PROJET LEONIDAS

ALEX CARRERA

SPOSORISÉ PAR JAVAD

FSDIE SORBONNE UNIVERSITÉ Fonds de solidarité et de développement des initiatives étudiantes

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PROJECT PRESENTATION – FRENCH – NOT FINAL VERSION

sommaire

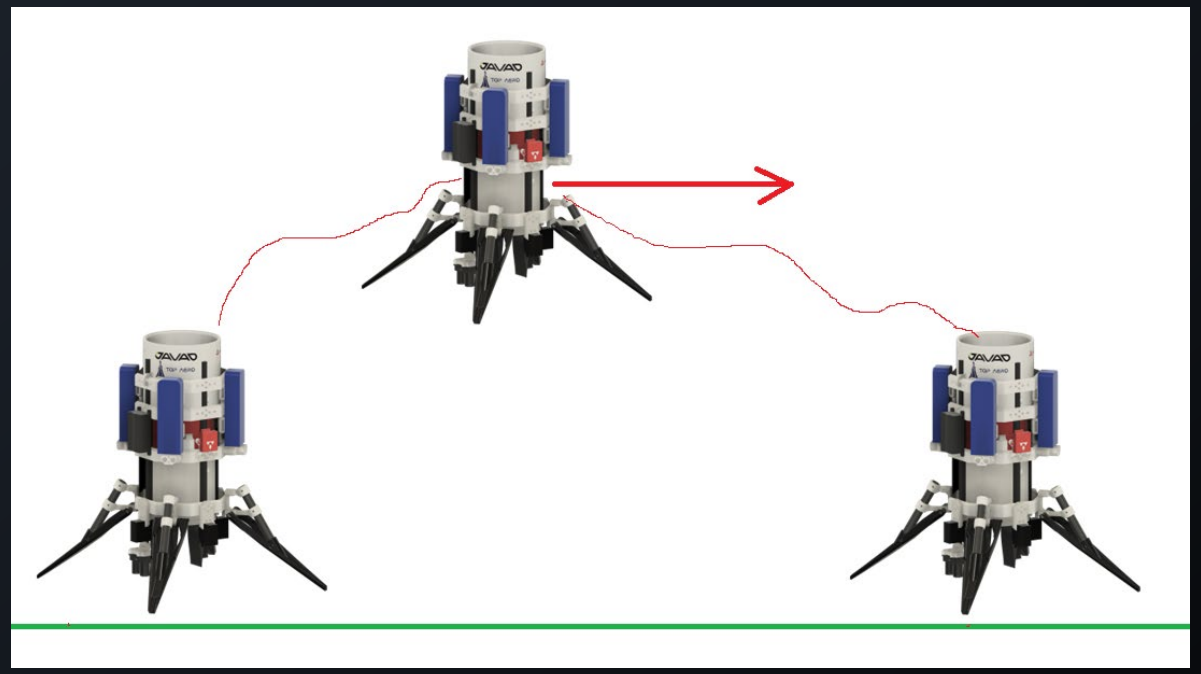
Introduction

- Aspect mécanique
- Propulsion
- Capteurs
- Ordinateur de bord
- Stabilisation et contrôle
- Base

Futures étapes et conclusion

introduction

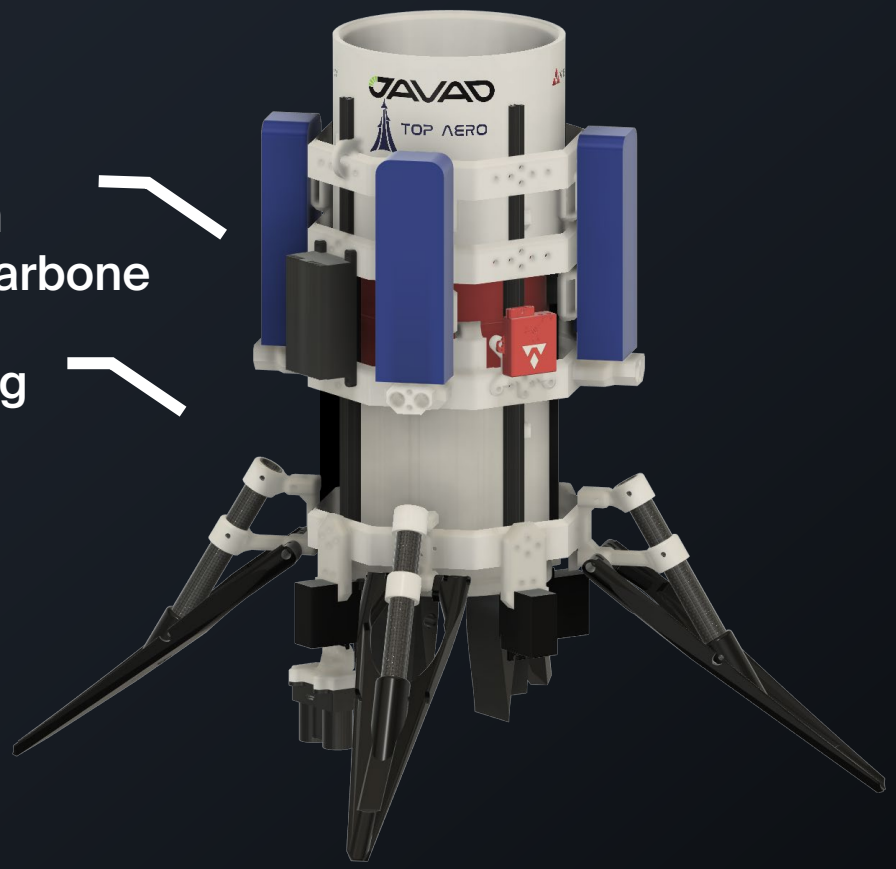
Atterrissage des *boosters* du Falcon H.- *SpaceX*



