MOEA

NICA 2020

National Invention and Creation Awards

Intellectual Property Office
Ministry of Economic Affairs

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Words From the Director General

2020 was a year full of changes, challenges, but also new ideas. Not only has the transformation of the global industrial supply chain been accelerated, but also the way we live has been changed due to the impacts of the US-China trade war and Covid-19 pandemic. However, even in times of drastic changes, inventors and creators from various fields still make sustained and unremitting efforts to spark their creativities to fulfill new needs for new lifestyles.

To motivate talented inventors and creators to keep inventing, Taiwan Intellectual Property Office (TIPO) has organized the “National Invention and Creation Awards” for 30 years, and the number of patented entries has increased year after year. In 2020, there were 583 entries eligible out of 624 entries received, representing an increase of 25% compared to 2018 entries. This year, the Evaluation Committee for the Awards was composed of a total of 38 experts, scholars as well as agency representatives and they conducted 14 evaluation meetings. After assessments, a total of 43 winning entries were awarded “Gold Medal”: 6 in the Invention, 5 in the Creation; “Silver Medal”: 20 in the Invention, 12 in the Creation. The fields of winning entries included “Technology and Research”, “Healthcare and Medical Equipment”, “Recreation and Education”, “Agriculture and Ingredients”, and “Daily Necessities”, etc. Most of them have already reached the commercialization phase; some of them have even been patented in several countries, hence, they all possess market potential and tremendous business opportunities. Through the commercialization and industrialization of patents, the economic benefits of inventions can be further enhanced.

To expand more benefits, TIPO has compiled the “2020 Invention and Creation Awards Booklet”, documenting the core technology and product features of each winning entry as well as creative processes from the award recipients. In addition, all winning entries will be exhibited at the Excellent Invention Pavilion of the Taiwan Innotech Expo from October 14 to 16, 2021. It is hoped that the exhibition will attract the attention of domestic and foreign investors to promote more industry applications. Furthermore, TIPO will continue collaborating with the National Science and Technology Museum to collect winning entries that can represent the industrial technology developments in Taiwan and use them for exhibition and education purposes. The aim is to facilitate and enhance creative thinking and the spirit of invention as well as motivating the public to engage in innovation and unleash their potentials to engender a thriving outlook for Taiwanese inventions.

Taiwan Intellectual Property Office

Director General

Hong Shu-min

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National Invention and Creation Awards

Invention

Gold Medal

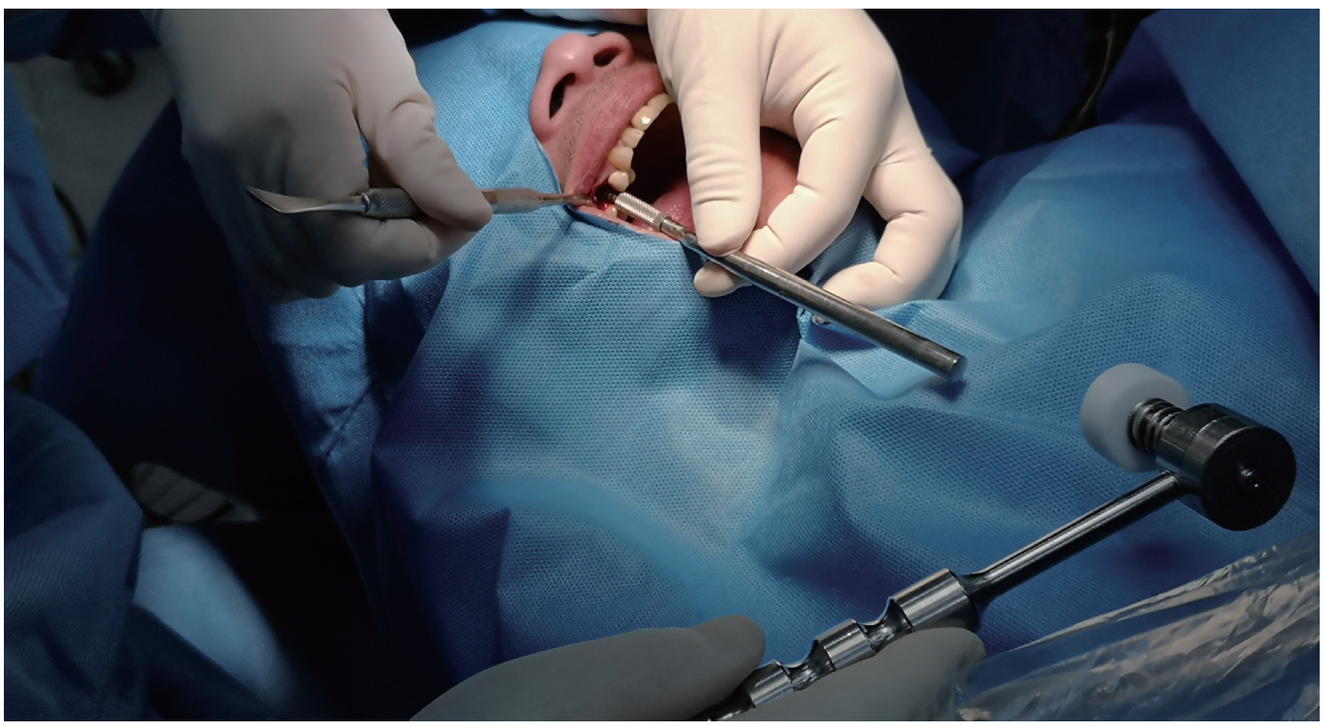
Force Limiting and Shock Reduction Device

Patent Certificate No.: I611882

Jui-yuan Shih

Innovative surgical hammer that reduces shock from impact and helps the user to limit force exerted

"Hammering/knocking" is a very common action we perform on a daily basis. It is done with a number of tools, ranging from the average hammer (to drive nails) to the much-smaller surgical hammer used by surgeons in operation. The Force Limiting and Shock Reduction Device is designed to help with shock absorption and reduction while enabling the user to maintain steady control of the force applied so as to achieve better results. It also serves as an ideal tool for new, extended applications in different domains such as medicine, industry operations and day-to-day life.



Many people are afraid to visit their dentists and they dread the prospect of doing so. It's not because their teeth are perfectly healthy and they don't need their dentists; it's just that they are terrified by the act, as the thought of dental apparatus that would enter their oral cavity for examination (or for dental transplant) while the dentist knocks and chips away at their teeth. Just thinking about the discomfort and the potential complications that could result would be enough to dissuade people from going to their dentists.

Working from the blind spot in search of a solution

Jui-yuan Shih, the inventor of Force Limiting and Shock Reduction Device (henceforth referred to as 'the invention') is a practicing dentist with 30 years of clinical experience. He delved into the domain of dental transplant several years ago. He studied sinus lifting procedure, which involves using a dental drill or ultrasonic surgery unit to flap back gum tissue at the sinus floor at approximately 1mm to the sinus membrane. The surgeon will then use a traditional surgical hammer to

create a socket in the bone, causing a minor fracture while augmenting the sinus membrane by filling the lower portion of the sinus membrane with bone grafting material before the implant is put in place.

However, Shih found a blind spot with this procedure. “Normal, healthy sinus membranes are usually no more than 0.3mm in thickness, and surgeons performing this process have to do it within the patient’s oral cavity and there is no way of seeing what is happening on the other side of the sinus cavity. In other words, the procedure’s success is highly dependent on the surgeon’s experience.” As a result, even with an X-ray or CAT scan performed prior to the operation, the resulting margin of error remains fairly significant. If the surgeon simply performs the procedure by the pre-operation measurements alone, he could accidentally perforate the sinus floor and cause the operation to fail. Not only that, it could also lead to concussion and infection. The use of a surgical hammer to create a socket would cause the patient’s body and head to shake, which could lead to dizziness. And as such, Shih committed himself to discovering a better solution by focusing on how he could control the force of the impact and reduce the shock created during the procedure.

Reducing shock and limiting force to ensure patient’s safety

This invention is a device that integrates features of “shock reduction” and “force limitation”. This dental hammer designed based on this concept comprises a hammer, a chisel and a double-layered spring member (i.e. double-layered spring) in structure. One end of the hammer is fitted to a connection structure with holes, while the other end is the handle for the hammer.

With a traditional surgical hammer, the reaction force generated from tapping would cause the hammer to bounce off from the surface of contact and would require the surgeon to exert more force. The device is designed with a double-layered spring member under the chisel to temporarily dampen the reaction force generated by tapping while converting the kinetic energy from the tapping to elastic potential energy to be stored temporarily. This elastic potential energy will reduce and dampen the shock by creating delayed rebound while continuing to deliver force to the target of impact to reduce waste of energy and noise created.

“Shock reduction is the prescription, while force limitation serve as the dosage”. With conventional surgical hammers, surgeons often generate varying degrees of strength with each tap due to the handling and discrepancies in the application scenario. In contrast, this invention features a magnetic mechanism on the chisel that ensures consistent delivery of force. The outer spring at the bottom end is elastic, while the inner spring provides the controlling force that helps to achieve shock dampening and absorption so that all taps performed with the invention will be consistent even if performed by different surgeons. Not only that, as the hammer is structurally separated from the handle, the user will experience no lateral force during its usage. By eradicating potential numbness for the user, the invention effectively improves both convenience of use and a high success rate for the surgery performed.

Patent awarded in several countries to pave the way for diverse, innovative applications

This invention had already won The Silver Award of iENA Nuremberg - International Trade Fair Ideas - Inventions - New Products in 2019, along with patents awarded in several countries. This surgical hammer has already seen extensive usage by surgeons and received overwhelmingly positive responses from doctors and patients. The invention is the result of the dedicated effort by inventor Jui-yuan Shih over more than 20 years, several hundred design prints he had drawn by hand and numerous researches and improvements. In his quest to refine his invention, Shih also found that the patented shock dampening/absorption technology can deliver similar outstanding results when applied to other common day-to-day tools. Examples include shock-reducing hammer, shock-reducing camping hammer, shock-reducing axe, shock-reducing golf clubs and so forth. This technology brought not just the invention of a single product, but also opened a new world to other innovative applications.

Invention

Lens Module and Eye Fundus Camera Including The Same

Patent Certificate No.: I629045

Chu-Ming Cheng, Long-Sheng Liao

Digital handheld medical imaging device - a Godsend for eye patients

People today have set new records in terms of their usage duration of 3C products at an alarming rate. Eye discomfort and ailments have literally become a common falling for all. The Lens Module and Eye Fundus Camera Including The Same is compact, lightweight and easy to carry, making it suitable for home and telemedicine so that eye fundus examination can be delivered to communities and remote townships. This means that the service is no longer restricted to hospitals and clinics and all eye patients can benefit from this invention.

You will find people spending a significant amount of time staring at their smartphones and tablets literally everywhere. Yet, looking at such devices for extended periods of time can cause various eye illnesses and diseases. According to a domestic survey on eye protection trends, the general public spends on average more than 10 hours a day using their 3C devices. As a result, the population of people suffering from eye illnesses has been rapidly growing. Coupled with other patients with diabetes and hypertension who require constant monitoring of their eye conditions, many people have indeed had experience going through an eye examination.

An innovative invention that helps with diagnostics

Nevertheless, most medical centers and hospitals usually have large ophthalmoscope for eye fundus exams, which requires the patient's pupils to be dilated first. During the examination, the patient has to withstand intense light from the equipment, not to mention the side effects from mydriasis, such as extreme sensitivity to light and impaired vision. Patients would also have to wait for the negatives to be developed and the images to be printed. All the hassles involved discourage patients from having the examination. At the same time, ophthalmoscopes are very expensive and bulky in size, making it difficult for clinics in rural townships and smaller clinics to purchase or use on premise.

With these shortcomings in mind, Medimaging Integrated Solution, Inc. began exploring and committing to the development of a handheld, eye fundus camera - the Lens Module and Eye Fundus Camera Including The Same (henceforth referred to as 'the invention') as a replacement for traditional medical/optical magnifying glass without a digital camera and recording function and alternative to high-end desktop medical diagnostic instruments. The unique feature of this invention lies in the integration of illumination and the imaging lens. Mediaimaging Integrated Solution Chairman Chu-Ming Cheng remarked, "When you take a picture outdoor, there is ambient light that helps with the imaging process. In contrast, our retinas do not create light, and this is why the invention is designed to function as a light source. One easy analogy of the invention would be the integration of a flashlight on a DSLR with its lens as it projects light through one's pupil in order for the lens to capture an image of the eye fundus, with which opticians and physicians can base their diagnosis. "

Auto-focusing with high imaging resolution

One critical aspect of eye fundus examination is to determine any symptoms or complications of illness at eye fundus. Examples of illnesses include macular degeneration, retinal detachment, glaucoma and so forth. In order to detect symptoms of said illnesses, the ophthalmoscope must provide adequate illumination and imaging quality. During the developmental process of this invention, the company had overcome the primary challenge of our natural sensitivity to light by casting intense light to trigger brief miosis that lasts merely 0.1 seconds, during which the invention would complete imaging capturing at incredible precision thanks to auto-focusing and imaging to obtain eye fundus image at high resolution.

One technical obstacle that presented itself is the fact that when a light source is integrated into the imaging component within the same optical lens module, such a setup tends to create stray light. Not only that, when a beam of light goes through one's retina, the light has to first penetrate the cornea and lens before it is reflected to the lens module for imaging. This meant that issues of scattering and diffuse reflection must be addressed as well. During early stages of development, the inventors had to work around issues of blurry images. The contours of the lens module were changed multiple times and in the end, the inventors chose to use a single piece of glass, non-spherical magnifier to enlarge the field of view. The magnifier is double-convex in shape to effectively reduce ghost images from reflection. For the second lens group, the first lens was designed to be concave in shape so as to prevent ghost images from making it through to the imaging lens. For the third lens group, glued lenses were used instead to overcome chromatic aberration in the human eye.

Compact and lightweight to improve efficiency

As the design focused on the creation of a handheld device from the get-go, the module required the illumination and imaging path to be miniaturized. Later on, the company adopted a single-point off-axis illumination structure to reduce the bulk of the illumination system to the smallest possible while using a compact, high-efficiency sensor to maintain film speed, with a reduction in lens size so as to achieve compactization. Weighing only 500g, the invention is easily portable for medical personnel and makes it possible to perform relevant checks for patients on-spot.

Presently, this invention is the world's first high-resolution, wide-angle handheld digital eye fundus camera. And as the invention has a memory card built-in, it enables the user to send captured images to a remote location for telemedicine. Not only that, the digital data can also be used to create an electronic medical history for patients and therefore significantly improves overall healthcare quality. The invention has won numerous major domestic and international invention awards, along with invention patents in Taiwan, the U.S., China, and Europe. It has also been selected as the designated eye fundus camera equipment reimbursed by the National Health Insurance in Taiwan for telemedicine. In the United States, the invention has been launched as an ODM product and commercial product in the consumer market. This invention has connected Taiwan to other developed nations around the world in the trend of extensively applying information technologies in medical care.

Invention

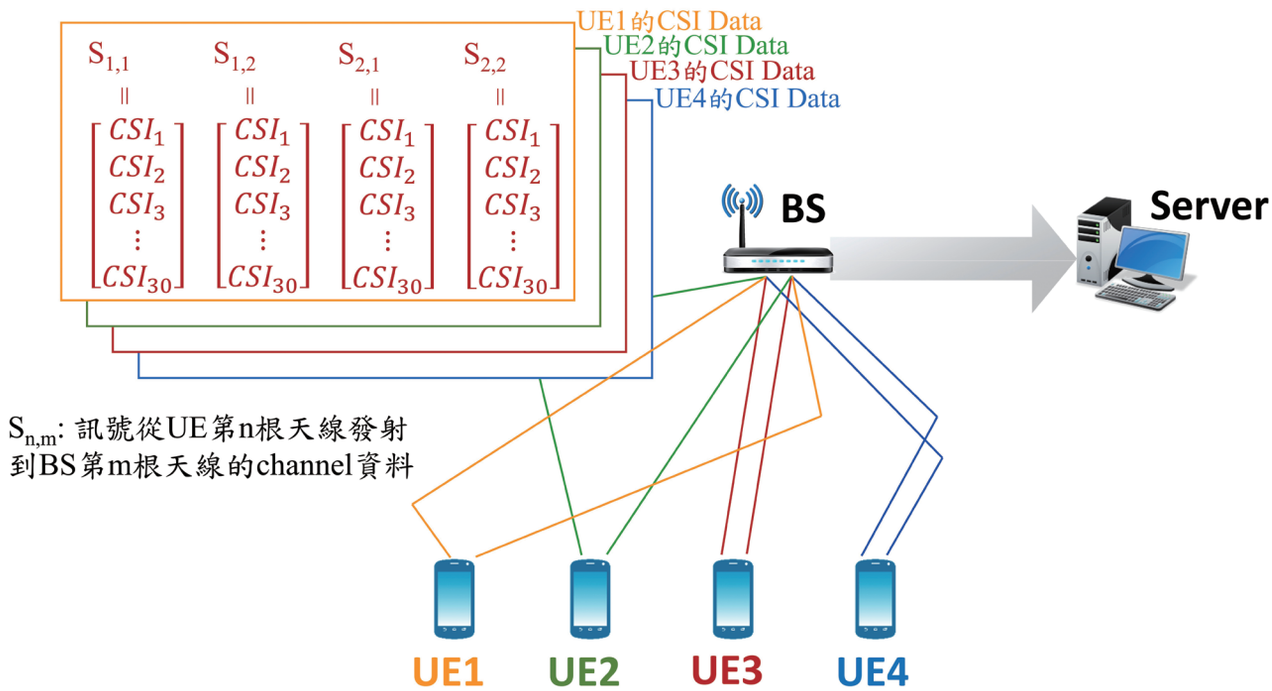
Channel-Based Positioning Device, System and Method Thereof

Patent Certificate No.: I645733

Pi-Chen Chiu, Ting-Wu Ho, Chia-Lung Liu

High precision Wi-Fi indoor positioning to overcome the pain point for the sector

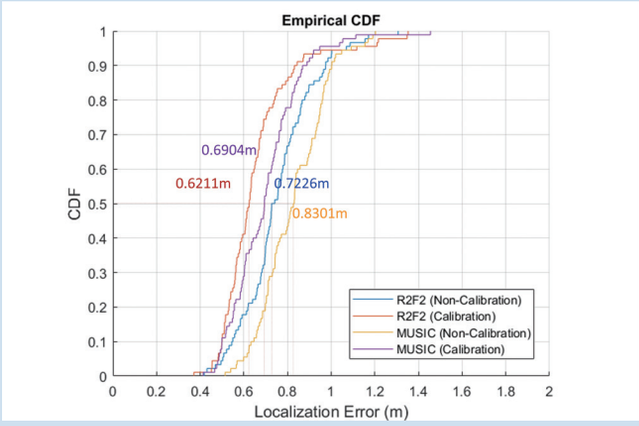
With the dawn of the 5G era, the rapid development of wireless communication technologies has forcefully driven demands for relevant services. Indoor positioning and wireless sensor technology have emerged as wireless technologies that caught the most attention at the moment as they can be extensively applied in areas such as factories, healthcare, departmental stores/shopping centers and so forth to create more opportunities.



Many people probably have had a similar experience - they navigate their way outdoors using GPS and everything seems to work smoothly without a hitch. However, the moment you set foot into an indoor area, such as a basement or a crowded shopping center, the GPS would suddenly lose its magic and no longer be able to position itself properly. But in truth, indoor positioning applications have huge potentials and opportunities in enterprise and business settings, including occupational safety management, personnel management, area control, equipment monitoring and so forth. It has always been a crucial and popular technology, but despite its massive market demand, a standard solution that has been proven to be effective has yet to be created.

Thinking outside the box-measuring distance with electromagnetic waves

The Channel-Based Positioning Device, System and Method Thereof (henceforth referred to as 'the invention') developed by the Information and Communications Team from Industrial Technology Research Institute has brought the technology of indoor positioning to a new height. According to ITRI Information and Communications Center Director Chia-Lung Liu, traditional WiFi indoor positioning technology has been around for almost two decades today and the distance of its reception is measured based on the Received Signal Strength indicator (RSSI). However, in the presence of any indoor element that can weaken the signal (such as sophisticated renovation, presence of huge crowds of people,



changing interior decors and so forth), the calculation would lose its accuracy. The discrepancy may reach 12-15 meters off from the actual location and this means significant room for improvement still exist.

Incidentally, the Information and Communications Center had been engaged in developing indoor positioning technology for more than two years for a project. The team was working on overcoming interference of WiFi electromagnetic waves. They noticed that whenever someone passes by with their mobile phone, they had to readjust the settings once more and found that WiFi to be very sensitive to mobile phone positioning. Since the wavelength of electromagnetic waves is mostly constant at approximately 12cm, the team came up with an idea to use the wavelength of wireless electromagnetic waves as the basis of measurement instead. In other words, the invention uses WiFi electromagnetic wave as a “ruler” for measurement. It significantly reduces the positioning discrepancy to 1 meter, which is 10 times more accurate compared to traditional technologies.

Seamless update to reduce deployment costs

Apart from being the world’s most precise indoor positioning solution, the invention’s low cost of deployment is another one of its key features. As Chia-Lung Liu pointed out, “This technology is compatible with all existing wireless LAN structures at different premises and venues so that proprietors are not required to spend more on building new WiFi environment in order to update to this positioning technology. Instead, they can just stick with their original hardware.” As the team has designed the WiFi positioning device to be deployed in the venue/premise of application to pick up electromagnetic wave signals from mobile phones as an alternative signal source, this solution can save nearly 2/3 of overall deployment costs, calculated based on solutions with existing technologies.

