Science China Newsletter, January 2018
Trends in education, research, innovation and policy

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Swiss Spotlight

**Scientist: Probabilistic Model Checking**

David N. Jansen is a computer scientist working at the Institute of Software, Chinese Academy of Sciences, Beijing. He is member of a research group dedicated to model checking; his speciality is probabilistic model checking. The basic idea of model checking is to produce rigorous mathematical proofs to verify that a model of computer behaviour satisfies its requirements. It has the advantage that it can provide safety guarantees with lower failure probabilities than (economically) achievable by testing. In recent years, David N. Jansen has concentrated on bisimulation, a method to simplify the mentioned models of computer behaviour without losing the safety guarantees. David N. Jansen visited the Institute of Software for the first time in 2013 and works there since 2016. Earlier, he studied and worked in Switzerland, the Netherlands and Germany. In addition to mathematics and computer science, he is interested in languages and philosophy of science: Do the sciences produce the truth, the whole truth, and nothing but the truth?


**Startup: Professional VTOL Drones for Mapping & Surveying**

Founded by ETH and University of St. Gallen alumnus Basil Weibel, Wingtra produces professional VTOL drones for mapping and surveying. Their first product, the Wingtraone, combines the easiness of a quadrocopter with the range of a fixed-wing airplane. Thanks to its long range and high load it allows the precise mapping of large areas with ease and thanks to its fully autonomous flight mode, no piloting skills are required. Wingtra is constantly expanding into new markets and has already amassed swift popularity and a loyal customer base around the world. Also thanks to the support of innosuisse China Market Entry Camp, Wingtra has recently announced a partnership with Chinese Tian Li Fa Group which allows them to set foot into China. “We are proud to say that our users come from areas as diverse as surveying, precision farming, glacier monitoring and wildlife monitoring,” says Basil Weibel, CEO Wingtra.

1. Policy

Technology Park for Developing Artificial Intelligence

(Xinhua, January 03)

A technology park dedicated to developing artificial intelligence will be built in Beijing in five years, authorities said. The park will be situated in suburban Mentougou district in western Beijing, covering 54.87 hectares, Beijing News reported, citing a plan released by Mentougou authorities. With an estimated investment of 13.8 billion yuan (about 2.1 billion U.S. dollars), the park is expected to attract about 400 enterprises, with an estimated annual output value of about 50 billion yuan (about 7.7 billion USD). The park will focus on developing areas such as super high-speed big data, cloud computing, biometric identification and deep learning. Its technological infrastructure includes a fifth generation mobile network, a super computer, and cloud services.

http://swissinnovation.org/newsSHA/web/2018/01-180103-84

Xi Presents Awards to Top Scientists

(China Daily, January 09)

President Xi Jinping presented China's top science award on Jan 8 to explosives expert Wang Zeshan and virologist Hou Yunde for their outstanding contributions to scientific and technological innovation. The nation's top science award comes with a prize of 5 million yuan ($769,000). Twenty-nine scientists have received the award since it was established in 2000. So far, seven foreign scientists won the state award for international cooperation and they received certificates from the top leaders at the ceremony.


Regulator Gives Go-ahead to Major Xinjiang Telescope

(China Daily, January 12)

Plans to build one of the world's largest moving single-dish radio telescopes in northwestern China have been given the green light. The Xinjiang Astronomical Observatory and the Chinese Academy of Sciences will build the facility in Qitai county, Xinjiang Uygur autonomous region. Once completed, it will be one of the world's largest fully rotatable radio telescopes - at a diameter of 110 meters it will be slightly larger than the Green Bank Telescope in the United States and the Effelsberg Radio Telescope in Germany - as well as the largest movable radio telescope in Asia and a platform for international science cooperation.

http://swissinnovation.org/newsSHA/web/2018/01-180112-3b
2. Education

China Declared World’s Largest Producer of Scientific Articles

(ScientificAmerican.com, January 18)

For the first time, China has overtaken the United States in terms of the total number of science publications, according to statistics compiled by the US National Science Foundation. The agency’s report documents the United States’ increasing competition from China and other developing countries that are stepping up their investments in science and technology. The shifting landscape is very evident when looking at the volume of publications: China published more than 426,000 studies in 2016, or 18.6% of the total documented in Elsevier’s Scopus database. That compares with nearly 409,000 by the United States. India surpassed Japan, and the rest of the developing world continued its upward trend.