introduction

PLA
Aluminium
Fibre de Carbone

4kg

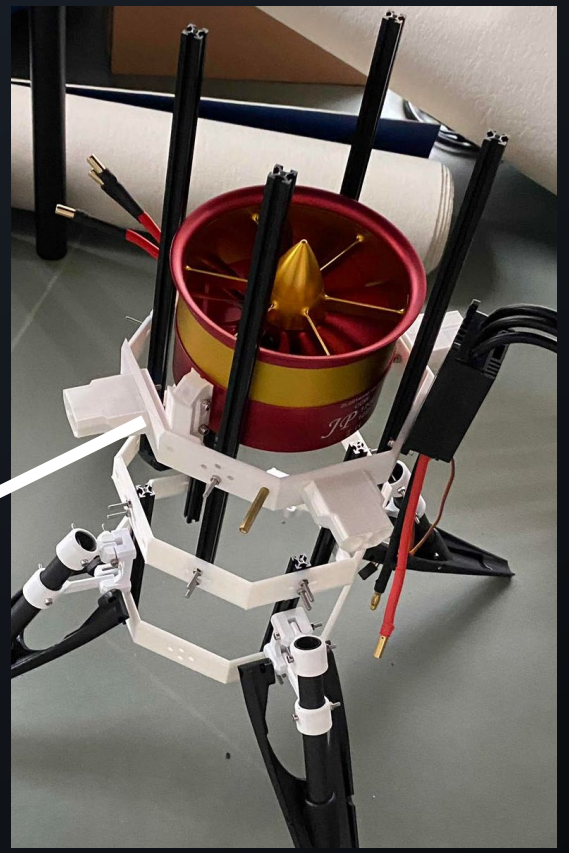


50 cm

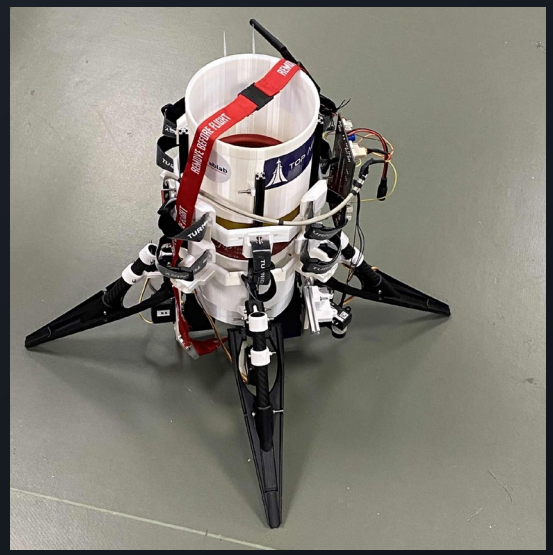
Construction mécanique

Profilés en aluminium - *MakerBeam*

Sections en PLA

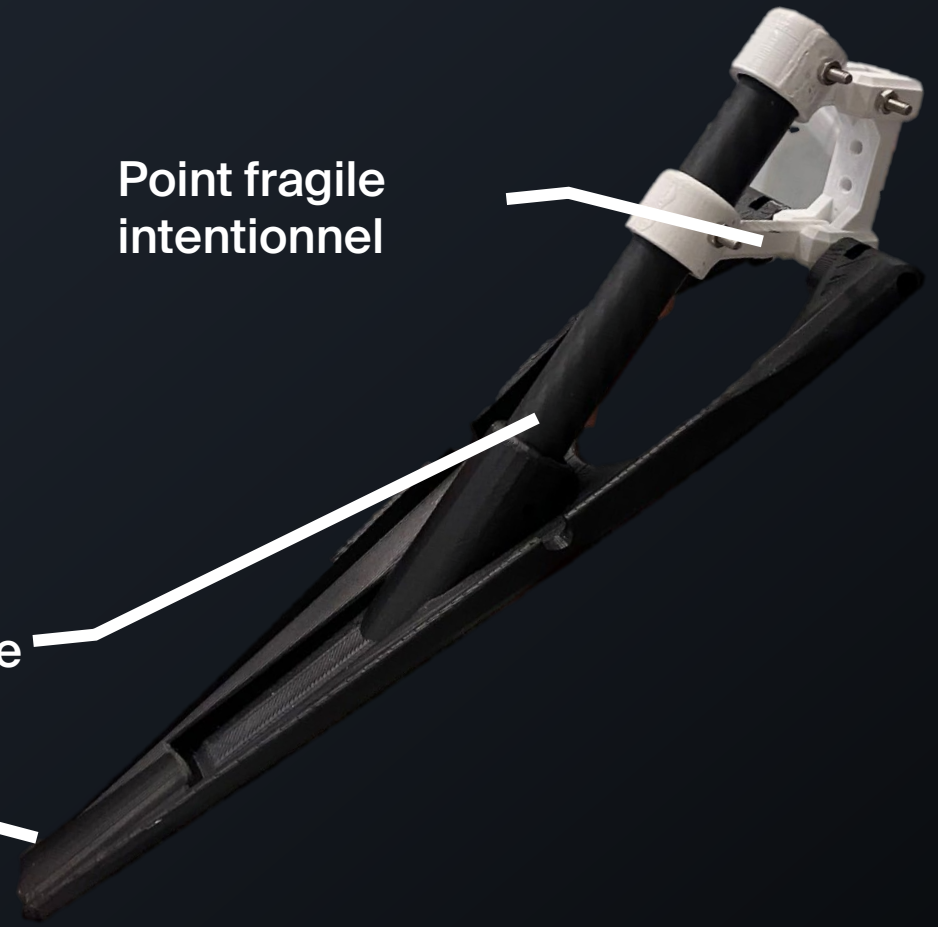


Construction mécanique

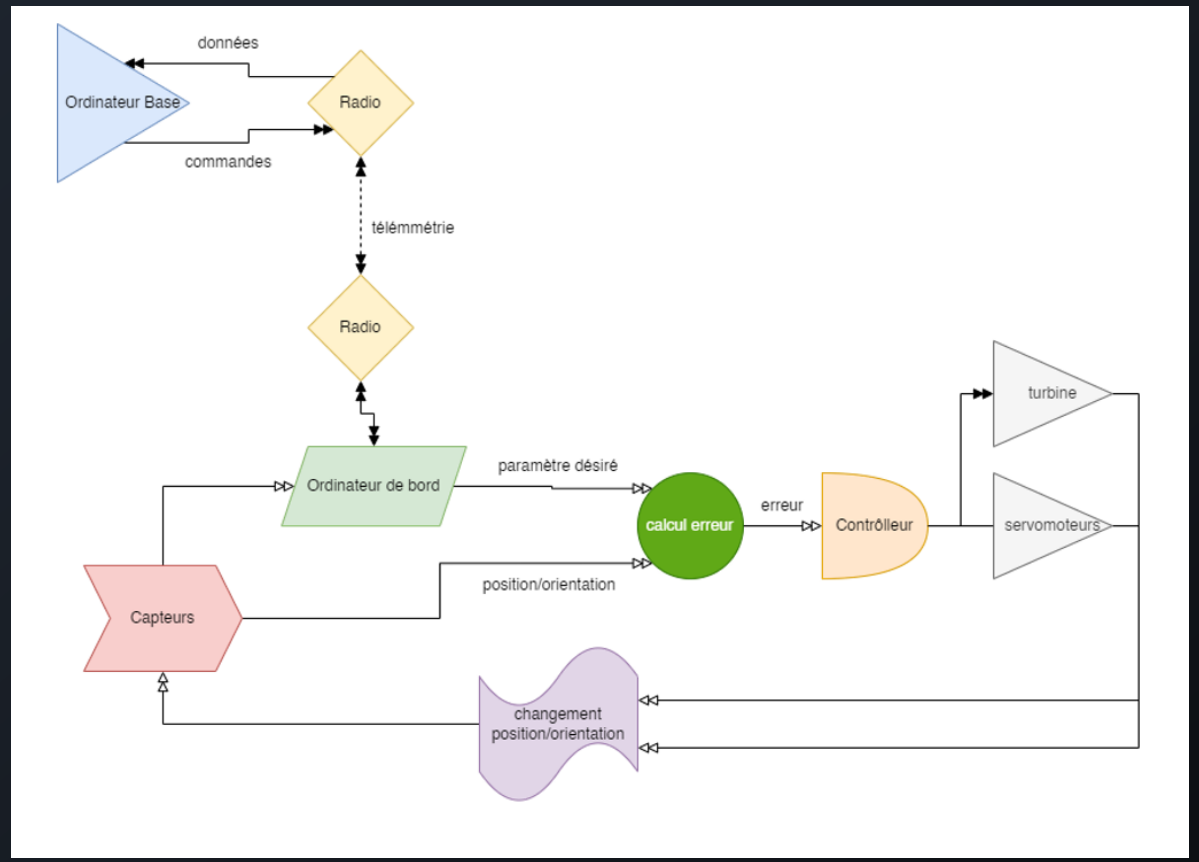


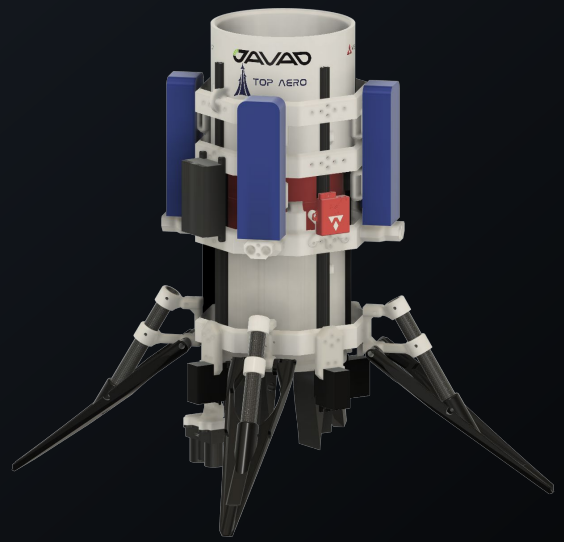
750g

Construction mécanique

