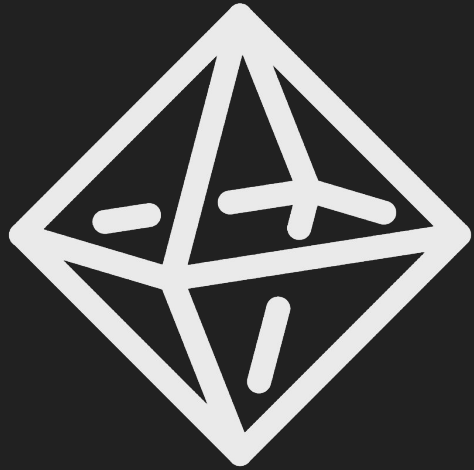


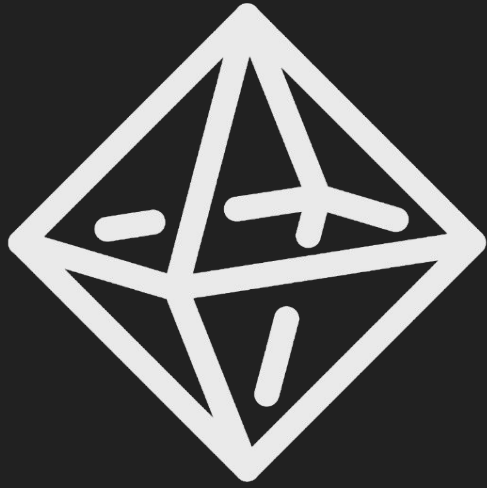
FossaSat-1, First Steps Into Space



FOSSA

PQ Workshop
Glasgow

Julian Fernandez



FOSSA

Free Open Source Software & Aerospace Systems

Fossa.Systems

FOSSA SYSTEMS

Our Dedicated Team



CO-FOUNDER / CEO

Julian Fernandez

Hardware Developer and Project
Manager



CO-FOUNDER

Richard Bamford

Lead Software Developer



Jan Gromes

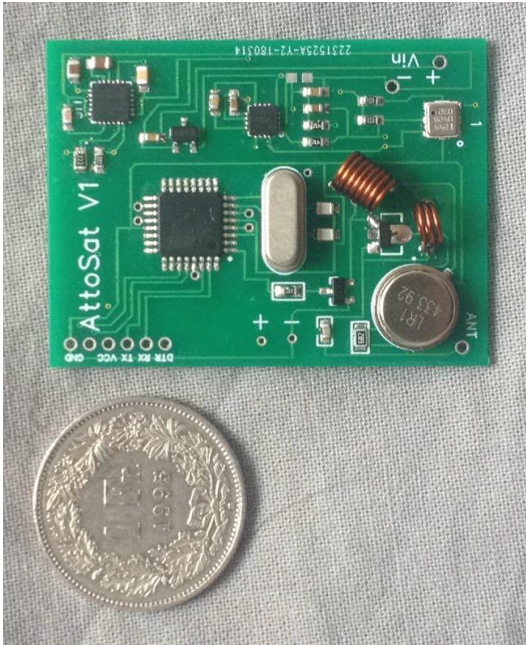
Software Developer / Comms and
Modulation



Chris Mulhall

Hardware Developer and Machinist

Our Origins...