Tsinghua vows to enhance cooperation among universities in B&R countries

(Global Times, January 25)

Tsinghua has signed university-level MOU with 46 universities in 21 Belt and Road countries, President of Tsinghua University Qiu Yong said in Davos on Jan 24. Tsinghua has also signed agreements with many Belt and Road countries on the application of its cutting-edge technologies, such as the large container inspection system and emergency management system for public safety. Last April, the Asian Universities Alliance, proposed by Tsinghua University and consisting of 15 Asian universities, was established in Beijing. It is expected to support the Belt and Road Initiative by promoting cooperation and exchanges among the universities in Asia.

http://swissinnovation.org/newsSHA/web/2018/02-180125-3e

3. Life Sciences / Health Care

China encourages TCM innovation

(China Daily, January 22)

State Administration of Traditional Chinese Medicine stated that China will continue to push forward technological innovation in traditional Chinese medicine (TCM) and plans to build more TCM labs and research centers in the near future. As of September 2017, 20.4 million patients had been discharged from TCM hospitals, accounting for 15 percent of all discharged patients in the country, the
administration said. Currently, 67 percent of town-level and community health centers have TCM units, totaling more than 30,000. By September 2017, there were 45,800 TCM clinics across China.

http://swissinnovation.org/newsSHA/web/2018/03-180122-ac

Genetic Analysis of Thyroid Cancer

(Xinhua, January 23)

Chinese scientists have depicted the genetic landscape of thyroid cancer in the Chinese population, providing a fundamental insight into the pathogenesis of the disease. The research was jointly conducted by the Beijing Institutes of Life Science, Chinese Academy of Sciences and Beijing Cancer Hospital. Papillary thyroid carcinoma (PTC) is the most common thyroid cancer. Scientists conducted genetic analysis of 355 samples of cancer tissues and adjacent tissues from Chinese PTC patients to determine the mutational landscape of the cancer. Genetic mutation of cancer varies by the factors, including geography and living habits. Previous researches focus on the genetic mutation of PTCs in Western populations. The research characterizes the genetic landscape in Chinese patients with PTC for the first time.


Successfully Cloned Monkeys

(The Atlantic, January 24)

For the past decade, Mu-Ming Poo, the director of the Institute of Neuroscience in Shanghai, has been on a quest to make monkeys that can be used to study human disease. Researchers in his institute have now announced a major milestone: the births of Zhongzhong and Huahua, the first two monkey clones created using the same technique behind Dolly the sheep. China has invested heavily in primate research in recent years as the United States and Europe have pulled back.

http://swissinnovation.org/newsSHA/web/2018/03-180124-1c

VR Treatment Proves Effective in Drug Rehab

(Xinhua, January 24)

Virtual reality (VR) treatment designed to help drug addicts give up their habit has proven effective, local Chinese rehabilitation authorities said. East China's Zhejiang Province has introduced the VR treatment method to many drug rehabilitation facilities. Over 10,000 drug users have received the treatment and 73.6 percent showed reduced reliance on drugs, said Chen Yuhai, head of the provincial bureau of rehabilitation. During the treatment, a drug user wears a pair of VR goggles and headset in
a three-stage program. First, videos simulate familiar scenarios that trigger drug cravings, then they show the effect of drug abuse using a form of aversion therapy. The third stage kindle the desire for a good life. Chen said Zhejiang detox facilities would further use technology and develop more technology-based treatment methods this year.


