



## ITRI TODAY Wins Gold at NYX Marcom Awards

“We’re honored and inspired to receive the NYX Marcom Awards. It’s been our pleasure to see readers discover their business and R&D interests via reading ITRI TODAY,” said the ITRI TODAY editorial team.

# ITRI TODAY 107 Winter Issue 2021



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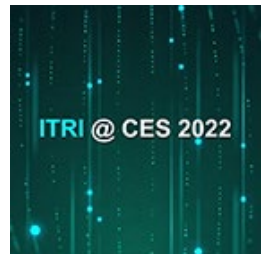
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## » Feature

# ITRI Brings Home Three 2021 R&D 100 Awards



*ITRI developed three out of Taiwan's eight 2021 R&D 100 winning technologies.*

ITRI has won three R&D 100 Awards this year with its **Software-defined Augmented Robot Joint (SARJ)**, **3D Printing Biomimetic Materials and Structures for Tissue Integration (BioMS-Ti)**, and **Ubiquitous Water Wand (UWAW)**. This marks the 14<sup>th</sup> consecutive year that ITRI has received the honor of R&D 100 Awards.

According to Paul J. Heney, VP and Editorial Director for R&D World, this year's R&D 100 Awards saw a huge increase in the number of submissions, thus winning in 2021 was much tougher than in previous years. "We've seen much impact in the industries from national laboratories' innovations, and that is one of the things that the R&D 100 Awards is designed to celebrate - inventions that change the world for the better," said Mr. Heney. "ITRI is clearly a major player in this area and a huge resource of Taiwan's industrial communities."

"The R&D 100 Awards serve as one of the most prestigious innovation award programs in the world," said ITRI President Edwin Liu. "Taiwan has eight awards this year, the highest number from Asian participants, and ITRI has won three of these against the strong

competition. ITRI is home to 46 of these winning technologies for the past 14 years. This demonstrates that ITRI’s research and innovation capabilities are on par with leading global innovators.” Dr. Liu added that ITRI’s three winners this year are breakthrough tech solutions that address market needs. For instance, SARJ upgrades industries with smart manufacturing capability, the BioMS-Ti implants provide innovative bone materials to fix fractures and ligament damage, and the UWAW allows clean, drinkable water to be collected from the air for people in arid climates. ITRI will continue to develop market-oriented R&D results and explore new opportunities for industries.

Click below to learn more about ITRI’s 2021 R&D 100 winners:

- [Software-defined Augmented Robot Joint \(SARJ\) >](#)
- [3D Printing Biomimetic Materials and Structures for Tissue Integration \(BioMS-Ti\) >](#)
- [Ubiquitous Water Wand \(UWAW\) >](#)

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## » Feature

### Software-defined Augmented Robot Joint (SARJ)

Smart manufacturing has become an important trend in the global industrial supply chain, and AI robots are an indispensable technology for its development. To increase application diversity, ITRI's patented Software-defined Augmented Robot Joint (SARJ) presents a modern and unique stacking design that features integrated high-power-density electric drive modules.

SARJ has the highest torque-to-volume ratio (22%) in the industry, with 40% less body weight in comparison to robots of the same grade. Its plug-and-play design also allows users to quickly build customized and flexible multi-joint modular robots, while the motor, drive controller, and HD harmonic deceleration electric module have better system rigidity and longer commissioning periods than robots of the same grade due to smart tuning and control technology. Traditional code development is also replaced by graphical guidance, significantly reducing the required programming time. Furthermore, the built-in software calculation technology is able to detect the robot's force, removing the need for installing any force sensing technology.



*ITRI's Software-defined Augmented Robot Joint allows for modular designs, and has the*

**highest torque-to-volume ratio in the industry.**

According to Dr. Wen-Yang Peng, Deputy General Director at ITRI's Mechanical and Mechatronics Systems Research Laboratories, the greatest value of SARJ is its software-defined hardware modules. "SARJ is not just a robot joint module or arm subsystem, it is also a system solution that can serve the user through software integration, and allows people to easily develop their own robot arm without needing a background in mechanics," he said.



***SARJ was recognized as a winning innovation at the 2021 R&D 100 Awards.***

This technology has already been transferred to major high-tech factories and the precision machinery industry for use in their production lines. It is hoped that the customization and modularity of SARJ will open up new applications in human-robot collaboration, and that the potential of this design will be realized in business, home appliance and medical fields in the future.



**Video of ITRI's Software-defined Augmented Robot Joint (SARJ).**

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## » Feature

### 3D Printing Biomimetic Materials and Structures for Tissue Integration (BioMS-Ti)



#### *Video of BioMS-Ti.*

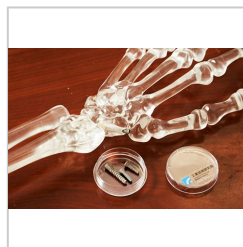
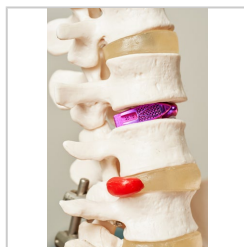
Aging societies have become a global phenomenon, and osteoporotic fractures have a significant impact on the wellbeing of the elderly. It is also common for seniors to have fractures and ligament damage from sports injuries or accidents. However, traditional manufacturing of customizable bio-active implants for the treatment of these injuries is difficult and costly. ITRI's 3D Printing Biomimetic Materials and Structures for Tissue Integration (BioMS-Ti) can create medical devices that cater to both tissue growth and biomechanical needs, with the material being capable of decreasing product rigidity to avoid injuring surrounding tissue. Using 3D printing technology to design and manufacture the bio-active implants grants special flexibility to absorb the repeated stretch tension of ligaments, and the microstructure can improve osseointegration and soft-hard tissue integration.

