

NUCLEO DE AEROESPACIAL

ASTRO

Electronics Report

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Abbreviations

- SRAD – Student Research and Development
- COTS – Commercial Off The Shelf
- RTOS – Real time operating system

1 Electronics Working Volume

- **Dimensions:** 200 mm × 119 mm (inner diameter)
- **Possible PCB positioning:** triangular configuration



Figure 1: View of future PCB placement

| PCB | Designation |
|-------|-------------|
| PCB 1 | SRAD |
| PCB 2 | COTS |
| PCB 3 | PSU |

2 Electronic Components

2.1 SRAD

| Device | Voltage (V) | Current (mA) | Power (mW) |
|-----------------------------|-------------|--------------|------------|
| CPU STM32F411 | 1.8 – 3.6 | ? | ? |
| 6DOF IMU ICM-45686 | 3.3 | 34 | ? |
| 3DOF accelerometer ADXL375 | 2.0–3.6 | 145 µA | ? |
| 3DOF magnetometer LIS2MDL | 1.71 – 3.6 | 200 µA | ? |
| Barometer MS5607 | 1.8–3.6 V | 1.4 | ? |
| GPS module NEO-M9N | 3.6 | ? | ? |
| LoRa SX1278 Ra-02 | 1.8 – 3.3 | 105 | ? |
| SparkFun microSD Transflash | 3.3 | 20 | ? |

2.2 COTS

| Device | Voltage (V) | Current (mA) | Power (mW) |
|-----------|-------------|--------------|------------|
| CATS Vega | 7–24 | 100 | 321.75 |

2.3 PSU

- Converts main battery voltage to 5 V, and 3.3 V
- Can be disconnected via an arming pin (to be removed before flight)

Battery System

Electrical power is supplied by two Lithium-Polymer (LiPo) batteries:

- **Main Battery (SRAD):** 7.4 V, 2400 mA·h
- **Redundancy Battery (COTS Flight Computer):** 7.4 V, 2400 mA·h

Gens ace 2400mAh 2S 7.4V RX Lipo Battery Pack with JST-SYP Plug

| Parameter | Value |
|---------------------------------|------------|
| Balancer Connector Type | JST-XHR-2P |
| Brand | Gens Ace |
| Capacity (mAh) | 2400 |
| Configuration | 2S1P |
| Connector Type | JST-SYP |
| Discharge Rate (C) | / |
| Height ($\pm 2\text{mm}$) | 17 |
| Is Featured Product | No |
| Length ($\pm 5\text{mm}$) | 88 |
| Max Burst Discharge Rate (C) | NO |
| Net Weight ($\pm 20\text{g}$) | 94 |
| Over 300Wh | No |
| Preorder Config | No |
| Store No. | M502A |
| Voltage (V) | 7.4 |
| Width ($\pm 2\text{mm}$) | 29 |
| Wire Gauge | AWG20# |
| Discharge Wire Length (mm) | 80 |
| Quantity per Box | 42 pcs/box |
| Capacity Range (mAh) | 1000–2999 |

Table 1: Specifications of Gens Ace 7.4V 2400mAh LiPo Battery

Additionally, external power can be provided via a pad connector to keep the main battery fully charged during pre-flight checks.

3 Control Logic / Operating System

- The COTS system will always send the recovery deployment signal.
- It will overrule any other signal sent by the SRAD computer.
- RTOS: FreeRTOS

4 Control System / Dynamics

(Section Placeholder)

5 Ground Station

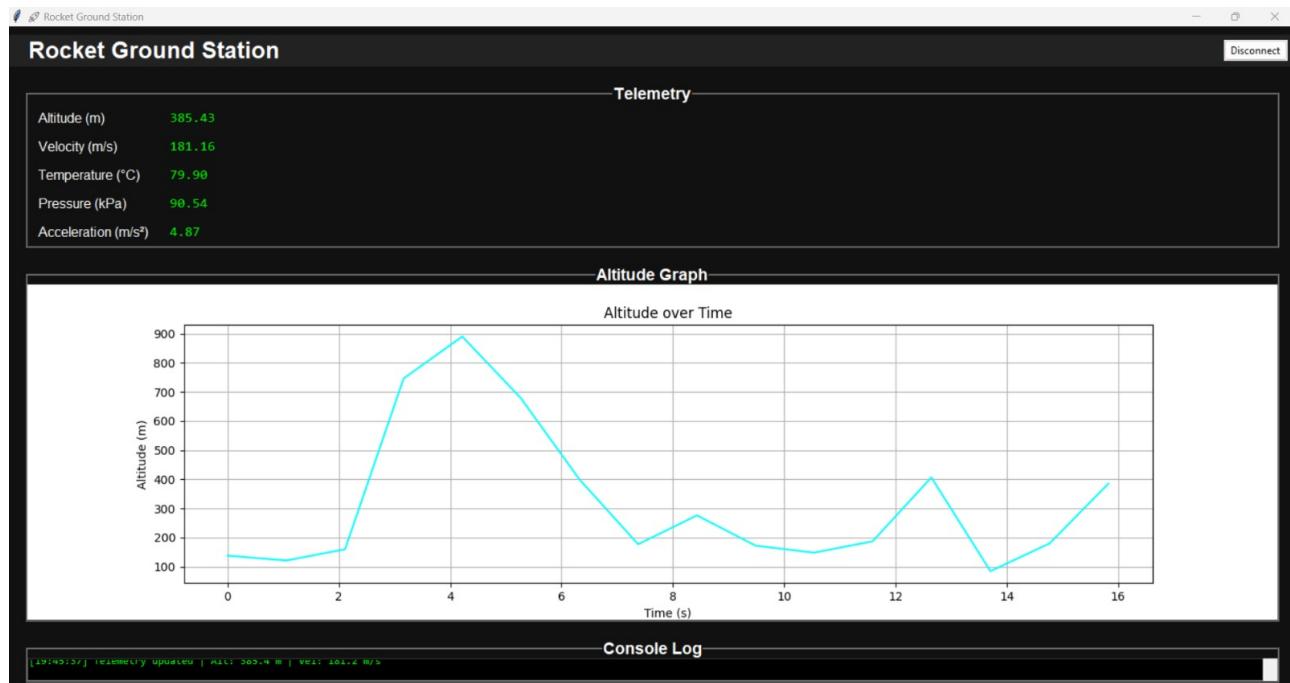


Figure 2: Current Ground Station

TODO:

- Add simulation CSV data input
- Display position in 3D
- Temperature data
- Airbrake percentage
- Gyroscope pressure data
- Parachute trigger (main/rogue)
- Ask for team feedback
- Rocket arming signal
- Time tracking
- Internal pressure measurement