

Be a Cosmic Poet

**From a small planet
a polished instrument
gazes back in time
the starry depths
offer up their mysteries.**

What sets us apart from other creatures? Is it language? Is it our tools? Some people think other animals also talk to each other and use simple tools.

Ah, but only we humans use tools (like telescopes and microscopes) to extend our senses and help satisfy our curiosity.

Only we use language to talk to each other about our tools and the wonders they reveal.

Only we use language to design new tools, to teach others to use tools, and to express how we feel about our tools.

Here is a chance to express your true humanity! Here is a chance to write poetry—perhaps the highest form of language—about our tools and how they have shaped our world.

Our tools now extend our senses far beyond what previous generations could have imagined. We now go places and find out things we would never have known if it weren't for our tools—our technology.

New technologies extend our awareness. We can detect particles far smaller than our eyes can see and extend our sight to the farthest reaches of the Universe. It seems nothing is too small or too large to be beyond our reach.

To explore other worlds in space, or to explore our own world *from* space, we have invented new ways to **propel** our space vehicles farther and faster. We have found better ways to **navigate** through space to constantly moving destinations never before explored. We have invented clever ways to **communicate** vast amounts of information across billions of miles of space. We have learned to harness every passing particle of solar energy to **power** our instruments. And we have

sharpened our vision to capture *images* of light far beyond our eyes ability to detect.

In its New Millennium Program, the National Aeronautics and Space Administration (NASA) tries out new technologies in space, reducing the risk to future space science missions. Each New Millennium spacecraft carries several new technologies into the harsh environment of space, putting each through a rigorous testing process.

At this point in the history of science, the technologies are in the driver's seat. Making new discoveries about the universe depends very much on advances in many different types of technologies.

Five kinds of space technology are described on the next page. Write a poem that captures something about one of these kinds of technology. Pick a technology type and think about how it enlarges our world. Think about how it sharpens our senses. Think about how it allows us be more than just our human bodies would allow. Think about how it lets us learn and discover wonderful things about the universe that we would otherwise never find out. Think about how it makes us more powerful or more significant. Think about how it helps us learn to appreciate and take care of our own beautiful Earth.

Try writing a poem of just 100 words or fewer and focus on just *one of the five types* of technologies. Your poem may be in any form, from free verse to traditional forms, such as sonnet, quatrain, limerick, etc. After you write your poem, ask yourself: Does the poem show a general understanding of the technology and its significance in space exploration? Does the poem show originality? Does the poem express—directly or indirectly—the benefits to humanity of space exploration?

Technologies for a New Millennium

Your poem should capture the feel of one of these five advanced New Millennium Program technologies:

1. Propulsion

Propulsion is the means—the engine—to get the spacecraft from Earth orbit (achieved by rocket launch or space shuttle delivery) to another destination in the solar system and beyond, and to make course correction or orbit insertion maneuvers. Examples of propulsion technologies are solar electric (ion) propulsion, chemical propulsion, and solar sails.

2. Navigation

Navigation is the technology the spacecraft uses to know where it is and to keep on course. Advanced navigation systems enable the spacecraft to check and correct its course autonomously (needing no commands from Earth).

3. Communication

Communication technologies enable the spacecraft to communicate with Earth or with other spacecraft. New types of communication antennas are very lightweight, have no moving parts, and can send and receive huge amounts of data very rapidly.

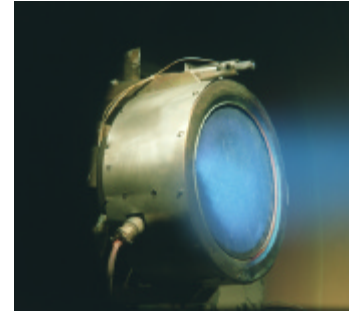
4. Power and Energy Sources

Power technologies supply electric power to all the spacecraft systems that need it, including the computer, communication antenna, science instruments, and motors that move and point instruments and antennas. New types of solar panels are very lightweight and efficient at converting the sun's energy to electricity. New types of batteries can withstand extreme temperatures.

5. Imaging and Mapping

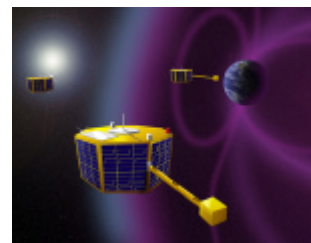
Imaging and mapping technologies collect the information needed to carry out the science goals of the mission. New imaging devices detect not only the light we see with our eyes, but a good part of the electromagnetic spectrum we don't see, including microwaves, ultraviolet, infrared, x-rays, or gamma rays. The technology of interferometry is also developing rapidly, combining images from two or more instruments some distance apart, thus giving a much clearer, sharper image.

Deep Space 1 proved that a solar electric (ion) engine can **propel** a spacecraft all the way to its target. The faint blue glow is charged Xenon atoms being emitted from the engine.



Deep Space 1 is the first spacecraft to use autonomous **navigation**. It was able to steer itself within 15 kilometers (10 miles) of Asteroid Braille on July 29, 1999, the closest flyby of an asteroid ever done.

For **communications**, Earth Observing 1 will test an X-band Phased Array Antenna, which has no moving parts.



Space Technology 5's three small, formation-flying spacecraft will use lightweight, long-lasting lithium-ion batteries for **storing energy** converted from the sun.

One technology Earth Observing 3 will test is an **imaging** instrument that will help scientists understand weather better and make more accurate predictions.