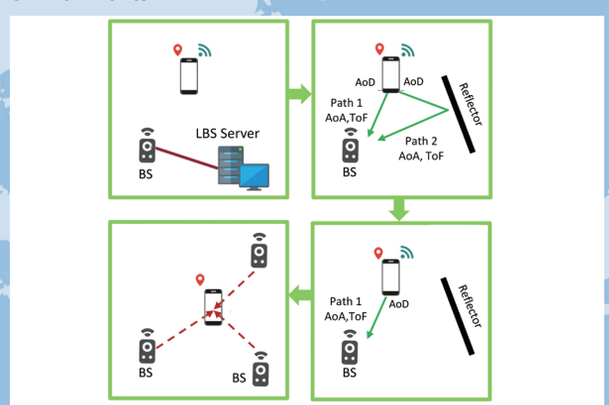
On the other hand, users can simply use WiFi internet access the way they have always been doing without having to download any App or acquire an additional device to have the system pinpoint their mobile phones with great precision. The solution also offers other advantages such as reduced lead time for system deployment, easy operation and maintenance, reduced power consumption and so forth to ensure seamless update to the new positioning system at different venues and premises with improved efficiency.

Extensive applicability with precise tracking and analytics

The team had several setbacks during the developmental process. Liu recalled that when the team pitched the idea for the first time, the client immediately turned down the proposition when the team suggested the renewal of existing hardware. It was an eye-opening lesson for the team and reminded them to see things from different perspectives and base the design from the users' standpoint and the venues they operate. By doing so, the solution enjoyed significantly better acceptance.

Presently, this invention had been adopted or licensed to several high-tech electronic manufacturers for technical transfer in applications for IT security management. For other industry 4.0 supply chain premises, occupational safety management at smart factories, access control for restricted areas, airports or large wholesale stores where customer flow tracking and hot spot analysis are necessary or tracking of key assets at medical institutions, emergency rescues and positioning analytics, the success of this technology means that obstacles that stemmed from limitations of conventional technologies can now be solved.

As the outbreak of COVID-19 continues to ravage the world, more and more businesses will become adopters of indoor positioning and tracking technology to contain the pandemic. This invention's positioning technology makes it possible for users to keep a record of all individuals someone might have come into contact with, along with backtracking features to generate the history of prior exposure and recreation of the path of movement in specific areas. With the pandemic still posing a great threat to people’s safety, the invention will help businesses to create safe and secured working environments.



Invention

Quinoxaline Compounds as Type III Receptor Tyrosine Kinase Inhibitors

Gold Medal

Patent Certificate No.: I648266

Shao-Zheng Peng, Chu-Bin Liao, Hung-Kai Chen, Chen-Hsuan Ho, Hung-Jyun Huang, Shian-Yi Chiou

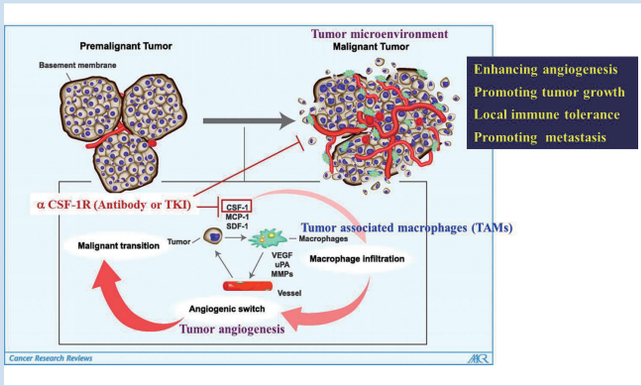
Development of new cancer immunotherapeutic agent demonstrates Taiwan's strength in biotechnology

Numerous anti-cancer agents had been available in the market at present; and the drugs for cancer treatments is the biggest pharmaceutical market in the world. The Development Center for Biotechnology (DCB) had developed the new cancer immunotherapy drug targeting tumor-associated macrophages to remodel the tumor microenvironment and reverse patient's immunity, thereby offering a safer and more effective treatment option for cancer patients.

With the advancement in medical technologies and better understanding of cancer biology, has promoted significant progress of cancer treatment over the years. Cancer treatments were evolving from surgical resection, radiotherapy and chemotherapy towards target therapy and precision medicine. More importantly, cancer immunotherapy which emerged in 2011 is considered as a critical breakthrough in current cancer treatment. Consequently, anti-cancer drugs that regulate patients' immunity have caught significant attention.

New immunotherapy drug makes its way to a niche market

The current cancer immunotherapies mainly focus on activating T cells to help patients' immune systems to eliminate cancer cells. However, the unique tumor microenvironment suppresses T cell activation, which limits the efficacy of cancer immunotherapy, because in the tumor microenvironment, there are many tumor-associated macrophages that can suppress immunity. As the proliferation and survival of these tumor-associated macrophage are regulated by CSF- 1R, a highly specific CSF-1R inhibitor is therefore capable of remodeling the tumor microenvironments, and is regarded as the next-generation cancer immunotherapy drug with great market potential.



With the support of the MOEA's technology development program, the team from DCB led by Dr. Shao-Zheng Peng and Dr. Chu-Bin Liao has discovered a series of new small molecules targeting CSF-1R kinase aimed for remodeling the immunosuppressive tumor microenvironment. It is expected that by inhibiting CSF-1R, the tumor-associated macrophages will be reduced to improve the immunosuppressive state of tumor microenvironment, and can help patients' immunity to better act against tumors. The research team had completed the development of "Quinoxaline Compounds as Type III Receptor Tyrosine Kinase Inhibitors" (henceforth referred to as 'the invention') and technical transfer within three years, fully demonstrating Taiwan's R&D strength and international competitiveness of small molecular new drugs development.

Targeting tumor microenvironments to promote health and wellbeing for mankind

The uniqueness of the present invention is that it shows more specific kinase inhibitory activity than other drugs with similar mechanisms. As Dr. Liao remarked, "The development of a new drug is an industry that compete for the first place, because people always want to use the best medicine. So creating differentiation is necessary during development of this invention." Compared to other small molecule kinase inhibitors that usually inhibit multiple kinases at the same time and may results in low specificity and obvious side effects, highly specific kinase inhibitors can reduce the side effects caused by off-target effects, however it is difficult to develop and has the highest risk of failure. Even so, after careful evaluation, the project team is determined to take a different path which aimed for targeting tumor microenvironment by developing a highly specific CSF-1R kinase inhibitor.

The biological activity and safety profile of the present invention are significantly superior to other competing drugs. Besides, its oral dosing formulation has the characteristics of convenience and flexibility for administration, which make it easy to control the side effects caused by drug. It is also worth mentioning that the entire preclinical research and development were completed by the project team of DCB which supported by MOEA. The invention has been technical transferred to biotech startup Elixiron Immunotherapeutics for further clinical development. In the present, the candidate molecule in the invention has been approved by the U.S. FDA and Taiwan TFDA for phase 1 clinical trial, giving Taiwan's self-developed new drug have the opportunity to shine in the international market.

With regards to the potential indications, the CSF-1R inhibitor can be used alone for the treatment of tenosynovial giant cell tumor (TGCT) or can be used in combination with other immunotherapy for the treatment of pancreatic or ovarian cancer. Except for cancer treatment, the drug can also be applied in neurological diseases or autoimmune diseases such as Alzheimer's Disease, Crohn's Disease, etc. Elixiron Immunotherapeutics had received a grant from the Part The Cloud-Gates Partnership sponsored by Bill Gates and The Alzheimer's Association of the Unites States for US$ 1 million in August 2020 to promote the drug's phase 1 clinical trial in U.S. for accelerating the clinical application in Alzheimer's Disease. This also reflects the positive and comprehensive impact of this invention on human health.

Upstream and downstreamintegration compete the international market

"Teamwork, good communication and professional specialization are key factors for new drug development in Taiwan." Dr. Peng pointed out that the development of new drug is highly professional, time consuming and with high risks. Therefore, resources and professional manpower are highly required. In other words, the success of this invention is not only to demonstrate DCB's strength in new drug development, but also to implement the development model of the upstream and downstream professional specialization integration in Taiwan's biotechnology and pharmaceutical industry. The integrated energy can accelerate the commercialization of new drug developed in Taiwan to compete the huge global market of new drugs.

Invention

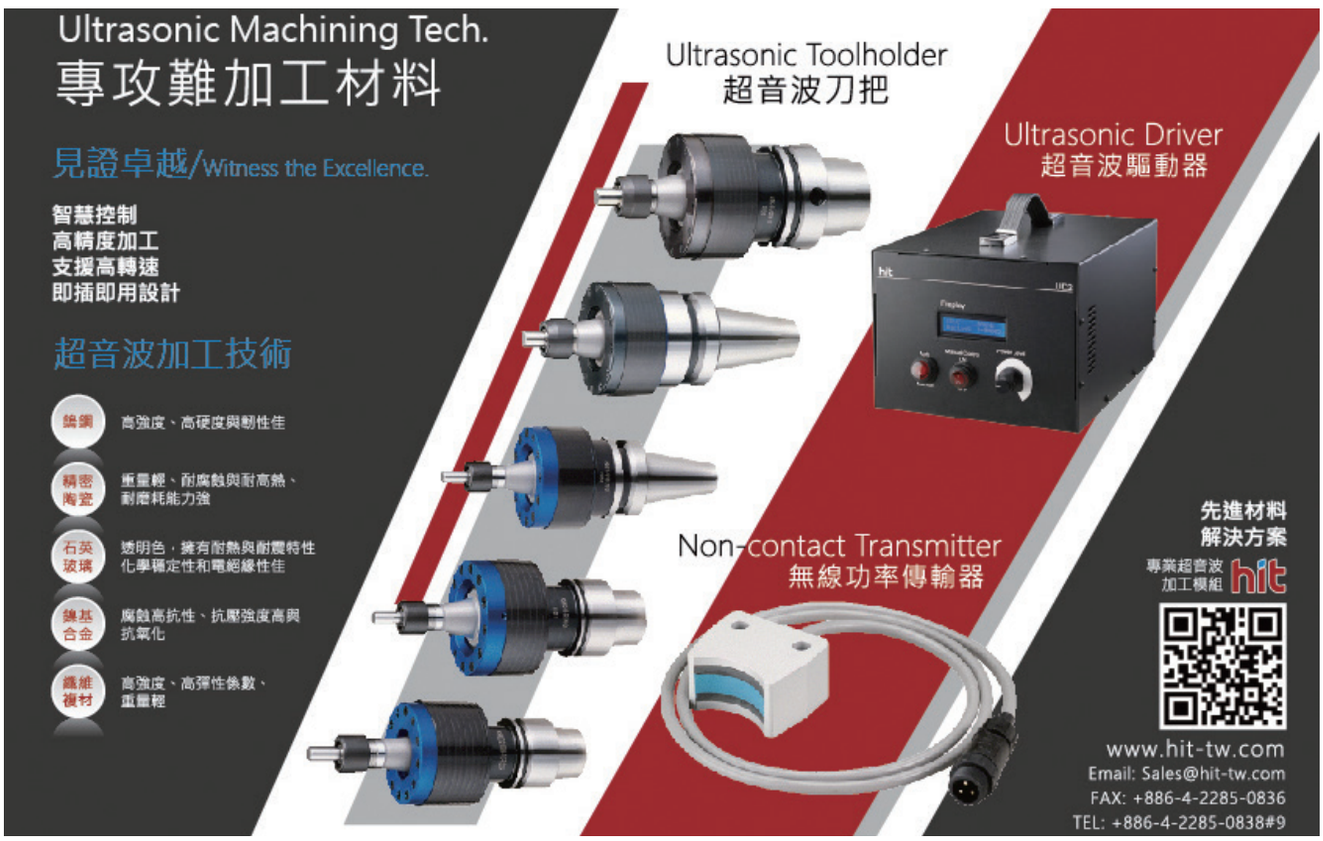
Machining Toolholder

Patent Certificate No.: I666087

Jenq-Shyong Chen, Hao-Tang Wang

Smart Supersonic Toolholder Module that helps to up-level traditional CNC equipment

With various industries changing rapidly, the demands from markets that work with advanced materials have been growing steadily. Examples include semiconductors, aeronautics, healthcare, electronic vehicle and even consumer electronics. Featuring modular design, the Smart Supersonic Toolholder can be installed directly on users' existing tools to cut various advanced materials. As such, it helps to boost processing performance and lower costs.



Machine tools have been referred to as "the mother of machinery", which is apt because people use them to cut and process all sorts of metallic parts and components. With technological advancements and the progress of civilization, mankind now faces various issues such as an aging population and environmental sustainability. As a result, different industries, including semiconductors, aeronautics, medical equipment, energy, smart electric vehicles, 5G communication, 3C products and precision molds, began to use a variety of lightweight, hard and high-temperature resistant materials such as SiC, sapphire, advanced ceramics, quartz, composite materials, superalloy and so forth. Nevertheless, traditional CNC machine tools are primarily designed for cutting and processing common metals. With advanced materials that are harder and more brittle, specific processing technique bottlenecks have become an issue.

An optimistic outlook for the blue ocean - committing to the actual research and development

As precision processing for advanced materials is a new blue ocean that is growing at incredible speed, the precision machinery industry places tremendous value. It takes the opportunity from this emerging market very seriously.

Nevertheless, the market is currently being monopolized by major companies from Europe, U.S. and Japan, and their commercial model requires clients to buy off the whole unit of supersonic processing equipment that costs in excess of tens of millions of NT$ but also takes more than a year to deploy and put into operation. For sectors that are highly competitive and pressed for time, such solutions do not address their needs.

For the past decade or so, multiple companies have devoted themselves to technological development but failed to achieve significant breakthroughs. It wasn't until the new startup Hantop Intelligence Tech, a spinoff from National Chung Hsing University that has received support from the Ministry of Science and Technology came forward and developed the Machining Toolholder (henceforth referred to as 'the invention') that finally brought the breakthrough. Jenq-Shyong Chen, the founder of Hantop Intelligence Tech, used to be teaching as a professor at National Chung Hsing University's Department of Mechanical Engineering. He had been working on his theoretical studies on supersonic theory for more than twenty years and this experience buttressed his extensive knowledge and expertise in the area. He was confident in the imminent trend for precision cutting and processing for advanced materials, so he steered his research to commercial applications.

Plug-in technology that lowered the hurdle of entry

This invention is an electrical powered supersonic assistive machining tool holder. With traditional CNC machine tools, they are typically designed with blades or tools spinning at high speed to cut metallic materials. As a result, the friction between the tool and the material tends to reduce the lifespan of tools. But with the use of this invention for the processing of advanced materials, as the primary spindle operates at high speed to cut the material, the invention would generate high-frequency vibration at 24000-40000 RPM to disperse the force of cutting. "The invention will not only make the cutting more effective during the processing, but by reducing the shearing force, it will reduce the load on the tool and in turn extend the tool's lifespan. The invention also improves the finished surface of the material and reduces the incidence of brittle edges or collapsed corner for difficult materials," Jenq-Shyong Chen explained.

Another highlight of the invention is the plug-in and modular nature of the supersonic tool holder, which is fully compatible with all existing CNC machine tools out there in the market. In other words, users can simply purchase the modular supersonic tool holder and install it on their existing machine tool. They will be able to essentially instantly upgrade their traditional CNC machine into precision processing equipment that can process advanced materials for semiconductors, ceramic and other composite materials without having to purchase entire units of tooling machines. This dramatically reduces customers' risks in terms of time and monetary investments and offers greater versatility in production capability management to empower users to be early exploiters of market opportunities with the new technology.

Integration of soft and hard power to venture into the high-end market

In the past two years, Hantop Intelligence Tech has developed more than 20 different specifications of smart supersonic tool holder in order to accommodate the domestic demands for the processing of advanced materials from the aeronautic, semiconductor, photovoltaic, 3C products and precision mold sectors. The products have been distributed to different overseas regions. End-users have adopted the supersonic tool holder modules in Taiwan, U.S., Korea, Singapore and Japan, and several semiconductor manufacturers all having introduced the invention in their mass production lines. The company will endeavor to stay competitive in the international market for high-end machine tools.

Reflecting on his research and development journey thus far, Chen noted that the greatest challenge is actually navigating through the tricky barriers in the domain of patent deployment set up by other European and Japanese pioneers. "It is a daunting task to develop better products without patent infringement." Fortunately, the startup company comprises talents from academia and we were able to align market demand with our momentum for scientific and technological research. We also had the support of outstanding talents in mechanical engineering, electrical engineering, electronic integration, information engineering, and so forth, which was the key that made our breakthrough possible.

Invention

Physically Unclonable Function Unit and Method for Operating A Physically Unclonable Function Unit

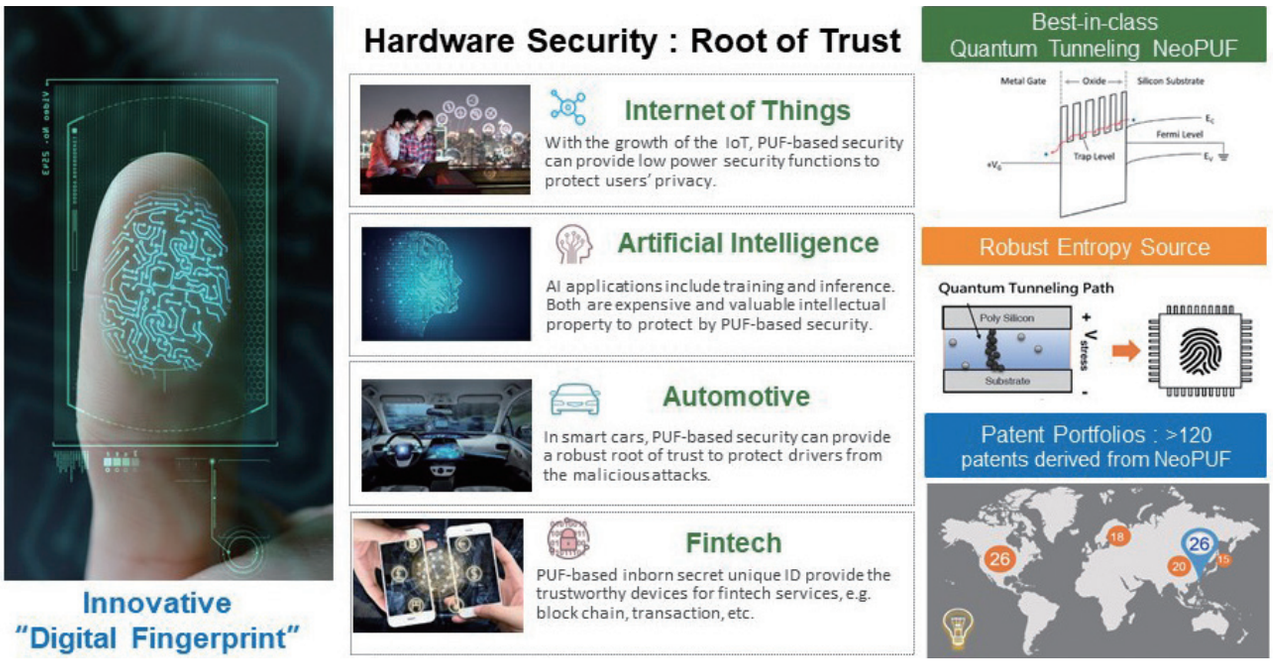
Gold Medal

Patent Certificate No.: I677152

Hsin-Ming Chen, Meng-Yi Wu, Po-Hao Huang

Disruptive innovation - foraying into the global market for a hardware security solution with NeoPUF

We live in the era of IoT today and as such, the issue of information security has become increasingly important. When it comes to the development of hardware security technologies, implementing it as early as the fabrication of SoC chip at the foundries will provide a substantial boost to information security thereby providing the most reliable safety mechanism for SoC chip that are used for end products such as electronic devices and self-driving cars.



According to statistics and data published by the US FBI, internet crimes have contributed over 3.5 billion USD of economic losses in 2019 alone. In addition to security vulnerabilities in applications, more and more cyberattacks have been made targeting hardware vulnerabilities. Considering the ubiquitous nature of IoT where all things are connected, information security is no longer a liability that might lead to damage of assets; it can easily escalate to threaten individual and even public safety. There have been multiple instances where hackers have easily hacked into vehicles connected to IoV and could manipulate the hacked vehicle's engine, causing it to accelerate/brake and steering the vehicle's direction. Such situations call for genuine concern on the potential threat to social security.

A new innovative solution for hardware security

During an event of a security attack, software vulnerabilities can be rectified quickly via coding and patching. However, hardware fixes can take substantially longer to implement, often involving product recalls that blemish a company's reputation. In light of this, world-renowned IP core solution provider eMemory Technology Inc. invented the "Physically Unclonable Function Unit and Method for Operating A Physically Unclonable Function Unit" (henceforth referred to as 'the invention') that implements security mechanism at the hardware level by providing highly efficient encryption computing as a new protective solution for SoC chip design to shield it against new security threats.

eMemory Technology's senior division director Hsin-Ming Chen touched on the philosophy behind the invention. "We leverage the physical micro-variations introduced during semiconductor fabrication and extract the unique "fingerprint" of each SoC chip to provide an uncontrollable and unpredictable root of trust. We then take a step further based on this hardware security to implement different encryption in accordance with the unique characteristic of each hardware. This dramatically increases the barriers for hackers to crack the hardware. It will also prevent vulnerabilities such as software loopholes that could cause the entire product line to collapse. "

High robust entropy bits

eMemory Technology has put itself on the map of the global physically unclonable unit (PUF) market with its disruptive innovation through this invention. Compared to SRAM PUF, the design, entropy bits quality and implementation with this invention may vary based on the actual application, yet it offers superior performance.

Due to the nature and physical characteristics of SRAM PUF, it can only extract 256 entropy bits since SRAM PUF is quite sensitive to signal noises, temperature and voltage. In addition, users may also experience errors with the product due to the aging effect. In contrast, this invention features the world's most advanced entropy source that is resistant against high temperature, high voltages and other environment factors. The raw entropy bits have been tested by both the U.S. NIST800-22 and the German AIS-31 test suits, verifying that the invention is capable of generating 64Kbits of high quality and robust entropy bits. These entropy bits also feature the reliability can be maintained for lifecycles over 10 years.

The target clients for this invention are designers and manufacturers of integrated circuit SoC chip and the invention will help them to resolve the following key security issues for chip designers: 1. to provide a root of trust for products by creating an unique and inborn key for identification; 2. to output true random numbers generated as keys for protection and following encryption/decryption of sensitive data.

