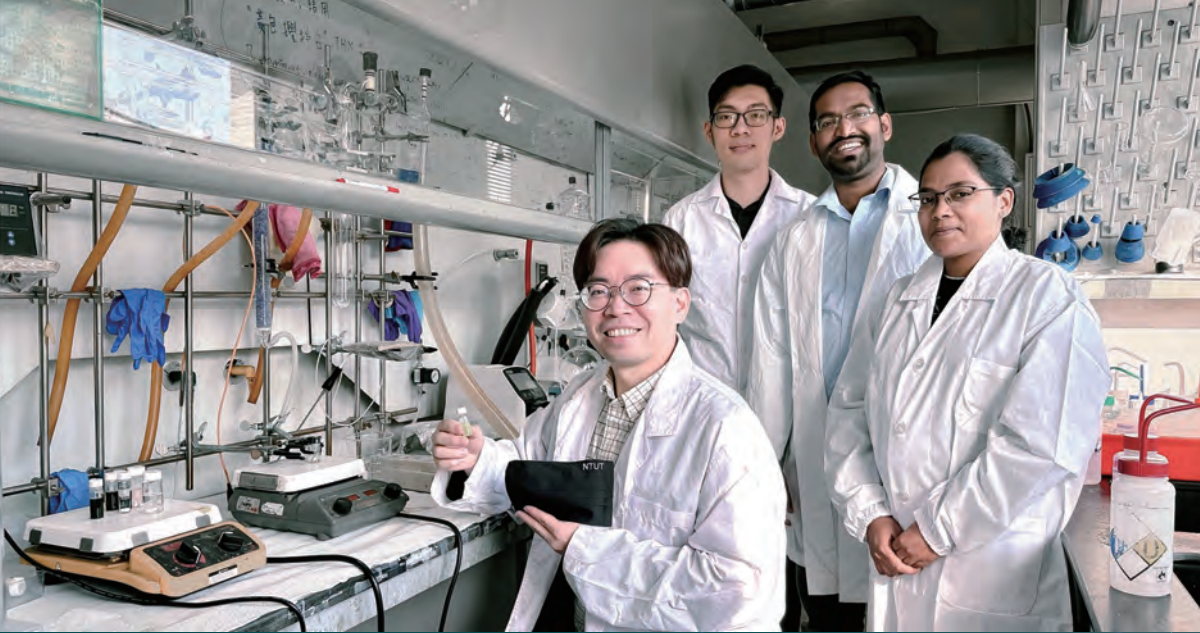
In his address, Governor Murphy emphasized New Jersey's role as a leader in innovative technologies and talent development. The signing ceremony reinforces the partnership between the State of New Jersey and Taiwanese universities and sets the stage for future collaborative innovation and research projects.

President Wang highlighted the significance of these agreements. He mentioned that NJIT, one of Taipei Tech's longstanding partners, will be playing a crucial role in the bilateral cooperation under the agreement signed today. Moreover, the MOU with Rutgers University symbolizes a new milestone of partnership between Taipei Tech and New Jersey. Governor Murphy's visit also shows his dedication to international higher education partnerships. Wang looks forward to the fruitful results that three universities can bring, considering Taipei Tech's legacy in fostering entrepreneurs and driving economic development.

NJIT is one of the most prestigious public tech universities in the U.S. It was recently ranked first among public universities nationwide for alumni earnings by a 2023 New

York Times survey. President Teik C. Lim of NJIT, during his time as the dean of the College of Engineering and Applied Science at the University of Cincinnati (UC), facilitated the establishment of the Elite Undergraduate to Graduate International Experience Program (EUGINE) with Taipei Tech. During his later position as the Academic Vice President and Acting President of the University of Texas at Arlington (UTA), he also fostered the implementation of several dual master's degree programs between UTA and Taipei Tech. Lim was delighted to see the stronger partnership with Taipei Tech in various fields such as biology, materials sciences, sustainable resource management, robotics, AI, and supply chain management. He indicated that there will be three collaborative research projects with Taipei Tech annually and thanked the New Jersey State Government for supporting these academic partnerships, which he believes will significantly contribute to socio-economic development.