Technology-wise, BioMS-Ti is an application of 3D model reconstruction, customized designs and additive layer manufacturing technologies to form a combination of three main features. First, the products have high strength and porosity. In terms of the printed material, the

structure has high density ( $>99\%$ ) and porosity ( $\geq 40\%$ ), with a surface roughness of  $>25\ \mu\text{m}$ . BioMS-Ti's fatigue test also resulted in  $>5,000,000$  cycles and boasts a high strength of 20-200 Mpa (controllable). Second, the implants are conducive to new bone growth. Composite materials such as biomedical ceramics or induction drugs can be added to the implant to foster bone cell growth, improving the recovery time of patients. Third, the technology can potentially have a wide variety of applications. Different types of bone materials can be produced from BioMS-Ti, such as internal fixation bone nails for the pelvis, hip joints, femur end, mandible, and skull, or ligament bone nails and bionic intervertebral discs.



***BioMS-Ti can print different types of implants to treat various injuries, such as bone screws/nails, sacral plates, and interbody fusion cages.***



While other similar products rely on rigid structures and cannot achieve bone integration or use polylactide that may cause inflammatory reactions, BioMS-Ti's structural compression is 10 times higher than that of other products on the market. Thanks to advances in 3D additive manufacturing, BioMS-Ti allows for customized designs and a myriad of shapes and sizes. This is a novel development for biomedical bone materials and implants, and can provide bone

material for use in sports medicine to treat different injuries tailored to each patient's needs. It can also be designed to absorb stretch tension and reduce rigidity, allowing tissue growth and avoiding injury to surrounding tissue. In the future, the compound material properties of BioMS-Ti can even assist the chemical and textile industries in branching into the biomedical industry, and ITRI has already begun discussions with medical institutions and biomedical material manufacturers for further cooperation.

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## » Feature

### Ubiquitous Water Wand (UWAW)



*UWAW was recognized as a 2021 R&D 100 Awards winner.*

Over a billion people across the globe do not have access to clean water. To reduce the threats of water scarcity, ITRI has developed the Ubiquitous Water Wand (UWAW), the world's first technology that uses air to directly produce clean drinking water.

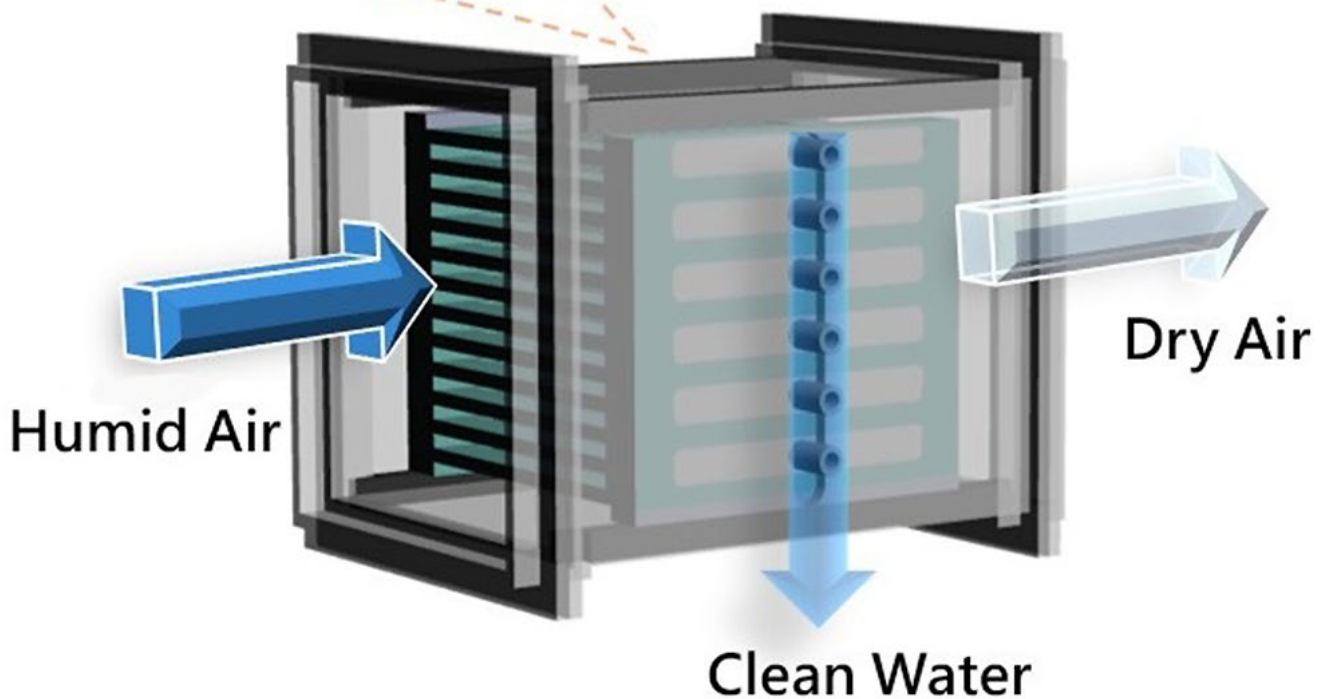
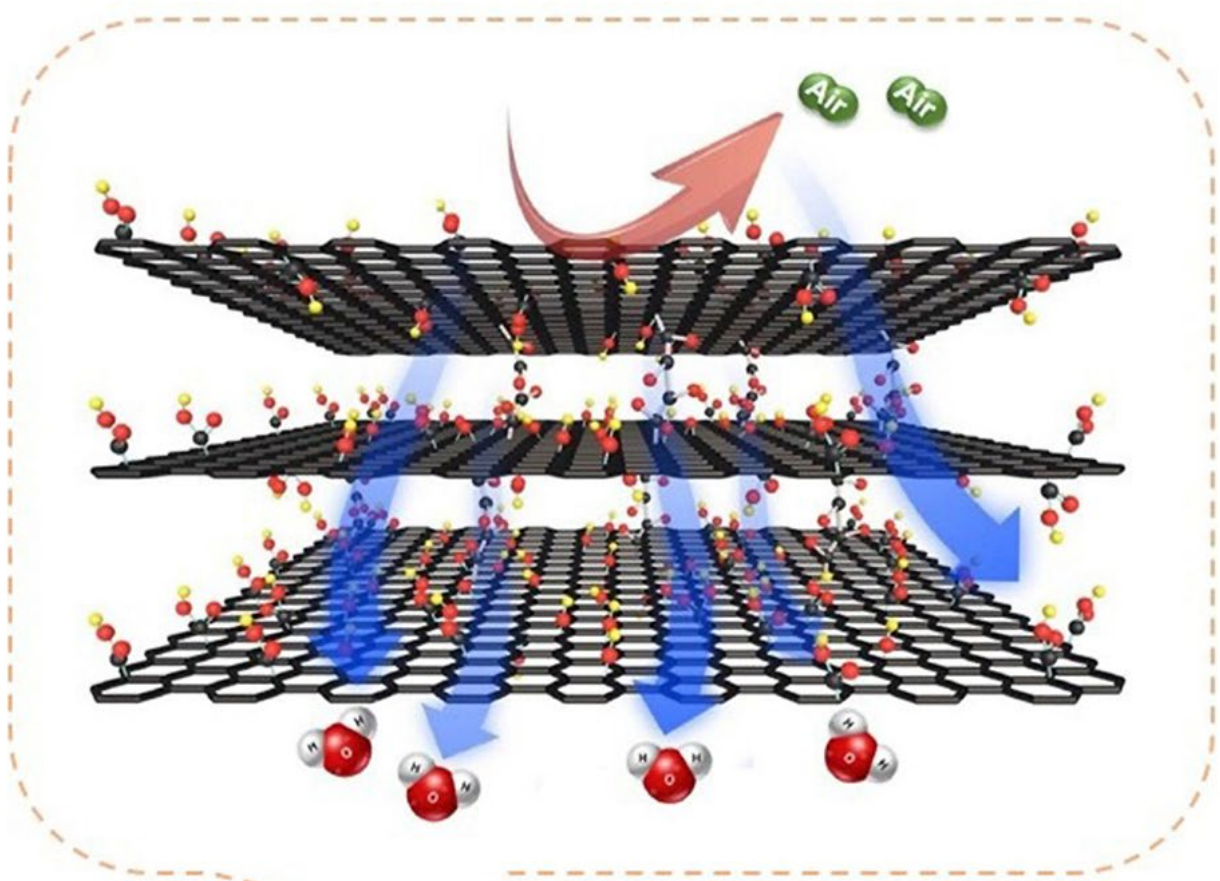
Unlike technologies that filter contaminated water, ITRI's UWAW separates air and water, extracting water from the air that people breathe. Specifically, ITRI arranges thousands of single-layered graphene oxide flakes with intervals of 1 nm to form a graphene oxide membrane.



