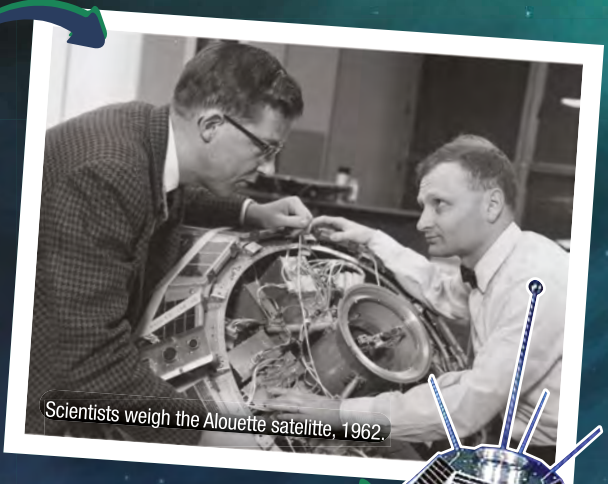
CANADA AMONG THE STARS

For more than 60 years, our tech has been an important part of space exploration. We count on it, but so do other countries and missions.

ALOUETTE

September 29, 1962, was a thrilling day. That's when the Canadian-designed and built Alouette satellite blasted off from California, carried on an American rocket. The launch made Canada the third nation in space after the United States and the Soviet Union (now Russia). Alouette took three and a half years to create. It studied the ionosphere, an outer layer around the Earth that bounces back radio waves for communication and navigation. The 145-kilogram satellite was only supposed to last a year, but it kept operating for a decade. It worked so well that three years later, its backup was made ready for space and launched as Alouette II.



Scientists weigh the Alouette satelitte, 1962.

Library and Archives Canada, Canadian Space Agency

Many early Canadian space scientists did their research in the Prince Albert Radar Laboratory in Saskatchewan. To mark its first day, June 6, 1959, American President Dwight Eisenhower sent a special voice message to Prime Minister John Diefenbaker.

ISIS I AND II

The Canadian International Satellites for Ionospheric Studies (ISIS) satellites went up in 1969 and 1971. One of their goals was to figure out why the aurora borealis or northern lights, which occur in the ionosphere, messed up radio waves. Over 11 years, the ISIS satellites measured how changes in the sun's radiation affected the Earth's upper atmosphere. Their data helped Canadians become experts in taking and understanding images from space.

STORABLE TUBULAR EXTENDIBLE MEMBER

The name of this antenna, invented by Canadian George Klein, shown above left, is usually shortened to STEM. Klein found a way to flatten and tightly roll up an antenna measuring 20 metres or more for the trip into space, where it could be unrolled again to its original shape. This valuable invention has travelled on Alouette, the first American space flights carrying humans, the Hubble Space Telescope, the Mars Pathfinder rover and more.

Anik

In 1969, the federal government set up the company Telesat to provide Canadians with satellite communications — phone, television and radio signals. Three years later, Telesat launched Anik A1. It was the world's first non-military communications satellite to sit in one place (called a geostationary orbit) over a country. Anik means "little brother" in Inuktitut. The satellite made it possible for people in Canada's Far North to watch live TV and have clearer long-distance phone conversations. Some communities weren't sure they wanted shows from other places that might change their way of life. Using the Anik B, launched in 1978, Inuit producers created programs, some in Inuktitut, for home and school, but the Canadian government ended its funding in 1981. Telesat has been a private company since the government sold its portion in 1998.