Promising business returns from global licensing

The random numbers generated by this invention are truly random in the sense that they are uncontrollable and unpredictable. In fact, when this technology was unveiled in a paper published at the International Solid-State Circuits Conference (ISSCC), which has been dubbed as "the Olympics of IC Design", the paper was chosen for the 2019 Takuo Sugano Award in front of an audience that comprised more than 2000 experts and scholars from all over the world. The technology has also received patents in Taiwan, U.S., China and Europe. More than 120 patents have been derived from this technology and it creates a significant differentiation from other PUF solutions in the market.

eMemory continues to establish its presence in the semiconductor industry with its disruptive innovations as a crucial member of the electronic supply chain. According to Chen, the invention had already been put to the test and verified at different production nodes from worldwide foundries. In fact, the technology will be featured in the TSMC 5nm FinFET process - the leading semiconductor technology node for mass production of SoC chips. In terms of business model, eMemory will license the technology to worldwide IC design houses and foundries to generate revenues through licensing and royalty to achieve a feat that has been rarely achieved amongst Taiwanese enterprises. Considering the fact that PUF will be a critical asset as hardware security in the future, the company has already registered its NeoPUF trademark to strategically establish its worldwide PUF brand. Presently, the NeoPUF IP has already successfully been adopted and licensed to renowned global companies from Europe, the U.S. and Asia. The invention has been featured in applications such as AI, (smart) IoT, GPS, FPGA and relevant electronic industries and made significant contributions to the domain of hardware security!

Safeguarding national information security in the era of IoT

Out of the six core strategic industries promoted by the government, information security naturally has a role to play in the grand scheme of things with the impending arrival of the 5G era. At the same time, developments in IoT, IoV and AI carry on, the protection of key assets and secret information has become ever more important. The birth of this invention will no doubt accommodate the ever-growing security demands from various IoT products and safeguards information security.

Invention

Zwitterionic-Bias Material for Blood Cell Selection

Patent Certificate No.: I481442

Yung Chang, Jheng-Fong Jhong, Sheng-Han Chan, Wen-Lin Lin

Silver Medal

Taiwan has the highest rate of blood donation around the world. In 2019 alone, as high as 7.77% of the general public had donated a total of 2.72 million units of blood (1 unit is equivalent to 250ml), which also places Taiwan in the top spot for the most blood donated. Presently, when one visits a hospital for blood donation, apart from having a crossmatch performed first beforehand, as white blood cells may trigger complications after transfusion of blood, 99.9% of the white blood cells in the donated blood must be removed first (i.e. out of every 1000 white blood cells in the blood, only 1 may remain) to ensure the recipient's safety after the transfusion.

In 2009, Chung Yuan Christian University distinguished professor Yung Chang (who is also the director of the university's R&D Center for Membrane Technology) led his team in the development of the Leukocyte Reducing System. From the conception of the idea to the actual transfusion of blood on a human subject, the entire process spanned 8 years to go from technology readiness level (TRL) 1 to 7. In 2015, the team was awarded a patent for their invention of Zwitterionic-Bias Material for Blood Cell Selection (henceforth referred to as 'the invention'), which enables medical personnel to remove 1 white blood cell from an average of 1250 blood cells without causing the red blood cells to agglutinate, thereby ensuring better healthcare quality for patients during blood transfusions.

Yung Chang admitted that the process of development had been fraught with difficulties, with the acquisition of blood product for testing purposes being the most challenging since the team had to go through a full registration and review process in order to obtain blood products in Taiwan legally for relevant experimentations. Another significant obstacle involved the design of apheresis materials and the construction of the filter system. For the material system, the team had to complete many sophisticated procedures such as molecular synthesis, material preparation, filter formation, filter assembly, and blood filtering. Each of the aforementioned steps required a significant investment of time and funding. The entire research and development process became such a sinkhole of time and money that the team could only proceed to the next phase by applying for project subsidy from the Ministry of Science and Technology.

In 2016, this invention was transferred to a new startup that later became Puriblood Medical Co., Ltd. The company established its R&D laboratory at Hsinchu Biomedical Science Park in conjunction with a manufacturing plant at Hsinchu Science Park for the production of leukocyte reduction filtration systems. The venue was accredited to ISO certification and obtained FDA product certification in 2018 for the product to be launched and distributed in the U.S. market. The company plans to launch the product in Taiwan in 2021 and Europe in 2022 while using this patented technology for two new products. As Yung Chang remarked, "Our next step is to work on platelet filtration device for regenerative medicine in the treatment of arthritis to help patients. "

Invention

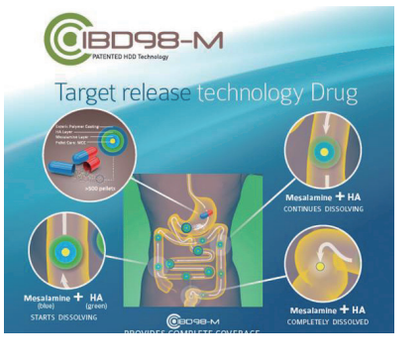
Mixture of Hyaluronic Acid for Treating and Preventing Inflammatory Bowel Disease

Silver Medal

Patent Certificate No.: I516269

Albert Wu

▲ Demonstration of manufacturing operation at Holy Stone Healthcare cGMP pilot Plant



▲ Schematic illustration of IBD98-M action in the intestinal tract

▲ TRUD Product

Inflammatory Bowel Disease (IBD) is an autoimmune disease that causes widespread, persistent chronic inflammation and ulceration in the colon and rectum. Patients suffering from IBD feel severe abdominal pain, persistent diarrhea, and long-term recurrence can lead to infection or even cancer. Unfortunately, the cause of IBD is still unclear and currently, only anti-inflammatory drugs and immunosuppressants are used to alleviate its symptoms. Patients are required to take their medication for a lifetime, having to endure a high relapse rate and side effects of the medication.

This invention combines different molecular weights of hyaluronic acid to stimulate the biological activity of tissue regeneration for the treatment of inflammation and ulceration caused by IBD. The invention restores normal function of the intestinal tract and mitigates the relapse rate to achieve treatment and prevention simultaneously, whilst also avoiding potential side effects from long-term treatment.

The key property of this invention lies in its unique combination and ratio of different molecular weight fractions of the polymer hyaluronic acid. Hyaluronic acid rheology is controlled to quickly cover the inflammation or ulceration sites forming a protective barrier that prevents irritation from external bacteria and allergens. Besides, the invention also functions as a regenerative material for tissue, facilitating the growth of endothelial cells to speed up wound healing of the inflammation and ulceration sites. This patented technology is primarily used for the treatment of inflammation and ulcers in the mucosa of the intestinal tract. Clinical trials of TRUD™ in IBD patients have proved that the inventions clinical response rate was 43% in the alleviation of patient symptoms, while the complete healing rate of ulcers was 24%. The invention has already received CE certification and has been launched in the market. This technology works on ulcers in the digestive tract and also the respiratory tract to restore their normal functions.

The patent has also been used as the basis for new drug development product reference IBD98-M. Apart from the unique characteristic of combined different molecular weight hyaluronic acids, IBD98-M also delivers and sustains the release of an anti-inflammatory drug at the inflammation sites of the colon and rectum. This targeted sustained delivery mechanism extends drug activity duration to enhance efficacy whilst also lowering the dosage required to favorably reduce potential side effects. Currently, IBD98-M Phase IIa clinical trial has been completed and the application for Phase IIb/III clinical trial is expected to be submitted in 2021.

Invention

Loop Tower CO2 Capture System, Carbonator, Calciner and Operating Method Thereof

Silver Medal

Patent Certificate No.: I516302

Wei-Cheng Chen, Siang Ouyang, Chin-Ming Huang, Cheng-Hsien Shen, Heng-Wen Hsu

In response to the threat of climate change, nations around the world have come together and adopted the goal of achieving net-zero carbon emission by 2050. In Taiwan, in addition to the objective of reducing “GHG emission in 2050 to less than 50% of that in 2005”, the government also set a short-term goal of reducing our GHG emission in 2030 to 20% less than that of 2005.

“Carbon dioxide capture, storage and reuse technologies are poised to have the most potential in the foreseeable future. The technology will be able to account for 13% of all CO_2 emission reduction and it has therefore become a critical technology in the international arena of innovative green policies as of now,” remarked Heng-Wen Hsu, Deputy Director of ITRI’s Green Energy and Environment Research Laboratories. Starting from 2009, the ITRI began its research on calcium looping technology. The principle of this technology involves the use of natural limestone (C_aCO_3) as the raw material, which is heated to thermally decompose into calcium oxide (C_aO) as an absorbent and gaseous carbon dioxide (CO_2). The carbon dioxide is then combined with solid C_aO to form C_aCO_3 once more. The C_aCO_3 is then fed into the calciner to obtain C_aO and this forms a loop that captures CO_2, which is removed and purified for storage or use. This technology makes it possible to ensure that carbon dioxide generated through industrial processes will not be released into the atmosphere.

With the support from MOEA’s Bureau of Energy, ITRI collaborated with Taiwan Cement Corporation in 2016 to set up a next-generation carbon capture plant employing calcium looping process technology at the Hualien Heping Cement Plant. The two primary reactors on premise are a calciner and a carbonator that feature a cascade cyclone tower structure, which is different from the dual fluidized-bed gasifiers that are used in European countries. According to Hsu, “Using the concept of cascade cyclone separator, the absorbent and the gas will have thorough contact that makes the reaction more complete. Also, upright calcium looping capture towers have the advantages of occupying less land area, lower costs and relatively simpler structures. These advantages make the invention highly viable large-scale carbon dioxide capture technology. ”

“Loop Tower CO_2 Capture System, Carbonator, Calciner and Operating Method Thereof” were submitted as a patented technology in December 2013. The patent is jointly owned by Industrial Technology Research Institute and Taiwan Cement Corporation as agreed upon in early patent licensing. The technology can be used extensively in other industries, including power generation, cement production, paper production, steel and petrochemical processing and so forth. It is estimated that it can capture at least 10 million tons of CO_2 and the high-purity CO_2 extracted this way not only helps to reduce carbon emission but can in turn be used in the manufacturing of valuable niche products such as light calcium carbonate, fuel and chemicals to create profit and opportunities to develop emerging energy sectors.

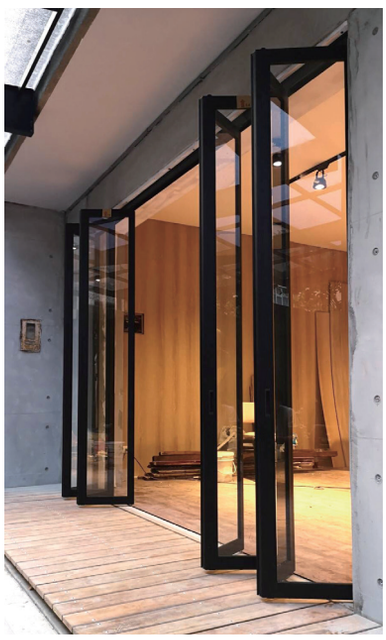
Invention

Silver Medal

Hingeless Folding Mechanism

Patent Certificate No.: I527957

Chen-Hsiang Lee



The invention of a hingeless folding mechanism offers an one-stop solution to overcome all shortcomings with conventional folding doors: height, precision, high weight load, smooth and noiseless operation and durability. No matter what angle it is folded, the door remains fully opaque. The contours are perfect and aesthetically pleasing, with no risk of getting your hand caught by it. The invention is resistant against shock and deformation and you will find no rotating parts on it, whether it's closed or open, no matter which side you view it. Once it is open and folded, the rotating part structure will fold seamlessly and become a part of the elegant contours.

Even with the countless advanced manufacturers of folding doors in the seven major industrial nations (Germany, France, Italy, England, USA, Canada and Japan), none of the renowned brand names had published or revealed a product that features a similar structure. With the invention of this structure, the numerous interior renovation studios, construction firms, architects, and interior designers in Taiwan looking for folding doors will finally have the ideal product they can use with confidence and adopt as an element in their designs projects.

Purpose of creation: I have always been troubled by the lack of an ideal alternative to traditional hinge and rotating parts that are ugly looking, outdated, potentially dangerous as one can get his hands caught by it and monotonous looking in Asia. Way back in 2002, the inspiration to create the invention and remained dormant in my head for 11 years, when I finally succeeded in creating a hingeless rotating part in 2012. My goal is to change people's aesthetic sense in Taiwan through design and through the delightful experience of actually using the folding door. My invention will hopefully change users' living environment and visual landscape. By contributing to the creation of an exquisite landscape, the improved indoor and outdoor landscape will change Taiwanese people's appreciation for aesthetics.

Scope of application: any door or two-piece folding doors or multiple folding-door setup that can be extended infinitely with rotating parts.

Economic benefits: Within the past four years, more than 40000 pieces of the invention have been sold in Singapore and Taiwan, with monthly distribution still growing at a significant speed. The value and potential of this patent are extensive and unlimited.

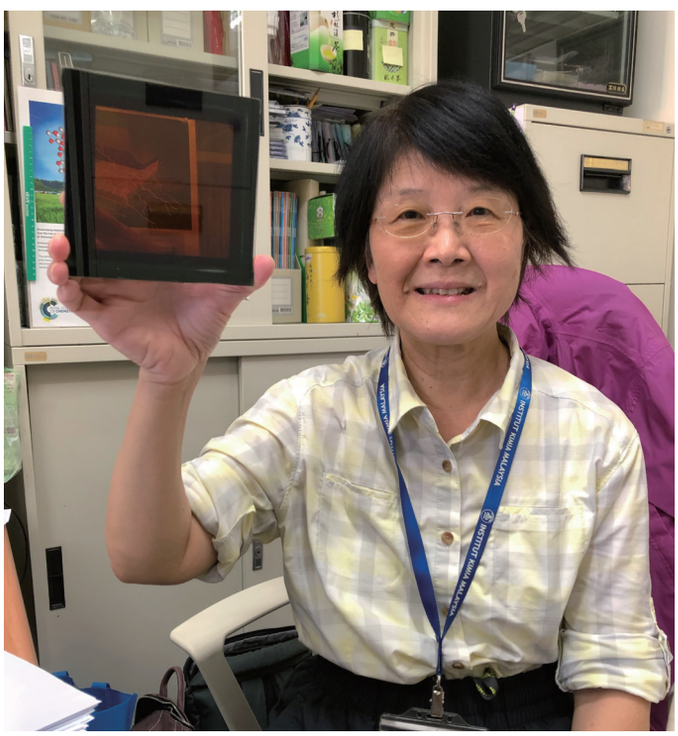
Invention

Pervoskite Solar Cell

Patent Certificate No.: I556460

Wei-Fang Su

Silver Medal



Solar cells have been a vital technology in the development and promotion of renewable energies. Professor Wei-Fang Su from NTU's Department of Materials Science and Engineering, Frontier Materials Research Laboratory, has been working on a solution process more than 10 years ago to create large-area solar cells. In the beginning, she worked with light-absorbing polymers but found the material to be lacking efficiency. It wasn't until the discovery of new light-absorbing material, "Organic/inorganic hybrid material with perovskite structure," in 2013 that she switched to this new material in the making of solar cells. Later in 2015, she finally succeeded in the design and fabrication of "Pervoskite Solar Cell" (henceforth referred to as 'the invention').

As Su pointed out, "Silicon-based solar cells remain as the dominant product in the market. Such solar cells involve energy-demanding crystal growth methods and non-continuous processing, both costly and difficult to promote for low cost mass production. In contrast, this invention involves the formation of a thin film with a solution in an atmospheric environment and it requires only one-thousandth of the materials needed compared to the silicon-based process. Due to the relatively simple process, the costs of production can be reduced to at least 1/3 of the original. "

The invention features an innovation in the chemical compositions and manufacturing process of Perovskite light-absorbing layer. Since the efficiency of optical-electrical conversion for a solar cell depends on the Perovskite light-absorbing layer's film-forming ability, crystallinity and thickness on the charge transport layer, given the fact that Perovskite compounds are organic-inorganic crystalline hybrids, they are not likely to form a continuous thin film on the surface. For this invention, polymers are added to the Perovskite precursor solution because polymers can form films easily. It helps the solution be evenly coated over the charge transport layer to effectively increase optical-electrical conversion efficiency by more than 25%.

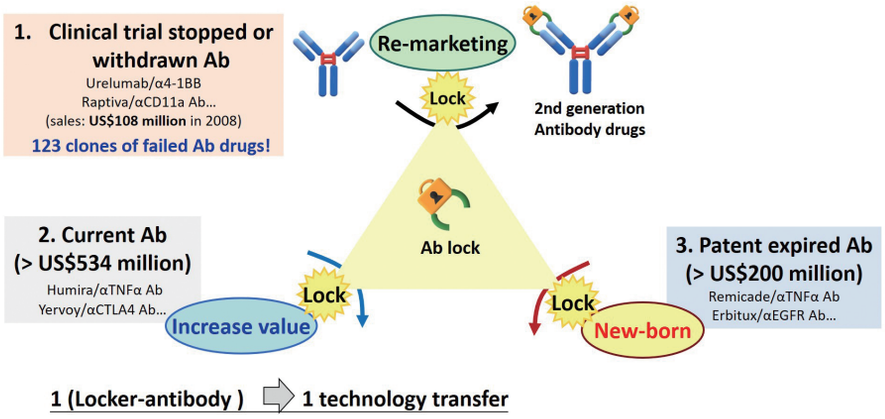
This invention has been improved further from small area processes to large area processes, and four patented technologies have been derived from it. Su has also been collaborating with domestic manufacturers in the development of large-area solar cell coaters and tandem solar cells by combining pervoskite solar cell with silicon solar cell. "Result is what matters most with scientific researches. Apart from having solid, fundamental knowledge, one must be diligent and relentless in order to learn from mistakes. This is how your philosophy is validated." According to Su. The next step for her is to develop flexible and lightweight Perovskite solar cells integrated with storage cells that can be used for aeronautics or unmanned aerial vehicle to promote the development of next generatim of solar power system.

Invention

Antibody Locker for The Inactivation of Protein Drug

Silver Medal

Patent Certificate No.: I582111
Tian-Lu Cheng, Chih-Hung Chuang, Hsiu-Fen Ko, Yun-Chi Lu



▲ Three major industrial applications for antibody lock: Re-marketing, Increase value and New-born

▲ Antibody lock press conference

▲ Lab partners

In recent years, antibodies have become a major treatment in clinical use. However, antibodies cannot distinguish whether target antigens are expressed in disease regions or healthy tissues. When antibodies neutralize antigens systemically, it can cause severe side effects in treatments. Therefore, it's important to improve the selective reactivity of antibodies in the disease region. For this invention, the team has used the hinge region as an antibody lock and “pasted” it on the antigen-binding site of antibody by using a protease substrate as a linker to generate pro-antibody. After the antibody lock is removed by expression of protease in the disease region, the cleaved pro-antibody is expected to be specifically activated and neutralize the target antigen to inhibit the disease progression.

This invention effectively boosts the selectivity of antibodies and reduces side effects. The antibody lock can be extensively applied to various antibodies to resolve existing challenges with antibodies and creates incredible marketing potential. This technology has been successfully applied in dozens of FDA-approved antibodies, such as the rheumatoid arthritis drug, Infliximab (anti-TNFα antibody). Pro-Infliximab only selectively activated in disease site and presented similar pharmacokinetics and therapeutic efficacy to Infliximab while minimizing the side effects, the interference in immunity against a Listeria infection in mice model. The findings have been published in top international journals (PLoS Bio. 2019). The patents for this innovative antibody lock have already been filed in 18 countries and certified in 11 countries, including Taiwan,the U.S., China, Japan, and the EU members.

The team has been actively promoted antibody lock to global pharmaceutical companies and provides customized pro-antibody drug design services. The technology transfer authorization of antibody lock and collaboration of pro-antibody development, can improve the safety of antibodies, and bring revolutionary breakthroughs to the mainstream of the antibody-drug field.

Invention

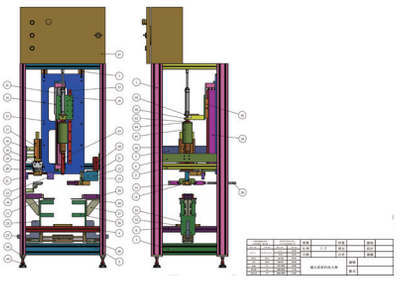
Bag Packaging Mechanism for Mushroom Cultivation

Silver Medal

Patent Certificate No.: I583600

Rong-Yuan Jou, Chih-Jen Lee

▲ Innovative PP bag-packing equipment with the production history traceable module



▲ 3D model for practical implementation of the patented concept

▲ Traditional PP bag-packing machine

Traditional packing operation of cultivated mushroom in PP bag involves a single unit of the machine with content filling feature along with 5~6 personnel to manually perform a number of steps including bagging, fastening/ring application/ bag turning, cotton stuffing and so forth. Such a line of operation can produce tens of thousands or even hundreds of thousands packaged bags of mushrooms a day. The purpose of this invention is to create a PP Bag-Packaging Mechanism for Mushroom Cultivation that can replace the most sophisticated and critical processes of fastening/ ring application/bag turning in the automated packing for mushroom cultivation in big bags. The invention comprises two clamps, a conveyor mechanism, air duct, suction/exhaust mechanism and a push lever mechanism. Applying the rings with the conveyor mechanism.

Firstly, the air duct will go through the ring and enter the bag through its opening before the two clamps close the upper section of the bag until the bag is flush on the air duct. The suction mechanism will draw out air from the back to secure the inner wall of the bag at the upper part. At this point, the two clamps will open while the push level will lower to move down the ring to fasten the upper part of the bag. The exhaust mechanism will then send air inside the bag to inflate the upper portion before the push lever lowers further to push the upper section to fold over downward as the air duct and push level move up to complete the automated packaging for mushroom cultivation in the big bag. This invention had already been approved in the U.S. for a patent.

This invention is designed for automated packaging equipment for mushroom cultivation in big bags. The concept feature in this invention can also serve as the basis for the design of a new automated packing system that can perform relevant operations, including bagging, filling, compacting, punching, ring application, bag turning, basket placement and so forth. Apart from providing a fully automated packing solution for bag mushroom cultivation industries so as to address issues including manpower shortage, reducing manpower demand and so forth, this invention also serves as the first milestone in the development of Taiwan's smart agriculture by achieving the goal of smart mushroom cultivation, smart packing and turning the processes of harvesting and packing into factory production lines. This invention is a vital technology that the industry needs for sector upgrade and attaining output capabilities to compete at the international level.

