

# Science Knows No Borders

Voice of the World

By QI Liming

The escalating tension between the U.S.-led Western alliance and Russia over the Ukraine conflict has threatened their cooperation in space programs.

However, no matter how the sanctions and counter-sanctions between the U.S. and Russia evolve, it is still necessary for the sci-tech communities from various countries to abandon their differences and work together to solve common problems facing humanity, such as climate change and space exploration.

**International cooperation in space remains active**

Shortly after its military action in Ukraine, Russia was sanctioned by U.S. and Western countries in all fields of high technologies. In retaliation, Russia has decided to stop supplying the U.S. with rocket engines. Some analysts are now concerned that space cooperation between the U.S. and Russia will face a complete suspension.

Yet, according to British newspaper *The Observer*, "Despite the challenges here on Earth — and they are substantial — NASA is committed to the seven astronauts and cosmonauts onboard the International Space Station (ISS)," NASA Administrator Bill Nelson said during a meeting with the NASA Advisory Council on March 1.

NASA had said it intended to continue cooperating with Russia on the ISS, which is currently occupied by four American astronauts, a German astronaut, and two Russian cosmonauts. The U.S. and Russia had been negotiating a deal to regularly transport Russian cosmonauts to the space station using SpaceX's Crew Dragon launch system. The same spacecraft has been used to fly American astronauts to the ISS every six months since 2020.

According to spacepolicyonline.com, the ISS crew is continuing its plans for the space program as arranged. In addition, Russian Space Agency, Roscos-



Last minute preparations for the launch of Antares rocket on Feb. 18, 2022 to deliver supplies to the International Space Station. (PHOTO: VCG)

mos, has assured that NASA's Mark Vande Hei, together with two Russian cosmonauts, is set to return to Earth on a Russian spacecraft on March 30, as scheduled.

**Academic perspective: a glimmer of hope in space cooperation**

On February 19, 2022, an Antares rocket took off with the Cygnus cargo capsule to resupply the orbiting ISS currently crewed by American, Russian and German astronauts.

The rocket is partly Ukrainian-built and partly American-built, and powered by engines made in Russia. The Cygnus cargo capsule is manufactured with components from all over Europe.

As Kuan-Wei (David) Chen, the Executive Director of the McGill Centre for Research in Air and Space Law, and professor Ram S. Jakhu, acting Director of Institute of Air and Space Law, McGill University said on the media platform Earthsky, "Like many space missions, this one shows that countries can come together and co-operate to accomplish great advancements in the exploration and use of outer space."

"Despite the ongoing military action against Ukraine, there is still a glimmer of hope that cooperation will persist in space," the two academics said. Regardless of the strained relations and sanctions, Roscosmos continues to work with its counterparts in the operation of ISS.

For more than 65 years of space exploration, Russian cosmonauts have flown on American spacecraft, while astronauts from the U.S. and other countries have relied on Russian spacecraft to access space. There is no indication that this mutually beneficial relationship will cease.

Indeed, space cooperation has been an enduring hallmark of how countries can come together despite political differences and disagreements.

Considering the growing need to promote multilateralism and international cooperation, it is hoped that tensions will subside and international peace can be brokered, on Earth as well as in space.

**Astronauts: sharing a common goal to explore and learn**

As former astronaut Scott Kelly told

ABC News in March, "When you're in space and you're flying around the Earth at 17,500 miles an hour and in a very hazardous environment, cooperation is the most important thing."

Kelly said the ISS is an example of where peace is possible because all astronauts share a common goal: to explore and learn.

"I just hope people realize and want to keep this partnership together, because it is one of the few things that unites all of humanity," said Kelly. "I think one of the biggest successes of the ISS is the international aspect of giving us something to work on together, that makes us friends."

According to spacepolicyonline.com, the ISS is a scientific research facility and a lot of experiments have been conducted there, but none that have resulted in a "killer app" with obvious benefits to people on the Earth.

Instead, the ISS wins praise as an engineering marvel and a model of international cooperation. On the latter, supporters argue it is worthy of a Nobel Peace Prize.

## Comment

# 6G Cannot be Developed in Isolation

By Staff Reporters

6G is widely predicted to be commercially available around 2030. China, the U.S., Japan, and European countries have already released their 6G development plans in quick succession. Meanwhile, experts in the field of communication agree that cooperation and sharing are vital for the development of 6G.

**Future expectations of 6G**

At present, 6G development plans released by the countries concerned, have elicited a wide range of opinions. One reason for this is that the currently proposed visions and candidate technologies include the wish list of several future generations, said Bi Qi, Chairman of the Global 6G Conference Program Committee and Chief Expert of China Telecom. He summarized these visions as moving in eight directions including: instant and fast, flexible and open, green and affordable, secure and trustworthy, simple and integrated, holographic and multidimensional, ubiquitous beyond 2D, as well as intelligent by design.

Wu Jiangxing, an academician of the Chinese Academy of Engineering, said that 6G will be an important supporting technology for smart network infrastructure beyond 2030, and a new paradigm that supports multi-objective sustainable and collaborative development should be opened up for 6G. He pointed out that research teams in China, Japan, the U.S. and the European Union have already put great efforts into 6G R&D. All of these countries have all emphasized the necessity to consider the simultaneous improvement and optimization of multiple objectives such as communication, security, energy consumption, service, and efficiency.

