MOEA

2024 NATIONAL INVENTION & CREATION AWARD

Award Report

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2024
NATIONAL INVENTION & CREATION AWARD

Message from the Director-General

Amid challenges such as US reciprocal tariffs or the restructuring of the global trade order, Taiwan continues to maintain a strong foothold and distinguish itself on the international stage, despite an ever-shifting international landscape and rapidly evolving geopolitical complexities. This resilience stems from our abundant R&D capacity and robust technological capabilities. In the “World Competitiveness Ranking 2024” released by the IMD Business School, Taiwan ranked 8th globally. Notably, among economies with a population of over 20 million, Taiwan has retained the top position globally for four consecutive years. This achievement is largely driven by the strong R&D and innovation capabilities of Taiwanese enterprises, which reflect the nation’s resilience and deep-rooted strength in the face of global challenges and shifting circumstances.

The “National Invention and Creation Award” is the highest honor in the field of invention, established by the Taiwanese government to encourage innovation and R&D, recognizing outstanding patent creators. Since its launch in 2003, the award has borne witness to countless journeys of creativity—from concept to realization. This year marks the first time the award incorporates brand identity thinking, introducing a distinctive logo based on the initials “NICA” (National Invention and Creation Award). The award features a carefully selected wooden trophy that blends elements of Eastern culture with sustainable design, conveying the message that under the protection of intellectual property, creativity can take root and flourish, ultimately transforming into national assets of lasting value. This year’s selection process saw 418 eligible patent submissions, evaluated rigorously by a Review Committee composed of 39 experts, scholars, and governmental representatives. After 14 rounds of evaluation meetings, the committee selected 6 Gold and 26 Silver Medal winners for the Invention Award, and 4 Gold and 4 Silver Medal winners for the Creation Award, totaling 40 award-winning entries. These winning entries span a wide range of fields, including semiconductors, telecommunications, biomedicine, aerospace, smart manufacturing, and sustainable agriculture, and address globally relevant issues such as AI, green energy, aging society, and net-zero transitions. Many of the awarded projects have already been commercialized successfully and granted patents in multiple countries, demonstrating strong market potential and industrial competitiveness.

To maximize the efficacy of the award, TIPO has compiled the “2024 National Invention and Creation Award Winners Booklet,” which comprehensively showcases the core technologies, product highlights, and creation processes behind each winning entry. This publication aims to enhance visibility, attract the attention of domestic and international investors, and create commercial opportunities for the awarded inventions and creations. In addition, TIPO is actively working to build an IP ecosystem by integrating resources related to exhibitions, match-making, and promotion to help award-winning projects reach the market. By positioning intellectual property as a bridging platform, we aim to transform creativity and technology into marketable value, realizing the vision of “spinning gold from creativity” and driving industrial advancement.

Director-General, Intellectual Property Office, Ministry of Economic Affairs

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INVENTION
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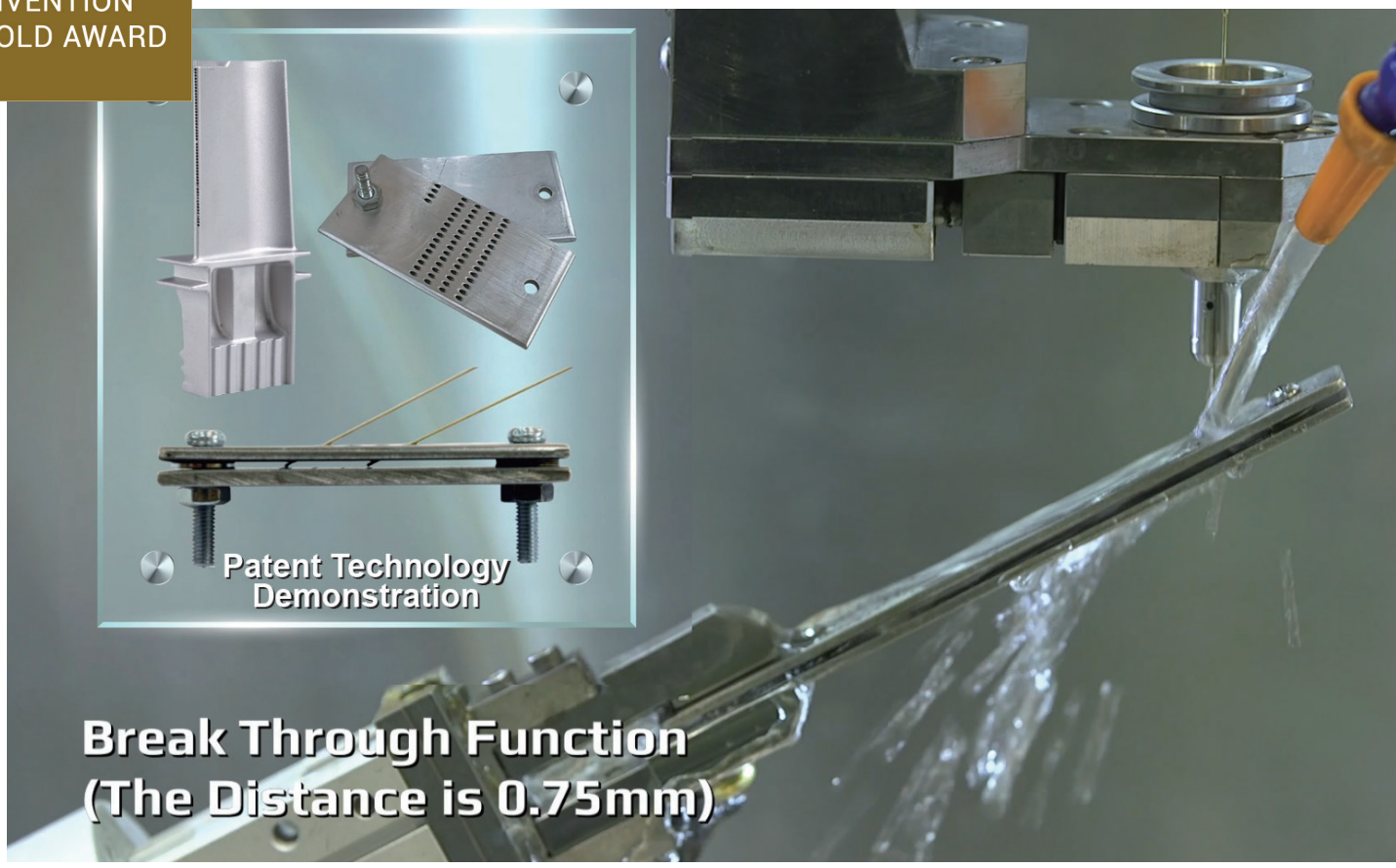

System for Drilling a Workpiece by Electrical Discharge Machining

Patent Certificate : I630965
Hong-Jhih Wong, Ben-Ciang Sia

High-Precision and Low-Cost Revolutionary Aerospace Processing Technology

The requirements for precision processing are highly strict in the aerospace industry. Ocean Technologies has been monitoring the through hole detection technology closely over the long term and successfully introduced the high-performance sensing technology in 2017 that, by means of real-time computer-assisted monitoring, is capable of greatly enhancing the test precision and efficiency to make machine tools from Taiwan more competitive against high-end equipment in America and Europe.

The aerospace processing technology plays a crucial role in the aerospace transportation industry. Its requirements for precision and tolerance, in particular, are highly strict. A turbine, for example, for the sake of pursuing even higher operating efficiency and stability, will have a large number of small-diameter film cooling holes on its rotor and stator blades to accordingly boost thermal efficiency and the lifespan of the blade.

The detection technology was yet to mature in the past, and hence, the depth needed to be determined with the naked eye or manually after a hole was drilled, resulting in increased cost of manpower and time. Chairman Yueh-Chao Liao of Ocean Technologies mentions that the Company secured purchase orders for aircraft engines from Safran (formerly known as Snecma) in 2009, and they required that the machinery and equipment needed to be capable of through hole detection. The team adopted water pressure monitoring back then. It was not an ideal optimal solution. Nevertheless, the Company kept the customer's demand in mind and successfully developed the high-performance through hole detection-sensing technology in 2017 and obtained the "Electrical Discharge Machine Through Hole Processing Control System" patent.

Exploration of Information to Define R&D Direction

Development Manager Pen-Chiang Hsia of Ocean Technologies indicates that this patented technology features primarily the utilization of real-

time computer-assisted monitoring that enables capture of the penetration signal within 1 to 2 seconds instead of the several tens of seconds needed for observation with artificial testing, and the processing depth is controlled at a precision from 0.1 mm to ± 0.03 mm. In addition, this breakthrough puts drilling electric discharge machines (EDMs) from Taiwan on a par with high-end machine tools in America and Europe, so that domestic and international turbine generator manufacturers can have access to high-performance equipment at a relatively low purchase cost, and more opportunities are created for local manufacturers to secure international purchase orders.

Pen-Chiang Hsia candidly says that the largest challenge encountered during the R&D process was not the technology itself but the access to information and positioning. There are limited high-end automatic control resources in the country, and the technologies of international equipment manufacturers are kept confidential, making the collection of information a daunting task. Without guidance, the R&D team was like walking in the fog while searching for a feasible direction. Upon the landing of the technology, on the other hand, there was the computing ability restriction. The computing speed back then was far from today's level. The team ensured that the software could work successfully on the machine and equipment by simplifying the calculation process through mathematical algorithms and external conversion technology.

Patent Deployment Demonstrates Depth of Technology

A patent is not just a legal tool to protect innovations; it is also an important strategy for a business to expand its market share. Yueh-Chao Liao indicates that Ocean is export-oriented, and hence, patents are applied not only in Taiwan but also proactively in international markets such as the European Union in order to ensure that the technology is protected in primary regions with sales.

As far as software technology protection is concerned, Pen-Chiang Hsia mentions that patents

and business secrets have their respective strengths. Without disclosing the core technology of software, it is hard for the outside world to figure out its operating principle; in this case, business secrets protection may be more advantageous. A patent, however, helps prevent competitors from applying for similar technologies maliciously, as the latter will undesirably put the originator at risk of tort and also demonstrate the technical capabilities of the team. Patent documentation is a means to convey the depth of technology on the market, too, to accordingly attract more customers and collaborative partners.

Innovative Commercial Model with a 30-Day Free Trial

The through hole detection technology can be applied extensively to precision dies, biomedicine, aerospace, among other fields. It has become a must-have feature in the aerospace industry, in particular. Around 15% to 27% of machines come with this optional technology at present, and it is growing each year.

Pen-Chiang Hsia indicates that Ocean adopts the 30-day free trial mechanism similar to that available in the software industry in order to enhance acceptance of this technology on the market. Conventional machine tool software usually needs to be purchased at once upon order placement. With digital key management, however, users can activate features during the trial period even without Internet access. In the future, besides continuous technological advancement, the possibility of exporting the patented technology is being evaluated. The through hole detection technology, for example, may be integrated into the IC or circuit boards to reach outside Ocean equipment, creating even greater business opportunities.

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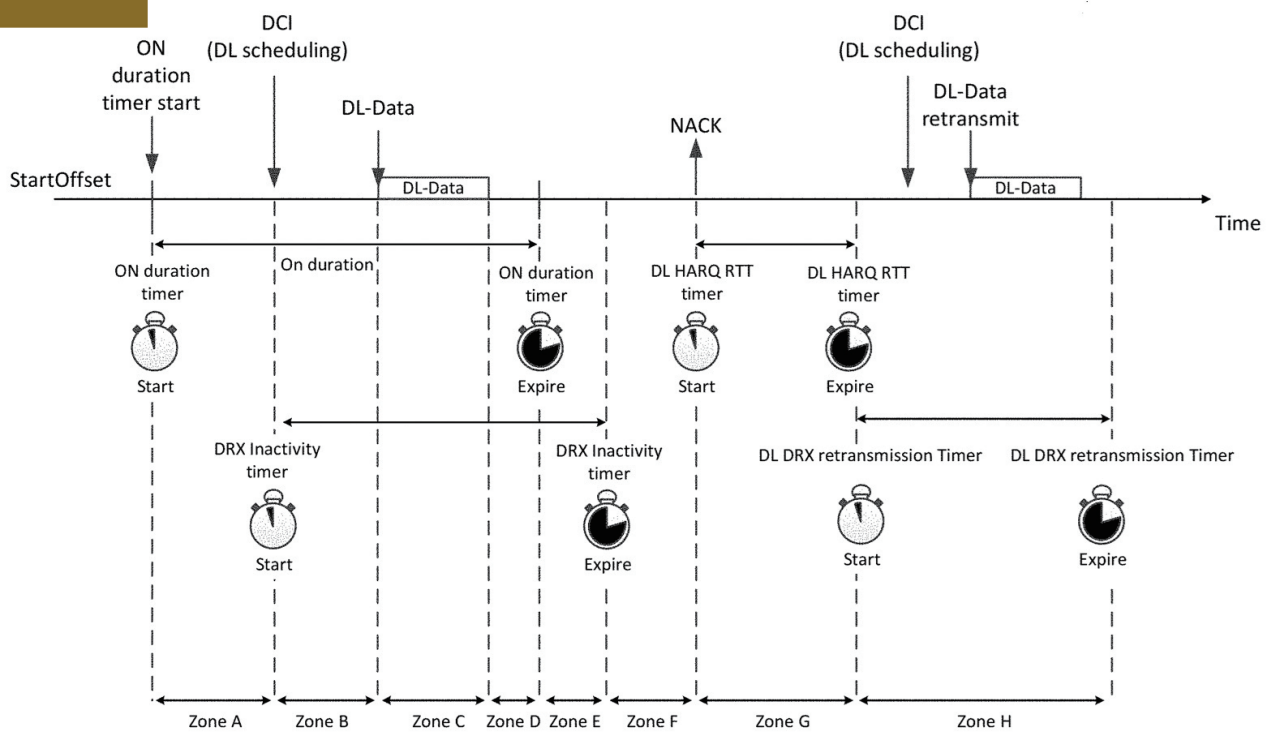
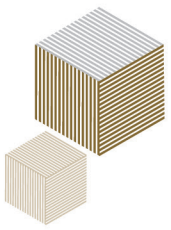


User Equipment and Method for DRX Operation



Patent Certificate : I728281
Chia-Hung Wei, Chie-Ming Chou

Patent Deployment First to Boldly Follow Global Communications Standard

Mobile communications technology concerns global industrial competition. In the past, 3G and 4G standards were mostly spearheaded by heavy-weight manufacturers in America and Europe. FG Innovation IP's R&D team developed the DRX energy-saving technology that was successfully adopted by the international standard organization 3GPP and became part of the global 5G Standard. Patent deployment enables Taiwan to play a crucial role in the international communications technology field.

Modern people can barely live without a mobile phone. As mobile networks become more and more popular, the improvement and establishment of a communications system are important. There is one saying in the communications industry that goes "tier-1 company defines standard; tier-2 company creates brand; tier-3 company enables manufacture." In the past 3G and 4G eras, all communications technical standards were nearly controlled by technology heavyweights in America and Europe. Taiwanese manufacturers were restricted in development and had to pay high royalties.

Patent Deployment-Target First and Shoot Next

In order for Taiwan to make contributions at the very origin of the industry, that is, in the development of technologies and in corresponding patent protection, FG Innovation IP's R&D team (Chie-Ming Chou and Chia-Hung Wei) devoted to the development of the DRX energy-saving technology in 2016 and obtained the patent in November 2018. The technology was later adopted

by 3GPP and included in the 5G Mobile Networks Standard introduced in 2018. Later, it was approved by the ITU and announced to be a conforming global 5G mobile network. Chie-Ming Chou indicates that the team focused on patent deployment, not product development, which differed from the traditional product-centered Taiwanese business model. He describes his strategy as “Target First and Shoot Next”; that is, precise patent planning ensures that the technology can make the most of its value on the market. Therefore, patent right has been the core means to protect technical and intellectual properties since the very beginning. From 2016 to 2018, when the first edition of the 5G Mobile Networks Standard was established, the team generated 200 to 300 patents, and one-third of them, approximately 60 technologies, were adopted by 3GPP to become part of 5G application and practice.

Key Strength-Standard and Essential Patent

Chia-Hung Wei indicates that in the technical development field, it is not difficult to obtain patent rights. A true challenge lies in how to make a patent “standard and essential”(a standard essential patent, SEP); that is, the patent is adopted by mainstream standard organizations around the world to become a core technology that has to be followed and enforced in industries.

Candidly, he also says that unlike international first-line heavyweights, the team is not widely known and hence does not have much of a say, which makes it difficult to make a case for and prove technical strengths in self-development in addition to the interactions with reviewers during patent application and ensuring that wordings adopted in the patent right perfectly answer to the 3GPP technical specification in order to prevent against arguments from other companies upon authorization in the future. In other words, the team needs not only to understand the developmental context of a communications system in depth but also to forecast future technical trends early on in order to design innovative solutions that meet future demand. The developed technology is protected properly first through a patent. The forward-looking technical deployment helps secure the upper hand in the communications standard battlefield known for fierce competition.

From 5G to 6G for Continuous New Ground-breaking

FG Innovation IP started in 2021 to gradually transfer S E P patent assets it owned to manufacturers in America, Europe, and Japan, and has had quite satisfying results in terms of patent lawsuits/authorization battlefields to not only consolidate currency-oriented technological deployment but also boost the publicity of well-reputed quality of Taiwan patents. Chia-Hung Wei, who currently works for US InterDigital, indicates that mobile network technology is not developed out of nowhere; it is the result of persistent evolution from the technology of the previous generation in order to satisfy the constantly changing needs of human society. The 6G to be discussed soon will continue to evolve on the basis of 5G. All the technical experiences and accomplishments accumulated in the 5G field in the past by the team can become the cornerstone for the development of the 6G Standard in the future. Chien-Ming Chou, on the other hand, continues to be devoted to the communications field and has founded FAINNOV. CO Limited to grow further from being an inventor to being a patent right holder. Besides expanding patent deployment from 5G to 6G, AI application is introduced in the preparation of standards and development of new technologies as well with the hope to play a crucial role in the new-generation mobile networks standard contest and to bring about more innovative opportunities for the industry, securing an important spot for Taiwan in the international communications technology field.

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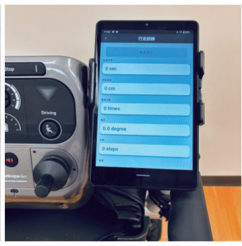

Walker

Patent Certificate : I731621
Chen-Yi Liang, Cheng-Hsing Liu, Chien-Wei Chen

Dual Walking + Riding Mode to Allow Senior People to Move Freely

With the arrival of an aging society, Wistron Corporation/Wistron Medical Technology's R&D team developed a walking aid that combines walking and riding in one and comes with the surrounding detection (the relative user position and slope of the terrain) feature for enhanced mobility and safety in light of the common restricted movement issue among the elderly. Along with its exclusive APP, the needs of different populations are precisely accommodated to realize a steady and comfortable walking experience.

Aging is a global trend. As estimated by the United Nations, there will be 1.6 billion people aged 65 and above by 2050, accounting for 16% of the overall population. The elderly population of Taiwan has exceeded 20% in 2025, making Taiwan a "super-aged society"; the medical care issue that follows cannot be ignored.

As the population ages quickly, the number of old people affected by chronic conditions such as osteoporosis and osteoarthritis increases each year. In light of the fact that many senior people have a restricted scope of activities and suffer worsened health condition as a result of degenerative mobility, Wistron Corporation/Wistron Medical Technology's R&D team has been devoted to the development of walking aids over the long term in order to help those with disability and the elderly applying smart technologies to boost mobile autonomy and obtained the patent in June 2021 (Inventors: Chen-Yi Liang, Cheng-Hsun Liu, and Chien-Wei Chen).

Simple Operation–Automatic Transformation in One Key

Researcher Cheng-Hsun Liu indicates that traditional walking aids are designed with only the walking feature that enables a limited walking distance. This invention combines both walking and riding features. In the walking mode, users can

walk by pushing the walking aid forward. If the user is tired, it can be switched to the riding mode; one does not need to worry about the problem of being unable to return because of a long distance.

For enhanced user convenience and safety, in the walking mode, no accelerator or brake lever is needed; it will automatically adapt to the moving intention of the user and accurately provide suitable moving power assistance. Meanwhile, it comes with the surrounding detection feature that provides support up the hill and helps decelerate down the hill automatically. In order for the user to realize shifting between two modes through the simplest operation, by the same token, it can be switched to the walking or riding mode automatically with only one key.

APP Settings and Precise Moving Power Assistance

Cheng-Hsun Liu says candidly that the product went through three generations over a period of 5 years from development to receipt of a patent. The first generation was designed with 6 modes, and it was reduced to two modes with the second generation (walking and riding). The third generation is known for its adaptability to the terrain during a ride. The whole process was met with quite a few challenges, such as the power wheel module to adapt to bumpy surfaces, maneuverability, walking adaptation control, disassembly, and transport, among others.

Among them, the very essentials, since the product combines riding and walking features in one, are: first, ergonomic design needs to be fulfilled in different postures and steady support may be provided to ensure user safety; second, the test regulations for both riding and walking aid have to be fulfilled at the same time given the even greater requirements for structural intensity due to the fact that the product structure is not fixed and may be switched. The product finally passed the test after constant testing and modification.

In addition, in light of the fact that the required level and pattern of moving power assistance for different populations differ, the team developed the adaptable user pattern APP. By adjusting parameters such as the walking control mode and the remote speed setup, suitable and self-adaptable moving power assistance is provided precisely for enhanced walking stability and comfort.

Patent Deployment Strategy Protects Innovation Accomplishments

This invention was produced in large quantities and available on the market in August 2024 (Name of Product: BestShape GO) and has been applied in hospitals to help with post-operative training of walking, and the field trial and qualification of automatic wheelchair tracking was completed for Taoyuan International Airport. In order for the product to be more thoroughly and properly protected, the team was also devoted to patent deployment for the technologies developed for different components. Despite the fact that certain patents are yet to be applied to existing products now, with increased demand on the market, they will hopefully be actually applied to products of the new generation.

Cheng-Hsun Liu indicates that patent protection helps ensure that technologies and R&D accomplishments are not infringed upon and are approved on the market for enhanced product ratings and credibility. With the additional recognition through the gold medal of the National Invention and Creation Award, the product's professionalism and innovative value are reinforced; it is a plus for future developments in the market.