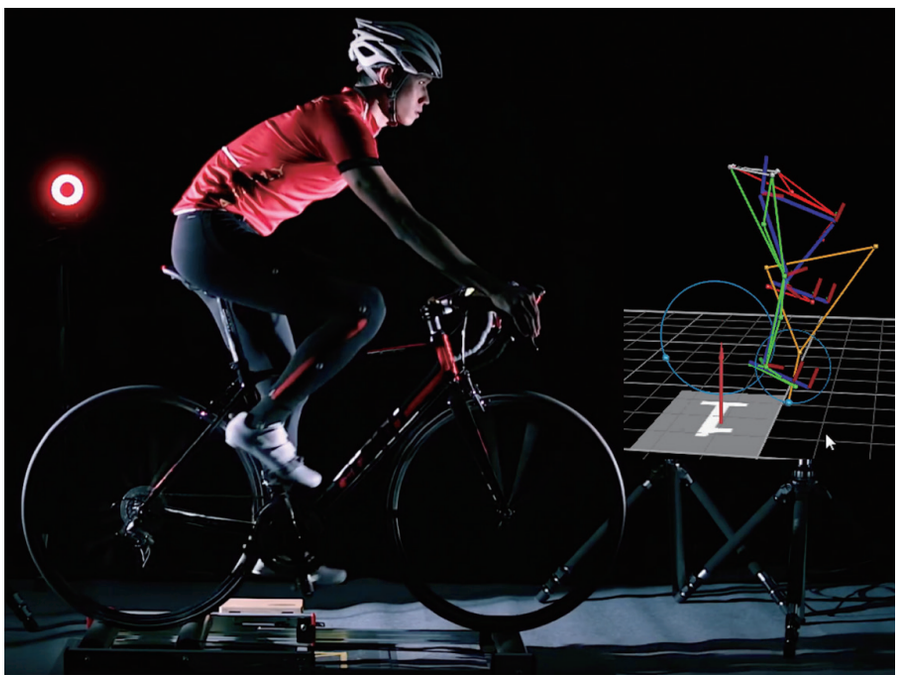
Invention

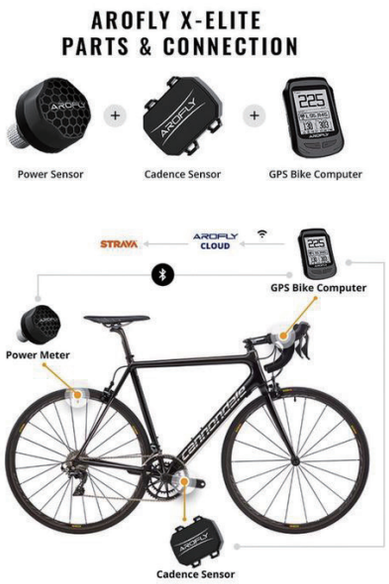
Dynamic Tire Pressure Sensor System for A Bike

Silver Medal

Patent Certificate No.: I604971

Tzyy-Yuang Shiang, Yin-Shin Lee, Chen-Fang Hsieh





The power meter developed with the patented bicycle “Dynamic Tire Pressure Sensor System” technology is as small as a bottlecap, and yet it has overcome the hardware limitations of complex, traditional cycling power meters. Traditional power meters have historically been limited to use by competitive athletes, due to their inability to transfer between bikes, complex hardware, and high cost. However, unlike traditional power meters, this novel power meter can easily be installed and transferred between a variety of bicycles, is lightweight and compact, and low in cost. As a result, this invention has removed the barriers previously limiting traditional power meters to widespread use and has effectively expanded the application of power-based cycling to new ventures.

This power meter is the only product of its kind that features a dynamic tire pressure sensor to calculate the cyclist’s power. In contrast to conventional products that calculate power via strain gauge hardware on the bicycle pedal or crank, this invention uses patented microsensor technology and specialized algorithms to calculate power from force measurements from within the bicycle tire. By doing so, this product gives any cyclist easy access to real-time information such as power, pedaling frequency, and speed on any type of bicycle, including commuter bikes and U-Bikes.

Because this novel device makes power-based cycling accessible to anyone, the scientific approach to power-based exercise can now positively impact new populations. Cycling power is an objective measurement of the intensity at which someone is cycling. Now anyone can clearly know the “what” of what was done in a workout. Although simple in concept, this data has powerful implications to help a cyclist control fatigue, reduce injury risk, boost performance, and exercise in a more efficient manner. Therefore, the health benefits of cycling can be more easily and efficiently obtained with power data.

The patented bicycle “Dynamic Tire Pressure Sensor System” features innovative thinking and makes power-based cycling accessible to anyone on any bike. Now anyone can better understand their exercise behavior in real-time to work out in a more safe, efficient, and goal-oriented manner. This novel power meter will facilitate growth for bicycle-related industries and boost consumer motivation to engage in exercise and healthier lifestyles.

Invention

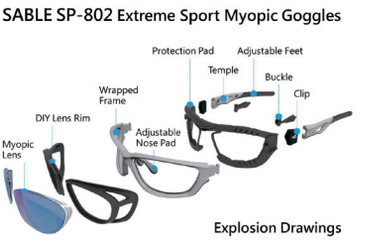
Modular Assembly System and Method for Terrestrial Myopic Sports Goggles

Silver Medal

Patent Certificate No.: I611238

Chia-Chun Mu

▲ Lens technology



▲ SP-802 structural diagram

▲ CP-823 structural diagram

With the changes in our lifestyles in modern times, the population of people with nearsightedness in Taiwan has been growing steadily. Many people wearing ordinary glasses engaging in physical exercises or playing sports have probably had their spectacles slipping off from their nose ridges due to perspiration or have their glasses break with shattered lenses/damage frames during collisions. In fact, many have come to think of their eyewear as an inconvenience and a potential source of danger. In order to overcome these issues, Eradiate Enterprise CEO Chia-Chun Mu had committed himself to the development of prescription sports glasses as early as 2007 and in 2017, he finally completed his design of “Modular Assembly System and Method for Terrestrial Myopic Sports Goggles” (henceforth referred to as ‘the invention’) to accommodate the needs of athletes with myopia.

This invention is a modular assembly system of myopic lenses and frames that users can use to get the ideal combination for proper alignment of the focal point. Simply put, the invention functions similar to Lego building blocks where the user can freely choose between a different combination of lenses and frames depending on the activity/sport involved, the weather and ambient lighting for the best experience. As Mu points out, “People already know that when you perform different exercises or play different sports, you need to change into the corresponding footwear. In other words, people with near-sightedness should also be wearing different sports goggles/glasses for different sports. For example, if you are going to engage in an intensely physical sport such as playing basketball, you would want glasses that have protective features. But if you are just going for a casual run, you are probably better off with a pair of light glasses with anti-fogging lenses. ”

In addition, the standard process of getting a pair of prescription glasses will require the user to visit an optician first before picking the frame so that the store can place the order for the lens factory to process the lenses. After receiving the processed lenses, the store will have to assemble the glasses and adjust the focal point for the glasses to try it on. At this point, even if the user has a sudden change of heart about the glasses, it will be too late for any changes to be made. In contrast, this invention comes with a modular “diopter bank” for myopia prescriptions (from 1.0D to 8.0D) and lenses made with different materials for reinforced strength, anti-fogging and special coating for the user to choose from. Within minutes, the user will be able to put together a pair of custom-built glasses that he/she can try on.

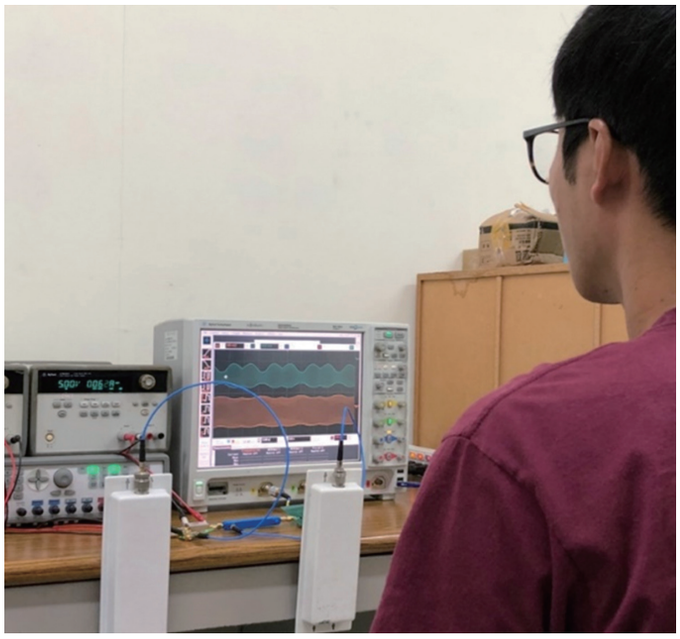
It also bears mentioning that Mu has been an enthusiastic sponsor of professional athletes in order to learn from their experiences and get their feedback. Events he sponsored include the Everest 135M Extreme Trail, the Ultra Trail Gobi Race, the South Pole Great Wall Marathon, along with other sports such as unpowered flight, basketball games and so forth in order for him to make constant adjustments and improvements to his invention, thereby enabling him to develop a myopic sports goggles solution that is suitable for all.

Invention

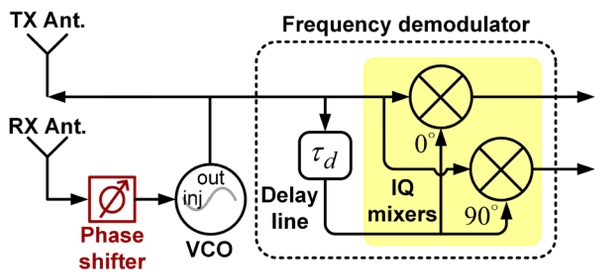
Silver Medal

Quadrature Self-Injection-Locked Radar

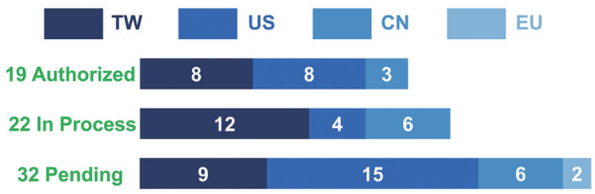
Patent Certificate No.: I616669
Fu-Kang Wang, Tzyy-Sheng Horng, Mu-Cyun Tang



▲ Experimental setup for detecting the cardiopulmonary activities of the subject seated 1.5 m away from the radar prototype



▲ Block diagram of the proposed quadrature self-injection-locked radar



▲ Patent deployment of self-injection-locked radars

When an oscillator is self-injection locked as the signal transmitted to an object is reflected back and injected to the oscillator, the signal-to-noise ratio of the phase-modulated component is significantly increased during the existence of nonlinear distortion. The quadrature self-injection-locked radar then provides a 0- or 90-degree of phase delay to the injected signal. With two-stage arctangent modulation, the invention is able to correctly reveal the trajectory of the test object.

Compared to the traditional architectures, this invention significantly increases the sensitivity by 60 to 100 dB while retaining the self-injection locked radar's clutter immunity and resolving the nonlinear issue. During its experimentation, a prototype circuit was used to detect the movement of a metal plate. When the plate moved by 0.25-5 cm (i.e., 0.02-0.4X wavelength), the device was able to measure the movement with a margin of error smaller than 1.5%. The outstanding performance of dynamic range allows the invention to detect chest movement and vital sign of humans or animals. Coupled with measurements of signal processing with different operating frequencies, the device can further acquire the distance from the test object.

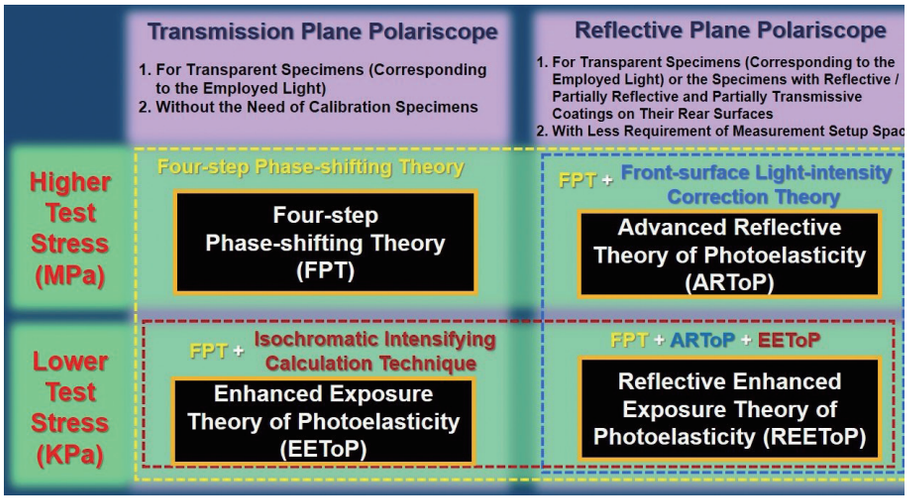
Benefited by self-injection locking mechanism, this system can also operate within common Wi-Fi bandwidths without requiring mmWave components. The system not only helps reduce development costs and time, but also presents exceptional penetration to non-metallic medium, suitable for the detection of vital signs of human bodies or other economic animals. In addition, nonlinear distortion commonly caused by random movements of the body/target during detection can be greatly reduced, thereby minimizing the complexity of signal processing. Furthermore, thermal image sensing will be much more accurate if distance information is used as the basis for calibration. In the foreseeable future, this technology will see its full potential in applications such as sports and fitness, home security, medicine and long-term care, and smart animal husbandry. A total of 41 patents related to the self-injection locked radar has been approved in Taiwan, U.S, China, and EU countries, with a total revenue in all technology transfers in excess of NT$ 100 million.

Invention

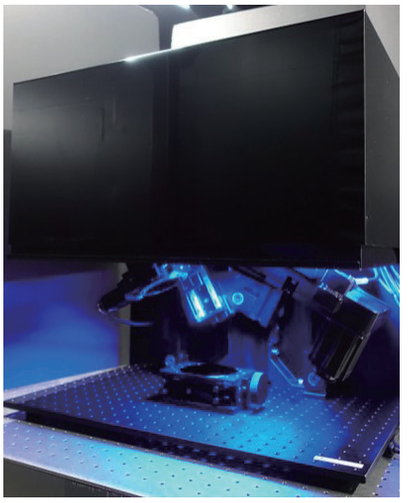
A Stress Measurement Method of Optical Materials and System Thereof

Silver Medal

Patent Certificate No.: I619933
Wei-Chung Wang, Po-Chi Sung, Zheng-Yong Lu, Yu-Liang Yeh, Po-Yu Chen



▲ Stress measurement theories for this patented technology



▲ ARToP & REEToP measurement module equipment

Optical materials have played an important role in high-tech industries. Nevertheless, the residual and processing stresses within the material have become the key factors that lead to NG products or structural defects. This patented technology brings breakthrough by overcoming bottlenecks with traditional optical stress measurement techniques. Based on the phase-shifting techniques, the team proposed an innovative isochromatic intensifying calculation technique and front-surface light-intensity calibration theory to achieve the low-level stress measurement and the stress measurement of coating test specimens that cannot be performed by the past techniques. Consequently, non-destructive optical stress measurement techniques can now be successfully applied in the display and semiconductor manufacturing industries and further extended to the stress inspections of flexible displays and thin films. So far, many industrial applications and cases have been implemented by this invention.

This patented technology offers the advantages of high measurement resolution, extensive application for different products and materials, low setup costs, full-field measurement, and fast online inspection. It has been patented in Taiwan, United States, Japan, and China. Furthermore, the measurement module devices of this technology had been awarded the 2nd place in the 12th NARLabs Instrument Technology Innovation Competition (i-ONE) and the Gold Award in the 2019 Hermes-Epitek Technology Thesis Award organized by the Taiwan Society for Precision Engineering. Both events are national competitions for excellence in innovation.

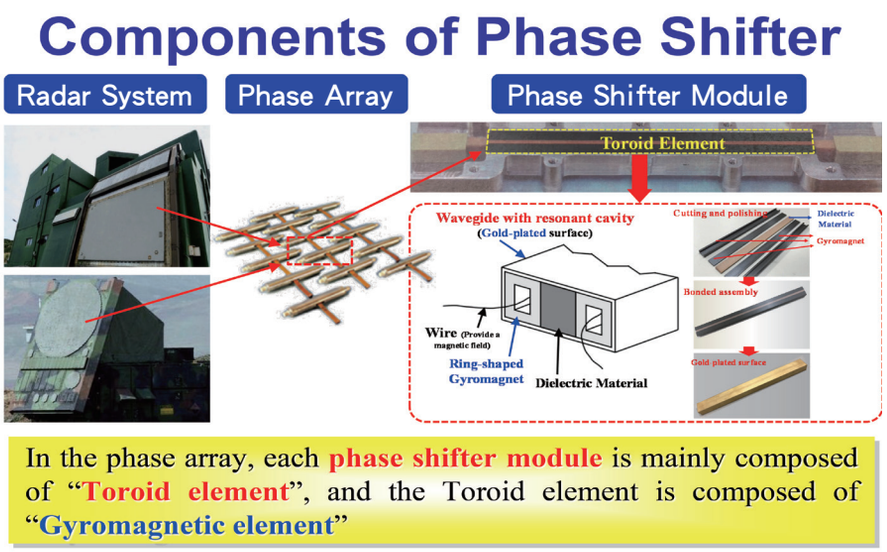
As this patented technology involves the non-destructive measurement for residual stress and stress, it is with the high feasibility in technology transfer to provide industries with fast yet precise measurements for residual stress and stress. Therefore, it is expected that this patented technology will become a replacement for the current destructive inspection criteria and testing standards adopted by the industries so that the even more precise inspection criteria and testing standards can be established. By further cooperating in relevant improvements in manufacturing processes, the benefits of products in yield rate and capacity rise, quality and value enhancement, as well as competitiveness increase can be achieved. Thus, this patented technology promises high potential for future market development.

Invention

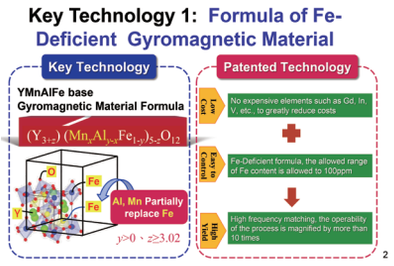
Method for Manufacturing Gyromagnetic Element

Silver Medal

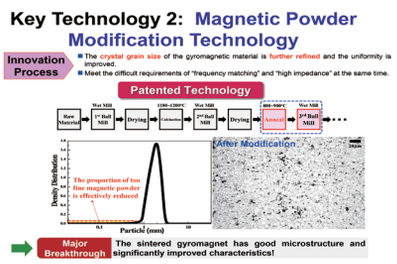
Patent Certificate No.: I636032
Ching-Chien Huang, Yung-Hsiung Hung, Jing-Yi Huang, Ming-Feng Kuo



▲ Phase shifter constituents



▲ Gyromagnetic element material formula



▲ Magnetic particle modification technology

Phased array radar serves as the eye of surveillance for Taiwan's military. In order to achieve greater autonomy in the development of our national defense, responsible units, organizations and domestic vendors involved in this effort have spent 10 years and put in NT$ 300 million in relevant development. Yet we were still unable to produce phase shifter module on our own. This final piece of the puzzle that stands in the way before the full domestic production of Taiwan's own radar system has become a technical bottleneck.

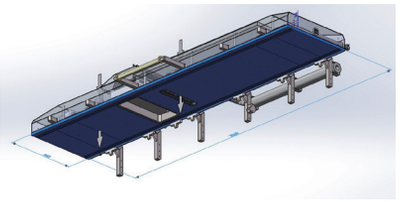
Independent national defense - the material is key In this invention, by establishing a "formula for gyromagnetic material" without using rare elements such as gadolinium and indium, the team was able to achieve the required characteristics for the microwave component at relatively lower microwave attenuation to reduce cost dramatically. With the formula design, the margin of error for iron elements can be increased to 100ppm, thus making the process easier to control. On the other hand, for the microwave frequency group, as microwave signals have very short wavelengths, any discrepancy in the gyromagnetic element's micro organism would be greatly amplified and in turn affect the overall electromagnetic wave phase shift. In contrast to traditional gyromagnetic element manufacturing processes, this invention introduces "Annealing and Repeated Ball Milled Magnetic Particle Modification Technology" to further reduce particle sizes while increasing their evenness to achieve the daunting task of balancing frequency matching and high impedance at the same time. This significantly boosts the operability of this process by tenfold and thereby drives up the yield rate. In summary, this invention will be able to satisfy various stringent requirements for radar microwave characteristics for integration into an usable module, thereby completing the last mile to the full domestic production of critical module for military-grade radar. In fact, this technology had already been implemented in the phase radar systems used by our military in different areas. The team had successfully sold tens of thousands of the gyromagnetic module while relevant units/organizations will also be releasing orders for self-use to collaborate with China Steel Corporation on key radar modules to capitalize this massive market opportunity. After stringent military grade tests and experiments to obtain actual results, the technology will see the further application in 5G commercial base station and other civilian areas.

Invention

Vacuum Reflow Oven

Patent Certificate No.: I651148

Jung-Kuei Peng, Cheng-Shang Huang, Mao-Jung Wu



In 2019, the total worth of Taiwan's semiconductor industries had exceeded 2.7 trillion NT$. Although the equipment and hardware cost approximately NT$ 500 billion in asset costs, the industry had relied on imports for at least 90% of the key equipment. In light of this fact, 3S Silicon Tech had committed itself to the development of full line automated semiconductor package equipment, including die bonder, pick and place machine, dispenser, screen printer, reflow oven and production line integration that covers image testing and induction, high precision mechanism design, flow field design, intelligent system design and precision machinery operation control calibration, material science and thermodynamics and other key interdisciplinary technologies. 3S Silicon Tech is the only production line integration service provider for semiconductor package in Taiwan. 3S Silicon Tech is driven by its goal of preserving and retaining key technologies in Taiwan while developing a local brand name for domestically manufactured equipment that is highly competitive so that Taiwan may secure its place in the market for precision semiconductor package equipment that foreign companies have monopolized.