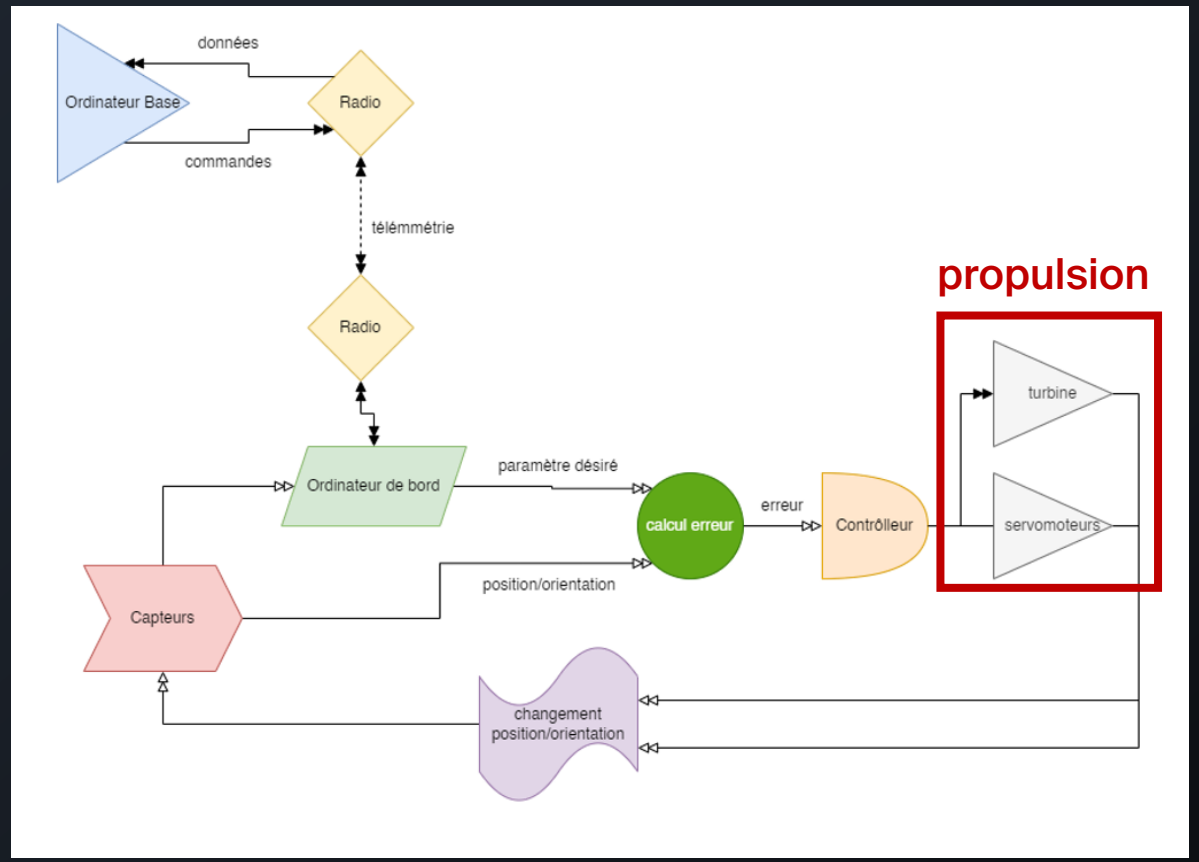


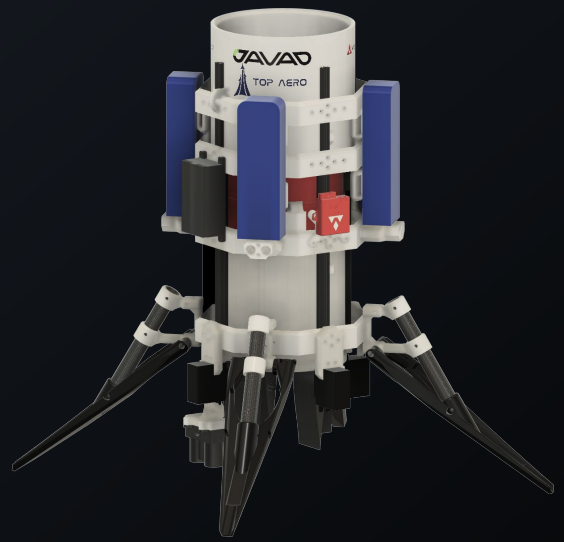
principe de fonctionnement





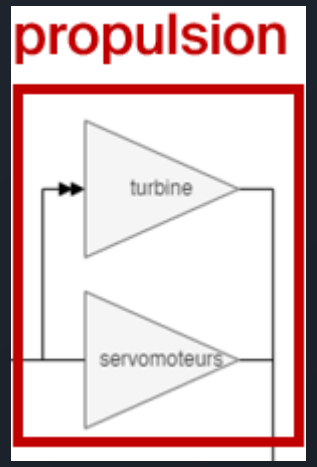
principe de fonctionnement





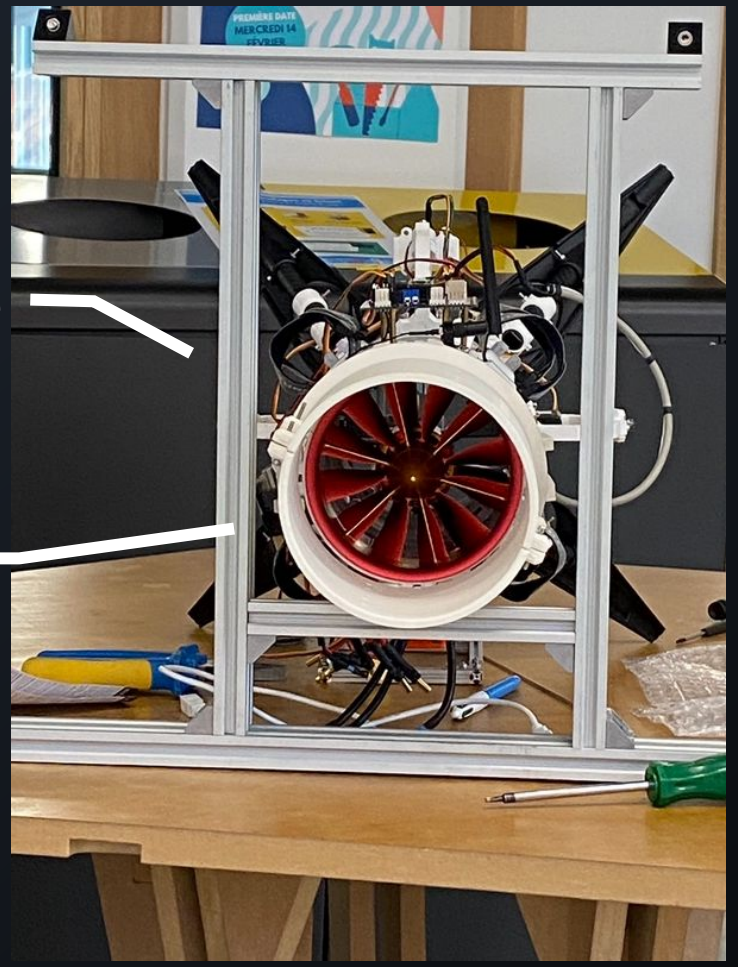
principe de fonctionnement

propulsion

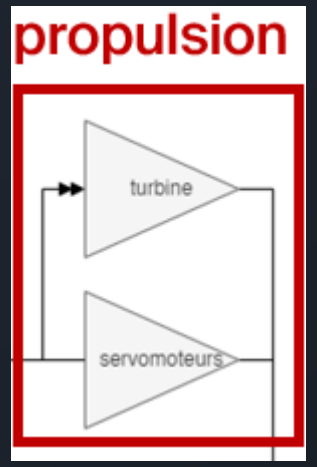


Turbine électrique
120mm – 8 kW

9.5kg – 94N
de poussée

