UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH
Escola Superior d'Enginyeries Industrial,
Aeroespacial i Audiovisual de Terrassa

Disseny d'un petit coet reutilitzable amb aterratge vertical - Design of a reusable model rocket with vertical landing.

BACHELOR FINAL THESIS

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This document contains: TECHNICAL SHEET

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0.1 Aerodynamic Brake System

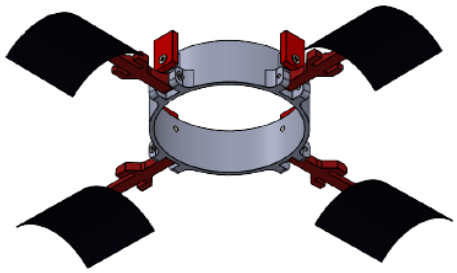

Figure 1 Schematic design. Source: own file.

An Aerodynamic Brake System that generates drag, slows down the vehicle and helps the rocket stay in an optimal attitude range where the thrust vectoring control can operate properly. It can be deployed by the flight computer when it is necessary to activate.

Characteristics

Width [mm]	$273.3x273.3$
Height [mm]	24
Structure material	PLA
Drag surface material	$Carboard$
Re-usable	YES

Table 1 ABS features. Source: own.

0.2 Landing Leg System

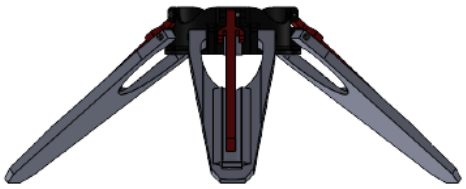

Figure 2 Schematic design. Source: own file.

A Landing Leg System with a tripod configuration to support the rocket when landing softly on the ground. It is enabled by the flight computer.

Characteristics

Width [mm]	$400x400$
Height [mm]	35
Structure material	PLA
Re-usable	YES

Table 2 LLS features. Source: own.

0.3 Thrust Vector Control

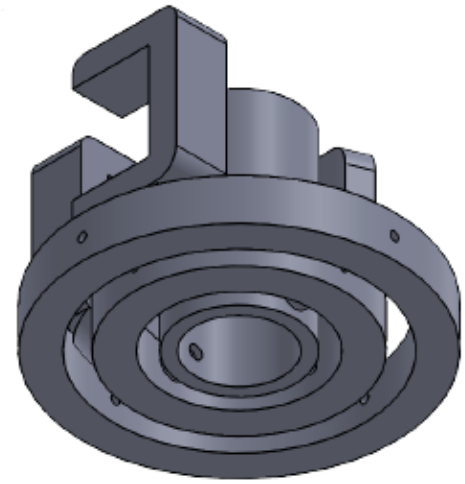

Figure 3 TVC. Source: own file.

A Thrust Vector Control Mount to correct the attitude of the rocket, pitch and yaw. It is a gimbal with 2-axes controlled by two servos that are commanded by the flight computer. It is designed to hold engines between $18mm$ and $27mm$.

Characteristics

Width [mm]	$75x75$
Height [mm]	50
Structure material	PLA
Re-usable	YES
Number of servos	2
Number of engines	1
Max. Sweep Response [Hz]	10

Table 3 TVC features. Source: own.

0.4 Flight Computer

A flight computer that with the data from the IMU sensor can determine its attitude. An algorithm that process data in real-time computes the precise deflection of the TVC to correct the angular position of the rocket while landing. Moreover, it is in charge of deploying the Landing Legs System, the Aerodynamic Brake System, and triggers the engine's ignition. In parallel, the flight computer receives information from a barometric sensor and with the data from the IMU, it processes data to obtain velocities, acceleration and altitude and log the values into an SD card for later review.

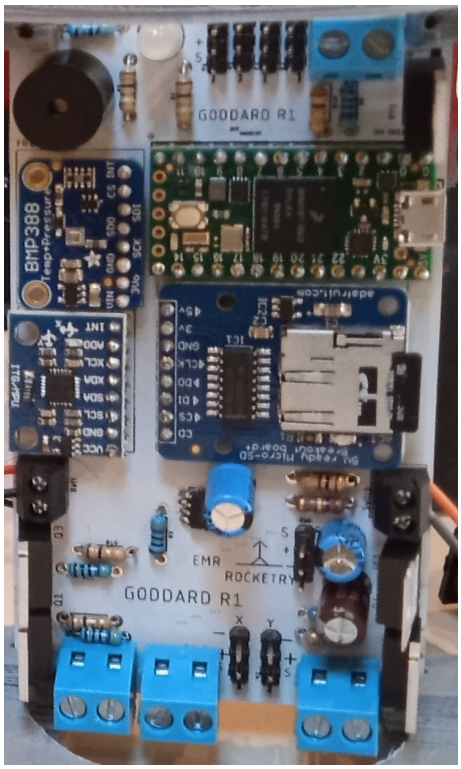

Figure 4 Front of the flight computer. Source: own.

Characteristics

Width [mm]	55
Height [mm]	100
Depth [mm]	1.5
Re-usable	YES
Power Supply	$7.4 - 15V$
Microcontroller	*Teensy* 4.0
Processor	$ARM\ CORTEX - M7$
Clock Speed [MHz]	600
Max. IMU Sample Rate [Hz]	200
Max. Barometer Sample Rate [Hz]	200
Storage	$micro - SDcard$

Table 4 Flight Computer features. Source: own.