4. Engineering / IT / Computer Science

First Home-made Large Amphibious Aircraft

(Business Standard, January 01)

China's first home-made large amphibious aircraft finished its first ever flight in south China's Guangdong Province. According to Xinhua, the aircraft AG600, code-named "Kunlong," successfully winged above the clouds from the Jinwan Civil Aviation Airport in the city of Zhuhai and remained in the high sky for about one hour. "Its successful maiden flight makes China among the world's few countries capable of developing a large amphibious aircraft," said Huang Lingcai, chief designer of AG600.


Advanced Server and Database System

(China Daily, January 04)

Chinese engineers have for the first time designed and produced an advanced server and database system as an alternative to foreign-made products that currently dominate the domestic market, according to the Beijing Institute of Computer Technology and Application. Researchers at the institute, a subsidiary of China Aerospace Science and Industry Corp's Second Academy, used domestically designed processors, servers, operating systems and software to build the Tianyue Data Warehouse Appliance. Tianyue is capable of performing about 9.4 million transactions per minute in testing scenarios designed by the China Software Testing Center and Tsinghua University. This means it can deliver the third-fastest database performance in the world after Oracle's SPARC Supercluster and IBM's Power 780 Server, said Gu Peng, a senior designer in charge of the machine's development at the institute.

Half of all New Cars with AI by 2020

(Reuters, January 05)

China aims to implement AI technology in at least half of all its new cars by 2020 and cover 90 percent of its big cities and highways with a wireless network that can support smart vehicles, its top state planner said. The goals are part of a draft for a national smart car strategy that the National Development and Reform Commission wants to seek public feedback for, it said in a statement.


Launch of Beidou-3 Navigation Satellites from Xichang

(Scientific American, January 12)

China launched a pair of Beidou navigation satellites from Xichang on Friday morning local time, marking another step in the construction of an alternative constellation to GPS. The satellites are the 26th and 27th Beidou spacecraft in the planned 35-satellite navigation constellation. The satellites are part of the third phase of deployment of Beidou satellites, which will allow the system--which currently offers regional coverage--to provide services globally by 2020. The satellites are based on a new satellite bus that features a phased array antenna for navigation signals and a laser retroreflector, with a launch mass 1,014 kg, according to Nasaspaceflight.com.


Plan to Destroy Space Junk with Giant Lasers

(Newsweek, January 15)

Chinese scientists have an audacious proposal to clean up Earth’s cluttered orbit using giant lasers to obliterate old satellites and other space junk. A paper by researchers at the Air Force Engineering University in China describes how space debris could be zapped into smaller, less-harmful pieces using space-based lasers.

Foundation for Building a Global Quantum-secured Communication Network

(Xinhua, January 22)

Traditional public key cryptography risks being hacked, while quantum key technology, used in quantum communication, eliminates the possibility of wiretapping and secures the communication. China's quantum satellite "Micius" has now allowed scientists to achieve quantum key distribution between China and Austria, laying a foundation for building a global quantum-secured communication network. Through satellite-to-ground secure key distribution, a secret key was created between the two countries at locations some 7,600 km away from each other. During the experiment, scientists transmitted images between the two countries, and a 75-minute video conference was successfully held between Beijing and Vienna.


Test of 600 km/h Maglev Train by 2020

(China Daily, January 26)

China is planning to develop a prototype of high-speed maglev train that can reach 600 kilometer per hour by 2020. The technical plan for the 600 km/h maglev train has been approved by a review committee consisting of 19 experts on Thursday. "As the plan has been reviewed, we will move to the stage of design construction," said Ding Sansan, deputy chief engineer of CRRC Sifang at the review meeting held in Qingdao. "According to the schedule, we will develop one sample carriage this year, while the prototype of the whole car will be tested on a five-kilometer route by 2020," Ding said. The high-speed maglev transportation system is one of the key projects under the Ministry of Science and Technology's 13th Five-Year Plan (2016-20) to promote advanced rail transit system.