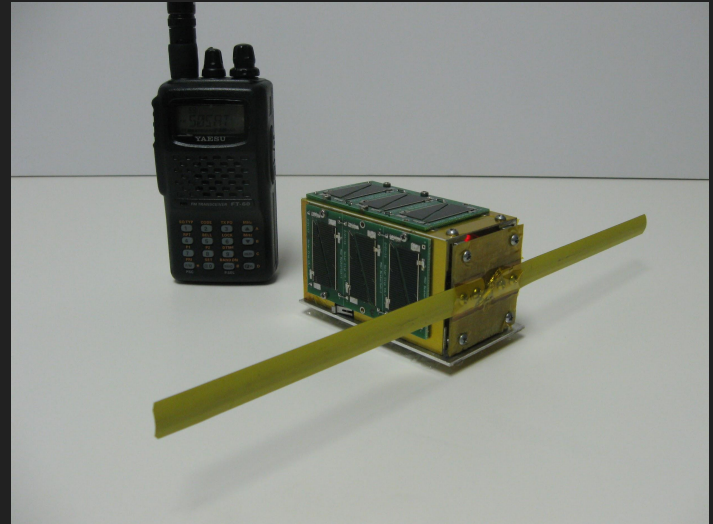
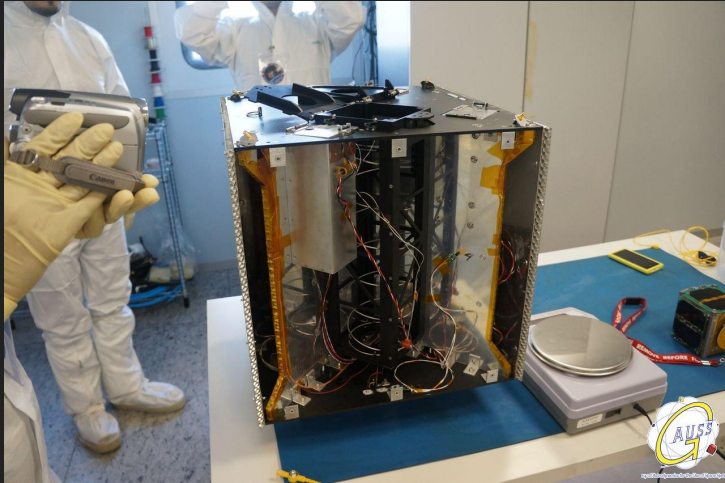
↑
71
↓

