



Innovations Showcased at BIO Asia-Taiwan 2022

At BIO Asia-Taiwan 2022, the largest bio industry exhibition in Asia, ITRI presented innovative technologies including an anti-adhesion & anti-leakage bioabsorbable sheet, a cell sheet production system, and an ophthalmic drug delivery solution.

ITRI TODAY

110

Fall Issue 2022

...

» Contents



FEATURE

Novel Biomedical Applications at BIO Asia-Taiwan 2022

SPOTLIGHT

5G O-RAN Energy-Saving System Recognized at SCF Small Cell Award 2022



R&D FOCUS

Smart Process System for Advanced Semiconductor Thin Film Equipment

ITRI-E-(S)4046: A Novel ROCK Inhibitor for Glaucoma

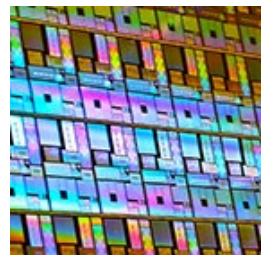
Innovative Controller for Electric and Self-Driving Vehicles

COLLABORATION

ITRI Announces Leading-Edge Magnetic Memory Technology

Bogie Running Tester Enhances High Speed Train Testing Efficiency

Global Partnership for 5G mmWave Communication



ACTIVITY

A Hybrid Celebration for ITRI 49th Anniversary

Amber Exhibition Features ITRI's Virtual-Real Fusion Technology

Taiwan's First Online Workshop on Trustworthy AI



ITRI
Industrial Technology
Research Institute

© 2014-2022 The Industrial Technology Research Institute.
ITRI Today is a quarterly publication reporting major events and
achievements at ITRI.

Accessibility AA



» Feature



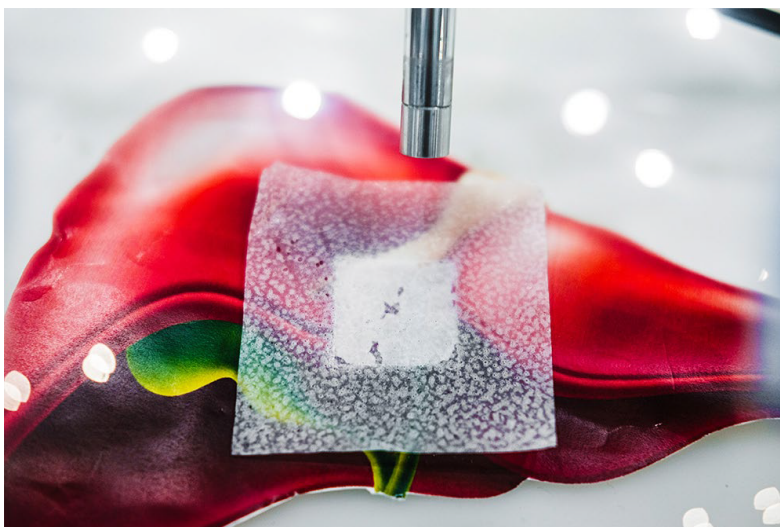
Novel Biomedical Applications at BIO Asia-Taiwan 2022

BIO Asia-Taiwan 2022, Asia's largest bio industry exhibition, was held in a hybrid format in Taipei at the end of July, attracting more than 100,000 visitors and 550 bio-industry manufacturers. At this grand event, ITRI showcased 10 biomedical innovations including a bioabsorbable sheet that prevents postoperative adhesions or leakages, a portable electrical impedance tomography for dynamic imaging, and a natural supplement for memory.

According to Dr. Chii-Wann Lin, Vice President and General Director of the Biomedical Technology and Device Research Laboratories at ITRI, the Institute is developing more effective biomedical technologies that can improve the quality of health and medical services. While benefiting more patients, the development of these smart innovations will also lead companies to grow their R&D capabilities and strengthen supply chain linkages.

Tech Showcase Highlights

Dual Functional Reinforcement & Anti-Leakage Bioabsorbable Sheet



The bioabsorbable sheet features both anti-leakage and anti-adhesion.

This is the world's only bioabsorbable sheet that features both anti-leakage and anti-adhesion. Applying this patch on a wound after a gastrointestinal surgery can prevent inflammation or infection caused by undesirable leakage of gastric acid. Meanwhile, the sheet can avoid adhesion between layers of tissues as the wound heals.

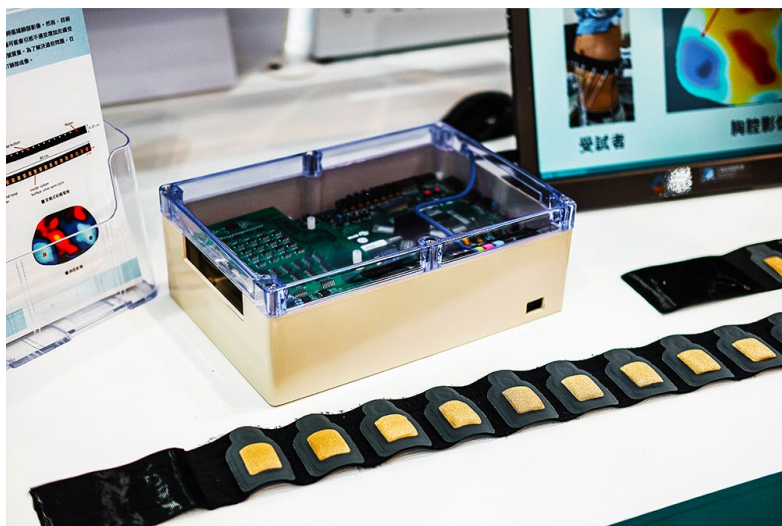
Cell Sheet Biomedical Material Integration System

Conventionally, cell sheets are cultivated in a laboratory, which requires weeks for cell production. ITRI's Cell Sheet Biomedical Material Integration System, in contrast, can be easily carried to a surgical room due to its compact design. With this system, cell sheets can be produced within just 20 to 30 minutes. The created cell sheets have a variety of applications in cell therapy, such as skin/myocardial tissue and tendon injury repair. The system also features aseptic techniques, preventing cells from contamination during the cultivation process.



ITRI's Cell Sheet Biomedical Material Integration System can produce cell sheets within 20 to 30 minutes.

Portable Electrical Impedance Tomography (EIT)



This wearable technology can provide long-term monitoring and dynamic imaging.

X-ray and computed tomography (CT) scans are traditional ways of taking lung images. However, such methods involve potential risks of radiation. In addition, the captured images are still and unable to reflect the examinee's lung condition continuously. To address these problems, ITRI has developed the Portable Electrical Impedance Tomography. Using wearable textile electrodes that are integrated in a belt, the technology can be easily

attached to the examinee's chest to achieve long-term monitoring and provide dynamic imaging of lungs during breathing.

Ophthalmic Technology Platform for Developing Drugs and Drug Delivery System

ITRI has established a one-stop service for ophthalmic drug design, synthesis, pharmacodynamics, pharmacokinetics, toxicology, and pilot and GMP production. Via this platform, ITRI has developed two types of eye drops. The first treats glaucoma by reducing eye pressure and ocular irritation. The other can be used as a non-invasive treatment to replace ocular injection for wet age-related macular degeneration (Wet AMD).



ITRI's platform is a one-stop service for developing ophthalmic drugs and delivery systems.

Bugu-M, a Natural Ingredient for Memory



Bugu-M is a natural supplement that can and mitigate cognitive impairment.

