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Innovation Pathway

Blueprint for High-quality Development of Marine Economy

Edited by TANG Zhexiao

China will promote high-quality development of its marine economy, giving priority to six aspects. They were outlined in a recent article in the *Qiushi Journal*.

The six aspects are: strengthening top-level design and policy support; enhancing independent innovation capacity in marine science and technology; building stronger, more competitive and scaled-up marine industries; strengthening overall planning for major bays; enhancing marine ecological and environmental protection; and actively participating in global ocean governance.

The government work report delivered in March proposed, for the first time, to "enhance overall planning for major bays and see that China's maritime sector gets stronger, performs better, and grows in size."

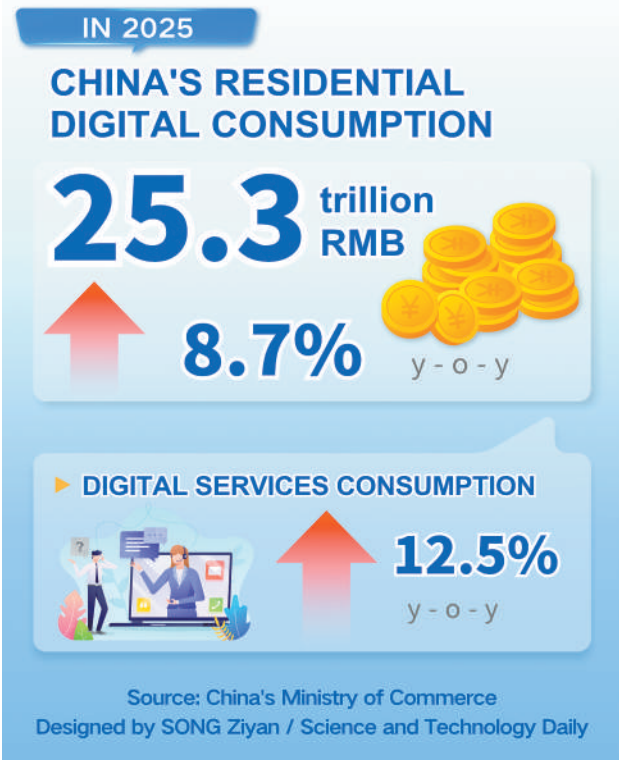
Minister of Natural Resources Guan Zhiou said in an interview after the closing meeting of the fourth session of the 14th National People's Congress that greater emphasis will be given to innovation-driven development to comprehensively enhance the capacity for deep-sea exploration and development. With a focus on win-win cooperation, extensive marine cultural exchanges will be carried out to build a maritime community with a shared future.

With the Laoshan Laboratory for Marine Science and Technology in Qingdao, east China, fully operational, Meng Xiang, the world's largest drilling vessel, entering service, and the Deep Sea No.1 offshore oil and gas platform in the South China Sea running, China's "blue economy momentum" maintains robust growth.

China's marine economy experienced steady growth in 2025. The gross ocean product reached nearly 11.02 trillion RMB (about 1.6 trillion USD), a year-on-year increase of 5.5 percent, contributing 0.4 percent to national economic growth, according to data released by the Ministry of Natural Resources.

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New Graphic



WECHAT ACCOUNT



E-PAPER



Farmers tend to early rice seedlings at a greenhouse in Qidong county, Hengyang city, Hunan province, March 30. (PHOTO: XINHUA)

STI Frontier

3MW Gas Turbine Powers New Era of Energy Security

By WANG Xiaoxia & ZHU Hong

At a recent industry event, the China State Shipbuilding Corporation (CSSC) unveiled its latest technological gem: the CGT3, a three-megawatt gas turbine.

Dubbed the "crown jewel" of manufacturing, gas turbines are notoriously difficult to design and build, with the technology long dominated by a few countries.

The new machine represents a major leap forward, heralding that China's small gas turbines are now fully self-reliant. A team of engineers spent over a decade turning a bold promise into reality.

Inspiration from a folk instrument

The journey began with a seemingly impossible mission: to build a combustion chamber that could run on two different fuels — diesel and natural gas, with seamless switching between them, without ever shutting down. This "dual-fuel" capability is essential for offshore

platforms, which start operations using shipped-in diesel but later tap into their own natural gas.

The core challenge was integrating oil and gas lines into a single, precise nozzle. The two fuels have vastly different energy values and burning behaviors; a tiny miscalculation could cause power fluctuations or even destroy the engine's core.

The team from CSSC No.703 Research Institute worked around the clock, building a dedicated test platform and developing an "intelligent strategy" that acts like a precise brain, enabling a smooth fuel transition in under 30 seconds.

But then, a new problem emerged: carbon buildup. When one fuel was in use, the idle fuel line would clog. The team's solution was an ingenious "collaborative purging method," effectively installing an automatic cleaner for the nozzle.

The most dramatic challenge came

just six months before delivery: dangerous pressure pulsations that could shatter the turbine blades.

Racing against time, the team formed an alliance with top universities to find a solution but remained stumped for four months. Then a eureka moment came from the shape of a traditional Chinese suona horn: a conical tube leading to a flared bell.

They redesigned a key transition section in that shape — a streamlined shape culminating in a flared end and the airflow became smooth and stable.

Taming the vibration beast

For any turbine, excessive vibration is a silent killer. It can wear down parts and lead to catastrophic failure. From the very beginning of the R&D work, the team prioritized vibration control and ensured the rotor dynamic balance design in all aspects, from component processing to assembling the entire machine.

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Why Technology Trade Surges in China

By LIANG Yilian, SUN Mingyuan & HUA Ling

The 2026 Zhongguancun Forum (ZGC Forum) Annual Conference, a global barometer of technological innovation, was held in Beijing from March 25 to 29 under the theme "Integrate Technological and Industrial Innovation."

At the venue, the momentum of this integration was palpable. At the 2026 ZGC International Technology Trade Fair, new project signings in frontier industries were announced one after another, and the buzz around technology transactions and commercialization continued to build.

From the laboratory to the produc-

tion line, China's technology trading market is experiencing unprecedented growth.

At the forum, Chen Hongsheng, an official from China's Ministry of Science and Technology, presented a striking set of figures: the value of technology contract transactions nationwide surged from 2.83 trillion RMB in 2020 to 6.84 trillion RMB in 2024, a remarkable 141 percent increase.