 **Arduino Satellite!**
r/arduino  · Posted by u/Julianfer5 1 year ago 

 |  **48 Comments** |  **Share** |  **Save** | 

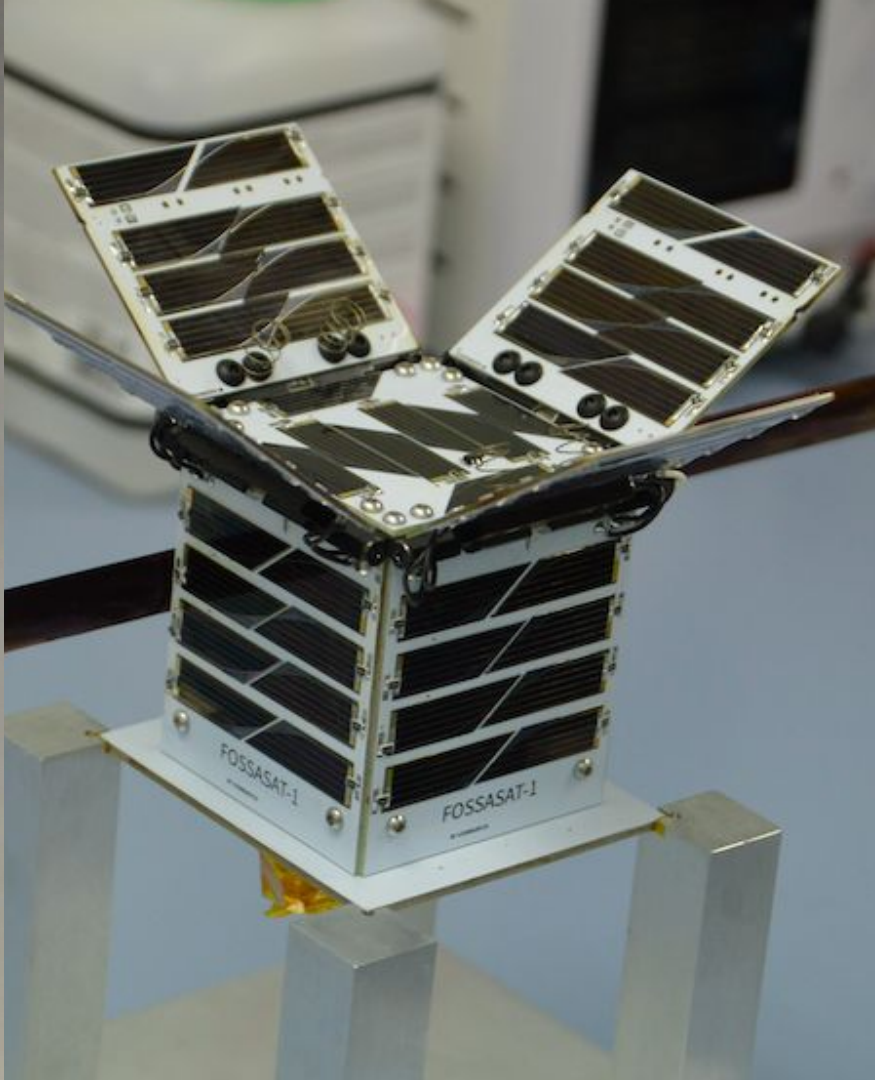
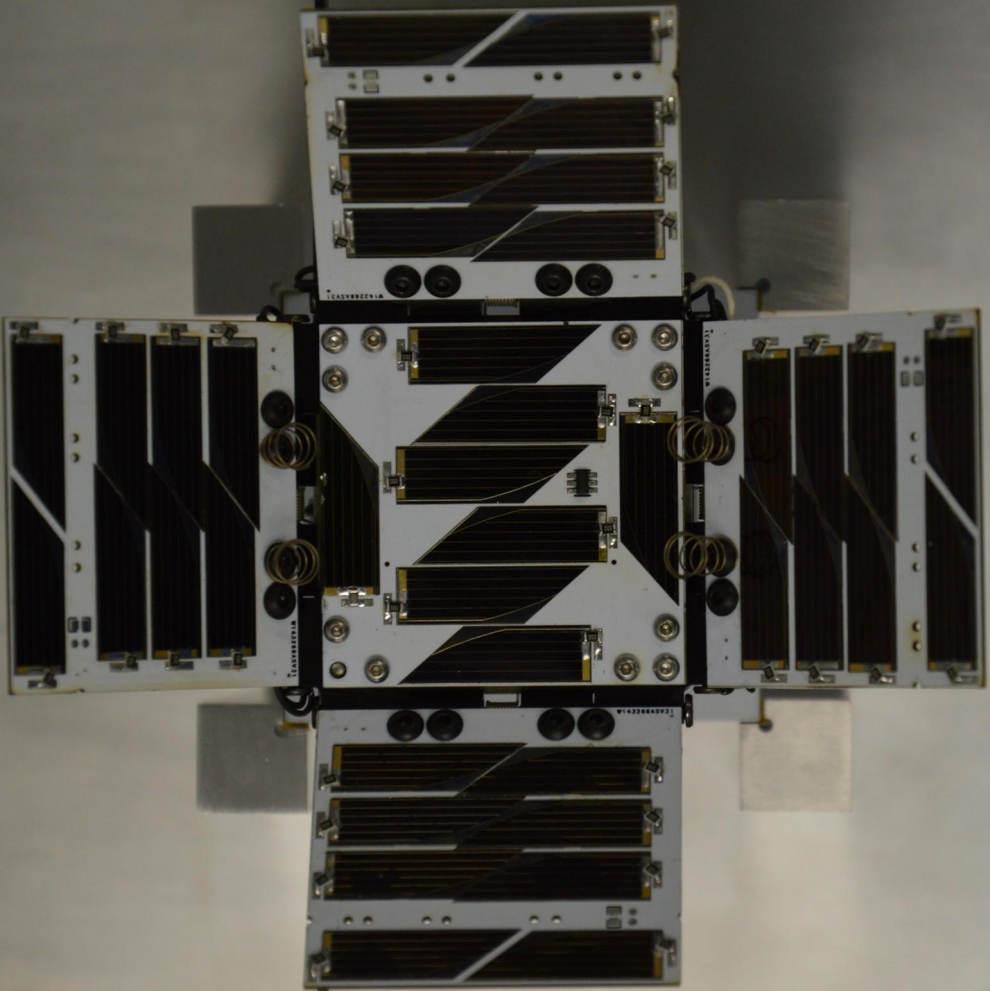
PocketQube

- Reduce Launch Price
- Reduce Development and Design Price
- General Lower Barrier to Entry