Sample Machine for Next-Generation Exascale Supercomputer

(People's Daily, January 29)

A sample machine for China's new-generation exascale supercomputer is set for launch this year. "The launch of the sample machine will pave the way for the development of a supercomputer capable of a billion billion calculations per second," said Zhang Ting, a researcher with the National Supercomputer Center in Tianjin. The
new supercomputer will be 200 times faster and have 100 times more storage capacity than the Tianhe-1 supercomputer, China's first petaflop supercomputer launched in 2010, Zhang said.


**China's First X-ray Space Telescope Put into Service after In-orbit Tests**  
(Xinhua, January 30)

China's first X-ray astronomical satellite, launched in June last year, has been put into service for scientific research after finishing in-orbit tests. It embodies a new phase of China's high-energy astronomy research, according to the State Administration of Science, Technology and Industry for National Defense and China National Space Administration.


5. Energy / Environment

**"Simulated Earth System" Device**  
(Xinhua, January 13)

China will build an earth system simulating device to strengthen fundamental research. The project, to be built in Beijing's northern suburbs of Huairou and Miyun, is a major national scientific infrastructure program, said Zhu Jiang, of the Chinese Academy of Sciences. The device can simulate the complicated progress of earth systems. It will further knowledge of the interaction and evolution of the atmosphere, hydrosphere, cryosphere, geosphere and biosphere, and lay a foundation for scientific research about climate and the environment. The first phase of the project will cover an area of 2.68 hectares at a cost of 1.25 billion yuan (194 million U.S. dollars).


**New Dinosaur Species with Colorful Feathers Discovered**  
(Xinhua, January 16)

Researchers have discovered a new dinosaur species with iridescent and asymmetrical feathers in China, according to a study published in Nature Communications. Jointly published by scientists from China, the United States and Belgium, the findings were based on a fossil unearthed in the Manchu autonomous county of Qinglong, Hebei Province. The new dinosaur species was named Caihong juji, which means "rainbow with a big crest" in Mandarin, because the well-preserved fossil indicated that the dinosaur had iridescent feathers on its head, neck, chest and around the base of its tail. The
A dinosaur lived 160 million years ago during the Jurassic Period. The new discovery may provide important information for the study of bird evolution.

http://swissinnovation.org/newsSHA/web/2018/05-180116-0f

National New Energy Vehicle Technological Innovation Center

(Xinhua, January 22)

China will build a technological innovation center for new energy vehicles (NEV) in Beijing, according to the Ministry of Science and Technology. The center will boost the supply of key new energy vehicle technologies to meet growing demand, said the ministry in a response to a request made by the Beijing government to establish the center. Leading resources in the industry, and higher learning and research institutions are encouraged to participate in the building of the center. The center should make its goals dynamic in accordance with new developments in global technology as well as the new energy vehicle industry, said the ministry. The government expects NEV output and sales to hit 2 million annually by 2020, according to a plan released last year.

http://swissinnovation.org/newsSHA/web/2018/05-180122-b1

Cave Explorers Spot Rare Fish in Southern China

(Xinhua, January 24)

A group of cave explorers have spotted a rare fish species in an exploration tour in southern China's Guangxi Zhuang Autonomous Region. A total of 15 explorers, including Chinese and French experts, spent nine days in caves in Hechi City in Guangxi, said group leader Chen Lixin. They explored eight caves, totalling 20 kilometers, and found the golden-line barbel, a type of rare cave fish, in Zhai'ao village in Bagong township. The fish live in water free from pollution and is in small numbers, according to Chen. They also spotted a type of rare shrimp, which shows the environment of the area is in good condition, he said. The explorers also found a great variety of stalactite in the caves. One stalactite column is 18 meters high, Chen said.

6. Physics / Chemistry / Material Science / Nano- & Micro Technology

Structuring of Universe Detected via Quasars for First Time

(Xinhua, January 15)

Researchers have recently managed to detect the structuring of the universe via quasars for the first time, according to the National Astronomical Observations (NAOC) of the Chinese Academy of Sciences. The work was conducted by the international group of eBOSS, the biggest ongoing spectroscopic survey in the world, which discovered redshift distortions signals when observing the spatial distribution of quasars that are 6.8 to 10.5 billion light years from earth. The signals discovered this time were generated during the time when the universe was only one third or half the size of today, according to a report published by the eBOSS group on the finding. The discovery is significant for future research in cutting-edge cosmological subjects such as dark energy and the essence of gravitation.