Out of all existing semiconductor package equipment, the reflow oven accounts for roughly 50% of the produced value. The post-welding quality of the product is determined by the precision and operability of the reflow oven. The vacuum reflow oven developed by 3S Silicon Tech is now in its 3rd generation semiconductor package equipment built to accommodate demands for highly reliable applications for diodes, MOSFET, IGBT and IPM. It features technical breakthroughs with traditional reflow ovens by offering the advantages of low void rate, continuous operation, automatic flux filtering, high production, high cost-performance ratio, low nitrogen consumption, high reliability and ease of operation to effectively resolve the issue of void rate with package products while lowering impedance and improving cooling.

By working closely with renowned domestic diode package service provider Eris Technology Corp, 3S Silicon Tech has been acknowledged by major domestic and foreign brand names such as Eris Technology, Luckyforests, Anova Technologies and Pan Jit International (Taiwan), Kaihong, Yangjie Electronics, LRC and Lite-On (China), Shindengen (in Japan), STM and Nexperia (Europe), Vishay (U.S.), EIC (Thailand), UTAC (Singapore) and so forth. 3S Silicon Tech's vacuum reflow oven has been extensively used in various automotive, avionics and highly reliable industrial-grade products. In addition, both orders from major semiconductor package clients and shipping quantity have shown promising momentum of growth. In the Greater China Region alone, the high-power discrete component packing equipment industry for the diode market has secured a significant 70% market share. In 2019, this invention already created NT$ 150 million in direct turnover for 3S Silicon Tech with a gross margin between 40~50% and a derivative turnover of NT$ 270 million.

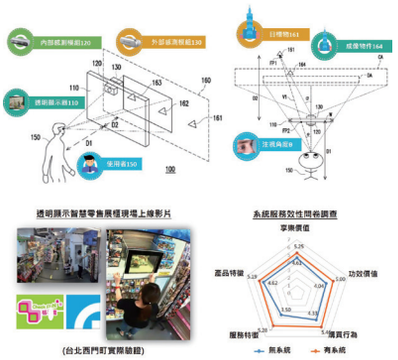
Invention

Silver Medal

Transparent Display Device, Control Method Thereof and Controller Thereof

Patent Certificate No.: I659334

Cheng-Chung Lee, Kuang-Jung Chen, Sheng-Po Wang, Heng-Yin Chen



This patent is tailored to user needs by innovating transparent display interaction and methods for information display. The patent enables a user to correspond the coordinates representing his/her current position and his/her view direction to an object in a scene, thereby presenting information about the object in a transparent display positioned between the user and the object in a real-time manner, so as to realize direct-view-based augmented reality. In addition to tourist guide, use of this patent can be extended to other diverse applications (such as smart Edutainment, smart healthcare, smart mobility, smart retail, etc.). We extend this patent in terms of service application, by teaming up with leading international partners to build ecosystems for various applications and take advantage of such a collaboration-based business mode to develop new markets.

Development of technologies related to transparent display panels in Taiwan is still immature. By contrast, international competitors usually possess extensive and deliberate patent deposits, making it difficult for display manufacturers in Taiwan to avoid infringing their IP rights. In addition, falling behind the leading dealers in the US, Japan and Korea in terms of technical development of industrial systems and key modules makes dealers in Taiwan relatively disadvantaged when it comes to market competition. This patent, nevertheless, turns this challenge into an opportunity by providing a killer application, for which the vivid panel, system and key module clusters in Taiwan can work together in a vertical integration platform different from traditional ecosystems and advance toward industrial upgrading and cross-discipline, cross-sector integration, thereby helping the relevant dealers in Taiwan to break out of the cocoon of “only making components and intermediate goods,” and enter a new business mode of “providing systematized products and services,” which adds more value. We expect this can in turn drive further development of ecosystems for hardware manufacturing, software sales, content development and field services in Taiwan, increase international competitive advantage, and open up a new blue ocean for export business.

Invention

Silver Medal

Surfboard with Foldable Seat Back

Patent Certificate No.: I659717

Tzong-In Yeh

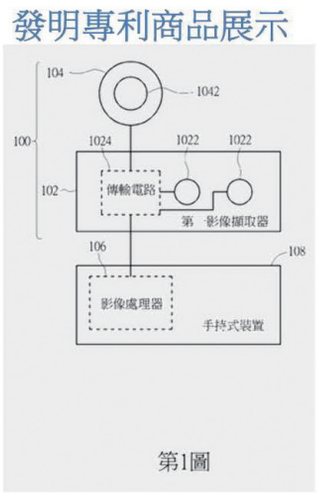
This invention is a surfboard with a foldable seat back, particularly suitable for a longboard equipped with a paddle (as known as a SUP). While some existing longboards are equipped with seats, it is common that their seat backs are less supportive, not well integrated with the surfboard body, and not foldable. The foldable seat of this invention includes a base, a seat backplate, and a support. The base is inlaid in the carrying surface of the surfboard body and is fixed to the surfboard body. The backplate is pivotally connected to one side of the base so as to be folded or unfolded with respect to the base. The support serves to prop up the unfolded backplate in position. When unfolded, the backplate provides firm support to the back of a user sitting on the carrying surface of the surfboard body, and its tilt angle can be adjusted by changing the position of the support. When the backplate is in its folded position, the support can be stored in a storage compartment defined by the backplate and the base. At this time, the backplate is flush with the carrying surface of the surfboard body without any raising or depressed parts. In brief, when folded, the entire foldable seat is concealed in the surfboard body, so that the whole carrying surface of the surfboard body remains smooth without any bulges or dents. This allows a user to stably stand on or comfortably sit or lie on the carrying surface free from obstruction, uncomfortableness or risks of tripping caused by a bulge or dent, making this novel foldable seat structure convenient, comfortable, safe and space-saving. This invention further includes a pair of footrests whose position is adaptable to a user's leg length. Each of the footrests is foldable. When the footrests are pivoted up from a lying position, a user sitting on the carrying surface with his/her back supported by the backplate can place his/her feet on the footrests for better exerting effort when on operating the paddle.

Invention

Image Device Corresponding to Depth Information/Panoramic Image and Related Image System Thereof

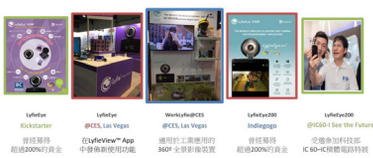
Silver Medal

Patent Certificate No.: I660231
Chao-Chun Lu, Ming-Hua Lin, Chi-Feng Lee



▲ Demonstration of the patented product

▲ 3D depth map camera- Applications



▲ 360 Spherical Camera- Implementation of innovation

As consumers have increasing demands on virtual reality (VR)/augmented reality (AR)/mixed reality (MR) recently, there are more and more hand-held devices installed with related applications. Valuing privacy also makes consumers welcome biometrics means (such as face recognition) as a security tool for hand-held devices. However, VR/AR/MR and face recognition have not become standard with hand-held devices yet, making it an unmet need to have hand-held devices equipped with VR/AR/MR and biometrics means all together.

This invention relates to an image device corresponding to Spherical image/depth information and a related image system thereof (a camera providing both Spherical 360-degree images and 3D depth information). The device is structured to combine a camera that captures Spherical 360-degree images and a camera that captures 3D depth information into an integrated 360-degree 3D depth camera using a single USB port. The camera is further connected to a hand-held device, such as a mobile phone, through another USB port, thereby using computing capability of the mobile phone to satisfy software needs. With a USB hub, Spherical 360-degree camera and the 3D depth camera can transmit their captures to the hand-held device where an image processor sophisticatedly switches between Spherical 360-degree images and 3D depth images.

Therefore, this invention is able to use the Spherical images or video for VR/AR/MR applications, and to use the depth information for face recognition.

The value of this invention includes supporting Spherical 360-degree applications: by providing the world's first compact combination of a mobile phone and a Spherical 360-degree camera. The patented device may be used for Spherical 360-degree photographing, real-time recording and live streaming. It is useful for applications for VR/AR/XR, AIoT and Smart City. Supporting 3D depth applications: by making a camera using the world's first commercial 3D depth control chip developed by eYs3D Microelectronics, Co.. The camera generates both color image and depth map information on the same time. These are useful in computer vision applications, thus being contribute to AIoT, XR, Smart City, and Industry 4.0. Supporting Spherical 360-degree 3D depth camera applications: by providing a camera combining Spherical 360-degree and 3D depth camera, so as to measure 3D depth while allowing observation of objects in a Spherical 360-degree environment. The system is useful for computer vision based on Spherical 360-degree images and 3D depth information.

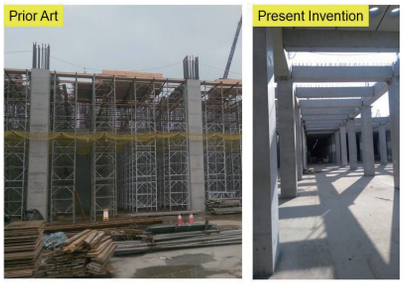
Invention

Construction Method for A Building

Patent Certificate No.: I662172

Samuel Yin, Kun-Jung Shu

▲ Inventive feature -Mobile installation equipment for waffle slabs



▲ Comparison of support scaffolds

▲ Comparison for formworks

Objectives of the Invention: The object of the invention is to provide a construction method for a building, which ensures smooth, obstacle-free construction routes of cranes, cars, people and material transportation at a construction site of the building.

Features of the Invention: This invention uses precast columns, precast floors and cast-in-place beams as fundamental building elements for construction of high-tech plants, and thus provides advantages such as free-support floor construction, reduced on-site formwork for cast in-situ concrete, increased construction speed and reduced workforce demand, detailed as below:

1. Minimized on-site concrete formwork: the amount of formworks is reduced by up to 90%, leading to decreased construction waste.
2. Reduced on-site support scaffolds: required amount of on-site support scaffolds is reduced by up to 80%, contributing to more ordered working environment and construction routes.
3. Precast-based, modular construction: the construction period is reduced by up to 27%.
4. Reduced workforce demand: the number of on-site workers required is reduced by two thirds, helping mitigate shortage of workers in the construction industry.

Applications of the Invention: This invention is designed for construction of rebar and concrete structures for high-tech plants, with the attempt to improve global competitive position of the high-tech industry. A plant construction using the method satisfies the strict requirements in terms of microseism, floor evenness and opening rate, and averts the troubles related to shortage of workers, such as schedule delay and inconsistent quality, with the engineering quality conforming to nano-scale precision manufacturing standards for high-tech plants. The patented method has been applied to construction of high-tech plants in Taiwan since 2017, and as of 2019, has been applied to five projects, with a total floor area as high as 1,086,000 m2 and a number of beneficiaries of about 6,900, bringing a revenue of over NT$ 4.075 billion to Ruentex.

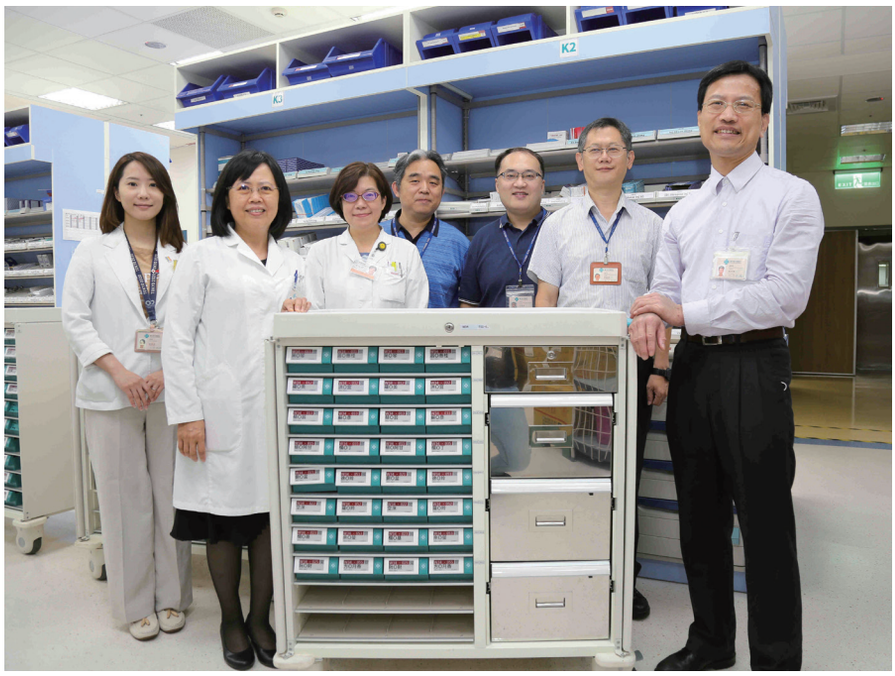
Invention

The Display Management System with e-Paper Tag

Silver Medal

Patent Certificate No.: I659334

Chen-Tsung Kuo, Yi-Chun Wu, Ming Fen Wu, Wei-Pin Lai, Lai-Shiun Lai



Features of the patent:

1. While e-paper tag systems have long been used for the purposes of store shelving, we are the first to apply this technology to medicine cartridges for real-time information display.
2. Medicine drawer are to be trolleyed between a hospital pharmacy and nursing stations, meaning that they are always on the run. This makes it difficult to manage tags thereon as compared to store shelves which are relatively stationary.
3. As to the design of the medicine drawer, a bayonet structure is added for easy replacement of batteries and aesthetic benefits.
4. Extensive search had been made in the market and found no products similar to our system. This was further proven as the system has been patented in 2019 in Taiwan, so there are no comparable products in the market.
5. Medication safety has been a global issue. To implement “three checks” and “five rights,” competent auxiliaries are essential. In addition, as patients or their families now tend to request more detailed medicine cartridge information when receiving inpatient pharmacy services, there are increasing hospitals trying to improve the existing medicine drawer, yet find that it can be extremely time-consuming and effort-consuming to update these hand-written tags one by one. With our years of research and experience in this field, we invented this system and have been granted with the related patent rights in Taiwan and China. The patent system is believed to have extremely huge potential in market development.

Economic Benefits:

1. Saving time that would be required when medicine drawer are labelled by dispensers manually: up to 3.3 hours every day can be saved in a case where 10 dispensers take care of this job together.
2. Enhancing the integrality of patient information on medicine drawer: by introducing e-paper medicine drawer, the integrality of bed no., patients’ names and administration time can be sure to be 100%, effectively improving integrality of patient information on medicine cartridges.
3. Increasing users’ satisfaction: satisfaction among surveyed dispensers to the patented system is as high as 98%.

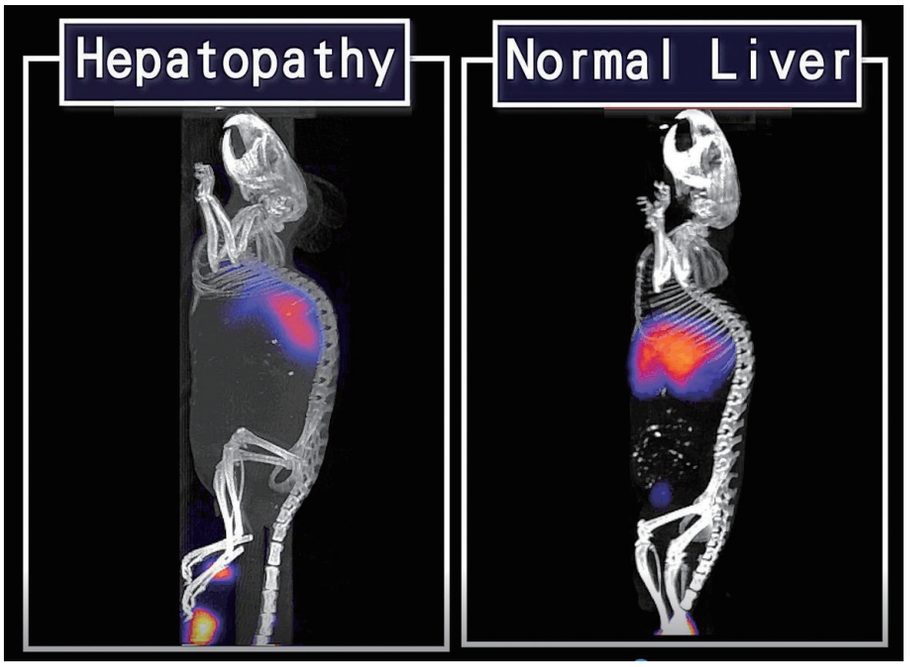
Invention

Hexa-Lactoside Tri-azanonane Tri-acetic Acid (NOTA) Derivative, Method for Radiolabeling Hexa-Lactoside Positron Emission Tomography (PET) Imaging Agent for Liver Receptor with Ga-68, and Hexa-Lactoside PET Imaging Agent for Liver Receptor

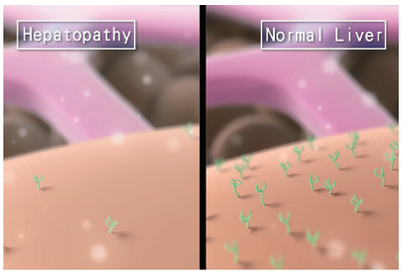
Silver Medal

Patent Certificate No.: I671077

Wuu-Jyh Lin, Mei-Hui Wang, Hung-Man Yu, Kun-Liang Lin, Yan-Feng Jiang, Rui-Yu Chen



▲ Image comparison between diseased and normal livers



▲ Quantitative comparison between diseased and normal livers

▲ Image of INER Dolacga Kit in the form of a lyophilized formulation

INER Dolacga Kit, a liver function imaging agent innovated by Institute of Nuclear Energy Research, is the first liver-targeting glycopeptide drug for liver function imaging in the world. INER has been granted with patent rights of “HexaLactoside Tri-azanonane Tri-acetic Acid (NOTA) Derivative, Method for Radiolabeling Hexa-Lactoside Positron Emission Tomography (PET) Imaging Agent for Liver Receptor with Ga-68, and Hexa-Lactoside PET Imaging Agent for Liver Receptor” in Taiwan, Japan, and the U.S.

Competent residual liver function is crucial to patients’ survival from liver diseases. As a significant difference exists between the number of asialoglycoprotein receptors on the parenchymal cell membrane of a normal liver and a diseased liver, asialoglycoprotein receptor imaging can be used to differentiate normal and diseased livers sensitively. The invention provides a method for preparing lyophilized formulation of a multivalent lactoside PET liver receptor imaging agent . The method involves the synthesis of a hexa-lactoside peptide derivative by conjugating a hexamer lactose with a p-NCS-benzyl-NODAGA chelator in a basic solution. The product was further developed to give lyophilized formulation that can be used for PET imaging after simple and fast (15 min) Ga-68 labeling. The labeled product specifically targets to liver receptors with high sensitivity and low background level. Convenient and rapid labeling (15 minutes), short half-life of Ga-68 (environmentally friendly), and stable (favorable to global distribution) are the key features and are advantageous to product commercialization.

INER Dolacga Kit as a tool for evaluation of liver reserve has proven in a phase I clinical trial to be highly safe. INER Dolacga Kit is expected to provide more accurate evaluation of residual liver function than most existing imaging technologies and replace them.

According to available statistics, globally, 854,000 people were diagnosed with liver cancer in 2015, in which 10~30% were evaluated as suitable to be treated using resection surgery in view of their residual liver function. Assuming that the 30% of the patients would receive liver receptor imaging for accurate evaluation of liver reserve before surgery for safe liver resection, there would be about 25 thousand~77 thousand patients every year benefiting from INER Dolacga-based imaging. Calculated using the current price of an average agent for positron emission tomography, NT$ 5,000~10,000 per dose (excluding the costs for Ga-68 radionuclide), the global market value of the products is about NT$ 125 million ~770 million.

Invention

Silver Medal

Sensing and Delivering Meals System

Patent Certificate No.: I672663

Chia-Jen Lin, Cheng-Yun Chung

▲ Demonstration at a MOS franchisee in Japan

▲ A food-delivering scenario in Taiwan

▲ Taipei International Food Show

"Here is your meal. Please handle with care. "A robot wearing a piece of orange-and-white workwear, holding an extendable sensing tray, with the LED on its face showing relevant text, is serving dishes while interacting with customers in voice. This is not a scene of some foreign movie, but a scenario where the Taiwan's first smart food-delivering robot successively developed by TECO is working.

Workforce shortage and high turnover have long been problems in the catering industry. Catching up the trend of smart manufacturing and artificial intelligence, TECO Group has invested highly in design and applications of service robot, and finally introduced a food-delivering service robot 100% made in Taiwan. The robot has a height equal to a half of an average adult's height, and represent integration of key mechatronic technologies. The core technology is a smart moving platform at the robot's bottom that works with high-precision sensing elements and an AI-based autonomous walking program. The robot has features such as real-time spatial orientation, accurate navigation, dynamic obstacle avoidance, map editing and control setting interface.

According to Chia-Jen Lin, Robot Development Manager at TECO, now the second-generation robot has been developed, and is more agile than its predecessor. In particular, the obstacle avoidance function in achieved by using a radar device to detect any obstacle ahead, and then a roadmap is generated according so that the robot when advancing can automatically avoid all obstacles. The robot is further equipped with AI automatic sensing devices at its hands. When arriving at a preset point, the robot extends its arms to present the tray to the customers. In addition, to ensure good interaction with customers even in noisy environment, the food-delivering robot is equipped with a high-power reality audio system, which provides good sound transduction in open space.

The robot has been now put in real-world use in selected stores of MOS Burger, and received very positive response. Dr. Cheng-Yun Chung said that the robot was not fully welcome by the store staff upon its initial introduction as the staff was unfamiliar with the user interface, but after communication and adjustment in the font size and color contrast, the robot started to contribute to the stores' food-delivering efficiency and visitor rate and is now appreciated. In the future, we will continue its development and optimization, and improve voice interaction and visual recognition, thereby ever enriching consumers' restaurant experience.

