

CanSat Design Challenge 2024

Critical Design Review

Team name:

School/Group:

City/Town:

<You can put your Team logo, mission patch, or school crest here>

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# INTRODUCTION

## Team organisation and roles

Present the team members and their respective roles in the team. Include their:

* Grade, educational path that they are planning on pursuing (e.g. physics, computer science, mechanical engineering, etc.), and other interests.
* Role on the team, giving details of tasks

How many hours per week do you spend working on your CanSat? How much of that time is in school (e.g., in Physics class) or out of school?

Introduce your teacher/advisor.

## Mission objectives

Describe your selected secondary mission and the reasons why you selected that mission.

* What are you going to measure/investigate/test?
* What result do you expect from your mission?
* Define which objectives/results should be reached for the CanSat launch to be considered successful.
* Are there any reference sources that you used to design/develop your mission?

# Cansat Description

## Mission overview

Name the key elements that you will use to accomplish your objectives (e.g. sensors, cameras, materials to be tested, etc.).

The mission overview should not describe any design choices!

Below is a basic block diagram that is not completed; you should fill it in with all the functional and/or physical blocks of the experiment and describe in general how these elements interact, without providing any technical detail. 

## Mechanical/structural design

Describe the mechanical design, the material used for the CanSat structure and how every component is mounted to the structure. Identify the major components of the CanSat and include any drawings, pictures or diagrams of how the CanSat structure will look and where the major components such as the main board, sensors, transmitter, and battery will be placed.

Include mechanical drawings and a list of parts (sensors used). Explain what each part of the CanSat does.



The figure above is an example of a mechanical diagram, made by a team in the 2016 European CanSat Competition. It was accompanied by a paragraph describing the purpose of each component.

## Electrical design

Describe the electrical interfaces (and selected components) of the CanSat – you can use electronic drawings similar to the ones in the YouTube tutorial. Make sure to add labels.

Provide a power budget, detailing how much power each component consumes and indicate the battery capacity. Make an estimation of the power consumption and the lifetime of the batteries. If batteries are used, give information about their type and characteristics.

The following table can be used to calculate how long your batteries will last with the required power by the used components.

|  |  |  |  |
| --- | --- | --- | --- |
| Device | Voltage (V) | Current (mA) | Power (mW) |
| Camera |  |  |  |
| Sensor #1 |  |  |  |
| GPS |  |  |  |
| Total power |  |  |  |

With the power budget and pre-determined battery capacity (in mAh) you will be able to calculate and indicate how long your batteries will last (should always be more than 4 hours, per requirement #5).

## RF Design

Describe the usage of the RF link: data rate of downlink, protocol, data rate of uplink (if applicable).

## Software design

Describe the software design of the CanSat and how it is expected to work and detail the On-Board Data Handling (OBDH).

Provide a simple flow diagram of the software program flow (see the example included from a previous team). If applicable, describe different software modes.



Estimate the amount of data gathered and discuss its storage on-board the experiment or its transfer to the ground segment.

Indicate what programming language(s) and development environments are used.

## Recovery system

Give a brief description of the recovery system used and the method used to affix it to the CanSat structure. You can add a picture of a design, or digitally-made diagrams similar to the example below from a former CanSat team.

What shape of parachute are you using, and why? Show the parachute equation(s) that you used to determine how the parachute dimensions.

Indicate the expected descent rate and flight time.

# Project Planning

## Time schedule of the CanSat preparation

Provide a schedule that includes the phases of design, prototyping, construction, testing and all key dates and deadlines.

## Resource estimation

### Budget

List all the foreseen costs in a table form. Any in-kind sponsorship of hardware should be included. Software should not be included. Include 95€ as the cost of any CanSat kit provided by ESA.

### External support

List the organisations, departments or companies that provide sponsorship or in-kind support. For example, teachers, local companies, r nearby research laboratories, etc. Mention any support or expertise which is lacking as well.

## Test plan

Describe all the tests that will be performed in order to verify that your CanSat can carry out both the primary and secondary missions.

Describe also any test developed to verify the correct deployment of the recovery system of the CanSat (parachute, airbag, etc).

You can add pictures, drawings, or links to videos.

# outreach programme

Outline the approach to outreach and communication about your project.

Describe the team’s outreach programme (e.g. a team’s website, blog or social media platform) and how it will evolve, what outreach activities you plan to do and when. Provide links.

Include a summary list or table of all outreach actions performed and any media coverage received. Suggested outreach activities and media coverage are (but not limited to):

* A link to your website / blog / social media platform
* Any performed outreach actions, e.g. publishing press releases, contacting journalists, designing a logo or information brochure
* Details of media coverage, e.g. newspaper articles, radio/TV interviews, internet news articles, etc.
* Presentations given by the team members, e.g. at the school or a local event
* Exhibitions of the experiment, e.g. at a fair or school open day

Include photographs of the above if possible (ensure you have permission when including educational outreach photos of other students).

# Requirements Verification

To be able to launch the CanSat safely from the Rocket, the CanSat should meet the requirements listed in the competition Requirements document.

Complete the following table by specifying the exact characteristics of your CanSat. Please make sure that the figures (numbers) indicated here correspond to the same figures and their units as in other sections of the document.

|  |  |
| --- | --- |
| Characteristics | Value (number + units) |
| Height of the CanSat |  |
| Mass of the CanSat |  |
| Diameter of the CanSat |  |
| Flight time scheduled |  |
| Calculated descent rate |  |
| Operational duration when ON |  |
| Total cost |  |

Teams are free and encouraged to add additional requirements based on their secondary mission.