Amyloid beta ($A\beta$) plays a crucial role in the pathogenesis of Alzheimer's disease. Using multiple plant extracts, ITRI developed Bugu-M that can ameliorate $A\beta$ -induced neurotoxicity. This natural supplement contains botanic ingredients that are good for brain health and memory improvement. Preclinical studies show that Bugu-



ITRI
Industrial Technology
Research Institute

© 2014-2022 The Industrial Technology Research Institute.
ITRI Today is a quarterly publication reporting major events and achievements at ITRI.

Accessibility AA



» Spotlight

5G O-RAN Energy-Saving System Recognized at SCF Small Cell Award 2022

The growing base station Open RAN (O-RAN) architecture is sparking new business opportunities in the 5G industry. Unlike traditionally proprietary networks, O-RAN allows interoperation between equipment by different vendors, which can accelerate entry into the global market for 5G base station products. To meet the demand for private networks, ITRI and major electronics manufacturer PEGATRON Corporation jointly developed the 5G Energy-Saving O-RAN System. The technology won an SCF Small Cell Award in 2022 for its outstanding software and services technology for small cells in commercial use, and won a gold medal for ITRI's Outstanding Research Awards in the same year.



The 5G Energy-Saving O-RAN System uses AI for smart distribution and allows idle base stations to hibernate and reduce energy costs.

Three main factors considered by companies to develop 5G private networks are ease of deployment, cost-effectiveness, and integration with existing equipment. ITRI and PEGATRON's 5G O-RAN Energy-Saving System can be scaled rapidly, helping to expand private network applications and drive digital transition for enterprises.

General Director Pang-An Ting of ITRI's Information and Communications Research Laboratories noted that the Energy-Saving O-RAN System developed by ITRI and PEGATRON has the following features: (1) High deployment efficiency: simply one click can simulate a number of base stations to assist in the planning of a private network; (2) Energy-Saving: AI is used in traffic monitoring and traffic steering for smart distribution and allows idle base stations to hibernate; (3) Smart Modularization: This enables highly flexible private network deployment in 5G vertical applications such as smart factories, hospitals, entertainment, drones, and logistics. The system also enables plug-and-play operation and can automatically perform optimization, monitoring, management, and repairs, reducing overall maintenance and operating costs.



The 5G Energy-Saving O-RAN System was recognized in the Outstanding Software and Services Technology for Small Cells in Commercial Use category.

CY Feng, General Manager of BU6 at PEGATRON Corporation, revealed that PEGATRON has committed to 5G O-RAN products since 2020 for vertical applications with products that comply with the 3GPP and O-RAN specifications. With progress in NFVI, network slicing, AI edge computing, and network management system (O-RAN SMO and Near-Real Time RIC), PEGATRON rolled out a portable solution aimed at 5G private network applications. Feng reiterated that with capabilities of gNodeB Energy Savings built with ITRI, PEGATRON hopes to lower operating and administrative costs for smart manufacturing, transportation, and digital resilience.



The SCF Small Cell Awards

The SCF Small Cell Awards honor those who have made breakthroughs in the development of small cell technology and made contributions to the industry. Other winners this year include global key 5G/telecom players such as Qualcomm, Rakuten, and Ericsson. Click [here](#) to learn more about the winners for 2022.





» R&D Focus

Smart Process System for Advanced Semiconductor Thin Film Equipment



ITRI's system can significantly reduce the time needed to reach optimal thin film disposition process parameters.

Semiconductor fabrication starts with the deposition of extremely thin films on silicon wafers. Thin film deposition is heavily affected by parameters including pressure, flow, and temperature. With hundreds of potential combinations, the semiconductor industry relies on the operator's experience to find the best combination, which takes time and drives up costs. ITRI's Smart Process System for Advanced Semiconductor Thin Film Equipment was developed to simplify this process, using a digital twin that can rapidly simulate and find the best optimization parameters.

"Thin film chambers have too many variables, so a very stable state is needed to control all kinds of chemical and physical reactions," said Deputy Division Director Dr. Ching-Chiun

Wang of ITRI's Mechanical and Mechatronics Systems Research Laboratories. "Thin film deposition can take anywhere from 10 minutes to 8 hours, which in the case of the most complicated scenarios, limits adjustments to two or three rounds per day if results are not satisfactory."

Comparison of Semiconductor Thin Film Process Development

	Traditional Method	ITRI's Smart Process System
Main Principle	Relies on experience and testing for manual adjustments	Introduces digitalization and parameter feedback for prediction correction
Accuracy	< 80%	> 95%
Process Repeatability Deviation	> 4%	< 2%
Adjustment Time	1 week	2 hours
New Product Development Time	3 months	1 month

ITRI's Smart Process System alleviates these issues by simulating and analyzing thin film quality from different parameter settings. Engineers can simply input different combinations to predict the result, saving much time spent on trial and error.

Since semiconductor processes are often confidential and lack authentic data for AI training, ITRI's Smart Process System works from a small amount of data to build its analysis models and adopted a virtual-real fusion approach to create a realistic thin film deposition chamber. The system incorporates flow field visualization and plasma diagnosis functions to retrieve more feedback data, which can be utilized to further adjust the model and improve the accuracy of predictions.

“

This technology is a great help for semiconductor manufacturers to develop new products, which makes the optimization process less like finding a needle in a haystack.

”

Ching-Chiun Wang
ITRI Deputy Division Director

With optimal parameters from the Smart Process System, the adjustment period for thin film equipment can be reduced to two hours from the one week needed for manual tuning. Overall, it shortens development time for new products from three months to one. The repeatability deviation for each process can be lowered to less than 2% compared to more than 4% from a manual approach. Moreover, the system's predictions can achieve more than 95% accuracy, outperforming the 80% from manual experience.