***Video of ITRI's Ubiquitous Water Wand (UAW).***

Dr. Yu-Lun Lai, Manager at ITRI's Green Energy and Environment Research Laboratories, noted that this alignment resembles the structure of corrugated fiberboard, raising the velocity of water molecules passing through the membrane. When moist air passes through the membrane, only water molecules are allowed to enter quickly, and other molecules such as nitrogen and oxygen are blocked. The water molecules penetrating the membrane become highly concentrated vapor, which can be naturally condensed into water. With such a hydrophilic membrane, UAW's separation rate of the air and water reaches up to 99.99%, surpassing current technologies that utilize membrane separation to isolate water from the air.

Existing water production products on the market are mostly based on cooling equipment that coagulates water molecules for collection. However, one major downside of this type of apparatus is that, apart from water molecules, larger substances like dust and bacteria will also be condensed, polluting the generated water. In addition, the filtering materials in the products need to be replaced frequently because dirt easily accumulates after long-term usage. With ITRI's UAW, impurities will be filtered during the separation process, thus allowing purified clean water to be retained.



***ITRI's UAW extracts clean water from the air.***

With extreme weather and droughts becoming common phenomena, water resources are increasingly scarce in many areas of the world. UAW is applicable to various climates, ranging from cold to hot regions (15-45°C) and from arid to humid areas (relative humidity of 20-99%). This innovation can be used to produce clean drinking water with lower maintenance and labor costs compared to conventional water production methods, boosting the availability of water resources and addressing the problem of severe water shortage worldwide.

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## » Spotlight

# ITRI to Exhibit Innovations in AI, Robotics, ICT, and Health Tech at CES 2022



*Teaser for ITRI @ CES 2022.*

CES® 2022 will return as a live event in Las Vegas from January 5 to 8, 2022, and we are thrilled to announce that ITRI will once again participate in this influential tech event! ITRI will be participating in both physical and digital exhibitions, and invites you to visit its online venue at <https://event.itri.org/ces2022/> or to come see us in person at Booth 9513, LVCC, North Hall, Las Vegas during the trade show.

Three of ITRI's technologies have already been named as CES 2022 Innovation Award Honorees this year:

The **RGB-D AI Robot**, which is the first collaborative robot that integrates a smart 3D vision module as a built-in standard for high-precision object recognition and pick-and-place operation.

**iPetWear**, a wearable device for pets that tracks health data including heart rate, respiration,



and activity, and alerts the pet guardian of abnormalities.

**All-in-One Thermal Sensing System**, which enables high-precision remote detection of vital signs and patient activities.

Other highlight technologies from ITRI include the **Autonomous Selfie Drone**, which flies itself into position to take the best picture based on common photography techniques; the **Interactive Time Machine**, which creates a unique real-time 3D interactive avatar and experience combining a user's motion, 3D model, and display; and the **PoseFit** muscular functional screening mirror, which measures muscular strength, flexibility, and imbalances and provides a personalized and actionable exercise plan.

In addition to the highlights, ITRI will also exhibit other technologies in AI, robotics, ICT, and health tech. To learn more, we welcome you to enjoy our [website](#) and upcoming virtual pavilion for CES 2022, and hope that we can explore new opportunities for technical and business collaboration together. See you soon!



The image shows a 3D rendering of the ITRI booth at CES 2022. The booth is white with teal accents and features the ITRI logo and the slogan "INNOVATING A BETTER FUTURE". A large teal banner at the top lists three key technologies: "All-in-One Thermal Sensing System", "iPetWear", and "RGB-D AI Robot". The booth includes several interactive displays, including a "DNN Video Analysis OS" screen, a traffic light display, and a QR code. A person is visible in the background, and the overall design is modern and tech-oriented.

**CES INNOVATION AWARDS 2022 HONOREE**

- All-in-One Thermal Sensing System
- iPetWear
- RGB-D AI Robot

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**INNOVATING A BETTER FUTURE**

**DNN Video Analysis OS**

**Jan. 5-8**  
**Booth: 9513, LVCC, North Hall, Las Vegas**

<https://event.itri.org/CES2022>

***ITRI returns to the CES 2022 physical exhibition in Las Vegas and also welcomes all to visit its digital venue online.***

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## » Spotlight

### Gold Winner for Marketing Material at NYX Marcom Awards 2021

It is thrilling to announce that ITRI TODAY has just been named a Gold winner of Content Marketing & Writing - Marketing Material by NYX Marcom Awards 2021! The program is a global competition hosted by International Awards Associate (IAA) to recognize creative excellence in marketing and communication campaigns that transcend intercontinental barriers.

“We’re honored and inspired to receive the NYX Marcom Awards. It’s been our pleasure to see readers discover their business and R&D interests via reading ITRI TODAY,” said the ITRI TODAY editorial team.

According to IAA, the 2021 NYX Awards received more than 1,000 submissions from over 50 countries worldwide, but only a few emerged victorious. “We are truly inspired by all of the astounding entries this year, as they exceeded our expectations,” said Kenjo Ong, CEO of IAA.

Winning in Marketing Material at the NYX Marcom Awards means that the publication has good quality of content, copywriting, and design, and is effective in achieving marketing and communication goals. As ITRI TODAY Publisher and ITRI President Dr. Edwin Liu stated, the publication is committed to creating a communication channel between ITRI and global partners, with the aim to get connected with tech communities, industries, and markets, and to seek further linkage and collaboration.



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**“We’re honored to be a winner of the NYX Marcom Awards, and it’s been our pleasure to see readers discover their business and R&D interests via reading ITRI TODAY. Stay current with us! We’ll continue to provide stories that spark more innovations.”**

ITRI TODAY Editorial Team

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“It is our great honor to receive a NYX Marcom Award, and we are more than happy to share the joy with all of our readers,” said June Lin, Editor-in-Chief of ITRI TODAY and General Director at Office of Marketing Communications, ITRI. “It is never easy to promote industrial technologies, especially those that are intangible and complicated. We have been trying to communicate with our target audience in a more engaging way.” She emphasized that ITRI TODAY has been active in enriching story perspectives (from editors, C-level experts, and frontline researchers) and leveraging the advantages of digital marketing to enhance communication effectiveness and impact.

In its over 26 years of history, ITRI TODAY has served as a key marketing material that links ITRI with international communities. The current digital format makes ITRI TODAY even more vivid and accessible. Every quarter, it gives a quick glimpse of ITRI’s critical progress by providing a dozen articles, each containing a 3-5 minute read. Subscribers from across the world can get the latest updates of the Institute’s activities via monthly email newsletters for free. They can find the material easy to access, digest and share due to the informative writing style, multimedia-aided content, and mobile-friendly design. Most importantly, readers with inquiries are always welcome to offer their feedback for discussion and interaction.

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## » R&D Focus

### Eco-Friendly Hot Melt Adhesives



***ITRI and Tex Year jointly developed biodegradable hot melt adhesives, which can be used to replace petrochemical-based products.***

Major global manufacturers have pledged to fully adopt biodegradable or reusable plastics by 2025 as these materials can reduce the impact on the environment. In light of this trend to a green transition, ITRI and Tex Year are cooperating in the development of biodegradable hot melt adhesives (HMAs) to replace petrochemical-based plastics and thus reduce the reliance on petroleum resources.

HMA is a solid thermoplastic resin that liquefies when heated and hardens on surfaces when it cools. It is able to bond two substrates within seconds and has advantages over solvent-based adhesives, such as eliminating the use of volatile organic compounds and the need for drying.

According to Dr. Tzong-Ming Lee, ITRI's Vice President and General Director of Material and

Chemical Research Laboratories, the new HMA developed by ITRI and Tex Year is solvent-free, fast-curing, and easy to apply and process. Its biodegradability makes it ideal to apply in printing and packaging, such as in labels and tapes, disposable hygiene products, food/beverage packing glue, and many more.

The glue features outstanding adhesion and durability and has passed field verification. The achievement involves ITRI's work in adjusting the resin and cellulose formula to enhance the material's biodegradation rate and cohesion. In addition, a special molecular structure was designed to enable the glue to melt at a lower temperature (80°C).

Tex Year Chairman Donald Hsiao said that as the new EU carbon tax regulations come into effect, Tex Year announced that it would take the initiative to conserve energy, reduce carbon, and develop eco-friendly products. In recent years, the firm has invested much in the development of biodegradable adhesives. It is even the first HMA manufacturer in Taiwan and in all of Asia to obtain both biodegradable and compostable product certifications from the German Institute for Standardization (DIN). Cooperation with ITRI, he said, demonstrates his firm's technical abilities and commitment in developing biodegradable materials.

As Dr. Lee indicated, an export-oriented economy such as Taiwan faces the pressing need among major brands to go green. ITRI, he said, is committed to helping industries here become integrated into the global green supply chain, and the innovative HMA offers just such a low-carbon, sustainable glue solution.

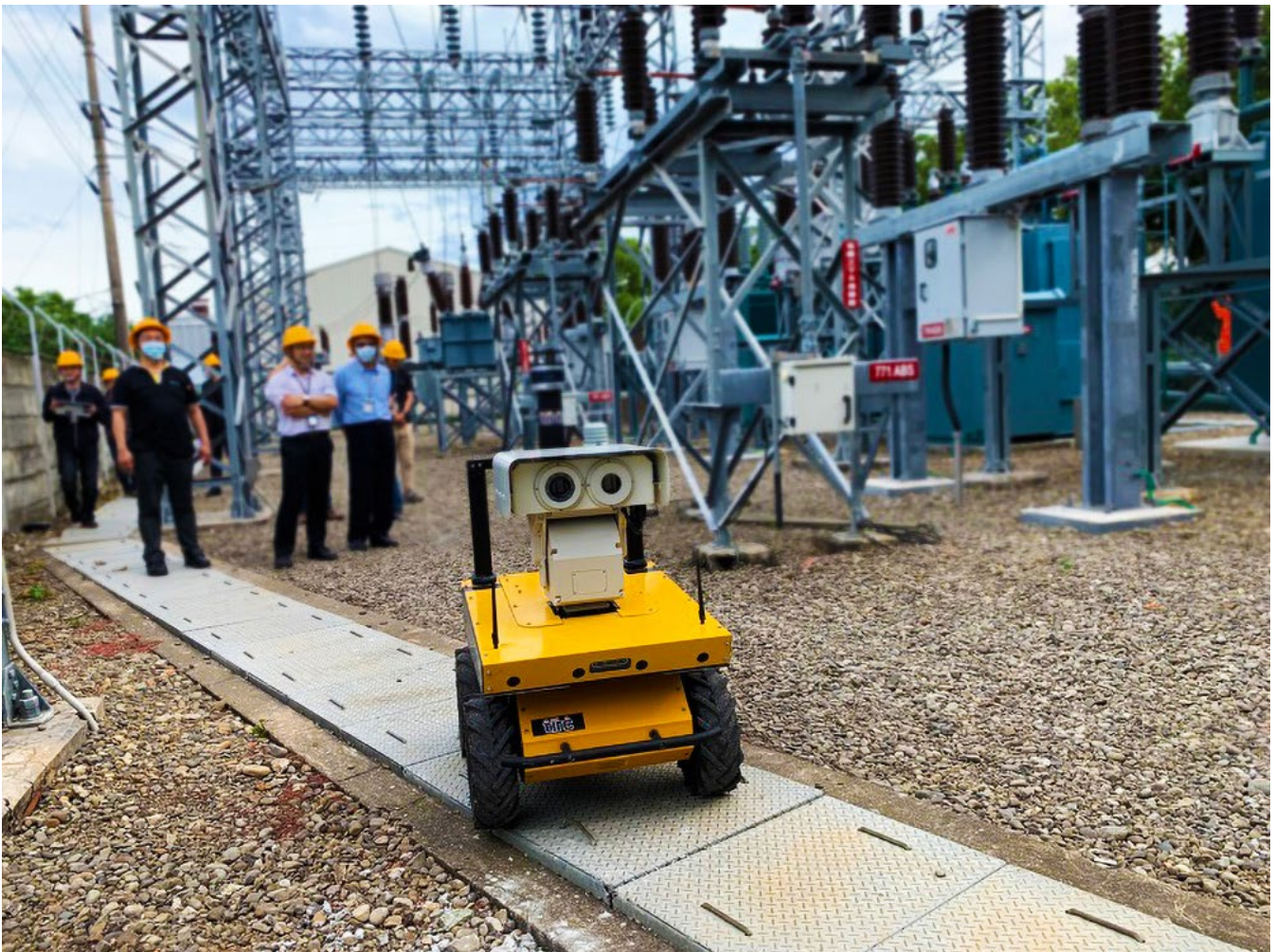
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## » R&D Focus

# AI Robots Offer Outdoor Inspection Services for Substations



***The AI outdoor inspection robot can conduct autonomous inspections at high-voltage substations, improving workplace safety and efficiency.***

ITRI, Taiwan Power (Taipower), and Taiwan Intelligent Robotics Co., Ltd. (TIRC) have jointly unveiled an AI outdoor inspection robot that has already been put in use at Taipower's high-voltage substations, significantly boosting inspection efficiency and safety. These robots are expected to be rolled out in a wider number of areas, providing smarter services and ensuring safer working environments. Meanwhile, novel AI applications will accelerate the digital transition of industries and reduce the impact of an aging workforce.