Rutgers University, the largest public research university in New Jersey, is well-known for its New Brunswick campus, which ranks in top fifteen among U.S. public universities. Antonio M. Calcado, Vice President and chief operating officer of Rutgers, said that the agreement with Taipei Tech will start from the research collaboration in engineering. This initiative aims to strengthen international educational connections and support students' academic and career progression.



Taipei Tech's Collaborative International Research with the U.S. and Japan Featured in Renowned Academic Journals

Taipei Tech's Professor Kuo Chi-Ching, PhD candidate Archana Pandiyan, and Assistant Professor of Research Loganathan Veeramuthu from the Department of Molecular Science and Engineering, along with Assistant Professor Tao Zhou from Penn State University, co-authored an article titled "A Comprehensive Review on Perovskite and Its Functional Composites in Smart Textiles: Progress, Challenges, Opportunities, and Future Directions." This article, published in the internationally renowned journal *Progress in Materials Science*, highlights the potential of durable and environmentally-friendly Perovskite composites.

Kuo indicated that Perovskite has become the most promising low-cost energy material for applications in optoelectronic components. Collaborating with Taipei Tech's Smart Smart Textile Technology Research Center, the research team began the research journey by studying the application of Perovskite composite materials in textiles, such as nano fibers, light-emitting textiles, sensor patch, and wound dressing. Kuo noted the continuous evolution in clothing materials, emphasizing their enhanced functionalities such as improved warmth, cooling, wind resistance, breathability, and waterproofing. He highlighted that the potential application of Perovskite in functional fibers could revolutionize the way we use clothing by converting the kinetic energy generated by body movement into electrical energy, which can then be stored for various uses.

Moreover, the research between Kuo and the research team of Professor Junji Kido from the University of

Yamagata, Japan was featured as the cover story in the prestigious international journal *Advanced Materials*. The article, titled "Synergistic Effect of Cation Composition Engineering of Hybrid $Cs_{1-x}FA_xPbBr_3$ Nanocrystals for Self-Healing Electronics Application," explores the innovative integration of Perovskite with self-healing materials. This groundbreaking work has garnered significant attention in the global academic community, marking a remarkable achievement in the field.

Kuo explained that Perovskite elements are typically used for their electrical conductivity and light-emitting properties in solar batteries, LED, and optical memory devices. However, their quick degradation from water and oxygen exposure can diminish their optoelectronic capabilities. Kuo and the research team developed a self-healing high molecular polymer that encapsulates Perovskite, enhancing not only its durability but also its environmental friendliness. The technique has been patented.

Encapsulating Perovskite took four years of rigorous research work. Students were sent to Japan to study the quantum dots that produce the purest Perovskite with the highest light-emitting efficiency. The research team followed up with inventing and combining self-healing high molecular materials with such Perovskite. The research team also developed reliable self-healing electronic component that can be applied to produce high-performing micro-LED display and laser devices.

Students' XR Project 'Actualities' Won the 2023 ACM SIGGRAPH Best in Show Award

The XR (Extended Reality) project Actualities, built by students from the Department of Interactive Design, won the Best in Show Award in the Immersive Pavilion section of 2023 ACM SIGGRAPH. Actualities transported the performance of a live band into the metaverse for audiences to interact with onsite and online. The Taipei Tech team was the only international participant that won an award in this section.

Assistant Professor Han Ping-Hsuan, together with students Lin Ke-Fan, Chou Yu-Chih, Weng Yu-Hsiang, and Lim Zin-Yin, took a year to finish the project. Actualities is a seamless live performance platform that serves on-site and online audiences synchronously, allowing the two kinds of audiences to interact with each other virtually in the metaverse. Both on-site audiences and participants joining virtually through devices are transported into a common virtual reality and become part of the live performance. Their participation can also influence the visuals showing in the virtual reality.