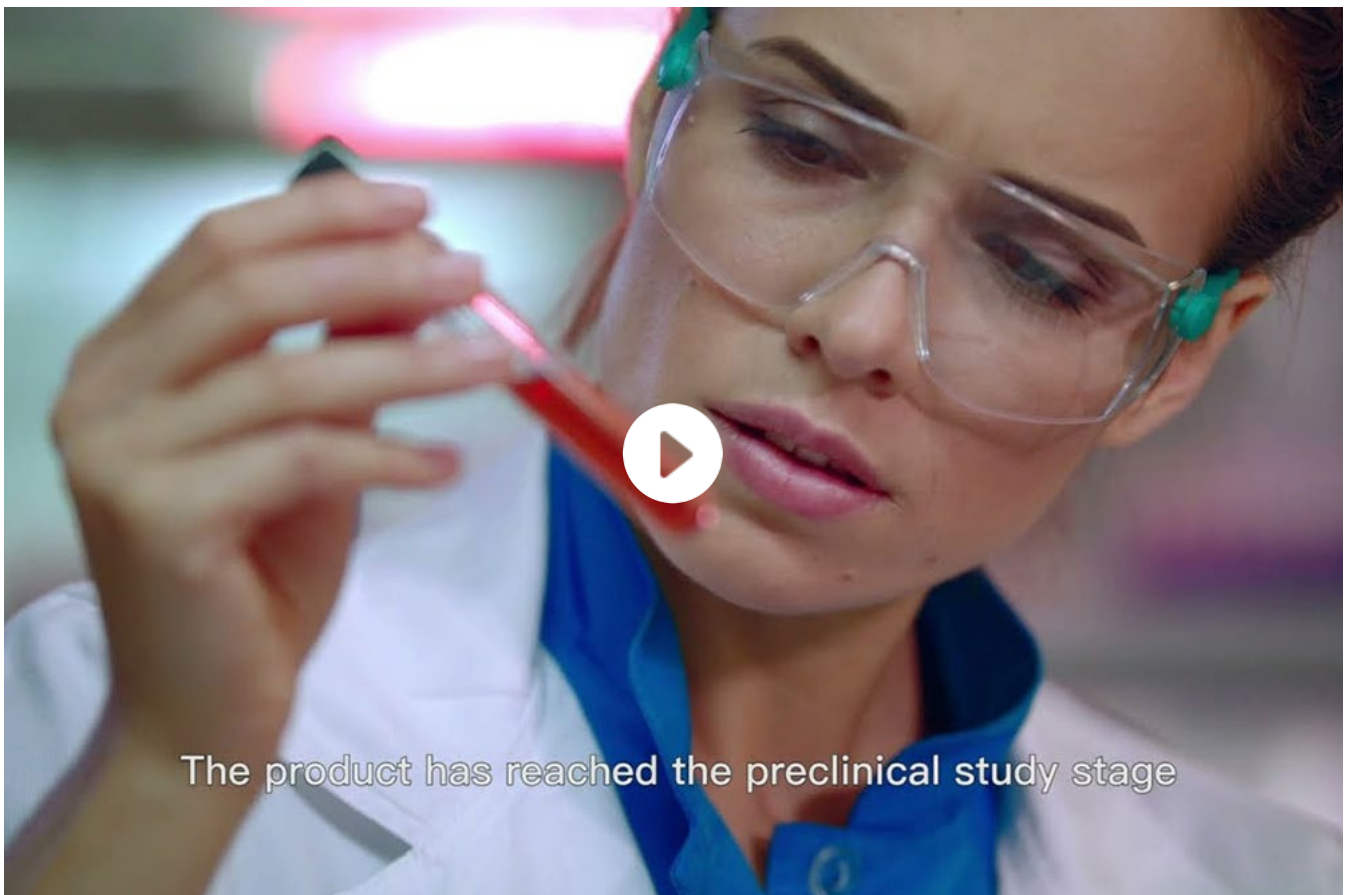
According to Dr. Wang, the Smart Process System for Advanced Semiconductor Thin Film Equipment can bring three major benefits for the industry. First, it achieves accurate data-driven predictions to mitigate the reliance on worker experience and accelerate digital transformation. Secondly, it helps semiconductor equipment manufacturers upgrade their technology and create more value for their customers. Thirdly, the predictive simulations reduce material costs during process development, which responds to the net zero trend and secures competitive advantages in the global market. The technology received a gold medal at ITRI's Outstanding Research Awards in 2022.





» R&D Focus

ITRI-E-(S)4046: A Novel ROCK Inhibitor for Glaucoma



ITRI-E-(S)4046 dual-target kinase inhibitor.

Glaucoma is a common eye condition that induces optic nerve atrophy from elevated intraocular pressure (IOP) and may cause vision loss. According to the WHO, in 2020 more than 80 million people suffer from this disease, with blindness resulting in about 10 million cases.

Current treatment methods generally include eye drops or oral administration of drugs. However, 40% to 50% of patients develop drug resistance after receiving treatment for one to three years, and experience growing side effects such as dark circles under the eyes, sunken eyes, eye irritation, or pink eye symptoms. To improve the treatment, ITRI developed the dual-target kinase inhibitor designated ITRI-E-(S)4046, which in trials has shown greater effect on lowering IOP than current drugs on the market.



ITRI developed the new glaucoma treatment drug on its Integrated Platform for Ophthalmic Drug Development.

Division Director Dr. Jui-Mei Lu of ITRI's Biomedical Technology and Device Research Laboratories pointed out that there are several drug treatments for glaucoma available on the market, which work by reducing the amount of aqueous humor created within the eye or target trabecular outflow. Around 50% of patients develop drug resistance after a year of treatment, and experience growing side effects.

“We applied ITRI’s targeted drug delivery system that was designed for tackling tumors to treat glaucoma,” said Dr. Lu. “Our team found from other research findings that Rho-associated Protein Kinase (ROCK) would cause the trabecular meshwork to contract, limit the flow of aqueous humor, and raise the patient’s IOP. Thus, we decided to use a kinase inhibitor that targeted ROCK as the basis to develop the new drug.”

The team tested more than 200 compound combinations on ITRI’s Integrated Platform for Ophthalmic Drug Development. This platform was established to provide a one-stop service for ophthalmic drug design, synthesis, pharmacodynamics, pharmacokinetics, toxicology, and pilot and GMP production. During preclinical trials, the team found a compound that not only inhibited ROCK but even suppressed MYLK4, another protein kinase that might affect the aqueous humor flow of the trabecular meshwork. Compared to current drugs, in vivo testing results have shown that ITRI-E-(S)4046 has 39 times greater effectiveness on inhibiting MYLK4, demonstrating ITRI’s formula as a dual-target glaucoma drug that has low hyperemia

and only requires one application per day.

ITRI-E-(S)4046 has already been transferred to a biomedical company in Taiwan and is slated to enter phase I and II clinical trials this year. It is expected that the successful development of this drug with significant improvement in lowering IOP will offer glaucoma patients a new option of reduced side effects and dosage to improve their life quality. The technology received a gold medal at ITRI's Outstanding Research Awards in 2022.



» R&D Focus

Innovative Controller for Electric and Self-Driving Vehicles

By Ming Une Jen and Ming-Hung Lu

With decades-long experience in intelligent vehicle technology, ITRI has built a new-generation integrated Powertrain and Chassis Control Unit (PCCU) that acts as a domain controller for electric, hybrid or self-driving vehicles. This two-in-one control unit, the only of its kind made in Taiwan, can be used as a vehicle control unit (VCU), an X-by-wire controller, or both through different embedded firmware and software.

Besides the three primary components—electric motor, motor controller and battery—for an electric vehicle (EV), introducing the PCCU into pre-production greatly boosts the competitiveness of car manufacturers. The PCCU serves as a vehicle control unit that provides torque coordination, operation strategies, onboard diagnosis, charging control, and monitoring for electric vehicles. It also enables precise by-wire control for steering, brake, throttle, gear shift and turn signals needed to develop self-driving vehicles.