Inspection robots in the past were typically non-autonomous robots. This meant that

employees were required to operate remote controls during an inspection, while also manually documenting relevant information. ITRI, Taipower, and TIRC cooperated in developing an inspection robot which adopts an AI navigation module to boost efficiency and reduce the chance of error. All of the hardware and software of the robot was developed in Taiwan.

Dr. Shu Huang, Division Director of ITRI's Mechanical and Mechatronics Systems Research Laboratories, stated that the use of unmanned technology in inspections has continued to increase due to aging manpower and the impact of the COVID pandemic. The inspection robot incorporates a high-performance AI algorithm that uses only 25% of the processing resources of the robot's brain. This is a big break from traditional algorithms that utilized 65-70% of the robot's brain capacity. With more computing power available for use, the robot can calculate and respond to emergencies faster, while performing real-time inspection and capturing data. This is conducive to higher-value predictive diagnosis or big data information extraction, he said.

Taipower's Power Distribution Division Director Ming-Shu Chen remarked that substations are an important place for voltage conversion. Any equipment failure could result in large-scale power outages and heavy losses. Consequently, Taipower needs to dispatch personnel to conduct regular inspections, even in bad weather or in distant places. In recent years, he said, Taipower has actively promoted "smart inspections". To this end, the cooperation with ITRI and TIRC has enabled Taipower to successfully deploy AI inspection robots in substations. Based on an inspection schedule, the robots check capacitors, transformers, and other equipment to ensure safety. Using an AI learning inspection route, the robots can transmit imagery back to a central control room even as they are moving. This allows personnel to understand the situation on a real-time basis, following which related workers can be sent to the site to carry out maintenance as needed.

KT Huang, Chairman and General Manager of TIRC, pointed out that unlike most indoor and non-autonomous inspection robots, the newly developed robot has the ability to navigate on its own, making inspections easier and more routine-oriented. In the future, automated robot applications will be even more diverse, such as utilizing overhead robots and drones for inspections or the use of mobile video cameras or real-time image recognition detection to address blind spots in industrial safety.

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## » Collaboration

### Providing Resources for Innovative IC Design Startups in Taiwan with Arm



***ITRI and Arm jointly created the IC Design Platform for Startups.***

ITRI collaborated with world-leading semiconductor design company Arm on providing critical resources to make innovative IC design accessible to startups in Taiwan through a new initiative called the IC Design Platform for Startups. The combination of services and support from ITRI and access to Arm technology through its highly successful Arm Flexible Access for Startups program will assist startups in accessing critical IP and accelerating the launch of competitive products for the global market.

Chih-I Wu, ITRI's Vice President and General Director of Electronic and Optoelectronic System Research Laboratories, stated that the collaboration between ITRI and Arm is expected to achieve three objectives. First, it invites global IC design innovators to come to Taiwan. Arm's global network and resources could assist foreign startups anchoring in Taiwan to speed

up chip development. Second, ITRI will contribute extensive industrial resources and experience to engage in IP conversion through its Nankang IC Design Incubation Center. In conjunction with Arm's diverse IP portfolio, this joint effort will provide startups with inclusive chip design and wafer roll-off services, quickly deploying niche chips to fulfill market demand. This arrangement should greatly improve the cash flow of startups and accelerate their time-to-market. Lastly, by connecting Arm's global ecosystem of more than 1,000 technology partners with Taiwan's unique semiconductor cluster, in addition to electronic OEM/ODM, software developers and the end application ecosystem, this initiative will be critical to further positioning Taiwan at the center of the Asia-Pacific semiconductor ecosystem.

Arm Taiwan President CK Tseng commented that helping startup teams to innovate and go to market quickly and successfully is fundamental to promoting continued technological advancement. More than forty partners worldwide, covering IoT, autonomous vehicles, terminal device AI and wearable medical devices, have taken advantage of Arm Flexible Access for Startups since its launch. Any startup with less than US\$5 million in capital can join this program; by gaining no-cost access to a wide portfolio of more than 80 Arm products, these startups have the freedom to experiment, evaluate and innovate in chip design, as well as access to Arm's global resources and ecosystem of other chip designers, software developers, technical support, training and tools. With no fees for prototyping or test tape-outs, the company then only pays a licensing fee at commercial rollout for the IP it uses. This allows startups to make better use of their funds, while shortening their product development cycle by an average of 6-12 months.

ITRI, offering extensive expertise in IP management and multi-disciplinary innovative technology, and Arm, providing broad access to leading technology through its Flexible Access for Startups program, are committed to helping IC startups take root in Taiwan. The cooperation is expected to combine enormous resources, providing global startup companies with comprehensive services from product development to worldwide marketing.

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## » Collaboration

# ITRI, AITA, and UCLA CHIPS Forge Cooperation on AI Chip Development



***The cooperation with UCLA CHIPS offers opportunities in the development of international specifications for heterogeneous integration.***

ITRI, the AI on Chip Taiwan Alliance (AITA), and the UCLA Center for Heterogeneous Integration and Performance Scaling (CHIPS) signed an MoU on the cooperation in heterogeneous integration advanced packaging on September 14. This agreement aims to utilize Taiwan's AIoT advantages and the experience of the US in high performance computing to jointly strengthen complementary advanced semiconductor technology R&D. The enhanced cooperation between Taiwan and the US in supply chains is hoped to open new business opportunities for AI chips.

Chih-I Wu, ITRI's Vice President and General Director of the Electronic and Optoelectronic System Research Laboratories, commented that die-to-die (D2D) interconnection bandwidth

plays a vital role in heterogeneous integration. ITRI, he said, has over the years created a solid foundation in cultivating packaging technology, and the specifications of the patented high speed communications interface developed under the AI on Chip initiative already surpass those of major international manufacturers. In the future, these technologies will be used in innovative applications that require high bandwidth, such as 8K high-resolution images and 5G communications.