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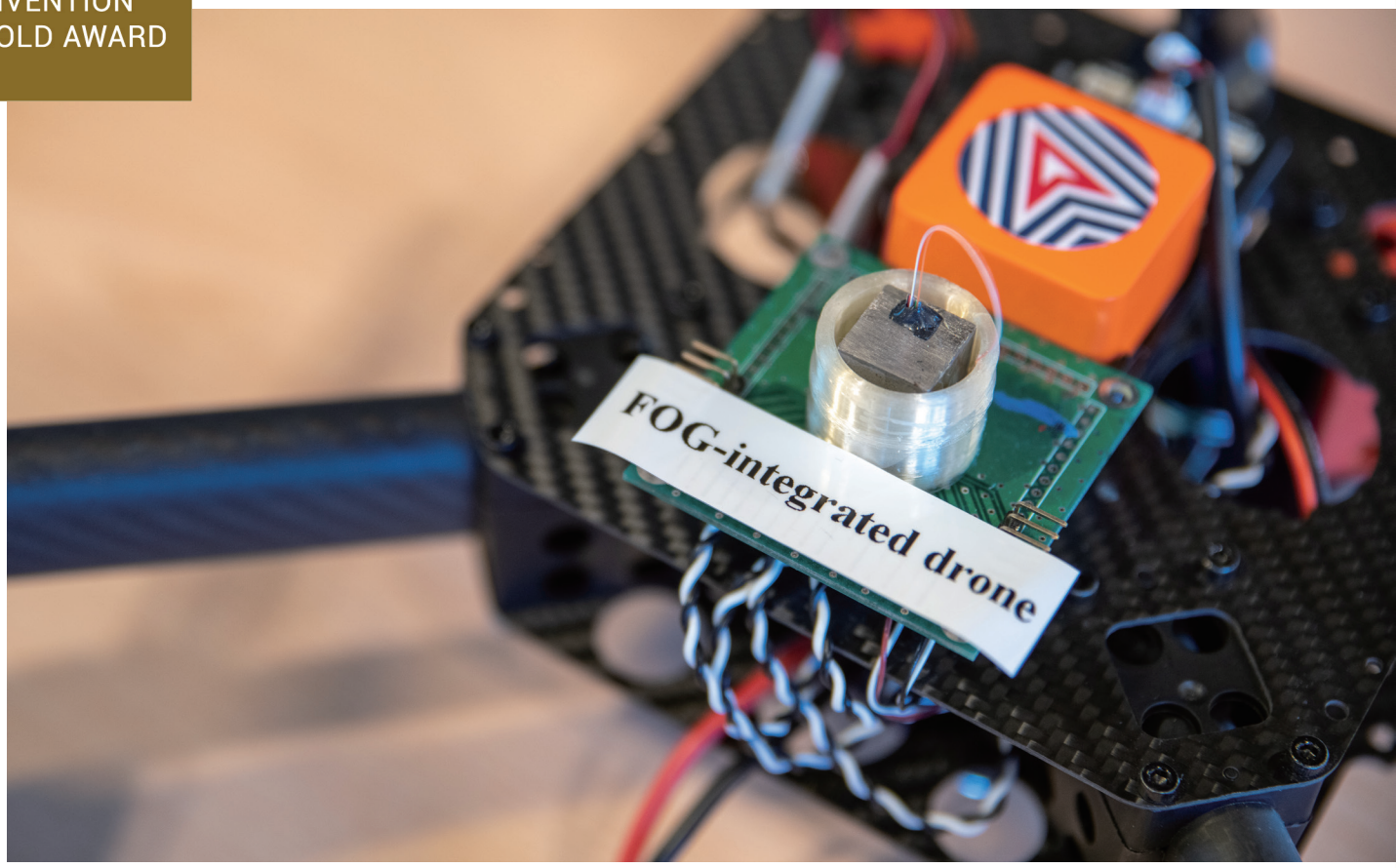


Silicon Photonic Integrated Circuit and Fiber Optic Gyroscope Apparatus

Patent Number : I765412
Yung-Jr Hung

Miniaturization and Low Cost Unlock New Applications

Navigation technology plays a crucial role in today's high-tech world, with the fiber optic gyroscope serving as a critical component in navigation systems. Through his research on silicon photonics integrated circuit technology, Yung-Jr Hung successfully reduced the gyroscope driver chip to the size of a sesame seed and lowered the manufacturing cost to just one-fifth—opening up new application possibilities across a range of industries.

Navigation is essential for space satellites, submarines, and the rapidly growing fields of drones, self-driving vehicles, and even robots. At the heart of all navigation systems is the inertial measurement unit (IMU), whose core technology is the fiber optic gyroscope. Most of the patent holders in this field are based in the United States and Europe. Due to the high development costs, breaking through the technological barrier has been very difficult.

Distinguished Professor Yung-Jr Hung from the Department of Photonics at National Sun Yat-sen University has been researching semiconductor lasers and optical fiber communication technologies since graduate school. At a seminar, he met Dr. Ren-Young Liu, a key proponent of fiber optic gyroscopes in Taiwan and a consultant at the Taiwan Space Agency. This encounter marked the beginning of a new era in gyroscope technology in Taiwan.

Building R&D Expertise through Hands-On Learning

A fiber optic gyroscope generally consists of multiple photonic components, including a light source, phase modulator, photodetector, optical coupler, and fiber loop. Each component is typically packaged separately and connected via optical fibers. The bulky size, complex assembly, and high cost create a barrier to miniaturization and commercial applications.

Yung-Jr Hung recalls, “As my research involved integrating optical elements onto chips, Dr. Liu suggested it might be possible to miniaturize a gyroscope by integrating it onto a chip.” Through a series of collaborative projects involving government, industry, and academia, Hung steadily made progress. These projects included the 2015 National Space Organization’s III-V Photonic Integrated Circuit for Fiber Optic Gyroscope Project; the 2018 National Science and Technology Council’s four-year Silicon Photonic Integrated Circuit Project; the 2022 Ta-You Wu Memorial Award Project; and most recently, the 2023 Breakthrough Academic Collaborative Project led by the National Chung Shan Institute of Science and Technology in partnership with the Armaments Bureau under the Ministry of National Defense.

Funding Support Essential to Scientific Research Breakthroughs

In 2022, Yung-Jr Hung and his research team received a patent entitled “Silicon Photonics Integrated Circuit and Fiber Optic Gyroscope Device.” Excluding the light source and fiber loop, their invention integrated the key photonic components onto a single silicon chip. This resulted in an innovative design consisting of only three components: the light source, the silicon photonics gyroscope chip, and the fiber loop. The gyroscope driver chip was reduced to the size of a sesame seed (4 × 1.2 mm).Additionally, since the silicon chip can be fabricated using the standard CMOS wafer process, production costs can be reduced to just one-fifth. These significant improvements were achieved without sacrificing the strategic sensing capabilities of a fiber optic gyroscope.

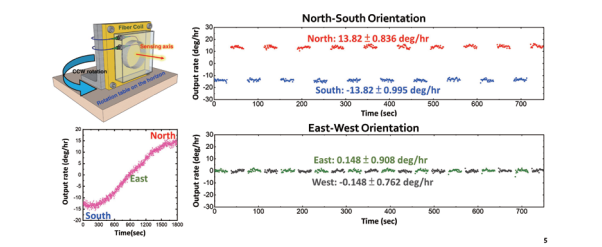
During the process, many challenges had to be overcome. Yung-Jr Hung points out that addressing each technical issue required significant time and effort. However, the most substantial bottleneck came from an external factor: securing adequate funding. “Our chips aren’t made in a lab; they need to be fabricated in a wafer fab. Producing these chips can cost several million NT dollars each year!” Hung explains. He added that the work would not have been able to continue without the financial support provided by the various research projects.

Flexible Configuration Broadens Application Scope

Dr. Hung is currently working with the National Chung Shan Institute of Science and Technology on the development of high-precision gyroscopes. These gyroscopes can be applied to the navigation and positioning of underwater rescue and exploration vehicles, as well as in national defense systems that require precision targeting.

On the commercial side, in January 2024, a non-exclusive technology transfer agreement was signed with Azimuth Avionics, an Australian company specializing in drone navigation modules. The goal is to commercialize silicon photonics gyroscopes across various industries, including applications in yachts and jet skis. “We can even customize the precision levels, and the costs can be adjusted as well,” Hung explains.

He emphasizes that this invention represents a major advancement in the miniaturization and cost-effectiveness of fiber optic gyroscopes. It is expected to open a “blue ocean” of new markets in medium- to high-end inertial navigation, positioning, and stabilization platforms.



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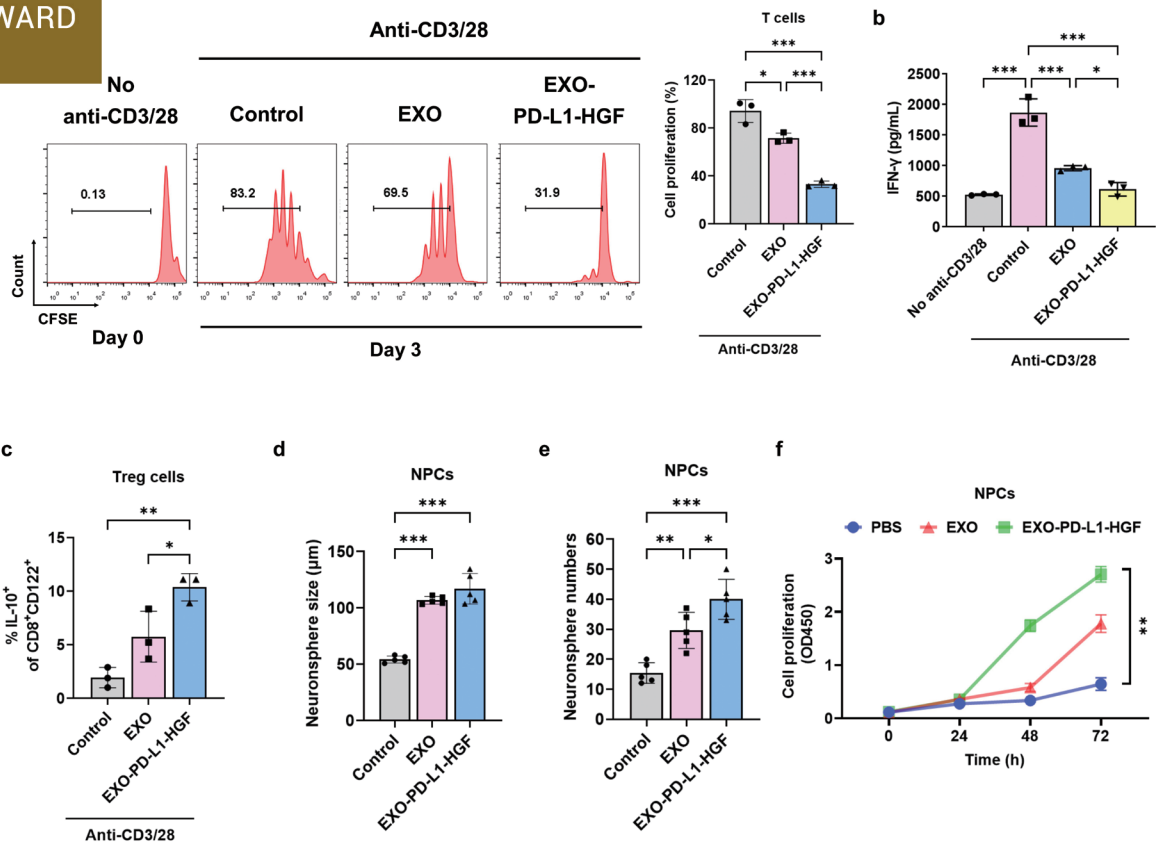


Gene-Engineered Mesenchymal Stem Cells and Applications Thereof

Patent Certificate : I769535
Woei-Cherng Shyu, Chien-Lin Chen, Yi-Hui Lee, Long-Bin Jeng

Cell Regeneration, Tissue Repair - A Great Leap Forward in Genetic Engineering

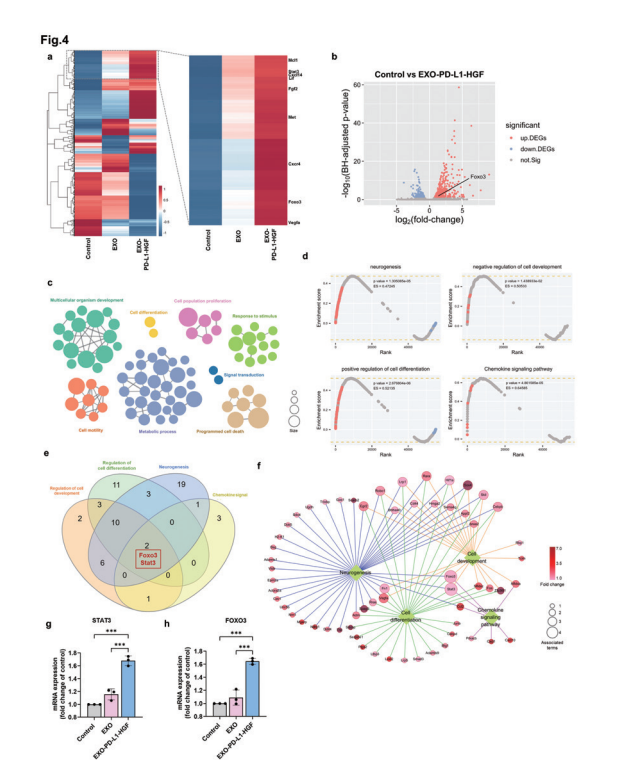
Regenerative medicine has mushroomed over the past few years. Compared to stem cells, exosomes are safer, more effective, and have minimal rejection risk in clinical treatment. The China Medical University team developed a potent exosome that can effectively inhibit the immune response triggered by stroke, repair damaged tissues, and promote nerve regeneration so that the patient can regain independence.

Statistics of the Ministry of Health and Welfare show that cerebrovascular disease ranks fourth among the Top 10 causes of death in Taiwan and takes more than 10 thousand valuable lives on average each year. For those who survived a stroke, 50% will be affected by residual neurological disorders to varying extents and suffer physical and mental disabilities.

Long-Bin Jeng, Chief Executive Officer of the China Medical University Healthcare System, indicates that besides mechanical thrombectomy, medication, and rehabilitation, which are part of the standard of care for acute stroke, with the flourishing development of regenerative medicine, China Medical University Hospital has started to apply stem cells to the treatment of stroke sequelae. Nevertheless, cell therapy is associated with uneasy preservation of cell culture stability, the immune rejection problem, and tumorigenicity. As a result, the novel stem cell-derived therapeutic preparation, exosome, was born.

Non-viral Vector Reduces Pathogenic Risk

Exosomes are microvesicles secreted by cells that serve as mediators of intercellular signal transmission. They are highly biocompatible and range in size from 30 to 200 nanometers. They can penetrate the blood-brain barrier and are regarded as a promising form of non-cellular therapy in clinical applications.



Woei-Cheang Shyu, Vice President of China Medical University Hospital, states that the team was dedicated to developing upgraded allogeneic exosomes derived from umbilical cord mesenchymal stem cells (EXO-PD-L1-HGF). Using a unique double-gene engineering modification technology without viral vectors, the team introduced PD-L1 and HGF into the mesenchymal stem cells, then isolated and purified the derived exosomes, followed by animal experiments. The whole research took nearly six years. The “Genetically Engineered Mesenchymal Stem Cell and Its Application” patent was granted in July 2022.

Professor Long-Bin Jeng also notes that the greatest challenge in this study was gene transmission. Previously, viral vectors were employed despite potential safety concerns. To address this, the team utilized non-viral electroporation to deliver double genes into mesenchymal stem cells. This approach, leveraging advanced genetic engineering and transfer technology, is not only safer but also offers advantages such as low immunogenicity and high gene-loading capacity. This represents a significant technological breakthrough.

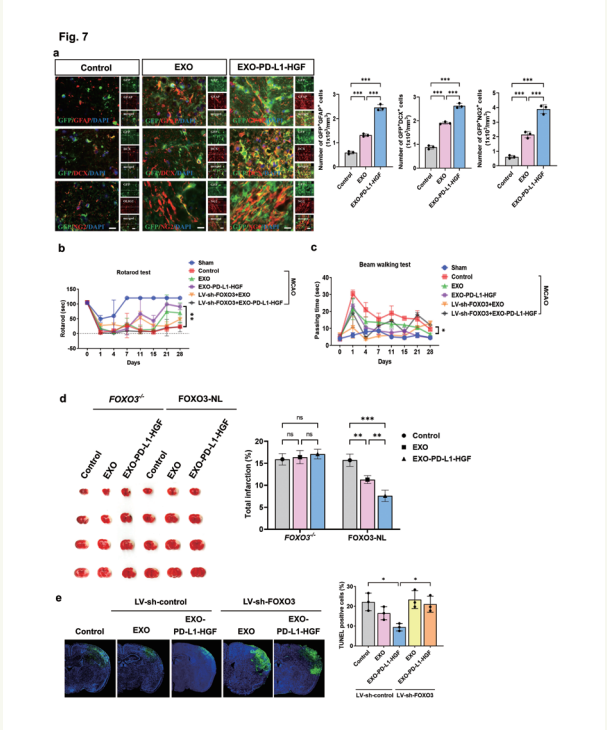
Double Gene Modification Boosts Repair and Regeneration

Compared to exosomes without gene modification, EXO-PD-L1-HGF is capable of inhibiting inflammation, resisting apoptosis triggered by oxidative stress, achieving spontaneous targeting, and promoting the proliferation and differentiation of brain-derived neural stem cells. This significantly improves tissue repair and nerve regeneration.

This patent’s proof of concept (POC) at the beginning of research and development was completed in the fundamental laboratory, and the validation study was conducted among animals. The technology was transferred and authorized to Shine-On Biomedical Co., Ltd. in August 2023 and then to Cytoengine Co., Ltd. for subsequent licensing and commercialization of the new drug.

Further Optimized Technology for Gradual Expansion in Application

Professor Long-Bin Jeng indicates that the team has been devoted to the research and development of drugs targeting central nervous system disorders such as stroke, epilepsy, and drug addiction, with current success seen in the treatment of stroke. In the second stage, the focus has shifted to acute kidney injury, where treatment with exosomes has demonstrated greater efficacy in the recovery of kidney function. In addition, exosomes have shown promise in repairing myocardial damage caused by myocardial infarction and have been effective in the treatment of metabolic dysfunction-associated steatotic liver disease (MASLD). Meanwhile, the team is currently researching and developing a next-generation transfer approach for even better treatment efficacy that can be applied extensively to the diagnosis and treatment of disease and benefit more patients.



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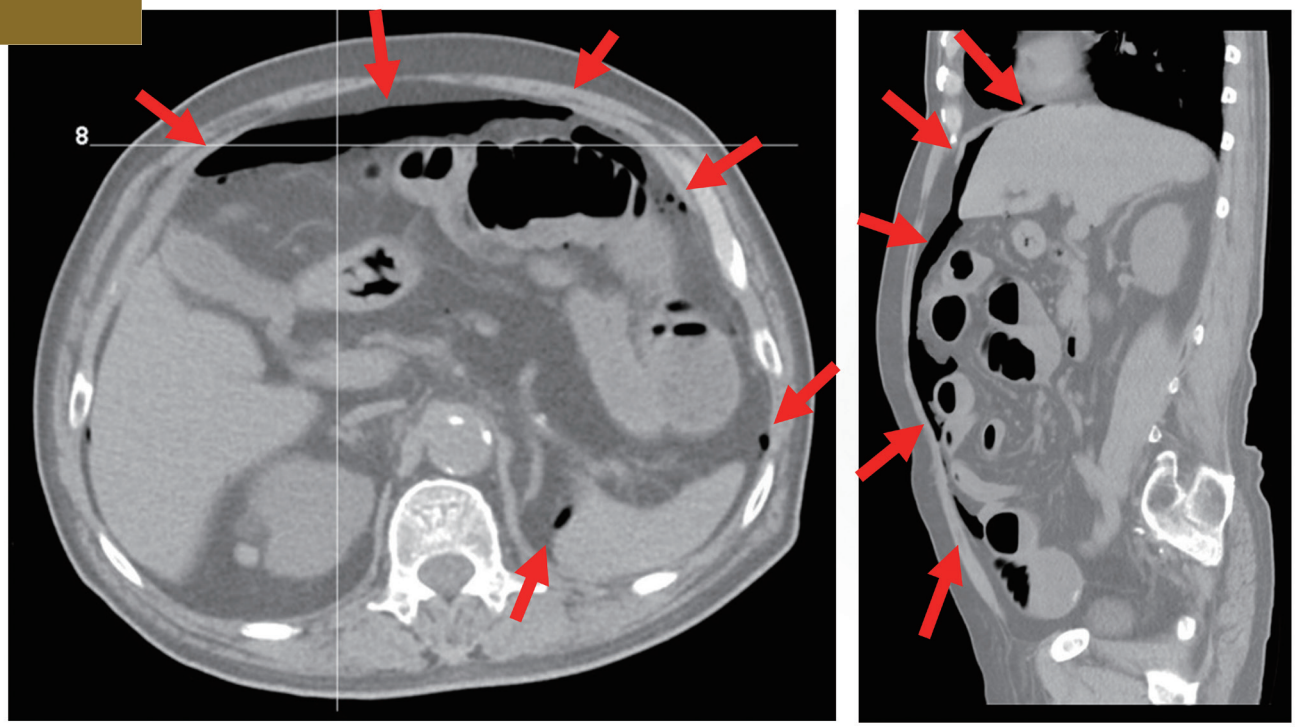


A Deep Learning-Powered Novel Artificial Intelligence Algorithm and System to Assist in the Identification of Pneumoperitoneum on Abdominal Computed Tomography

Patent Certificate : I801273
Chang-Fu Kuo, Yueh-Peng Chen, Tzuo-Yau Fan, Li-Jen Wang, Kuang-Fu Chang, Ker-En Lee, Yi-Feng Wang

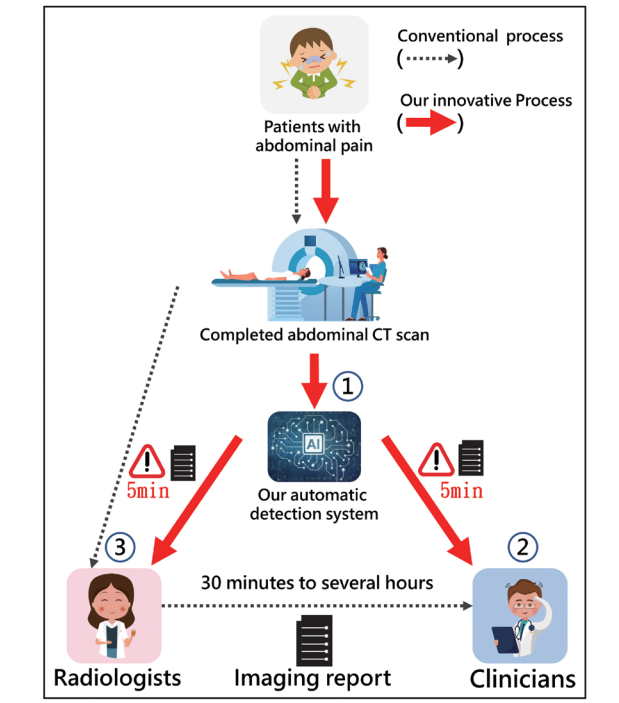
AI Empowerment Boosts Diagnostic Efficiency and Precision

The number of patients seeking medical attention due to abdominal pain is alarming. The most fatal “pneumoperitoneum”, if not diagnosed within 24 hours, is associated with a surge in the death rate by 8 folds! CT image interpretation as part of the conventional procedure is time and effort-consuming. The AI automatic interpreting technology developed by New Taipei Municipal Tucheng Hospital is capable of detecting abnormal free air and giving out alarms in real time to effectively improve precision and clinical efficiency.

Statistics of the Ministry of Health and Welfare show that there was a headcount of more than 2 million people seeking medical attention due to abdominal pain in 2023, accounting for 9.86% of all patients. Among the patients with abdominal pain, the most dangerous condition is pneumoperitoneum, that is, the presence of abnormal free air in the abdomen, which usually means rupture of an organ or the intestine requires emergency surgery. Any delay in diagnosis can be life-threatening.