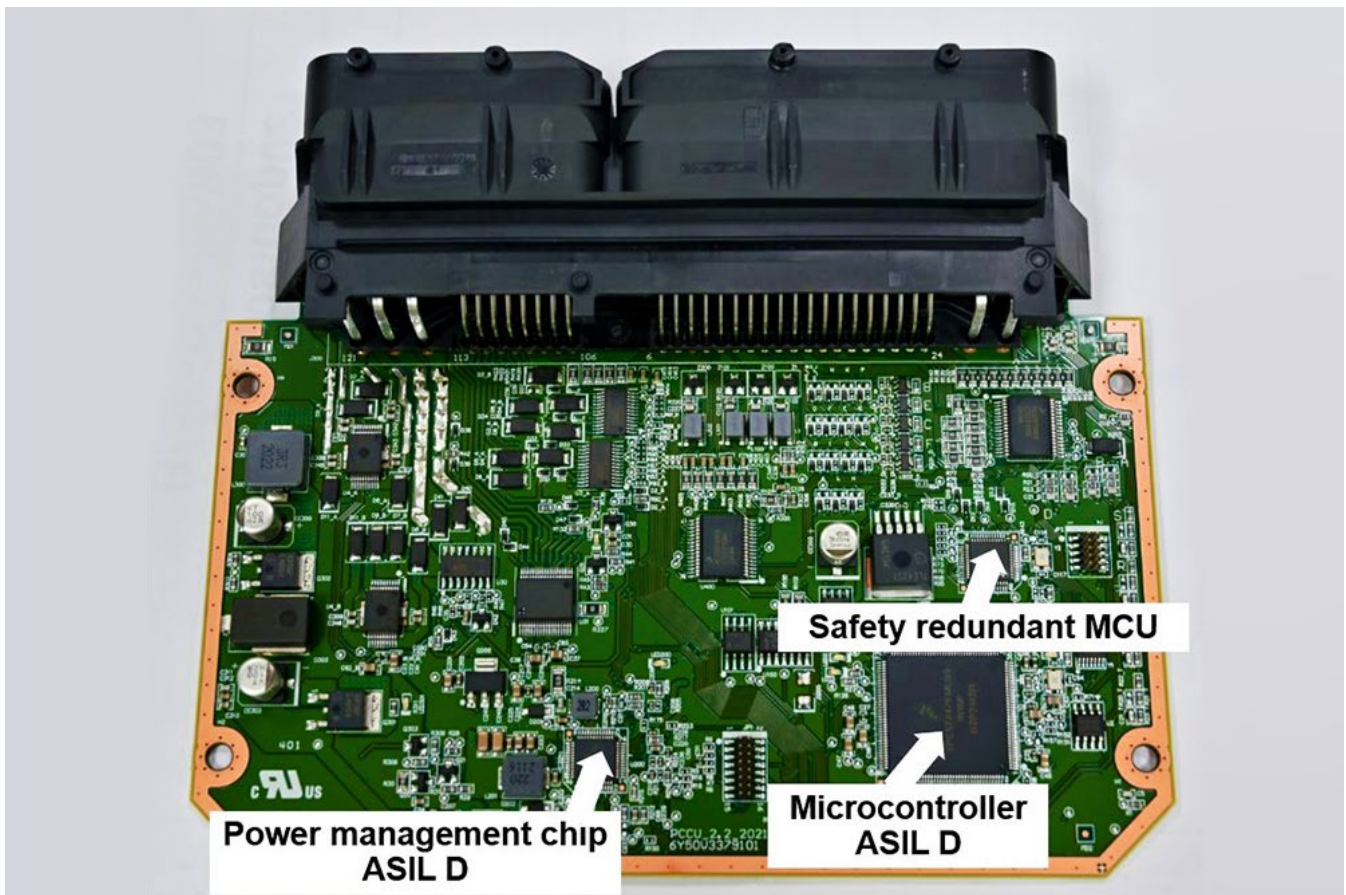
The integrated Powertrain and Chassis Control Unit (PCCU) developed by ITRI.

Feature-wise, the PCCU’s hardware and software designs follow functional safety development process guided by ISO 26262, which aims to reduce possible hazards caused by the malfunctioning behavior of electrical and electronic systems. As the core of hardware, the main microcontroller (MCU) and the power management chip of the PCCU own the highest Automotive Safety Integrity Level,

ASIL D. An additional ASIL B MCU is added as a safety redundancy. Similarly, model-based software architecture of basic system functions and functional interfaces conforms to the standardization defined by Automotive Open System Architecture (AUTOSAR). Partner developers can thus integrate, exchange, re-use, and transfer functions within a vehicle

network, which substantially improves their efficiency of development over the product lifecycle of a vehicle.

Additionally, ITRI's PCCU was developed and manufactured to meet automotive grade product quality requirements. To be a qualified product, environmental reliability testing and electromagnetic compatibility testing were performed and certified by a third-party organization. According to the validations, the PCCU complies with ISO 16750/CISPR 25, and the ingress protection rating of PCCU meets IP 6K7 and IP 6K9K.



The core chips of PCCU achieve the highest Automotive Safety Integrity Level, ASIL D.

As one of the technology spotlights of the Mobility Taiwan Automotive Research Consortium (mTARC), the PCCU made its debut at the tradeshow Autotronics Taipei 2022, attracting the interest of many visitors and vendors as the first vehicle controller of its kind produced in Taiwan. The orders for the PCCU from bus and car manufacturers exceeded 1,100 sets by the end of April, with 500 sets already manufactured by Inventec Corp.

Achieving technology readiness level (TRL) 8, the PCCU has become the VCU for almost all major electric bus manufacturers in Taiwan, including ZTE, Hon Hai, RAC and Master, and has been used in the self-driving vehicles of HCT Logistics, Green Transit Co. and Leon Energy Co. Being a core technology for EVs and self-driving vehicles, the PCCU can help integrate the EV supply chain and lay a solid foundation for the vehicle controller industry.



About the Authors



Dr. Ming Une Jen is a senior researcher working for the Mechanical and Mechatronics Systems Research Laboratories at ITRI. She was also a member of Hybrid-EV committee of SAE Standards Works in 2012-2016. Dr. Jen received University of Maryland, US. She specializes in NVH engineering, electric vehicles, and chassis engineering, and has published over 65 technical papers. her Ph.D. degree in mechanical engineering from



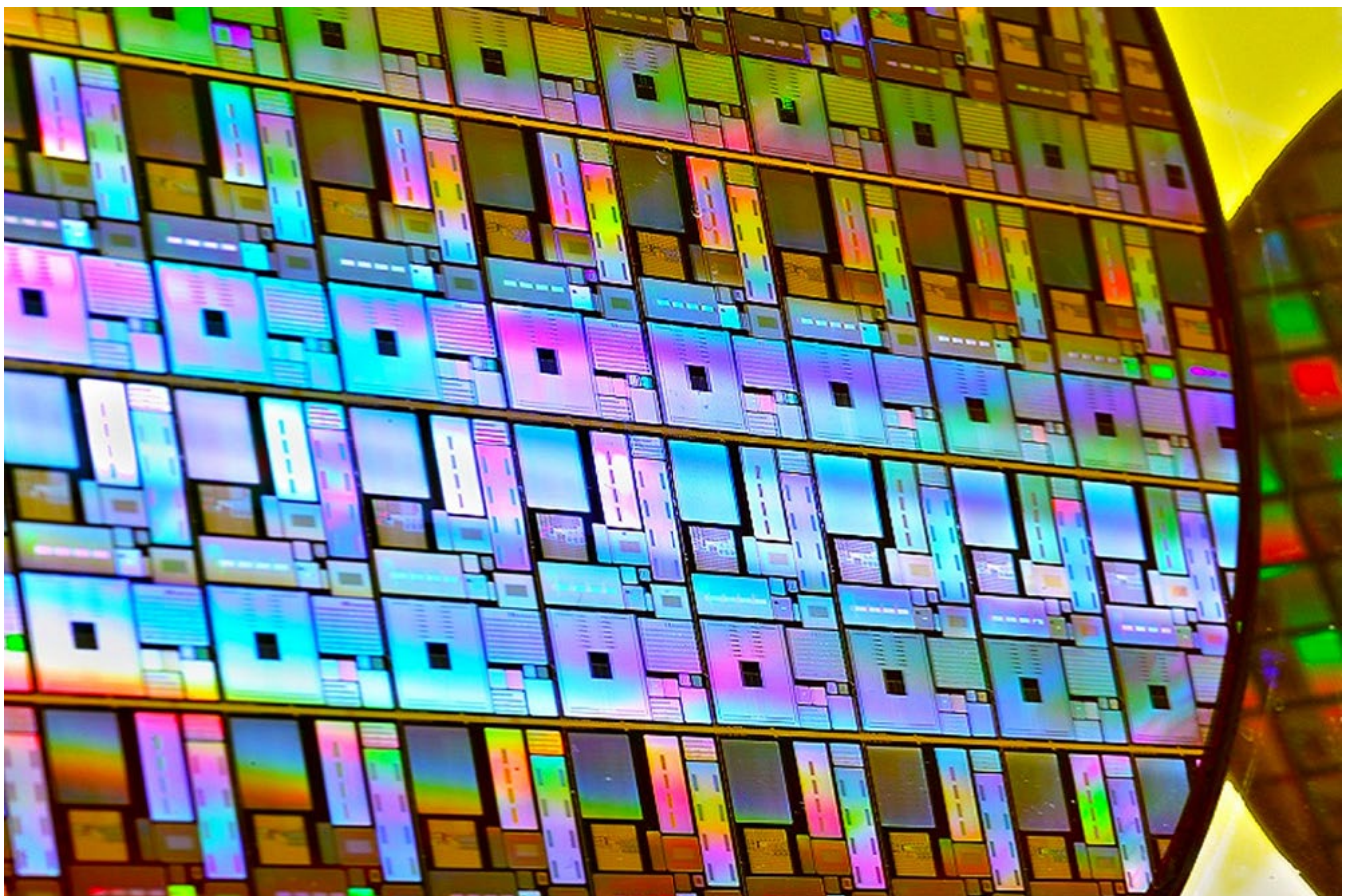
Ming-Hung Lu is a senior researcher of the Mechanical and Mechatronics Systems Research Laboratories at ITRI. He earned his B.S. and M.S. degrees in mechanical engineering from National Chiao-Tung University. His research focuses on X-by-wire technology and vehicle noise and vibration, with over 60 technical papers published.





