

A Macro Vision of Microelectronics

Dialogue

By LONG Yun & XU Keqi

Sino-French cooperation in science and technology dates back to 1978, marking a significant milestone in bilateral relations. Over the years, this collaboration has flourished, particularly in fields such as people-to-people exchanges, basic scientific research, and high-tech cooperation.

One individual who has played a pivotal role in the collaboration is French scientist Olivier Bonnaud. Currently, he serves as an Emeritus Professor at the University of Rennes and a Permanent Guest Professor at South-East University (SEU) in Nanjing, east China's Jiangsu province.

Taking the first step
Last week, Bonnaud, who has just celebrated his 75th birthday, spoke to *Science and Technology Daily (S&T Daily)*, reflecting on a remarkable journey dedicated to the field of microelectronics, that spans five decades.

Fueled by a passion for innovation and driven by a desire to contribute to the advancement of technology, Bonnaud has always striven to embrace the challenges and opportunities presented by the exciting field of microelectronics.

In the 1970s, microelectronics education was in its infancy in France, and there was a need to develop the field within universities and engineering schools.

Bonnaud began teaching in this field in 1975, becoming one of the youngest full professors at the time.

"I firmly believed then, as I do now, in the importance of microelectronics," said Bonnaud. His faith in the field's significance propelled him to establish microelectronics laboratories and collaborative centers across France.

Bonnaud sees his role from two



Professor Olivier Bonnaud (middle) and his Chinese colleagues. (PHOTO: LONG Yun / S&T Daily)

aspects: as a scientist and an educator. As the director of many research laboratories, Bonnaud has initiated collaborations with industry partners. These interdisciplinary endeavors, involving experts from diverse fields like biology and chemistry, were crucial in addressing complex challenges and driving innovation.

Preparing for the future
As an educator, Bonnaud emphasizes the importance of bridging the gap between theoretical knowledge and practical application. "I didn't own a company. Instead, I prepared individuals for the industry," he said.

His eyes sparkle with pride whenever he speaks about his students. "As a professor, part of my role has been to motivate and convince students for more than five decades," he said.

He has trained thousands of engineers and researchers, equipping them with the knowledge and skills needed

in the rapidly evolving field of microelectronics.

"Collaboration between academia, industry, and other fields is crucial for driving innovation and addressing pressing social issues," he said.

However, development of the microelectronic industry is not without its challenges. Unfortunately, there's an imbalance between job demand and available talent, with many positions remaining unfilled. This underscores the importance of attracting young people to careers in science and engineering, which is something Bonnaud is passionate about.

Despite facing challenges along the way, Bonnaud remained steadfast in his commitment to advancing the frontiers of microelectronics. "No, never," he said with confidence when asked if he ever felt bored with his work.

In search of cooperation
Bonnaud's teaching career is by no

means confined to France. He has been bridging the gap between France and China by promoting exchanges between the SEU and the University of Rennes since 2005.

"Professor Bonnaud's exceptional expertise has been instrumental in the success of our bilateral cooperation," said Lei Wei, a professor from School of Electronic Science and Engineering of SEU and also his long-time friend in China, who applauds Bonnaud's unwavering dedication to teaching and research.

Recalling his connection with SEU, Bonnaud recounts a journey marked by shared aspirations and a commitment to excellence.

"Our collaboration began with a focus on microelectronics," he said, highlighting the importance of interdisciplinary partnerships in driving innovation forward.

Over the years, Bonnaud's involvement in university governance and academic exchanges has deepened the ties between SEU and the University of Rennes, paving the way for groundbreaking initiatives such as joint international master's programs and doctoral schools.

For Bonnaud, the success lies not in many awards he has received, but in the tangible impact of collaborative endeavors on society at large. However, "Recognition from students, organizations and governments is significant," he acknowledged, citing the Friendship Awards bestowed upon him by provincial and national governments in China as a symbol of appreciation for his contributions.

Looking to the future, Bonnaud remains optimistic about the prospects of Sino-French sci-tech cooperation, emphasizing the importance of global collaboration in addressing pressing challenges.

XU Keqi is a professor at SEU.

Green China

Preserving Biodiversity, a Moral Code

By BI Weizi & CHEN Chunyou

"Be part of the Plan" is the theme for this year's International Day for Biological Diversity.

Science and Technology Daily (S&T Daily) reporters visited the Xishuangbanna Tropical Botanical Garden (XTBG) of the Chinese Academy of Sciences in Yunnan province in southwestern China, where they witnessed the joint efforts of scientists from China and abroad to preserve biodiversity.

"Everyone is responsible for biodiversity, it's a moral code that we have to live by," said Dr. Kyle Warwick Tomlinson, a researcher at XTBG. Raising people's awareness through educational events and encouraging them to visit nature reserves to see what diversity can be like in environments with less human impact are important ways to help them be part of the ecological course and contribute to sustainable development, Tomlinson added.

China has established a system to keep the ecosystem intact and protect biodiversity. National parks are the mainstay of this system, supported by nature reserves and complemented by nature parks such as the Sanjiangyuan National Park in northwestern China which is the cradle of three mighty Asian rivers, the Giant Panda National Park in western China, and the Hainan Tropical Rainforest National Park at the southern tip.

"These are really large areas that are important for biodiversity conservation because they maintain whole ecosystem processes," Tomlinson said.

As a Chinese proverb says, "All beings thrive when they live in harmony and are nourished by nature." Biodiversity is the foundation of human survival and development. According to Tomlinson, it is not only about the diversity of species, but also their functional diversity. "Animals eat grass and bees eat flowers. These are functions that they fulfill and they affect how the whole ecosystem works together," he explained.