Another set of data released at the forum shows that in Beijing, the value of technology contract transactions rose from 700.57 billion RMB in 2021 to 986.5 billion RMB in 2025, representing a 40.8 percent increase. With the strong national momentum continuing, technology

transactions are expected to expand across more regions in 2026.

Behind the rising numbers lies a deeper transformation: China's role in the global innovation landscape is evolving, while the mechanisms that turn scientific breakthroughs into market-ready technologies are being rapidly reshaped.

From one-way introduction to two-way collaboration

Once largely seen as a destination for imported technologies, China's technology market is increasingly becoming a hub of two-way collaboration, where ideas, talent and technologies flow in multiple directions.

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International Cooperation

China-Vietnam Sci-tech Unity Potential

By GONG Qian

China's Foreign Minister Wang Yi told the 17th meeting of the China-Vietnam Steering Committee for Bilateral Cooperation that both sides should expand the breadth of pragmatic cooperation. This process includes promoting railway connectivity, strengthening cooperation in agriculture, electricity, finance, key minerals and technological innovation, and jointly safeguarding the multilateral trading system, said Wang.

Not long before this meeting, held in Hanoi on March 17, Vietnamese Ambassador to China Pham Thanh Binh spoke at the Chongyang Institute for Financial Studies, Renmin University of China in Beijing. He noted that China's 15th Five-Year Plan, focusing on high-quality development, outlines key plans to build a leading country in science and technology, develop new quality productive forces, and make progressive moves in emerging sectors.

Both views align with Vietnam's strategic goal of taking scientific and technological innovation and digital transformation as the core drivers of economic growth going forward, Binh said.

Enterprises from the two countries have focused on cooperation in emerging areas including digital transformation and innovation, artificial intelligence, green economy, renewable energy and smart infrastructure, Binh added.

China-Vietnam sci-tech cooperation is currently enjoying a new period of strategic opportunities. In 2025, the 75th anniversary of diplomatic relations between China and Vietnam, the two countries signed a memorandum of understanding on strengthening cooperation in the development and governance of AI. In November of the same year, the China-Vietnam AI Application Cooperation Center was officially inaugurated in Hanoi, marking the first national-level AI cooperation platform between the two countries.

Cooperation in the digital economy and cross-border e-commerce are key highlights. The new "livestreaming + cross-border" model has effectively removed information barriers in traditional trade, allowing Vietnamese agricultural products and Chinese industrial goods to be directly marketed to consumers in both countries.

To address bottlenecks in cross-border e-commerce, China and Vietnam have completed piloted smart port projects in the border region, which has further reduced cross-border logistics costs and improved trade efficiency. See page 3

WEEKLY REVIEW

Changying-8 Cargo UAV Makes Maiden Flight

China's first seven-tonne-class cargo unmanned aerial vehicle (UAV) Changying-8 successfully completed its maiden flight in Zhengzhou, central Henan province, on March 31. It has an ultra-large cargo compartment with a volume of 18 cubic meters, a maximum takeoff weight of seven tonnes, and a maximum payload capacity of 3.5 tonnes.

Lijian-2 Y1 Carrier Rocket Launched

China's Lijian-2 Y1 carrier rocket was launched from a commercial aerospace innovation pilot zone in northwest China on March 30 and successfully sent three satellites into the planned orbit. It is China's first launch vehicle using a "common booster core" design.

'Supergenies' That Speed Up Evolution Uncovered

Scientists from the Cambridge and Antwerp universities have uncovered how some species evolve with surprising speed. Certain sections of DNA, known as "flipped" segments, appear to help fish rapidly adapt to new environments and even split into entirely new species. Their findings were published in *Science*.

Scientists Turn MXene into Nanoscroll Supercharger

Scientists at Drexel University turned ultra-thin MXene sheets into powerful nanoscrolls, about 100 times thinner than a human hair, that could supercharge everything from batteries to quantum tech. The research was published in *Advanced Materials*.

AI Facilitates Industrial Transformation

By Staff Reporters

The "Artificial Intelligence + Industry" Forum, a parallel session of the 2026 Zhongguancun Forum Annual Conference, was held in Beijing on March 27, focusing on large-scale commercial application of AI, fostering new business models and formats native to AI, deepening the development and utilization of data resources, and improving AI governance.

The forum was hosted by the Ministry of Science and Technology, and organized by *Science and Technology Daily (S&T Daily)* and the Institute of Scientific and Technical Information of China.

Wu Jing, president of *S&T Daily*, said the forum was a concrete measure to carry out the national strategic deployment to accelerate the development of next-generation AI.

Experts and entrepreneurs shared their thoughts on how AI is shaping the industrial development.

It is widely acknowledged in the sector that AI will empower the automated system of manufacturing in an all-round way, said Yu Haibin, an academician of the Chinese Academy of Engineering and a researcher at the Institute of AI for Industries, Chinese Academy of Sciences, in his keynote speech.

Yu said in complex, uncertain and dynamically changing environments, the new generation systems can autonomously perceive, make decisions and execute without human intervention. With the integration of large models and embodied AI, cyber-physical systems will possess an exceptional ability to adapt to specific objectives, heralding the advent of "super-automated factories."

Such reshaping of productive forces is not only demonstrated in the underlying logic of technologies, but also in the upgrade of industrial application



At the embodied AI robot training center of Qingdao Technical College, humanoid robots demonstrate the effect of motion programming in the classroom setting. (PHOTO: XINHUA)

paradigms. Yin Dawei, vice president of Baidu AI Cloud, said, China's AI industry is entering a new stage of large-scale development, with the shift from large models to intelligent agents emerging as the most prominent technological trend.

Baidu AI Cloud leverages its full-stack capabilities — spanning chips, cloud, models and agents — to support the evolution of intelligent agents from

conversational bots to professional assistants with complex reasoning capabilities.

Yin said the maturation of this "intelligent agent infrastructure" will enable developers to rapidly build multi-modal applications in scenarios such as transportation and industry, closing the loop from model services to enterprise-level services.

Liu Xin, director of Transport Planning and Research Institute, Ministry of Transport, said embodied AI is driving the evolution of transportation vehicles into autonomous agents. In the construction of smart roads and waterways, it is transforming systems from passive response into active prevention.