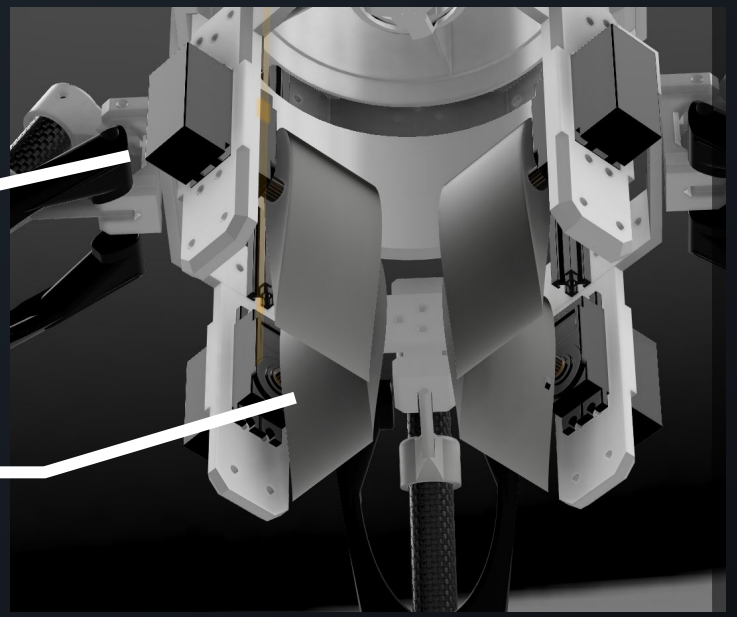


principe de fonctionnement

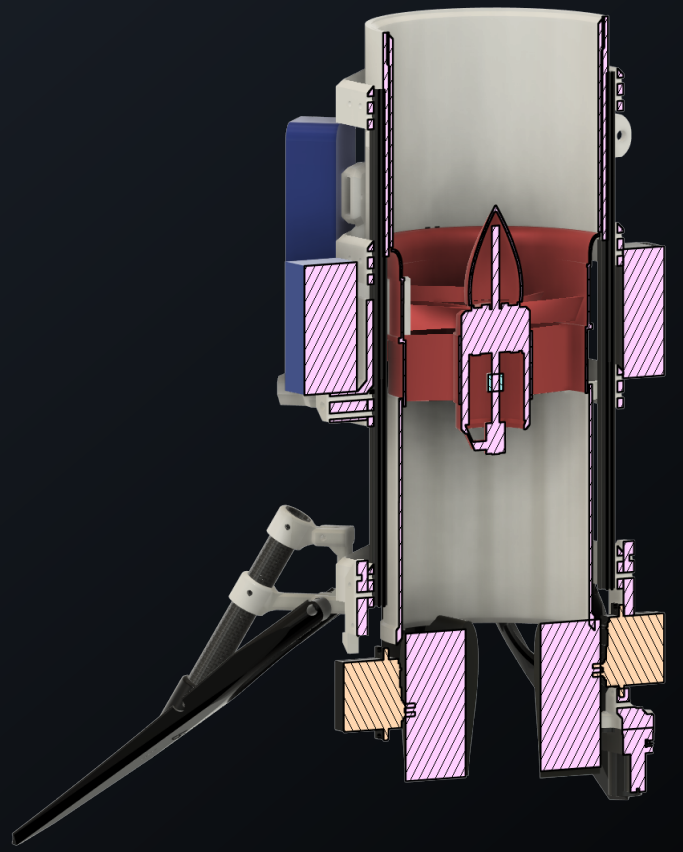


servomoteur

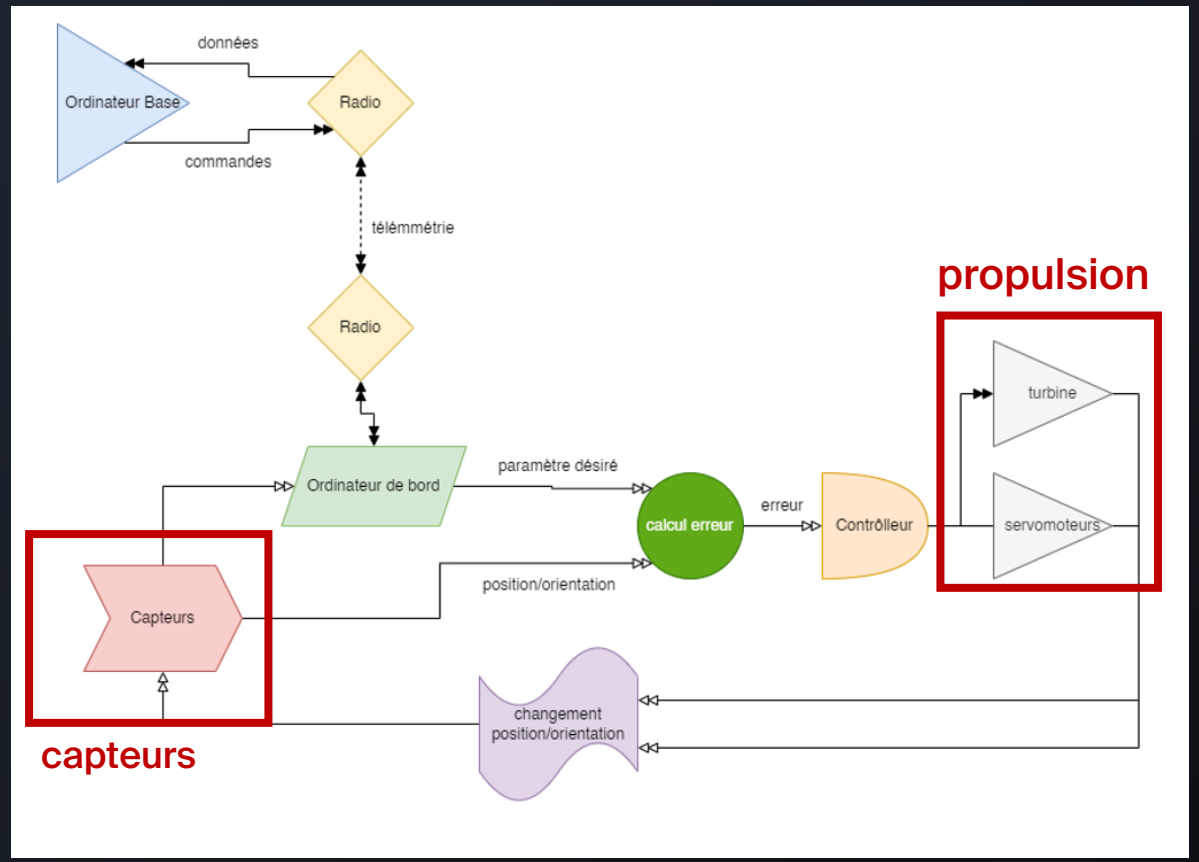
pâles de contrôle

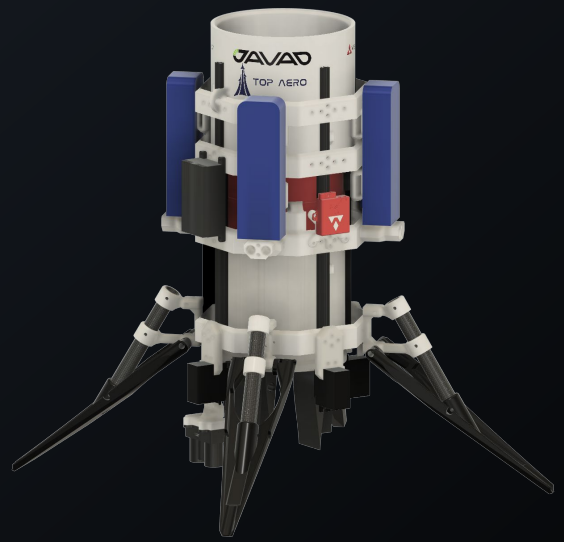


entrée d'air

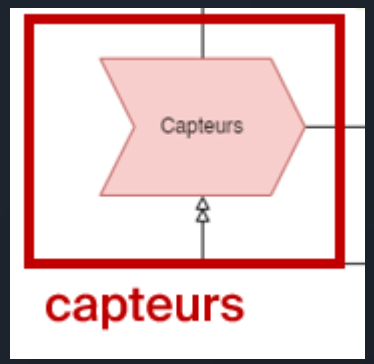


principe de fonctionnement





Capteurs / électronique

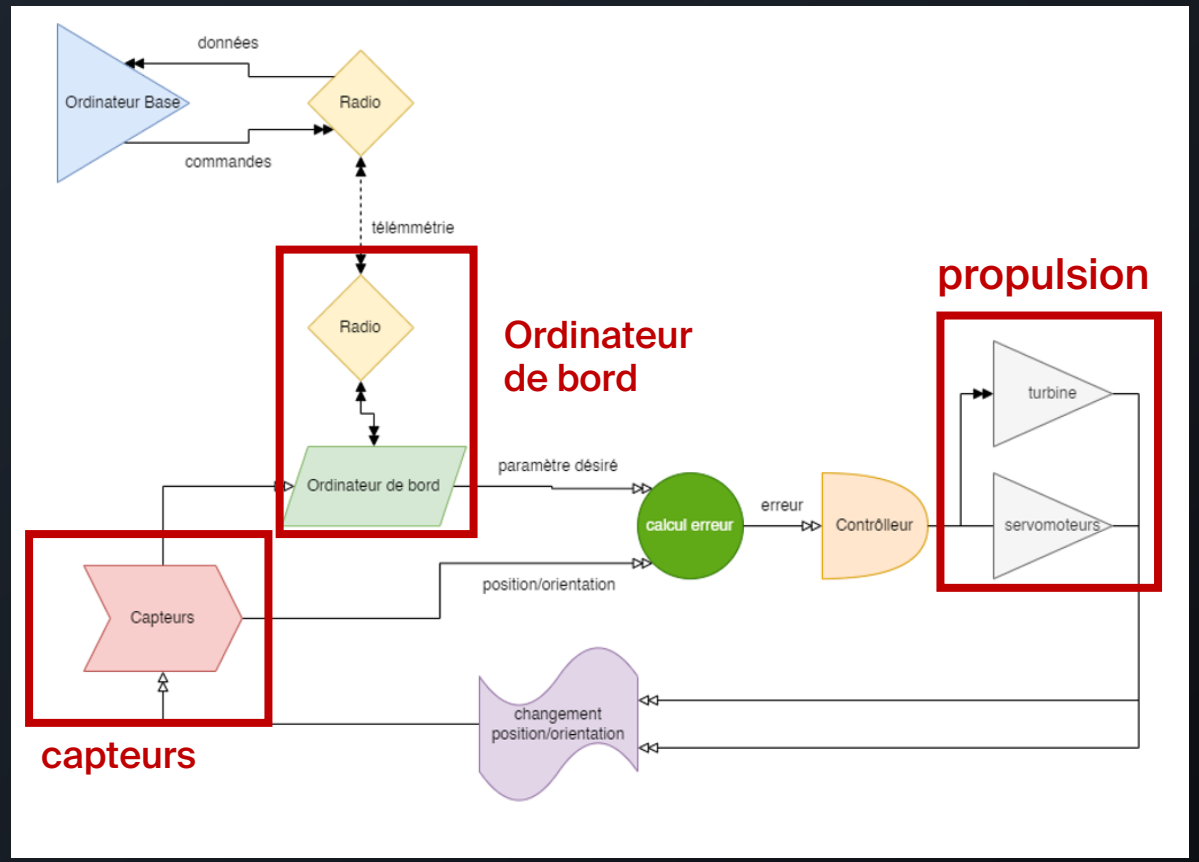


