MISSION X

TRAIN LIKE AN ASTRONAUT

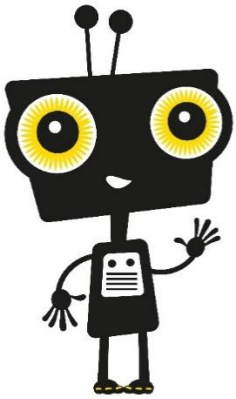
HUMAN ROBOT

MISSION DESCRIPTION

Exploring other planets in the Solar System is essential to our understanding the formation and evolution of our own system. However, because of the vast distances separating the planets, it is not currently possible to send humans to explore these extraterrestrial worlds. Instead, we'll be sending robots that are capable of analysing the characteristics of planets and satellites for us. In particular, in order to explore the surface of the Moon and Mars, numerous astromobiles, or rovers, have been sent to collect and analyse samples from these celestial bodies. These machines are controlled from Earth using computerised remote controls.
The students' task here is to discover the principle of programming and create a series of commands to control a human robot.

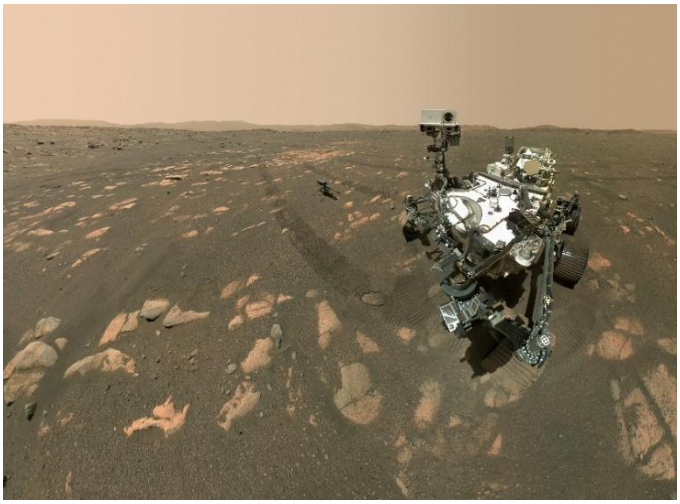
SUMMARY

Theme: Robotics
Age: 3-6
Session duration: 60-90 min
Location: outdoors or classroom



Learning objectives:

- Discover the basics of programming;
- Cooperating as a team to succeed;
- Discover the concepts of commands and directions;
- Make individual progress for the benefit of the team.



The Perseverance rover on the surface of Mars
© NASA/JPL

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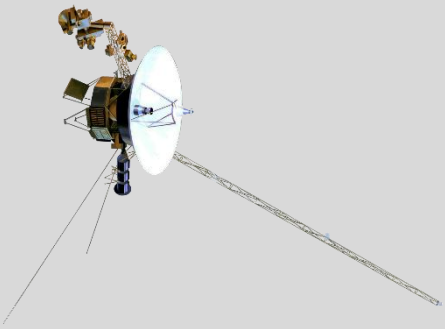
MISSION CONTEXT

Robots to go where humans can't!

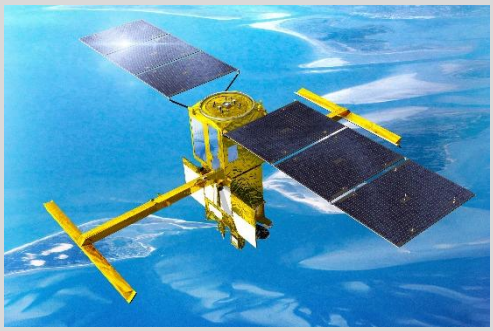
With no atmosphere, sulphuric acid rain and extreme temperatures, it's not a good place for human beings to live in the solar system outside our planet Earth! It is therefore necessary to send robots to explore it.