Automatic Interpretation Expedites Diagnostic Procedure

Julian Seak Chen June, Head of Department and Associate Professor, Department of Emergency Medicine, New Taipei Municipal Tucheng Hospital indicates that the method universally accepted to be the most sensitive and precise at present to detect abnormal free air in the abdomen is computed tomography. There may be, however, more than one hundred images generated at the end of each exam, and it highly relies on the clinician and the radiologist spending time and effort to interpret them. In actual medical practice, however, physicians often have to manage multiple patients simultaneously, while processing large amounts of complex information in the field. With the added interference from



various clinical tasks, it becomes nearly impossible to dedicate oneself solely to real-time image interpretation throughout the day. Insufficient experience and excessive fatigue can also lead to omission of potentially highly fatal free air, as shown in the images, which give rise to countless medical malpractice disputes.

"The mortality rate or death rate of pneumoperitoneum can increase by eightfold or more with every 24-hour delay in diagnosis, making timely diagnosis medically urgent and essential/indispensable." After more than a year of research and development led by Dr. Julian Seak Chen June, the Tucheng Hospital team obtained a patent in May 2023 for a technology entitled "A deep learning-powered novel artificial intelligence algorithm and system to assist in the identification of pneumoperitoneum on abdominal computed tomography." This system is capable of automatically identifying abnormal free air in CT images, reducing the average diagnostic time for pneumoperitoneum from 153 minutes to under 5 minutes. Additionally, real-time alerts are sent to on-site physicians and radiologists to expedite confirmation and accelerate clinical response.

Novel Technology with Up to 90% in Precision

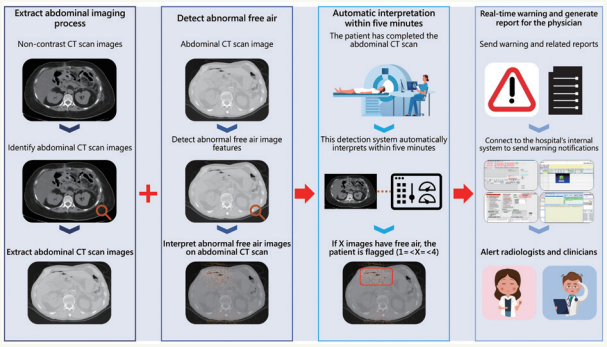
This AI-powered automatic interpretation software has been successfully integrated with existing CT machines. Compared to conventional detection methods, it utilizes a larger volume of training data, can detect both abdominal and non-abdominal free air, and is effective even on CT images without contrast medium-addressing cases where contrast administration is not possible due to a patient's clinical condition. Moreover, this technology adopts the highly sensitive lung window setting for interpreting parenchyma, enhancing the clarity of abdominal images by making the shape, density, size, and distribution of free air more distinguishable. It utilizes multiple CT slices simultaneously as the basis for interpretation, and validation studies have shown that when up to four images display pneumoperitoneum, the system achieves a diagnostic accuracy of up to 93%.

"Since the technology is both novel and advanced, it was met with quite a few challenges and frustrations throughout the R&D process," said Dr. Julian Seak Chen June. He mentioned that the team—comprising senior, mid-career, and young members, each with different ideas—collaborated effectively, sparking innovation through their diverse perspectives. He also noted that the need for high-speed computing to train the model made budget support essential. Fortunately, Chang Gung's strong, supportive, and robust research system enabled the study to proceed successfully.

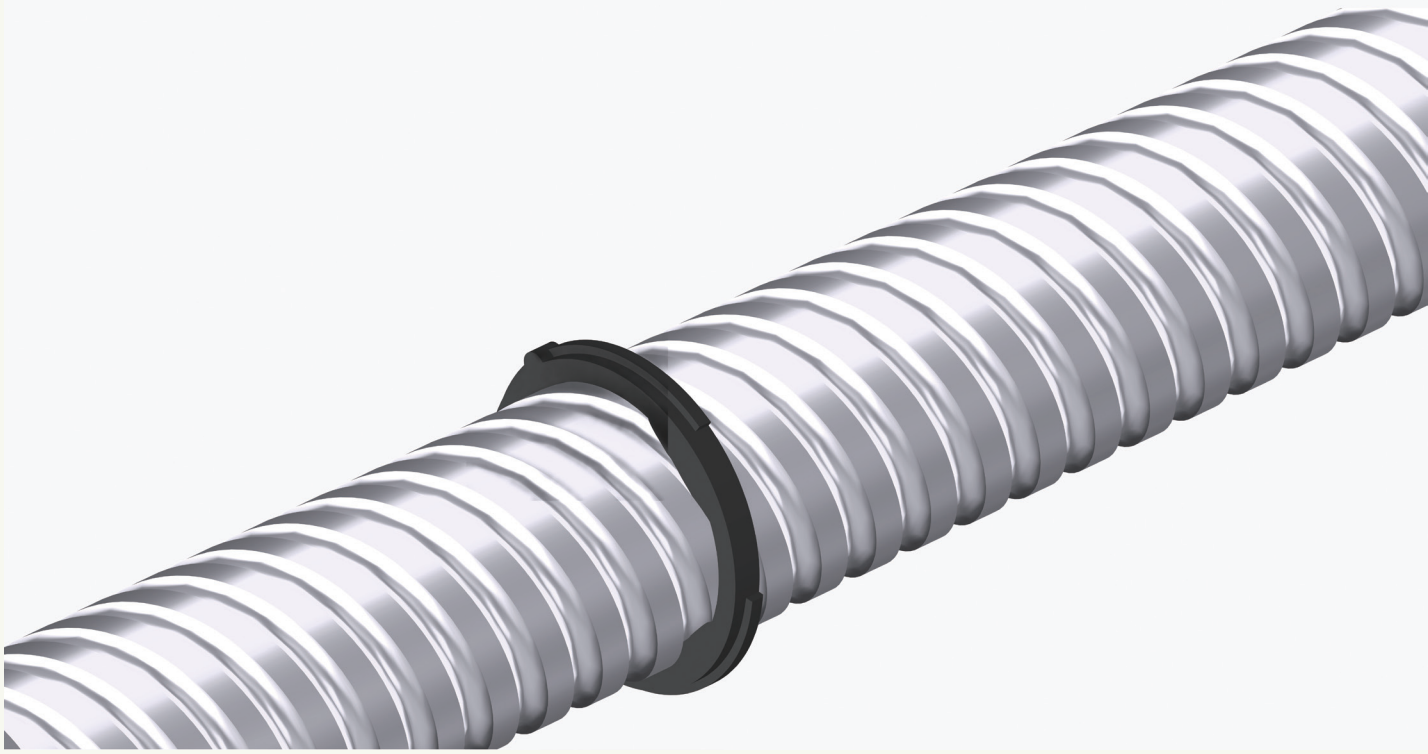
Constant Advancement Creates Win-Win for Physician and Patient

The system was officially launched in August 2023. By October 2024, Tucheng Hospital had detected pneumoperitoneum in 83 patients by processing 810,000 CT images, with real-time alarms alerting physicians enabling timely surgical treatment. This accomplishment marks a significant milestone in improving patient care at Chang Gung Tucheng Hospital.

Dr. Julian Seak Chen June indicates that the team has further researched and developed the abdominal free air image separate positioning technology, which automatically highlights the specific CT image numbers showing abnormalities and pinpoints the precise locations of free air. This advancement delivers more detailed clinical information and improves medical efficiency and quality, creating a meaningful win-win outcome for both physicians and patients.



INVENTION
SILVER AWARD



Ball Screw with a Dust-Proof Assembly

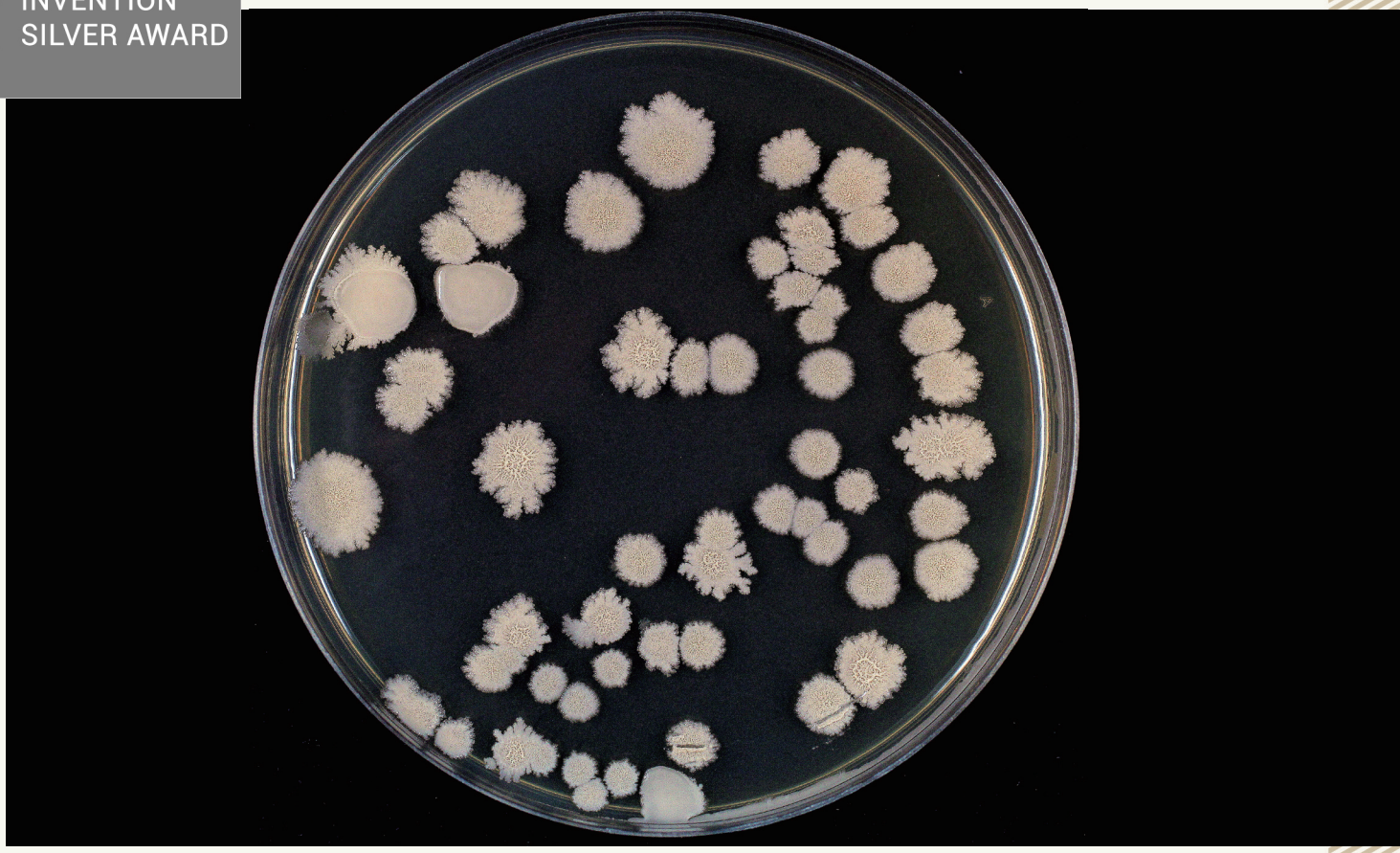
Patent Certificate : I630333
Wei-Lun Liu, Sheng-Hao Hong

This invention was made primarily to respond to the needs of end users and to meet the market's needs for industrial developments. The quartz scrap from etching of parts adopted in semi-conductor equipment, copper foil and aluminum scrap from the processing of BGA substrates from a PCB forming machine, graphite scrap from the processing of precision graphite dies, and woodworking machine tools, among others, are generally found with issues such as undesirable durability of dust-proof elements and oil-seal performance, driving torque, and uneasy installation.

With the innovative design of the dust-proof component, this invention makes closer-to-complete adhesion of the dust-proof lip to the ball screw orbit possible and can accommodate specifications applied in respective industries while at the same time satisfying market application demand characteristics, including low driving force, high dust-proof and oil seal performance, easy installation, among others.

This invention is the core structure of a highly dust-proof ball screw product that has significantly addressed end-user issues in terms of its promotion in industries and has gradually replaced competitor products from Japan, Europe, and Germany on the market, with extensive application to respective industries, such as woodworking machines, automation & semi-conductor equipment, industrial machinery, and industrial robots, among other equipment to accordingly increase its industrial application value while at the same time optimally addressing issues reflected by end-users on assembly and also answering to ESG energy-saving, environmental protection, and low-carbon industrial application trends that emerged in recent years. This invention also accomplishes energy-saving efficacy for end-users and answers to RoHS regulations at the same time to properly fulfill environmental protection responsibilities from production to the utilization of a product.

INVENTION SILVER AWARD



Bacillus Subtilis KHY8, Cultivation Method for Increasing KHY8 and Use Thereof

Patent Certificate : I638889
Tai-Yuan Chen

To answer to the government's policy to reduce the risk of agricultural chemicals by half in ten years and to promote sustainable development of agriculture, this patent will come with industrial mass production of multi-purpose Bacillus subtilis KHY8 and will be applied to the prevention and control of field botanical disease. KHY8 can give rise to multiple antibiotic substances and iron-chelating ones to effectively inhibit the growth of botanical pathogens, and it also generates multiple extra-cellular enzymes and IAA to boost crop growth. It is highly safe and has been approved through rat lung and oral toxicology studies; it is a strain that can be used as a food ingredient or in food processing. This patented approach can render KHY8 biological preparations with a warehousing activity of more than 2 years; it is of commercial value and competitive potential. KHY8 is proven to have outstanding antibiotic performance against multiple botanical pathogenic fungi and bacteria, and can effectively reduce the incidence of botanical disease. The final KHY8 biological preparation produced with this patent and its usage and purpose have been proven through multiple field experiments reviewed and approved by the government; it is capable of effectively preventing against important diseases as a result of undesirable preventive and control effects of multiple agricultural chemicals such as rice blast, mango melasma, mango anthracnose, and post-harvest anthrax in the field. It cannot only serve as the primary disease prevention and control measure in organic cultivation but also be used in common agricultural practice together with fertilizers and certain agricultural chemicals, with high user convenience and expandability. This patent can be used in the production of microbial pesticides, microbial fertilizers, compost, soil amendments, and disease-inhibiting media; it is multi-functional. In terms of microbial pesticides, the technology was transferred to practitioners at NTD 5 million for the production of microbial pesticides that were reviewed, approved, and registered with the government for use in the prevention and control of disease in 11 crops, including rice, mango, and coffee. The product has been well received since it was available for the first time on the market in October 2020; the total sales had come to approximately NTD 7.24 million by the end of 2024.

INVENTION
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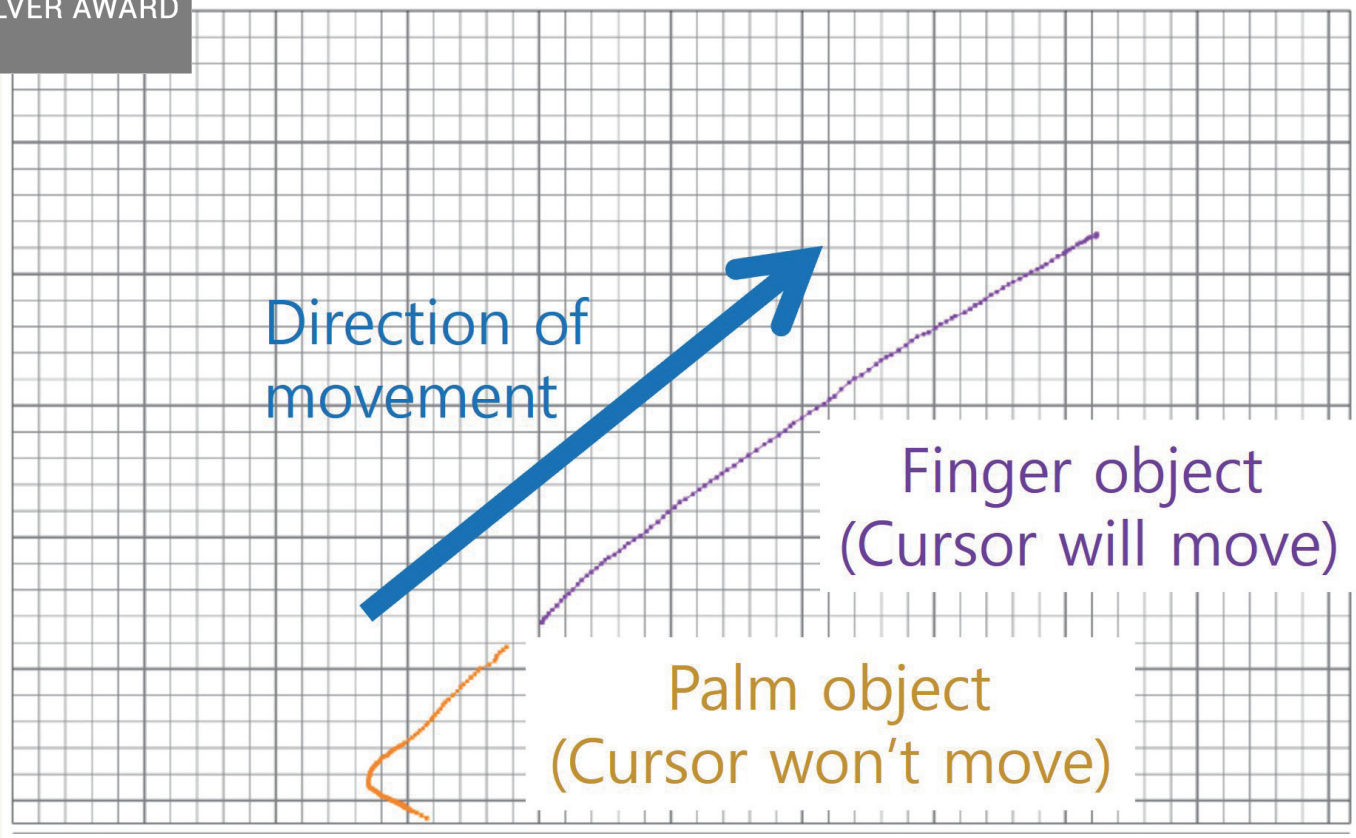


Method of Changing Identified Type of Touch Object

Patent Certificate : I662460
Tuan-Ying Chang, Hsueh-Wei Yang, Pin-Jung Chung

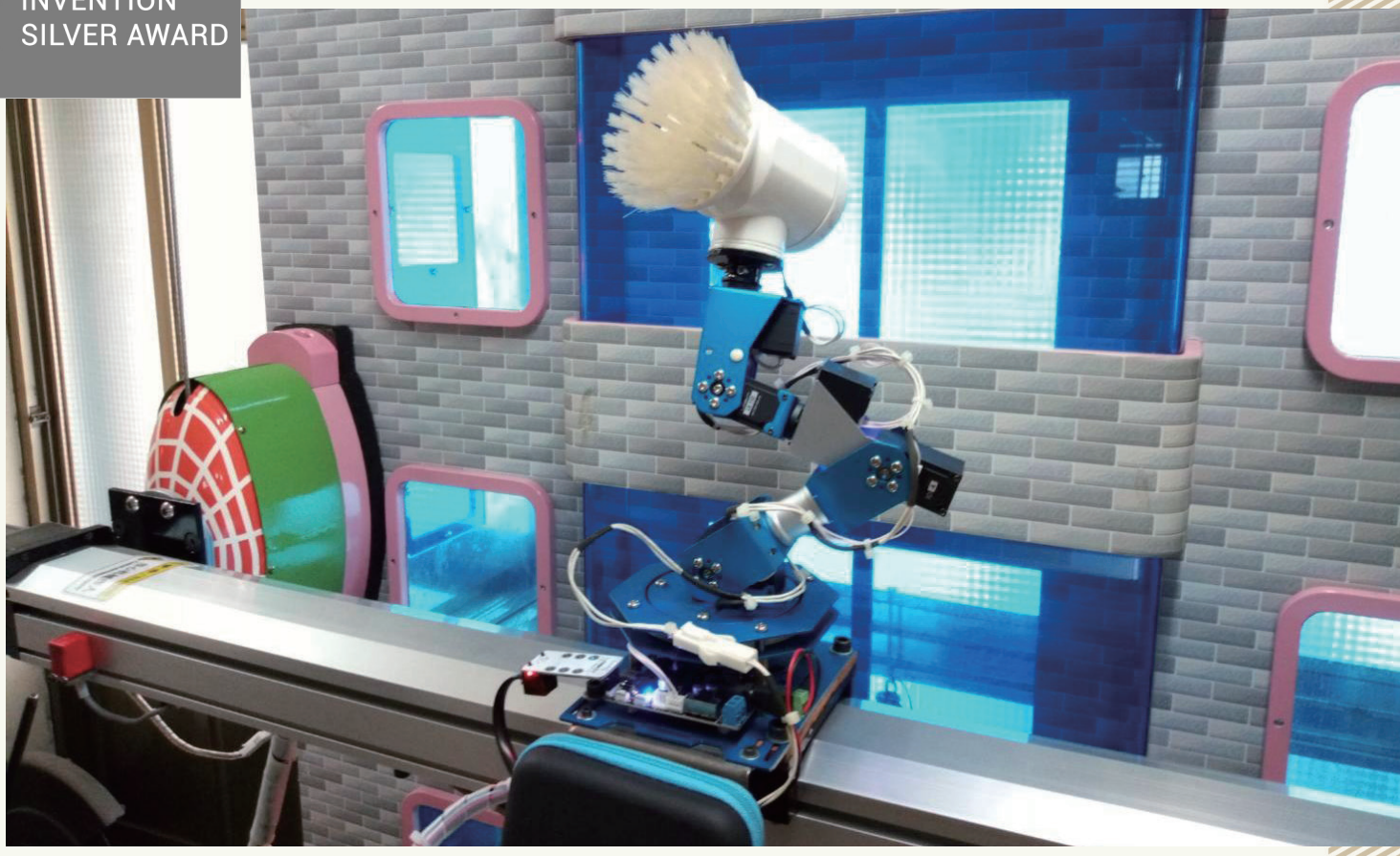
The touch trackpad of a notebook computer, to prevent against negative user experience as a result of unexpected shift or clicking with the cursor touched by accident, comes with an identification algorithm for the type of object in contact and reports identification results to the operating system. With the finger, the cursor is allowed to move. If the object is not a finger (e.g., a palm), on the other hand, the operating system will ignore the action.

For the instantaneous prevention against accidental touches, it is required to output the identification findings as soon as the object comes into contact with the touch panel. It is, however, often comparatively easy to misidentify before a complete contact, and in the same operational sequence output, the Windows operating system only allows the type of object to be changed from finger to palm, not from palm to finger. Therefore, if it is identified incorrectly as a palm instead of a finger at the beginning of contact, the whole operation will be ignored, and the user needs to raise his/her finger and operate all over again, resulting in an undesirable user experience.

This invention, by means of a series of virtual movements, breaks through the restrictions of the Windows operating system and is able to continue operating without the need to raise the finger again when the operating finger is erroneously identified as a palm in the beginning. This enables the possibly palm object to notify the system as soon as possible to lock up the mouse cursor, and a correct judgment is made through more complete subsequent contact area and operation before the system is notified to unlock. It offers a win-win solution in terms of reaction speed and identification accuracy. Compared to before the introduction, the reaction speed after the introduction is improved by 30 ms and the identification accuracy by 5%.