LiDAR- Garmin distance L-S

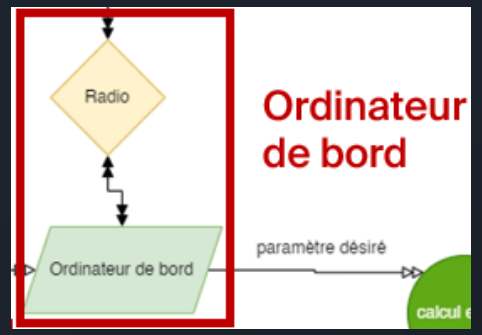
VN-300 - orientation

TR-G2 - position

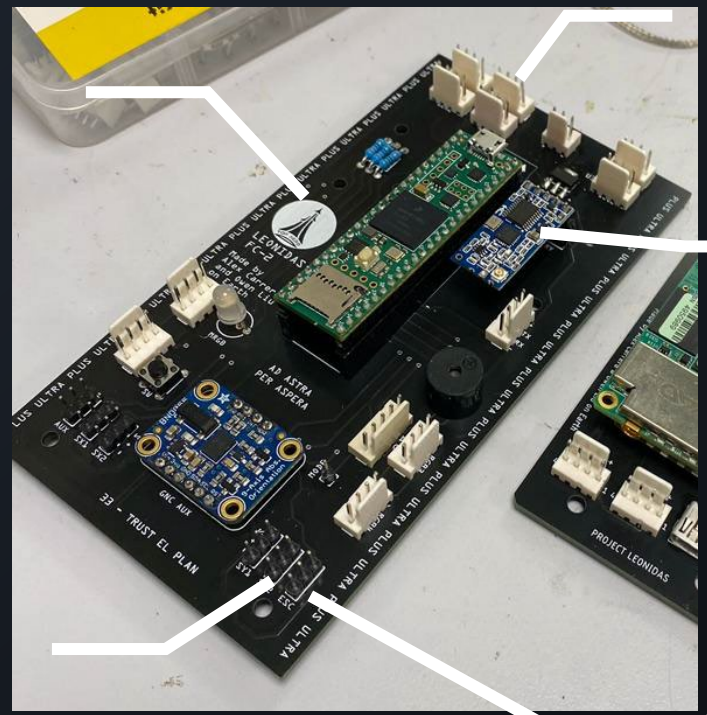
principe de fonctionnement



Ordinateur de bord



Teensy 4.1

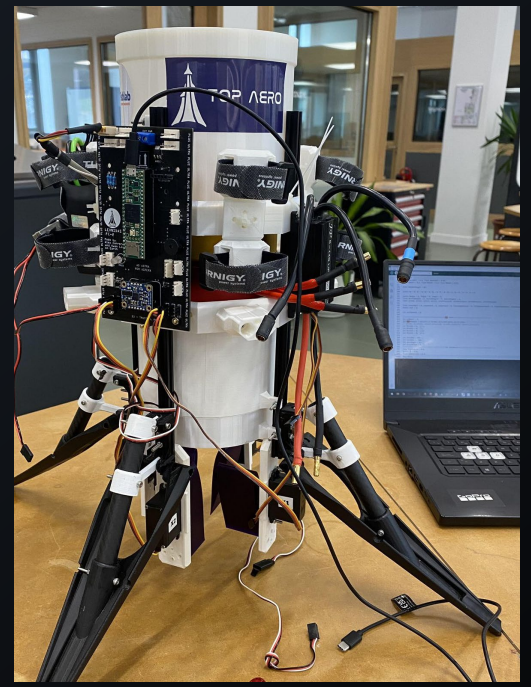


Connection TR-2S + VN-300

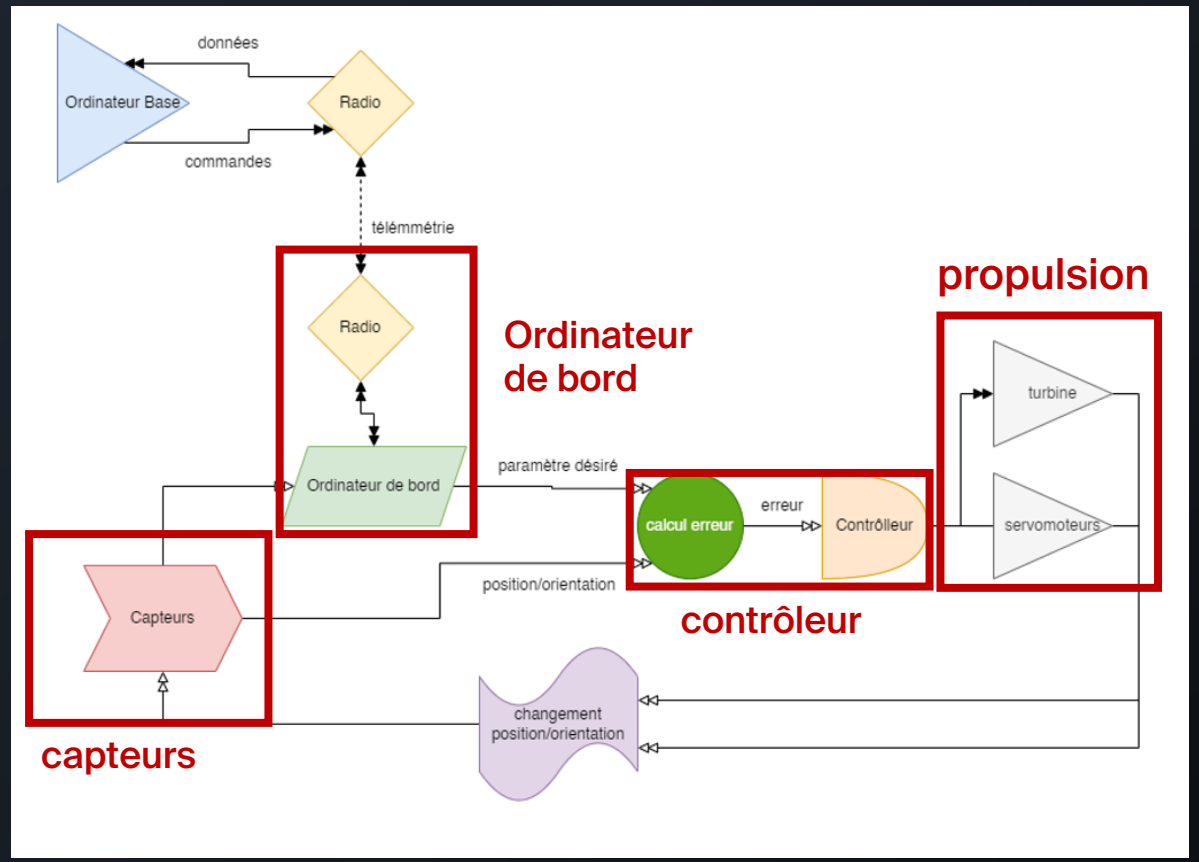
Radio

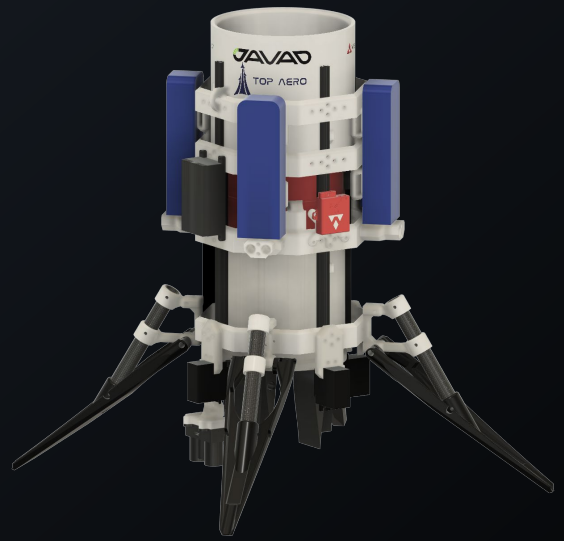
Connections servos

Connection turbine

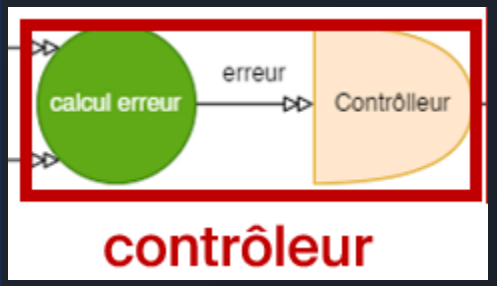


principe de fonctionnement





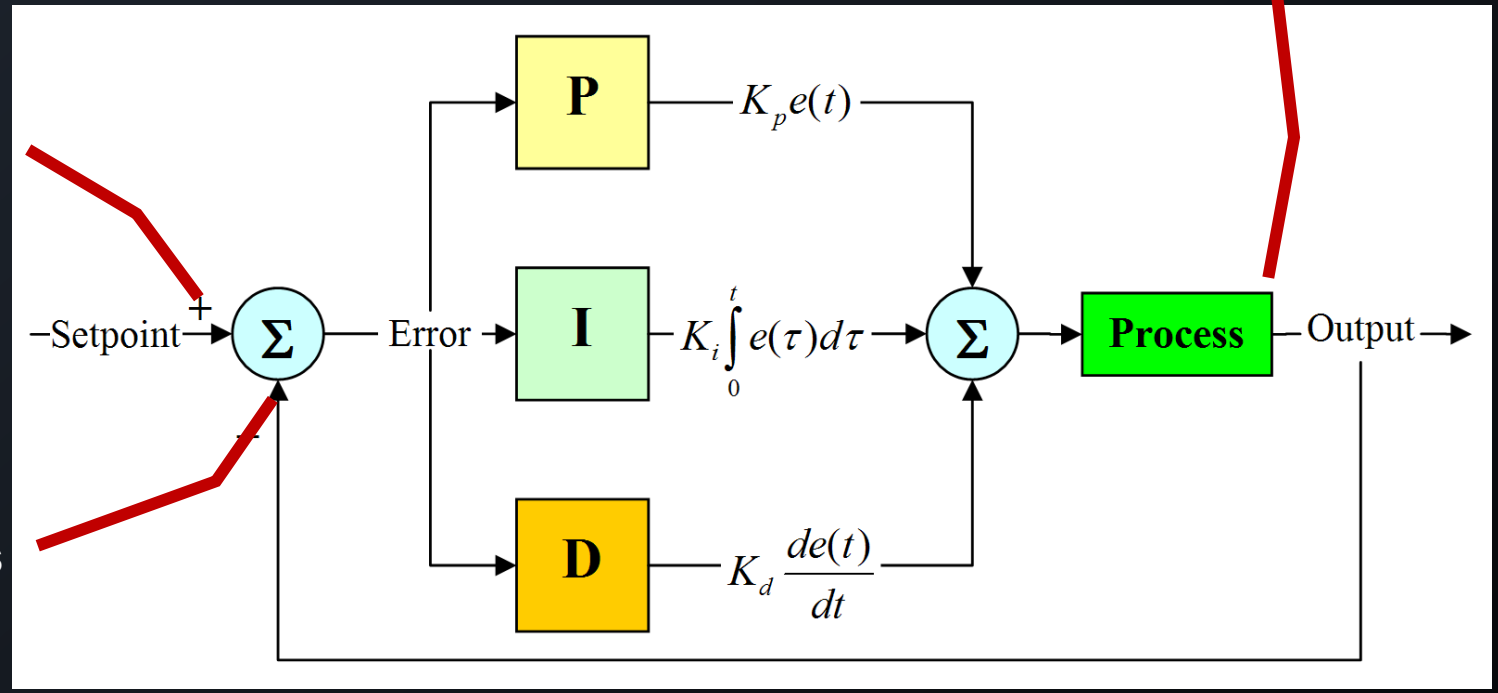
Contrôleur/régulateur



Paramètre désiré

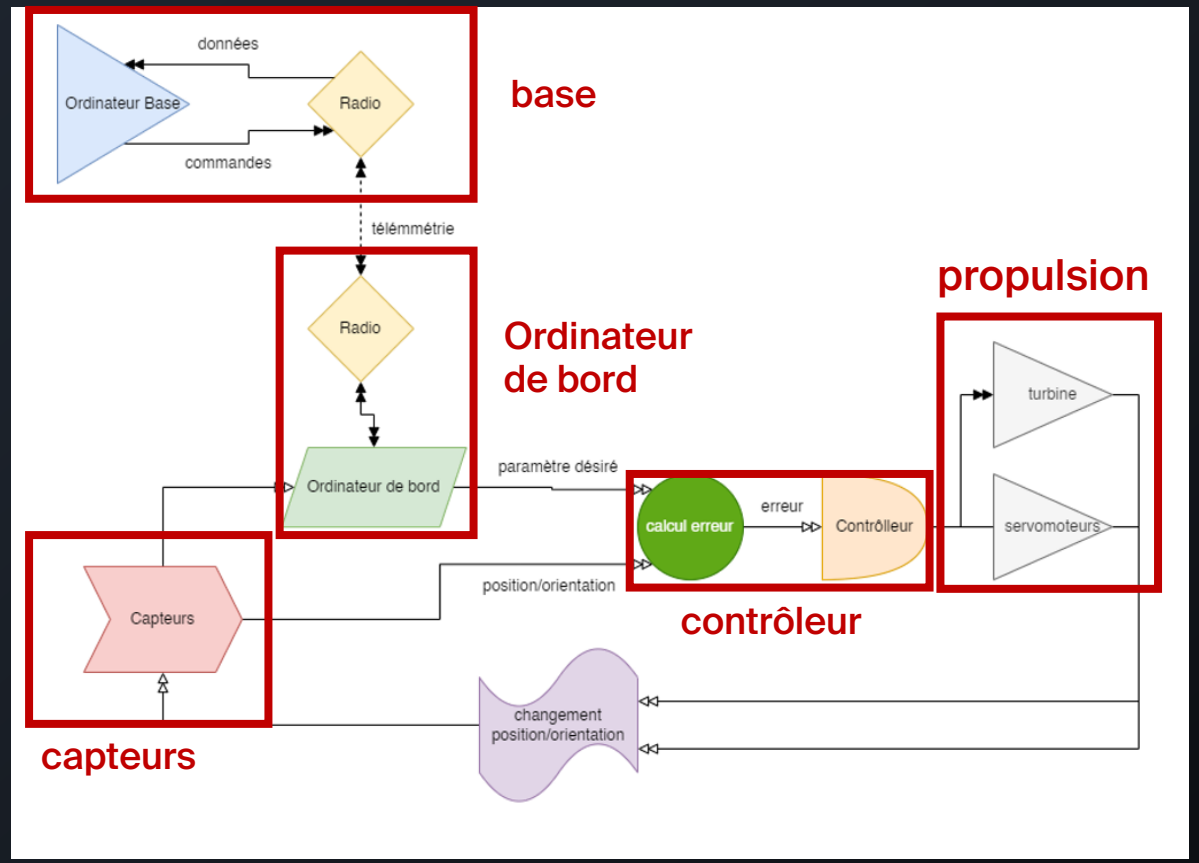
Données capteurs

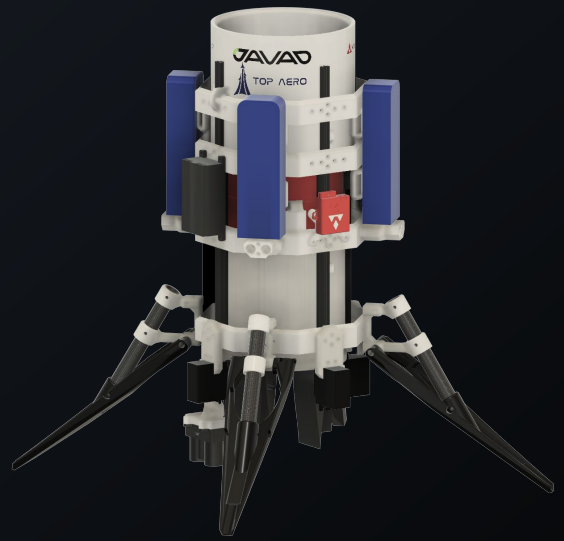
Servomoteurs / Turbine / Autres



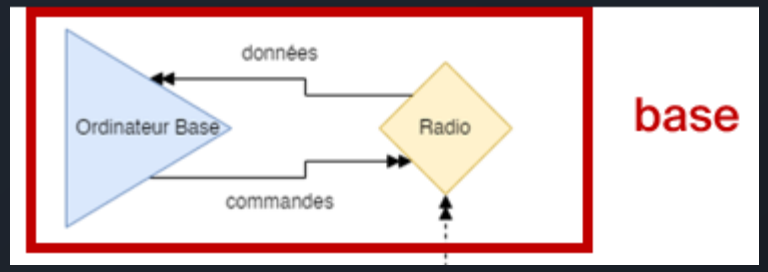
Régulateur PID – *microcontrollerslab.com*

principe de fonctionnement

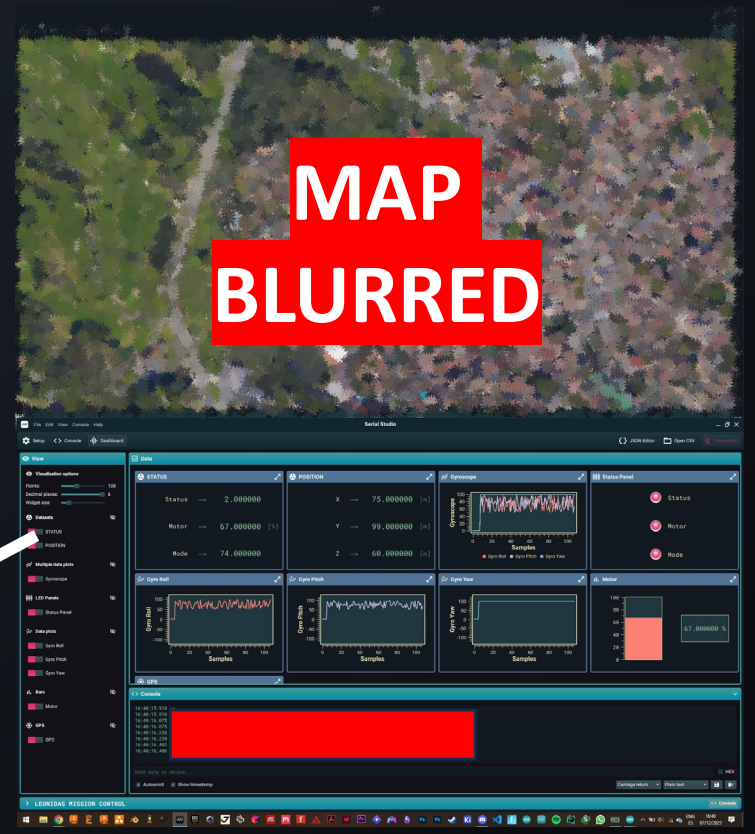




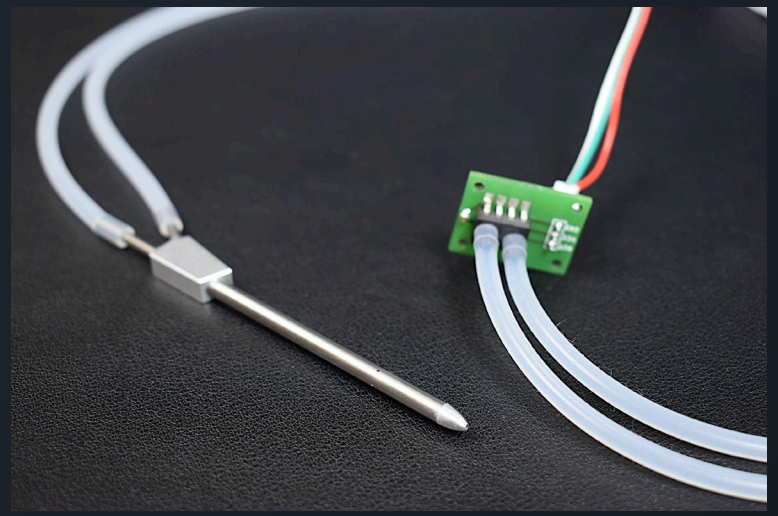
Base



Données + Commandes en temps réel – 20Hz

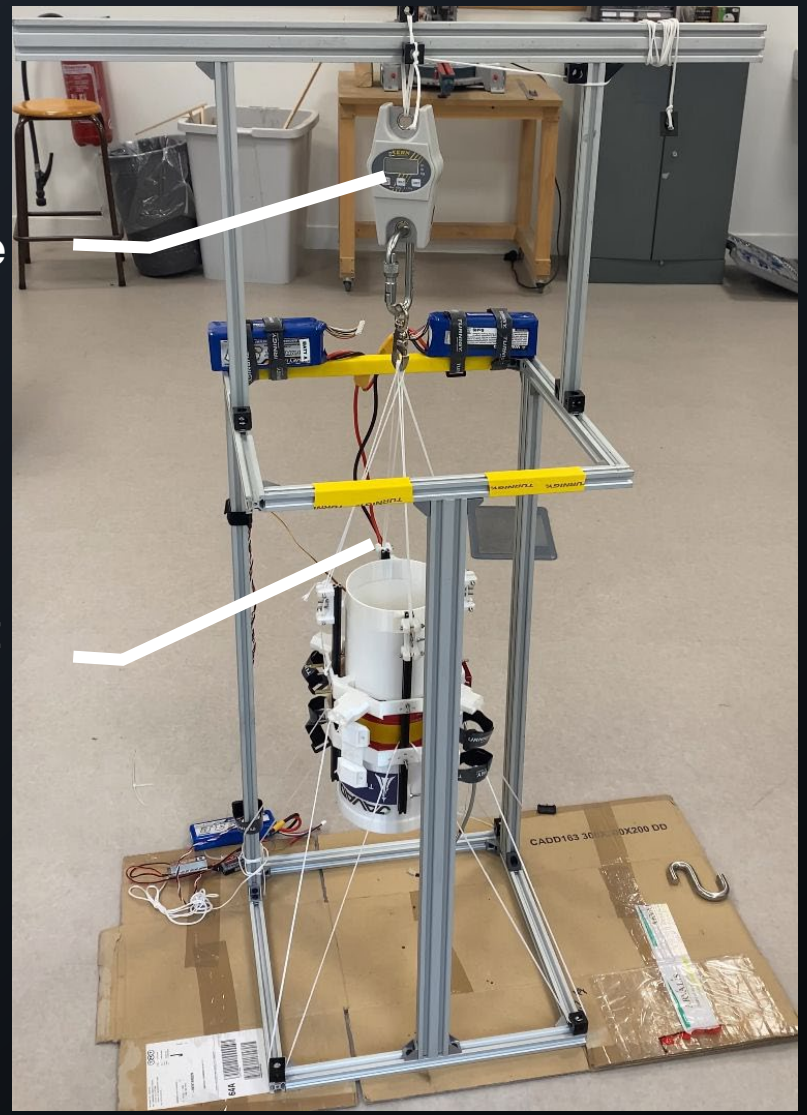


Banc de test



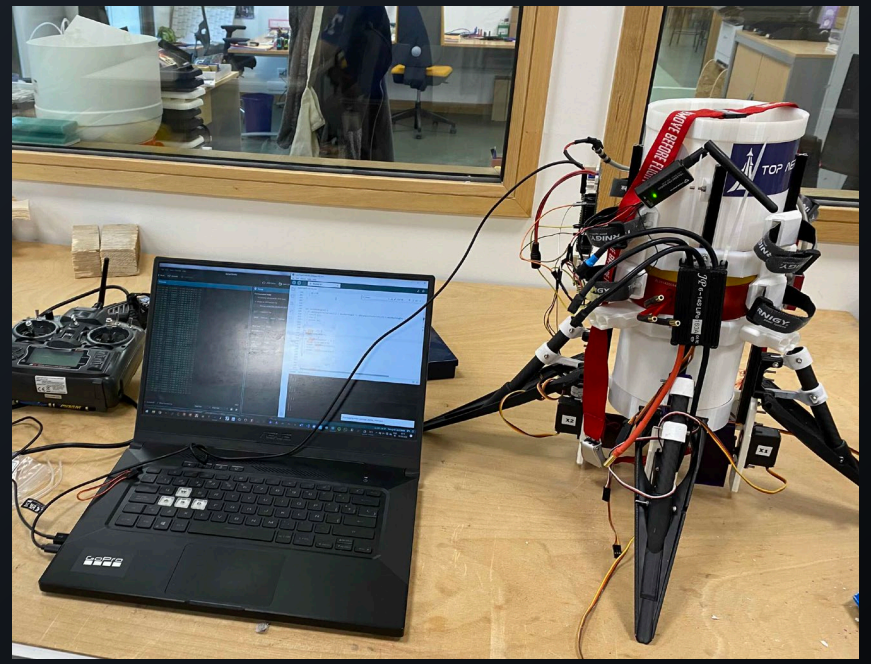
Capteur de force
±0.1 N

Sonde pitot
± 1m/s*



conclusion

- Atterrisseur à la verticale
- Propulsé électriquement
- Autonome
- Utilisation pâles et capteurs pour se stabiliser
- Utilisation du banc de test
- Réalisations simulations
- Saut en Septembre 2024

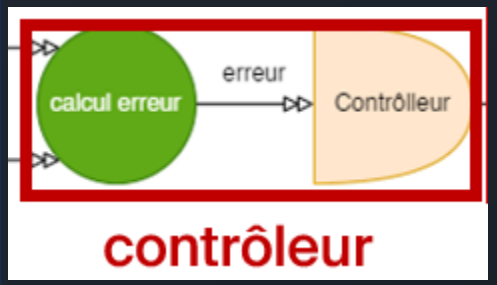


conclusion

"We're about 75% done with only 80 to go now" – *@BuilderCreator*

Merci de votre attention

Contrôleur/régulateur



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Données capteurs

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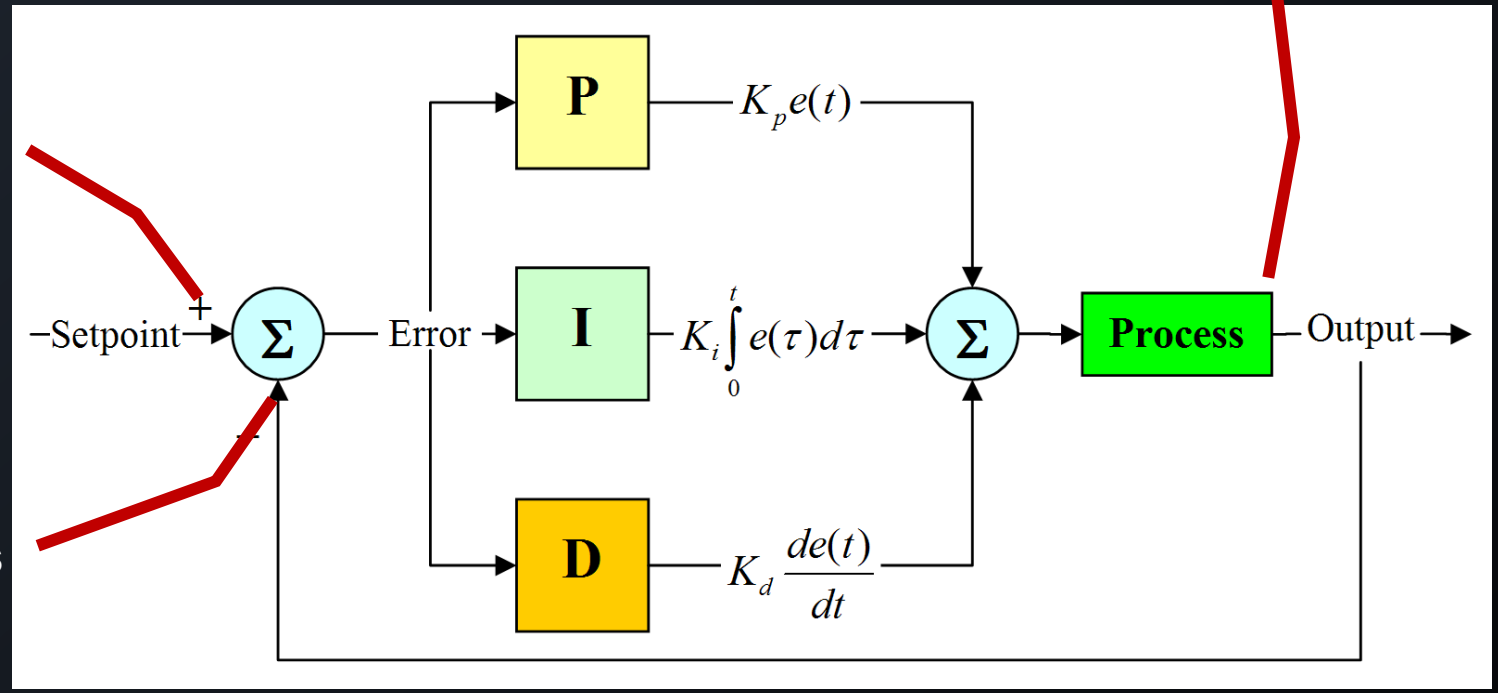
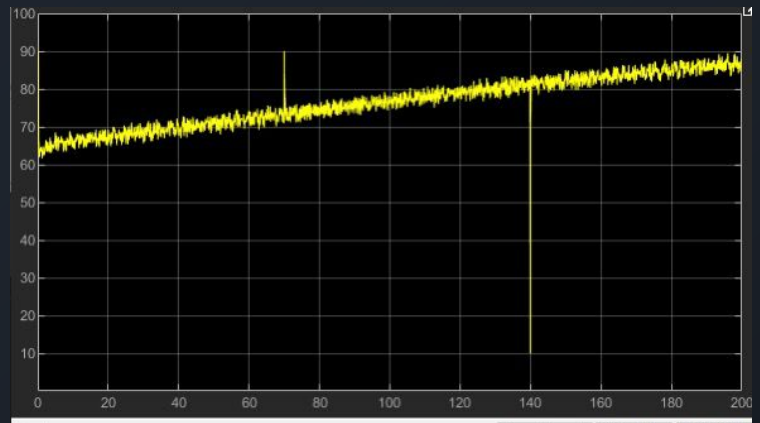
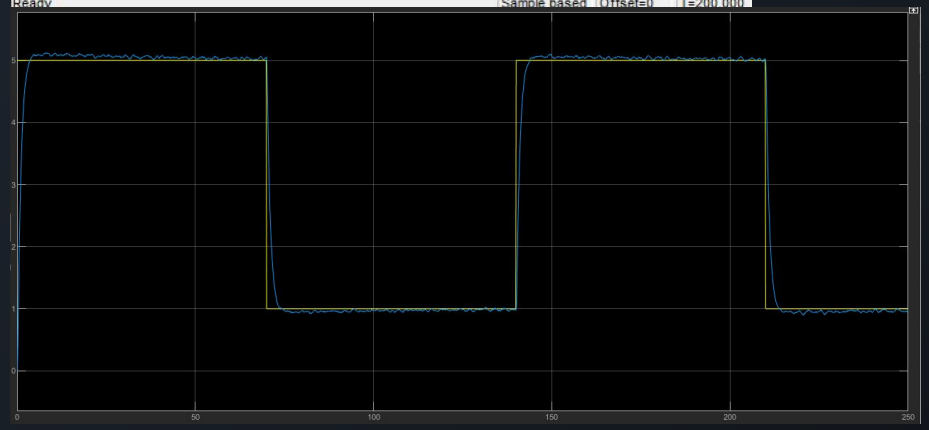
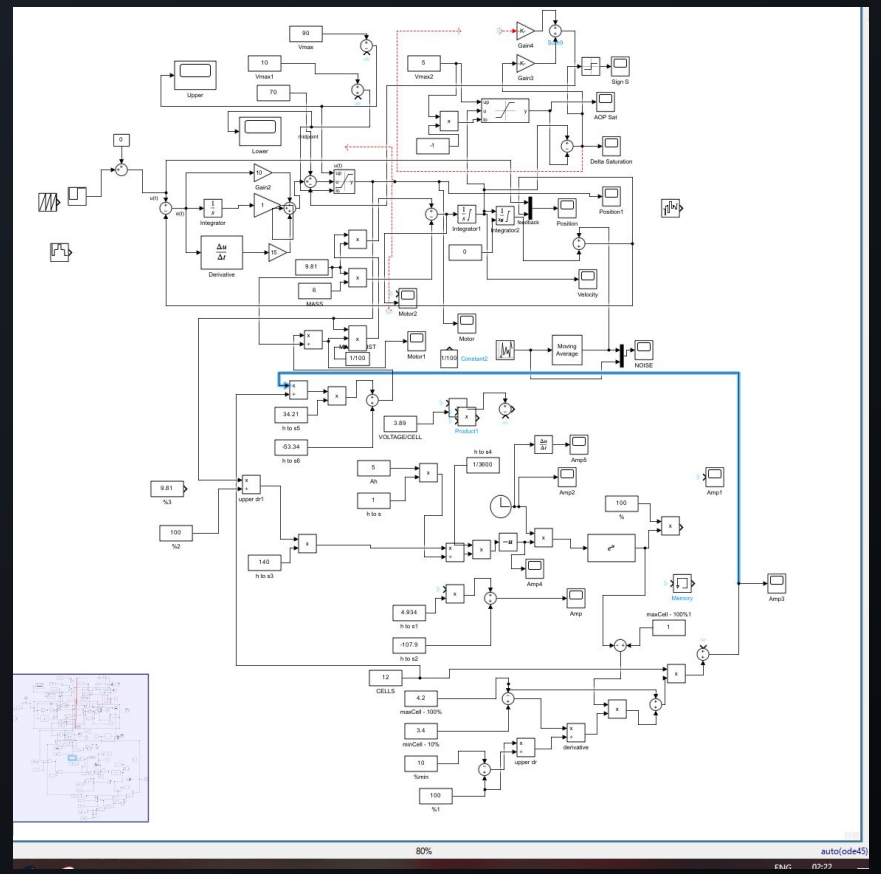


Régulateur PID – *microcontrollerslab.com*

Futures étapes: Simulations







Ordinateur de bord
Code

Code pour stabilisation de l'orientation seulement et *altitude hold*

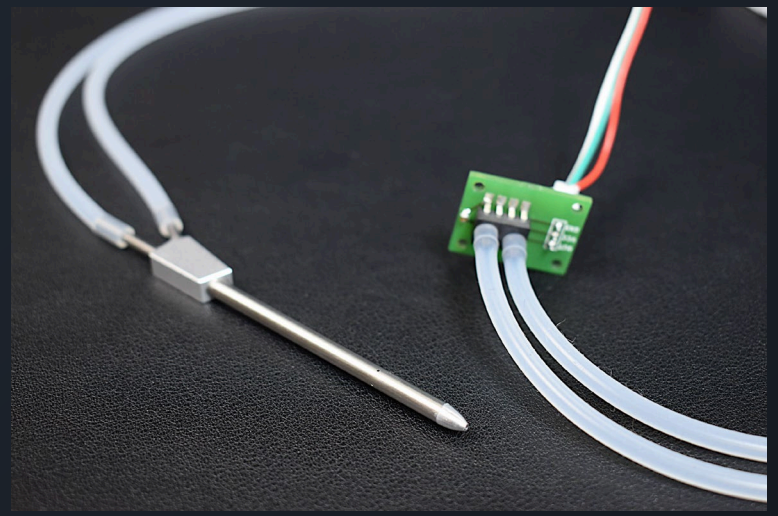
+1000 lignes

```
603
604
605
606 void getLidar() {
607   //LiDAR.reading(float(myLidarLite.distance() - 5));
608
609
610   if( readDistance()==-1){
611       Serial.println("n");
612     return;
613   }
614
615   float distaceNow = (float)myLidarLite.distance()/100.0; // en m
616   lidarSensorAvg.addValue(distaceNow);
617   lidarReadings[0] = distaceNow ;
618   lidarReadings[1] = lidarSensorAvg.getAverage();
619   lidarReadings[2] = lidarNormalised();
620 }
621
```

Codé « en Arduino »

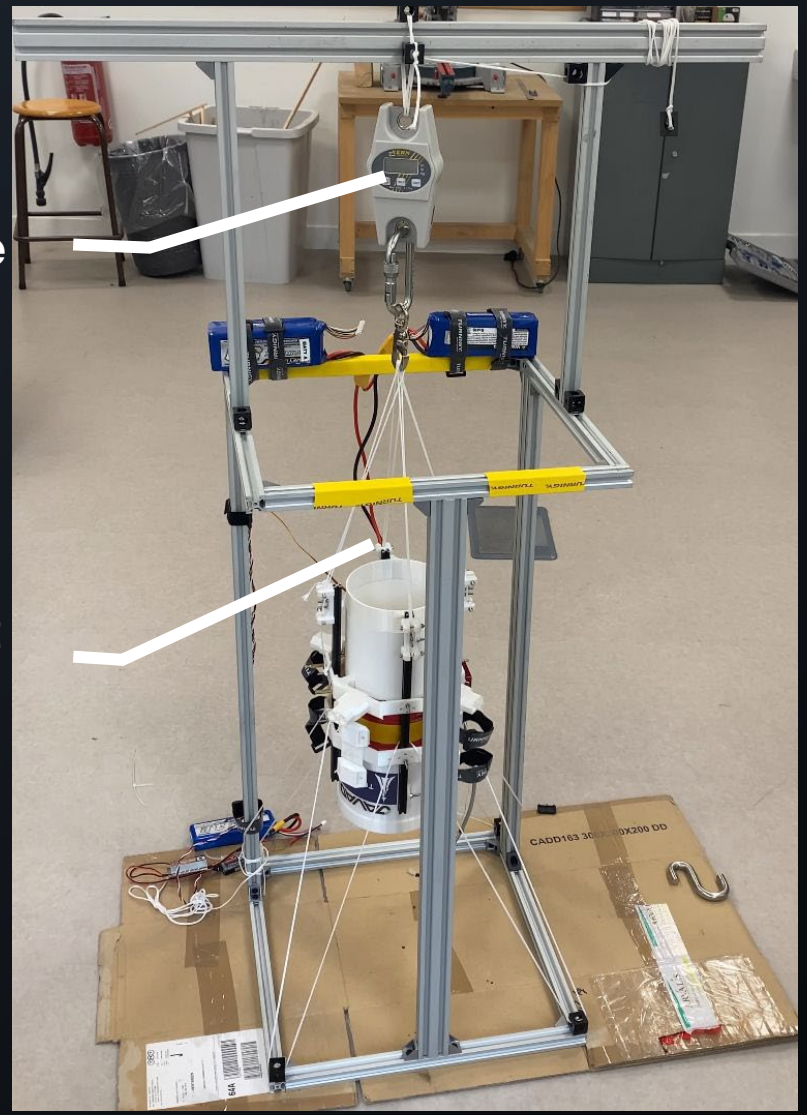
Banc de tests

Capteur de force
±0.1 N

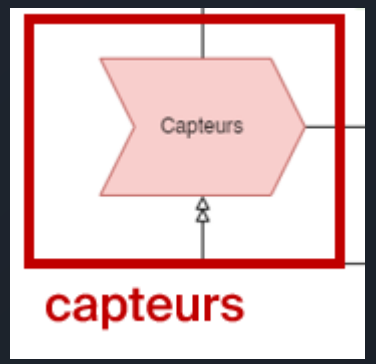


Sonde pitot
± 1m/s

$$u_{air} = \sqrt{\frac{2P_{diff}}{\rho_{Air}}}$$



Capteurs / électronique



LiDAR- Garmin
@100Hz – 1cm

VN-300 - INS
@400Hz – 0.01°

TR-G2 - GNSS
@100Hz – 3 cm