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CHINADAILY

香港版
HONG KONG

MONDAY, April 26, 2021

中國日報

www.chinadailyhk.com HK \$10

Mars rover named after ancient god of fire

By ZHAO LEI and CANG WEI in Nanjing

China named its first Mars rover Zhurong on Saturday after a figure in Chinese legend who was the god of fire in ancient times.

Announced at the opening ceremony of the 2021 China Space Conference in Nanjing, Jiangsu province, the China National Space Administration said the name represents the rover's symbolic task to ignite the hope of the nation's interplanetary exploration, encourage humanity's relentless adventure into the universe and urge humankind to keep pursuing self-transcendence.

The administration said that naming the rover after the ancient god of fire also symbolizes the integration of modern science and traditional culture and highlights the nation's spirit of exploration and confidence in its culture.

Zhurong, part of the ongoing Tianwen 1 mission, is scheduled to land on Mars next month.

If it touches down safely on the red planet and works as planned, Zhurong will be the sixth such vehicle deployed on Mars, following five predecessors launched by the United States.

If the semi-autonomous craft functions efficiently, it will work for at least three months and undertake comprehensive surveys of the planet.

The rover is 1.85 meters high and weighs about 240 kilograms. It has six wheels and four solar panels, and it will be able to move at a speed of 200 meters an hour on the Martian surface. It will carry six scientific instruments including a multispectral camera, ground-penetrating radar and a meteorological sensor — which will allow it to obtain information about a wide range of factors, such as the composition of the planet's surface and the geological structure, climate and environment of Mars.

Tianwen 1, China's first independent Mars mission, began in July when it was launched atop a Long March 5 rocket from the Wenchang Space Launch Center in Hainan province.

It is the world's 46th Mars exploration mission since October 1960, when the former Soviet Union launched the first Mars-bound spacecraft. Only 19 of those missions have been successful.

Tianwen, or *The Quest for Heavenly Truth*, is an epic work by Qu Yuan, a renowned poet from the Chu Kingdom who lived during the Warring States Period (475-221 BC).

The administration said that naming the mission after the poem was meant to illustrate China's determination to explore deep space and also implant a love of science in the nation's young people.

If Tianwen 1 can fulfill its objectives — orbiting the planet to make comprehensive observations, landing on the planet and deploying a rover to conduct tasks — it will become the first Mars expedition to accomplish all three goals with one probe.

The most recent rover to operate on Mars is the US' Perseverance, which started operations at the Jezero Crater in mid-February.

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Visitors tour an exhibition about Chinese rockets, staged as part of celebrations of China's Space Day, in Nanjing, Jiangsu province, on Saturday. FENG PENG / FOR CHINA DAILY

Robotic spacecraft will fly to asteroid, comet

Probe plans to collect samples, explore celestial bodies during 10-year mission

By ZHAO LEI in Nanjing zhaolei@chinadaily.com.cn

Chinese scientists and engineers have begun to develop a robotic spacecraft to collect samples from an asteroid and have performed many ground tests, a top scientist said.

Ye Peijian, a leading spacecraft researcher at the China Academy of Space Technology, said Chinese researchers have chosen 2016 HO3, the smallest and closest "quasi-satellite" to Earth, as the target.

"We plan to use a probe to obtain some samples and bring them to Earth. After accomplishing this goal, it will continue to fly toward a main-belt comet to explore it," he told the main forum of the 2021 China Space Conference in Nanjing, Jiangsu province, on Saturday, which was China's Space Day. "The whole mission is expected to take about 10 years."

The mission's basic road map is to use a large carrier rocket to send a probe consisting of two parts — an orbiter and a reentry module — toward the asteroid. After

approaching the asteroid, the spacecraft will first orbit around the small body and then fly very close to it to use a mechanical arm to collect samples from its surface. Carrying the samples, the probe will fly back to Earth orbit and release the reentry module, allowing it to fall back to the ground with the samples.

The orbiter will then travel toward a main-belt comet named 311P to continue its scientific exploration tasks. Ye said the mission has been included in China's interplanetary exploration program, which also plans to retrieve samples from Mars and send a spacecraft to the Jovian system.

"We want to explore an asteroid because, scientifically speaking, such small celestial bodies contain traces left through the evolution of our solar system that will help scientists deepen their knowledge about the system and origins of life," he said.

"Exploring an asteroid requires new types of spacecraft and scientific apparatus, which will boost research in space science and technology."

Such missions will enable human-

ity to prospect for exploitable resources and devise methods for avoiding asteroid-caused hazards, Ye said.

Scientists have identified about 1 million asteroids in our solar system, with more than 20,000 of them traveling near Earth, he said.

2016 HO3, also known as 469219 Kamo'oa'e, was first spotted in April 2016 by an asteroid survey telescope at the Haleakala Observatory in Hawaii.

The celestial body travels in an orbit around the sun that makes it a constant companion of Earth. It is too distant to be considered a true satellite of Earth, but it is the best and most stable example to date of a near-Earth companion, or quasi-satellite, experts from NASA have said.

The mission will be challenging because it will take a very long period of time and involve a great many uncertainties, Ye said, adding that scientists hope it can obtain information about the physical, chemical, structural and orbital characteristics of 2016 HO3 and 311P.

He said that designers and engineers will need to develop technologies to allow the probe to carry out highly sophisticated maneuvers such as orbiting around a celestial body with weak gravitational attraction.

Reusable plane project aims for low orbit

By ZHAO LEI

China Aerospace Science and Industry Corp, a major defense contractor, plans to produce a reusable aerospace plane and put it into commercial flight by 2030.

The plane will take off from and land on a conventional runway like a jetliner and will be capable of flying in near space or even into outer space.

The low-cost aircraft will have high-quality safety features and will be used to fulfill a wide range of operations such as space tourism, astronaut commuting, satellite deployment, cargo transportation and emergency rescue, the State-owned defense conglomerate said in an introduction board in front of a scale model of the new craft, which is on display at the 2021 China Space Conference.

Generally, near space refers to the region of Earth's atmosphere that lies between 20 and 100 kilometers above sea level. It comprises the altitudes above where commercial air-

liners fly but below orbiting satellites.

The company said it has conducted a key flight test by a conceptual demonstration prototype to verify the propulsion shift mechanism between ramjet and rocket engine. It did not disclose details about the test.

Engineers will strive to finish the research and development of all major technologies before 2026 and then build prototypes for flight tests, the company said, noting the aerospace plane is scheduled to become commercially ready by 2030.

Each plane will be able to take personnel or cargo with a combined weight of 2 metric tons to a low-Earth orbit about 300 km above the ground and could be used for 100 flights, according to CASIC.

Wei Yiyi, CASIC's deputy general manager, told attendees at the main forum of the 2021 China Space Conference in Nanjing, Jiangsu province, on Saturday that the government has listed reusable aerospace transportation systems as

one of its key research priorities.

Compared with carrier rockets and traditional spacecraft, an aerospace plane will have lower operational costs and a shorter preparation time, and it will be easier to maintain and operate.

However, he added, designers and engineers will need to resolve some technical obstacles, including managing its sophisticated propulsion system and developing aerodynamic designs suitable for ultrafast flight. Internationally, researchers in the United States, Germany, Japan and Britain have been designing aerospace vehicles for many years.

"The rapidly rising demand in commercial satellite launch services and space tourism offers a promising market for the aerospace plane. Moreover, it can realize the aspiration for ultrafast air travel — passengers will be able to get to any place on the globe in just a few hours in the future," said Wang Yanan, editor-in-chief of Aerospace Knowledge magazine.