This invention is the one and only approach in the world. There are no other technologies that may compete with it at present, and it has been introduced into the touch products of the Company comprehensively. This invention is already a role model in the industry for other competitors and is designated in particular by some international notebook computer heavyweight manufacturers to be a test item, indicating that it is highly competitive.

INVENTION SILVER AWARD



Automatic Wall Adhesion and Cleaning System

Patent Certificate : I669161
Yi-Wen Lin

All urban constructions around the world, modern high-tech buildings or historical classic architectures, need to withstand winds, sunlight, and rain and rely on periodic cleaning to keep their appearance and structure safe. High-altitude cleaning, however, is both time and effort-consuming and is associated with a high risk level, as accidents during artificial cleaning often occur. The core objective of this invention is to reduce risks associated with artificial operations by realizing automatic cleaning of the exterior walls of buildings, applying innovative AI technologies.

This invention breaks through the conventional operational mode and combines the hoist, absorption mechanism, linear guide, and robotic arm as well as the cleaning device at the end of the robotic arm in one, creating an automatic cleaning system that is able to cope with the high-altitude environment flexibly and run steadily to meet the exterior wall cleaning demand of a building with stylish 3D design.

The maneuverable robotic arm adopted by this invention comes with a cleaning device on its front end (articulated or suspended robotic arm), and its bottom is fixed to the linear guide to allow lateral movements. There are absorption mechanisms on both ends and a hoist on the absorption mechanism or the top floor. An operating hoist enables the whole equipment to rise or lower. When it reaches a specific point, the absorption mechanism is activated, and it can adhere to the wall for the cleaning device and the robotic arm to start automatic cleaning.

Once this invention is available on the market, it will become the first product in the world that is capable of automatically cleaning 3D stylish buildings. The preliminary operating efficiency is already more than 6 times the efficiency of artificial operations, and it will continue to climb with the optimization of AI and machine learning. The cleaning result will further exceed that of the traditional artificial operational mode! This is one small step for the world and one giant leap for the industry!

INVENTION
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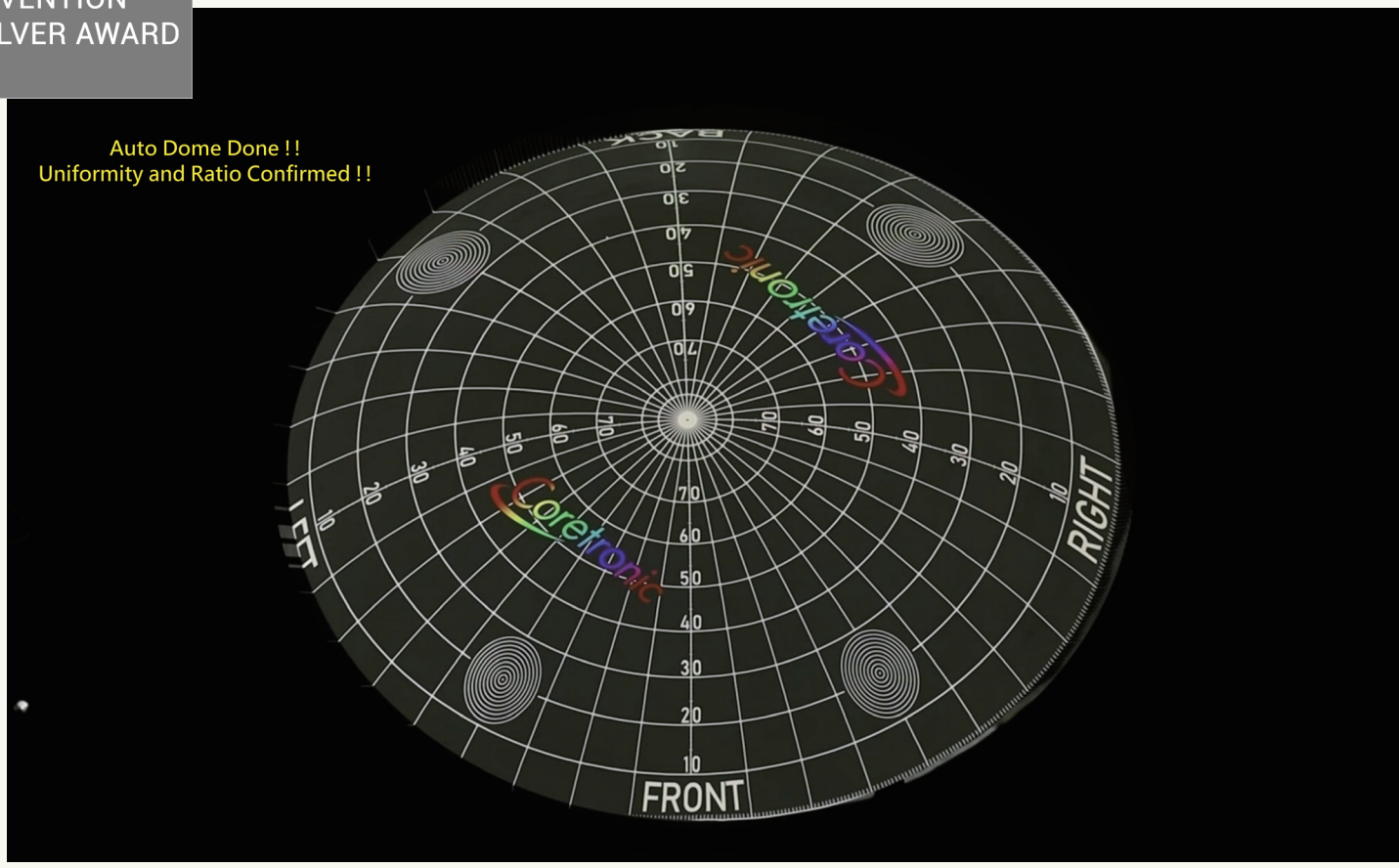


Projection System and Projection Method

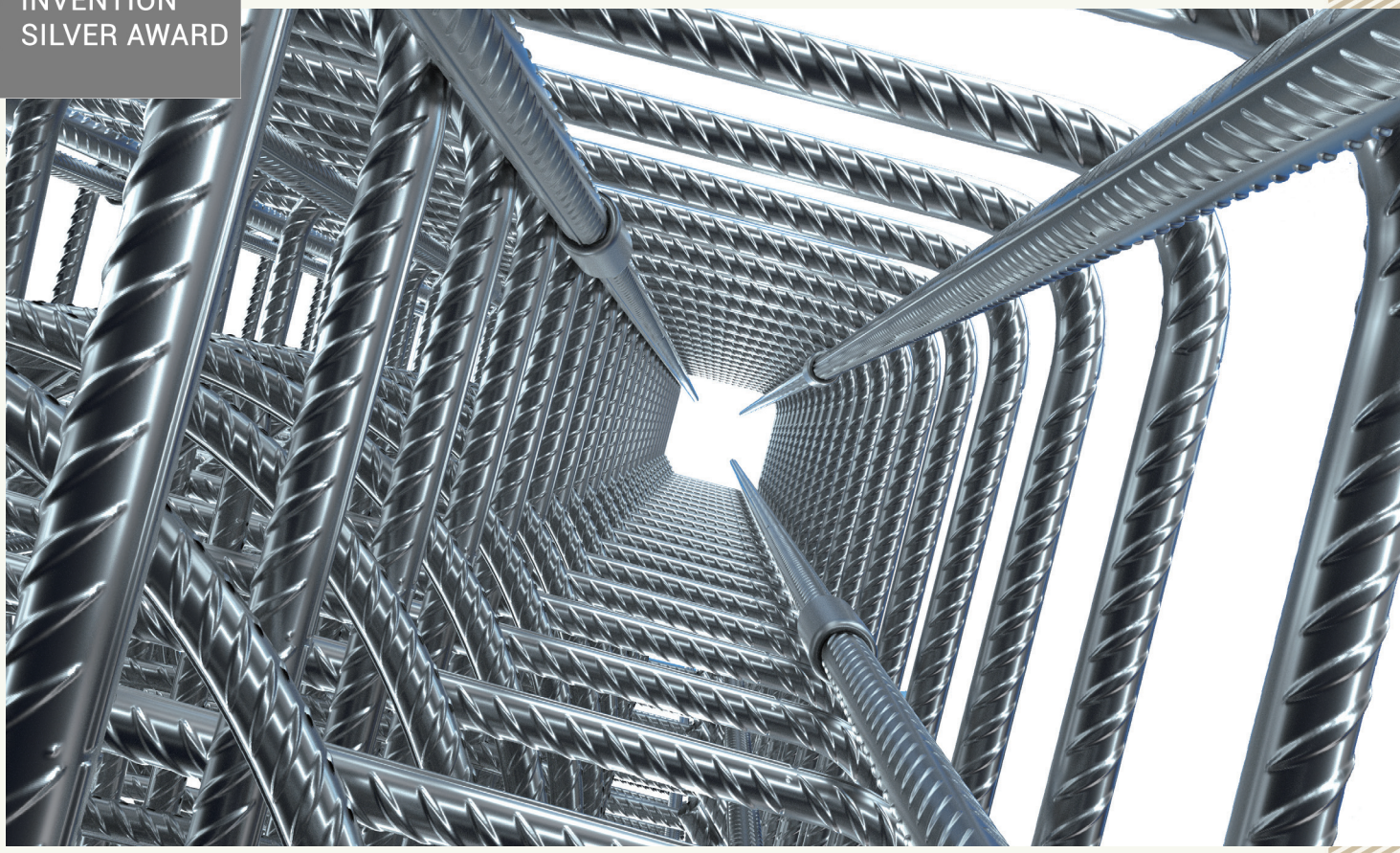
Patent Certificate : I698127
Chien-Chun Peng, Chi-Wei Lin

This invention aims to address the key issue of image blending accuracy and completeness, which can be affected by the symmetrical four-grid positioning method when a camera imaging grid is used for multi-projector automatic image blending. In particular, it correctly renders coordinates relative to the full projection screen and identifies the projection area and direction using angular grid points. This is especially crucial when there are two sets of grids due to environmental reflections or multi-angle projections, or when the projection angle is otherwise impossible to identify. The projection orientation is precisely identified through these angular grids.

The asymmetrical grid design effectively eliminates identification errors caused by environmental factors, ensuring that full projection screen coordinates and the projection area are obtained correctly. This leads to enhanced image blending accuracy and success rates. To solve these issues, this invention adopts a non-isometric triple grid positioning method to correctly obtain coordinates and the projection area relative to the full projection screen, identifying projection orientation by applying angular grids.

Automatic image blending, applying this patent, is feasible in both general planar displays and the most complicated dome splicing. When actually applied to the automatic image blending application developed by Coretronic Corporation, it realizes automatic dome splicing, black-level adjustment identification, and calculation, fulfilling the rapid and precise demand for overall automatic image blending. This technology is applicable to general planar displays (large screens and exhibition displays), dome splicing (ball theaters, flight simulators), and immersive projection settings (VR theaters, etc.). Its high automation helps bring down the time and cost wasted due to manual adjustment, thereby enhancing image blending accuracy and efficiency. This world's only automatic black-level adjustment and image blending technology is made possible on the basis of asymmetrical grids. It is highly competitive in the automatic image blending market, poised to create even greater market value and business opportunities.

INVENTION SILVER AWARD



Three Dimensional Rebar Structure of Building Cylinder and Circular Transversely Closed Confined Stirrup Structure

Patent Certificate : I700417
Hsin-Yu Tsai, Jung-Bang Wang

Purpose and features of the invention:

This invention aims to provide horizontal confined steel rebar materials and the construction method for dual-confinement structural column rebar projects. It can form dual-core columns featuring two cores in one column, round inside and square outside, to achieve the goal of an innovative dual reinforced concrete seismic building. One-piece cylindrical stirrups with two-way reinforcement to hold in place and confine the main reinforcement of at least 4 struts. It is to be enforced in the core concrete portion of a rectangular or polygonal reinforced concrete structural column. The dual-confinement reinforced concrete structural rebar cage with dual confinements (round inside and square outside) is formed and goes through ready-mix concrete pouring and curing to complete the dual-core column with two cores in one column, round inside and square outside. It realizes increased horizontal rebar confining performance of a column, improved carrying axial strength, delayed axial stressed damage in case of a powerful earthquake, and enhanced lateral deformation. The primary efficacy of maximized reinforced concrete structural seismic resilience and enhanced energy consumption is achieved.

Application of the Invention:

This invention is primarily applied to the construction of reinforced concrete structures and is one of the important technologies to enhance the seismic safety of a building. It helps satisfy the design requirements for a building, that is, no damage in case of a small earthquake, repairability in case of a medium earthquake, and no collapse in case of a big earthquake. This invention allows completion of column reinforcement engineering of an innovative dual-confinement reinforced concrete building at the construction site with pre-fabricated standardized dual-confinement horizontal rebars according to the construction quality control procedure of Homia Licensing CO., LTD., and also completion of erection and assembly with the dual-confinement rebar cage previously assembled at the rebar processing yard and carried to the construction site, in addition to reflecting the room available at the construction site, planning and designing of a dual-confinement pre-assembled rebar cage that is at least one-story and no more than three-story high. It effectively addresses delayed construction and unsteady quality as a result of labor shortage, and the engineering quality meets the requirements of the Reinforced Concrete Seismic Specification.

INVENTION
SILVER AWARD

Adjustable Workpiece Support System and Method

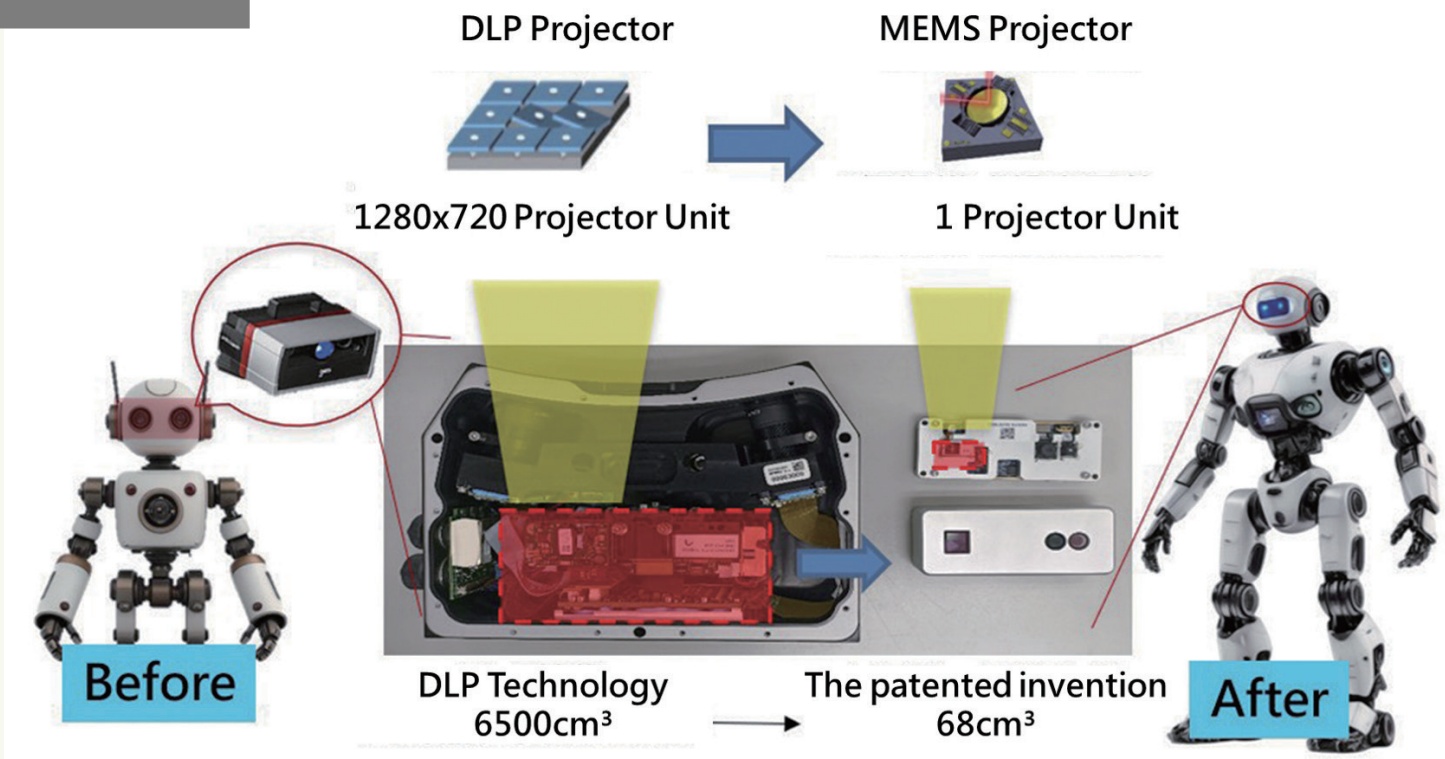
Patent Certificate : I707740
Chun-Ting Chen, Chien-Chih Liao, Pei-Yin Chen, Bo-Jyun Jhang, Jen-Ji Wang

Over the past few years, composite materials have been widely adopted in the automobile, aerospace, and marine industries because of their lightweight and high strength. Processing of composite materials in Taiwan still relies on fixed dies. The dies are not interchangeable. Therefore, a large number of dies are needed to cope with the different composite material shapes. The production efficiency is undesirable, and the large quantity of dies indirectly increases the production and inventory costs, causing domestic composite material manufacturers to gradually lose their competitive advantages in the face of enhanced production efficiency of international composite material manufacturing equipment.

This invention introduces an adjustable workpiece support system whose adjustable support device comes with a set of support elements to support one workpiece. Each of the said support elements is adjustable in height and angle. The analysis support point module, on the other hand, imports the computer-assisted design file of the supported workpiece and analyzes the said computer-assisted design file in order to render a set of optimal support points for the said workpiece. The post-coordinate processing module calculates the support coordinates of respective support elements corresponding to the set of support points. The control module receives support coordinates of respective support elements and adjusts the height and angle of respective support elements in order to support the said workpiece and to accordingly minimize deformation of the workpiece.

The key adjustable support system introduced through this invention can effectively resolve issues such as undesirable fixed die production efficiency, die production cost, and required floor area. Its strengths include the possibility to finish workpiece input setup and generate the support status within 30 minutes, reflective of the outlooks of different workpieces; it helps reduce the line switch time by at least 70% compared to the 4 to 6 hours needed for line switch with a conventional shaper.

INVENTION SILVER AWARD



Projecting Apparatus and Projecting Calibration Method

Patent Certificate : I722703
Kai-Shiang Gan, Po-Lung Chen, Shi-Chen Chen, Chien-Chun Kuo

In the introduction of 3D visual sensing technology, small-load AI robots are often met with the restrictions of traditional equipment in terms of volume and precision. Existing industrial 3D sensors often adopt the DLP technology. Despite their high precision, the bulky size and relatively slow scanning speed disfavor smaller robotic integration and application. The galvanometer scanning system, on the other hand, is known for its small size and high speed; nevertheless, the galvanometer mechanism is susceptible to impacts of temperature, time, and structural and morphologic transformation, which will lead to insufficient sensing precision to make it unfit for workplaces such as industrial ones, where high precision is a must. This patented technology is a breakthrough of the foregoing issues as it makes up for the errors triggered by galvanometric moving parts and addresses issues such as projective decoding, light spot, and deformation that tend to occur. The next-generation 3D visual sensor, known for features such as “high precision”, “small size”, and “ultra-high speed”, has been successfully developed through the integration of optical calibration and prediction algorithms and is particularly suitable for small-load AI robotic applications. Core innovations of this technology include the creation of a linear light source machine, a standardized calibration procedure, and the introduction of a multi-space corresponding forecast model to effectively overcome the issues of insufficient information and thermal deformation with traditional single-axial projection. Actual tests show that the sensor system increases 3D sensing precision by more than 26 times (with the error reduced from 5.1 mm to 0.19 mm), accomplishing the sub-millimeter high-precision requirement. In terms of application, this technology has successfully helped domestic manufacturers enter the AI-assisted robotic market and facilitated the landing of smart factories and smart shops. The technology has been transferred to the world’s second-largest collaborative robot business for introduction to the hand-eye coordinated robot platform. It is estimated that a production value of more than NTD 4 billion will be created within 3 years. It has been applied to high-precision manufacturing venues such as metal casting, plastic injection, semiconductor manufacturing, and the automation industries. In addition, this technology has been technically transferred to sensor and system integration businesses for the creation of local AI-intelligent hand-eye robot solutions. The developed sensor is highly compatible and is not restricted to specific platforms; it can be quickly integrated into the equipment of major international first-line industrial robot manufacturers and possesses high potential for mass production and promotion.

INVENTION
SILVER AWARD

Self-Bonding Coated Electrical Steel Sheet, Laminated Core, and Method for Producing the Same

Patent Certificate : I726763
Hsin-Wei Lin, Ping-Cheng Sun, Heng-Shou Chang, Shih-Yu Chan

With the rapid growth of the electric vehicle (EV) market, the demand for high energy efficiency, low noise, and extended driving range in traction motors has led to a shift in core manufacturing techniques—from traditional "riveted and welded" cores to "bonded" cores. However, the bonded core manufacturing process has long been monopolized by German and Japanese suppliers through “in-die gluing” technologies, leaving domestic stamping manufacturers in Taiwan with limited options and significantly constraining the supply chain of electrical steel.

To address this challenge, this invention introduces an innovative technology that integrates adhesive materials with the steel substrate, resulting in the development of Self-Bonding Coating Electrical Steel (SBES). The technical principle involves three key stages:

[Stage A] Develop an environmentally friendly, low-carbon water-based coating, which is uniformly applied onto the steel strip surface using a roll-coating process.

[Stage B] Pre-cure the coating steel to form a dry, non-tacky film on the surface, followed by coil winding and packaging.

[Stage C] In the downstream process, the coating steel coil is slit and stamped into laminations, which are then stacked and bonded into a solid core through the application of heat and pressure.

This invention not only offers a comprehensive solution for bonded core manufacturing but also demonstrates several advantages, including low production cost, high bonding strength, small tolerance, and improved energy efficiency. Furthermore, it effectively circumvents existing in-die gluing patents in the market.

In recent years, self-bonding coating of electrical steel has been successfully promoted as a core material for next-generation motors in international automotive manufacturers. It also shows strong potential for application in emerging markets such as drones, robots, and high-speed AI cooling fan motors. Since its launch in 2017, this technology has generated over 7,800 metric tons of steel coil orders for China Steel Corporation (CSC), resulting in cumulative revenue of NTD 360 million, with a gross margin of 30%. The market is projected to grow by 2 to 3 times annually, with order volumes expected to exceed 20,000 metric tons and create over NTD 1 billion in annual production value by 2025.

