

A French Engineer's Railway Dream: From Nanjing to Europe

Dialogue

By LONG Yun & ZHANG Jianing

While speaking with *Science and Technology Daily*, Adrien Peulvast, a French railway signaling engineer, reached into his pocket, pulled out his business card, and slid it across the table. It read: SilkRail, the name of his company.

Peulvast has spent over two decades in railway signaling research. He holds multiple international safety certifications and was once the youngest member of the Institution of Railway Signal Engineers. But rather than rest on his credentials, he has taken a new path. Today, his four-year-old startup in Nanjing in east China builds AI-powered tools that test train control systems.

From robots to railways
Peulvast's interest in his research field started early. "When I was young, I wanted to work in robotics and automation," he said. After university, he joined a railway company almost by chance. "It suited me well. I enjoyed the heavy industry, the complex systems that last for decades, the computers, and the rigorous processes."

One of his early projects, the UK's High Speed 1, the country's first high-speed railway, has now been running for two decades. "It has carried billions of passengers without any problems," he said. "I am proud to have contributed to a system that remains in daily use two decades later."

He also worked on China's Shijiazhuang-Taiyuan high-speed line, which opened in northern China in 2009. "Seeing a system operate reliably for decades gives you a sense of fulfillment."

At the start of his career, the CENELEC safety standards — European electrotechnical standards — were just emerging. He subsequently gained experience in Sweden, Spain, and China, and witnessed how common standards enable cross-border cooperation. "When you speak with Chinese engineering teams, everyone uses the same technical language. That is remarkably powerful."



Adrien Peulvast. (COURTESY PHOTO)

A sleepless night that changed everything

That technical language became the foundation of his own company. The idea for SilkRail's an important product, an AI-powered testing tool that shortens a typical test cycle from 30 days to just seven, came from a project with China Railway Signal & Communication (CRSC).

"We had an idea: to automate the testing process," Peulvast said. "During the day, they explained their requirements. Through the night, we developed the solution."

His wife Zhang Yu, who handles commercial and translation work for SilkRail, filled in the details. "We did not sleep at all that night," she said. "I translated the Chinese technical data, the requirements. He wrote the code. Within a week, we had a working prototype."

The client was impressed and that initial success led to a formal partnership. SilkRail signed a contract and built the full software incrementally, using an agile approach. "Now the client uses it on many railway lines," Peulvast said. "You simply launch the tool, and it runs the tests automatically."

The company name, SilkRail, reflects a broad ambition. "My dream is that one day we will see trains bearing

the SilkRail logo running from China to Europe," he said. "A bridge between two continents."

China's high-speed miracle and the road ahead

That dream is rooted in Peulvast's deep respect for what China has already achieved. Asked about the country's greatest high-speed rail accomplishment, he pointed to the scale and speed of deployment. "More than seventy percent of cities are connected. Trains run at 350 kilometers per hour — the fastest in the world. To have built such a vast network in such a short period of time is remarkable. Taking the train in China is convenient, comfortable, and punctual."

He also noted a key difference between China and Europe. "In Europe, trains cross multiple national borders, so we need a system that functions everywhere. China is a single country, so the technical specifications can be unified. That is very powerful. Every time you build a new line, you know exactly what needs to be done, and every team speaks the same technical language." Looking ahead, the biggest challenge is no longer construction but maintenance.

On the future of railway signaling, Peulvast sees two critical areas. One is the data format. "Our company is the first Chinese member of the

RailML consortium. If everyone uses the same data format, we can share data and make train systems more predictable and efficient."

The other is AI reliability. "When you ask AI for an answer, it is not always accurate. The challenge is to ensure that AI-generated answers are reliable enough to analyze systems and solve problems effectively. The models are getting better, and we are learning to use them."

A home in Nanjing

For Peulvast, China is not just a place to do business. It is home. Moving to Nanjing in late 2020 during the pandemic was not an easy decision. "It was a difficult time everywhere," he recalled. "We had to choose: return to France, go somewhere else, or stay in China."

They stayed. "I never had any doubt about settling in China," he said. He had already traveled to China many times before, starting in 2007. "I knew what it was like. The support we received from the local government in Nanjing made the decision easier."

Peulvast and Zhang Yu highlighted both the practical and lifestyle benefits of living in Nanjing. Nanjing is one of China's largest rail hubs, offering convenient transportation. It also has a green environment, which they appreciate.

Their two children attend local Chinese schools. "Our daughter writes Chinese characters very well," Zhang Yu said. "She wants to become a cultural ambassador between China and France. That is her dream."