Most Powerful Laser in the World

(Science Magazine, January 24)

Inside a cramped laboratory in Shanghai physicist Ruxin Li and colleagues are breaking records with the most powerful pulses of light the world has ever seen. The heart of their Shanghai Superintense Ultrafast Laser Facility (SULF) is a single cylinder of titanium-doped sapphire about the width of a Frisbee. After kindling light in the crystal and shunting it through a system of lenses and mirrors, the SULF distills it into pulses of mind-boggling power. In 2016, it achieved an unprecedented 5.3 million billion watts, or petawatts (PW). [...] The researchers are now upgrading their laser and hope to beat their own record by the end of this year with a 10-PW shot, which would pack more than 1000 times the power of all the world’s electrical grids combined.


World’s Most Powerful Hyper-gravity Centrifuges

(Xinhua, January 31)

China plans to build two centrifuges for hyper-gravity experiments that, when completed, will become the world’s largest by capacity, Chinese scientists announced recently. The centrifuges are designed to each have a capacity of at least 1,500 gravity tons (gt), compared with the 1,200-gt centrifuge developed by U.S. Army Corps of Engineers, the world’s most powerful to date. The project is expected
to be completed in five years, with funding of more than 2 billion yuan (about 303 million U.S. dollars). One of the planned centrifuges will give researchers access to a range of hyper-gravity up to 1,500 times of Earth gravity and the other up to 600 times. The centrifuges will provide strong support to research in areas such as underground and deep-sea exploration, disaster control, waste disposal, and new material manufacturing.

http://swissinnovation.org/newsSHA/web/2018/06-180131-0b

7. Economy, Social Sciences & Humanities

Archaeological Findings Show Chinese City Dates back 4,500 Years

(Xinhua, January 26)

An archaeological excavation discovered the history of Yan'an city in northeast China's Shaanxi Province can be traced back 4,500 years, 2,300 years earlier than the previous estimate. The provincial cultural heritage bureau said that archaeologists discovered housing and cooking sites and city walls at Lushanmao Site in Baota District of Yan'an City. A large number of cultural items including pottery, stoneware, boneware and jadeware were also unearthed at the site. The site, covering an area of two million square meters, is one of the largest prehistoric settlement sites in China. The earliest documentary record of the city's founding can be traced back to the Qing and Han dynasties around 2,200 years ago, said Du Linyuan, a professor at Yan'an University.


8. Corporates / Startups / Technology Transfer

DiDi Opens AI Labs

(Xinhua, January 26)

Chinese ride-sharer Didi Chuxing has opened artificial intelligence labs to develop new transportation ideas, the company recently announced. The labs are an expansion of DiDi's research network intended to attract top professionals to push the frontiers of smart traffic technology. With a team of over 200 scientists and engineers, DiDi AI Labs will work on natural language processing, computer vision for operational research, deep learning, statistics and other innovative technology. DiDi will make use of technology developed at the labs to improve user experience and efficiency. At DiDi, AI is enabling
more convenient commutes, providing higher incomes for tens of millions of drivers and making travel safer for everyone, according to Jean Liu, president of Didi Chuxing.


**Call: Venture Leaders China**

Venturelab presents venture leaders China, a unique 10 day business development program to explore the Chinese market potential for your startup. 10 carefully selected high-tech entrepreneurs will get a unique chance to give their technology and business a commercial boost, thanks to venture leaders. A high powered jury will provide valuable insights into how to commercialize scientific ideas on the global market. The 10 winners will travel to Beijing, Dalian (participation to the World Economic Forum), Shanghai, Shenzhen and Hong Kong from where they will attend a unique entrepreneurial and business development program. Eligible are founding or managing members of innovative Swiss-based technology startups, ready for export, with a high market impact potential. Deadline for applications is March 19, 2018.


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