Dr. Wu emphasized that the alliance with UCLA CHIPS offers two main advantages. First, through the use of the UCLA CHIPS platform, Taiwan's D2D technology will be promoted internationally. Second, UCLA CHIPS has the latest heterogeneous integration technology. This will help connect international system integration requirements with Taiwan's semiconductor ecosystem. ITRI's pilot line will verify the functionality of its product prototypes, and further orders for products can be forwarded to Taiwan's semiconductor manufacturers, assisting the industry in solidifying links with international contacts.



***Representatives from ITRI, AITA and UCLA CHIPS gathered together to sign the agreement.***

“Our collaboration with ITRI is a centerpiece of our international collaboration in the area of heterogeneous integration and packaging for high performance computing and artificial intelligence,” said UCLA CHIPS Center Director Prof. Subramanian S. Iyer. “We are grateful for the close technical collaboration with ITRI engineers who bring incredible innovation and a

wealth of experience to our collaboration. The feedback and suggestions we get from ITRI have had a very positive and meaningful impact on our research direction, execution and most importantly on the education of our students who will lead this work in the years to come. We hope that this interaction with UCLA CHIPS is just as beneficial for ITRI as well.”

AITA Chairman Nicky Lu, also CEO of Etron Technology, Inc., stated that AITA connects the resources of Taiwan’s semiconductor-related industries with those of the government and academia and is strengthening cooperative relationships with global innovators. Since its inception in 2019, AITA now has over 125 member companies, working to develop AI chip technology for AIoT system applications. This cooperation with UCLA CHIPS offers opportunities in the development of international specifications for heterogeneous integration, and provides a window for technology promotion and exchanges. Dr. Lu said that Taiwan’s mature industry chain and abundant experience in chip production, in conjunction with UCLA’s resources, will pave the way for Taiwan manufacturers to take the lead in creating a strategic blueprint and accelerating development for AI chips.

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## » Collaboration

# ITRI and Oxford Instruments to Collaborate on Compound Semiconductors

ITRI and Oxford Instruments signed a cooperative research agreement on the development of next-gen compound semiconductors on September 24, under the witness of officials from the Department of Industrial Technology (DoIT), Ministry of Economic Affairs (MOEA). This agreement is expected to leverage the complementary R&D capacities of both sides and will help develop a new industry chain for compound semiconductors in Taiwan to create new opportunities in the global market.

The MOEA has been active in assisting Taiwan's manufacturers in advancing core technologies associated with ultra-high frequency (UHF) components by providing key technology solutions and development platforms. It has also been dedicated to facilitating collaborations between Taiwan companies and global partners. For instance, its International Industrial Innovative R&D Program and the Fast Track Program for clinical trials have attracted many cooperations and investments as well as the establishment of R&D centers in Taiwan. Up until the end of this April, a total of 18 applications have been received.

ITRI Executive Vice President Pei-Zen Chang remarked that ITRI is an important stronghold of Oxford Instruments in the Asia-Pacific region. The two sides began cooperation on precision testing analysis 15 years ago and have achieved excellent results in multiple fields such as HBLEED, MEMS, Micro-LED, silicon photonics, and nanoanalysis. "The collaboration with Oxford Instruments will enhance the growth of the next-gen semiconductor supply chain in Taiwan, allowing research and development to be implemented in system integration and multidisciplinary innovation. This will further boost the industrial transformation and economic development of Taiwan," he said.

Representative of British Office in Taipei John Dennis remarked that the UK is a world leader in compound semiconductors for both fundamental and applied research, with many exciting new technologies coming through the UK's thriving innovation focused companies. Beyond this, the UK also has a number of important specialist companies providing equipment and services for semiconductor production and Oxford Instruments is a perfect example, providing high tech products and services to the world's leading industrial companies and scientific research communities including ITRI. He was excited to see the collaboration between Oxford

Instruments and ITRI in compound semiconductors, which will open the door to some really exciting advanced technologies including electric vehicles, 5G and other wireless technologies, and even the power converters on wind turbines.



***ITRI and Oxford Instruments signed an agreement for a cooperative research project on the development of next-gen compound semiconductors.***

Chief Executive Officer of Oxford Instruments Ian Barkshire expressed his appreciation for the ongoing strengthening of the relationship between Oxford Instruments and ITRI. He pointed out that Oxford Instruments’ R&D base established at ITRI in 2011 has allowed the company to accelerate its technology program and better support its customers across Asia. With the new agreement signed, Oxford Instruments and ITRI will combine the innovation, technological and end-market knowledge to drive the advances in semiconductor and power devices that will enable a greener, healthier, more connected, advanced and sustainable society.

ITRI Vice President and General Director of the Electronic and Optoelectronic System Research Laboratories Chih-I Wu pointed out that ITRI has already developed GaN semiconductor technology to be applied in high-frequency communications, and it has cooperated with universities on epitaxy technology and UHF communication components. “Based on Taiwan’s key leading technology, its comprehensive industry chain in semiconductors, and ITRI’s innovative R&D capabilities, the collaboration with Oxford Instruments on the development of compound semiconductors will help increase the yield rate of GaN’s High Electron Mobility Transistor (HEMT) component processing and improve the source charging power and transistor performance,” he said.





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## » Activity



## Five New ITRI Laureates Honored



***President Tsai Ing-wen honored ITRI's new laureates for their key roles in industry innovation.***

ITRI held the 2021 ITRI Laureate Ceremony and Forum to honor new laureates and discuss strategies for Taiwan in achieving net zero carbon emissions, which will be one of the biggest challenges facing the world over the coming three decades. The five newly named laureates include Macronix International Chairman and CEO Miin Wu, MediaTek Vice Chairman and CEO Rick Tsai, ITRI Advanced Research Advisory Committee Chair Cheng Wu, National Taiwan University College of Medicine Professor of Internal Medicine Pan-Chyr Yang, and Onward Therapeutics Chairman and CEO Grace Yeh.

ROC President Tsai Ing-wen personally bestowed medals and plaques to the five new laureates, praising them for their outstanding performance in different fields. President Tsai congratulated the laureates and expressed her hope that they can provide insights in promoting green energy, industrial transformation, and net zero carbon emissions, helping the government formulate solutions to these issues.



***Hosted by ITRI President Edwin Liu, the Laureate Forum discussed the challenges and opportunities for net zero by 2050.***

Following the ceremony, the Laureate Forum focused on what different sectors can do to address net zero carbon emissions. The session was hosted by ITRI President Edwin Liu and joined by ITRI Laureates including Stan Shih, Chintay Shih, Yuan-Teh Lee, Hsing-Shih Chen, Matthew Miao, Chen-Tung Yang, Rick Tsai, Pan-Chyr Yang, and Miin Wu. Liu noted that while many may consider that net zero emissions will increase operational costs for companies, he sees this as a great opportunity to create new markets and industrial growth. The laureates agreed that as an export-oriented economy, Taiwan must work together with the world in moving toward net zero emissions, and that the government and enterprises should aggressively invest in this transition as soon as possible.

## 2021 ITRI Laureates



### **Miin Wu**

Macronix International Founder, Chairman and CEO, introduced digital transformation to the semiconductor manufacturing process 30 years ago. Macronix International was the first semiconductor company in Taiwan to promote self-owned brand products and technology, and now nearly all cars have Macronix chips embedded within.

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**Rick Tsai**

MediaTek Vice  
Chairman and CEO,

has made substantial contributions to industries such as semiconductor, IC design, and electronic communications over the past 40 years. Since his appointment, MediaTek has grown to be one of the leaders of the mobile phone chip industry.



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**Cheng Wu**

ITRI Advanced  
Research Advisory

Committee Chair, has started four businesses successfully, creating hundreds of billions of dollars in market value. With unique insights into the ICT industry, he is a keen observer of the latest trends of the industry, and his experience in systems, storage, cloud, and telecommunications have allowed him to design strategies for Taiwan's next generation of key technologies.



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**Pan-Chyr Yang**

Professor of Internal Medicine at National Taiwan University College of Medicine, is a leading researcher for lung adenocarcinoma in Taiwan, and has been dedicated to the genetic research of lung cancer and precision medicine.





## Grace Yeh

Onward Therapeutics Chairman and CEO, is the first female ITRI Laureate and is a pioneer in promoting innovation in Taiwan's biotechnology industry. Yeh led the development of a drug for pancreatic cancer, which became the first Taiwanese cancer drug approved by the U.S. Food and Drug Administration.

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## Intelligent and Green Techs at BIO Asia-Taiwan 2021



### ***ITRI's highlight technologies at BIO Asia-Taiwan 2021.***

ITRI showcased tech innovations in intelligent medical technologies and green tech for a circular economy at the physical exhibition of BIO Asia-Taiwan 2021 in Taipei in early November. The event featured more than 650 biomedical and healthcare companies from 13 countries and over 1,600 booths, making it the largest onsite biotechnology exhibition held since the COVID-19 outbreak.

According to Dr. Hsin-Hsin Shen, Deputy General Director of ITRI's Biomedical Technology and Device Research Laboratories, ITRI is dedicated to enhancing Quality Health, one of three major domains featured in ITRI's *2030 Technology Strategy and Roadmap*. "The institute is trying to leverage Taiwan's strengths in ICT and medical care systems to develop smart medical and healthcare technologies for the industry," she said. "In this year's BIO Asia-Taiwan, we are focusing on intelligent and green technologies and demonstrating how these innovations can be applied in biomedical fields, machinery areas, botanical medicine and circular economies."

Below are some of ITRI's highlights at BIO Asia-Taiwan 2021.

## Intelligent Technologies

### Spinal Surgical Navigation-Robotic Arm



The spinal surgical navigation-robotic arm system includes a medical robotic arm driven by a medical navigation system. The system can shorten required preparation time and achieve precise surgical accuracy, allowing for personalized medicine according to each patient's situation.

### Ultrasound-Guided iRFA System



Radiofrequency ablation (RFA) is an interventional therapy that has been emerging in cardiac catheterization and in treatment of solid tumors, allowing lesions to be approached and treated non-surgically.

### **Automatic Cell Production System**



ITRI's automatic cell production system includes cell culture, cell image detection, cell

medium exchange, cell subculture, and harvesting. This system requires only 60% to 70% of the manpower to create more than 10 times the production of a conventional lab.

## Green Tech

### Circular Economy of Calcium



ITRI has established an environmentally friendly process to extract calcium from ocean, livestock, or industrial waste such as clam shells, oyster shells, and animal bones. The purified and extracted calcium substances can be modified by chemical reactions, providing products to different target markets including food, cosmetics, pharmaceutical, and fine chemicals industries.

### Botanical Formula ANDE1





ITRI has developed the botanical healthcare formula ANDE1, combining a medicinal Dendrobium species and other botanical substances to relieve eye dryness through an increase in tear fluid production, reduction of tear loss, and inflammation inhibition.

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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.itsri.org/eng>.

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