CanSat Design Challenge

Requirements Review

November 24, 2023

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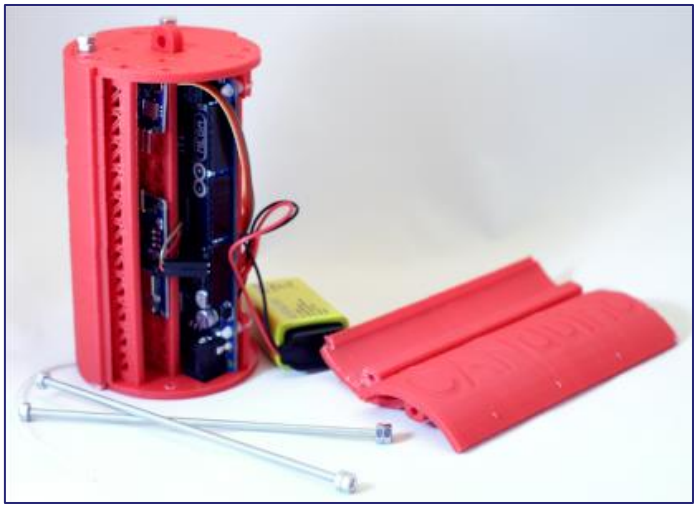
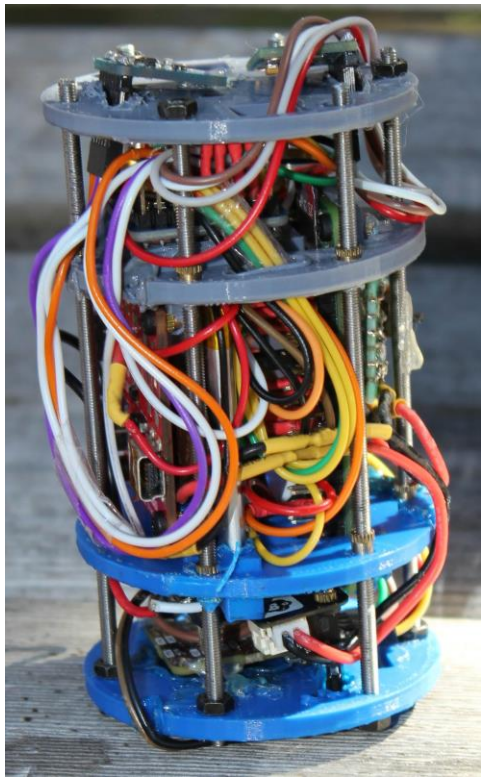
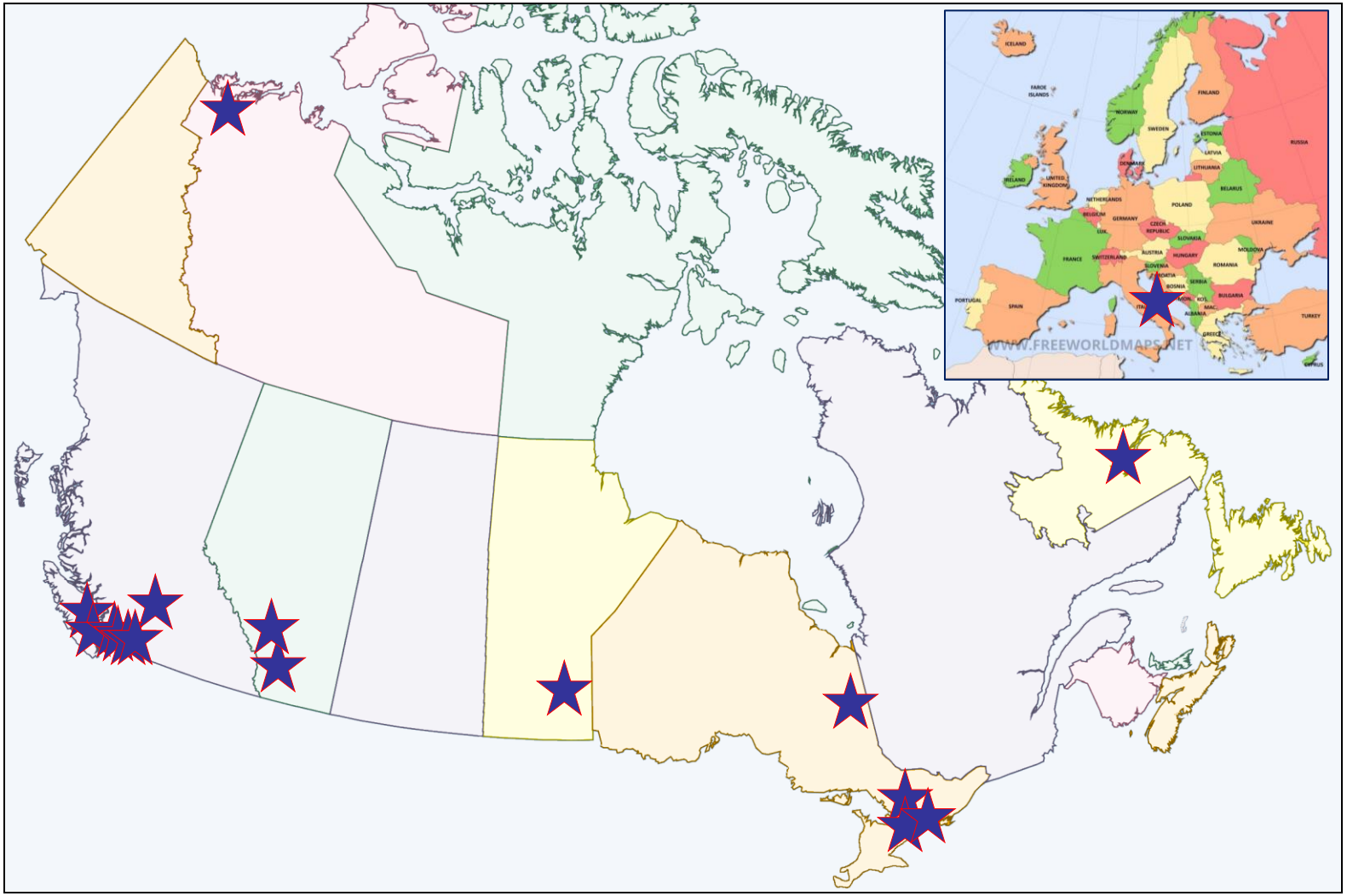
Canadian Satellite Design Challenge Management Society