Having witnessed China's rapid technological transformation and having participated in it through his own work, Science and Technology Daily asked Peulvast to sum up the country's tech development. He offered four words: "Fast. Giant. Flexible. Smart."

After a brief pause, he added a fifth: "Cooperation. China is remarkably open and excels at working with others."

For now, Peulvast continues to write test scripts and run through the forests of Nanjing, hoping that one day a train bearing his company's name will cross the Eurasian continent.

ZHANG Heyan from *International Talent Magazine* also contributed to this article.

Overseas Echoes

Chinese Embassy in U.S. Hosts Open House with Sci-tech Exhibition

By SUN Xueping & ZHONG Ping

The Chinese Embassy in the U.S. hosted an open house on May 2, featuring a science and technology exhibition titled "Innovate Together: Science & Technology for a Shared Tomorrow."

The exhibition was built on a popular format from previous years, using panels, models, videos, and hands-on experiences to present the outcomes of U.S.-China sci-tech cooperation and China's own innovation drive. It underscored China's commitment to open, win-win collaboration in science and technology and its contribution to the global innovation system.

The "China-U.S. Sci-Tech Cooperation and China's Sci-Tech Innovation" section detailed their practical collaboration in agriculture, public health, clean energy, and high-energy physics. Highlights included hybrid rice cooperation to bolster food security, a folic acid intervention program that reduced birth defect rates, and the work of the China-U.S. Clean Energy Research Center in advancing green and low-carbon development.

Additionally, panels introducing the International Science and Technology Cooperation Initiative and the Initiative on International Cooperation in Open Science illustrated China's advocacy for an open, fair, equitable, and non-discriminatory approach to global scientific cooperation. They also demonstrated China's readiness to join other nations in tackling shared development challenges.

The model display area featured replicas of major Chinese scientific achievements: the Five-hundred-meter Aperture Spherical radio Telescope (FAST), the Jiangmen Underground Neutrino Observatory (JUNO), the High-Intensity Heavy-Ion Accelerator Facility, the Fendouzhe deep-sea

manned submersible, and the Tiangong space station.

Many visitors lingered in the area, having in-depth conversations with the embassy's science and technology staff. English-language videos on China's open sci-tech cooperation, its women scientists, and major facilities such as FAST and JUNO were also played on a loop, giving American audiences an insight into the latest progress in China's science and technology development and its open cooperation practices.

For the first time, the exhibition introduced a regional innovation section, with northwestern Shaanxi Province as the guest of honor. The Shaanxi exhibition highlighted the province's achievements and international cooperation in aerospace, advanced manufacturing, and AI through panels, models, and interactive experiences.

A BYD model car demonstrated the growth of the new-energy vehicle industry, and an AI-powered chess robot drew many participants. The arrangement enriched the exhibition and offered the American public a window into the scientific and technological development at China's local level.

The embassy's science and technology staff talked with visitors on topics such as sci-tech cooperation, innovation policies, and future developments. Many attendees said they walked away with a fuller, more nuanced understanding of China's innovation system and its vision for open collaboration.

Dai Gang, the embassy's minister counselor for science and technology, said the exhibition vividly demonstrated the openness and inclusiveness of China's sci-tech innovation. It helped Americans better understand China's technological progress and played a positive role in promoting bilateral sci-tech exchanges and cooperation.



Visitors have in-depth conversations with the embassy's science and technology staff. (COURTESY PHOTO)

Why Xuelong 2 Explores the Antarctic Deep Freeze in Southern Hemisphere's Winter

Science Outreach

By BI Wenting & BI Weizi

On March 27 — the second day of comprehensive station operations during the 2026 Autumn Joint Voyage to Prydz Bay, part of China's 42nd Antarctic Expedition — force 12 gale winds, whipping up blowing snow, raged across the Davis Sea Polynya.

As the side hatch of China's newest icebreaking vessel Xuelong 2's Moon Pool workshop slowly opened, expedition members successively deployed a vertical net, a particulate matter profiling system, and a Conductivity-Temperature-Depth profiler to probe the mysteries of the Southern Ocean (Antarctic Ocean) in autumn.

Why conduct research during autumn and winter?

Given such severe climatic conditions during autumn and winter, why does the Xuelong 2 venture deep into the Southern Ocean to reach Antarctica's Prydz Bay? Chen Jianfang, a researcher serving as the deputy leader of China's 42nd Antarctic Expedition and chief scientist of this Joint Voyage, explained that China has conduct-

ed oceanic surveys in Prydz Bay for over 30 years. However, in the past — constrained by sea conditions, weather, and technological limitations — these surveys could only be carried out during the summer months; consequently, international scientific understanding of this region during the autumn and winter seasons remains extremely limited.

The successful completion of the first Joint Voyage to the Ross Sea — undertaken during China's 41st Antarctic Expedition in November 2024 — provided invaluable experience for the current Joint Voyage to Prydz Bay. During the autumn and winter seasons, the biosphere of the Antarctic marginal seas remains active. Mesoplankton, krill, and Antarctic silverfish larvae constitute the primary biological components of this ecosystem; influenced by deep convection and their own migratory behavior, these organisms migrate from the shallow layers down into the deep ocean.

Prydz Bay is a quintessential example of an Antarctic marginal sea, where the Antarctic Bottom Water is formed. As one of the densest and coldest water masses globally, Antarctic Bottom Water covers 40 percent of the world's deep-sea regions and plays a pivotal role in global thermohaline circulation and climate regulation. Furthermore,

key species within the Antarctic ecosystem — such as krill, fish, seals, and seabirds — breed, live, and overwinter in this environment.

Chen noted that conducting research in Prydz Bay during the autumn and winter seasons serves multiple purposes: it not only helps fill gaps in seasonal survey data for the region but also facilitates a deeper understanding of the formation mechanisms of Antarctic Bottom Water, allows for the assessment of carbon sink intensity, and enables the investigation of the overwintering processes of key biological species.

Anchoring at the "birthplace" of Antarctic Sea ice

To achieve the above scientific objectives, the selection of a representative study area is of paramount importance. Within the vast expanse of Prydz Bay, numerous "ice factories" — known as polynyas — are scattered across the water. Among these, the Davis Polynya and the Mackenzie Polynya open water have been designated as the primary focus for the current expedition.

Wang Shuoren, assistant leader of China's 42nd Antarctic Expedition, explained that a polynya refers to a relatively open area of water that appears amidst dense sea ice during the autumn and winter months. During this period, atmospheric temperatures drop

significantly below the temperature of the seawater; this drastic temperature differential causes the ocean to release heat into the atmosphere, thereby triggering the formation of new ice.

However, katabatic winds — descending from the high elevations of the ice sheet like a colossal hairdryer — sweep the newly formed ice away from the sea surface, leaving exposed water that continues to freeze. Alternatively, driven by upwelling currents, warmer deep-sea water may rise to the surface, inhibiting ice formation or even melting existing sea ice.

Through this continuous cycle, polynyas emerge as the regions within Antarctica with the highest volume and efficiency of ice production, serving simultaneously as natural laboratories for the study of sea ice formation. Traditional Antarctic expeditions have historically focused on the summer season; however, with regard to Antarctic sea ice production and the formation of bottom water, summer is precisely the most "quiescent" period. Autumn, conversely, constitutes the critical window during which the Southern Ocean transitions from open water to a frozen state — and so represents the optimal opportunity to unlock the core mysteries surrounding the "polynya-deep convection-bottom water" nexus.

Advancing Basic Research to Solidify Foundation for China's Strength in Science, Technology

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Xi noted that it is essential to integrate the development of education, science and technology, and talent, make comprehensive efforts in cultivating, introducing, and utilizing talent, and expand the talent pool for basic research.

He advocated carrying forward the spirit of scientists, promoting science popularization, and stimulating the imagination and curiosity of young people, so that pursuing basic research becomes their lifelong aspiration.

Xi stressed the need to strengthen support for basic research, and called for gradually increasing the share of funds for basic research and establishing a mechanism of diversified inputs.

He also called for a systematic approach to developing major sci-tech infrastructure, the advancement of intelligent research platform systems, and the improvement of a categorized evaluation system tailored to the characteristics of basic research.

Efforts should be made to enhance the working and living conditions of those engaged in basic research, foster an open, inclusive and failure-tolerant

innovation environment, and strengthen research integrity, Xi said.

He called for actively integrating into the global innovation network, deepening international exchanges and cooperation in basic research, jointly tackling major scientific issues such as climate change, energy and environment, as well as life and health, and actively participating in global sci-tech governance.

Cai Qi, a member of the Standing Committee of the Political Bureau of the CPC Central Committee and director of the General Office of the CPC Central Committee, attended the symposium.

Ding Xuexiang, a member of the Standing Committee of the Political Bureau of the CPC Central Committee and Chinese vice premier, presided over the symposium.

Ding called for greater confidence and resolve, as well as more practical measures and actions, to comprehensively strengthen basic research, enhance original innovation capabilities, and strive for a high level of self-reliance and strength in science and technology.

Source: XINHUA