Creation

Gold Medal

A Co-gate Electrode between Pixels Structure

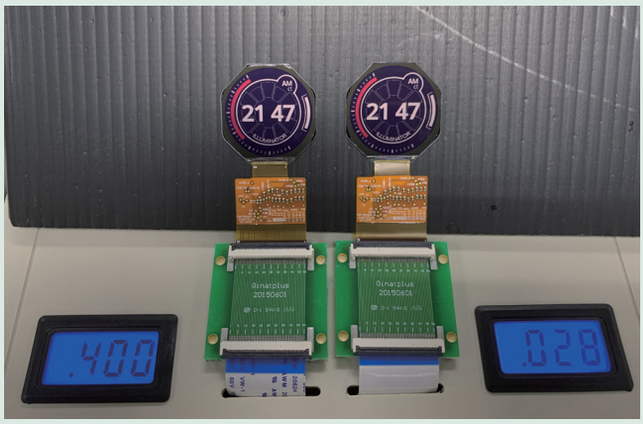
Patent Certificate No.: M561222

Che-Yao Wu, Kai-Ju Chou, I-Ta Jiang

1Hz super-low frequency and Gc technology contributing to extreme power-saving performance

Gate Common (Gc) is a highlight of the small-size power-saving technology as a solution for degraded visual effects caused by low-frequency scanning and current leakage caused by long holding time, thereby providing benefits of low energy consumption, good visual effects, and high resolution.

To distinguish itself in the highly competitive LCD market, Giantplus has invested in development of “small-size power-saving technology” since 2013. After years of efforts, the R&D results were successfully turned into mass production, making Giantplus a recognized supplier for the world’s top three e-Paper Tag providers. In 2018, a focus put on “power saving” and “picture quality” led to the titled utility model “Co-gate Electrode between Pixels Structure” (henceforth referred to as ‘this creation’), which is expected to be extensively applied to e-Paper Tags, POS terminal, portable displays and outdoor navigation in the future.



Reducing energy consumption and enhancing visual effects with Gc

Thanks to its achievements related to small-size power-saving technology, Giantplus provides extremely power-saving products. With watches, that means charge-free continuous use for one whole month. With e-tags providing simple display only, that means a single mercury cell can operate the device for five or six years.

According to Che-Yao Wu from the R&D team at Giantplus, extreme power saving relies on two key technologies. The first is “transflective technology.” Since an LCD panel does not emit light itself, the illumination comes from a backlight mechanism. Transflective is achieved by additionally providing the panel with a reflective layer that uses the ambient light to light up the panel, and thereby significantly saves power that would be otherwise required by the backlight mechanism. The second one is “1Hz super-low-frequency panel.” Generally, screen update for mobile phones, computers and TV sets is performed at a frequency of 60Hz, which means signals are input every 1/60 second. In contrast, the new technology lowers that frequency to 1Hz, which means signals are input every one second, thereby effectively saving power.

While low-frequency scanning (1Hz) significantly reduces energy consumption, current leakage tends to happen because of the long holding time, and this is visually presented as brush marks. For preventing current leakage and improving resolution, Che-Yao Wu and his coworkers Kai-Ju Chou and I-Ta Jiang introduced a technology called Gate Common, or Gc in short.

Breakthrough only comes from persistence and accumulation

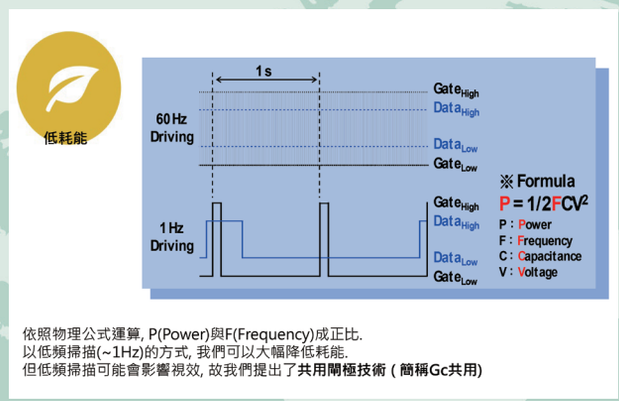
“Gc (Gate Common) represents the peak of the development of small-size power-saving technology. However, it would never be achieved without those numerous previous R&D works. ” Che-Yao Wu called to mind that there were so many challenges to be overcome in the initial stage of their development of the power-saving “1Hz super-low-frequency panel.” For instance, with low-frequency scanning, when the screen is updated every second, there are tides on the panel visible to naked eyes very second, being an eyesore. To address this problem, the team took the whole panel into pieces and investigated them one by one. Moreover, for visually catching the variation of the tides, the team even gazed at the panel with a photoflood lamp shined thereon. Fortunately, the team’s efforts resulted in a solution based on improved signal output. With the power source held still, the undesired tides gradually disappeared, finally leading to a low-frequency scanning panel without undesired tides.

“These challenges nevertheless became nutrients contributing to our continuous growth. ” Che-Yao Wu affectively said that their R&D was once challenging and frustrating because their objective was unprecedented and could only be made possible by their own exploration and deliberation. Failures at that time were their daily routines. Perseveration is the only key to success.

We want the display to not only save power, but also charge itself!

Among all types of flat-panel displays, LCDs particularly feature for low costs. With the rapid development of big data, and IoT technologies, user interface for LCD is expected to be more and more diverse. Giantplus has now achieved its goal in terms of saving power, and its next step is toward powering LCDs with external power sources.

“Use of natural energy resources is subject to many restrictions, but I believe we can find a way to again break the border. Next time, we want the display to not only save power, but also charge itself! ” Che-Yao Wu stated with full confidence.



Creation

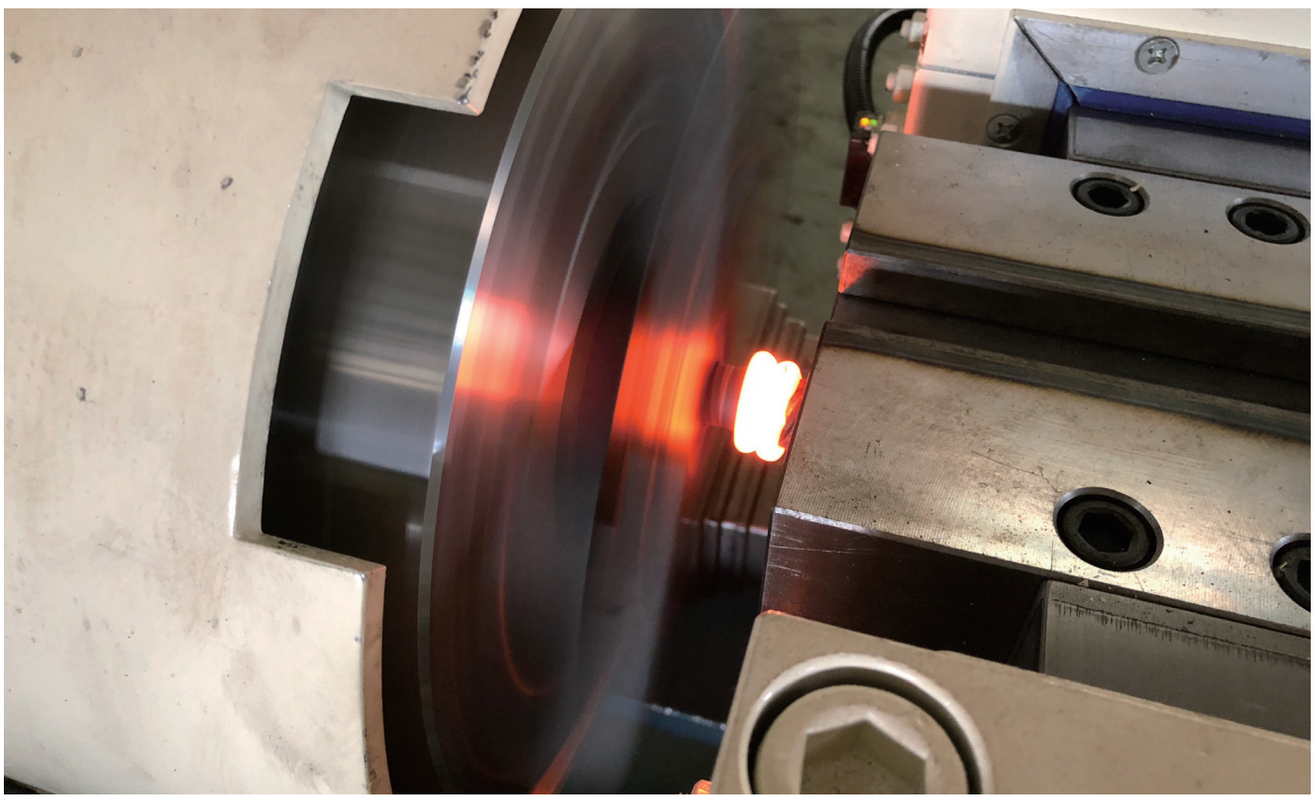
Friction Welding Machine with Servo Mechanism

Patent Certificate No.: M567788

Chin-Fu Jao, Hong-Cheng Jao

Digitalizing traditional experience to ensure rebar welding quality!

The patented “friction welding machine with servo mechanism” uses a servo motor to drive a screw, and turns traditional hydraulic pressure values into digitalized data, making it possible to produce well coupled rebars with consistent quality and thereby ensuring building safety. ”



Rebars are essential to modern concrete construction. In order to properly shape and position rebars, shearing, bending and friction welding are important rebar-processing techniques. Most rebar-processing shops in Taiwan only deal with shearing, straightening and bending. Because friction welding particularly requires expertise and know-how from experienced workers, this an exclusive business cornered by professional welding shop.

Established as an equipment builder, Darhung had long been devoted to develop and manufacture of rebar-processing equipment, including machines for rebar shearing, bending and straightening, and stirrup bending machines. With the ambition to complete its rebar-processing business, rebar friction welding, Darhung made extra R&D effort and finally find the only miss puzzle piece when its “Friction Welding Machine with Servo Mechanism” (henceforth referred to as ‘this creation’) was granted with patent rights in 2018 in Taiwan.

Replace a hydraulic cylinder with a servo screw drive for a stable output pressure and a high success rate

Hong-Cheng Jao, Vice General Manager at Darhung pointed out: “Different form rebar shearing and bending, friction welding is a separate discipline, and it took us about one whole year, with extensive reference to different models from makers in Taiwan and in other countries, to have our own machine fabricated. The most significant breakthrough we made is on the drive. Conventionally, rebars when welded are driven by hydraulic cylinders. However, our president insisted that ‘Our late start means that we have to do it better and more advanced than others.’ Thus, we use a servo motor as the drive instead, and see the stability and yield of products significantly improved. ”

With the traditional hydraulic cylinder, the push force tends to vary with the oil temperature, and thus frequent and repeated adjustments have to be made to maximize consistence of the resulting pressure. This is a process where experience and skill are highly demanded. Any over-pressure or under-pressure operation can lead to welding failure. This creation drives a screw using a servo motor with the assistance of a computer program to ensure accurate control in terms of distance and speed, thereby providing consistent welding quality and good yield.

Digitalize experience-based expertise and unlock the know-how in the hands of a few

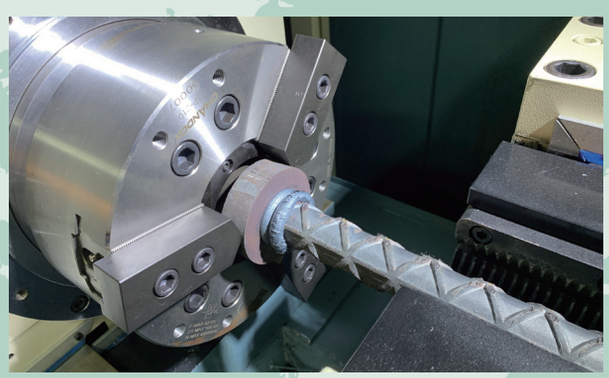
As a pioneer in servo motor drive, Darhung had faced many difficulties. As Hong-Cheng Jao said, “friction welding is based on frictional heating generated during high-speed rotation, and this requires not only precision, but also high motor torque and high propelling force. Any tiny error can cause seizure. The optimal fit tolerance came after repeated reassembling and adjustment in dimensions and materials. ”

Another huge challenge is to fully computerize the traditional manual control. In addition to using a servo motor in place of manual operation and pressure control, we developed a complete set of friction welding steps. Most importantly, all the rebar parameters had to be set and verified. “Because this was a job without any prior reference, what we could do was trial, one rebar after another.” Hong-Cheng Jao also indicated that rebars are of various specifications and sizes, such as those of different strength levels, like SD280, 420 and 490, and those made in Korea, Japan and other countries, meaning that there are dozens of possible combinations. After thousands of times of the pull-off test, or the tensile test, we finally found the optimal set of parameters that was proven by a fracture formed on the rebar body but not in the joint. With the verified parameters, even the most unexperienced worker can make coupled rebars meeting the stipulated safety requirements, thereby totally freeing the operation of friction welding from the limitation of worker availability.

Fully-automated production lines aimed at Industry 4.0

This creation has been put into mass production and is popular among ironworks and processing shops in Taiwan and other countries. Almost 50 lines were sold in two years, and its market has expanded to the Netherland, Hong Kong, and Vietnam, with introduction to Korea and Japan as the next move. “This award is a great encouragement to our team, rewarding our long efforts and making us more confident in developing more novel products,” Hong-Cheng Jao affirmed.

Darhung are now developing fully automated production lines composed of counters, cutters, clamps, robotic arms and friction welding mechanisms to cover the complete workflow from automatic counting, cutting, clamping and coupling rebars, and will keep collecting and analyzing big data to realize smart factories in the future.



Creation

VAGO-Portable Vacuum Compressor

Patent Certificate No.: D184890

Ta-Ching Chao

VAGO miniature vacuum compressor, a new travel convenience!

VAGO is the world's first fully automatic miniature vacuum compressor, which works in virtue of vacuum dynamics. It is compact, light, portable and effective in reducing the size of any package of soft articles, such as clothing, by more than one half, saving the valuable space in a suitcase.

Every trip is a story, and every souvenir stores a memory. When going home from a trip, people always want to put all the souvenirs they like into their suitcases, and this would be the very moment they think the suitcases are too small. In view of this, Ta-Ching Chao, CEO of Big Good Design, led his team to develop the "VAGO-Portable Vacuum Compressor" (henceforth referred to as 'this creation'), which uses the state-of-the-art technology to make more room in a suitcase and bring about a whole new travel experience.

This creation is currently the world's smallest vacuum compressor. Based on vacuum dynamics, the compressor is only 7cm high and 77g in weight, yet it provides a vacuum pressure more than 2.7 times of that provided by an average home vacuum cleaner, allowing compressible, soft articles to be stored efficiently in a space-saving way.

VAGO Portable Vacuum Compressor A clever travel solution for smart packing

Big Good Design Co., Ltd was established in 2011 as an OEM / ODM business that specialized in guiding its clients through everything from product design to mass production, with a focused experience in electric motor design. In 2015, the company started designing a miniature vacuum compressor and one year later had developed its first prototype. This prototype showed potential but was not compact and light enough to be a portable device. Another year was invested into iterating and improving on the design before the novel, aerodynamics-based VAGO miniature vacuum compressor could finally be introduced to the world.

Chao shared how he revolutionized the space-saving gadget. “In theory, a higher vacuum pressure can only be achieved with a larger machine. Our biggest challenge was to design a portable one for travelers without compromising its power and performance, and we found a way"

Chao explains that the vacuum works like a stream flowing through a tube. When the water flow (the vacuum pressure) entering the water inlet (the air intake) is strong, the water flow coming out at the water outlet (the air outlet) will also be strong. An increase of vacuum pressure means a proportional increase of volume. Based on the concept of vacuum dynamics, a proprietary spoiler was used to reduce the pressure at the air outlet to near zero. With such mechanics in place, the volume of the compressor can be significantly reduced without compromising the vacuum pressure at the air intake.

Used Together with VAGO Vacuum Storage Bags, this handy gadget brings compression performance to a whole new level

To further increase performance, Chao also developed its own vacuum storage bags for VAGO. The bag is made of several special composites that have proven to be virtually tear-proof and superior to other products in terms of quality, airtightness, and endurance. The combination of the VAGO Vacuum Compressor and VAGO Vacuum Storage Bags provides excellent performance that is unique in the international market and is trusted and loved by consumers around the world.

The creation earned a great response upon its first launch in the middle of 2017 and quickly expanded to 26 countries in less than a year. It has now become a bestseller that is championed by mainstream retail channels like Isetan Department Stores in Japan, Lane Crawford Department Stores in Hong Kong, MoMA in New York, and duty-free shops in major international airports.

VAGO - A Taiwanese Brand with a Global Vision and Outreach

VAGO is a Taiwan-born brand that has won numerous awards both locally and internationally. In 2020, VAGO won the Taiwan Excellence Award and Taiwan SMEs Innovation Award. It also became one of the official partners of the Chinese Taipei Olympic Committee. Most recently, VAGO has won the Golden Award of the highly valued National Innovation and Creation Award in VAGO’s home of Taiwan is a milestone for Chao and his team. It recognizes their efforts in creating a strong brand that embodies quality and excellence. “In the future, we will keep developing revolutionary products that benefit society and let the world see the beauty of MIT-Made in Taiwan,” said Chao.

Creation

Head-Mounted Display

Patent Certificate No.: D190775

Lee-Wei Chen, Yien-Chun Kuo, Hung-Yu Chen, Meng-Sheng Chiang

Having breakthrough in appearance and design, and providing “wireless” VR experience

“VIVE FOCUS Head-Mounted Display” breaks the traditional frame by providing a three-point load-bearing design, eliminating the need of any connection wire, and using advanced positioning and tracking technologies, enabling users to explore the virtual world at will, anytime, anywhere.

With the progress of on-line transmission technologies, increasingly enhanced image computation and presentation fuel the vivid development of the virtual reality (VR) industry. In view that the VR devices on the market are all similar in structure, at HTC, the design team wanted to introduce structural breakthrough and tried to make VR devices more comfortable and more convenient to wear. With this ambition, the team used the innovative Inside-out Tracking (6DOF) technology to create the patented “VIVE FOCUS Head-Mounted Display” (henceforth referred to as ‘this creation’), for users to explore the virtual world at will without real-world limitations.

A three-point load-bearing design, providing both esthetics and comfort

Different from the traditional head-mounted VR device, this creation uses an innovative three-point (forehead, calvaria and back of the head) load-bearing design to evenly distributing the load among the supporting points, so as to effectively reduce wearing stress, and provide a stylish appearance. When talking about the design concept, the HTC design team said: “the main structure of the product is also a part of its appearance, so it is important to make innovation in appearance while providing functionally satisfying user experience. With the three supporting points, VIVE FOCUS when viewed from the side looks like a crescent, endowing the wearer with a great personal style. ”

Another feature of this creation is its being standalone. With the built-in battery, CPU and stereo amplifiers, the device eliminates the needs for an inlaid mobile phone, a connection wire, and a PC, not to mention any complicated peripheral. Besides, it is equipped with world-scale 6DOF positioning and tracking technologies, which means that no matter the user uses it indoor or outdoor, its built-in sensors can immediately start to detect and automatically turn on the screen upon the user’s tough on the power button, giving the user with immersive VR experience anytime, anywhere.

Integrating diverse materials to realize the best possible wearing experience

“Ergonomics and user experience are of most importance when it comes to VR product design. Making the product comfortable to everyone in every scenario is particularly challenging.” According to HTC design team, more than ten prototypes were made during the development process. Each of these prototypes was tested by asking users of different races, head forms, genders and ages to wear it for a long time period, so as to identify the optimal design parameters.

In order to provide better use experience, the R&D team redefined how a VR device should be put on, and used different materials, such as leather, cloth and plastic, to make combinations of software and hardware. More than 200 mask samples were made before the quasi-optimal combination and formula were found. After repeated communication and adjustment, the perfect balance between weight and performance could finally be reached. In addition, this creation has knobs for rotational angle adjustment, folding and accurate control. It is easy to wear and is equipped with an anti-sweat leather pad for providing users with the most comfortable wearing experience.

From business to health, application of VR is infinite

This creation was put into mass production and first introduced to the market in 2018, and awarded with the golden award of the “US International Design Excellence Awards” (IDEA) in the same year. It was later become a permanent collection of Henry Ford Museum. VIVE FOCUS PLUS, its successor model, also won the “iF Design Award” (Germany) in 2020. This creation adopts a more intuitional and user-friendly design and its use is locationally independent. When working with different software programs, the device is applicable in the fields of entertainment, education, design, training, logistics, business sales and even healthcare. For instance, Penumbra, a US-based medical equipment provider uses the VIVE FOCUS integrated head-mounted display to provide stroke -affected patients with the rehabilitation programs they need, so that the patients can carry the device with them when go out and use the device in various environments.

HTC design team added, “in the process of our participation in the competition of the National Innovation and Creation Award, we reviewed the core value of the creation of VIVE FOCUS, and this gave us an opportunity to identify the direction of our future product development, leading us to create more breakthrough products. ”

Creation

FUJACOOK Multifunction Pot

Patent Certificate No.: D195062

Hsien-Chen Chen

A pot you've never imaged - one pot on your table for all uses

"FUJACOOK Multifunction Pot" breaks the limitations of traditional cooking tools by integrating frying, BBQ, steaming, stewing, boiling, poaching, simmering and more functions in a single device. Additionally, its front and back cooking areas are designed to be controlled separately, thus having been recognized by many international awards.

Hot pot is one of the most popular cuisines in Taiwan, representing an amazing market value of NT$ 40 billion per year. In Taiwan, you can see hot-pot restaurants everywhere. Hsien-Chen Chen, President of FUJACOOK, once planned to run his own hot-pot restaurant, and during his evaluation, he found that the most crucial defect of the existing hot-pot & BBQ pots is that the hot pot and the BBQ pan share a common heat source. When only the hot pot or the BBQ pan is used for cooking, the other part is undergoing air burning, which wastes energy and may cause fire. Additionally, these known cookers are limited in function.

Therefore, Hsien-Chen Chen changed his path and started to develop a pot addressing the foregoing problems. After 4 years of hard works, the "FUJACOOK Multifunction Pot" (henceforth referred to as 'this creation') was invented and later granted with 178 patents in 27 countries. It also won the platinum award at Taipei International Invention Show & Technomart 2015, the silver award at iENA Nuremberg International Trade Fair, the top award at Seoul International Invention Fair 2019, and the gold medal at Bangkok International Intellectual Property, Invention, Innovation and Technology Exposition 2020, making it veritably "the glory of Taiwan."