"China has taken leadership in this role and made impressive gains in the last 10 years," he added. It has always been a firm supporter of the United Nations Convention on Biological Diversity (CBD), supporting the conservation land area objectives of the CBD in consecutive meetings and working on preventing pollution in the country massively, improving the quality of the rivers and air quality substantially.

A healthy eco-environment is the foundation of a better life and the common aspiration of the people. "Respect and protection of nature have contributed greatly to the survival and prosperity of the Chinese nation for thousands of years," Tomlinson said. It is his hope that the concept of "harmony between man and nature" will always be a distinctive feature of the Chinese civilization.



Dr. Kyle Warwick Tomlinson gives an interview to S&T Daily. (PHOTO: S&T Daily)

Traditional Eastern Wisdom

New Archaeological Finds Show Prehistoric Cultural Ties

By ZONG Shihan

The Keqitou Site group, an archaeological cluster going back to the Neolithic Age 6,500-7,300 years ago, was one of China's top 10 archaeological discoveries in 2023. Located on Pingtan Island in southeast China's Fujian province, the cluster includes the Keqitou, Xiying, Donghuaqiu and Guishan sites.

The pottery unearthed at the sites includes a large number of round-bottomed vessels, such as round-bottomed cauldrons, bowls and jars, and various ceramic bases for the vessels. The vessels and bases together created pots with legs like tripods. However, their advantage was that while tripods cannot be disassembled, they could be, making them more portable. This re-

flected the survival wisdom of the ancient Chinese.

The pottery has a wide range of patterns, from simple rope and string patterns to intricate shell and dot patterns. Mainly gray, black, grayish yellow, red and brown in color with signs of uneven firing, the pottery shows the aesthetic concepts of ancient Chinese.

It also has many similarities with other potteries unearthed at other sites, such as the Fuguodun and Dapenkeng sites in Taiwan, with comparable wave and shell patterns. This suggests that the ancient people on both sides of the Taiwan Strait had a deep love and reverence for the sea.

The cultural development sequence of the Keqitou Site group is very clear, encompassing both the local culture represented by the round-bottomed pottery

and the Huangguashan and Huangtulun cultures in the Minjiang River of Fujian province. They provide important clues

for understanding the prehistoric culture of the southeast coastal areas of China.



Potteries unearthed from the Guishan site of the Keqitou Site group. (PHOTO: XINHUA)

'Origin Wukong' Ushers in China's Quantum Computing Era

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Wukong is the name of the fictional character Monkey King from the 16th century classic *Journey to the West*, who was endowed with magic powers. The name symbolizes the machine's formidable capabilities.

The quantum computer must work in an ambient temperature close to absolute zero (~273.15°C), which requires the connected cables to not only transmit signals without distortion but also iso-

late heat.

The team developed high-density microwave interconnect modules suitable for ultra-low-temperature environments, crucial for China's superconducting quantum computer industrialization.

Future prospects
On April 10, Origin Wukong integrated China's first post-quantum cryptography "anti-quantum attack shield," enhancing both its computing power

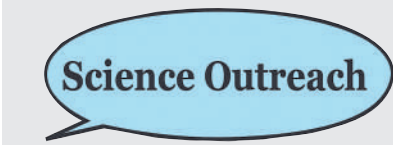
and security.

The Origin Wukong manufacturer's comprehensive research and development, from theory to manufacturing, have positioned it as the sole Chinese company currently capable of delivering complete superconducting quantum computers. Collaboration with various industries is enriching China's quantum computing landscape, paving the way for future applications.

The Chinese government, as outlined in this year's Government Work Report, emphasizes nurturing emerging industries like quantum technology, laying the foundation for future industrial leadership.

Guo Guoping reiterated the company's commitment to advancing quantum computing principles, technology translation, and application development, aiming for scalable programmable quantum computing.

Don't Let Small Flying Insects Bug You



By Staff Reporters

As the weather gets hotter, light-colored clothes, especially yellow or green clothes, tend to attract small flying insects, causing a great deal of annoyance. Why does this happen, and how to prevent it?

It's due to insects' taxis, says Shi Juan, a professor at Beijing Forestry University. Taxis is the movement of an organism in response to a stimulus, such as thermotaxis, which is triggered by temperature, phototaxis caused by light, and chemotaxis induced by chemical substances.

Different types of insects also have specific color preferences. For instance, aphids, leaf miners, and whiteflies have a strong attraction to yellow, while thrips are more drawn towards blue.

The essence of insects' preference for color is phototaxis. Insects can sharply perceive colors, which are the light waves reflected from

the surface of objects. "Insects' color preferences play a crucial role in their foraging, mating, habitat selection, and avoiding predators. It is a biological behavior formed by insects during long-term evolution," Shi explained.

Studies suggest that color saturation levels significantly influence insect attraction. In general, most insects have a strong preference for yellow. In addition to the aforementioned flying insects, yellow clothes may also attract other insects such as mosquitoes and bees. Blue and green clothes also attract insects. As a result, if you want to prevent or reduce the infestation of insects hovering over you during spring and summer, avoid wearing these colors.

Wear goggles to prevent insects from entering the eyes. If a small flying insect accidentally lands in an eye, do not rub it. Instead, rinse your eye with water or eye drops.

In addition, wearing clothes with long sleeves and long trousers, using insect repellents or insecticide sprays and avoiding the use of perfumed products can reduce insect infestation and make your outdoor activities more enjoyable.