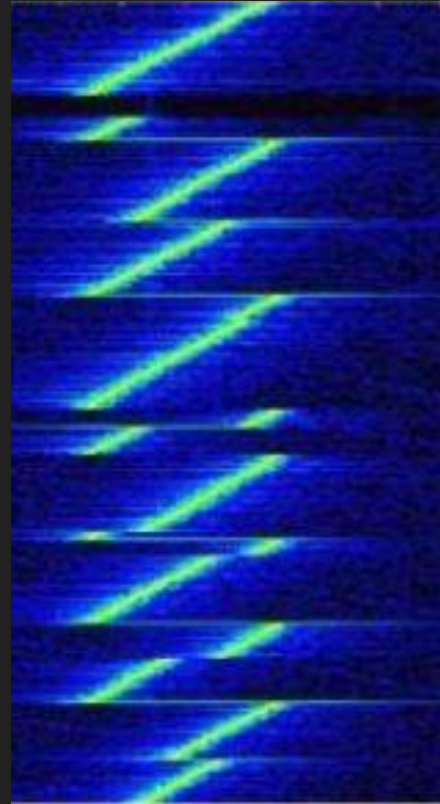
FossaSat-1 Mission

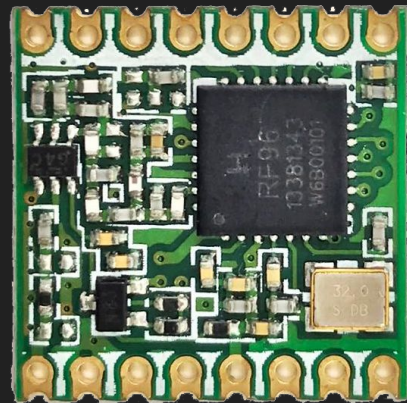
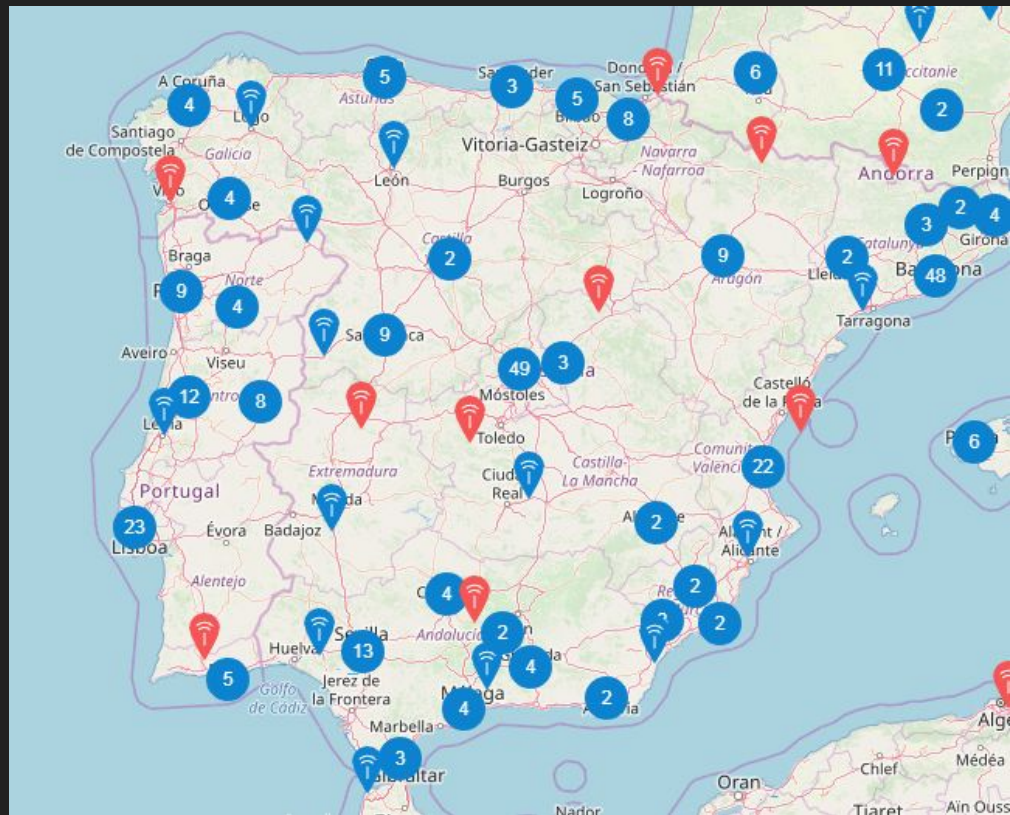
- LoRa Low-Power Communications Demonstration
- Deployable Panel Demonstration
- Fossa PQ COTS Architecture
- Picosatellite Educational Outreach
- First Step Into Picosatellite World