Frying, BBQ, steaming, stewing, boiling, poaching, simmering, one pot for all uses, for your boundless creativity

The pot mainly includes two parts, namely the pot body and the induction stove. The pot body is divided into a pan (the front, lower area) and a soup pot (the back, higher area). The most creative change is changing the pot shape from round to rectangle, which provides the maximum capacity in a given volume. Another change is replacing the conventional big pot with two individual-use cookers (a 500ml front pan and a 1000ml rear pot), which makes the product more suitable for singles or small families. Moreover, step-shape edges are provided to work with a series of accessories and a pot lid, adding the pot with functions like steaming, stewing, simmering, in addition to frying, boiling, and BBQ, making it true to “one pot for all uses.”

The accessories designed by Hsien-Chen Chen include a perforates steam plate that allows juice of meat or clams steamed thereon to bleed down to add sweetness to the soup; a stem dish designed for a fish or anything desired to be juicy; and an inner pot that can be used to make steamed egg and when working with the lid can turns the cooker into a stewpot. A more thoughtful feature is that the product comes with a flat-head ladle specially designed for the rectangular pot for taking out the last drop of soup from the pot. All the accessories including a shovel and the ladle are sized to prevent them from falling into the pot. Also included is a multifunction tray for storage.

In addition to functions, Hsien-Chen Chen also places great importance on product safety. For example, the pot lid is made of heat-resistant glass and equipped with a backlite knob. Furthermore, steam vents are moved from the top to the corners of the lid so as to prevent steam burn when the user uncovers the pot. This inventive design has been granted with patent rights in 27 countries.

Separate temperature controls for front and rear cooking areas, preventing air burning, saving power and being environmentally friendly

As to heating, the highlight of the product is on its separate temperature controls. Adopting a double heat source design, the pot has two separate electric heat systems for its front and rear cooking areas. For the front pan, the low heat is 250W and the high heat is 500W, and those wattages are 350W and 700W, respectively, for the rear pot. As each of the cooking areas is only heated in use, the problem of air burning can be eliminated. Hsien-Chen Chen explained, “conceptually, this is a combination of two induction stoves. However, it is much easier said than done. The challenge was to secure the two systems from mutual conflict and interference, and they had to be halved in size.” He continuously studied with experts and made improvements for 4 years and invested more than NT$ 40 million before he finally found a solution.

A whole-pack solution satisfying practical needs

Costs are directly reflected on selling prices. To penetrate into households, Hsien-Chen Chen controlled the manufacturing costs by employing electric heat system and fully wrapping the pot and the heating tubes. This successfully reduced the costs by one third while allowing fast heating in just a few seconds. Such an economical utility was sold for 10 thousand units in one month after its introduction to the market. “Needs drive invention. When there is a need, there is always someone try to satisfy the need. Like FUJACOOK Multifunction Pot, it is a product originated with practical needs. This is an invention of true value,” Hsien-Chen Chen so stated.

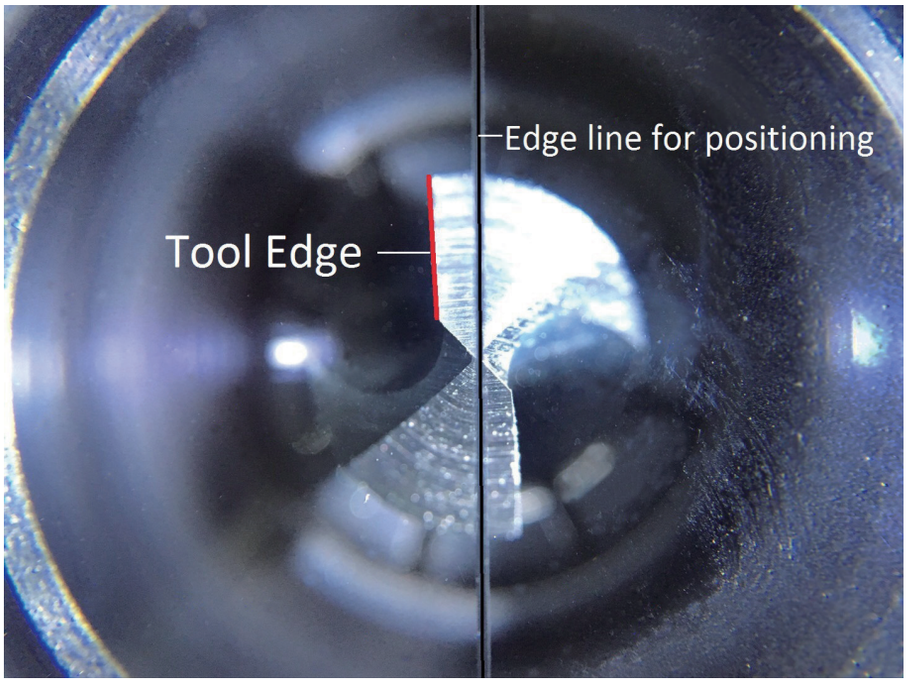
Seeing the market potential of the Multifunction Pot, Hsien-Chen Chen is now planning to expand its sale into the commercial market in hope that good use experience of consumers in restaurants can drive the sales in the household market. He even had an idea to develop easy cooking packs for time-saving and convenient cooking, such as a combination of rice noodles, meat balls and fish fillets. The whole-pack solution is expected to offer 100 different easy cooking packs.

Creation

Silver Medal

Visible Positioning Cutting Edge Angle of Tool

Patent Certificate No.: M512466
Charles Lin, Leo Lin



▲ A drill bit reviewed with a corrector using a 15X magnifier

▲ A corrector working with a movable chuck set

▲ A cutting edge corrector for an M12LSB drill bit sharpener

One objective of the creation is to provide a visible positioning cutting edge angle of tool that enables a user to rapidly review the cutting edge angle of the tool and facilitates adjustment and alignment. With the patented technology, a tool can be well positioned in a single operation without the need of repeated adjustment, and the cutting edge angle of the tool can be easily reviewed and aligned so that one tool having one or more cutting edges can be sharpened conveniently. The overall operation for tool positioning and calibration is effort- and - time-saving. Additionally, the creation can sharpen a drill bit without using any auxiliary, making the sharpening work efficient and accurate. Another objective of the invention is to provide a visible positioning cutting edge angle of tool adaptable to tools of different lengths.

This creation has the following advantages: 1. Accurate positioning is ensured for any variation of the central thickness of the drill bit. 2. For small-diameter drill bits, a magnifier may be added to provide visual benefits. 3. The operation is simple and thus facilitates standardization. 4. Depending on needs, a movable chuck set may be used with a cutting edge corrector for re-positioning. The flute can be enlarged to prevent chips from building up when long holes are drilled.

This creation enables any operator to well sharpen a drill bit like a skilled worker, and allows a tool to be well positioned in a single operation, also facilitating standardization. A normal operator can become a professional sharpening master after three or five times of practice.

The drill bit sharpener with the visible cutting edge positioning addresses the shortcoming related to most of the conventional sharpeners using dials and is suitable for tool processing and sharpening in most of industries, satisfying international consumers' needs.

This creation has extensive applications! All the challenges of drill bit positioning during tool sharpening can be overcome, effectively eliminating the problems of the existing tool sharpening! Facilitating industrial upgrading and benefiting people, the device is absolutely an innovative and advanced product.

Creation

Celestial Globe

Patent Certificate No.: M529247

Yen-Kuang Lin

▲ Celestial globe

▲ Celestial globe DIY course

▲ Astronomy course

Concentrating the entire starry sky on a 25cm globe to show you the astronomical landscape! Yen-Kuang Lin, CEO of FUNSKY S&T EDU Co., Ltd. invented the celestial globe for easy astronomical observation. By setting the date, the time and the latitude, and pointing to the orientation, the user can use a laser pen to indicate the astrometric position of interest for astronomical education.

Traditionally, astronomical observation is made on a planisphere or on a mobile phone loaded with an AR App for this purpose. However, with these known tools, astronomical observation in class is limited in a small plane, making it less understandable, and the learning result is not satisfying. Thus, many teachers in elementary and secondary schools feel it difficult to teach astronomy. Yen-Kuang Lin, with an electrical machinery background, saw the need, and thus spent about three years to create a 3D celestial globe as a combination of technological and astronomical knowledge.

The celestial globe is an imaginary ball with the earth at its center that visually shows astronomic information like heavenly bodies, constellations and the zodiac. By specifying a date, a time and a latitude, a user can call out the sky then and there. The operation is very easy. When a user uses a laser beam to point at a star, the deviation does not excess two fingers, so the accuracy is satisfying.

The biggest challenge Yen-Kuang Lin met during R&D was how to present information from a planisphere on a three-dimensional globe. Thermal compression had to be done to ensure the normal appearance presented on the spherical surface. Since deformation vary with the latitude, this was a quite time-consuming process. In addition, dates and times are associated with Earth's rotation and revolution. It was also an effort-consuming job to align dates and times with the sun's positions. The celestial globe has been granted with utility model patents in seven countries and an invention patent in the US. Particularly, the examination for the US patent took a whole year to conclude with grant, proving that the invention is truly of value.

"Creation was only the first step, and letting more people know such a device is the only way to give a future to it." Yen-Kuang Lin is now working with the Taiwan Normal University to train astronomy teachers across Taiwan, and to teach B&B and campground owners to use the celestial globe in hope that they can offer astronomical observation events to their guests. Yen-Kuang Lin is also working on online crowdfunding for the second-generation celestial globe that is designed to illuminate. All these are for making astronomy more popular among and more accessible to People in Taiwan.

Creation

Silver Medal

Fast Adjusts Water Pump Pliers

Patent Certificate No.: M548050

Jin-Fu Chen

Many water pump pliers on the market require more than two times of adjustment before getting right positioned. The inventive water pump pliers are designed to eliminate repeated adjustment and fast adjustment.

The water pump pliers are provided with many engaging teeth at its back that are integratedly forging, opposite to the existing engaging teeth that are made by milling process.

The engaging teeth of the inventive water pump pliers thus eliminate the need of further processing and have good structural strength. The main body is different from the traditional form for that the fixed lever is a two-piece composed of a back cover and a lever body riveted together, thereby reducing the processing steps and material waste. Therein, the rivets that rivet the lever body and the back cover are also integratedly forging on the lever body, thereby further saving costs for preparing separate rivets.

The key part (pressing shaft) is made using metal injection molding. The pressing shaft is wear resistant and high-pressure resistant. Moreover, the design details of the main body are optimized in terms of assembling, so as to further reduce manufacturing costs and in turn to increase competitiveness of the product.

Creation

Silver Medal

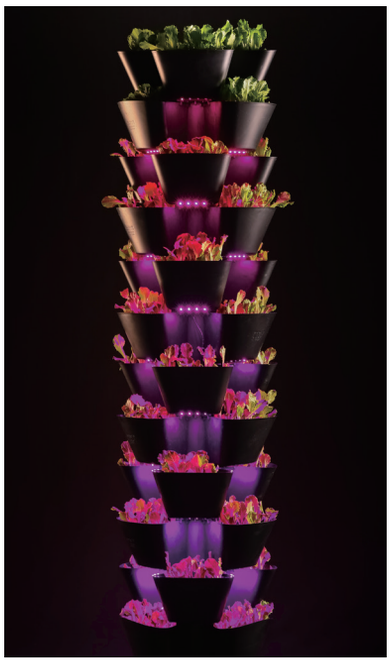
Three-Dimensional Planting Structure

Patent Certificate No.: M575650

Jui-Hao Yeh

▲ Demonstration of water mist

▲ Water mist and its recycling



▲ Product photo

▲ Fill light demonstration

Objective: to ensure food safety, to enhance health, to improve agriculture, to change life, to help the environment, and to promote sustainable development.

Features: The creation has the following advantages:

1. Land preservation: the three-dimensional, 360°-coverage planting structure makes full use of space and thus is a solution to shortage of arable land.
2. Water preservation: the employed water-saving designs include: (1) using an anion generator to infuse irrigation water with anions; (2) using high-pressure spray to nebulize irrigation water, thereby saving water effectively and facilitating plants' water intake; and (3) using a special inclined wall to guide surplus water to a water collecting tank at the bottom for water recycling.
3. Plant grow lights: artificial light is provided so that the structure can use in environments where sunlight is scarce. The grow lights emit light of a special wavelength that helps plants to grow and are structured to be waterproof and anti-creep, ensuring use safety.
4. Versatile use: the frame can be assembled in various ways to work with multifunction irrigation means, making the structure tailorable to practical needs.

Application scope: with the foregoing features, the creation is applicable to organic agriculture, urban beautification, environmental greening, home or community landscaping or greenhouse farming, being a truly versatile product.

Economic benefits: when used agricultural production, the creation helps to preserve land and water resource, and brings about several-fold capacity improvement. For households, the patented structure may be used to build home vegetable gardens, providing healthy food, educational opportunities and peaceful family atmosphere. To sum up, the inventive product is extensively applicable and influencing, making it of high value and economically benefiting.

Conclusion: realizing natural agriculture, cultivating Taiwan, providing new agricultural modes, achieving healthy life.

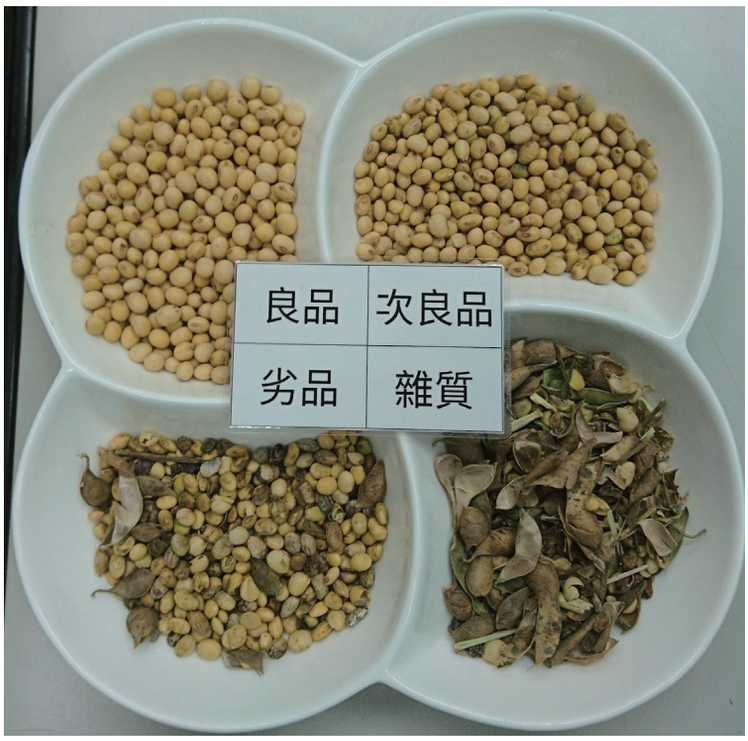
Creation

Silver Medal

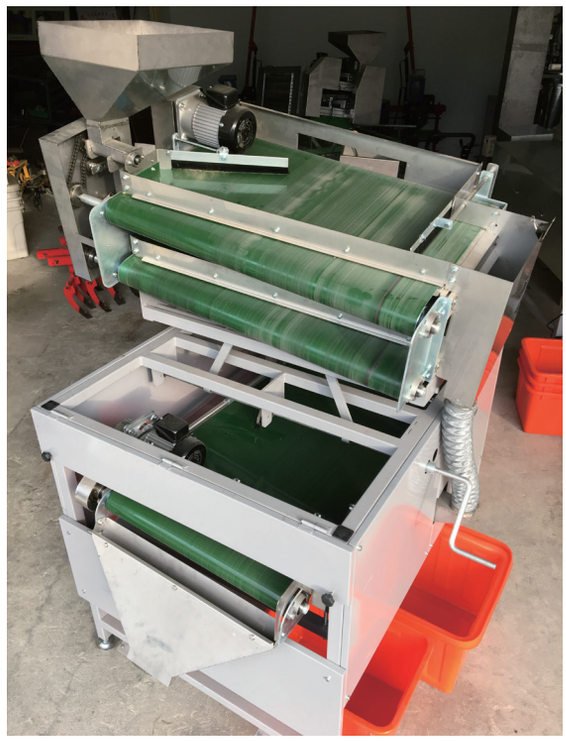
Multi-layer Bean Sorting and Grading Machine

Patent Certificate No.: M578196

Kuang-Hua Chang, Hong-Yu Chien, Wei-Hsiang Lin



▲ Soybeans sorted into four grades



▲ Soybean sorting and grading equipment

Council of Agriculture, Executive Yuan is now promoting the Big Granary Program to encourage farmers to plant import substitute crops. Hualien District Agricultural Research and Extension Station particularly recommend farmers to organically plant soybean variety Hualien 1 and Hualien 2. Thanks to supportive policies and technologies, the area under organic soybean cultivation has continuously increased and now reaches 200 hectares. However, postharvest handling like impurity removing, sorting, and grading is time- and effort-consuming. As compared to imported soybean, domestic soybean requires higher production costs and tends to have inconsistent quality, making it less welcome to downstream processing factories. The “Multi-layer Bean Sorting and Grading Machine” was thus developed to solve this problem.

Superior and inferior materials roll in different paths due to their different surface properties. Based on this principle, the patented device uses multilayer incline conveyer to sort and grade soybean in terms of roundness. The upper sorting system includes a double-layer conveyer that handle materials parallelly in two layers. Generally, round beans roll faster than less round ones, so they can roll into the superior collecting tank before the conveyer could bring them out. On the other hand, impurities are conveyed to the lower sorting system. A brush is provided to remove impurities like dried stalks and pods.

The equipment was trailed by organic soybean farms and sorted over 50 tons of beans during its development. The trails proved the durability and provided farmers’ feedback for continuous improvement. According to trial results, the superior sorting accuracy reached 99.53%, and the inferior sorting accuracy reached 93.03%, while the overall net sorting efficiency was 99.52%. This device was applied to soybean variety Hualien 1, Hualien 2, Kaohsiung Sel.10, Shidan (Jinzhu), Tainan 3, and Tainan 11. The capacity was up to 200 kg/hr, with the daily output up to 1.5 tons. As compared to small sortor, the manufacturing cost reduction is more than 70%, making the equipment highly competitive on the market. Two companies have completed technology transfer, and the accumulated sales as of 2020 was over NT$ 1 million.

Creation

Structural Improvement of Two-Row Transplanting Machine

Silver Medal

Patent Certificate No.: M585475

Yun-Sheng Tien, Chin-Yuan Chang

▲ Tractor with the two-row transplanter attached thereto

▲ Attached two-row transplanter planting taro seedlings in the field

▲ Press conference announcing the results of the taro seedling transplanter

Dajia District and Daan District in Taichung City are production areas of taro, with a yield taking one third of the total taro production in Taiwan. Therein, wetland taro is the staple. The planting period is November this year to March the next year . In the cold winter days, taro farmers have to repeatedly bend down and transplant the seedlings one by one to wet fields, so the work is really toiling and labor-consuming. In order to reduce taro farmers' workloads, Taichung District Agricultural Research and Extension Station Council of Agriculture, Executive Yuan (TDARES) made extensive studies on Taiwan-made and foreign agricultural machines and developed Taiwan's first attached two-row taro seedling transplanter.

The inventive machine is to be attached to a tractor. In operation, three workers are teamed up, wherein one take care of driving, the other two are in charge of taking and supplying seedlings, respectively. The machine then can sequentially handle soil breaking, furrow opening, seedling placing, pressing and covering in the field. As compared to traditional manual planting, use of the inventive machine improves working efficiency by more than 20%, effectively reducing taro farmers' toiling routines.

Yun-Sheng Tien from TDARES introduced the innovations incorporated in the inventive machine. The turntable of the seedling placing device and the seedling claw base adopt modular assembly in place of the conventional integrated casting approach, thus providing advantages of low manufacturing costs and easy maintenance. The seedling claws of the seedling placing device has been improved from the original fixed eight-finger claw to four assembly methods, and it is matched with the replacement of the transmission gear that can provide 12 options of plant spacing, making the machine applicable to other plants, such as green onion and sugar cane seedlings. The fingers of the seedling claw are available in two widths for better fitting seedlings' sizes.

In traditional machine, the two seedling placing devices are driven by contact wheels to rotate. When either of the contact wheels meet an obstacle, the seedling placing devices are blocked from rotation, and the seedling supplying is interrupted. The inventive machine employs a drive shaft and a chain to force two devices rotate simultaneously, thereby ensuring two-row transplanting. In addition, with a clutch, the two seedling placing devices can be switched between "parallel" and "cross" modes, endowing even more flexibility to application of the machine.

This machine has been technically transferred to agricultural machine makers, and is now used by production and marketing groups and commissioned farming teams. According to Yun-Sheng Tien, the machine transplants seedlings in dry fields, and this is different from working in wet fields. Taro farmers thus need some more time to get used to the new farming mode, and more conceptual communication has to be done. In the future, TDARES will keep holding demonstration and introduction events to promote mechanized taro seedling transplanting, thereby reducing taro farmers' workloads and mitigating workforce shortage in farming seasons.

Creation

Scooter

Silver Medal

Patent Certificate No.: D180492

Yao-Te Wang, Bo-Chun Jan, Yen-Hao Lu

▲ FORCE_ Vigorous design

▲ FORCE_ Sharp and dynamic styling

▲ FORCE_ Majestic front face

1. An avant-garde, luxurious, dynamic scooter with excellent control performance: as a continuation of the avant-garde, luxurious, dynamic image of “S MAX,” the scooter further expands the F&A (FUN&ADD VALUE) customer base toward younger customers.

2. A design that exhibits youth, aggressiveness and impact: with a more aggressive profile, the scooter looks more undulating and more domineering. The unique appearance together with sporty-style and detail-enhance components gives a next-generation modern feeling.

3. Functions that serve for practicality, convenience, user friendliness, comforts: the design integrates stylishness with functionality, creating an urban, sporty scooter that exhibits masculinity, novelty, dynamics, sporty performance, comfortable riding and convenient functionality.

As an embodiment of the foregoing design ideas, YAMAHA FORCE155 was first introduced in 2016 and soon attracted the attention of young people. The scooter exhibits urban, sporty scooter that exhibits masculinity, novelty, dynamics, sporty performance, comfortable riding and convenient functionality, and successfully expanded the F&A customer base toward younger customers, creating great sales of nearly 100 thousand scooters!

Silver Medal

Base unit of Tune Pro High-Performance Blender

Patent Certificate No.: D183935

Wen-Ching Lee

Design of wheel knob control is inspired by radio and camera. It is a perfect innovative design to combine the multi-tasking selection or fine-tuning the power to applying on high performance blender.

1. 3 different functions controlled by the wheel knob, turning forwards or backwards for fine tuning and press for program selection which makes it more user-friendly. The knobs' size, texture and way of operation are concerned during the designing process.
2. Appearance of Tune Pro adapting geometric shape, smooth converting from square to round edges which is representing simple and modern design style.
3. Ergonomic LED touch panel with straightly graphics display allow users to operate the unit easily.
4. Variety of materials-metal and high qualify plastic composite the housing unit, it also shows the uniqueness and noble of Tune Pro.
5. Air ventilation is hidden at the bottom of the base unit, it is integrated into the design and achieving both aesthetics and performance. The air ventilation also serves as a handle to move the unit.
6. Brushless inverter DC motor provides special high torque power & ultra-low speed while preparing thick texture recipes e.g.: kneading dough, grinding nuts paste. The brushless motor ensures extra-long operation life for professional performance.

Tune Pro already launched in European market by the high-end brand bianco di puro and rated by "haus-garten-test" product testing magazine. Tune Pro obtained the absolutely victory on performance, operation, food processing result, environmental protection, product safety and design of appearance. Bianco di puro provides 15 years warranty on motor base.

Creation

Silver Medal

Portable Storage Device

Patent Certificate No.: D187642

Shih-Huang Tsai

Dustproof

Shockproof

Waterproof

- IP68 durable external SSD
- Waterproof (IPX8)
- Dustproof (IP6X)
- Military-grade shockproof

1.This patented device is wrapped by silicone, and the silicone-shaped reinforcement features at the four corners are provided to protects the product from damage caused by impacts caused by dropping. The two sides of the main body are each covered by an aluminum panel processed using blasting and anodization to ensure good heat dissipation and add texture to the product. The front is equipped with an easy-use water resistant -dustproof plug that when used provides excellent IP68-rated protection.

2. It survived the strict military-class MIL-STD-810G 516.6 drop test, proven to be effective in preventing impact-caused damage. This means you don't have to worry about the integrity of your data even when the device drops.

3.This patented device conform to IP68 standards, the highest rate of water resistance and dust resistance. It perfectly endures immersion in 1.5 m of water up to 60 min! Also, it is totally dust resistant.

4. Three of its four silicone-covered edges are made with a depressed and specially textured hand-grip portion for users' comfortable and non-slip holding.

5. The silicone shell is raised from the main body to provide impact protection and anti-slip function, so the product can be placed on surfaces of any material without the concern of sliding and falling.

6. The logotype is formed on the front aluminum panel to present an exquisite diamond-cutting effect, adding value to the product.

7. The internal water resistant -dustproof structures are integrated with the external silicone shell to save molding costs and improve fabricating efficiency.

8. This product has an appearance designed for both stylishness and protection, and can perfectly fit all use scenarios. The product is available in two color combinations - pure black and yellow-green.

9. This patented device has been recognized by eminent awards in Taiwan and other countries: Taiwan Excellence Award, Computex d&i Award, iF Design Award, Reddot Design Award, Good Design Award.

Creation

Silver Medal

3-In-1 Interface USB Drives

Patent Certificate No.: D190142

Mei-Ling Chiu, Wen-Te Shen

1. 3-in -1 interface for unrestricted transmission and expandability
   Mobile C50 is equipped with 3-in -1 interface-USB Type-A, Micro-B and Type-C, allowing rapid and convenient data transmission among next-generation USB Type-C equipment, laptop computers, desktop computers and Android smart phones or tablets, being the best bridge enabling cross-device data transmission. In addition, Mobile C50 provides storage up to 128GB to give your cutting-edge devices extra capacity.

2. Trend-leading Type-C interface
   The next-generation USB Type-C connector is designed for low-profile devices and is fully reversible in terms of plug orientation, contributing to more convenient use.

3. Strong protection, Plug and Play
   Made of highly elastic, strong and environmentally friendly TPU, a cap provides the USB Type-C port with perfect protection and is connected to the main body so you'll never lose the cap. Besides, the connection survived more than 10,000 times of folding during factory testing, proven to be of great durability.

4. Metal-reinforced hanging hole for easy swapping
   Mobile C50 is designed to be compact and has each of its ports well protected by a connected cap, plus the considerately designed metal-reinforced hanging hole, making it highly portable and durable.

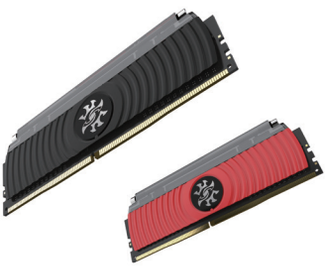
Creation

Silver Medal

Memory Module

Patent Certificate No.: D194452

Shih-Huang Tsai



1. The world's first DDR4 RGB water-cooled memory has its front and rear surface coved by aluminum members that facilitate air cooling, and uses an intermediate aluminum member to transfer heat to a liquid tank located above, so that the heat can be dissipated through metal structures at two sides, thereby providing excellent heat-dissipating efficiency.
2. The patented device features a hybrid heat-dissipating technology. The interaction between the aluminum heat sinks and the thermally conductive material of the PCB works with a high-efficiency cooling fluid to provide a heat-dissipating effect better than the pure air-cooling solution.
3. The airtight package using an exclusive airtight package technology well prevents the liquid in the light pipe from leakage and evaporation.
4. The liquid is a non-corrosive, non-electrically-conductive engineering fluid, which is highly stable and provides good heat transfer efficiency.
5. The liquid tank located above is made of a black-tinted translucent material, making the cooling liquid contained therein visible to users. The metal heat sinks at the front and rear sides are arranged into a ripple-like pattern as an echo to the water-cooling function of the product, making the overall product design more thematic.
6. The metal panel centrally decorated with reflective concentric circles further enhances the overall texture of the product.
7. The LEDs at the top of the product emit RGB light that shines the users through the liquid tank and looks like shining in water. The visual effect resembling glistening light of waves further adds esthetics to the product.
8. The RGB light is user programmable. The user may set the light to be controlled by the control software provided by one of the leading motherboard manufacturers, or use our in-house developed proprietary App, XPG RGB Sync, to compose an exclusive visual effect.
9. This patented device has a special appeal and thus distinguishes itself from other memory products on the market.
10. This patented device has been recognized by eminent awards in Taiwan and other countries: Taiwan Excellence Award, iF Design Award (Germany), Reddot Design Award (Germany).

Creation

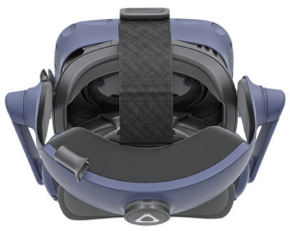
HTC VIVE Pro VR Headset

Patent Certificate No.: D194927

Chang-Hua Wei, Shih-Hsiu Lee, Yu-Chuan Chang

▲ VIVE PRO's wireless module

▲ VIVE PRO's front angled perspective view and peripherals



▲ VIVE PRO's rear perspective view

VIVE PRO is a VR device reinvented from inside to outside for extreme immersive experience: in virtue of high-precision optical tracking technology, clearer and sharper image quality can be achieved. By integrating 3D space and certified high-resolution amplifiers, lifelike sound effects can be created. VIVE PRO allows the player to experience unimaginably realistic scenarios in the virtual world. The built-in dual lens camera supports various applications from virtual reality and augmented reality to mixed reality.

In order to give its users the best wearing experience, VIVE PRO has underwent throughout ergonomic optimization. With its many innovative structural designs, the wearing experience is incomparably comfortable and the use is easy. The device is applicable to users with different head sizes and visual acuity, and even a user wearing glasses can enjoy the stress-free, comfortable experience. The new design features include a core structure that provides the optimal weight distribution, the exclusive self-adaptable head rest for accommodating differently angled head rests, the adjustable eye comfort structure that ensures the optimal visual effect for users having various head shapes and sizes, and more innovative details.

VIVE PRO has opened up a new VR domain and represents infinite possibilities of the VR industry. In addition to consumers applications for eSports, entertainment and gaming, VR has been extensively used in military, commercial, enterprise and medical applications.

Invention Award

Medal Prize	Patent No.	Patent	Inventor	Patentee
Gold Medal	I611882	Force Limiting and Shock Reduction Device	Jui-yuan Shih	Jui-yuan Shih
Gold Medal	I629045	Lens Module and Eye Fundus Camera Including The Same	Chu-Ming Cheng, Long-Sheng Liao	Medimaging Integrated Solution, Inc.
Gold Medal	I645733	Channel-Based Positioning Device, System and Method Thereof	Pi-Chen Chiu, Ting-Wu Ho, Chia-Lung Liu	Industrial Technology Research Institute
Gold Medal	I648266	Quinoxaline Compounds as Type III Receptor Tyrosine Kinase Inhibitors	Shao-Zheng Peng, Chu-Bin Liao, Hung-Kai Chen, Chen-Hsuan Ho, Hung-Jyun Huang, Shian-Yi Chiou	Development Center for Biotechnology
Gold Medal	I666087	Machining Toolholder	Jenq-Shyong Chen, Hao-Tang Wang	National Chung Hsing University
Gold Medal	I677152	Physically Unclonable Function Unit and Method for Operating A Physically Unclonable Function Unit	Hsin-Ming Chen, Meng-Yi Wu, Po-Hao Huang	eMemory Technology Inc
Silver Medal	I481442	Zwitterionic-Bias Material for Blood Cell Selection	Yung Chang, Jheng-Fong Jhong, Sheng-Han Chan, Wen-Lin Lin	Chung Yuan Christian University
Silver Medal	I516269	Mixture of Hyaluronic Acid for Treating and Preventing Inflammatory Bowel Disease	Albert Wu	Holy Stone Healthcare Co., Ltd
Silver Medal	I516302	Loop Tower CO_2 Capture System, Carbonator, Calciner and Operating Method Thereof	Wei-Cheng Chen, Siang Ouyang, Chin-Ming Huang, Cheng-Hsien Shen, Heng-Wen Hsu	Industrial Technology Research Institute, Taiwan Cement Corporation
Silver Medal	I527957	Hingeless Folding Mechanism	Chen-Hsiang Lee	Chen-Hsiang Lee
Silver Medal	I556460	Pervoskite Solar Cell	Wei-Fang Su	National Taiwan University
Silver Medal	I582111	Antibody Locker for The Inactivation of Protein Drug	Tian-Lu Cheng, Chih-Hung Chuang, Hsiu-Fen Ko, Yun-Chi Lu	Kaohsiung Medical University
Silver Medal	I583600	Bag Packaging Mechanism for Mushroom Cultivation	Rong-Yuan Jou, Chih-Jen Lee	National Formosa University
Silver Medal	I604971	Dynamic Tire Pressure Sensor System for A Bike	Tzyy-Yuang Shiang, Yin-Shin Lee, Chen-Fang Hsieh	National Taiwan Normal University

Medal Prize	Patent No.	Patent	Inventor	Patentee
Silver Medal	I611238	Modular Assembly System and Method for Terrestrial Myopic Sports Goggles	Chia-Chun Mu	Chia-Chun Mu
Silver Medal	I616669	Quadrature Self-Injection-Locked Radar	Fu-Kang Wang, Tzyy-Sheng Horng, Mu-Cyun Tang	National Sun Yat-sen University
Silver Medal	I619933	A Stress Measurement Method of Optical Materials and System Thereof	Wei-Chung Wang, Po-Chi Sung, Zheng-Yong Lu, Yu-Liang Yeh, Po-Yu Chen	National Tsing Hua University
Silver Medal	I636032	Method for Manufacturing Gyromagnetic Element	Ching-Chien Huang, Yung-Hsiung Hung, Jing-Yi Huang, Ming-Feng Kuo	China Steel Corporation
Silver Medal	I651148	Vacuum Reflow Oven	Jung-Kuei Peng, Cheng-Shang Huang, Mao-Jung Wu	3S Silicon Tech., Inc.
Silver Medal	I659334	Transparent Display Device, Control Method Thereof and Controller Thereof	Cheng-Chung Lee, Kuang-Jung Chen, Sheng-Po Wang, Heng-Yin Chen	Industrial Technology Research Institute, Intellectual Property Innovation Corporation
Silver Medal	I659717	Surfboard with Foldable Seat Back	Tzong-In Yeh	Tzong-In Yeh
Silver Medal	I660231	Image Device Corresponding to Depth Information/Panoramic Image and Related Image System Thereof	Chao-Chun Lu, Ming-Hua Lin, Chi-Feng Lee	eYs3D Microelectronics, Co.
Silver Medal	I662172	Construction Method for A Building	Samuel Yin, Kun-Jung Shu	Ruentex Engineering & Construction Co., Ltd.
Silver Medal	I663549	The Display Management System with e-Paper Tag	Chen-Tsung Kuo, Yi-Chun Wu, Ming Fen Wu, Wei-Pin Lai, Lai-Shiun Lai	Taichung Veterans General Hospital
Silver Medal	I671077	Hexa-Lactoside Tri-azanonane Tri-acetic Acid (NOTA) Derivative, Method for Radiolabeling Hexa-Lactoside Positron Emission Tomography (PET) Imaging Agent for Liver Receptor with Ga-68, and Hexa-Lactoside PET Imaging Agent for Liver Receptor	Wuu-Jyh Lin, Mei-Hui Wang, Hung-Man Yu, Kun-Liang Lin, Yan-Feng Jiang, Rui-Yu Chen	Institute of Nuclear Energy Research
Silver Medal	I672663	Sensing and Delivering Meals System	Chia-Jen Lin, Cheng-Yun Chung	TECO Electric & Machinery Co., Ltd.

Creation Award

Medal Prize	Patent No.	Patent	Inventor	Patentee
Gold Medal	M561222	A Co-gate Electrode between Pixels Structure	Che-Yao Wu, Kai-Ju Chou, I-Ta Jiang	Giantplus Technology Co., Ltd.
Gold Medal	M567788	Friction Welding Machine with Servo Mechanism	Chin-Fu Jao, Hong-Cheng Jao	Darhung Machinery Co.,Ltd.
Gold Medal	D184890	VAGO-Portable Vacuum Compressor	Ta-Ching Chao	Big Good Design Co., Ltd.
Gold Medal	D190775	Head-Mounted Display	Lee-Wei Chen, Yien-Chun Kuo, Hung-Yu Chen, Meng-Sheng Chiang	HTC Corporation
Gold Medal	D195062	FUJACOOK Multifunction Pot	Hsien-Chen Chen	Hsien-Chen Chen
Silver Medal	M512466	Visible Positioning Cutting Edge Angle of Tool	Charles Lin, Leo Lin	Charles Lin, Leo Lin
Silver Medal	M529247	Celestial Globe	Yen-Kuang Lin	Yen-Kuang Lin
Silver Medal	M548050	Fast Adjusts Water Pump Pliers	Jin-Fu Chen	Jin-Fu Chen
Silver Medal	M575650	Three-Dimensional Planting Structure	Jui-Hao Yeh	Jui-Hao Yeh
Silver Medal	M578196	Multi-layer Bean Sorting and Grading Machine	Kuang-Hua Chang, Hong-Yu Chien, Wei-Hsiang Lin	Hualien District Agricultural Research and Extension Station,Council of Agriculture,Executive Yuan
Silver Medal	M585475	Structural Improvement of Two-Row Transplanting Machine	Yun-Sheng Tien, Chin-Yuan Chang	Taichung District Agricultural Research And Extension Station Council Of Agriculture Executive Yuan

Medal Prize	Patent No.	Patent	Inventor	Patentee
Silver Medal	D180492	Scooter	Yao-Te Wang, Bo-Chun Jan, Yen-Hao Lu	Yamaha Motor Co.,Ltd.
Silver Medal	D183935	Tune Pro High Performance Blender	Wen-Ching Lee	Wen-Ching Lee
Silver Medal	D187642	Portable Storage Device	Shih-Huang Tsai	ADATA Technology Co., Ltd.
Silver Medal	D190142	3-In-1 Interface USB Drives	Mei-Ling Chiu, Wen-Te Shen	Silicon Power Computer & Communications Inc.
Silver Medal	D194452	Memory Module	Shih-Huang Tsai	ADATA Technology Co., Ltd.
Silver Medal	D194927	HTC VIVE Pro VR Headset	Chang-Hua Wei, Shih-Hsiu Lee, Yu-Chuan Chang	HTC Corporation

Design Idea For the Award Trophy

Designer: Heinrich Wang,

the founder of the Tittot Museum

Design Idea:

The purpose of the National Invention and Creation Award is to encourage and affirm the innovative efforts and achievements made by the award winners.

The visual image of the design features a big circle and a small circle, which represent the overall spirit of the invention process and results. It means being adventurous but yet also very careful to achieve the wholeness, satisfaction, stability, soundness, and excellence.

In addition, the big circle symbolizes all kinds of creativity comprising the wisdom and inspiration of award winners while the small circle portrays the originality of their ideas. The rolling form of the two circles illustrates the initiative and positive attitude of winners as well as the rising hope.

Selection Guidelines

I. Purpose:

Encourage those engaging in research and invention as well as innovative design creations. The outstanding inventors selected will receive the National Invention and Creation Award as recognition. The goal is to drive the R&D spirit and promote the development of our nation's industrial technologies.

II. Basis:

Article 3 of the Regulations Governing Invention and Creation Awards . This awarding event is held biannually.

III. 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 prior to the award selection year (i.e., obtained an invention patent issued between January 1, 2014 and December 31, 2019 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 prior to the award selection year (i.e., obtained a utility model or design patent issued between January 1, 2014 and December 31, 2019 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.

IV. The National Invention and Creation Awards and prizes:

(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 20 winners. Each will win a prize of NT$200 thousand, an award certificate, and a trophy.

(II) Creation Award

1. Gold medal : Up to 6 winners. Each will win a prize of NT$200 thousand, an award certificate, and a trophy.
2. Silver medal : Up to 12 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 the agreement within the period, the Taiwan Intellectual Property Office (hereafter "TIPO") shall issued 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.

V. Registration Procedures:

(I) Registration Period

Between April 10, 2020 and June 30, 2020.

(II) Registration Method

1. Submit the registration documents personally or via registered mail to the registration address (registered mail shall be based on the postmark, and personal delivery shall be made prior to 5 PM of the deadline date or shall be rejected).
2. Registration address: 11F, No. 149, Section 3, Xinyi Road, Da'an District, Taipei City, Taiwan, 10658.

(III) Required documentation and materials

1. The inventor, utility model creator, or designer shall fill-in the registration form for the invention or creation award event and shall also be attached the patent certificate and patent specification(including the descripton, claim, drawings). For utility model patents, four copies of the technical evaluation report, as well as one copy of the national ID document of the contestant(s), shall also be attached to the registration form.
2. When two or more inventors jointly register, the entry piece shall be jointly named by all inventors. If a co-inventor abandons the contest, a contest withdraw form must be submitted.
3. One registration form is limited to one patent entry. Utility model creators participating in the creation award shall attach the utility model patent technical evaluation report and bind it to the documents specified above.
4. If documents or materials submitted by the contestants are not in compliance, the list and the supplemental items needed will be published on July 6, 2020 (Mon.) in the "National Invention and Creation Award" section of TIPO's chinese website, and no other notice shall be provided. The contestants shall review the list and complete the supplementation procedures in writing by 5 PM, July 10, 2020 (Fri.)(registered mail shall be based on the postmark, and person delivery shall be made prior to 5 PM of the deadline date). The registration shall be rejected for failure to provide supplementation documents or if the case is still not in compliance after the supplement.
5. The preceding registration materials shall not be returned after delivery.

VI. 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 Processs

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) Selection Review Standard

1. Invention Award
   (1) Technology R&D 40%
   Evaluated based on the degree of technological innovation as well as the differences compared to existing technologies, uniqueness, criticalness, and technical feasibility.
   (2) Patent Value 40%
   Evaluated based on the production cost or implementation cost, patent efficiency, breadth of patent application on the product, industrial contribution, and the patent portfolio strategy.
   (3) Degree of Commercialization and Marketability 20%
   Evaluated based on the technology transfer, license, industry-academic partnership, commercialization value, or commercialization potential.
2. Creation Award
   (1) Utility Model Patent
   a. Technology R&D 35%
   Evaluated based on the degree of technological or product innovation as well as the differences compared to existing technologies or products, uniqueness, criticalness, and technical feasibility.
   b. Patent Value 30%
   Evaluated based on the production cost or implementation cost, patent efficiency, breadth of patent application on the product, and the patent portfolio strategy.
   c. Utility Model Patent Technical Evaluation Report 5%
   Evaluated by comparing the utility model patent technical evaluation report results of the contestant entries.
   d. Degree of Commercialization and Marketability 30%
   Evaluated based on the technology transfer, license, industry-academic partnership, commercialization value, or commercialization potential.
   (2) Design Patent
   a. Visual Effects and Design 40%
   Evaluated based on the degree of technological innovation, product visual effects, and design creativity.

b. Patent Value 30%
Evaluated based on the production cost or implementation cost, breadth of patent application on the product, and the patent portfolio strategy.

c. Degree of Commercialization and Marketability 30%
Evaluated based on the technology transfer, license, industry-academic partnership, commercialization value, or commercialization potential.

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

(IV) 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.

(V) 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.

(VI) Review Result Appeal

1. Contestants may appeal the review result 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 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.

VII. Recognition:

(I) 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 social public electronically, in paper, and via online media.

(II) The winners shall collaborate and participate in Taiwan Innotech Exop. organized by the Ministry of Economic Affairs (tentative expo. date: October 2021). The booth rental fee shall be borne by TIPO. In addition, the winners shall also collaborate to participate in the award entry presentation and ceremony (tentative date: April 2021).


Intellectual Property Office
Ministry of Economic Affairs
廣告