By utilizing various sensors, Actualities captured signals from a live performance venue and digitalize them as virtual elements. For example, the music notes from

guitars become flowers and butterflies, and cajón beats become fireworks in the virtual reality. In the SIGGRAPH demonstration, the visual content is projected onto a screen while being simultaneously livestreamed online. People can join this concert virtually through their phone or VR headset. This allows for a metaverse concert that provides engaging experience for all participants.

In SIGGRAPH 2023, Actualities drew international visitors to participate in the live band performance. The jury highly praised the sophisticated interactivity and the ease to participate. The design fully shows the concept of immersive technology and the creative potential of such technology.

Dr. Han, adviser to the project, indicated that the design of Actualities originated from a collaboration with manufacturers last year. His XR Lab was responsible for developing the software kits for music visualization. His team then added the capability of streaming media and worked with Good Band to produce Actualities. "Our team would like to build a brand-new experience for onsite and online audiences to together participate in a live performance. The final metaverse concert is very much like an interlaced parallel universe." Good Band has applied this technology earlier this year in their performance. The XR Lab team also demonstrated this technology in the 2023 VGW (Vision get Wild) exhibition.

SIGGRAPH (Special Interest Group on Computer Graphics and Interactive Techniques) is an annual conference centered around computer graphics and interactive techniques since 1974. This indicative worldwide exhibition was held in Los Angeles USA this year. Thousands of visitors from 78 countries in both industry and academic areas shared their innovative research, exceptional pieces, and thoughtful inputs during the meeting.



Taipei Tech and Taipei Medical University Showcased Innovative Smart Healthcare Technologies

Collaboration



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.

Taipei Tech and Fulbright Invited Five Schools to Share EMI Experiences



Taipei Tech and Fulbright Taiwan invited the EMI (English as a Medium of Instruction) teaching groups from five schools to the EMI consensus meeting on September 18th to discuss strategies and annual goals for a better bilingual teaching and learning environment. The five schools included National Taipei University of Technology, National Cheng Kung University, National Sun Yat-Sen University, National Taiwan University of Science and Technology, and National Central University.

In his remark, Fulbright Taiwan CEO Dr. Randall Nadeau said that EMI programs are important to universities for many reasons. EMI programs could incentivize international students to consider studying in a university. Embedding local students in EMI program can enable them to express their opinions and creativity in an international workplace, making

them better cross-cultural communicator and more competitive on the international stage. As a bridge between Taiwan and international partners, Fulbright Taiwan offers customized instruction consulting services that aim to improve teaching qualities and help Taiwanese talents stand out globally.

Tzeng Shin-yuan, official from the Department of Higher Education of the Ministry of Education (MOE), thanked Fulbright Taiwan and the forty English instructors from aboard for their support. He is confident that, through the multifaceted collaboration, Taiwanese students will have better communication skills, career competitiveness, and global mobility via EMI programs.

Dr. Hwang Yuh-Shyan, Taipei Tech Dean of Academic Affairs and Director of Center for Bilingual Learning, indicated that Taipei Tech had initiated a policy to have a specific percentage of English-instructed courses in graduate schools before the launch of EMI. Furthermore, the school has implemented ESP (English for Specific Purposes) programs that serve as good foundation to progressively incorporating EMI programs. MOE has recognized three colleges at Taipei Tech as principal EMI institutions. These include the College of Electrical Engineering & Computer Science, the College of Engineering, and the College of Management. Earlier this year, selected Taipei Tech teachers underwent training abroad, participating in EMI instructor training in the University of California at San Diego and Penn State University. Combined with EMI resources that Fulbright Taiwan provides, Taipei Tech aims to boost the English instructional skills of lecturers in multiple ways.

The Southern Regional Resource Center for Bilingual Education in National Sun Yat-Sen University has been holding seminars and workshops for nine schools in Kaohsiung, Pingtung, Taitung, and Nantou in the past year. The members regularly exchange instructional resources and share experiences. Attendees from National Cheng Kung University noted that the 36-hour online training workshop with two EMI trainers has been helpful and facilitated more interaction than a traditional classroom setting.

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