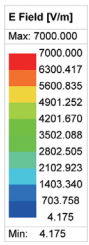
INVENTION
SILVER AWARD

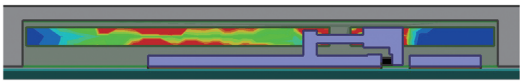
Image Sensor Package and Endoscope

Patent Certificate : I730621
Shang-Yi Wu, Ming-Che Hsieh

This invention features an innovative integrated modular design that replaces traditional structural and manufacturing methods, delivering more stable product quality, improved production efficiency, and reduced overall costs. The advanced endoscope module utilizes a high thermal conductivity substrate with internally embedded conductive lines, allowing flexible positioning of both the image sensor and surrounding LED lighting elements. The integration of a 3D substrate design further enhances illumination efficiency, enabling clearer and more effective imaging.A key advantage of this invention lies in its adoption of semiconductor-level packaging and testing processes to achieve miniaturization while maintaining high productivity, reliability, and quality consistency. Leveraging Taiwan's advanced semiconductor packaging technology, this approach allows for the successful integration of miniature image sensors and mini-LEDs into a compact camera module designed specifically for endoscopic applications. The entire manufacturing process is compatible with automation, ensuring high yield and scalability.Thanks to this high-precision packaging approach, the invention achieves a level of miniaturized accuracy that is typically difficult to attain in single-use endoscope solutions. As a result, it not only promotes the widespread adoption of single-use endoscopes — offering more accessible diagnostic tools — but also significantly reduces patient discomfort through its compact design.This technology has been awarded invention patents in both Taiwan and the United States and has been successfully applied to the EES100 Single-use Electronic Nasopharyngoscope, developed by Medimaging Integrated Solution Inc. and marketed locally under the Horus brand. The product has received full regulatory approval from both the U.S. FDA (510(k)) and Taiwan TFDA, and has already generated tens of millions of dollars in production value.With international certifications secured and potential applications across multiple medical fields, this innovation is expected to unlock global business opportunities worth several tens of millions, setting a new benchmark for high-performance, cost-effective disposable endoscope solutions.

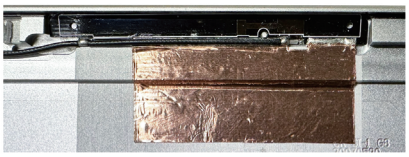
Dual Slot Antenna Performance



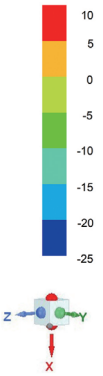


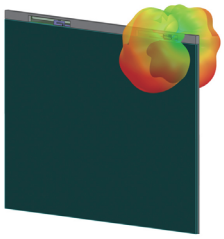
Electrical Field Diagram of Low Band

Electrical Field Diagram of High Band

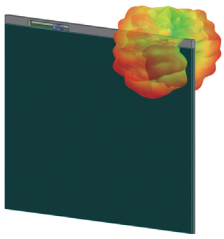


Product

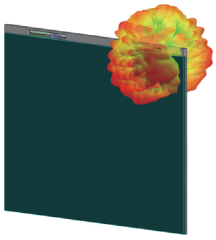




2GHz_3D Radiation Pattern

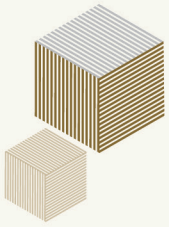


5GHz_3D Radiation Pattern



6GHz_3D Radiation Pattern

Electronic Device and Antenna Module



Patent Certificate : I737302
Kuan-Hung Li, Shang-Ching Tseng, Yu-Yu Chiang

Laptop computers that incorporate metal housings are well-received among consumers because of their lightweight and thin, minimalist appearance. Those available on the market, however, generally come with single-slot antennas. This type of design only supports bandwidths up to 160 MHz, and thus is unable to satisfy the high-speed internet connectivity requirements of the Internet of Things.

To overcome the bottleneck caused by this, an R&D team (Yu-Yu Chiang, Kuan-Hung Li, and Shang-Ching Tseng) at WNC Corporation used their experience and expertise in communications technology to develop an Electronic Device and Antenna Module patent. The patent includes a dual-slot antenna design coupled with a single-loop antenna in order to excite the resonant frequencies of the antennas in these slots. By using HFSS software to conduct simulations and adjusting antenna locations on laptop housings, the team was able to achieve real-world performance results in line with simulated ones. The upper end of the high-frequency band range used by the patent's antenna design was increased from 5 GHz to 7.5 GHz, putting it within the Wi-Fi 7 working band range. Bandwidth was increased by 130% compared to Wi-Fi 6 specifications.

This patent addresses the performance issues that impact antennas used in laptop computers with all-metal housings, enabling antennas to meet Wi-Fi 7 performance standards, thus ensuring fast and reliable connectivity. The manufacturing processes described within the patent meet environmental regulations, help lower overall costs, and also reduce manufacturing time by 60% compared to traditional manufacturing methods. This patent meets Wi-Fi 7 specifications and has been successfully implemented in commercial products, achieving outstanding sales figures. For brand companies focused on providing electronic products with elegant, stylish metal exteriors, adopting the designs in this patent will greatly boost the network speeds of their products.

Moreover, the patent can be applied to antennas used in other network communications products with metal housings, such as tablets, desktop computers, wearable devices, and automotive antenna modules. In recent years, WNC has been expanding its offerings of smart in-vehicle and automotive connectivity solutions. The use of patented technology in the design and manufacturing of the company's automotive antenna modules showcases the versatility and ease of integration of the technologies and processes adopted, highlighting the patent's immense potential.

INVENTION
SILVER AWARD

Pipe Freezing Method

Patent Certificate : I738370
Fei-Lung Liu, Fei-Fung Liu, Tzu-Yin Chiang

With escalating competition in the international semiconductor industry, chip plants need high-speed and high-performance manufacturing processes, and water used in the manufacturing processes makes the stability of the water supply system a necessity. In the event the water system needs to be repaired or expanded, the water supply previously needed to be shut down to be repaired and expanded, which would mean stopping production and colossal economic losses. To tackle this problem, the inventor group used the “Registration Water-Stop” approach and developed no-shutdown repair technology in order to enable maintenance of water supply systems and operation of production lines to proceed in parallel. When the development and research started, the team was already at a disadvantage due to having nothing they could look back on in regards to experience, equipment, or technologies. They initially tried freezing in an attempt to stop water using a refrigerant machine and a copper pipe covered with water color. Although the idea was viable, it would take anywhere from 5 to 6 hours to freeze water, thus slowing engineering efficiency. Consequently, the group modified the technology, designed a proprietary freezing die, and utilized liquid nitrogen to accelerate the freezing cycle, successfully cutting time down to just 30 minutes. The technology was inspected and approved by the client and has been successfully installed on site since. Freezing to stop water and repairs afterwards were successfully achieved within 6 hours.

This invention makes it possible to make fast engineering, occupies minimal space in use, and is destructive-free. Once frozen, the ice cube blocks water pressure for purposes of repairing or expanding the pipeline. Once done, the ice melts, and the water supply resumes. According to the Standard Operating Procedure established by experimentation, water temperature and in-pipe flow rate are the major parameters of this freezing practice. Experiments also validate that the ice cube has the ability to withstand a water pressure of 300 kg/cm². Therefore, freezing to close off water is a quick, low-carbon-footprint, and highly reliable repairing technique. It has been proven appropriate. It is suitable for water supply systems that would be greatly impacted by interferences, such as those in semiconductor factories like TSMC, AUO, and ASE, and in facilities like National Taiwan University Hospital, Taipei 101, Taipei City Hall, the Ministry of Education building, and the Taipower building, where it has already been used. Freezable pipe diameters range from 13 mm to 350 mm. This patented technology's greatest advantage is that it can effectively shut off water pressure for maintenance and expanding production lines without interrupting water supply or production. With this invention, semiconductor producers and commercial structures can enhance operational continuity, lower engineering costs, and deliver valuable contributions to economic growth in various industries.

INVENTION
SILVER AWARD

Infusion Method

Patent Certificate : I739058
Wen-Fong Chang, Yen-Hsiang Hsiung, Chia-Yao Chang

With conventional venous infusion, residual air bubbles pose a threat to the patient's health. Therefore, nurses must manually remove the bubbles, which increases the cost of medical care and the workload for healthcare professionals. To address this issue, the technology described here has been integrated into the smart infusion pump. With the automatic air bubble detection and removal mechanism, it ensures the safety and stability of the infusion process while at the same time reducing the burden on nurses and boosting clinical operating efficiency.

Technical Characteristics and Strengths:

1. Air bubble detection and automatic removal: The built-in sensor can detect air bubbles inside the infusion tube without removing the infusion tube; there is no need to remove the infusion tube. The air bubbles can be quickly and safely removed through a simple operation.
2. Reduced waste of solution: The auxiliary storage device effectively recycles discharged solution to avoid wasting expensive medicine and optimize the distribution of healthcare resources.
3. Pressure monitoring to assist in removing air bubbles: While air bubbles are being removed, this invention, with its auxiliary infusion tube pressure detection mechanism, ensures that the operation is correct and free of errors to protect patient safety.
4. Enhanced nursing efficiency: Air bubbles are removed automatically to reduce the burden on nurses so that they can focus more on other care tasks; it adds smoothness and accuracy to the clinical operating procedure.

Patent Deployment and Application on the Market:

This technology has been patented in multiple countries such as Taiwan, the US, and China, and applied to the "SmartMed Infusion Pump" and adopted in multiple medical centers and healthcare facilities at all levels in Taiwan for significantly improving venous infusion safety and advancing the development of smart medicine. In addition, "SmartMed Infusion Pump" (with this patented technology) has been recognized with the National Industrial Innovation Award and the Symbol of National Quality laying a solid foundation for expansion into the international market.

INVENTION
SILVER AWARD

Surgical Image Pickup System

Patent Certificate : I743473
Rui-Cian Weng, Yih-Sharng Chen, Te-I Chang, Chi-Hung Huang, Yen-Pei Lu, Yen-Song Chen, Kuan-Yin Yu

During precision surgical procedures such as heart surgery, the surgeon needs to wear the loupe, and usually a 2-4X loupe is used in a cardiac procedure, with an actual operational field of vision of about 10 ~ 15 cm before the waist, and the loupe lens itself is already heavy. In addition, the headlights used in operating rooms nowadays mostly have optical fiber and halogen light source hosts. Plus, the camera and headband, the bowhead surgery that lasts for 6 to 8 hours, will become a great burden for the neck. Therefore, the headband needs to be adjusted at the light source and field of vision in order to ensure that the light precisely covers the surgical site. This makes it necessary for the surgeon to perform complex adjustments with sterile gloves on, and the light source lines often tend to get entangled, impacting surgical flow. Meanwhile, the shadowless lamp used during surgery cannot effectively illuminate deep parts; wearing an additional headlight, hence, becomes a must. The equipment currently available on the market is not of the coaxial design; as a result, the image recording area, the light source irradiation range, and the zoom-in view cannot be matched precisely, and this impacts clinical application. At present, an optical fiber system needs to be connected to an additional light source host. The equipment is cumbersome and cannot be carried easily.

This invention and patented technology, therefore, features the development of an integrated head-mounted device and has the head light and camera designed to be a co-light bundle system, and adopts the LED instead of traditional halogen light host optical fiber for illumination to effectively reduce equipment weight and to significantly enhance portability and convenience. The core technology is the coaxial real-time automatic focal camera that ensures consistency in the illuminated area and the perspective of the recording system. A precise perspective can be maintained regardless of the distance to improve the comfort and stability required for long surgical procedures; it can be used by the medical team for communication and surgical teaching purposes. Once developed, this invention will be introduced to the market at a reasonable selling price to enhance the quality of medical care in Taiwan. Most of the equipment available now is imported from overseas. A pure headlight illumination system is relatively affordable. With the additional recording feature, however, the overall cost will surge to NTD 100 thousand to 1 to 2 million. As a locally made product with a complete and modified coaxial camera system and a competitive price to enter the market, it is expected that the market potential will not only be limited to its replacement of existing equipment; it is capable of reaching out to even more extensive application scenarios.

INVENTION
SILVER AWARD

Alternative Delivery Route to Posterior Eye

Composition for Improving the Solubility of Poorly Soluble Substances, Use Thereof and Complex Formulation Containing Thereof

Patent Certificate : I754787
Wen-Chia Huang, Yen-Jen Wang, Felice Cheng, Chia-Ching Chen, Shao-Chan Yin, Chien-Lin Pan, Tsan-Lin Hu, Meng-Nan Lin, Kuo-Kuei Huang, Maggie Lu, Chih-Peng Liu

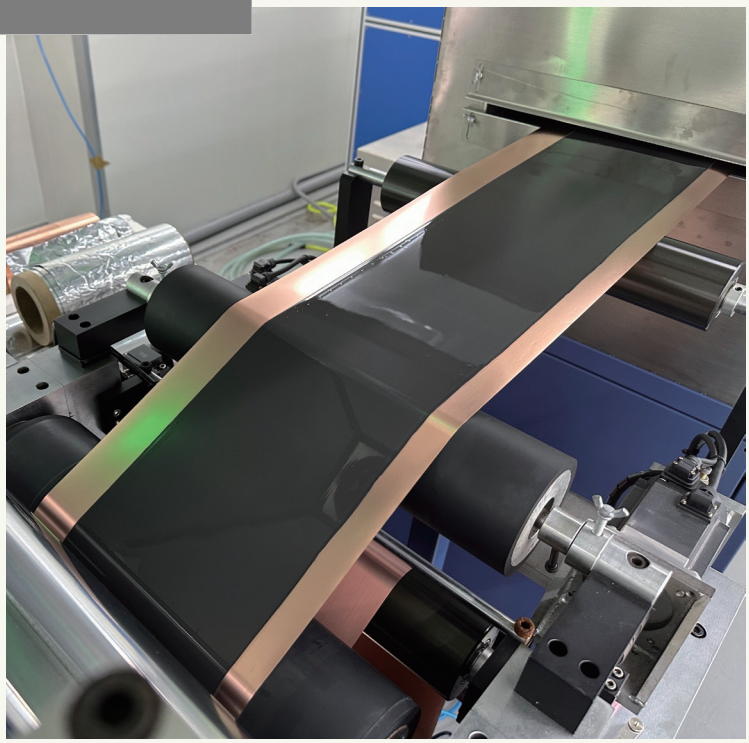
In response to the common challenge of poor water solubility and inefficient delivery of both marketed and developmental small-molecule drugs, this invention is designed to significantly enhance drug solubility and delivery efficiency, thereby improving therapeutic efficacy and enabling precise targeting of the intended tissue.

The core innovation of this patent lies in the use of a US FDA-approved cyclodextrin in combination with a water-soluble polymer, a stabilizer, and an insoluble small-molecule drug to form coordinated supramolecular complexes. This formulation markedly enhances drug solubility—up to a 40,000-fold increase in one case—whereas cyclodextrin alone improves solubility by only 160-fold. Furthermore, it increases retinal drug exposure by up to fourfold, demonstrating strong potential for posterior segment drug delivery.

This invention can be formulated as an eye drop solution to overcome the challenge of insufficient drug exposure in target ocular tissues for the treatment of both anterior and posterior segment diseases, such as uveitis and macular degeneration. Notably, it extends the therapeutic reach of topical ophthalmic administration to posterior ocular disorders, thereby reducing the risks associated with intraocular injections or implanted drug delivery devices, and alleviating patient anxiety. This advancement contributes to improved treatment stability and medication adherence.

Legally approved materials are adopted in this invented technology to lower the R&D threshold, and it has been licensed in multiple countries such as Taiwan, Japan, the European Union, the US, and China. The technology was transferred successfully in 2021, and clinical trials involving human subjects began in 2022. Continuous assistance will be given to the manufacturer in the future in optimizing the development of technologies and products in order to further boost competitiveness in the international market, bringing about breakthrough innovations in the global eye medicine market worth tens of billions of US dollars.

INVENTION SILVER AWARD



Method for Preparing Artificial Graphite

Patent Certificate : I756928
Yan-Shi Chen

Graphite is the main anode material for lithium-ion batteries, but its anisotropic structure limits the development of automotive power batteries in terms of safety, cycle life, fast charging performance, and low temperature performance. In order to improve its shortcomings and enhance the high-value application of heavy oil, high-capacity artificial graphite with fast charging performance has been successfully developed to expand its application in power batteries.

CPC (CPC Corporation, Taiwan) has successfully used its own heavy oil and developed high-capacity artificial graphite materials through its self-developed refining processes as anode materials in power lithium-ion batteries. The main features of CPC's high-capacity artificial graphite materials are high capacity (≧ 360mAh/g), high initial coulombic efficiency (~94%), and high pressing density (1.95~1.99g/ml). The characteristics of full battery are characterized by fast charging and discharging capabilities, excellent cycle life under fast charging, high temperature/low temperature cycle life, and low temperature rise of discharging at high-rate operation (safety enhancement), all of which are superior to the currently commercially available artificial graphite products.

The main technical key is to construct the molecular arrangement of the carbon layer structure from the perspective of molecular design (Bottom Up) to form a polycrystalline structure, and optimize the battery power characteristics of carbon-based anode materials through carbon microstructure design. Simultaneously, the modification of surface structure and other related technologies from the perspective of post-processing (Top Down) are carried out to make up for the difficulties of molecular control, making CPC's processes for developing artificial graphite more diversified and easier to meet the design requirements of power batteries.

The patented technology improves the utilization value of heavy oil and is applied to battery energy storage materials, achieving three contributions:
1. High value of heavy oil: low-priced heavy oil is transformed to enhance energy utilization.
2. Increase in output value: the value is increased from USD 0.5/kg to USD 12/kg.
3. Environmental benefits: CO_2 reduction is about 80,000 tons per year.

INVENTION
SILVER AWARD

Terminal Device and Health Managing Method

Patent Certificate : I760304
Ping-Hao Liu

CoDoctor Pro is an integrated health monitoring device featuring eight major measurement functions. It combines a compact design with multiple medical monitoring technologies, covering key indicators such as blood pressure, blood oxygen saturation, electrocardiogram (ECG), and heart rate. It also includes a built-in test strip system capable of measuring blood glucose, uric acid, and total cholesterol. These health metrics are essential for patients with chronic diseases and support daily tracking, health management, and disease prevention.

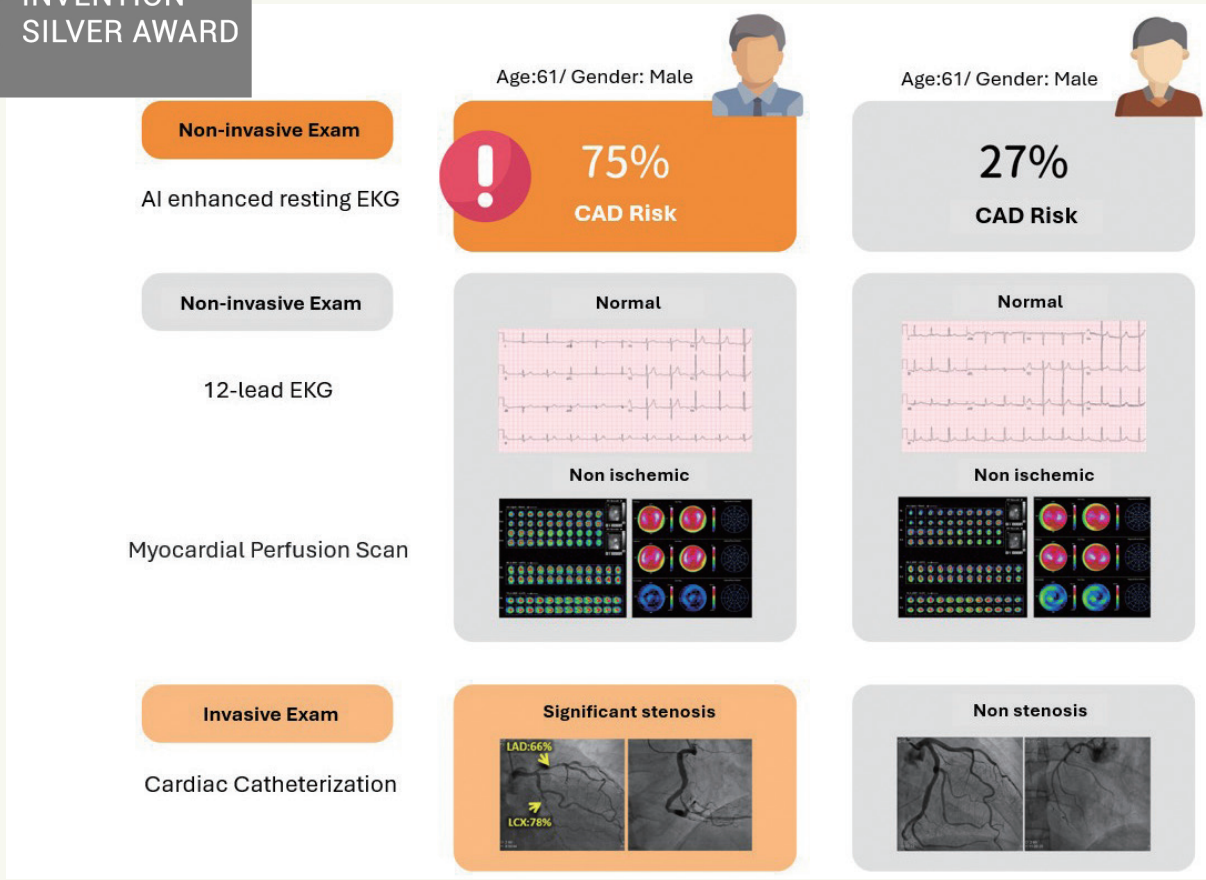
Deep Integration of Terminal and Cloud Enables Real-Time Health Management

Guided by the principle of “patient centricity, hospitals as the foundation, and technology as the bridge,” a new digital health ecosystem has been established. CoDoctor Pro leverages the HonHai Health Data Center (HHDC) platform to integrate cloud computing and cloud-based artificial intelligence (AI-assisted diagnostics), enabling real-time data storage and big data analysis. Through its AI-driven multimodal medical model, the platform delivers precise diagnostic support services and advances a new data-driven, remotely connected model of digital healthcare.

Breaking Geographical Barriers to Make Healthcare More Accessible and Inclusive

CoDoctor Pro serves not only as a home-based medical center but also as an optimal access point to various health platforms. Users can consult professional medical teams anytime via video conferencing through the cloud platform, forming a comprehensive ecosystem for remote health management that is both timely and convenient. Whether in remote rural areas or for patients with mobility limitations, everyone can enjoy seamless, 24-hour cloud-based medical services from the comfort of their own home.

INVENTION SILVER AWARD



Electronic Device and Method for Predicting Obstruction of Coronary Artery

Patent Certificate : I768624
Yun-Hsuan Chan, Chun-Hsien Li, Jun-Hong Chen, Tsung-Hsien Tsai, Ting-Fen Tsai, Chi-Hsiao Yeh

Purpose of the Invention:

Current medical diagnostics have limited ability to detect early narrowing of the coronary arteries and to provide appropriate treatment before a myocardial infarction occurs, especially in asymptomatic patients. This invention applies AI to enhance electrocardiogram interpretation, enabling earlier detection of coronary artery occlusion and helping to prevent myocardial infarction.