A platform for matching application scenarios and technology supply nationwide developed by *S&T Daily* was launched at the forum. It will serve as a bridge connecting scenario providers — such as governments, enterprises and industrial parks — with technology suppliers, including tech companies and research institutions.

It will reduce the costs associated with matching scenario demand and supply, enhance the efficiency of scenario development, and accelerate the practical application of technological achievements.

The platform will also provide specialized services for matching application scenarios in the "AI+Industry" sector.

ery-saving equipment. It specifically calls for accelerating the R&D of new materials, components, and products — targeting higher efficiency and performance — that meet market demands and demonstrate outstanding energy-saving effects.

Accelerating the high-quality development of energy-saving equipment is a crucial measure for boosting industrial energy efficiency and achieving the goals of carbon peaking and carbon neutrality. Furthermore, it serves as a fundamental pillar for meeting the growing energy consumption demands of society as a whole, while safeguarding national energy security.

The release of this plan will drive the high-quality development of energy-saving equipment and accelerate the advancement of new industrialization.

Case Study

Jiangxi Races to Lead BCI Innovation

By TANG Zhexiao & WEI Yichen

Enabling people to control computers with their minds and even getting those who are paralyzed to walk using brain-implemented devices is now a reality, thanks to revolutionary brain-computer interface (BCI) technology that builds a bridge between the brain and machines.

This year's government work report has identified BCI as one of the future industries to be prioritized for development during the 15th Five-Year Plan period (2026-2030).

Located in eastern China, Jiangxi province is striving to build a pilot zone for the BCI industry through four major pathways: policy support, clinical breakthroughs, industrial implementation and ecosystem development.

Tech transformation

Recently, during a surgical procedure at the Jiangxi Provincial People's Hospital, a surgical team — assisted by a high-precision neurosurgical robot — precisely implanted a 1,024-channel high-density stretchable electrode array into a patient's brain.

With the successful completion of intraoperative testing, a brand-new "data superhighway" has been established between the patient's brain and the external world.

Once the patient has completed their recovery, decoding algorithm engineers will guide them to use their thoughts to control a cursor on a screen and to "speak" the words they wish to communicate.

Clinical application represents the "first mile" in the transformation of BCI technological achievements. The success of this surgery clearly demonstrates Jiangxi's high-level promotion for the development of future industries.

Currently, patients suffering from conditions such as epilepsy, amyotrophic lateral sclerosis, and high paraplegia have strong practical needs of BCI technology.

In October 2025, the first BCI clinical research ward in Jiangxi was established through a collaboration between the First Affiliated Hospital of Nanchang University and NeuroXess, a pioneering BCI company that developed China's first fully implanted wireless BCI with an integrated battery.

"Our collaboration with this hospital aims to conduct large-scale clinical research," explained Tao Hu, founder and chief scientist of NeuroXess, "On one hand, we hope to benefit patients in Jiangxi; on the other, we seek to acquire high-quality, high-value electroencephalogram data to provide the necessary foundation for optimizing and iterating our algorithms, thereby enhancing product performance."

Policy support

Scientific research and clinical application alone are insufficient to support a thriving industry. Industrial prosperity demands the precise alignment of policy, technology and capital.

In 2023, BCI was included in Jiangxi's future industry plan.

Five BCI medical service price items, which came into effect on November 1 last year, make Jiangxi the sixth province nationwide to implement relevant BCI medical service pricing.

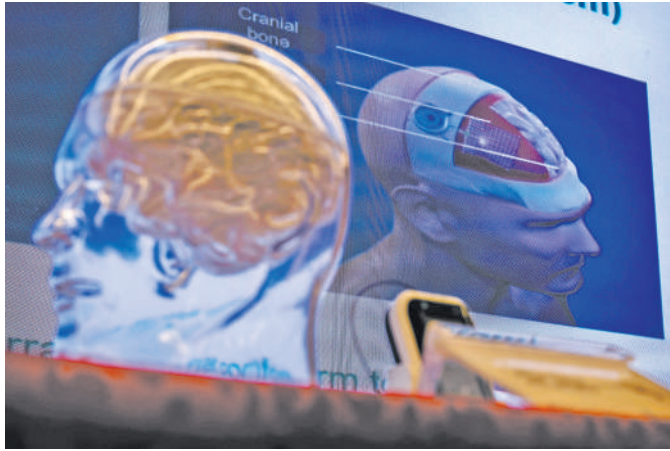
In November 2025, the provincial government issued Several Measures to Accelerate the Development of BCI Technology and Industry, putting forward 11 specific initiatives.

In response, related government departments established a special review channel for innovative medical devices, to accelerate BCI products' market launch. A BCI product testing center is also being prepared, making use of the provincial medical device testing center.

By the end of 2025, Jiangxi had issued several measures, providing full-chain policy support for the BCI sector — from scientific research and clinical trials to review, approval and industrial implementation.

Ganjiang New Area, China's 18th national-level new area located north of Nanchang city, has established a 300 million RMB special fund for the BCI industry, adopting a funding support plus equity cooperation model to provide critical seed funding for promising BCI enterprises.

"In Jiangxi, I have witnessed the concerted efforts of all parties to provide application scenarios and advance clinical research and technology application, and I feel the strong determination to cultivate and grow the BCI industry," said Zhou Zhitaο, chief technology officer of NeuroXess.



The screen shows how the Beinao-1, a semi-invasive brain-computer interface system, is installed. (PHOTO: VCG)

Next-Gen Energy-saving Solutions

Policy Express

By TANG Zhexiao

Energy-saving equipment aimed at accelerating the sector's intelligent transformation, high-quality development and green upgrading has been thrust into the spotlight after an action plan by four Chinese government agencies, including the Ministry of Industry and Information Technology and the National Energy Administration, was recently issued.

As defined in the plan, energy-saving equipment refers to products and devices designed and manufactured using

advanced technologies that enhance energy efficiency, and reduce energy consumption and loss, across the entire energy production and utilization process.

The plan prioritizes six specific categories of energy-saving equipment: energy-efficient motors, transformers, industrial heat pumps, industrial refrigeration and heating equipment, water electrolysis hydrogen production equipment, and information and communication equipment. Driving energy conservation and carbon reduction in key industrial sectors is set as the objective, which will adopt green design and manufacturing, equipment renewal and retrofitting, and AI empowerment as the core pathways.