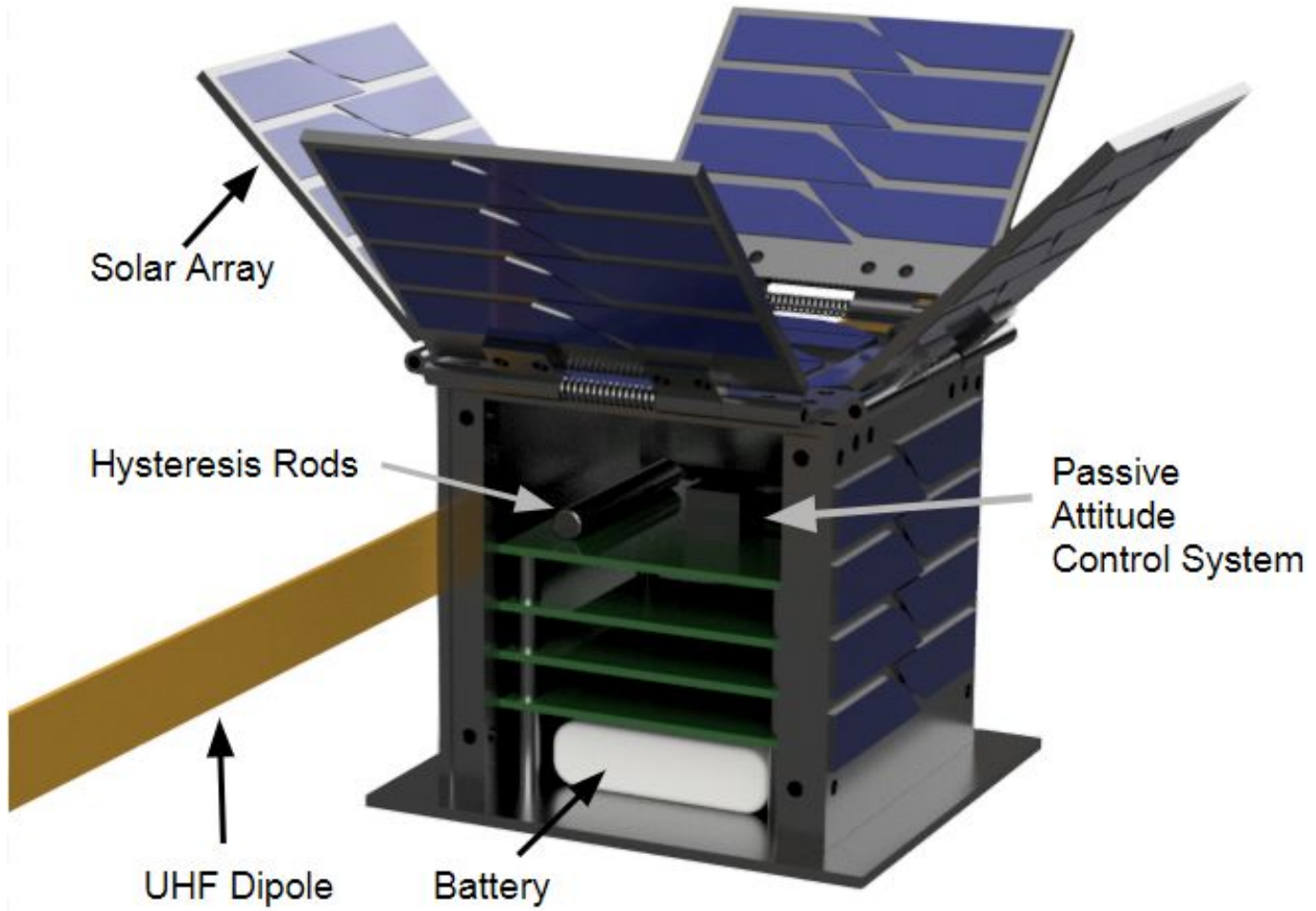
- Chirp Spread Spectrum
- RX in ISM Band
- Terrestrial IoT Applications
- Robust and very high link budget





Iterative Learning Process

Learn & Adapt FAST!