This is what we're going to make!





Participating Teams



Schedule

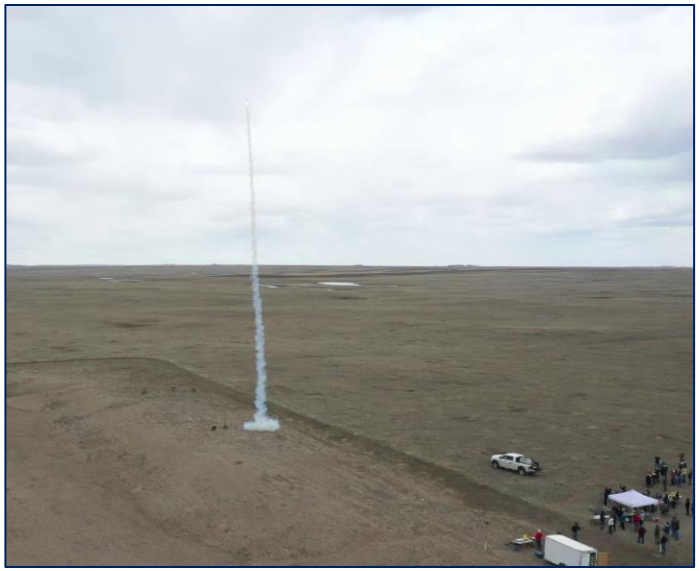
Beginner Category	
Information session(s) - via Zoom	Until mid-October, 2023
Registration deadline	October 27, 2023
CanSat kits sent to participating teams	by December 15, 2023
Design! Build! Test!	January to May, 2024
Beginner Category Online Conference	Mid-February, 2024
Launch event (no travel required)	May, 2024

Advanced Category	
Information session(s) - via Zoom	Until mid-October, 2023
Registration deadline	October 27, 2023
CanSat kits sent to participating teams	by December 15, 2023
Design! Build! Test!	January to May, 2024
Preliminary Design Document due	February 14, 2023
Pre-Launch Report due	April 27, 2023
Launch event in Alberta	May 9-13, 2024 (TBC)

Advanced Category Requirements

In the Advanced Category, the CanSats must comply to all requirements – technical and documentation.

- CanSats will be launched by rocket.
- Data is down-linked by radio, and must be received and recorded by the team.
- Teams must travel to Alberta for the Launch Campaign



Beginner Category Requirements

The Beginner Category is not as demanding technically, and does not have as much report writing. It is ideal for new or less-experienced teams (who can then join the Advanced category next year?).

- Data is saved on a micro-SD card.
- Teams do not have to travel to the launch event (just mail your CanSat to us).
- CanSats will be dropped by helicopter or drone.