By 2028, notable breakthroughs will be made in key materials and core components for energy-saving equipment, according to the plan. The compatibility and actual operational efficiency of energy-utilization systems in key industrial sectors are projected to improve continuously.

The energy efficiency levels of equipment such as motors and transformers are expected to reach internationally leading standards, while the market share of energy-saving equipment is anticipated to increase further.

The plan outlines a systematic deployment of tasks covering several key areas, such as promotion of advanced energy-saving equipment, and advancing the digital upgrading of en-

Why Technology Trade Surges in China

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The trend is reflected in trade data. In 2025, China's intellectual property royalty exports increased by 26.3 percent, with advanced technologies in fields such as new energy, biomedicine and high-end equipment entering global industrial chains through patent licensing and international partnerships.

"We must not only pursue original innovation, but also attract global talent and research outcomes to provide high-level technological supply for China's development," said Liu Qing, director of the National Technology Innovation Center par Excellence.

The center has established 10 overseas representative offices, including in Silicon Valley, Northern Europe, Israel and the United Arab Emirates.

Liu told the forum the center has set up a proof-of-concept fund at the University of New South Wales in Australia, investing around 1.2 million Australian dollars annually to support overseas innovations with strong commercialization potential that are interested in entering the Chinese market.

Operating under the model of "discover overseas, incubate in China, and serve global markets," the initiative attracted 15 cutting-edge projects last year

in areas such as new materials and flexible displays.

From passive waiting to active integration

China's technology market is also undergoing a structural shift — from passively waiting for research outcomes to actively integrating innovation resources.

Chen Dongmin, director of the industrialization committee at the Songshan Lake Materials Laboratory, explained that the proof-of-concept stage often struggles to secure investment because of its high technological and market risks. To address this challenge, the Songshan Lake model uses government funding to leverage private investment.

An initial one billion RMB in fiscal funding was invested in 27 projects, which subsequently attracted more than 1.2 billion RMB in venture capital, creating a powerful synergy between public funding and market forces.

Nationwide, the strategy of investing earlier and in smaller startups is gaining traction. Yang Tao, deputy director of the National Institution for Finance and Development, said China's equity investment market reversed its decline in 2025, reaching 928.7 billion RMB. Investment in seed-stage enterprises surged

78.4 percent, while funding for early-stage firms rose 12.7 percent.

Supporting this trend is an increasingly robust institutional framework. Social security funds have established technology investment funds totaling over 160 billion RMB in provinces such as Zhejiang, Jiangsu and Sichuan, focusing on long-term investment in hard-tech companies.

Alongside technology finance, China is also strengthening its ecosystem of technology managers and professional services, which acts as a key facilitator of technology transfer. By the end of 2024, universities and research institutes nationwide had established 2,364 technology transfer institutions, while 36 national training bases had collectively trained more than 110,000 technology transfer professionals.

From bottlenecks to coordinated innovation

Besides financial support and professional services, localized institutional innovations are helping remove the remaining bottlenecks in technology commercialization.

Kang Kaining, general manager of Southwest Jiaotong University Research Institute (Chengdu) Co., Ltd., highlighted the reforms allowing researchers to

establish limited partnerships and co-own service-related invention patents. These policies help bypass rigid salary caps and significantly boost researchers' incentives to commercialize their discoveries. The approach is now being replicated across Sichuan and other western regions.

Institutional innovation is also taking place across entire industrial chains. Yuan Yu, deputy director of the National (Qingdao) Integrated Innovation Demonstration Zone, described a collaborative mechanism in which national ministries and central state-owned enterprises translate production bottlenecks into research challenges that are openly published nationwide. Research institutions and private firms can then compete to address them, creating a coordinated innovation ecosystem.

Viewed through the lens of the 2026 ZGC Forum, the rapid rise of China's technology trading market is not the result of a single factor. Rather, it reflects broader global engagement, institutional reforms, and numerous grassroots innovations working together. As a nationwide network for technology commercialization takes shape, a more dynamic, innovation-driven China is rapidly emerging.

When 'Security Risks' Mask Industry Self-interest

Clear Voice

By LIANG Yilian & HU Dingkun

On March 22, the U.S. House Committee on Homeland Security announced that its Subcommittee on Cybersecurity and Infrastructure Protection had recently held a hearing to assess the security risks posed by Chinese technologies, including artificial intelligence and robotics.

During the hearing, executives from several U.S. tech companies and industry association representatives — described as "industry leaders" — argued that Chinese technologies posed security risks to the U.S. market. Yet a review of the testimony they submitted suggests that many of these so-called risks are little more than recycled accusations and speculative claims with no concrete evidence.

Among the concerns raised were assertions that using Chinese data to train large U.S. AI models could lead to "data poisoning," and that Chinese-made robots might be remotely controlled.

More noteworthy is that these "prominent figures" from the U.S. technology sector were not merely discussing potential risks, they were also offering policy suggestions to U.S. Congress on how to restrict and suppress related Chinese industries.

A closer look suggests that the warnings by these U.S. "industry leaders" may be driven less by genuine security concerns than by corporate or sectoral interests. Their proposals largely focus on reducing the use of Chinese data, technologies, and products in the U.S.



A robot demonstrates moving boxes at the 2026 Beijing International Science Fiction and Future Industry Expo, March 27. (PHOTO: XINHUA)

market, reflecting a deeper unease among certain American companies — and even parts of the broader AI and robotics sector — about competing with their Chinese counterparts.

For example, Michael Robbins, president and CEO at the Association for Uncrewed Vehicle Systems International, urged Congress to pass legislation banning federal procurement of unmanned ground vehicles and robots manufactured in China.

He also called for restrictions on the use of Chinese robots, sensors and related equipment in critical infrastructure, as well as limits on Chinese technologies such as LiDAR within the U.S. robotics industry.

Max Fenkell, an executive at the AI company Scale AI, suggested that Congress should investigate Chinese robotics data as a potential national security

threat. Matthew Marzano, vice president of software at the robotics company Boston Dynamics, proposed that Congress direct security agencies to conduct national security assessments of Chinese robots currently used in U.S. industrial and government settings.

The unease expressed by these U.S. "industry leaders" appears to stem largely from anxiety over China's rapid technological progress and the scale advantages of its manufacturing sector. Scale AI is a major player in the U.S. data-labeling industry.