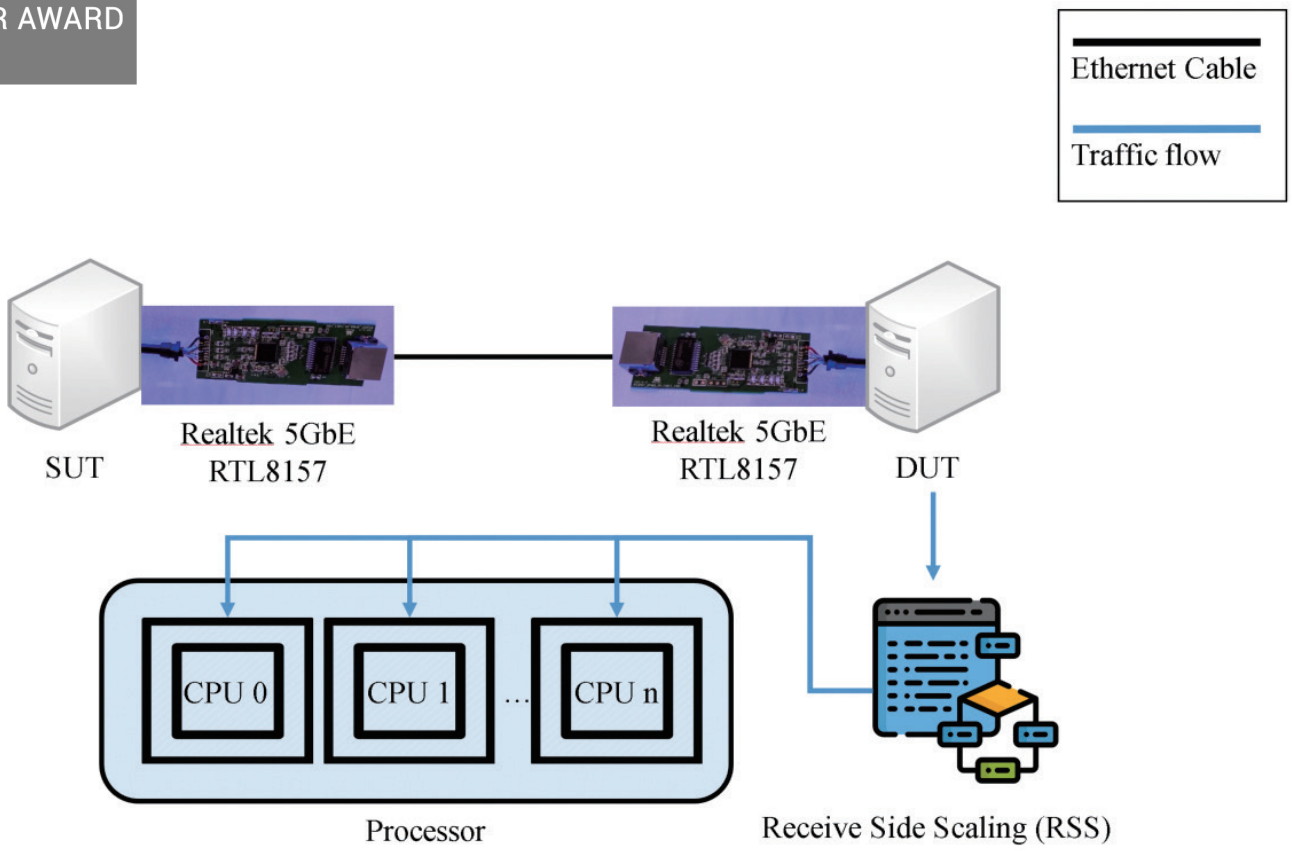
Characteristics of the Invention:

This invention is a non-invasive solution that includes a device, method, and procedure designed to improve the accuracy of electrocardiograms in detecting coronary artery occlusion. Its main features are as follows:

1. An electronic device and method for predicting coronary artery occlusion. It can identify whether a blockage exists, determine the type of affected coronary artery, and locate the specific site of the occlusion.
2. The algorithm and procedure use a multi-stage, systematic machine learning approach with accuracy comparable to advanced diagnostic tools such as myocardial perfusion scans.
3. Traditional electrocardiograms have an accuracy of only 50%–60% for detecting coronary artery occlusion, and treadmill stress tests reach about 70%. In contrast, this invention's AI algorithm achieved an AUC of 84%–90% in real-world tests at two hospitals, showing significantly improved diagnostic performance.

Scope of Application of the Invention and Patented Technology:

The inventor anticipates a wide range of applications for this technology, including value added to ECG machines, enhancements to mobile cardiovascular health apps, expanded offerings in the health examination market, and improved services provided by life insurance companies.



Universal Serial Bus Device and Host

Patent Certificate : I774026
Zhen-Ting Huang, Shih-Chiang Chu, Er-Zih Wong, Chun-Hao Lin, Chia-Hung Lin

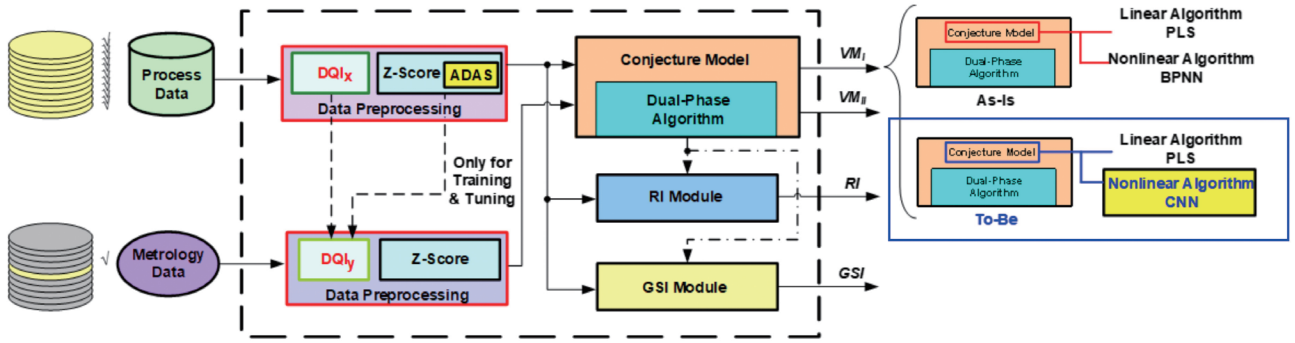
Receive side scaling (RSS) is a Network technology that is capable of effective distributed network reception processing across multiple processors in a multi-processor system to dynamically balance the load of each processor and to prevent a load imbalance. By increasing chances for shared data to be run on the same processor, by the same token, it reduces the spin lock load and increases the efficiency of use of resources such as the Cache.

All existing technologies, however, are based on the Peripheral Component Interconnect Express (PCIE) interface; it is a practice without a universal serial bus (USB) interface. USB-interfaced processor balancing, at present, relies on the mechanism provided by the USB host controller, and this mechanism usually does not apply to a network device scenario, which will ultimately give rise to multiple issues, such as a processor load imbalance associated with a USB-based network device. Therefore, the invention herein offers a brand new hardware/software solution where the massive streaming media receiver adjustment mechanism is introduced to the underlying USB host controller and device, and the hash calculation and splitting adopted in RSS are introduced to the corresponding massive streaming so that the network data carried by identical massive streaming possesses the same hash value. Meanwhile, a cross-reference table is adopted to make network data, massive streaming, and the multi-processor core answer to one another. Network data with identical hash values can be matched directly to a proper processor core to eventually realize the receiver adjustment mechanism in the USB interface. Moreover, this invention can realize MSI-X support in the USB host controller so that direct connection to the corresponding multi-processor core is possible to render equivalent effects comparable to those of PCIE equipment. As technologies such as WiFi 7, GPON, and artificial intelligence (AI) evolve, the development of the multi-gigabit network ecosystem is getting more and more important. Upgrading resources spent on respective equipment, however, is where difficulties are met in landing the new technology at present. The invention herein, therefore, enables both consumers and industries to apply the existing USB interface by upgrading the old unit directly to the multi-gigabit network setting and expediting the application, promotion, and popularization. The resultant environmentally friendly solution featuring low cost and minimal waste of environmental resources further boosts the welfare of the human society and promotes the development of the national high-speed network application ecosystem.

INVENTION SILVER AWARD

Virtual Metrology Method using Convolutional Neural Network and Computer Program Product Thereof

Second-Generation AVM (AVM_{II})



- The AVM_{II} system replaces the BPNN in the original AVM_I with a deep learning-based CNN, which not only shortens the time required for model parameter selection but also improves the prediction accuracy of AVM.
- The AVM_{II} system uses the Automatic Data Alignment System (ADAS) to process and standardize the input data, addressing the data quality consistency issue in CNN-based virtual metrology applications, thereby ensuring the stability and reliability of the model.
- The AVM_{II} system adopts an innovative integrated learning architecture that combines multiple CNN models and an estimation model to handle time-series data of various parameters simultaneously and achieve more accurate prediction results.

Virtual Metrology Method Using Convolutional Neural Network and Computer Program Product Thereof

Patent Certificate : I776444
Fan-Tien Cheng, Yu-Ming Hsieh, Tan-Ju Wang, Li-Hsuan Peng, Chin-Yi Lin

This invention utilizes the convolutional neural networks (CNN) technology in combination with the dynamic time warping (DTW) algorithm to significantly improve the accuracy of the first-generation Automatic Virtual Metrology (AVM_I) system. This technology comprises three major innovations:

1. Introduction of the automatic data alignment system (ADAS), which can automatically eliminate abnormal data and align data dimensions prior to CNN modeling. This effectively addresses the data quality consistency issue when applying CNN to virtual metrology.
2. Development of an integrated learning CNN architecture that combines multiple CNN models to process time series data with different parameters and generate more accurate predictions via the estimation model. The experiment results display an average improvement of 17% in prediction accuracy.
3. Extensive scope of application that has been successfully implemented in various leading companies, including Formosa Plastics Group TAIRYFIL (carbon fiber industry), Chung Hwa Pulp Corporation (paper industry), and Powerchip Semiconductor Manufacturing Corporation (semiconductor industry). Through implementation, enterprises can realize their visions of total product inspection, yield improvement, and cost reduction.

This invention was licensed to Mirle Automation Corporation in January 2024, demonstrating its high commercial value. Mirle Automation is collaborating with the National Cheng Kung University team to provide comprehensive services, including system installation, verification, deployment, and maintenance. This collaboration aims to further promote the Industry 4.1 intelligent manufacturing framework that incorporates this patented technology and the second-generation Automated Virtual Metrology (AVM_{II}) across various industries. As such, the goal of achieving zero-defect manufacturing can be realized, which fully demonstrates the industrial contribution and future development potential.

INVENTION
SILVER AWARD

Stably Braking System and Method Using the Same

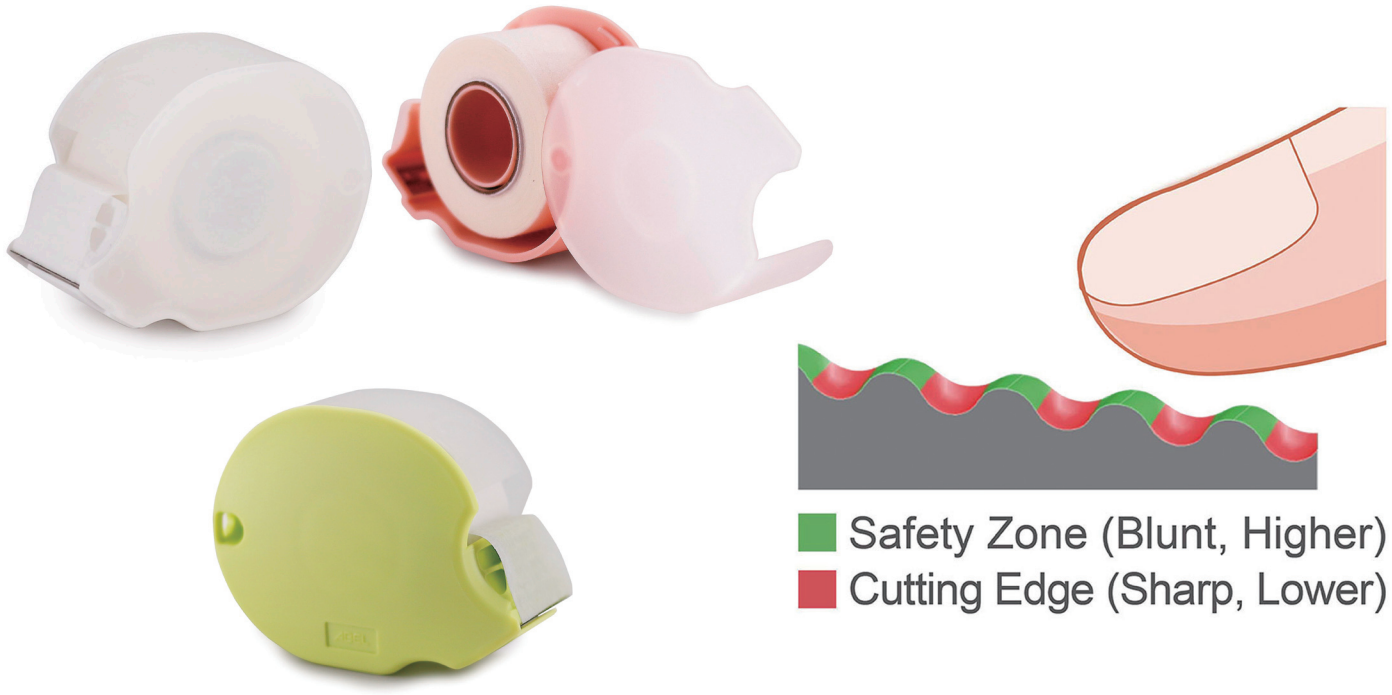
Patent Certificate : I779911
Jia-Le Wei, Tsung-Hua Hsu

Taiwan's motorcycle ownership exceeded 14.65 million units in 2024, meaning there's roughly one motorcycle for every 1.59 people. However, the injury and fatality rate from motorcycle accidents remains stubbornly high. In response, the government has been actively promoting the installation of Anti-Lock Braking Systems (ABS) on motorcycles to enhance rider safety.

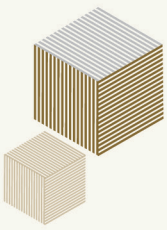
This invention integrates ABS functionality. It effectively prevents wheel lock-up, keeping the wheels rolling to ensure maximum deceleration. It also assists vehicles in maintaining steering control to avoid obstacles during emergency braking, significantly enhancing braking stability and safety.

The invention's applications span two-wheeled motorcycles, three-wheeled motorcycles, and four-wheeled automobiles. The technology has been successfully transferred to leading domestic industry players such as LIOHO Machine Works and CHIPMAST AUTOTRONIX. It has been successfully implemented by manufacturers like Taiwan Golden Bee ATV and Aeon Motor, with over 60,000 units accumulated to date. Furthermore, its adoption continues to expand to other vehicle manufacturers, helping domestic companies overcome the constraints imposed by international giants and accelerating the widespread adoption of ABS across various vehicle models, thereby effectively improving road safety for Taiwanese citizens. This invention's technology realizes ABS functionality, and its performance, especially on wet and slippery roads, surpasses the test values of international major manufacturers, showcasing the strength of "Made in Taiwan" (MIT) research and development.

INVENTION
SILVER AWARD



SafeTouch Blade



Patent Certificate : I801297
Chun-Yen Chen

To Enhance Safety and Cutting Efficiency of Medical Tape Dispenser

Healthcare professionals frequently use tape. The traditional cutting tool, however, is associated with safety and efficiency issues. A metal blade tends to incur accidental cuts or stab wounds and hence increase infection risk while a plastic serrated blade is associated with undermined efficiency at work due to its dullness that makes cutting difficult. Some tape dispensers come with external protection; they are, however, hard to operate. As such, it is difficult to take care of safety and convenience at the same time.

This blade invention features “safety-zone design” and “micro teeth and wavy knife”; it is a safe and effortless solution that makes cutting easy and ensures clean, smooth tape edges with every cut.

Technological Innovation:

1. Safety-zone design - prevents accidental cuts and stabs.
2. Micro teeth + wavy knife - enables effortless cutting with clean tape edge.
3. Highly durable blade - long-lasting and sharp.
4. Intuitive operation - time-saving and highly efficient.

Market Recognition:

This patented technology was honored with the 2024 Golden Pin Design Award and has been tested in professional healthcare academic institutions to be rated as a highly safe and protective product. The innovative teeth and safety-zone design significantly increase the cutting efficiency and safety and reduce the infection risk and are optimal tools for healthcare facilities to improve their operating efficiency.

INVENTION
SILVER AWARD

Rotor Structure with Edge Notches

Patent Certificate : I801840
Lian-Shin Hung, Ching-Chih Huang, Yu-De Li

The rotor structure designed with notches on the edge introduced with this invention is applied to a high-performance permanent-magnet synchronous motor to realize a breakthrough from the perspective of distribution of the magnetic field and to effectively enhance the overall performance, operating efficiency, and stability of the motor, meeting the market demand for high performance, low vibration, and low-noise motors. Meanwhile, it significantly reinforces the competitive advantages of the product on the market, with extensive market prospects and competitive advantages.

1.Characteristics of the Patented Technology:

- Reduced electromagnetic noise: The harmonic component electromagnetic noise caused by uneven distribution of the magnetic field is reduced.
- Reduced motor vibration: The vibration issue caused by cyclic amplitude fluctuations is corrected for enhanced operational stability.
- Improved motor output efficiency: The distribution of the electromagnetic field is optimized; energy consumption is reduced; and output power and operational efficiency are enhanced.

2.Market Benefits and Value:

- Improved product competitiveness: The overall performance of the permanent-magnetic synchronous motor is significantly reinforced to make it more attractive on the market.
- Answering to the energy-efficiency trend: It helps enhance the energy utilization rate and answers to the low-carbon and energy-saving trend to go with the global demand for motor-driven developments.
- Application on emerging market: It is suitable for technical innovation-oriented markets, electric vehicle and new energy industries.

3.Scope of Application:

- Electric motors of electric buses, electric motors of electric boats, and driving systems of hydrogen vehicles, among others.

INVENTION SILVER AWARD

Drug Scanning and Identification System and Using Method Thereof

Patent Certificate : I809530
Hsi-Pin Li, Fei-Peng Chang, He-Yi Hsieh, Pei-Ying Lin, Yung-Yu Huang

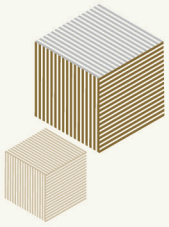
Substandard and counterfeit drugs are emerging one after another to pose a serious threat to national health. As society ages, the burden of pharmaceutical care increases, too. The conventional way of scanning the barcode and telling from the appearance is unable to effectively prevent against the penetration of and harm done by substandard and counterfeit drugs. How to determine drugs accurately and rapidly has become quite an important issue. Conventional substandard and counterfeit drug testing relies on professional laboratories that are known for highly sophisticated, expensive, and time-consuming laboratory testing processes; the chemical reagents used will even cause secondary environmental pollution. This testing practice is unable to quickly ensure the medication safety of healthcare professionals and the general public. Besides substandard and counterfeit drugs, qualified drugs that look similar tend to be confusing as well. A lot of drugs look alike , but they work completely differently in the clinical setting. Although domestic practitioners have developed drug image recognition technology, it is unable to effectively explore the composition of drugs and is prone to misjudgment.

Compared with traditional laboratory chemical analysis methods or image recognition technology, the present invention is characterized by combining a miniature near-infrared spectrometer, a mobile device APP, and a drug identification model established by machine learning, providing medical staff and the public with a drug scanning and identification system that can instantly ensure drug safety. By scanning the molecular vibration spectrum of the drug through a miniature near-infrared spectrometer, the molecular composition of the drug can be accurately detected, eliminating the problem of image misjudgment, and rapid drug screening can be performed in a non-destructive, fast, low-cost and non-secondary pollution manner.

The invention has been promoted to more than 10 hospitals, alliances and academic research clients so far, and has cooperated with the National Taiwan University Hospital-Hsinchu Branch to implement the 2024 "Smart Health Application Trial Site Promotion Project" of the Joint Commission of Taiwan (JCT), and jointly launched a rapid screening platform for drug identification to further improve drug safety. In addition, the invention has also been successfully promoted overseas, covering more than 10 pharmaceutical companies, academic research institutions, and non-profit organizations.

INVENTION
SILVER AWARD

Moisture-Response Deforming Fabric



Patent Certificate : I814175
Wei-Hsiang Lin, Po-Hsun Huang, Jen-Chi Chao, Ta-Chung An, Shu-Hui Lin

AquaBreath®, the world's first single-material moisture-response nylon fiber, was developed by the team at the Taiwan Textile Research Institute. The reactive dynamic deformability in humid surroundings is added to fiber through the macromolecular co-polymerization/modification and precise spinning control technology to realize the "elongate when wet and recover when dry" mechanism and to accordingly modulate the breathability of fabrics, effectively enhancing the comfort, cool sensation, and quick-dry performance of clothing.

AquaBreath® is designed with a single material, which not only reduces production costs but also makes recycling possible. It addresses both high performance and sustainable environmental protection. This technology has been successfully transferred to Formosa Chemicals & Fibre Corporation and applied extensively to products such as underwear and sportswear that are available under domestic and international well-known brands and distribution channels now, creating a production value on the end-user market of more than NTD 1.5 billion.

The R&D accomplishments are also applied to boost public interest. Training clothes manufactured with this technology have been donated to the "Hong-Chih Kuo Sports Development Association" and the "Taitung County Yanping Township Hongye Elementary School Baseball Team" in honor of the belief in giving back to society with textile technology.

With complete industrial chain integration and promotion on the market, AquaBreath® not only significantly enhances the international competitiveness of performance textiles from Taiwan but also is an innovative and smart textile solution for the global market.

INVENTION SILVER AWARD

Conductive Coating and Manufacturing Method of the Same

Patent Certificate : I815112
Hou-Sheng Huang, Chien-Lung Shen

This invention features a conductive coating that can withstand high-intensity deformation, can be washed with water, and is environmentally friendly and recyclable. It can be applied to multiple electronic products to effectively address challenges encountered by existing electronic materials in terms of durability, manufacturing efficiency, and sustainable environmental protection, creating new opportunities for the electronics industry.

While this technology was being developed, we overcame key challenges such as maintaining coating stability and conductive performance and optimizing the mass production process, among others. In order to ensure that the coating is able to keep its electronic performance over an extended period of time, we controlled the precision material so that the latter steadily keeps its conductivity under multiple conditions, such as twisting, stretching, bending, squeezing, and stripping.

This conductive coating can be extensively applied to the Internet of Things (IoT), physiological monitoring devices, wearable electronics, light-microscope modules, and 3D circuit boards, among others, and supports multiple forming processes, maximizing application possibilities of electronic technology products.

Patent deployment is completed for this invented technology domestically and internationally, with 9 key patents for the application of this technology. With the supply chain integration and mass production test, it is proven that the technology can significantly bring down manufacturing costs and boost the throughput and product yield rate, serving as a competitive solution for businesses and driving green electronics.

CREATION
GOLD AWARD

Agricultural Sensing Bird Repellent Device

Patent Certificate : M621977
Dong-Jhen Guo, Kuang-Hua Chang, Yi-Wei Li, Wei-Hsiang Lin

Environmentally-friendly Smart Technology Addresses Bird Damage

Bird damage has been a headache for farmers. The conventional bird-repelling practice, however, is barely effective, and repellents that are available on the market tend to be learned by birds. The “Agricultural Bird-repelling Sensor” developed by the Hualien District Agricultural Research and Extension Station helps keep birds off ahead of time, applying the laser technology to effectively minimize damage done to crops.