» Collaboration

ITRI Announces Leading-Edge Magnetic Memory Technology



ITRI announced its collaborations with TSMC and National Yang Ming Chiao Tung University on the development of magnetic memory technology.

ITRI announced its collaborations with industry and academic partners on making advancements in magnetic memory technology. It has worked with semiconductor manufacturing leader TSMC in the development of Spin Orbit Torque Magnetoresistive Random Access Memory (SOT-MRAM) array chips. Meanwhile, it joined hands with National Yang Ming Chiao Tung University (NYCU) to develop magnetic memory technology that can perform across a wide operating temperature range of nearly 400°C. Both developments are pivotal for industries to move towards next-generation memory technology.

Dr. Shih-Chieh Chang, General Director of ITRI's Electronic and Optoelectronic System Research Laboratories, pointed out that the use of lower voltage and current in the memory

can lead to higher efficiency. Therefore, ITRI and TSMC developed SOT-MRAM technology that incorporates high write efficiency and low write voltage, achieving a writing speed of 0.4 nanoseconds and a high endurance of 7 trillion reads and writes. The memory also offers a data storage lifespan of over 10 years. In the future, it can potentially be integrated into the advanced processes of embedded memory, which has outstanding prospects in applications such as AI, automotive electronics, and high-performance computing chips.

In the ITRI-NYCU collaboration, both parties have worked to develop high-efficiency operating technology for MRAM and jointly presented the R&D results at this year's IEEE Symposium on VLSI Technology and Circuits, one of the leading events in the global semiconductor industry. The newly developed Spin-Transfer-Torque MRAM (STT-MRAM) adopts ultrathin composite films and magnesium spacers to boost writing speed, reduce latency, minimize writing current, and improve endurance. The multi-functional magnetic memory has optimal data access performance and stability across a wide operating temperature range between 127°C and -269°C. This is the first of its kind to pass verification tests and will offer enormous potential for applications such as quantum computers and aerospace.

ITRI will continue to develop forward-looking semiconductor technology and present innovative solutions to address market needs. Under its 2030 Technology Strategy and Roadmap, the Institute seeks to collaborate closer with industry and academia in intelligentization enabling technologies, which will promote industrial upgrading and cross-sector cooperation and boost new business opportunities.

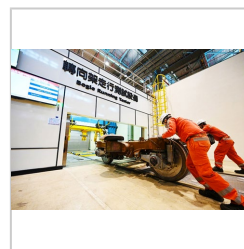
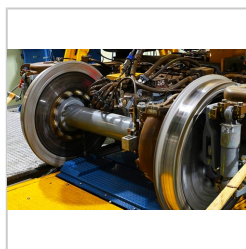
» Collaboration



Bogie Running Tester Enhances High Speed Train Testing Efficiency



ITRI and THSRC developed the first locally made BRT in Taiwan.



A bogie is a key component of railway vehicles especially for high speed trains. Attached underneath the train, the structure contains essential parts including traction motors, brakes, suspensions, and wheels, carrying the weight of the coach. It reduces vibration and is critical to the safety and stability of running trains, while bogies with motors also provide power for the

train.

Conventionally, train bogies undergo regular inspections such as wheels, bearings, and axle verification and load testing to ensure their functionality and performance. The Bogie Running Tester (BRT) developed by ITRI and Taiwan High Speed Rail Corporation (THSRC) is now incorporated into existing maintenance procedures to enhance the quality and efficiency of bogies.

ITRI and THSRC's BRT can test bogies running at speeds of up to 320 km/h. This high speed assessment helps improve the safety of mainline testing. Moreover, the system can detect and analyze bogie abnormalities at an early stage. With the establishment of the maintenance database, monitoring accuracy and system reliability are increased.

“The BRT leverages ITRI's expertise in mechatronic systems, control engineering, vibration noise suppression, and system integration,” said Da-Jeng Yao, General Director of ITRI's Mechanical and Mechatronics Systems Research Laboratories. He further indicated that the BRT collaboration between ITRI and THSRC has made Taiwan one of the few countries in the world with the ability to design a BRT. Other than Taiwan, only Japan, Germany, and China possess this technology.

The self-design and manufacturing of BRTs is conducive to railway industry localization and brings many benefits. Taiwan's component makers, for example, can join to provide flexible customized services with add-on features. Moreover, costs will be saved when there is less dependence on international suppliers.

According to the European Rail Industry Association, the global rail market is estimated to grow up to 192 billion euros by 2023. ITRI and THSRC's BRT aims at such opportunities and seeks to enable expansion into the Southeast Asian market.

The BRT has obtained the Conformité Européenne (CE) Certification with its performance proved in anti-electromagnetic interference, low voltage and mechanical safety. In addition to high speed rail, it can also be introduced to medium-speed rail to support safe transportation service.