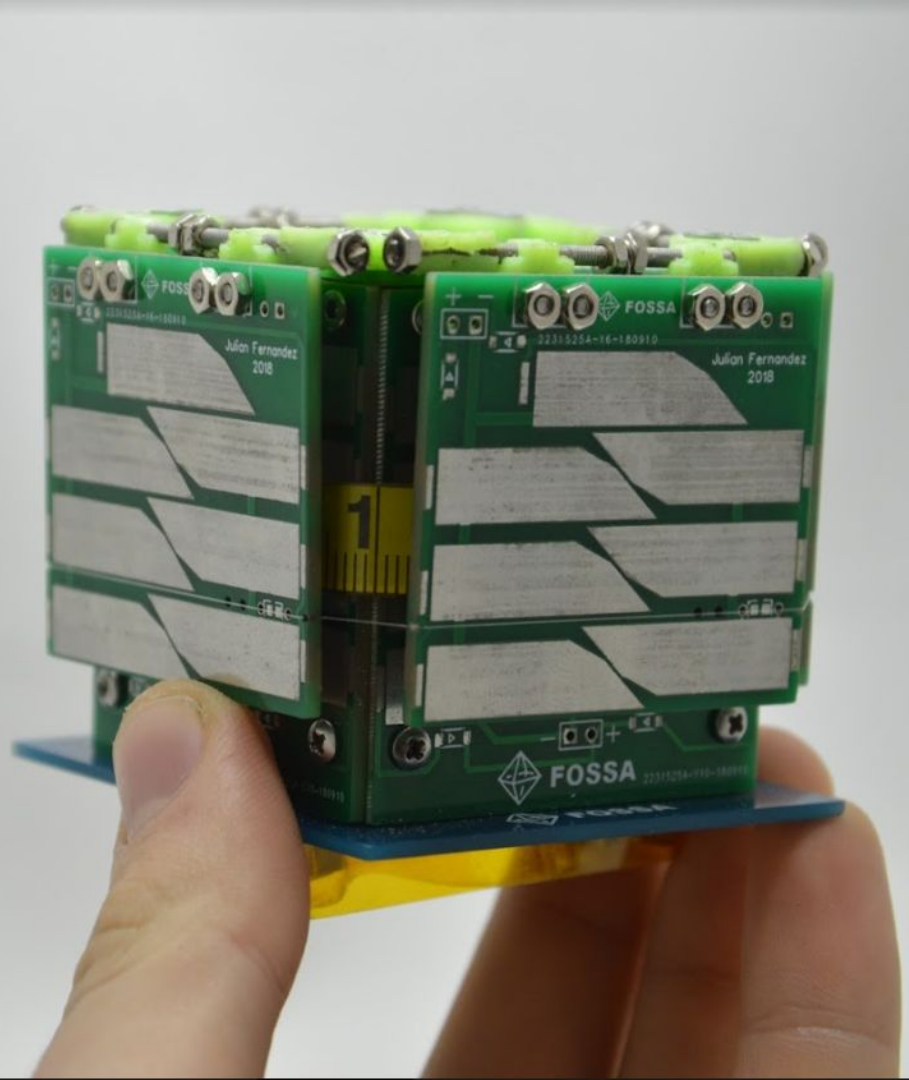
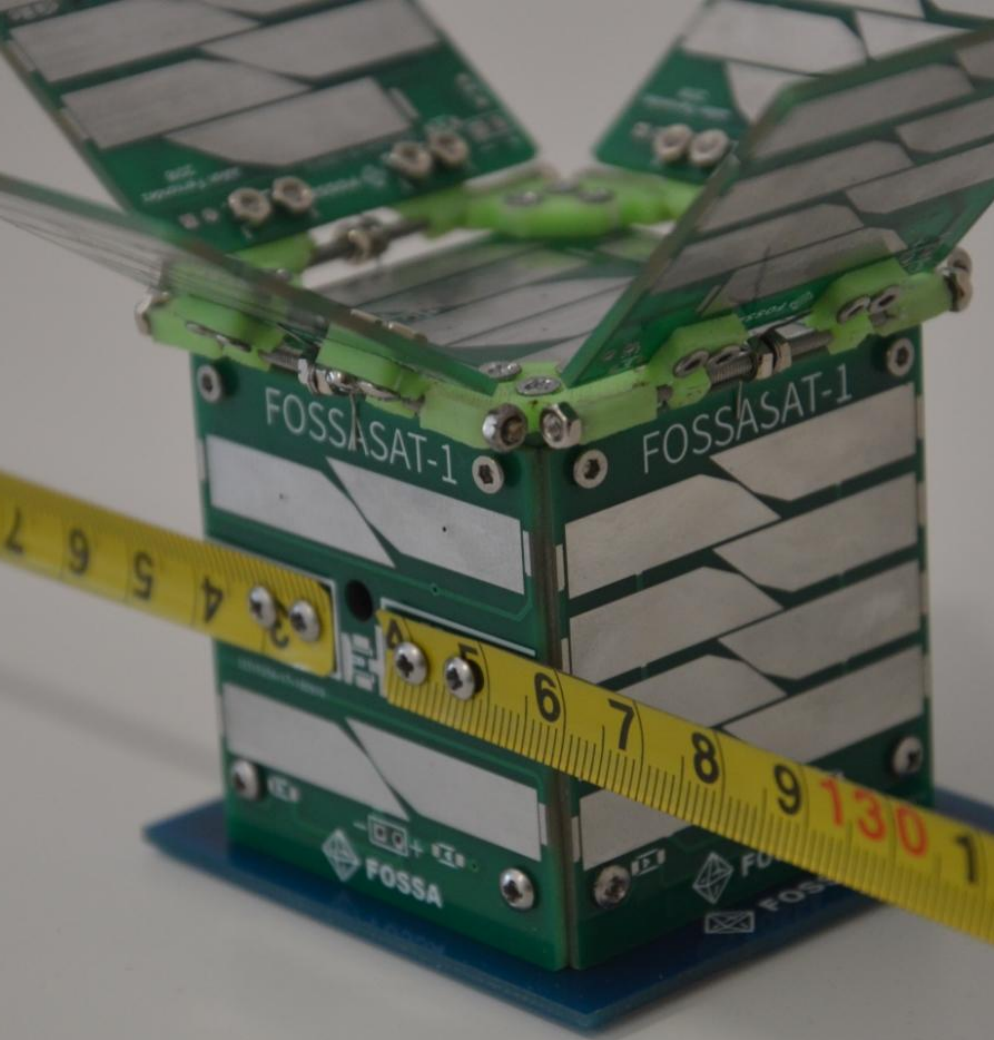
Solar Array