A note about Requirements:

- "**must**" means that the Requirement is mandatory.
- "**should**" or means that the Requirement is optional, but recommended.
- "**may**" means that the Requirement is optional

Technical Requirements - Physical

1. All the components of the CanSat **must** fit inside a standard soft drink can (115 mm height and 66 mm diameter), with the exception of the parachute and parachute connector. Radio antennas and GPS antennas **may** be mounted externally on the top or bottom of the can, depending on the design, but not on the sides.
   Note: The rocket payload area usually has about 5 cm of space available, above the top of the CanSat, which must accommodate all external elements including parachute, parachute attachment hardware, and antennas.

2. Elements of the CanSat **must** not extend beyond the can's diameter until it has left the launch vehicle.

3. The mass of the CanSat **must** be between a minimum of 300 grams and a maximum of 350 grams. CanSats that are lighter **must** take additional ballast with them to reach the 300 grams minimum mass limit required.

4. Explosives, detonators, pyrotechnics, and inflammable or dangerous materials are strictly forbidden. All components used **must** be safe for the personnel, the equipment, and the environment. In case of any concern, Material Safety Data Sheets (MSDS) may be requested from the teams.

Technical Requirements - Power

5. The CanSat **must** be powered by a battery and/or solar panels. It **must** be possible for the systems to remain switched on for two continuous hours.

6. The battery **must** be easily accessible in case it has to be replaced/recharged.

7. The CanSat **must** have an easily accessible master power switch. The CanSat **must** also have an “ON” light which **must** be obvious to notice when the CanSat is on.

8. Inclusion of a positioning system for retrieval (beeper, radio beacon, GPS, Apple Tag, etc.) is **highly recommended**.

Technical Requirements – Launch & Descent

9. The CanSat **should** have a recovery system, such as a parachute, capable of being reused after launch. It is **highly recommended** to use bright-coloured fabric (e.g., "high-visibility orange"), which will facilitate recovery of the CanSat after landing. *Note: High-visibility fabric will be supplied in the CanSat kits.*

10. The parachute connection **must** be able to withstand up to 50N of force. The strength of the parachute **must** be tested to ensure that it will operate nominally.

11. For recovery reasons, the CanSat **should** have a maximum flight time of 120 seconds. If attempting a controlled landing, then a maximum of 200 seconds flight time is recommended.

12. An *un-controlled* descent rate between 8 and 11 m/s is recommended for recovery reasons. However, the CanSat's *un-controlled* descent speed **must** not be less than 5 m/s or greater than 12 m/s for safety reasons. Additionally, the airfield or weather conditions might determine additional mandatory restrictions on the velocity.

13. **(Advanced Category only):** The CanSat **must** be able to withstand an acceleration of up to 20 g.

Technical Requirements – Mission

14. The total budget of the final CanSat model **should** not exceed CAD $800. Ground Stations and any related non-flying item will not be considered in the budget. More information regarding the penalties in case the teams exceed the stated budget can be found in the Evaluation Criteria section. In the case of sponsorship, all sponsored items **must** be specified in the budget with the actual corresponding costs on the market.

15. **(Beginner Category only):** The CanSat **must** save all of its experiment data on an SD-card integrated inside the CanSat. The SD-card **should** be easily accessible, or connectable, in order to download the data afterwards.

16. **(Advanced Category only):** The CanSat **must** down-link its data by radio. The assigned frequency **must** be respected by all teams in the Launch Campaign. *Note: Canada: 915Mhz (902MHz – 928MHz). Europe: 434 MHz (APC220)*

17. The CanSat **must** be flight-ready upon arrival at the launch campaign.

Outreach

18. As part of their Educational Outreach efforts, each team **must** give at least one presentation to each of the following:
    - an elementary school class or group;
    - a junior secondary school audience (Grades 8 to 10); and,
    - a public audience, such as a school “Open House”, a teachers’ conference, or other adult-level audience.

For the Beginner Category this is optional – but still recommended!

Resources

CSDCMS YouTube tutorials:

- www.youtube.com/@CSDCMS

ESA CanSat resources & tutorials

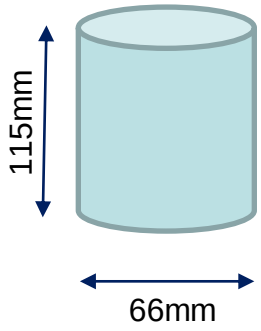
- www.esa.int/Education/CanSat/Cansat_resources

Canduino: 3D structure, tutorials

- canduino.eu

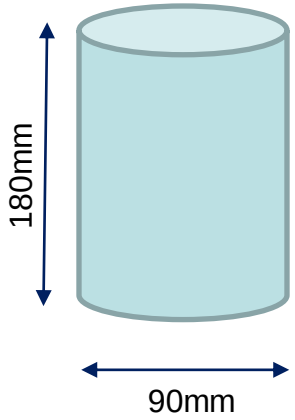
The Lunar CanSat

Standard CanSat:



Mass: 300g – 350g

Lunar CanSat:



Mass: 900g - 1kg