As people become more and more aware of health and environmental protection, organic farming is the contemporary agricultural development trend. Organic farming, however, does not allow the use of agricultural chemicals and other chemical bird-repelling methods. Therefore, bird damage has been the biggest issue. Seeds that are just sown, sprouts, fruits, and ears of rice ready to be harvested can all become food for the birds, resulting in reduced production and undermining the interest of farmers.

It is quite difficult to prevent bird damage. Scarecrows, firecrackers, or anti-bird ribbons do not work well as time goes by because birds learn quickly. For this reason, members of the team of the Hualien District Agricultural Research and Extension Station under the Council of Agriculture (Dong-Zhen Kuo, Kuang-Hua Chang, Yi-Wei Lin, and Wei-Xiang Lin) developed the harmless repelling facility “Agricultural Bird-Repelling Sensor,” focusing on weaknesses of bird-repelling devices available for people and what farmers need; it is fairly priced and bird-friendly and was patented in 2021.

Random Operation Reinforces Bird-repelling Results

Contract Assistant Hung-Yu Chien at the Hualien District Agricultural Research and Extension Station indicates that, unlike commercialized bird repellents, this creation repels birds by applying fixed frequency or fixed behavior. The product has laser as its core technology. Laser scanning is reinforced in areas with birds (360 degrees horizontally and 120 degrees up

and down). Repelling takes place before birds land. Along with the micro-processor and timer, the number of seconds needed for activation and breaks is set, and operation takes place in the random number model. Birds will be unable to learn and adapt themselves.

Test results show that two repellents set up per hectare (diagonally) help reduce the damage done to crops by 40%. In the common case of paddy, for example, with reduced bird damage, the harvest increases by about 1.4 tons per hectare. Compared to a sound repellent, which works for only about 1 to 2 weeks, the laser repellent renders a repelling rate of 60% after it is active for more than 30 days.

Constant Validation Optimizes Product

Hung-Yu Chien candidly says that “the biggest difficulty during development is validation; after all, a method needs to be confirmed to be effective before it may be promoted among and used by farmers.” Therefore, the team could only constantly test in the field with 1 laser element or 2 laser elements. Eventually, 4 to 6 laser elements were adopted to form a repelling dimension that makes birds feel that something big is approaching them. Meanwhile, the high-power laser causes discomfort for the birds visually to accordingly exercise the repelling effect.

In addition, in order to enable setup of the operating time of the bird-repelling device reflective of different crops and different times of the day and automatic start-up and shutdown for reduced cost incurred by the time needed for farmers to keep an eye on the field and to accomplish self-sufficiency with the help of solar power charging, the team spent some time adjusting the automatic programmed control and battery supply to optimize the product.

International Deployment with Promising Market Potential

At present, this creation is authorized to Sean & Stephen Corporation as non-proprietary technology for mass production and commercialization. Each set sells at around NTD 16,000. For farmers deeply affected by bird damage, despite the relatively high installation cost in the beginning, with the harvest of paddy increased by 40% or the loss of soybean reduced by 20%, the cost of the equipment can be recovered after use for 1 to 2 seasons. By changing the laser scan range and the pitch angle, on the other hand, it can also be applied to industries deeply affected by bird damage, such as poultry farms, livestock farms, and outdoor fish and shrimp farms. Photonics businesses are highly interested, too.

Hung-Yu Chien indicates that sales have reached nearly 200 units by the end of 2024 since this patented product was introduced to the market. Japanese businesses have even spontaneously approached to talk about the possibility of introducing it to their local markets through sole agency. The next step will be to promote it on the Southeast Asian market, creating enormous business opportunities.

CREATION
GOLD AWARD

Stirring Device for Food Waste Disposer

Patent Certificate : M636787
Yu-Chao Chao

Turn Kitchen Leftover into Gold for a Win-Win in Economy and Environmental Protection

The buckets carrying kitchen leftovers wasted in Taiwan each year will pile up to equal 10 thousand Taipei 101s. It is a dilemma, however, how to process kitchen leftovers. Yu-Chao Chao built the modified food waste processor known for its high smashing performance, energy-saving, and modularization features through technological innovation to effectively bring down the processing cost and turn kitchen leftovers from waste to treasure, bringing new business opportunities in terms of environmental protection.

As people become more and more aware of environmental protection, trash classification is part of everyone's daily routine. The treatment of kitchen leftovers, however, is often ignored. Statistics of the Ministry of Environment show that nearly 620 thousand tons of food are thrown away each year on average for the past 10 years, which, with the standard 60-kg kitchen scrap bucket, when piled up, is equivalent to 10 thousand Taipei 101s; it is alarming.

Kitchen leftovers are treated in Taiwan as food for pigs, compost, and for raising black soldier flies, with the ultimate remainder to be incinerated and landfilled. Since the breakout of the African Swine Fever epidemic in 2019, however, kitchen leftovers have been incinerated in large quantities to overload the equipment and lead to the discontinuation of acceptance one after another. Some of the leftovers are turned out to be processed through high temperature gasification only inefficiently. Compost, on the other hand, has sodium content restrictions. A high sodium content makes it uneasy to raise black soldier flies, too. Therefore, Yu-Chao Chao, the person in charge of GOODKYM TECHNOLOGY CO. started the idea to research and develop a modified food waste processor.

Innovative Modularized Design Makes Service Easy

In light of the fact that a conventional commercial food waste processor is bulky and highly electricity-consuming and does not work well in processing rigid items such as pork leg

bones, pork bones, and chicken bones, among others, Yu-Chao Chao modified the processor's mixing device and the product is known for its three major features; that is, powerful smashing, energy-saving, and modularized serviceability.

The mixing device comes with two stirring blades and multiple support arms, and the shaft is designed with axial positioning and is relatively steady. It can easily smash pork leg bones, clam shells, and other kitchen leftovers that are relatively difficult to process and dry to turn into powders that may be used as feeds or fertilizers. The modularized design, by the same token, make service even more convenient. Parts can be quickly replaced even if the machine bears damage , which helps bring down the service cost. In addition, the product's energy-saving design makes the operating cost far lower than the market price. The processing cost per ton of leftover is about NTD 120 to 130; it is more cost-effective than outsourced processing (NTD 800 per ton).

Patent Protection Increases Commercial Value

The utility model patent was obtained in August 2022 for the "mixing device to be used in the food waste processor". The development only took 3 months, demonstrating high-performance research and development and precision design as strengths. Yu-Chao Chao indicates that he will first discuss with R&D staff and prepare the sketch while deciding to develop a new product, and the details will be further discussed through 3D modeling to ensure its feasibility. Upon completion of the design, the trial production stage begins. Thereafter, the trial run is conducted to test the performance and details further, and to ensure that each machine on the market is outstanding in terms of quality and stability.

Yu-Chao Chao emphasizes that a patent is an important means to protect one's product against counterfeits. One of his friends suffered exactly because of not applying for a patent and for registration by a counterpart ahead of time, which eventually made continuous production impossible, with great losses. Moreover, it is generally believed among consumers and enterprises that a patented product leads in technology and helps boost market competitiveness. The additional halo added by the National Invention and Creation Award is conducive to the Company in terms of future investments or financing, too.

Pluralistic and Flexible to Maximize Market Presence

The modified food waste processor currently introduced has a capacity of 60 kg. It can run 2 to 3 times a day and mainly serves large restaurants and airport catering services. As the demand on the market changes, the team is currently researching and developing small food waste processors that target small catering businesses that create about 30 kg of kitchen scraps a day, such as noodle stalls and diners, to secure even greater market shares. The Mainland China market has expressed its intention to cooperate, too. Local production is planned to take place through technical transfer to maximize market shares. In addition, the team sets foot in the development of special drying equipment, such as chicken blood drying equipment, targeting the Muslim market and demonstrating ambitions in technological diversification and international deployment.

CREATION
GOLD AWARD

Testing Instrument

Patent Certificate : D194579
Shih-Chin Tseng, Ching-Sung Chang

One-stop Physiological Measurement Helps Upgrade Health Management

In light of the fact that most people are insufficient in managing their own health data to lead to reduced efficiency of medical care, Inventec Appliances Corp. (IAC) researched and developed a series of physiological measurement equipment to integrate the monitoring of data such as blood pressure, blood glucose /total cholesterol/uric acid, blood oxygen, body temperature, and electrocardiogram so that people can measure physiological data while at home; it helps boost the quality of personal health management.

The global population is aging, with an increased risk of developing chronic disease, and the number of patients affected by chronic disease is constantly increasing. Developing smart medicine and care technologies, such as tele-care and health monitoring equipment, among others, for enhanced care efficiency is a future trend. The medical care policy in Taiwan is gradually shifting from being “treatment-oriented” to “preventive medicine”. It is expected that the ratio of people who measure their physiological data at home will constantly climb in the future. IAC, with modularized design, developed a series of physiological measurement equipment and combined them into “Chiline Physiological Measurement System”, which integrates physiological data measurement of blood pressure, blood glucose /total cholesterol/ uric acid, blood oxygen, body temperature, and ECG, among others, to protect the health of your family on all fronts.

One-stop Health Data Management

Mr. Ching-Sung Chang is currently a Board director at IAC and the inventor of this patent, with outstanding contributions in terms of technological innovation and leadership, and continues to promote corporate developments. Ching-Sung Chang has noted that most people are familiar with technological products such as YouTube, mobile phones, or social media, but care little about their own physiological data, resulting in inefficient medicine. Patients with hypertension, for example,

often manage their data in a “it’s in my head” way and cannot provide clear information about the time of measurement and change in value, among others; this makes it difficult for the physician to keep track of precise data when rendering a diagnosis, and accordingly impacts the treatment efficacy.

The Chiline physiological measurement equipment was born exactly to address the pain of managing physiological data. Its core belief is the preservation, sorting, and transmission of physiological data so that users can easily document their personal health data and properly categorize it, such as time, daily life records, etc., and can further pass down the information clearly to the physician, their family, or keep it for future reference. Ching-Sung Chang indicates that to fulfill this goal, Chiline stores the data in the cloud to ensure that the data is not lost and the physiological measurement equipment consistently adopts the same operating procedure to lower the learning threshold. Meanwhile, products come in a consistent appearance and are square-shaped to allow stacking and magnetic fixation; it is convenient to put away and carry the product.

Innovative Design with Magnetic Suction and APP Operation

Mr. Shih-Chin Tseng is the director of Industrial Design at IAC and the inventor of this patent. Shih-Chin Tseng indicates that from the preliminary product planning stage, the team has had many discussions and adjustments. Firstly, different from conventional measurement equipment, Chiline has no display. It is operated through a mobile APP. Can users accept it easily, particularly elderly users? In this regard, the team optimized the user interface to ensure that the operation is simple and intuitive.

Secondly, physiological measurement equipment discards the common snap-fit structure. Instead, magnetic suction is adopted to hold the host and the storage box in place. It had to overcome issues such as the magnetic force, robustness, and anti-falling. It was tested and adjusted multiple times during research and development so that the host picks and places optimally to ensure user safety and convenience.

Combination of Smart Technology to Keep Up to Date

The IAC “Chiline Physiological Measurement System” (including the Chiline physiological measurement equipment, the Chiline APP, and the Chiline health management platform) is currently going through patent deployment and regulatory medical care product certification in Taiwan, the United States, Singapore, and Mainland China. Patent protection , plus related invention and utility model patents, form omnipresent protection for the product. Shih-Chin Tseng emphasizes that “attending the National Invention and Creation Award contest is an excellent opportunity for the Company to showcase its innovation accomplishments; winning an award, in particular, is a high level of recognition of the R&D team and will bring about optimal promotional effects on the market.”

Ching-Sung Chang indicates that as time goes by, Chiline will continue to evolve. The current monitoring already covers 5 physiological data points. Future developments will be focused on two major respects: First, to add new test equipment and to expand the physiological data monitoring range; Second, to upgrade existing functions and to combine an AI large language model, edge computing, and terminal application for enhanced user experience. On the basis of keeping the current APP and appearance designed, intelligent optimization makes health management more precise, highly effective, and convenient.

CREATION
GOLD AWARD

Head Mounted Display

Patent Certificate : D227669
Yien-Chun Kuo, Lee-Wei Chen, Tse-Hsun Pang

Modular Design Maximizes XR Application Diversity

Global technology magnates compete with one another over metaverse opportunities and follow one another in devoting themselves to advanced technologies such as AR/VR. The R&D team of HTC Corporation, with its head-mounted“VIVE XR Elite”, challenges the limit. The modular design realizes removable temples and battery replacement, and enhances portability and battery life to satisfy professional application needs.

Since the idea of “Metaverse” began in 2020, the head-mounted device industry has been growing quickly. The market survey institute IDC estimates that the number of AR/VR head-mounted devices shipped in 2024 reached 12.70 million, with an annual growth rate of up to 38.7%, and will break the threshold of 20 million by 2026. The compound annual growth rate (CAGR) between 2023 and 2027 is up to 29%.

As market demand constantly grows, companies are trying their best to keep up with the pace of their competitors. HTC introduced its first head-mounted device that combines VR and MR in one “VIVE XR Elite” at the US Consumer Electronics Show (CES) in January 2023, and introduced again its upgraded edition in June 2024 to offer users a more relaxing and comfortable wearing experience.

Key Breakthrough - Removable Battery Temples

“The biggest feature of ‘VIVE XR Elite’ is modularization. It is hoped that the product is as light as eyeglasses and can be used over an extended period of time. Therefore, ‘light-weight’ and ‘battery life’ are prioritized upon constant improvement”, indicates Zhe-Xun Pang, Product Designer of HTC.

In order to make the whole unit even lighter, the R&D team (Yen-Jun Kuo, Li-Wei Chen, Zhe-Xun Pang) turned the temples that connect the

battery socket removable to allow the replacement of the battery and to extend the duration of use; the temples can also be folded and placed in the box, too, for portability. On occasions such as professional rescue team drills, charging management may be optimized. It is required to only remove the temples and place them on the charging tray, and multiple batteries may be charged at the same time for enhanced operating efficiency.

"Removable temples seem to have a simple design; in fact, they are full of challenges." Zhe-Xun Pang candidly says that they had to ensure that the push button mechanism is durable and does not get damaged due to frequent operations, while realizing the one-key battery removal and replacement feature. While being tested in the beginning, however, the temple structure was fragile and tended to break; the team had to constantly try different materials. After having failed several times, they finally found a rigid and elastic material to make the temple robust, stable, and removable. In addition, it was required to hide a horn in the temple to ensure the sound effect experience when worn, and it cannot take up too much space; this made

the design even more challenging. Eventually, the team successfully made the temple; it can be folded and put away, does not break easily, and comes with built-in sound effects; these are the highlights of VIVE XR Elite.

Ergonomic Design Enhances Wearing Comfort

For comfort after having been worn for an extended period of time, VIVE XR Elite adopts an ergonomic design and comes with an adjustable headband and mask to suit different head shapes and facial characteristics. It also comes with lenses whose diopters can be adjusted and a knob to adjust the pupillary distance (PD). One does not need to wear corrected glasses while enjoying the clear visual experience. Zhe-Xun Pang mentions that more than ten design prototypes were tested throughout the process. Each design prototype

had to go through extensive testing involving different genders, ages, and races in order to find out optimal design parameters.

Another ingenuity is the package design. Besides minimization of the size and weight and reduced carbon emissions during transport, the packing material is botanical fiber; it is 100% recyclable, answering to the global environmental protection trend.

Patent Protection Builds Technological Barrier

VIVE XR Elite obtained its design patent as a "head-mounted display" in September 2023 and has been comprehensively commercialized. Besides the consumer market, it is further applied to commercial fields such as military and police training, schools, and medical education. Zhe-Xun Pang indicates that obtaining the patent ensures that the technology is not copied by competitors and helps access internal resources. With patent certification, the company will value the technology more, and the management will be more confident while approving the related R&D budget. The next goal of the team is to challenge a lighter weight and smaller size while at the same time following technological developments on the market closely in an effort to secure the leading position in the field for XR, with fierce competition.

CREATION
SILVER AWARD

Intelligent License Plate Retrieval Machine

Patent Certificate : M601425
Hui-Hung Li, Wan-Yi Huang, Sung-Ling Huang, Shih-Hsien Liang, Chia-Pin Huang

The intelligent license plate retrieval machine, upon ideation, aims to replace manpower with machinery and provide convenient services anytime, anywhere. Once introduced to the Motor Vehicles Office, the machine allows users to return a license plate through self-service; there is no need to wait in lines. This significantly improves the service quality and administration efficiency.

From ideation to completion of development of the machine, there were multiple technological challenges to be overcome, such as:

1. **Optimization of recognition technology:** To determine the authenticity of a license plate and to ensure recognition accuracy, verification technologies such as image comparison and contrast, weight sensing, and vehicle registration data are needed for a breakthrough.
2. **Categorization and structural design:** In order to boost machine durability and license plate storage management ability, the design is improved from the rotating style (Edition 1.0) to the horizontal collection technology (Edition 2.0).
3. **System integration and payment:** In order to ensure information and communication security of the system and user convenience, difficulties in connecting to the motor vehicle and driver information system are overcome to inquire about vehicle violations and pending payments in real time, and to offer the credit card payment feature.

The intelligent license plate retrieval machine features self-service, automation, and intelligence, and realizes multi-functional self-service throughout the process, including license plate recognition, data integration, payment, and license plate collection without waiting at service counters, and enhanced quality of public service.

This machine has been granted multiple utility model patents, including the vehicle license plate smart collecting device, intelligent license plate retrieval machine, horizontal license plate collecting module, and motor vehicle and driver self-service counter machine.

CREATION SILVER AWARD

Folding and Standing Structure of Flat-Type Carton

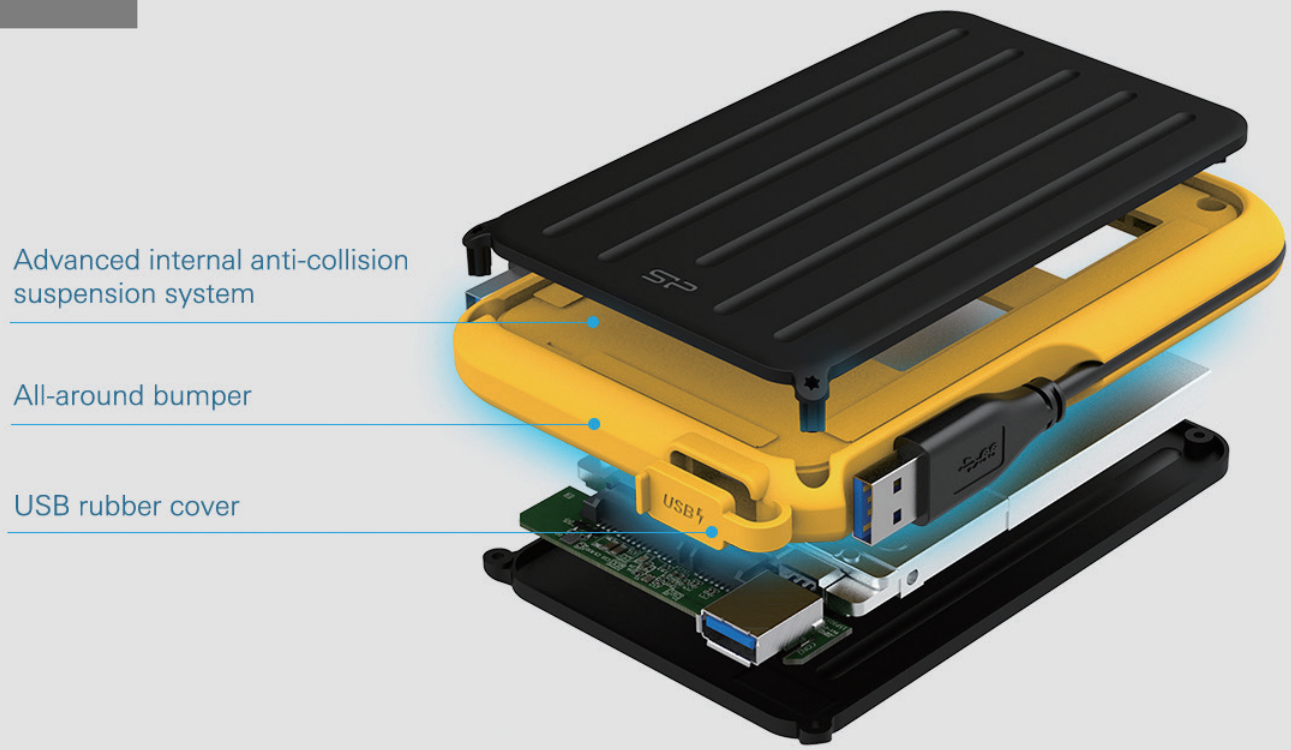
Patent Certificate : M601722
Chin-Yuan Chang, Yun-Sheng Tien

Export-oriented flowers (such as Dancing-Doll Orchid), once harvested, need to be quickly sorted, graded, treated, defoliated, organized, bundled, wrapped, and boxed to ensure their quality and exportation as scheduled. With the conventional packaging procedure, one needs to manually fold the carton into boxes and place flowers in the box. The highly repetitive labor is not only time-consuming but also at risk of hurting the wrist, fingers, and shoulder. Pre-folded boxes also take up enormous space and impact the operational traffic flow. Our team researched and developed the “Fold-and-Stand Structure of Flat Carton”, which has obtained the utility model patent (M601722), and produced the carton-folding machine to mechanically help with carton-folding, reduce manpower burden, and enhance the packaging efficiency. This technology helps lessen the workload of flower growers, minimize occupational injury risk, and improve the efficiency of the packaging process in order to mechanically replace the highly repetitive artificial carton-folding motion, promote agricultural mechanization, and optimize the procedure.

This carton-folding machine can fold a carton box into shape automatically, and it is only necessary to manually feed the carton box blank. The mechanical procedure consists of folding the long side, folding the short side, inserting the box ears, etc. Exclusive parts are designed for different specifications so that the box ears may be structurally secure once inserted and do not fall off easily to ensure boxing stability. Through mechanical assistance, the carton-folding operational load may be optimized by more than 80% to effectively bring down the load and to minimize the space needed for piling up the carton boxes.

The technology has been transferred to “NORKY ENTERPRISE CO., LTD. ” as non-proprietary technology. The parties work together to integrate the QR Code labeling system and develop the automatic carton-folding and labeling system (Invention Patent I839939) in an effort to promote a smart and automated packaging procedure. QR Code labeling reinforces traceability management and digitalization of the supply chain, enhances the value added to the product, and helps with smart and standardized agriculture. The team will continue to deepen the technology and promote smart agricultural equipment in order to bring about an even higher-performance, safer, and more convenient production model for the industry, contributing to the transformation of agricultural technology and sustainable development.