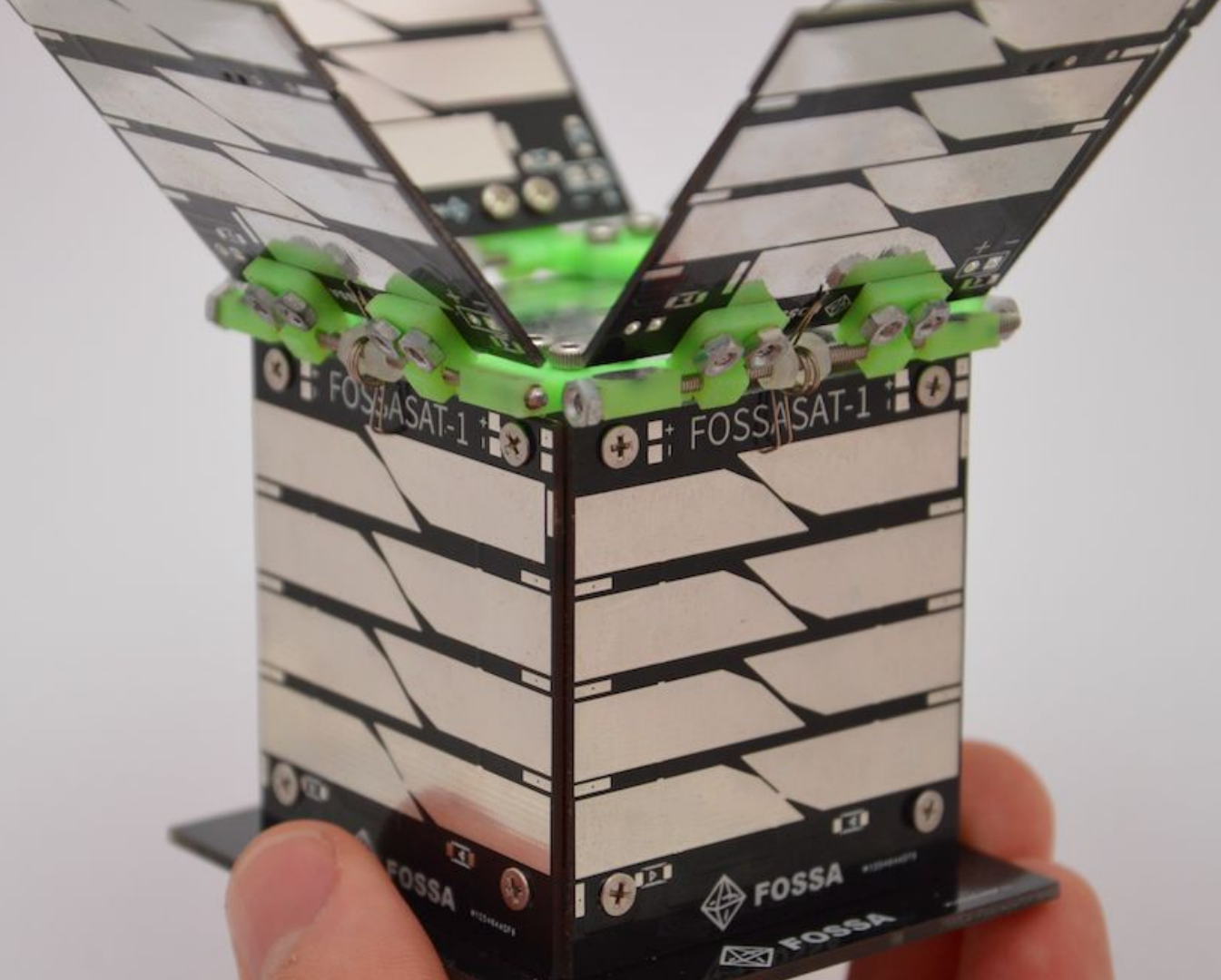
Hysteresis Rods

UHF Dipole

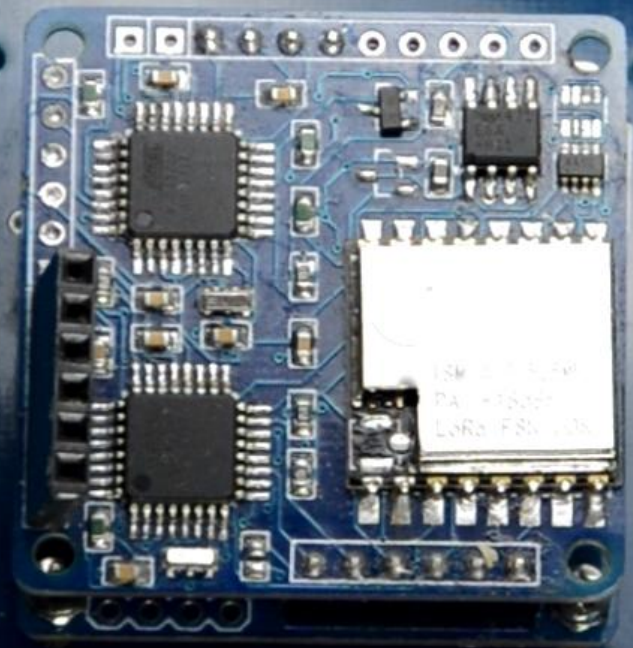
