

## **SPACE EXPLORATION: VOYAGERS**

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There is the meaning of «Space robot» in space robotics. Space robots, are robots that are adapted to work in the endless space. The advantage of space robots is that they can work in dangerous environments and run on solar energy. It will also be much easier to overcome the loss of such a robot than the death of an astronaut. Usually, the task of a space robot is to operate some scientific activity, but a simple robot working on the surface of a planet can do the same. In order to meet all these requirements, scientists have been creating more and more advanced devices that save money and energy and have a high toughness. Study has showed that sending a person to Mars will cost about 200-300 billion dollars, despite the fact that it will be an irrevocable departure. A few months will be spent on an adaptation of the members in a new environment. While sending a ship, with a robot, will cost about 5-10 billion dollars [1].

Voyagers. On April 15, 2021, the New Horizons automatic research station became the fifth spacecraft in the history of mankind to overcome the milestone of 50 AU from the Sun. Before it, this conditional border was crossed by the Voyagers, and even earlier by the Pioneer-10 and Pioneer-11 research probes. It is considered, none of these space wanderers will ever return to Earth. Some of them are still continuing their mission, while others remain in silent.

The launch of the Voyager 1 mission on September 5, 1977. Its main purpose was to explore Jupiter and Saturn. It is now at a distance of 154 AU from Earth, moving away at a speed of about 17 km/s or 3.6 A.U./year.

The contribution of Voyager 1 to the study of the solar system can hardly be overestimated. Thanks to him, several satellites of Jupiter were discovered, as

well as an unknown early system of rings. Voyager's cameras recorded eruptions of Io's volcanoes and convincingly showed that Jupiter's great red spot is a giant storm. The device sent to Earth hundreds of images of the largest planet of the solar system and its satellites, and after the station crossed the orbit of Neptune, its instruments transmitted to Earth a lot of valuable data on interstellar plasma. It is impossible not to mention another mission apparatus that left Earth on August 20 of the same year, speaking about Voyager 1. The targets of Voyager 2 were Saturn, Uranus and Neptune. However, it also moved closer to Jupiter to gain additional acceleration. The pictures taken by this spacecraft suggested the presence of a subsurface ocean in Ganymede and Europa. Having reached Saturn, «Voyager 2» got the data of the temperature of the gas giant and its magnetic field, as well as, discovered several previously unknown satellites of the planet and, of course, many photos were taken of the surface of both Saturn itself and its rings [2].

We have come into the age of space exploration and interplanetary research probes are only the first steps of mankind to study the infinite universe. They may be destroyed as a result of a collision with some cosmic body. One day our distant descendants may return the technology of interstellar flights to the earth and turn them into museum exhibits. But, most likely, fragile mechanisms will spend many years in endless flight through lifeless space. And finally, radioactive radiation and rare particles of cosmic dust will turn them into that will vanish in the universe in millions of years later.

### **References**

1. Space research [Electronic resource]. – Mode of access: <https://epizodsspace.airbase.ru>. – Date of access: 20.03.2024.
2. Вояджер [Electronic resource]. – Mode of access: <https://ru.m.wikipedia.org/wiki>. – Date of access: 24.03.2023.