» Collaboration

Global Partnership for 5G mmWave Communication



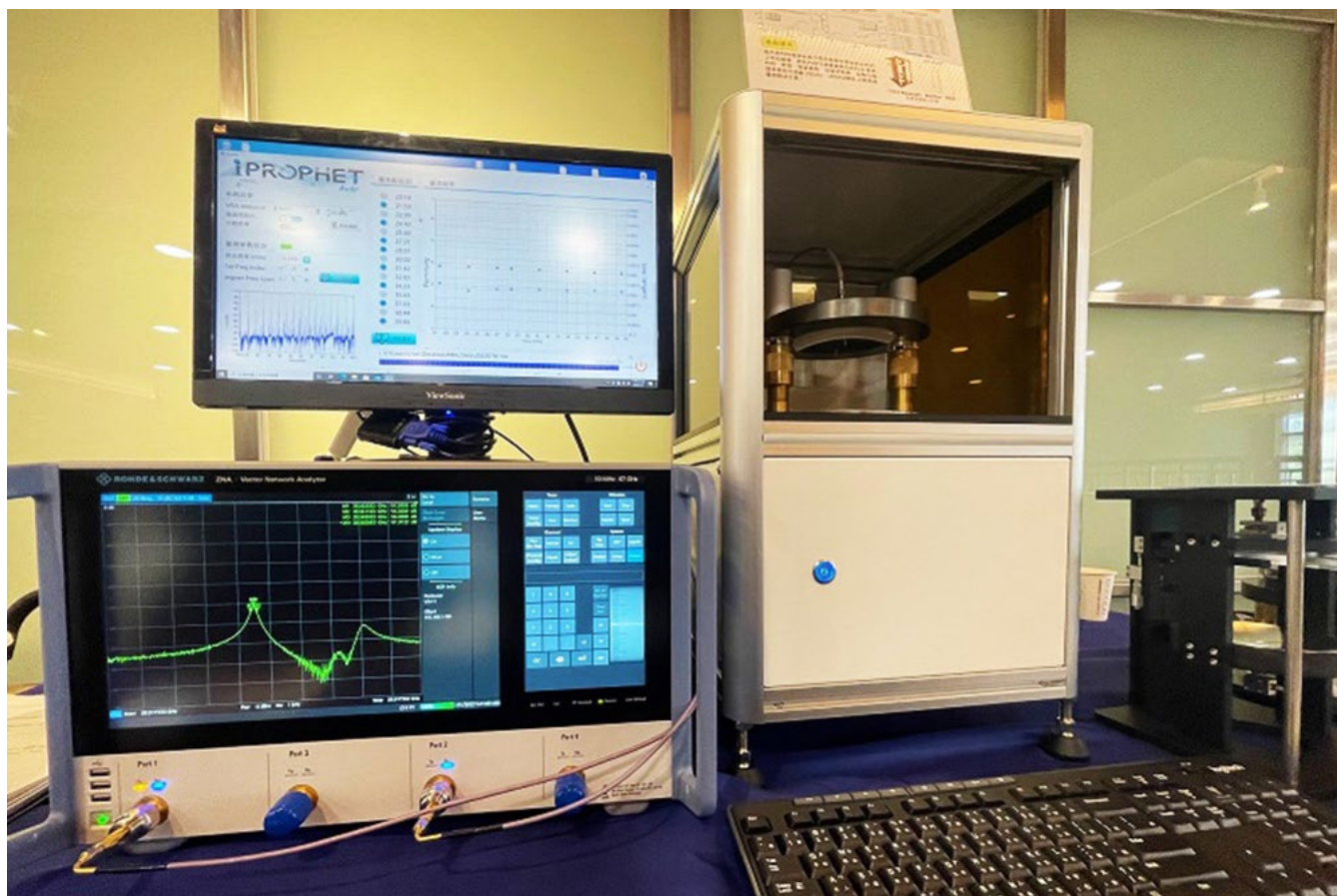
ITRI, DuPont, and Rohde & Schwarz Taiwan held a seminar to discuss the Low Temperature Co-Fired Ceramic (LTCC) applications in 5G millimeter wave in Taipei in early July.

To meet the demand for next-generation 5G communication technology, ITRI has teamed up with DuPont Microcircuit and Component Materials (MCM), and Rohde & Schwarz Taiwan to collaborate on the development of Low Temperature Co-Fired Ceramic (LTCC) for 5G mmWave applications. A seminar was held jointly by the three parties along with Taiwan Ceramic Society in Taipei in July, addressing innovative technologies spanning across material, process, design and measurement.

“Through the collaboration with DuPont MCM and Rohde & Schwarz Taiwan, we have assessed the feasibility of LTCC in antenna-in-package (AiP) and offered a total solution for

industries,” said Tzong-Ming Lee, ITRI’s Vice President and General Director of Material and Chemical Research Laboratories.

According to Lee, ITRI has verified LTCC’s superior environmental tolerance and high level of design freedom for high-frequency applications, noting that the technology is perfectly suitable for such devices as RF transceivers at 5G mmWave bands such as 28 GHz and 39 GHz.



ITRI utilizes its high precision, low vibration system and integrated algorithms to provide fast measurement of mmWave material dielectric properties.

In addition to the development and selection of materials, ITRI also focuses on process precision control. Specifications and guidelines on component design are established, and a concurrent model was adopted to streamline and integrate design, process, materials, and verification to improve product development efficiency and yields.

Yu-Ling Hsiao, Global Technology Leader of DuPont MCM, stressed that they were very pleased to collaborate with ITRI to demonstrate the value of DuPont MCM GreenTape™ LTCC system for AiP applications. “ITRI is not only known for their strong material research expertise but also for their RF design and testing capabilities,” she explained. “They combine their technical know-how and commercial production-scale LTCC equipment to foster industrial development for their partners.”



LTCC for mmWave AiP.

As shown in the video, the low insertion loss feature of DuPont MCM's LTCC allows the material to exhibit good thermal stability and heat performance, which are advantageous in developing new AiP substrates that can reduce size and signal loss.

Alex Lu, BD & Marketing Senior Director of Rohde & Schwarz Taiwan, pointed out that his company, with nearly 100 years of experience in wireless communications and RF test and measurement, has a wide range of equipment to fully support the industry's needs for THz measurement. "Rohde & Schwarz Taiwan is proud to be working with DuPont MCM and ITRI. We look forward to providing the academia and industry with comprehensive services from materials, components to system validation for mmWave applications," he added.

» Activity



A Hybrid Celebration for ITRI 49th Anniversary



All ITRI campuses participated in the celebration simultaneously.

ITRI held a hybrid celebration engaging in-person and virtual cross-campus participation to mark its 49th anniversary on July 5. During this event, the Institute honored ITRI Elites for their excellence in R&D and service performances as well as their contribution to industrialization. It also showcased innovative multidisciplinary R&D results to demonstrate its efforts to reach the goal of net zero emissions by 2050.

Minister of Economic Affairs Mei-Hua Wang in her online opening remarks applauded ITRI for its innovation prowess, calling the Institute an important force in Taiwan's industrial upgrading and transformation. She stressed that the Ministry of Economic Affairs (MOEA) will continue to support ITRI in forging forward-looking technologies across multiple domains to achieve a net zero future. The low-carbon methanol development technology under an MOEA-sponsored R&D project, for example, can reduce carbon emissions in the production process by 2.1 million tons. "It is expected that ITRI will become a bridge in cultivating industrial talent and connecting global innovation networks to increase national competitiveness," she added.

ITRI Chairman Chih-Kung Lee remarked that the pandemic has ushered in changes to lifestyles and industrial development and that ITRI employees are responding to the new normal through innovation. He is proud that ITRI's R&D achievements have been recognized at the R&D 100 Awards and the Edison Awards. He also pointed out that ITRI is one of the only three R&D institutions in the world to be named a Top 100 Global Innovator in 2022.

“

ITRI has been able to adapt to the challenges of the pandemic thanks to innovative thinking, agile management, and open communication.

”

Edwin Liu
ITRI President

“ITRI has been able to adapt to the challenges of the pandemic thanks to innovative thinking, agile management, and open communication,” said ITRI President Edwin Liu. He noted that a climate conducive to innovation and entrepreneurship has been created via corporate culture, competition platforms, and system design. New work models such as flexible work schedules, work from home rotations, and satellite offices become popular in recent years. The Institute has also promoted an open door policy to foster greater communication between managers and their staff.

As part of the celebration, net zero emission technologies covering the aspects of supply, manufacturing, demand, and environment were showcased at ITRI's six campuses and 10 research bases. One exhibit is a biomass PEF polyester material that can be applied to food packaging or textiles. This eco-friendly plant-based solution features 10 times higher oxygen barrier capacity than PET materials and can reduce carbon emissions of raw materials by 67%.



Exhibits of ITRI's net zero technologies were showcased on various campuses as part of the celebration.

In its 49th anniversary, ITRI reaffirmed its commitment to assisting industry in the transition towards net zero. It is hoped that through innovative carbon reduction technologies and services, industrial partners can stay sustainable and competitive, while securing an advantageous position in the green supply chain.



