

Chapter 11.3 Technologies Used to Explore Space

1. Rocket Propulsion

- a rocket that transports materials and astronauts into space requires a great deal of thrust to launch
- this is created by explosive fuels combining in the body of the rocket

2. Space Suits

- designed to protect astronauts
- it is essentially a mini-space shuttle that provides oxygen, temperature and pressure systems to simulate Earth as well as a communication system

3. Orbiting Satellites

- objects in orbit around the earth which provide communication services and remote sensing (weather, forest fires, etc.)

4. Probes

- unmanned space vehicles designed to travel millions of kilometres and analyse planets, moons, comets or asteroids as they fly past

5. Rovers

- Robotic devices designed to land on a planet (or moon) and carry out tests (ex: Mars rovers)

6. Optical Telescopes

- lenses or mirrors used to magnify images of faraway objects (ex: Hubble Space Telescope)

7. Radio Telescopes

- large receivers collecting wavelengths other than light which are then interpreted as data revealing characteristics of celestial bodies that cannot be “seen” with optical telescopes

Canadian Contributions to Space Research and Exploration

Canada has been involved with space exploration since the very early days and still has a large space industry. A few examples of our contributions...

➤ The Canadarm 1

A Canadian designed and built robotic arm used to retrieve and launch satellites and to provide a platform for astronauts to go about their tasks in space.

- The International Space Station
 - A space-based laboratory built with the cooperation of 16 countries, including Canada. The crew conducts numerous experiments in a microgravity environment (weightlessness). The Canadian Space Agency is known around the world for its research in this area.
- The Canadarm 2 or Space Station Remote Manipulator System (SSMRS)
 - Designed for the International Space Station, it is a larger version of the Canadarm 1 that is able to move by itself and reach nearly every part of the space station's exterior.
- "Dextre" or Special Purpose Dexterous Manipulator (SPDM)
 - A two arm robot attached to the end of Canadarm 2 that can perform tasks outside the space station that previously astronauts had to do.

Notable Canadian Astronauts

- Roberta Bondar
 - Canada's first female astronaut
 - First neurologist in space
- Marc Garneau
 - First Canadian in space
 - Took part in three of NASA's space shuttle missions
 - President of the Canadian Space Agency from 2001 to 2006
- Chris Hadfield
 - First Canadian to walk in space
 - Has flown two space shuttle missions
 - In December 2012, he will travel to the International Space Station where he will stay for 6 months
 - In March 2013, he will be the first Canadian to be Commander of the International Space Station
- Jeremy Hansen
 - Started his flight career when he joined the Air Cadet Program at 12 years old
 - Started in the Canadian Military after high school and after much university education and military experience, he graduated from Astronaut Candidate Training in 2011
 - He is currently a Crew Support Astronaut for the upcoming ISS mission