Public Domain, NASA, NWT Archives

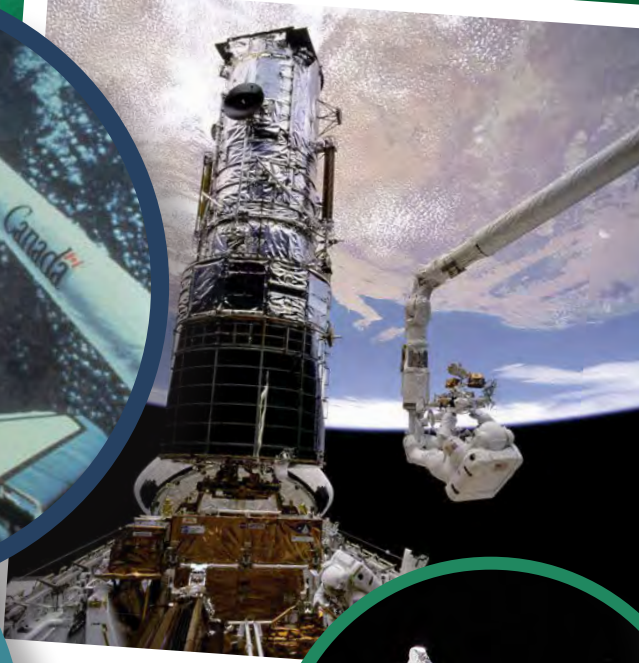
Lunar Lander

The famous American Apollo 11 spacecraft wouldn't have been able to plunk down on the moon in 1969 without landing gear designed and made by Quebec company Héroux (now Héroux-Devtek). In fact, all six moon landings set down on Héroux landing gear.

Staff of the Alberta Native Communications Society are shown below in 1978. The Indigenous group was one of the first to make programs just for other Indigenous people and transmit them by satellite.

Launched in 1976, Hermes was the most powerful satellite ever built. It was the first to experiment with broadcasts sent directly to small stations on Earth. This photo shows Canadian and Peruvian diplomats in Lima, Peru, in 1978, getting ready to watch a hockey game broadcast this way.

Canadian Space Agency, Friends of CRC



This photo from April 28, 2001, shows something pretty amazing: two Canadian robotic arms "shaking hands" in space. Canadian Space Agency astronaut Chris Hadfield was at the controls.

Canadian Space Agency

CANADARM

In the early 1970s, the American National Aeronautics and Space Administration (NASA) was working on a new kind of spacecraft, the space shuttle. The NASA team realized they would need a giant robotic arm to unload the shuttle. A team of Canadian companies invented exactly what was needed. The Canadian government gave the arm to NASA, which used it in space for the first time on November 13, 1981. The Canadarm, as it was soon known, operated a lot like your arm does, swivelling at the shoulder, elbow and wrist. For 30 years, it moved cargo and astronauts who needed to fix equipment. It helped build the International Space Station (ISS). It even caught satellites and returned them to orbit after repairs. After 90 missions, the original Canadarm went out of service in 2011. The Canadarm2 launched in 2001 and is still at work in space on the ISS.

Dextre

This amazing robot, built by Canada's MacDonald, Dettwiler and Associates, can be attached to the ISS or operate at the end of Canadarm2. Since 2008, it's been installing and fixing things on the ISS, which gives astronauts more time to work on experiments. It has five cameras and a tool holster. Dextre can detect leaks of deadly gases and even fix itself.

Where can you find a Canadian astronaut, Canadarm2 and Dextre close to home? On the back of our five-dollar bill!

RADARSAT

Why launch three identical satellites? To keep track of what's happening with soil, ice, forests, lakes and oceans in Canada. The RADARSAT Constellation Mission (RCM), launched in 2019, does all that from about 600 kilometres above the Earth. It can scan our planet day or night, in any weather, to create amazing images that help us cope with climate change and watch for disasters.

Bank of Canada, Canadian Space Agency

ALL ABOARD

Many other countries' spacecraft use our tech. Here are just a few of the impressive Canadian inventions out there.

NASA's **OSIRIS-REx**, launched in 2016, used a Canadian instrument to gather information and map the asteroid Bennu. Our researchers get to work on a bit of the samples it sent back from the asteroid in 2023. The mission may help us understand more about how our solar system came to be.

There are two instruments built by Canadian company Honeywell on the powerful **James Webb Space Telescope**. One helps the telescope track, identify, point at and focus on the things operators want to take images of. The other helps study ancient galaxies and how they have changed over billions of years. NASA, the Canadian Space Agency and the European Space Agency work together on the telescope project.

Canadian instruments have ridden on the **Herschel Space Observatory** (launched in 2009), **Curiosity** Mars rover (2011), the **Swarm** observation satellite (2013) and many more.

Canadian Space Agency

CANADA FIRST

It's an exciting time for Canada in space. In the months ahead, a Canadian rover (shown below) will land on the south pole of the moon. The information it collects could help scientists learn whether there was ever ice made from water there. The rover will also analyze the moon's soil and try out new technology. Canadensys Aerospace is working with organizations from all over the world to build the rover.

IN 2024, CANADIANS VOTED FOR THE NAME OF THE ROVER. WATCH TO SEE WHICH CHOICE WINS: ATHABASCA, POL-R, COURAGE OR GLACIER.