CREATION
SILVER AWARD



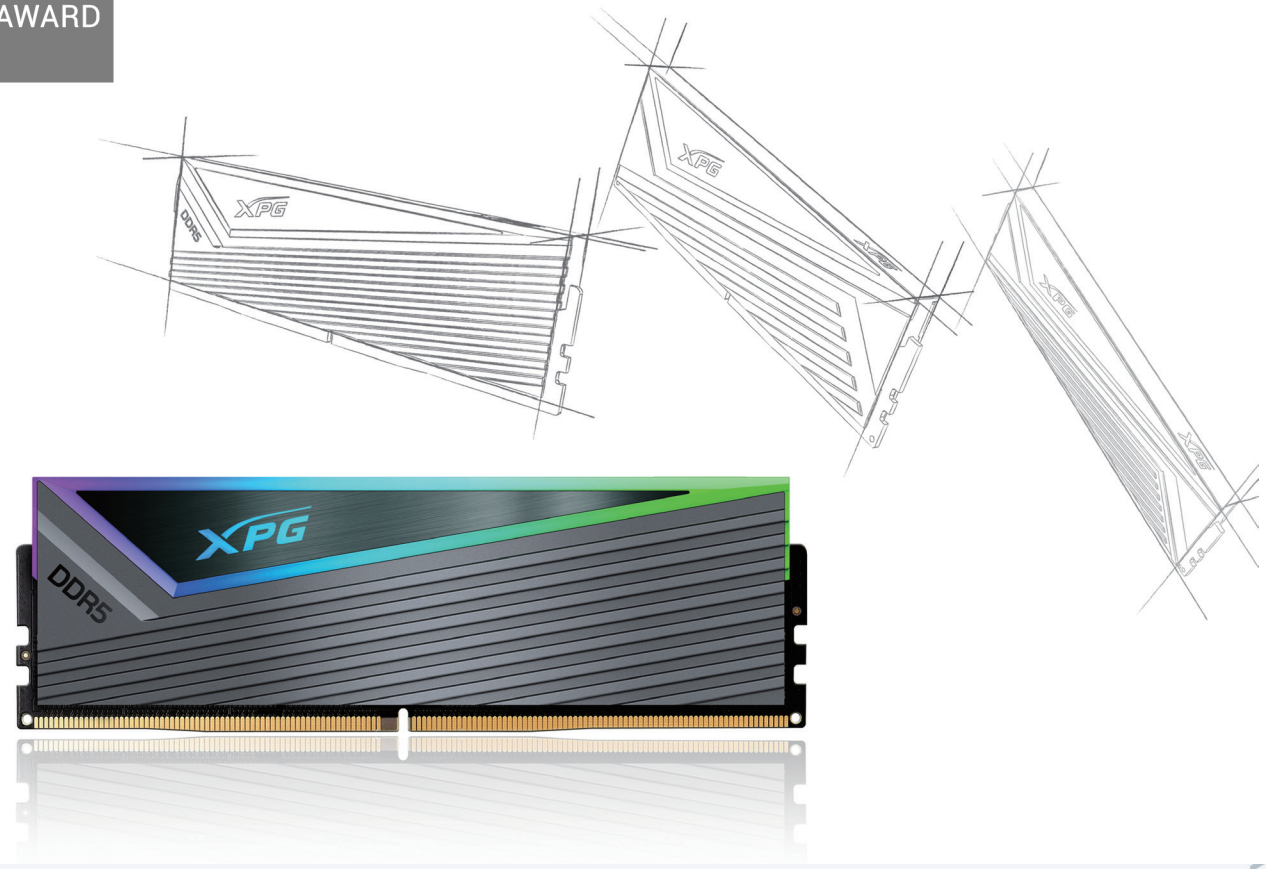
Portable Storage Device

Patent Certificate : D216648
Ming-Sung Lin, Wen-Te Shen

SP/Armor A66 is a military waterproof seismic add-on drive of one-piece plastic and overall envelope design. It has been approved through military seismic testing and meets the waterproof criteria of IPX4 to be capable of coping with various external unexpected situations, such as falling, collision, rain, and dust, easily at any time, anywhere, indoors and outdoors, to safeguard the integrity of the user's precious data on all fronts. Even in the case of an accidental fall onto the ground or spray of water drops in daily life, the integrity of data inside the drive can be retained. The thoughtful embedded groove design allows easy storage of the transmission line next to the drive to make it more convenient to bring the drive outdoors. The total silicon envelope design is known for its outstanding anti-slip effect so that the user can hold and carry it more conveniently, turning portability and usefulness into a reality. The tough yet simple design of Armor A66 comes with a mixture of modern colors, black, clear blue, and chrome yellow to create a fully trendy sports air for the user.

The biggest challenge encountered in design is that it has to be fall-proof and water-proof in addition to compatibility with a capacity and thickness that differ in specification! The product is of the sandwich design after generations of development experiences accumulated and evolved over the long term. The biggest design characteristic is that die parts may be shared and assembled quickly. Applying replaceable design mezzanines reduces the development quantity and cost of dies by half! While the product was being designed, a larger-than-expected product size occurred as a result of the structural screw locking position, which might make it inconvenient for the user to carry or fetch. After constant discussions, adjustments, and modifications, the product of the innovative and useful design was eventually introduced to the market and was honored by the "Red Dot Design Award," the "Good Design Award," and the "Taiwan Excellence Award" as soon as it was available on the market. The product is now sold throughout the world and has successfully created the innovative value of a design.

CREATION
SILVER AWARD



Memory Module

Patent Certificate : D221101
Nai-Yu Huang

This patented DDR5 memory module integrates top-notch performance and future-like design to fully demonstrate the charm of technology of the new generation. The design as a whole is based on simple geometric elements and combines the tactic treatment of multiple materials to present a modern and future-like visual style.

In terms of the heat-dispersion design, the front and back metal heat sinks are made of aluminum, with exquisite, stylish ribs on both sides, which, along with high-performance thermal grease, perfectly attach core elements to solve the issue of high temperature during efficient operation. On the heat sinks on both sides, there is the hairline metal-texture triangular ornament that goes with the light guide style, so that powerful triangular light effects are presented when the product glows to make illumination at every moment a powerful brand impression and to signify the brand Logo for enhanced brand identity.

In order to signify the high efficacy of the DDR5 memory, the minimalist diagonal stripes are used to show the power of speed and transmission from the appearance. The uneven ribs are designed not only to increase the heat dispersion area for greater heat dispersion efficiency but also to render a dynamic visual effect of the product, implying its outstanding performance during high-speed operation.

The exquisite diagonal hairline metal texture nameplate answers to the consistent diagonal stylish ribs. The overall design lexicon further reinforces the core topic of “speed” by combining the high-speed performance of the product with modern technology. Each detail is meant not only to realize excellence but also to make the brand image deeply rooted in people’s hearts.

Invention Award

Medal Prize	Patent No.	Patent	Inventor	Patentee
Gold Medal	I630965	System for Drilling a Workpiece by Electrical Discharge Machining	Hong-Jhih Wong, Ben-Ciang Sia	Ocean Technologies Co., Ltd.
Gold Medal	I728281	User Equipment and Method for DRX Operation	Chia-Hung Wei, Chie-Ming Chou	FG Innovation Company Limited
Gold Medal	I731621	Walker	Chen-Yi Liang, Cheng-Hsing Liu, Chien-Wei Chen	Wistron Corp.
Gold Medal	I765412	Silicon Photonic Integrated Circuit and Fiber Optic Gyroscope Apparatus	Yung-Jr Hung	National Sun Yat-Sen University
Gold Medal	I769535	Gene-Engineered Mesenchymal Stem Cells and Applications Thereof	Woei-Cherng Shyu, Chien-Lin Chen, Yi-Hui Lee, Long-Bin Jeng	China Medical University
Gold Medal	I801273	A Deep Learning-Powered Novel Artificial Intelligence Algorithm and System to Assist in the Identification of Pneumoperitoneum on Abdominal Computed Tomography	Chang-Fu Kuo, Yueh-Peng Chen, Tzuo-Yau Fan, Li-Jen Wang, Kuang-Fu Chang, Ker-En Lee, Yi-Feng Wang	New Taipei Municipal Tucheng Hospital
Silver Medal	I630333	Ball Screw with a Dust-Proof Assebly	Wei-Lun Liu, Sheng-Hao Hong	Hiwin Technologies Corp.
Silver Medal	I638889	*Bacillus Subtilis* KHY8, Cultivation Method for Increasing KHY8 and Use Thereof	Tai-Yuan Chen	Kaohsiung District Agricultural Research and Extension Station, Ministry of Agriculture
Silver Medal	I662460	Method of Changing Identified Type of Touch Object	Tuan-Ying Chang, Hsueh-Wei Yang, Pin-Jung Chung	Elan Microelectronics Corporation
Silver Medal	I669161	Automatic Wall Adhesion and Cleaning System	Yi-Wen Lin	Yi-Wen Lin
Silver Medal	I698127	Projection System and Projection Method	Chien-Chun Peng, Chi-Wei Lin	Coretronic Corporation
Silver Medal	I700417	Three Dimensional Rebar Structure of Building Cylinder and Circular Transversely Closed Confined Stirrup Structure	Hsin-Yu Tsai, Jung-Bang Wang	Jung-Bang Wang
Silver Medal	I707740	Adjustable Workpiece Support System and Method	Chun-Ting Chen, Chien-Chih Liao, Pei-Yin Chen, Bo-Jyun Jhang, Jen-Ji Wang	Industrial Technology Research Institute

Medal Prize	Patent No.	Patent	Inventor	Patentee
Silver Medal	I722703	Projecting Appartus and Projecting Calibration Method	Kai-Shiang Gan, Po-Lung Chen, Shi-Chen Chen, Chien-Chun Kuo	Industrial Technology Research Institute
Silver Medal	I726763	Self-Bonding Coated Electrical Steel Sheet, Laminated Core, and Method for Producing the Same	Hsin-Wei Lin, Ping-Cheng Sun, Heng-Shou Chang, Shih-Yu Chan	China Steel Corporation
Silver Medal	I730621	Image Sensor Package and Endoscope	Shang-Yi Wu, Ming-Che Hsieh	Medimaging Integrated Solution, Inc.
Silver Medal	I737302	Electronic Device and Antenna Module	Kuan-Hung Li, Shang-Ching Tseng, Yu-Yu Chiang	Wistron NeWeb Corporation
Silver Medal	I738370	Pipe Freezing Method	Fei-Lung Liu, Fei-Fung Liu, Tzu-Yin Chiang	Xiang Tai Water & Electricity Facility Company
Silver Medal	I739058	Infusion Method	Wen-Fong Chang, Yen-Hsiang Hsiung, Chia-Yao Chang	Inventec Appliances Corp.
Silver Medal	I743473	Surgical Image Pickup System	Rui-Cian Weng, Yih-Sharng Chen, Te-I Chang, Chi-Hung Huang, Yen-Pei Lu, Yen-Song Chen, Kuan-Yin Yu	National Applied Research Laboratories
Silver Medal	I754787	Composition for Improving the Solubility of Poorly Soluble Substances, Use Thereof and Complex Formulation Containing Thereof	Wen-Chia Huang, Yen-Jen Wang, Felice Cheng, Chia-Ching Chen, Shao-Chan Yin, Chien-Lin Pan, Tsan-Lin Hu, Meng-Nan Lin, Kuo-Kuei Huang, Maggie Lu, Chih-Peng Liu	Industrial Technology Research Institute
Silver Medal	I756928	Method for Preparing Artificial Graphite	Yan-Shi Chen	CPC Corporation, Taiwan
Silver Medal	I760304	Terminal Device and Health Managing Method	Ping-Hao Liu	Hon Hai Precision Industry Co., Ltd.
Silver Medal	I768624	Electronic Device and Method for Predicting Obstruction of Coronary Artery	Yun-Hsuan Chan, Chun-Hsien Li, Jun-Hong Chen, Tsung-Hsien Tsai, Ting-Fen Tsai, Chi-Hsiao Yeh	National Health Research Institutes, Chang Gung Memorial Hospital, Keelung, Acer Incorporated, Acer Healthcare Inc.

Invention Award

Medal Prize	Patent No.	Patent	Inventor	Patentee
Silver Medal	I774026	Universal Serial Bus Device and Host	Zhen-Ting Huang, Shih-Chiang Chu, Er-Zih Wong, Chun-Hao Lin, Chia-Hung Lin	Realtek Semiconductor Corporation
Silver Medal	I776444	Virtual Metrology Method Using Convolutional Neural Network and Computer Program Product Thereof	Fan-Tien Cheng, Yu-Ming Hsieh, Tan-Ju Wang, Li-Hsuan Peng, Chin-Yi Lin	National Cheng Kung University
Silver Medal	I779911	Stably Braking System and Method Using the Same	Jia-Le Wei, Tsung-Hua Hsu	Automotive Research & Testing Center
Silver Medal	I801297	SafeTouch Blade	Chun-Yen Chen	Chun-Yen Chen
Silver Medal	I801840	Rotor Structure with Edge Notches	Lian-Shin Hung, Ching-Chih Huang, Yu-De Li	TECO Electric & Machinery Co., Ltd.
Silver Medal	I809530	Drug Scanning and Identification System and Using Method Thereof	Hsi-Pin Li, Fei-Peng Chang, He-Yi Hsieh, Pei-Ying Lin, Yung-Yu Huang	InnoSpectra Corporation
Silver Medal	I814175	Moisture-Response Deforming Fabric	Wei-Hsiang Lin, Po-Hsun Huang, Jen-Chi Chao, Ta-Chung An, Shu-Hui Lin	Taiwan Textile Research Institute
Silver Medal	I815112	Conductive Coating and Manufacturing Method of the Same	Hou-Sheng Huang, Chien-Lung Shen	Taiwan Textile Research Institute

Creation Award

Medal Prize	Patent No.	Patent	Inventor	Patentee
Gold Medal	M621977	Agricultural Sensing Bird Repellent Device	Dong-Jhen Guo, Kuang-Hua Chang, Yi-Wei Li, Wei-Hsiang Lin	Hualien District Agricultural Research and Extension Station, Ministry of Agriculture
Gold Medal	M636787	Stirring Device for Food Waste Disposer	Yu-Chao Chao	Yu-Chao Chao
Gold Medal	D194579	Testing Instrument	Shih-Chin Tseng, Ching-Sung Chang	Inventec Appliances Corp.
Gold Medal	D227669	Head Mounted Display	Yien-Chun Kuo, Lee-Wei Chen, Tse-Hsun Pang	HTC Corporation
Silver Medal	M601425	Intelligent License Plate Retrieval Machine	Hui-Hung Li, Wan-Yi Huang, Sung-Ling Huang, Shih-Hsien Liang, Chia-Pin Huang	Chiayi Motor Vehicles Office, Highway Bureau, MOTC
Silver Medal	M601722	Folding and Standing Structure of Flat-Type Carton	Chin-Yuan Chang, Yun-Sheng Tien	Taichung District Agricultural Research and Extension Station, MOA
Silver Medal	D216648	Portable Storage Device	Ming-Sung Lin, Wen-Te Shen	Silicon Power Computer & Communications Inc.
Silver Medal	D221101	Memory Module	Nai-Yu Huang	ADATA Technology Co., Ltd

Selection Guidelines

I. Purpose:

For the purpose of encouraging research and innovation, the National Invention and Creation Award is set up for inventors/creators/designers of inventions, utility models, and designs to select for granting awards and honor outstanding ones among them as well as to promote the trend of research and innovation, facilitating national development of industrial technology.

II. Contestant Eligibility:

(I) Contestants are limited to natural persons of the Republic of China.

(II) Entry Rules

1. Invention Award
   Inventors who have obtained a domestic invention patent within 6 years from the award selection year (i.e., obtained an invention patent issued between January 1, 2018, and December 31, 2023, with a patent certificate; and the patent remains valid as of the registration deadline) may register to enter the Invention Award contest.
2. Creation Award
   Utility model creators or designers who have obtained a domestic utility model or design patent within 6 years from the award selection year (i.e., obtained a utility model or design patent issued between January 1, 2018 and December 31, 2023 with a patent certificate; and the patent remains valid as of the registration deadline) may register to enter the Creation Award contest.

(III)Contestant Restrictions

Those with invention, utility model, or design entries that had entered in the Invention or Creation Award contests may enter the contest again if they conform to the preceding entry rules. Those with invention, utility model, or design creation entries that had already won an Invention or Creation Award may not enter the contest again.

III.Award and Prize:

(I) Invention Award

1. Gold medal: Up to 6 winners. Each will win a prize of NT$400 thousand, an award certificate, and a trophy.
2. Silver medal: Up to 26 winners. Each will win a prize of NT$200 thousand, an award certificate, and a trophy.

(II) Creation Award

1. Gold medal: Up to 4 winners. Each will win a prize of NT$200 thousand, an award certificate, and a trophy.
2. Silver medal: Up to 4 winners. Each will win a prize of NT$100 thousand, an award certificate, and a trophy.

(III)The prize provided by the National Invention and Creation Award for the invention, utility model, or design creation entries shall be denied if said entries do not meet the prize selection benchmark. Said selection benchmark shall be determined by the selection committee.

(IV)Prize Issuance Related Rules

1. The prize for the invention or creation award entries shall be issued to the inventor, utility model creator, or designer listed in the patent certificate.
2. If the entry was jointly invented or created by several people, the inventors shall jointly receive the prize. If the inventors have reached an agreement regarding the grant prize, said agreement shall prevail. If the joint-receivers have been notified to reach an agreement on the grant prize allotment ratio amount within a certain deadline but cannot reach an agreement within the period, the Taiwan Intellectual Property Office (hereafter "TIPO") shall issue the prize based on the ratio according to the number of people.

3. When jointly receiving an award certificate, each inventor, utility model creator, or designer may receive one certificate. When jointly receiving an award, all of the inventors, utility model creators, or designers shall jointly receive one trophy, but the receivers may request the TIPO to reproduce trophies at his/her own expense.
4. If a participant of the National Invention and Creation Award, is to be awarded but it is found that his or her patent rights are revoked or the evidential documents provided are involved in plagiarism or falsification, the Intellectual Property Office will revoke his or her eligibility for receiving awards and demand return of received awards.

IV.Registration Procedures:

(I) Registration Period

May 2, 2024 (Thursday) through 5 pm July 29, 2024 (Monday). Late applications will not be accepted. It is advised to sign up online as early as possible to avoid inability to get registered as a result of high online traffic at the last minute.

(II) How to sign up

1. All contestants may only take part through “online registration” by providing their information. Please go to “National Invention and Creation Award” on the website of the Intellectual Property Office (www.tipo.gov.tw [Home] >> Subject Website >> National Invention and Creation Award). Access the online registration information system and download the application form with the participation number to fill in the information.
2. Upload the electronic files containing contestant information (including the signature and complete annexes) to (www.tipo.gov.tw [Home] >> Subject Website >> National Invention and Creation Award) (PDF only for the format of the materials/the file has to be smaller than 30MB in size).

(III)Required Documents and Information

1. Required documents:
   Contest materials need to be uploaded. The Registration Form needs to include the signatures of all inventors, and the scanned copies of both front and back sides of the ID supporting documents of the contestant need to be provided.
2. Abstention Affidavit: When there are two or more contestants having registered, with some of the joint inventors abstaining from the contest, they shall sign the “Abstention Affidavit” in person and have it enclosed in the contest materials.
3. Supplementation Procedure: Among the electronic files enclosed by the contestant, the roster and materials to be supplemented will be released under “National Invention and Creation Award” on the website of the Intellectual Property Office by August 7, 2024 (Wednesday) [www.tipo.gov.tw [Home] >> Subject Website >> National Invention and Creation Award]. No additional notice on supplementation will be issued. The contestant shall visit the website for such information unilaterally and send electronic files of related materials to be supplemented by August 20, 2024 (Tuesday) to the exclusive mailbox for the National Invention and Creation Award: abc@mail.caita.org.tw. Specify in the Subject field of the email “Supplementation - 2024 National Invention and Creation Award - Patent Number”. Failure to supplement by the said date or to meet requirements despite supplementation is subject to rejection.
4. In order to maintain the fairness of the Award, supplemented materials will be sorted and integrated by the working group, and it is disallowed for the contestant to remove or replace any of them.
5. Attention:
   (1) If the inventor (creator or designer) is already deceased, the successor will enclose the ID supporting documents or related materials and sign the “Contestant Signature” block. If any of the inventors/creators/designers changes his or her name, a certificate of name change issued by the Household Registration Office shall be provided.
   (2) Only one patented product may be provided in one Registration Form.
   (3) The foregoing contest materials are to be uploaded electronically; no paper copies are acceptable.

Selection Guidelines

V.Selection:

(I) Formation of the Selection Review Committee

1. TIPO shall establish the National Invention and Creation Award selection review committee, comprised of 25-40 relevant agency representatives, experts, and scholars responsible for the relevant selection review matters.
2. TIPO shall elect 1 member to serve as the chairman of the selection review committee. The selection review committee shall establish teams to select and review the contestant entries according to their registration category.

(II) Selection Process

1. Initial selection: The selection review committee shall score the written materials from the contestants and nominate the shortlist.
2. Secondary selection: The selection review committee is divided into teams to conduct a site survey or receive a briefing from the shortlisted contestants as needed, and shall record the secondary selection score.
3. Final selection: The selection review committee calculates the final score by adding 30% of the initial selection score and 70% of the secondary selection score to determine the winners.

(III)Rating Criteria

1. Invention Award

Review Indicator	Description	Weight
Technical R&D	The innovative nature of the technology, its crucial essence, and competitiveness analysis, among others, will be rated.	30%
Patent value	Patent implementation efficacy, international deployment, related patent deployment, among others, will be rated.	30%
Commercialization efficacy	Contribution to commercialization of the patent, technical transfer, authorization, production value, purchase orders, and commercialization potential, among others, will be rated.	40%
Total		100%

2. Secondary selection:

(1) Novel Patent

Review Indicator	Description	Weight
Technical R&D	The innovative nature of the technology, its crucial essence, competitiveness analysis, Novel Technology Report, among others, will be rated.	30%
Patent value	Patent implementation efficacy, international deployment, related patent deployment, among others, will be rated.	30%
Commercialization efficacy	Contribution to commercialization of the patent, technical transfer, authorization, production value, purchase orders, and commercialization potential, among others, will be rated.	40%
Total		100%

(2) Design Patent

Review Indicator	Description	Weight
Innovative Design	The innovative nature of the technology, its visual aesthetics effect, and competitiveness analysis, among others, will be rated.	30%
Patent value	Patent implementation efficacy, international deployment, related patent deployment, among others, will be rated.	30%
Commercialization efficacy	Contribution to commercialization of the patent, technical transfer, authorization, production value, purchase orders, and commercialization potential, among others, will be rated.	40%
Total		100%

※ The selection standard is for reference only, and the actual selection standard passed by the selection review committee resolution shall prevail.

(4) Encourage Individual Inventors to Innovate in R&D

1. The selection review committee shall add points during the secondary review phase if the patentee of the invention or creative award contest invention, utility model, or design entry is the inventor, utility model creator, or designer.
2. The actual points added by the selection review committee resolution shall prevail.

(5) Selection Result Notification

The initial, secondary, and final selection review results and winners shall be published in the "National Invention and Creation Award" section of TIPO's Chinese website.

(6) Review Result Appeal

1. Contestants shall apply for the review result appeal within 30 days after it has been published by TIPO, or the application shall be rejected.
   (1) The contestant shall fill out an application form providing the name and contact information of the contestant's entry, and submit the form to TIPO.
   (2) Only 1 review result appeal may be permitted.
2. The appeal application shall not request reevaluation or the names and relevant information of the review judges

VI. Recognition

The winning entries shall be publicly awarded by TIPO. In addition, the winning entries shall be compiled in the Chinese and English Award Album (the winners shall collaborate to provide the Chinese and English manuscripts as well as the relevant digital photo files for the award album), which is promoted to the public electronically, in paper, and via online media.

We Pursue Excellence - Spinning Gold from Creativity