In his testimony, Fenkell acknowledged that China currently accounts for roughly 90 percent of the global commercial robotics AI data industry and that Chinese production costs are about 60 percent lower than those of U.S. companies — an advantage that cannot be easily eliminated simply

through increased investment.

Data from the international market research firm Omdia further highlights the scale of China's presence in emerging robotics sectors. According to the firm, Chinese companies accounted for about 90 percent of global humanoid robot shipments in 2025.

Marzano also noted in his testimony that at the 2026 Consumer Electronics Show in Las Vegas, the number of Chinese companies exhibiting humanoid robots appeared to be about five times that of U.S. companies.

LiDAR technology provides another striking example. In 2025, Chinese company Hesai Technology shipped more than 1.6 million LiDAR units — 64 times the shipment volume of Ouster, a leading U.S. company in the same field.

Ultimately, competition in the technology sector should be determined by innovation and technological capability. Continuous innovation in an open and fair competitive environment remains the most sustainable path for industry development. Resorting to political maneuvering or protectionist measures to exclude competitors may temporarily shield certain companies, but it risks making markets more closed and weakening the fundamental incentives for technological progress.

As leaders of high-tech companies and industry associations, these U.S. "industry leaders" would do better to focus on strengthening their own technological capabilities and improving the cost-effectiveness of their products. Smearing competitors and lobbying politicians may offer short-term tactical advantages, but such "clever maneuvers" cannot resolve the deeper structural challenges facing the development of U.S. industries.

Fusing China's Smart Economy into Daily Life

Opinion

By Staff Reporters

China's 2026 government work report has for the first time proposed the goal of "creating new forms of smart economy," signaling a shift in the country's approach to artificial intelligence. Rather than focusing solely on technology or products, China now regards AI as a strategic priority that encompasses industrial chains, industrial ecosystems and even the wider economy.

During this year's Two Sessions, smart economy was a hot topic. A key question emerged: how to transform the "green apples" of laboratory research into the "golden apples" of real-world market success.

In fact, across China this trend is already taking shape.

In Chongqing's Nan'an district, 5,000 drones have taken to the night sky on multiple evenings, entertaining crowds with precisely coordinated aerial formations that transform into galloping horses. Meanwhile, in Hangzhou's Wushan Square in Zhejiang province, smart mattresses capable of monitoring heart rate and breathing in real time, along with robots that perform lion dances and write auspicious Chinese

characters, have become festival favorites.

These scenes, filled with a sense of technological possibility, illustrate how smart economy is gradually moving from concept to reality.

Yet challenges remain. Transitioning from eye-catching demonstrations to practical, widely adopted products remains a challenge. For many emerging technologies, the key obstacle lies in the "last mile" of commercialization — turning promising innovations into everyday consumer applications.

"China's ultra-large market is a unique advantage for technological innovation," said Wang Chengbin, a member of the National Committee of the Chinese People's Political Consultative Conference. According to Wang, the crucial task is to transform that market scale into development momentum by gradually opening more real-world application scenarios, where new technologies can be tested, refined and improved.

Wang suggested expanding application scenarios in fields closely tied to daily life and production, including urban governance, transportation, community services, household life and cultural tourism. Local governments could also lead the way in procuring and adopting locally developed innovative products in conjunction with major projects such as urban renewal, new infrastructure devel-

opment and smart city pilot programs.

Such an approach would create a virtuous cycle in which market demand stimulates technological supply, while innovation generates new demand, Wang said.

Industry representatives also emphasized the importance of building demonstration scenarios. Zhou Yunjie, chairman of Haier Group, said that AI is evolving from "perception and cognition" to "embodied intelligence." He suggested that policy support should encourage leading companies to create benchmark application scenarios that can accelerate the adoption of AI technologies.

Meanwhile, Tu Hongyan, chairwoman of Wensli Group, called for a framework combining "standards, subsidies and scenarios" to support the application of AI agents in traditional industries such as textiles. Such measures could help address the current challenge of "isolated breakthroughs but broken industrial links," she said.

Despite rapid technological progress, experts acknowledge that structural obstacles remain.

One major challenge is the persistence of "data islands." These fragmented and incompatible data systems limit the ability of AI to operate across various platforms and scenarios. High computing costs also pose barriers, particu-

larly for small and medium-sized enterprises.

In addition, a gap often exists between advanced technologies and consumer markets. Many cutting-edge innovations developed for enterprise use lack the secondary development needed to transform them into accessible consumer products, leaving potential users uncertain about their value or how to use them.

To bridge these gaps, policymakers and industry leaders have proposed a range of solutions.

Wang suggested establishing a "public service platform for the consumerization of frontier technologies." He envisions this platform helping to identify promising technologies developed for enterprise applications that could be adapted for civilian use and provide professional services, such as industrial design, product engineering and user-experience testing. The goal, he said, is to help hard technologies better align with consumer demand.

Lu Qingguo, chairman of Chengguang Biotech Group, proposed increasing investment in pilot-scale testing facilities and building regional shared platforms that allow industrial demand to participate earlier in the research and development process. This would help prevent technologies from being developed in isolation from market needs.

company Trina Solar, is a model project of typhoon resistance and high efficiency. During construction, new roads were built and old ones repaired, which were donated to the local government. This improved road network has enabled villagers to transport their crops more easily and boost their income.

China-Vietnam sci-tech cooperation will not only deliver tangible benefits to the people on both sides, but also contribute to regional economic integration.

Vietnam is seeking more international cooperation in green energy. China's exports of photovoltaic modules, inverters and energy storage batteries to Vietnam have grown rapidly. The two countries have also jointly built more photovoltaic power stations, not only meeting Vietnam's growing domestic demand for electricity, but also promoting the green and sustainable development of its local economy.

For example, the Trung Son Solar Power Plant in Vietnam, built by Chinese

Voice of the World

China Opens Lab Doors to Shared Global R&D

By QI Liming

China's total R&D investment exceeded 3.92 trillion RMB (about 569 billion USD) in 2025, reaching 2.8 percent of GDP, according to the Ministry of Science and Technology, at a time when the country unveiled plans to accelerate its momentum in innovation through 2030. China has increased its ongoing investment in science and technology, which has not only played a significant role in promoting global sci-tech development, but also contributed to the well-being of mankind.

Public funding of science

U.S. think tank the Stimson Center recently summed up the indicators of Chinese scientific dominance, reaching from patent applications and renewable energy space to university rankings. In November 2025, Alessandra Zimmermann, who analyzes R&D spending for the American Association for the Advancement of Science, suggested that China may have already overtaken the U.S. in R&D spending.

According to a forecast by U.S. academics, China is on the cusp of becoming the world's biggest public funder of research.

The analysis was produced exclusively for Nature Index, by researchers from Frontiers in Science and Innovation Policy (FSIP), a program at the University of California, San Diego, that studies the U.S. R&D system and examines the extent to which public and private funding drives technological development.

According to the FSIP's forecast, China's public spending on research is likely to overtake that of the U.S. in the next two to three years. "I think the earliest likely [date] is 2028, plus or minus one year," said Robert Conn, a specialist in research policy and science philanthropy, who co-leads the FSIP.

As China pulls ahead, it will create a shift in the center of gravity for global research, attracting talent, according to physicist and science-policy researcher

Neal Lane at Rice University in Houston, Texas.

"Young people who wish to pursue careers in science will move from the U.S. and other countries to China, learn the language, [and] figure out how to function there," he said.

Win-win scientific cooperation

China has always adopted an open attitude towards education and research, warmly welcoming experts and scholars from across the world to its shores for exchanges and cooperation. It is also willing to collaborate with other countries to engage in scientific research to benefit all humankind.

According to new analysis by Denis Simon, a senior research fellow in the Quincy Institute's East Asia program, Chinese students filled structural gaps in STEM graduate programs in the U.S., enabling departments to maintain scale and productivity even as domestic interest fluctuated.

These students have been central to U.S. research capacity since the 1980s, sustaining graduate programs, powering laboratories, and making major contributions to patents, startups and federally funded R&D.

According to the Chemical & Engineering News, a weekly news magazine published by the American Chemical Society, as China's research labs are increasingly becoming the benchmark for their international peers, scientists say that continued breakthroughs depend not just on China's own spending and capacity to develop domestic talent, but on international cooperation, its ability to attract both researchers from other countries and Chinese-born researchers working abroad, and further integration with the international scientific community.

Lane said scientists hope that there could be cooperation with China in fundamental research. This might include collaboration in "important areas like health, let's say, perhaps energy and environment, transportation, telecommunications."

'Soil Echometer' Sensing Signals When Crops Are Thirsty

Hi-Tech

By QI Liming & LU Chengkuan

For the first time, a "soil echometer" using distributed optical fiber sensing technology, able to conduct real-time monitoring of farmland water flows every single minute, has been developed by researchers from the Institute of Geology and Geophysics, Chinese Academy of Sciences along with other institutions.

As soil moisture levels are so crucial for agricultural production, directly affecting crop growth and final yield of crops, this breakthrough provides a brand-new perspective for understanding the impact of different farming methods on soil health.

Without causing soil disturbance, the research team laid optical fibers on the surface of farmland soil. By captur-

ing the changes in the propagation speed of seismic waves generated by the background noise of the ground on the soil, they were able to deduce the dynamic structure of soil pores.

This technology can also "diagnose" the changes in the soil caused by different farming methods. In traditional intensive plowing areas, the fiber optic data shows that brief rainfall causes water to accumulate in the surface layer and be difficult to penetrate before evaporating rapidly in sunlight.

Meanwhile, the heavy weight of farm tools has accelerated water loss. In soil that is minimally disturbed by farming or human intervention, water can quickly seep downward and be stored, acting like a sponge to provide a stable water supply for the crop roots.

This research ingeniously applied seismological observation methods to agricultural scientific research, providing a new perspective for understanding the interaction between plants and soil.



The water conditions of untilled soil and soil with excessive deep plowing. (PHOTO: Institute of Geology and Geophysics, Chinese Academy of Sciences)

China-Vietnam Sci-tech Unity Potential

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An example is the Youyiguan Port, or Friendship Pass, one of the largest and most accessible land ports connecting the two countries, the first cross-border smart port project between China and Vietnam. Digital and intelligent upgrading has allowed the port to offer 24/7 customs clearance. Information-based management systems such as the intelli-

gent inspection assistance system and smart logistics control platform provide full-process visual supervision of imported agricultural products and automated operations, including inspection queuing and call-ins. These measures are estimated to have cut cargo waiting time by 20 percent and improved the turnover efficiency of inspection bays by 35 percent.

A Two-decade Bond with China

Dialogue

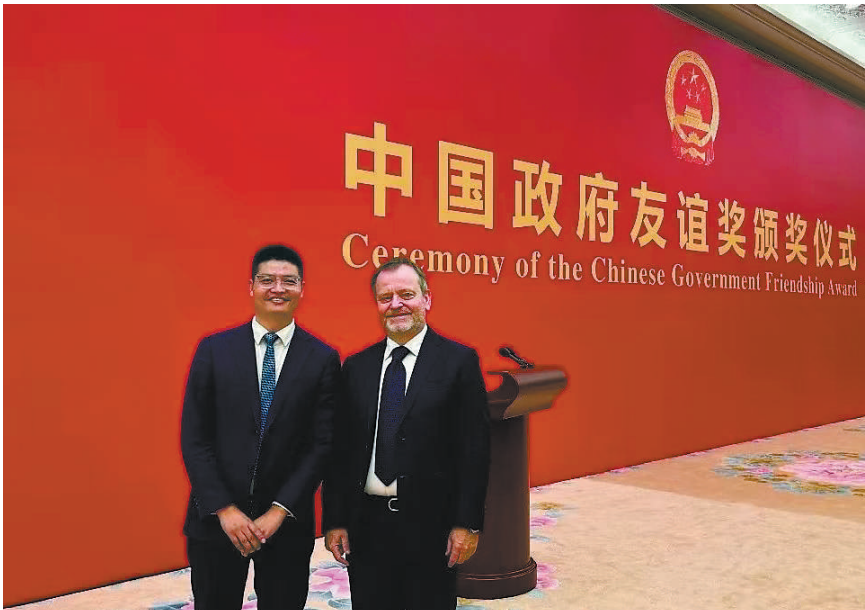
By Staff Reporters

Juergen Haering is a seasoned expert in the field of global automotive precision manufacturing, and established Haering Precision Technology (Taicang) Co., Ltd., in 2004. For over two decades, he has championed close cooperation between China and Germany in intelligent manufacturing, technical standards and vocational education. He has also played an active role in facilitating cultural and business exchanges between Chinese and German enterprises. In recognition of these contributions, he was awarded the prestigious 2025 Chinese Government Friendship Award.

Love at first sight

In spring 2004, Haering set foot in Taicang, Jiangsu province, for the first time — a moment when Taicang's cooperation with Germany was still in its infancy. After observing the yet to be completed industrial park, he walked the full circuit of the project's perimeter, taking in the bustling construction workers, the neatly planned roads and the rows of brand- new, standardized factory buildings. His eyes sparkled with excitement. "What I saw was not just an industrial zone beginning to take shape, but a blue ocean of manufacturing ready for explosive growth," said Haering.

"My vision was not just to build a basic production plant, but to establish a comprehensive R&D and manufacturing base that could grow alongside China's industrial supply chains, integrating a 'German heart' into 'Made in China'." This unwavering conviction stemmed from both an entrepreneur's keen in-



Juergen Haering (right). (COURTESY PHOTO)

sight into the market and a technical expert's profound intuition regarding industrial transformation. Over the following two decades, Haering invested almost one billion RMB in China, gradually transforming his company from a single production unit into an integrated innovation hub encompassing R&D, training and standards formulation.

Stepping into the Haering Taicang facility, visitors can see fully automated flexible production lines working seamlessly with a digital manufacturing execution system. This results in 85 percent of manufacturing processes being automated.

"Intelligent manufacturing is not just the aggregation of machines, but the harmonious integration of people, processes and data," said Haering. Driven by this vision, the company has taken the lead in formulating four national and industry- wide standards, providing

robust support for elevating China's precision machining capabilities to the forefront of the global stage.

A German family's China story

Haering and his family have been immersed in Chinese culture for over two decades. He spearheaded the establishment of the Sino-German Friendship Kindergarten, an institution that blends German early childhood education philosophies with traditional Chinese culture. Implementing a bilingual immersion curriculum has enabled the kindergarten to benefit more than 200 Chinese and German families. His own family is a vivid microcosm of Sino-German cultural exchange: his two daughters have studied Chinese since childhood and speak the language fluently. They set a shining example of people- to- people friendship between China and Germany, embodying the idea that culture is the bond and trust is the bridge.

"They love ancient Chinese poetry and Taicang's sabre- fish wontons," Haering said with a smile. "Cultural integration happens right here, in our everyday lives."

During an interview with major German media outlets in 2025, he drew upon his own first- hand experiences to present an authentic, multifaceted and rapidly developing China that is increasingly open to Europe. His family stands as a living symbol of the harmonious blend between Chinese and German cultures.

Mutual benefit and a shared future

"I often tell my German friends that to truly understand modern China, they can't rely solely on media reports. They must come here in person, walk around, observe and engage in conversation," said Haering. Through his efforts to build connections, numerous renowned German enterprises have successfully established a presence in Taicang.

At the same time, he has actively encouraged private Chinese enterprises to adopt advanced German technologies, thereby empowering more local firms to leverage German expertise, enhance their competitiveness, and expand into international markets. He believes that cooperation is a process of mutual empowerment between China and Germany — German companies contribute advanced technology and management expertise, while China offers a dynamic market environment and a wealth of innovative opportunities.

Haering has fully embraced his role as a bridge- builder and facilitator, deepening bilateral cooperation between China and Germany and helping realize the noble vision of mutual benefit, win- win outcomes and a shared future.

Tech+Culture

Resurrecting Relics with Cutting-edge Tech

By Staff Reporters

Often called an "artifact hospital," the Inner Mongolia Museum feels like a place where time seems to slow down. In the organic artifact restoration laboratory, conservator Shi Liqin is restoring a thousand- year- old embroidered leather bag from the Liao Dynasty (916- 1125). Made of leather, textiles and bronze, the bag poses a significant challenge due to the different "temperaments" of its components.

The restoration began with removing the bronze buckle. As bronze and organic materials have vastly different moisture tolerances, any forceful separation could cause irreversible damage. Conservators devised a bespoke "rehydration" regimen to slowly reawaken the leather fibers under strictly controlled temperature and humidity to safely detach the buckle — a painstaking process that marked only the first step.

Shi then used a low- pressure vacuum cleaner to gently remove surface dust, which applies localized negative pressure to targeted areas. Smoothing every crease and supporting fragile sections demanded the utmost patience. As she explained, restoration follows no fixed timetable, as continuous monitoring and expert judgment determine each next step.

In this process, technology provides

a foundation for precise diagnosis. Hua Lubin, head of the laboratory, explained that the team used X- ray diffractometers to analyze bronze patina and identify harmful corrosion. Fourier- transform infrared spectroscopy and gas chromatography- mass spectrometry help identify fiber types and dye components in textiles. In addition, some specialized analyses require external research institutions, as the team strives to decipher the historical narratives embedded within these artifacts.

In the inorganic laboratory, conservator Ji Yuanyuan works on a gilded silver saddle ornament from the Tang Dynasty. Facing extensive hard surface deposits, the team first used a handheld X- ray fluorescence spectrometer to analyze their composition. With surgeon- like precision, they spent nearly two months cleaning the saddle using scalpels, bamboo splinters and cotton swabs, restoring it to its original splendor.

All restorations adhere to strict protocols: minimal intervention, discernibility and reversibility. Each artifact undergoes a comprehensive process — from storage retrieval and data acquisition to pathology identification, analytical testing, custom treatment planning, repair execution and environmental intervention, which ensures the treasures are kept alive for future generations.



Conservator Ji Yuanyuan works on a historical relic. (PHOTO: Inner Mongolia Museum)

Six Major Ancient Finds Unearthed in Shanxi

By Staff Reporters

On March 15, six archaeological sites in north China's Shanxi province were named as major discoveries of the province in 2025.

These include the Xiyin Neolithic Site in Xia county, where painted pigment tools were found, offering insights into ancient pottery- making techniques.

The Guduo Site in Hejin city unearthed six ceramic and stone- carved silkworm pupae, which are important for studying the early practice of sericulture as recorded in historical texts.