IN SPACE

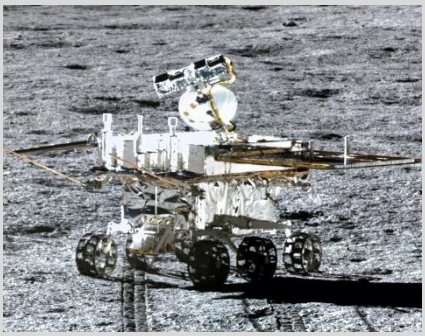
- Since the beginning of space exploration, a large number of robotic objects have been sent into space to explore the solar system. The first of these, Sputnik, was launched by the USSR in 1957 and was limited to emitting a sound signal. Since then, probes have crossed the entire solar system to visit all the planets, and two of them, Voyager 1 and 2, have even passed the outer boundary of our system.
- Without having to travel billions of kilometres, there are a large number of these objects around the Earth, known as artificial satellites. In 2024, there were several tens of thousands of objects in orbit around the Earth. These satellites have a variety of functions: Earth observation, weather forecasting, telecommunications, space observation, scientific experiments in microgravity, etc.
- To study other celestial bodies, placing an object in orbit is generally not enough, as it does not allow us to study the body in detail. This is why so many objects have landed on the surface of other bodies. One lander has landed on Saturn's largest moon, Titan, and four have landed on the surface of Venus, but the extreme conditions on the surface of these objects have made them difficult to explore. This is not the case for the Moon and Mars, where 14 and 7 landers and 7 and 6 rovers, respectively, have successfully landed on their surfaces.



Voyager 2 © NASA



SWOT satellite © CNES



Chinese lunar rover Yutu 2 © CSNA

ROBOTS AT THE SERVICE OF ASTRONAUTS

In our daily lives, we use a large number of robotic devices: vacuum cleaner robots, kitchen robots, voice assistants, automated machines on production lines, etc. So do astronauts. Robots and voice assistants can be found on board the International Space Station. In addition, astronauts on future lunar and Martian bases will be accompanied by robots capable of assisting them in their daily tasks. Learning how to control and maintain these robots will therefore be an integral part of the astronauts' training.

The CIMON assistant alongside German astronaut Alexander Gerst © NASA

For more information:

- Martian challenges: Perseverance
- How do satellites observe the Earth?
- Activity: Lunar rover

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MISSION PREPARATION

For the facilitator

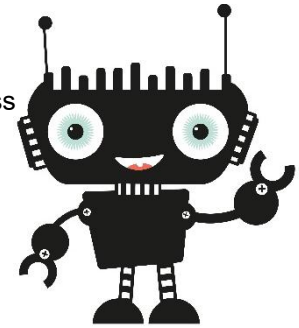
- Provide blank paper or print out robot colouring sheets
- Make sure there is enough space for the human robot to move around

Organising the activity with the students

- Preparatory work on the display board with the whole class

Options if you need to adapt

- Print a large sheet of checkered paper to guide the human robot's movements
- The patch of ground for the robot to move around on can be made by the pupils in art class
- The human robot can be played by the students or by the teacher



MISSION SEQUENCE

Suggested step-by-step instructions for carrying out the activity

Explanation of the reference situation
The teacher starts by asking the students if they know anything about robots (from everyday life, films, books, etc.) and what the differences are between humans and robots (no need for air, food, leisure activities, etc.). The students can then draw a robot as they imagine it or colour one in.
The teacher then briefly introduces space robots and discusses with the students the advantages of sending robots into space rather than humans. Next, a short introduction to the robots' remote controls is given on the board, with drawings of the contents of the commands (forward, backward, left, right, stop, etc.).
Finally, the students will determine a path for the robot to follow, based on the commands determined earlier. Finally, the human robot will complete the route. The robot can be played by a student or by the teacher.

Contextualisation of the situation to be given to the students
The class represents a crew on an expedition, in the new moon base. To explore the Moon, the young astronauts will be accompanied in their tasks by a robot that they will have to learn to control.

Organisation
Once the introduction to robots has been completed, the students create a path for the human robot to follow on the checkered paper (printed beforehand) using the commands drawn on the board. This can be done individually or all together on the checkered paper, depending on the level of the students. The human robot then follows the commands to complete the course on the checkered paper. You can repeat the exercise by testing different routes or changing robots.

LEARNING AREAS

- Making full use of language
- Acting, expressing themselves and understanding through artistic activity
- Acquiring the first mathematical tools
- Exploring the world

PRINTABLE APPENDICES

- Example of a patch of ground for a human robot to move around on: