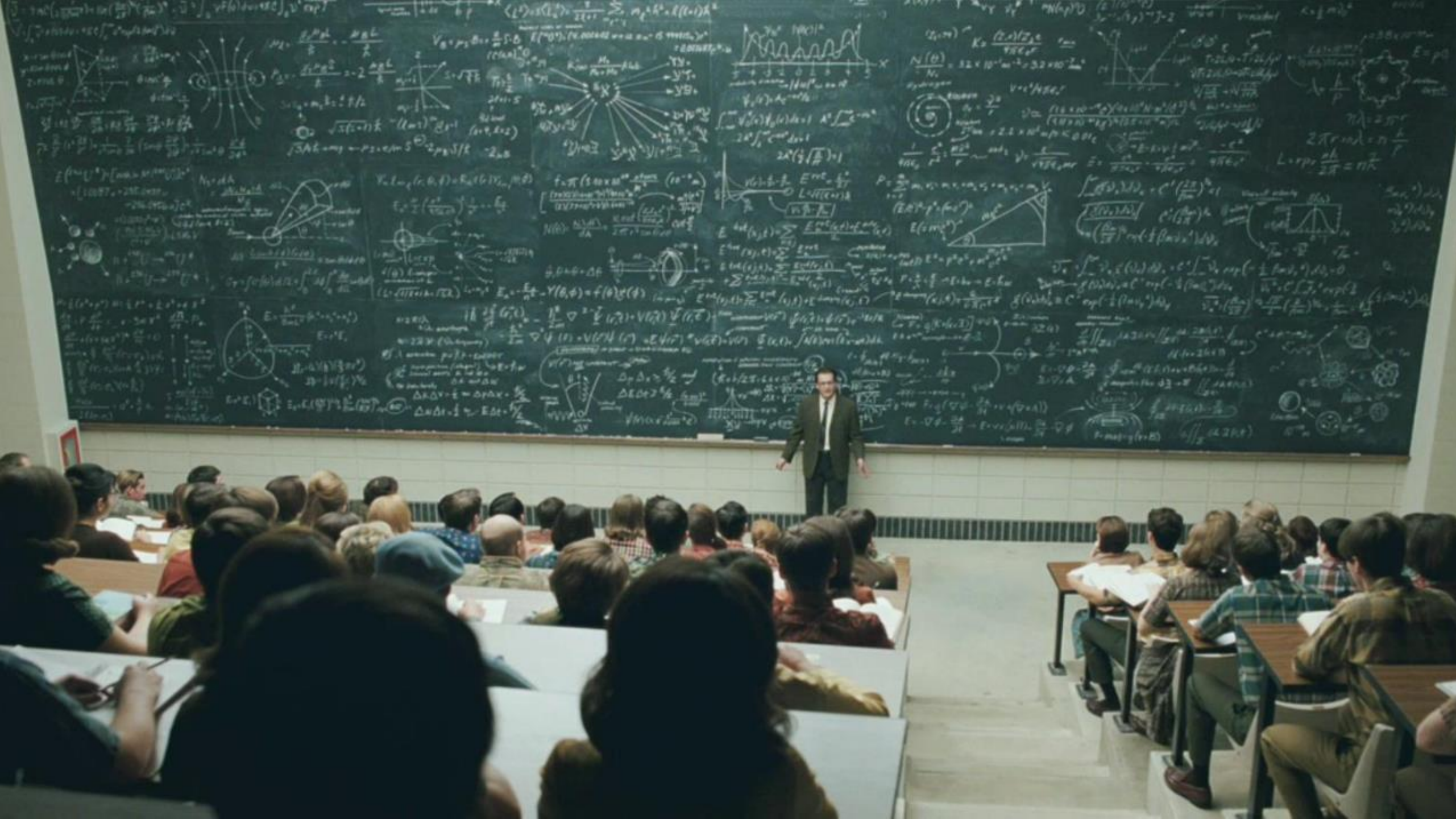
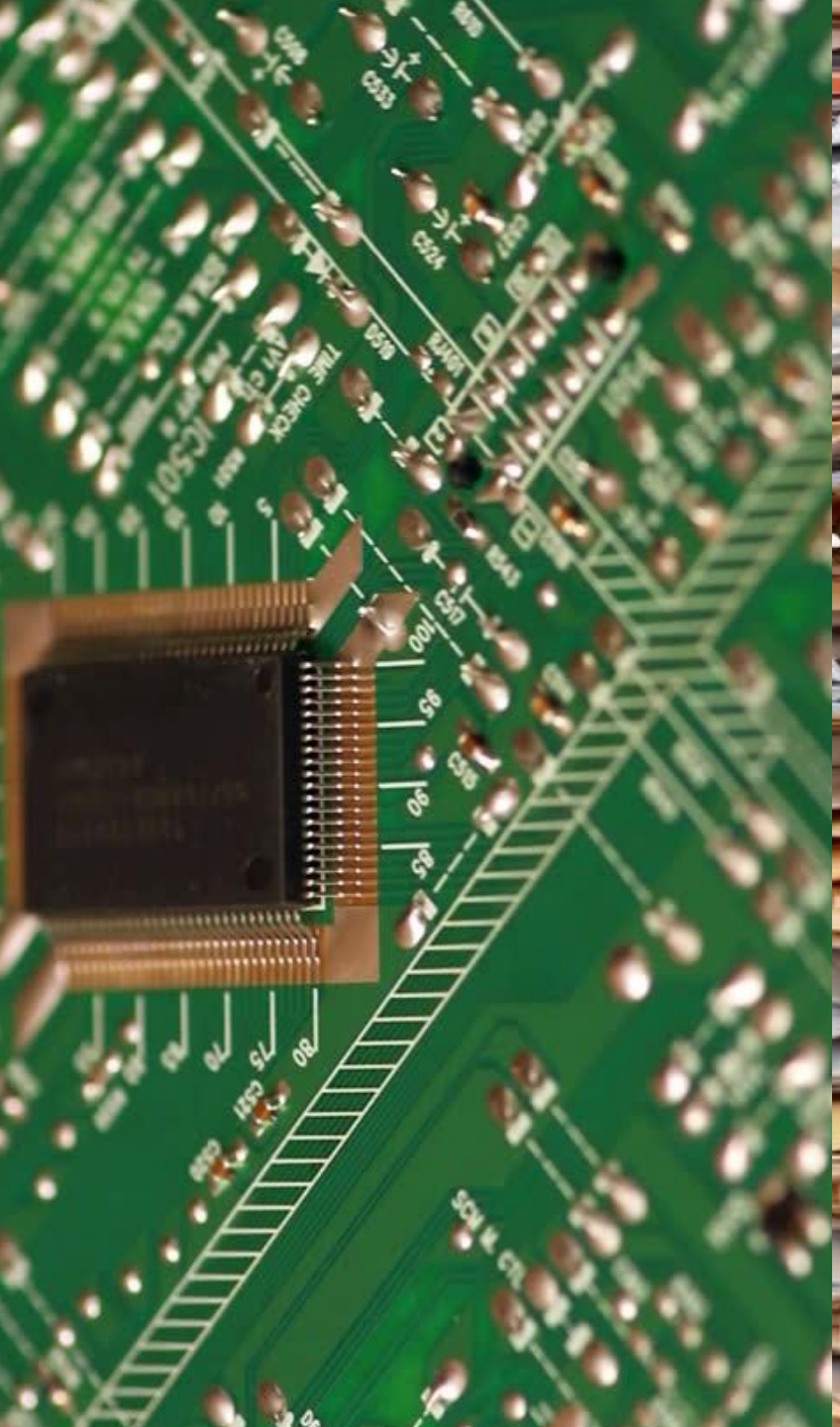
CanSat: The best way to start getting involved in space

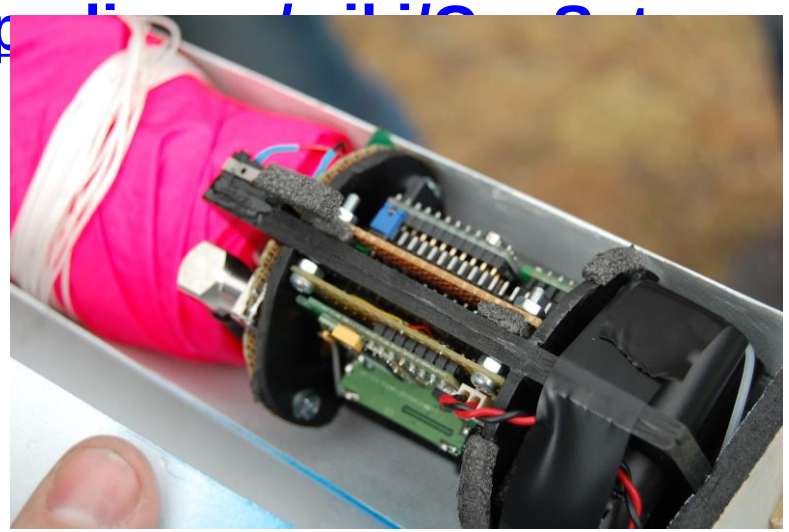
Open Source Cubesat Workshop 2018
Daniel Sors Raurell

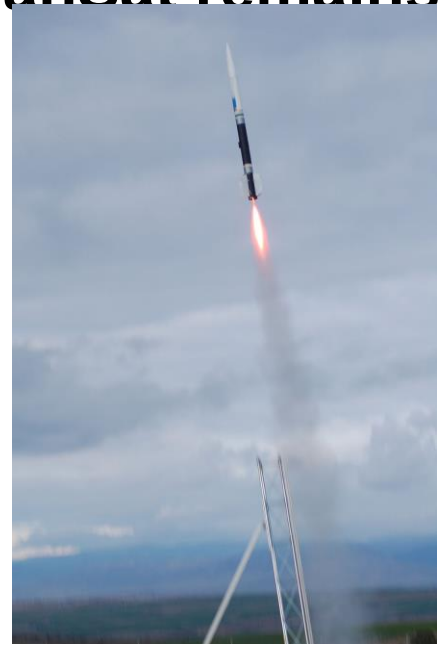




CanSat & CubeSat origins

- Both concepts appeared hand to hand around 20 years ago
- Both with similar purposes: stimulate and simplify access to space
- CubeSat transition into commercial while CanSat remains educational
- https://en.wikip





International CanSat Competition

CANSAT

European CanSat Competition

www.cansat.eu

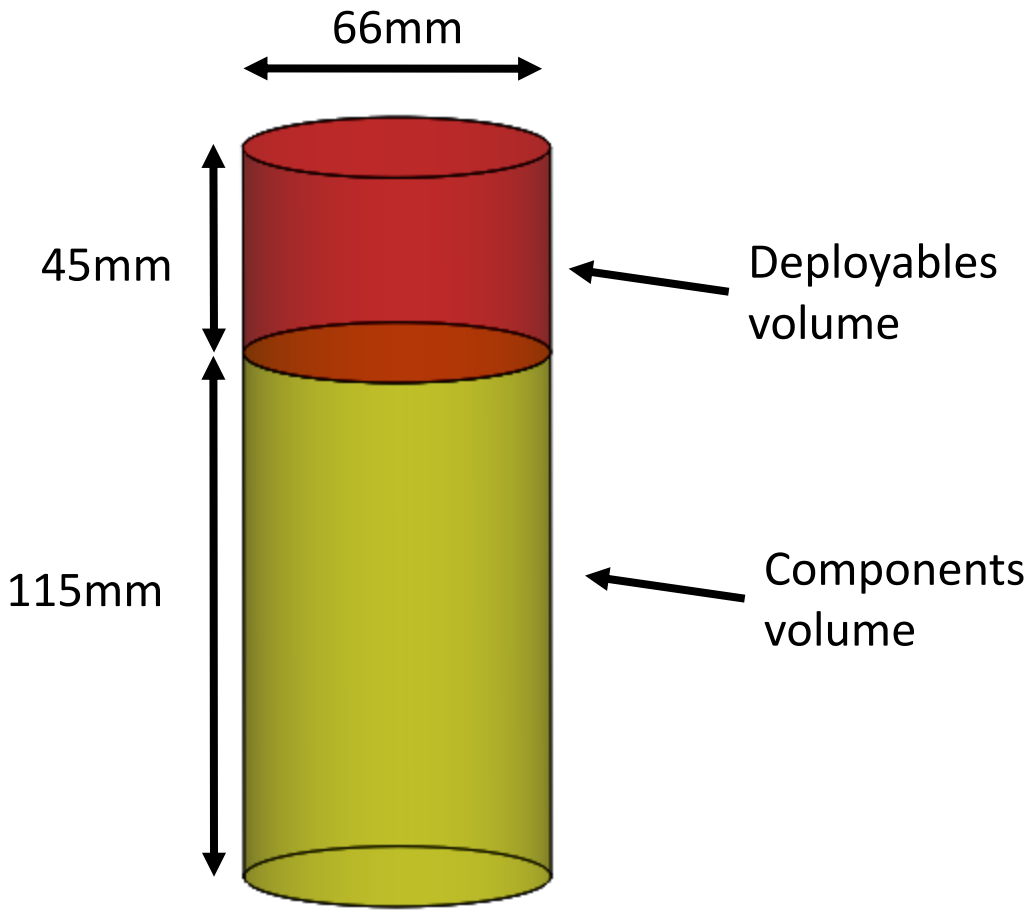
Cansat

Suborbital satellite in a can

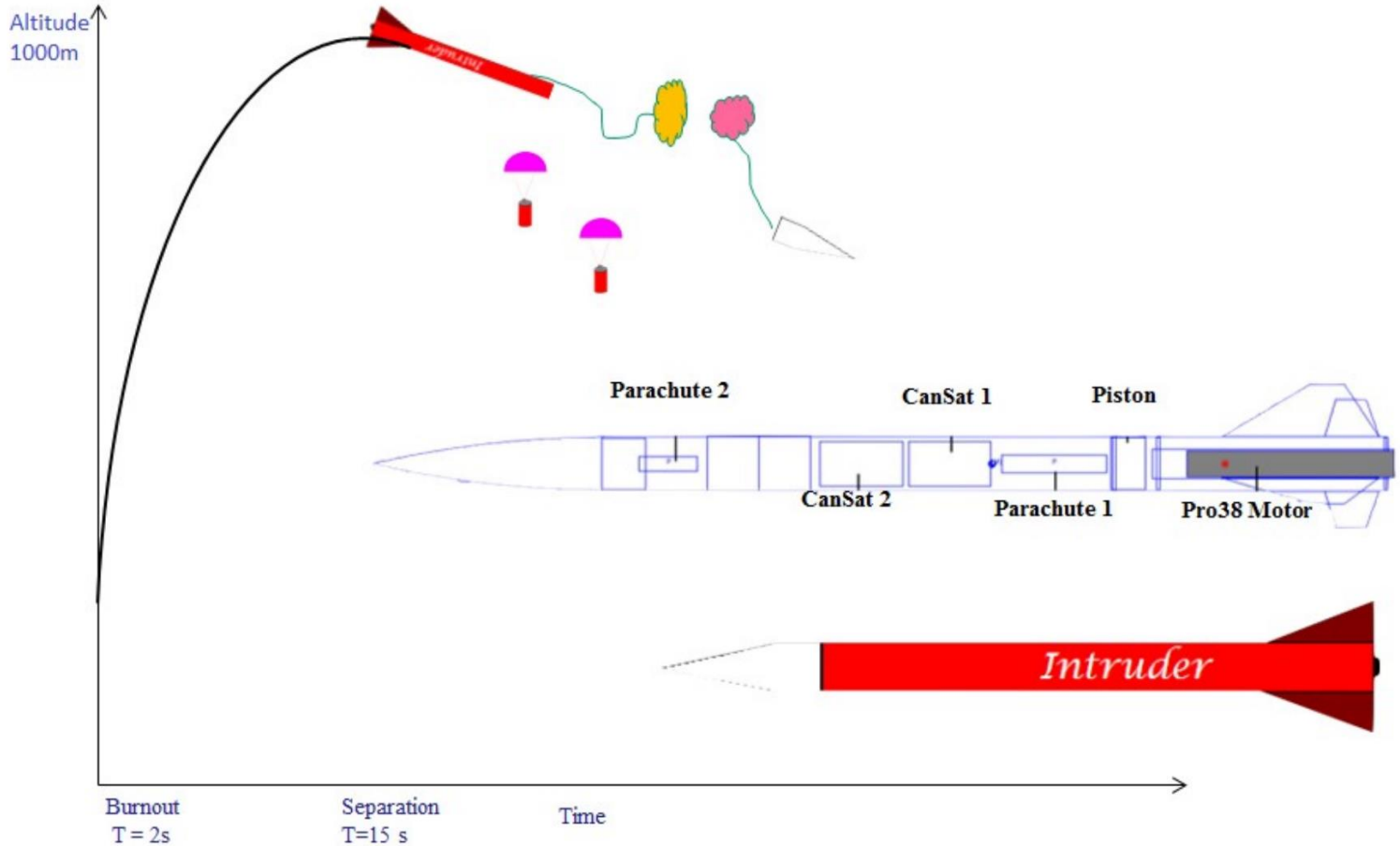
- Primary mission:

Transmit air temperature and air pressure data at least every second to ground station.

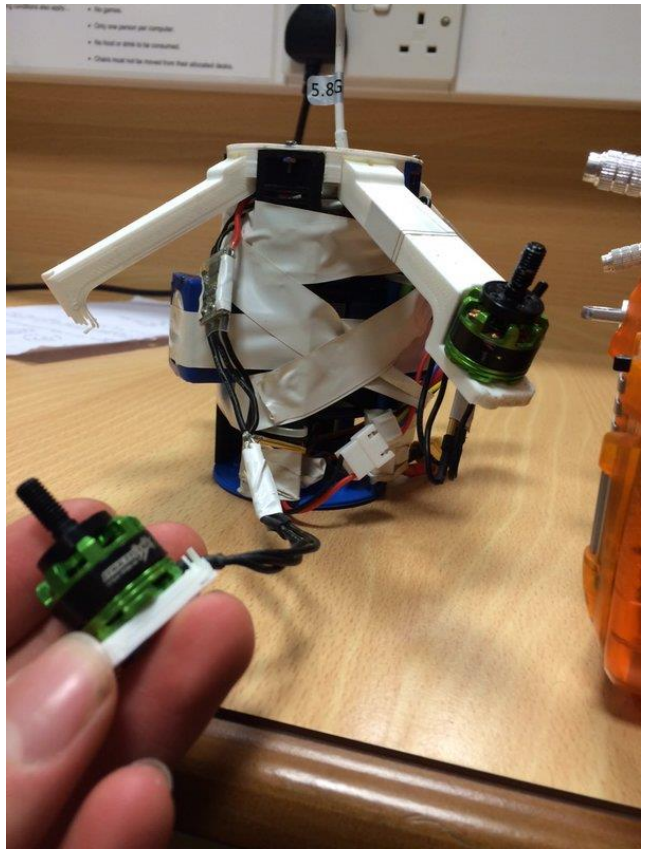
- Secondary mission up to the team:
  - Transmit or gather other sensors information (acc, gyro, GPS, CO2...)
  - Autonomous flight
  - Test lander technologies
  - Ground sampling



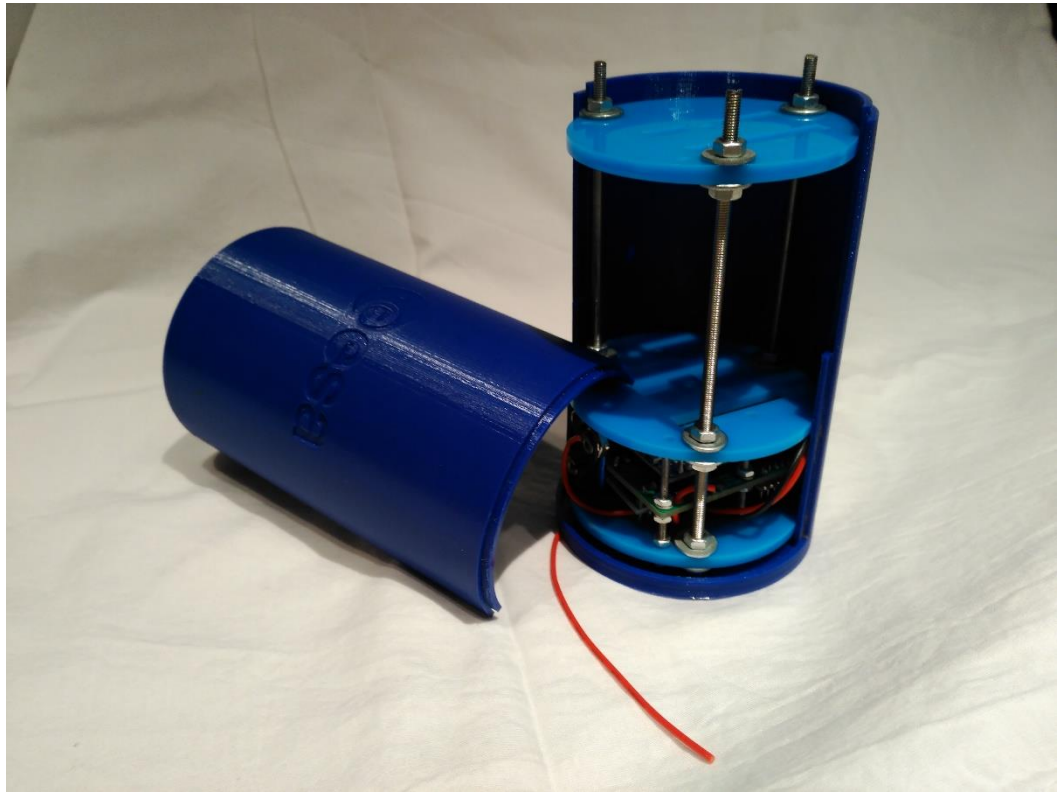
The Rocket Launch

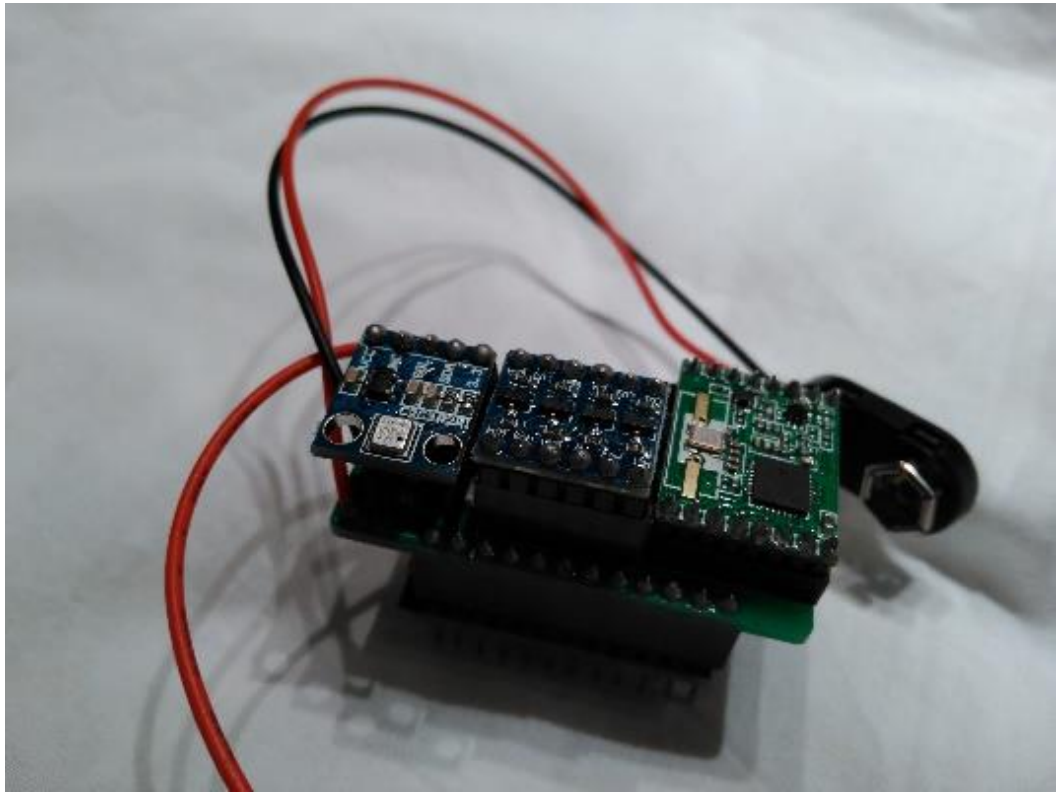


Cansat examples



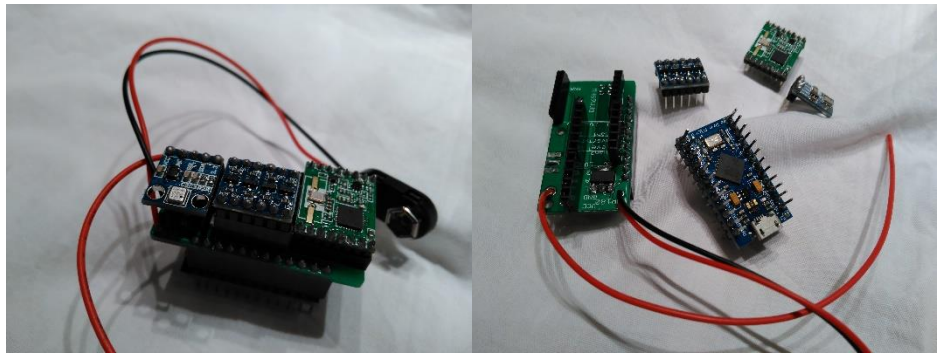
qbcan



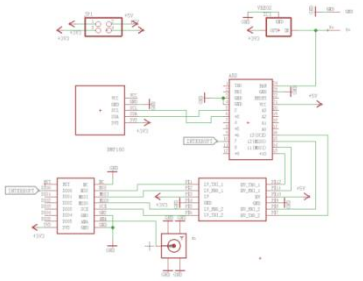


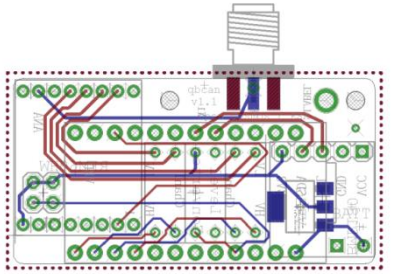
DESIGN

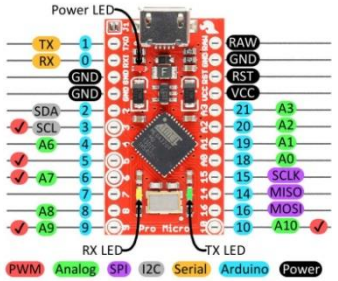
Modular



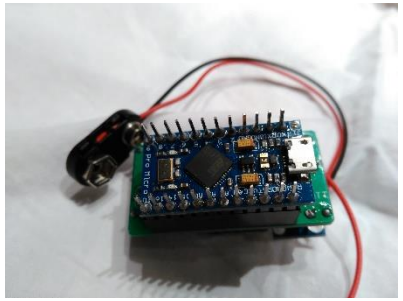
Open Source off the shelf components

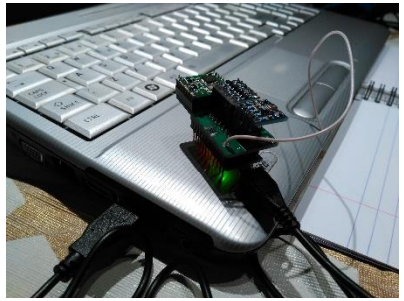






Multiuse CanSat/GS/other





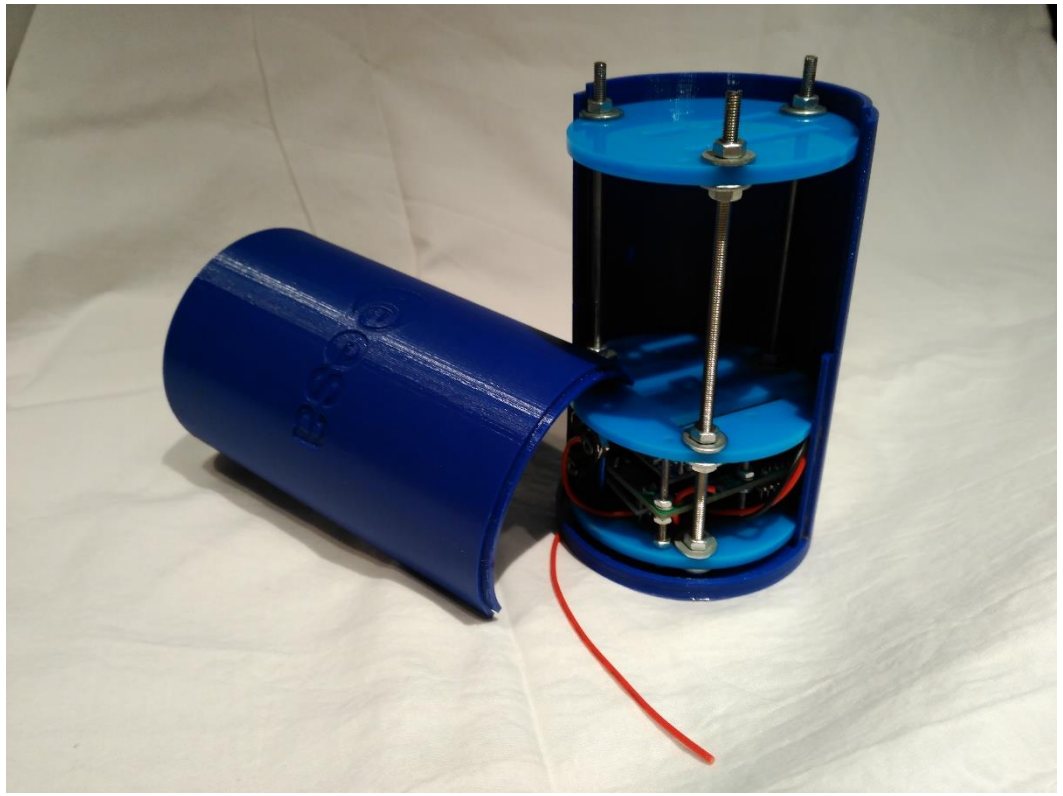
Technical features

- 5V and 3.3V additional outputs
- Yaggi antenna addapter
- Maximising payload volume
- Multiple communication channels

QBCAN CANSAT KIT

	Component	Quantity
electronics	Arduino Pro Micro	2
	Transceiver RFM69HW 433MHz	2
	Temperature and pressure sensor BMP180	2
	PCB board	2
	Voltage regulator	2
	Logic Level Converter (LLC)	2
	Battery connector	2
	Antenna	2
	Yaggy antenna adapter	1
	USB cable	1
structure	Shields	4
	M2 rods & M3 rods (threaded)	2 & 4
	Nuts, washes, hook	Loads

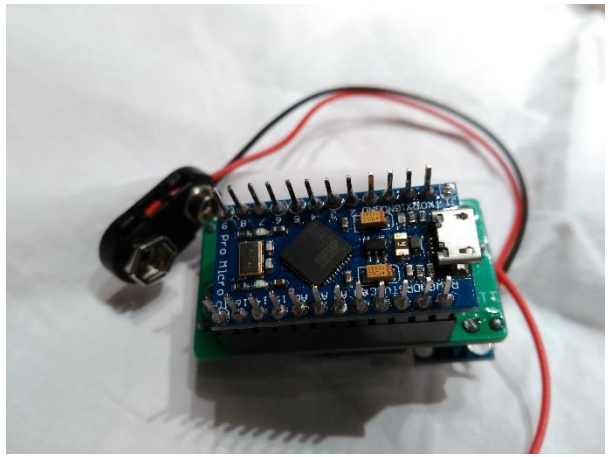
STRUCTURAL TECHNICAL SPECIFICATIONS

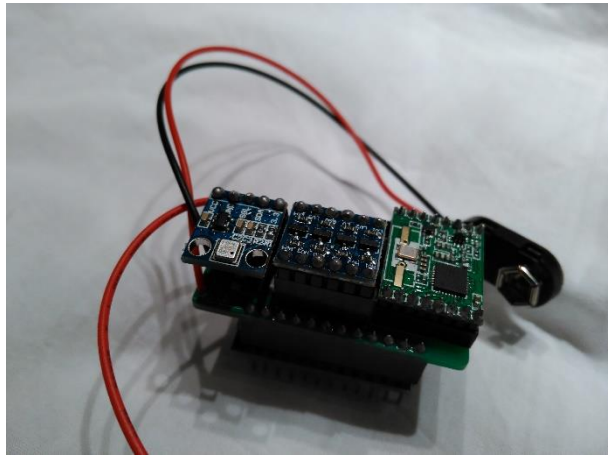


- 3D printed Shell (PLA)
- Two rod configuration
  - 3 rod mode
  - 1 rod mode

Specification	Value
Total mass	180g
Total volume	115h 66Φ mm (cil)

ELECTRONIC TECHNICAL SPECIFICATION

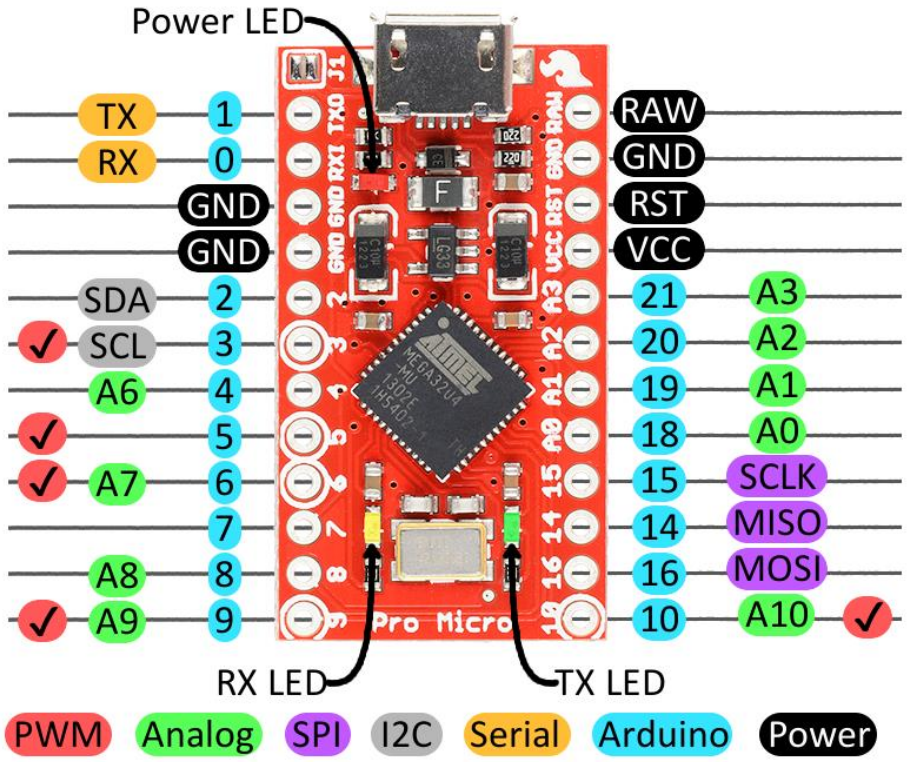




- Powered with a standard 9V battery
- Micro USB data connector
- 3 posible configurations
  - Modular
  - Integrated
  - Single PCB

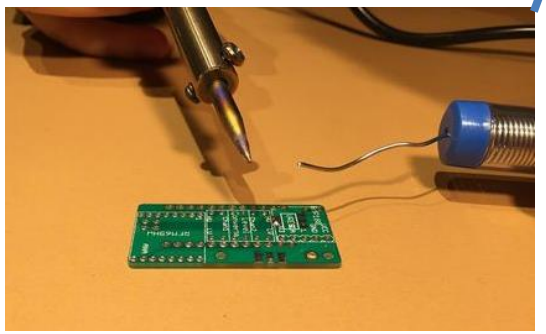
Specification	Value
Electronic's mass	16g
Electronic's volume	40x30x20 mm

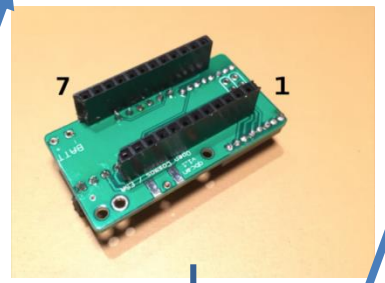
Arduino Micro pro

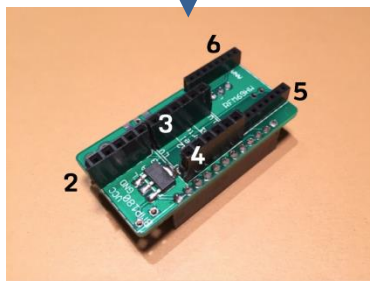


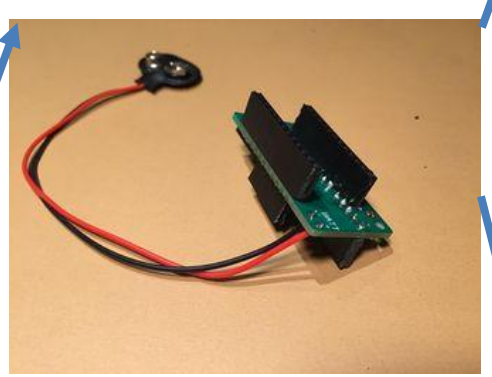
- ATmega32U4 running at 5V/16MHz.
- **Easy to program** using the Arduino Integrated development environment.
- On-Board micro-USB connector for programming.
- **I2C, SPI and UART serial communication** ports.
- 4 channels to read analogue signals using a 10-bit analogue to digital converter.
- 5 Pulse Width Modulated output pins.
- 12 Digital Input Output pins.
- Tiny footprint: 33.0 x 17.8 mm

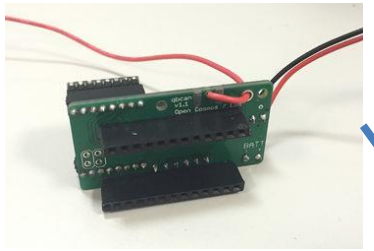
INTEGRATION PROCESS

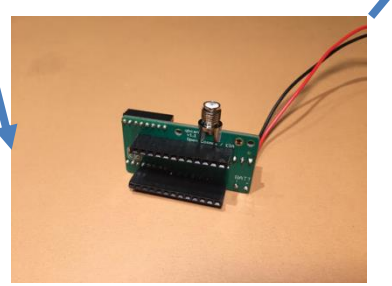


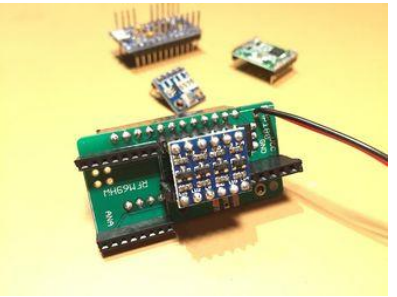




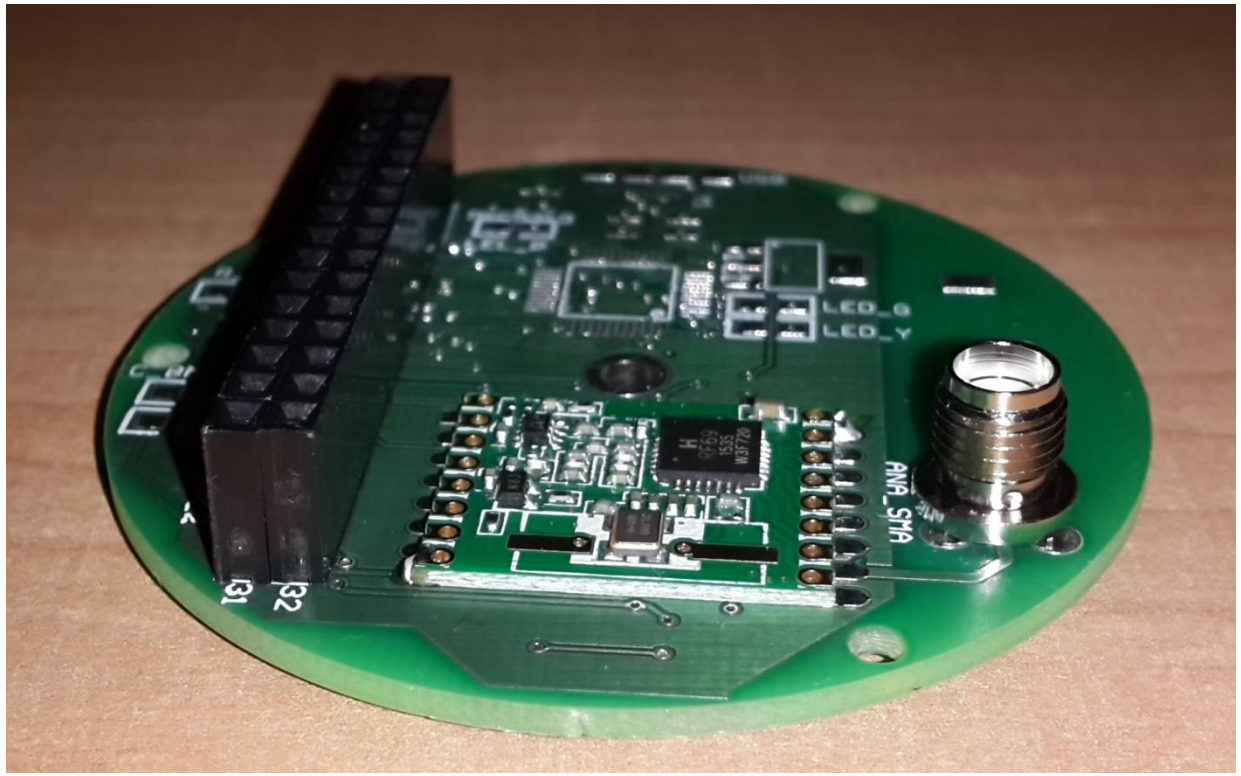








Single PCB version

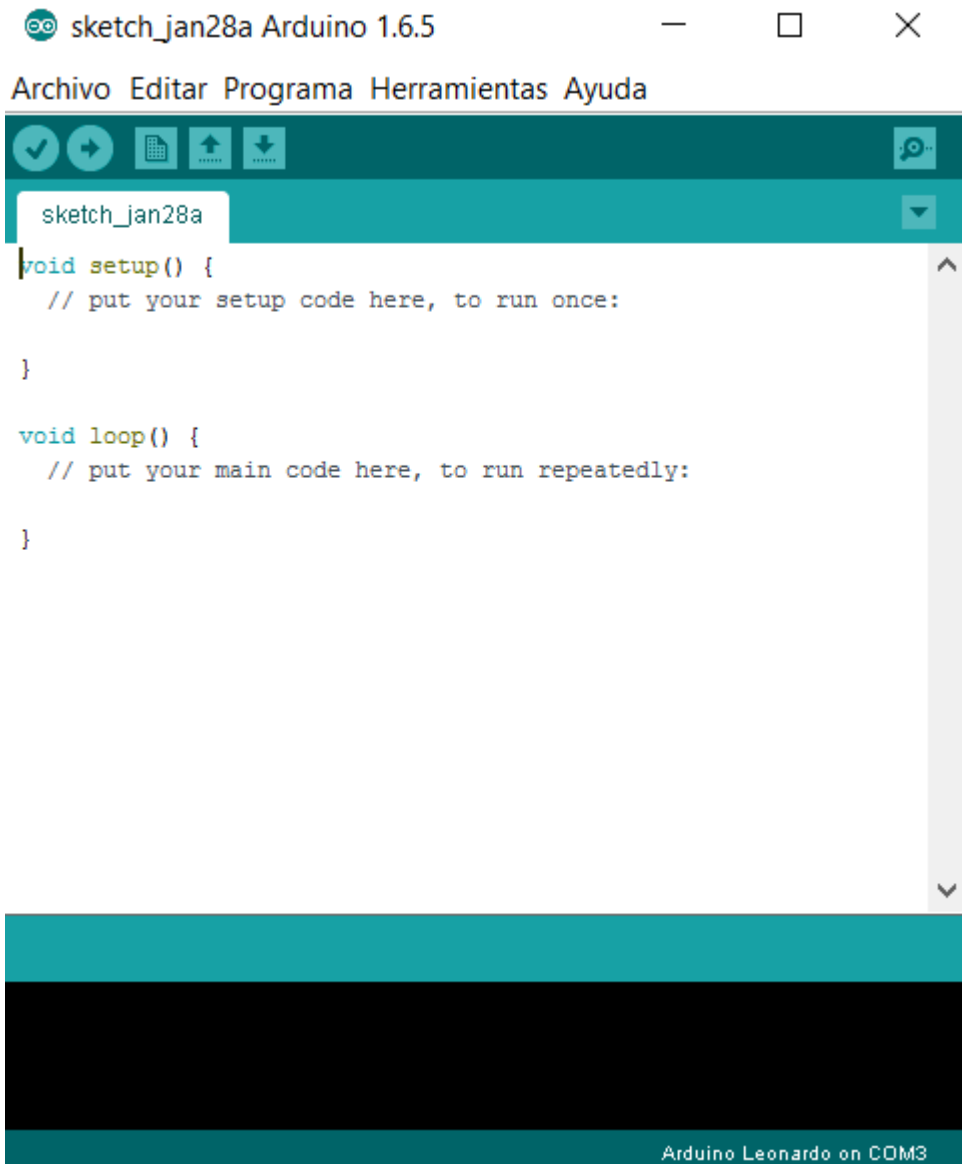


Increase in capability compared to the modular version

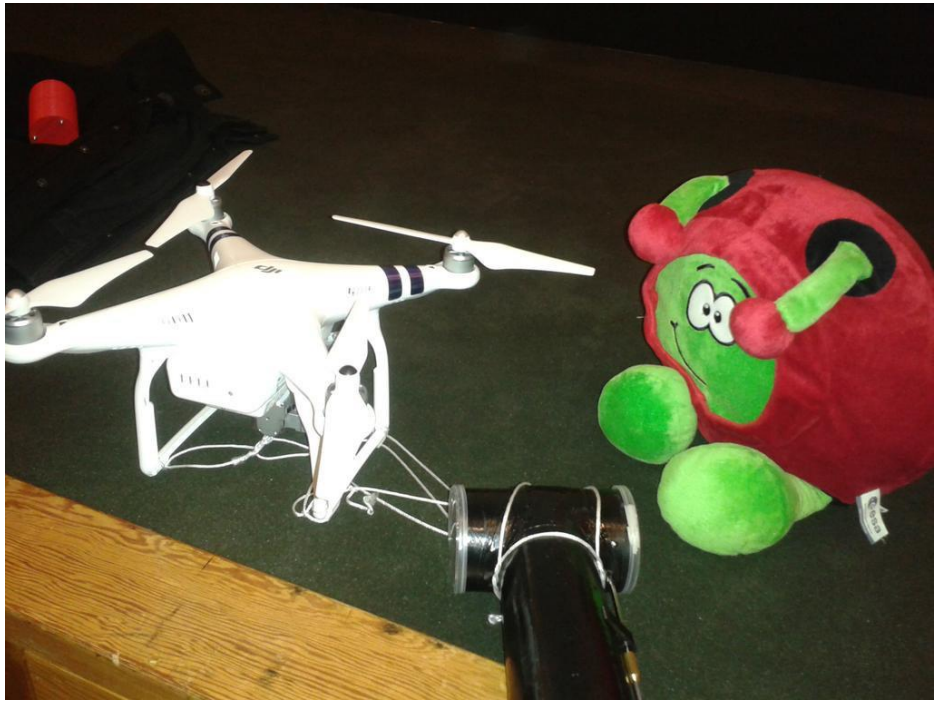
- 14x digial I/O
- 4x PWMs
- 6x analog I/O
- 2x 5V from voltage covnerter
- 1x 3V3 from voltage converter
- Raw battery voltage
- I2C, SPI and UART serial communication ports

SOFTWARE

- qbcan library provided: Contains basic functions to communicate and use the pressure and temperature senssor.
- qbcan and groundstation code examples provided.
- Arduino: Big commuity, tons of examples, libraries, tutorials and help online.
- Easy to code and test.



Cansat releasers



qbcan

qbcan modular

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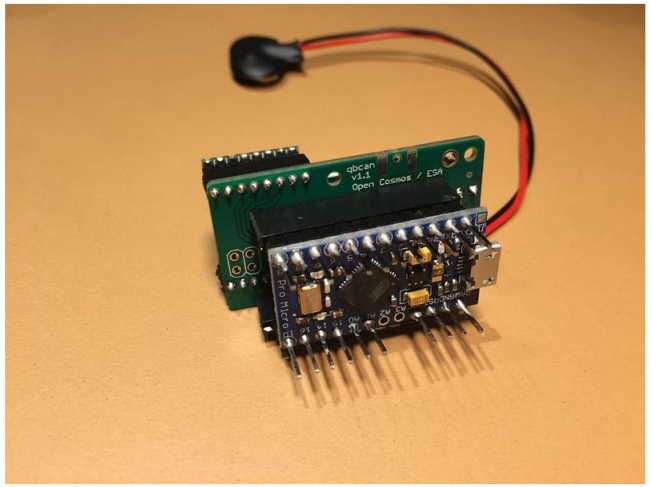


This document is the **qbcan modular user manual**. It describes the qbcan CanSat kit, the soldering and assembly process and the software setup. It provides a step-by-step guide to help the user go through the development process, from the opening of the qbcan kit to transmitting data from one qbcan to another.

The qbcan kit has been developed by Open Cosmos. Open Cosmos is a start-up willing to use nano-satellites to provide simple and affordable access to space to organisations ranging from SMEs and research institutions to space agencies in developing countries.

Click here to download the qbcan library

Support

In case you have any problem during the assembly or operations please post your questions into the Open Cosmos community so all the users can benefit from the content.

Sensors terminology

BMP180	Pressure and temperature sensor
LLC	Low Level Converter
RFM69	433 MHz transceiver

Contents

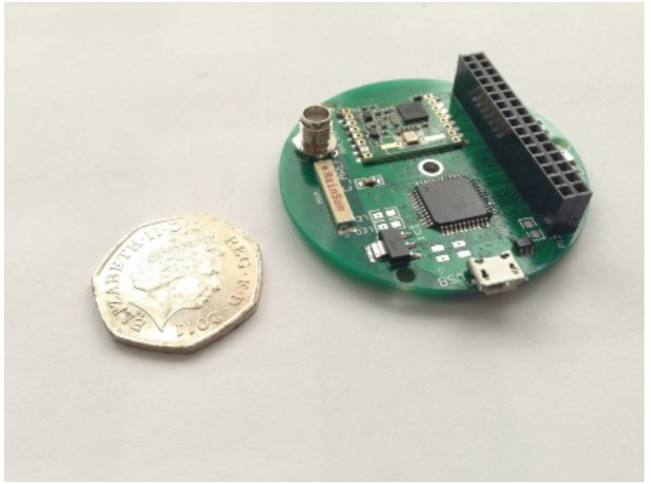
[hide]

1 System description
- 1.1 Physical dimensions and mass
- 1.2 qbcan assembly, structure
- 1.3 Microcontroller
- 1.4 Transceiver
- 1.5 Temperature and pressure control
- 1.6 Power
- 1.7 Library

qbcan compact

This document is the **qbcan compact user manual**. It describes the qbcan compact CanSat kit and the software setup. It provides a step-by-step guide to help the user go through the development process, from the opening of the qbcan kit to transmitting data from one qbcan to another.

The qbcan kit has been developed by Open Cosmos for the users that want to have a working solution out of the box avoiding the assembly of the parts and soldering and hence focus the efforts on the payload.



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Contents [hide]

1 System description
1.1 qbcan compact versions
1.2 qbcan assembly, structure
1.3 qbcan compact board mechanical interfaces
1.4 qbcan electrical interfaces
1.4.1 Reset interface
1.4.2 Power buses
1.5 Microcontroller
1.6 Transceiver and antenna
1.7 Temperature and pressure control

qbcan

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qbcan modular user manual
qbcan compact user manual

Get the source code examples and libraries for *qbcan* and *qbcan Releaser* in our GitHub

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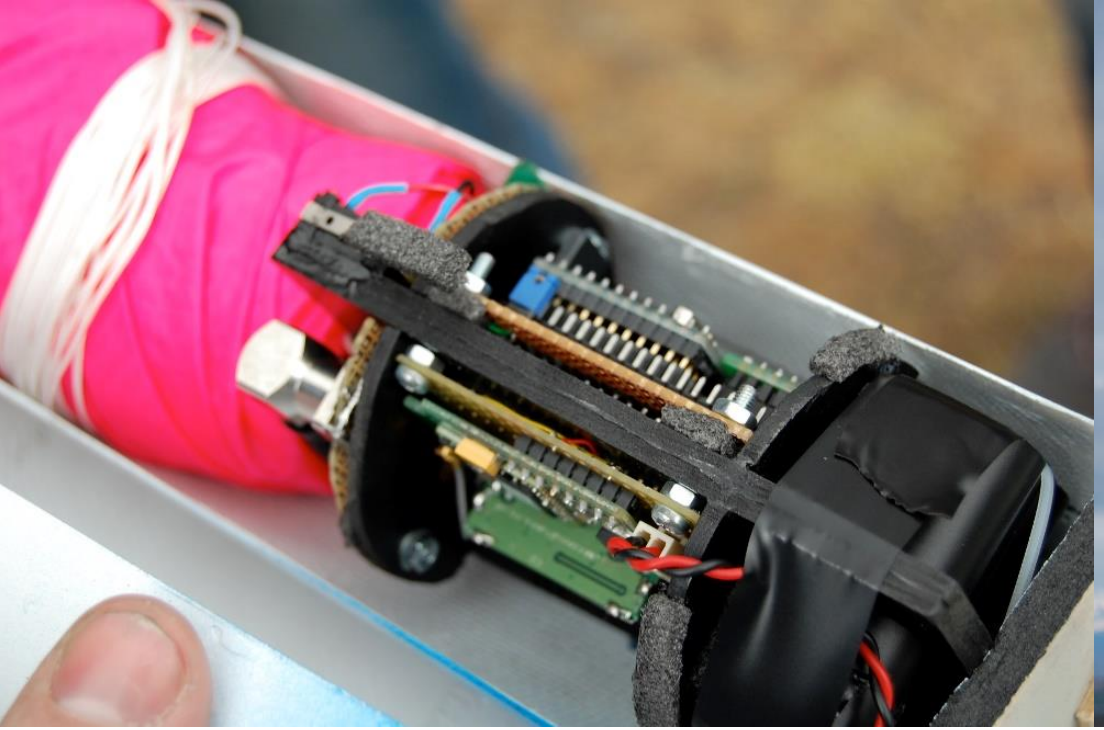
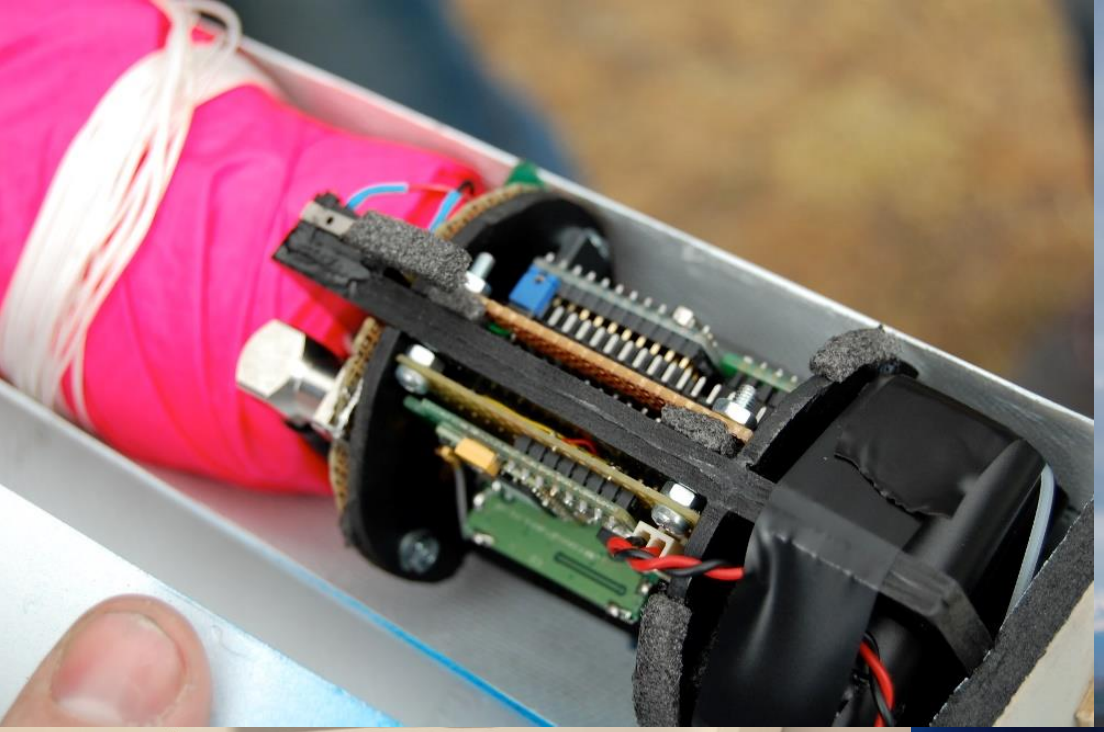
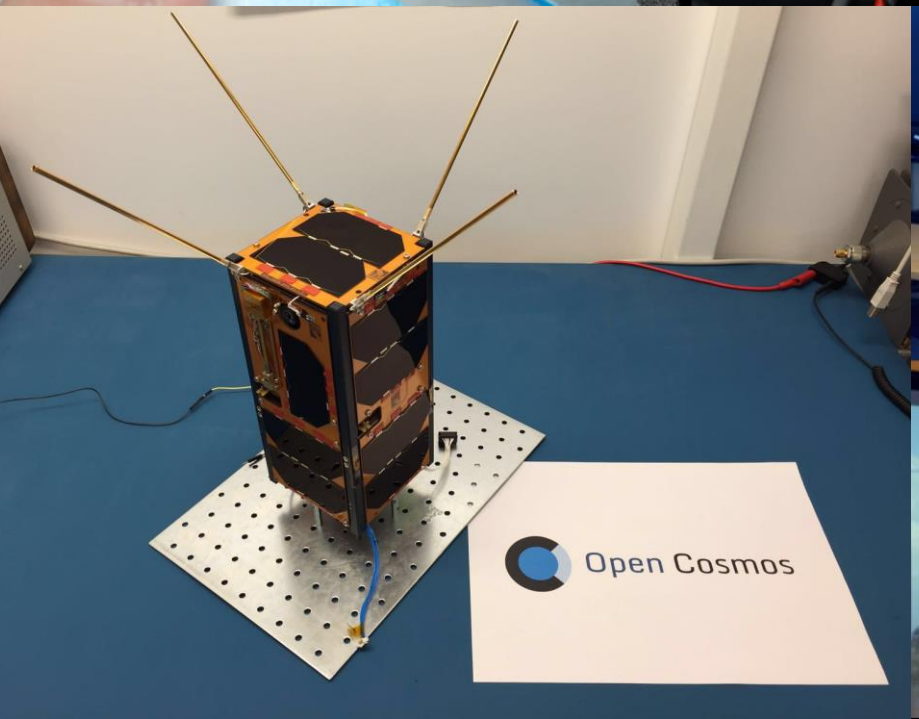
Qbcan modular assembly instructions	qbcan	M	0	152	Jan 5
ESA Cansat kit assistance		M, B	10	1.1k	Sep '17
Stackable Pin headers used in qbcan	qbcan	T	0	185	Sep '17
Multiple qbcan in one location - changing RF channels	qbcan	B	0	312	Mar '17
Qbcan, how to connect a acceletometer to the Pro Micro board?	qbcan		1	410	Mar '17



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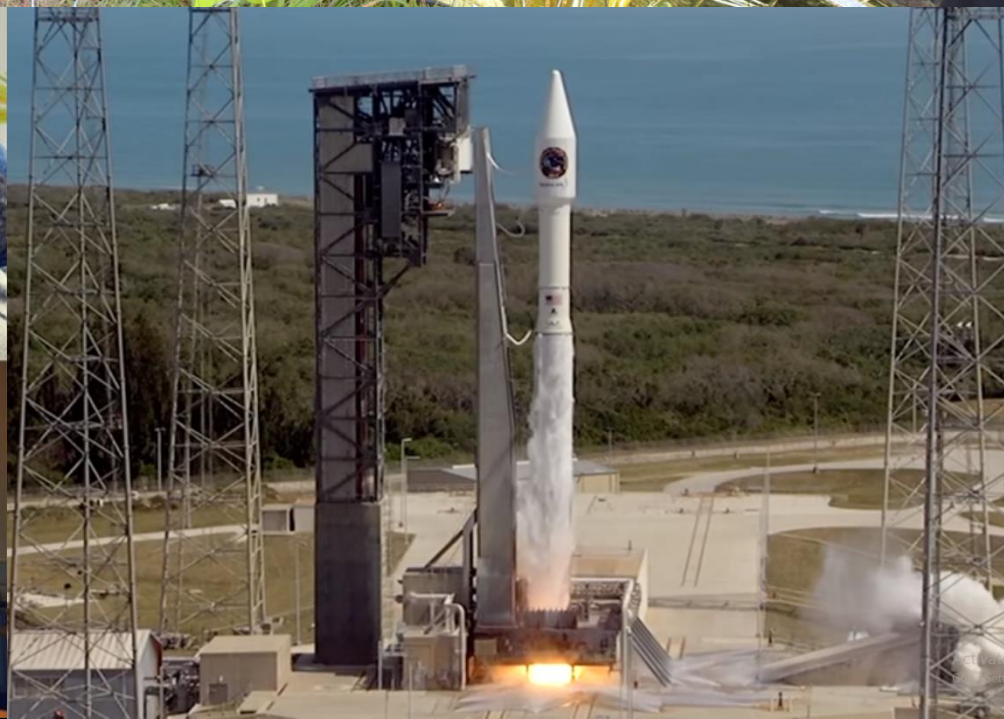

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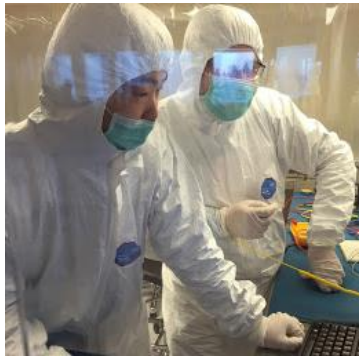
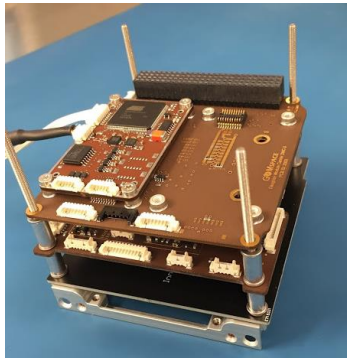
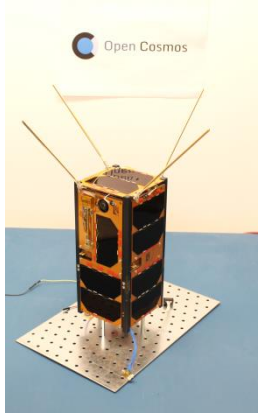
PLDSPACE







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