» Activity

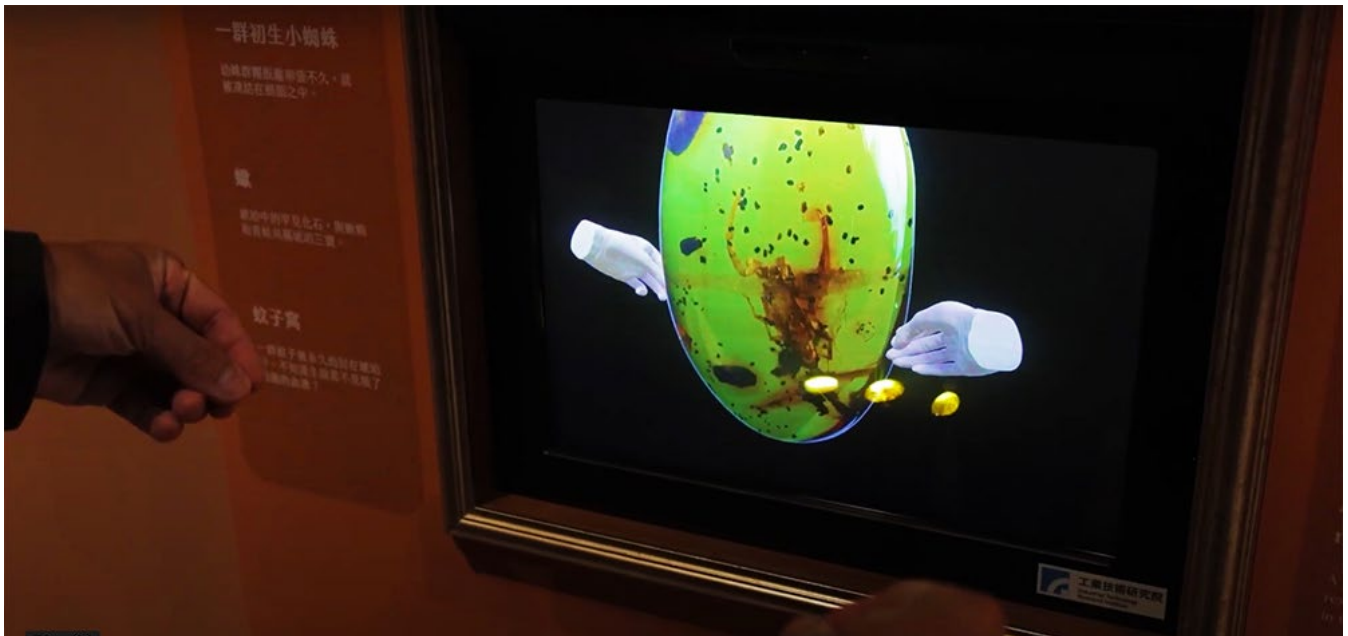


Amber Exhibition Features ITRI's Virtual-Real Fusion Technology



ITRI's Virtual-Real Fusion Technology at Exhibitions.

In the 1993 movie classic Jurassic Park, a mosquito preserved in amber was a key plot point for the film's story. At Taiwan's National Museum of Natural Science (NMNS) special exhibition "Amber: A Moment Buried En Resin," different amber specimens are displayed for visitors to observe, including various creatures preserved within the fossilized tree resin. The exhibition employs ITRI's High Clearness Transparent Projection Screen technology in conjunction with vision and gesture recognition modules, offering guests an interactive virtual-real edutainment experience.



ITRI's High Clearness Transparent Projection Screen technology gives visitors a non-contact interactive experience for exhibitions.

ITRI developed the High Clearness Transparent Projection Screen based on advanced optical structural design on a transparent substrate. The transmittance achieves $\geq 80\%$, haze $\leq 10\%$ and luminous efficacy of ≥ 1.2 nits/W. This technology can effectively scatter projected light on the surface of the screen and keep the background scene clear.

With augmented reality technologies and gesture recognition modules, ITRI's smart display system provides a vivid exhibition experience that allows visitors to interact with the exhibit intuitively. Via gesture control, visitors can grasp, hold, rotate, and enlarge the item in the air. This makes it easier to observe amber specimens and their contained animal or plant matters in detail as they are often small and difficult to see clearly. Visitors can have more fun than conventional exhibiting methods such as microscopes, magnifying glasses or display cases. Virtual interactions with the exhibits can also avoid possible item damages from the viewer's physical touch.



The technology allows visitors to learn about the exhibits in a more intuitive and instant way than conventional museums.

According to NMNS exhibition curator Dr. Yang Tzu-Ruei, ITRI's High Clearness Transparent Projection Screen is a breakthrough technology that opens up new possibilities for immersive virtual-real fusion exhibitions. Digitalization technologies can provide magnified and clear imagery for easier learning with intuitive features, giving visitors a chance to discover more about the secrets of natural science through smart edutainment.

Shih-Chieh Chang, General Director of ITRI's Electronic and Optoelectronic System Research Laboratories noted that the Institute has worked with industry to develop high value and innovative display technologies and perform field validation for its applications. From the collaboration with the NMNS, the High Clearness Transparent Projection Screen, when combined with face and gesture recognition, can provide visitors with an engaging mixed-reality experience, demonstrating the technology's potential for immersive applications.



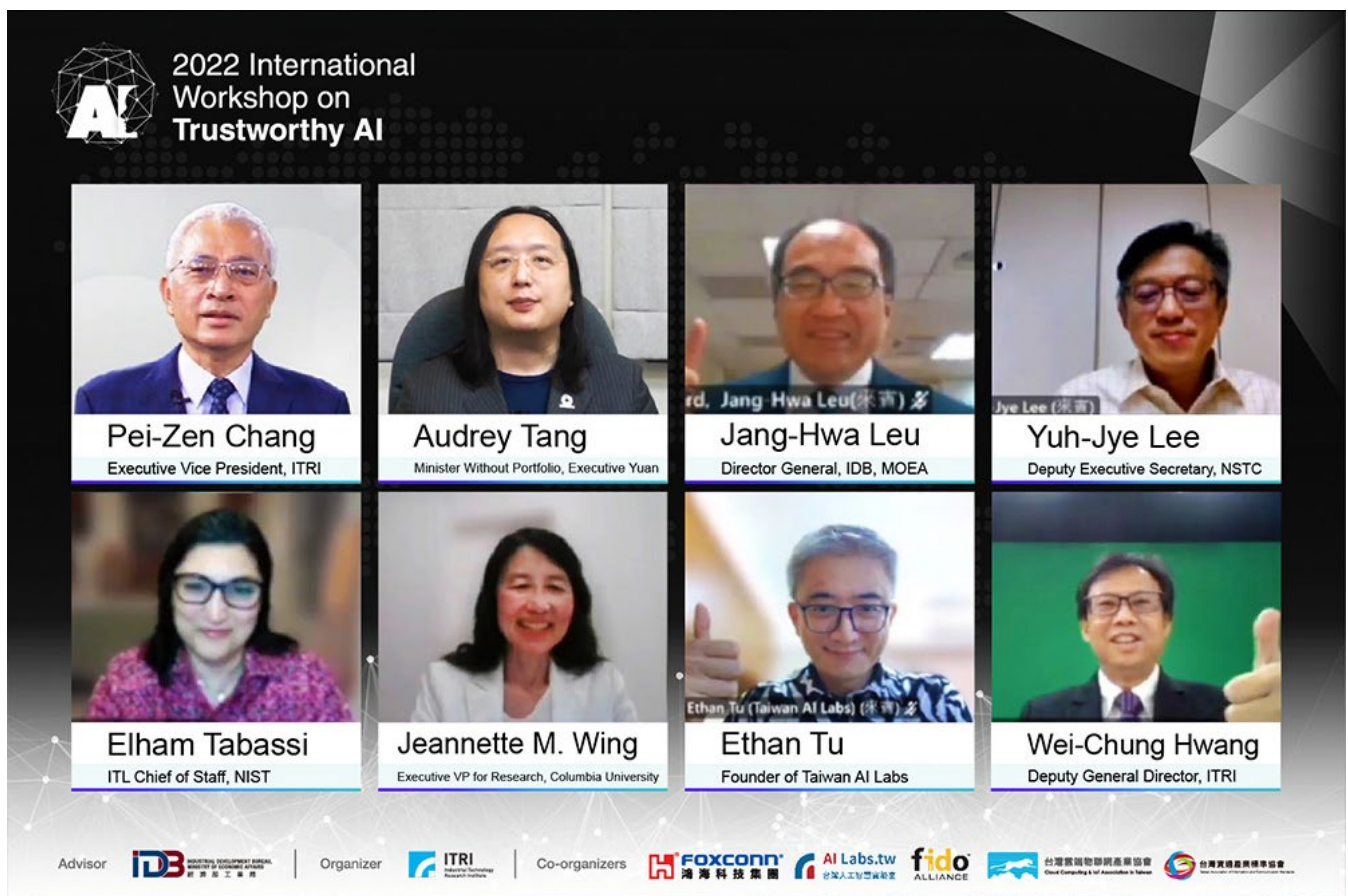
ITRI
Industrial Technology
Research Institute

