Unit 5 : Space Exploration *End of Unit Project*

You must choose 1 of these

You may do this project **alone**, with a **partner**, or in a **group of 3 or 4**

Description of Project Goal

1. To design and construct a model (prototype) of a **robot arm** that can successfully retrieve objects from a specified distance and place them in a specified location. (**optional**: arm may be electrically powered)
2. To design a scale model of a Mars **settlement** in the year 2025
3. To design a miniature **museum** of Canadian Space Moments

Background:

Canadarm 3

Canada's most recent contribution to the **International Space Station** was the ***2nd generation* Canadarm 2.** This remote device, that '*rides the rails*' on the Space Station, is used to launch and recover satellites, as well as repair and install equipment such as the Hubble Space Telescope. The Canadarm 2 has three primary systems: the remote manipulator system, the mobile base system and the special purpose dexterous manipulator.

Marsville

It is projected that manned interplanetary missions could begin as early as 2015. If that is the case, over 10 years, manned missions could establish a significant presence on ***Mars***. Modular units could be interconnected throughout the Mars settlement and all aspects of life support would have to be considered if a settlement is to be practical.

Canada in Space eh!

Canada has made significant contributions to the space program. Beginning in the early 1800's until now, many Canadian accomplishments have broadened the base of knowledge and supported the technological advancements of space travel and exploration. Keeping track of the past efforts of distinguished Canadians is an important part in recognizing that " ***I AM CANADIAN*** ".

Specifications:

Canadarm 3 (Robotic Arm)

Prototype must be your own design. *(no commercially-developed robotic kits will be allowed – ie. Lego, Knex, Mechano, etc.)*

Testing: Objects (different sizes and shapes) will be placed on a table and on the floor directly beneath the table, which is located inside a circle (with a diameter of 4m). At no time during the test are you allowed to go inside the circle to move any of the objects. You will be given a visual sample of what objects will be used prior to the actual test. You will be required to manipulate your robotic arm to relocate each of the objects as directed, during the test phase. You will be given a **time limit** to perform each part of the test.

Project **Report** should include:

- Design Blueprint
- Procedural Outline
- *Construction Details*
- Troubleshooting
- Answers to questions which direct your self analysis of this project
- Feedback sheet from peers

Marsville (Mars Settlement 2025)

Miniature 3D Model must simulate a Mars settlement in the future.

Size: (Restrictions) No larger than a lab table, no higher than the width of your textbook.
The idea is to present **a miniature version** of what you think a settlement will look like on Mars is the primary goal of this activity.

Materials: Choice of materials is open, *(no commercially-developed robotic kits will be allowed – ie. Lego, Knex, Mechano, etc.)*

Project **Report** should include:

- Design Blueprint
- Procedural Outline
- *Construction Details*
- Troubleshooting
- Answers to questions which direct your self analysis of this project
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Canada in Space eh! (Model Canadian Space Museum)

3D Miniature Model Museum should include all of the major accomplishments of Canadians in the Space Program over the past 100 or so years. It should be 3D and represent each achievement with a brief summary of the achievement.

Size: (Restrictions) No larger than a lab table, no higher than the width of your textbook.

Materials: Choice of materials is open, *(no commercially-developed robotic kits will be allowed – ie. Lego, Knex, Mechano, etc.)*

Project **Report** should include:

- Design Blueprint
- Procedural Outline
- *Construction Details*
- Troubleshooting
- Answers to questions which direct your self analysis of this project
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Evaluation:

Model/Test (Effectiveness)
50%

Report: Self-Evaluation/Analysis/Peer Evaluation
50%