**Technology is ahead of demand**

6G is moving forward at a steady pace from demand to standards, while the world has just started the commercialization of 5G networks. This begs the question: Is that appropriate for humans to develop 6G at present? The Institute of Electrical and Electronics Engineers (IEEE) fellow You Xiaohu, also the Chief

scientist at China's Purple Mountain Laboratories, noted that 6G is not inconsistent with the development of the existing 5G, although it is a new generation of mobile communication for the period after 2030. In fact, the development of the existing 5G is laying the foundation for the development of 6G. Studying 6G is actually for the purpose of driving the development of the existing 5G. "Demands may be lagging, but never absent," said Hong Wei, professor of School of Information Science and Technology at Southeast University. Hong's view is based on the development of wireless communications. "Sometimes the technology may lag behind the demand, but more often than that, the technology is ahead of the demand. We have faced the same problem when developing 3G, 4G and 5G."

**The world needs a globally unified 6G standard**

It's inevitable to establish a globally unified standard for 6G in light of the history of mobile communication. According to Hong, to achieve ubiquitous connectivity in the 6G era, we should put equal stress on both integrations of different industries and continuous evolution. For terrestrial mobile communication networks, 6G should be based on the technological evolution of 5G. For space-based satellite networks, all the countries in the world should strengthen cooperation to develop advanced protocol standards as well as protocol standards for integration with terrestrial networks as soon as possible.

Bi noted that countries around the world have begun to promote 6G-related technology and research. The Alliance for Telecommunications Industry Solutions (ATIS) has brought together dozens of global technology giants such as Qualcomm, Samsung, Ericsson and Apple to form the Next G Alliance. Chinese companies have not yet been invited to join. "The success of the mobile industry relies on the existence of the global ecosystem. Establishing a unified set of global standards is a prerequisite for the success of 6G," he said.

## Hi! Tech

# Self-driving Trucks, a Bonanza for Logistics

Edited by QI Liming

Defying all odds, the self-driving truck industry has mushroomed at a time when supply chains are strained and labor shortages loom, all against the backdrop of the COVID-19 pandemic.

A self-driving or autonomous truck could be programmed and tracked to drive itself and deliver cargo

from point A to point B. It is ideally suited for long, uninterrupted and uncomplicated routes.

Stable and predictable conditions are important because self-driving vehicles are driven by sensors and software. During the software development process, developers try to imagine every possible situation that the software must be able to handle, and then program for that.

What we've learned is that despite the advances of technology and the Internet of Things (IoT), some human intervention is still needed in the operation of autonomous vehicles. There are always technology constraints and unpredictable situations that software can't anticipate.

Snowstorms, for instance, impede the abilities of today's IoT sensors to capture data, and require human inter-

vention. Complex intersections in cities with a variety of traffic situations are also difficult for sensors and control software to decipher and navigate, not to mention the unpredictable element of human drivers and the decisions they make.

Thus, self-driving trucks may be a logistics bonanza, but being complete driverless on the road may still need further research.



Workers in northwest China try to contain the moving sand dunes. (PHOTO: XINHUA)

# From Desert Sand to Fertile Land, the Glue Solution

By Staff Reporters

Chinese scientists have developed a kind of "glue" to improve the quality of desert sand, which can directly transform large areas of desert into fertile farmland.

Chinese scientists extracted a fiber bonding material from plants that could melt into the sand like glue. After putting the material into the sand and mixing it with water, the sand can become as sticky as soil, instead of being loose grains. This not only allows plants to take root, but also enables the sand to firmly lock in the water and avoids evaporation under the hot sun.

With no doubt that there are many other methods in the world that can

transform sand into soil, most research faces the same major problem, which is the cost. The cost of transforming one hectare of land often runs into the hundreds of thousands of dollars, which even a rich country like Saudi Arabia can't afford.

However, the cost of using this glue to improve the sand quality, is minimal and the transformation could be permanent. Thus it is very suitable for a worldwide promotion. Moreover, this plant glue can both maintain the characteristics of soil permeability and will not pollute the environment, so the transformed desert can be used not only for planting trees, but also as agricultural land, for planting cash crops like watermelon.

# Humanoid Robot Coming to Reality

By YU Haoyuan

Inside China's Dalian EX Future and Science Museum, several bionic robots built with silicone skin are being exhibited to the public. These robots are so lifelike, and it is hard to believe they are not real.

The designers are planning to make more realistic humanoid robots. A clip released by CGTN shows that after a man has his face scanned on a computer, his robotic version can be printed out. What is most impressive is that this robot can almost imitate all the man's movements, including rolling his eyes or sticking his tongue out.

The robot is made of medical-grade bionic silicone, and the designers have considered every detail to make it more

human-like. You can see details like the goosebumps and veins on the robot's arms, and the palm lines on its hands. So far, the robot's company is setting up plans to let people customize their own robots in the museum.

This is not the first time the EX robots have been demonstrated to the public. "Albert Einstein" and a "Steve Jobs" versions have already shown what they are capable of at the 2021 World Robot Conference.

And besides being seen in the museum, they have also been used in reality. In November 2021, a female EX robot, "Jin Xiaopu," was employed to guide COVID-19 nucleic acid testing. Its novelty appearance during the pandemic not only relieved public tension, but also reduced the medical staffs' workload.



Several humanoid robots are exhibited in Dalian EX Future and Science Museum. (PHOTO: EXROBOTS OFFICIAL WEBSITE)