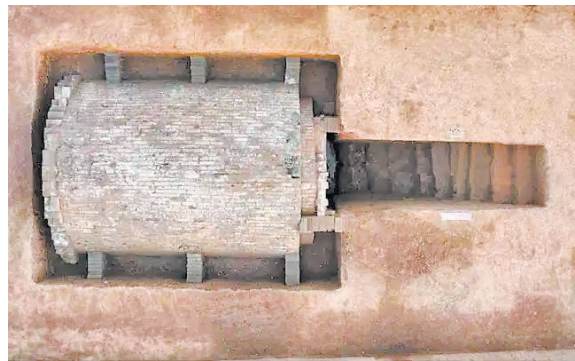
At the Potou Site in Ruicheng county, one of the largest Neolithic settlements in southwestern Shanxi has been found, featuring tombs with upright stones dating to around 2000 BC. These are the earliest known examples of tomb markers in China, which set the tone for

the later development of tombstones.

Remains from the Shang Dynasty at the Dongwu Site in Jiang county have filled a crucial gap in the archaeological record of southern Shanxi, which is key for studying the cultural exchanges between the Shang Dynasty of the Central Plains and the Loess Plateau.

Excavations at the Nanfeng site in Xiangyuan county disclosed Late Shang Dynasty artifacts that blend YinXu culture with central Shanxi traditions and local elements. The strong YinXu influence suggests that the Changzhi region formed part of that cultural region.

Finally, the Qinjiazhuang Family Tomb in Luzhou district, Changzhi city, consists of seven well- preserved Ming Dynasty brick- chambered tombs. As the first relatively intact Ming imperial clan cemetery to be found in Shanxi, it provides invaluable material for the study of Ming royal burial systems.



The Qinjiazhuang Family Tomb in Luzhou district, Changzhi city. (PHOTO: Shanxi Provincial Archaeological Museum)

Mystery of Qingming's Shifting Dates

Science Outreach

By BI Weizi & CHEN Xi

As the temperature begins to rise, the fifth of the 24 solar terms — Qingming — is about to begin.

Many people have noticed that the date on the Gregorian calendar of the Qingming Festival, a time when Chinese honor their ancestors, is not fixed. In 2025, Qingming fell on April 4, while in 2026 it falls on April 5. So, why does the date of Qingming vary from year to year, when the precise moment of its onset is calculated down to the minute? *Science and Technology Daily* spoke to Yan Weiguo, president of the Tianjin Astronomical Society, to find out the reason.

"The timing of the Qingming solar term is based on rigorous astronomical logic and a scientific system of calculation," Yan explained. He noted that the 24 solar terms used today are not tied to fixed calendar dates, but constitute a scientific scale based on the Sun's trajectory across the celestial sphere, known as the ecliptic.

In ancient times, people divided the Sun's annual path (spanning 360 degrees) into 24 equal segments, designating a specific solar term for every 15 degrees of movement. The moment the Sun reaches a particular position marks the precise onset of that solar term. The criterion for determining Qingming is the exact instant the Sun reaches an ecliptic longitude of 15 degrees. This set of rules, known as the *Dingqi Fa*, has been in continuous use since the Shixian Calendar of the Qing Dynasty (1645), ensuring a precise correspondence between the solar terms

and the Sun's actual position.

So, why does the date of Qingming on the Gregorian calendar fluctuate between April 4, 5 and 6? Yan explained that this phenomenon primarily stems from the discrepancy in length between the tropical year — the time it takes for the Earth to complete one full orbit around the Sun — and the standard Gregorian calendar year.

A tropical year actually lasts around 365 days, five hours and 49 minutes, whereas a standard Gregorian year has only 365 days. This results in an annual residual difference of almost six hours; over four years, these accumulated hours amount to around one full day. This is precisely why the Gregorian calendar incorporates leap years, adding an extra day (February 29) to compensate for this discrepancy.

However, because the Earth's orbit is elliptical rather than perfectly circular, its orbital speed varies (it moves

faster at perihelion and slower at aphelion). This causes the precise timing of the solar terms to fluctuate in a complex manner — variations that the leap- year- system cannot fully offset.

Consequently, the Qingming solar term begins approximately five to six hours later each year; however, in a leap year (such as 2028), it falls a day earlier. This causes the date of Qingming to fluctuate between April 4 and 6. For example, in 2025, Qingming fell on April 4 at 20:49, whereas in 2027, it falls on April 5 at 08:17.

"Fundamentally, the precise moment Qingming begins is an astronomical event, not a fixed date in the folkloric sense, and its fluctuation is a normal astronomical phenomenon," Yan said. Regardless of whether the Qingming solar term falls on April 4, 5 or 6, the traditional customs of honoring ancestors and communing with nature remain unchanged.

3MW Gas Turbine Powers New Era of Energy Security

From page 1

But when they tested the new, higher- speed CGT3, the vibrations at critical speeds were off the charts. The previously mature experience had actually failed, Sun Yong, a senior engineer at the No.703 Institute, said.

Faced with this unexpected beast, the team launched a two- pronged strategy. They redesigned the rotor's structure to change how it vibrated, physically disrupting the transmission of the jerks. Then they discarded traditional low- speed balancing for a more precise high- speed dynamic balance test, painstakingly fine- tuning the rotor to eliminate even the tiniest weight imbalances.

The engineers worked in shifts,

monitoring data, and celebrating each microscopic improvement. After countless adjustments, the vibration was finally confined to safe limits. The ordeal didn't just fix the CGT3; it gave China's entire small- turbine industry a precious lesson in advanced vibration control.

Battling the deep freeze

The ultimate test came in November 2025, in the brutal winter of Harbin, where temperatures plunged to - 20℃ to -30℃. The team knew the cold would be a formidable final opponent, and it didn't disappoint.

Everything went wrong at first. The water lines froze solid, cutting off supply. Lubricating oil turned to sludge. The natural gas was too cold to ignite. The

test ground to a halt.

"The stakes couldn't be higher," researcher Liu Bingbing recalled. "This was the ultimate test of three years of effort."

The team acted promptly. They insulated the water lines and installed electric heating tape to thaw the icy water. They reworked the heating systems and pipelines to get the oil flowing again. For the stubborn natural gas, they built a makeshift pre- heater on the spot, carefully raising its temperature degree by degree.

For days and nights, the test site was a hive of intense activity. Whenever a parameter went wrong, the team would analyze and adjust their strategy.