© 2014-2022 The Industrial Technology Research Institute.
ITRI Today is a quarterly publication reporting major events and
achievements at ITRI.

Accessibility AA

» Activity

Taiwan's First Online Workshop on Trustworthy AI



Experts from around the world attended the 2022 International Workshop on Trustworthy AI hosted online by ITRI.

ITRI held the 2022 International Workshop on Trustworthy AI online in August, which saw over 500 experts join from around the globe at the first-ever conference on this theme in Taiwan. Topics such as AI risk management and trustworthy AI systems were discussed to explore closely the issues of fairness, transparency, security, and reliability of AI-based decision making.

Minister without Portfolio Audrey Tang lauded the seminar as a good start in promoting the standardization of trustworthy AI and in accelerating the development of digital technology in Taiwan. She pointed out that AI can be understood as Assistive Intelligence, rather than something that completely replaces humans. “It’s like the complementary relationship

between the AI robot and humans in the Japanese manga Doraemon,” she said. Taiwan is an important partner in the global supply chain, Tang noted, adding that in the field of ICT, it has formed a solid ecosystem with the US supply chain. The establishment of a trusted AI framework, with its introduction into products and exports to the world, will create a new peak for Taiwan’s industry, while helping Taiwan move closer towards its vision of Smart Taiwan 2030, which emphasizes innovation, inclusion, and sustainability.

ITRI Executive Vice President Pei-Zen Chang remarked that the popularization of AI applications has sparked discussions on ethical issues, including data bias, privacy protection and security, system transparency, and interpretability. For instance, Portable Edge AI-DR, a technology for which ITRI won an Edison Award this year, employs AI analysis to identify the location of disease and its severity in just three seconds, assisting doctors in reaching rapid diagnosis. If this data can be provided to and exchanged among different hospitals while protecting patient privacy and ensuring security, this type of federated learning will then push AI medical care in Taiwan into a new realm.

IDB Director General Jang-Hwa Leu emphasized the importance of AI risk management or supervision. Taiwan intends to cooperate with national laboratories such as the National Institute of Standards and Technology (NIST) in the US and Laboratoire national de métrologie et d'essais (LNE) in France. This will link relevant technical specifications or standards across Taiwan, the US, and the European Union. It will also assist Taiwan’s AI products in meeting common standards and requirements on a global basis, enabling Taiwan to become an internationally trusted partner for AI, he stated.

Also invited to the workshop was Elham Tabassi, Information Technology Laboratory Chief of Staff at the NIST, who shared the NIST's AI risk management tools that can make AI inference as fair as possible based on trustworthy AI models. Meanwhile, Jeannette M. Wing, Executive Vice President for Research at Columbia University, expressed her belief that the trustworthiness of AI systems can be increased thanks to the expansion of trusted computing architecture.

Others attending the event included Andrew Shikiar, Executive Director & Chief Marketing Officer at the FIDO Alliance; Taiwan AI Labs Founder Ethan Tu; Jane Yung-Jen Hsu, Professor of Computer Science & Information Engineering at National Taiwan University; Hon Hai Research Institute CEO Wei-Bin Lee; National Science and Technology Council Deputy Executive Secretary Yuh-Jye Lee; Egis Technology Inc. Principal Engineer Shang-Wei Chou; Tzeng-Yow Lin, Chief Executive of the National Measurement Laboratory and General Director of ITRI’s Center for Measurement Standards; and Kai-Lung Hua, Deputy General Director of ITRI’s Information and Communications Research Laboratories. These experts shared developmental trends and experience in trustworthy AI and held discussions on a technology roadmap for Taiwan.



ITRI
Industrial Technology
Research Institute

© 2014-2022 The Industrial Technology Research Institute.
ITRI Today is a quarterly publication reporting major events and
achievements at ITRI.

Accessibility AA



» About Us



Industrial Technology Research Institute (ITRI) is one of the world's leading technology R&D institutions aiming to innovate a better future for society. Founded in 1973, ITRI has played a vital role in transforming Taiwan's industries from labor-intensive into innovation-driven. To address market needs and global trends, it has launched its 2030 Technology Strategy & Roadmap and focuses on innovation development in Smart Living, Quality Health, and Sustainable Environment. It also strives to strengthen Intelligentization Enabling Technology to support diversified applications.

Over the years, ITRI has been dedicated to incubating startups and spinoffs, including well-known names such as UMC and TSMC. In addition to its headquarters in Taiwan, ITRI has branch offices in the U.S., Europe, and Japan in an effort to extend its R&D scope and promote international cooperation across the globe. For more information, please visit

<https://www.itri.org/eng>.

Publisher: Edwin Liu Editors-in-Chief: June Lin

Deputy Editor-in-Chief: Irene Shih

Managing Editor: Alex Chang

Contributing Editors: Dan King, Larry Hsu, Kevin Lai

Video Photographer: Michael Hsu

Graphic Designer: Luc Tsui

Marketing & Services: Larry Hsu

Subscription:

<https://www.itri.org/itritoday/subscription>

Inquiries:

E-mail: itritoday@itri.org.tw

ITRI TODAY Website:

<https://www.itri.org/english/itritoday>

Published by:

Industrial Technology Research Institute
No. 195, Sec.4, Chung Hsing Rd. Chutung,
Hsinchu, Taiwan 310401, R.O.C. **Tel:**
+886-3-582-0100

ITRI Website:

<https://www.itri.org/eng>

ITRI's Overseas Offices

ITRI International Inc.

2880 Zanker Road, Suite 103, San Jose, CA 95134, U.S.A.

Tel: +1-408-428-9988

Fax: +1-408-428-9388

E-mail: info@itri.com

ITRI Japan Office

TTD Bldg., 3F, 1-2-18 Mita, Minato-ku, Tokyo, 108-0073, Japan

Tel: +81-3-54193836

Fax: +81-3-34555079

E-mail: itritokyo@itri.org.tw

ITRI Berlin Office

7 OG., Hohenzollerndamm 187, 10713 Berlin, Germany

Tel: +49-30-8609-360

E-mail: contact_germany@itri.org.tw



Related Sites

TAIWAN TODAY

taiwantrade.com

Taiwan
Panorama
台灣光華雜誌



ITRI

Industrial Technology
Research Institute

© 2014-2022 The Industrial Technology Research Institute.
ITRI Today is a quarterly publication reporting major events and
achievements at ITRI.

Accessibility AA