Battery

Passive
Attitude
Control System

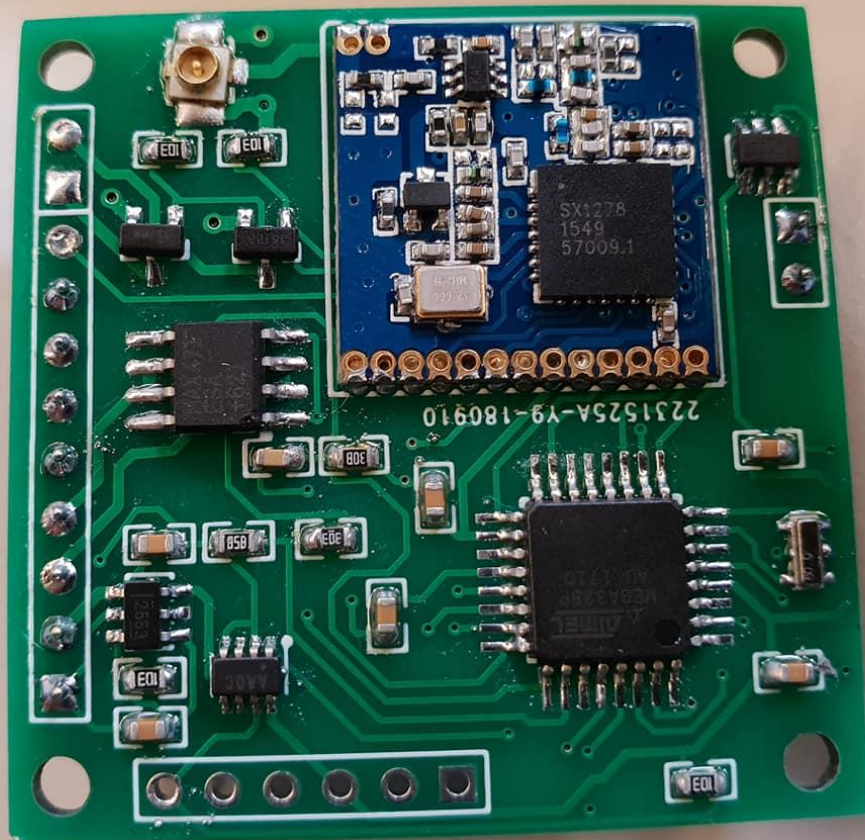




August 2018



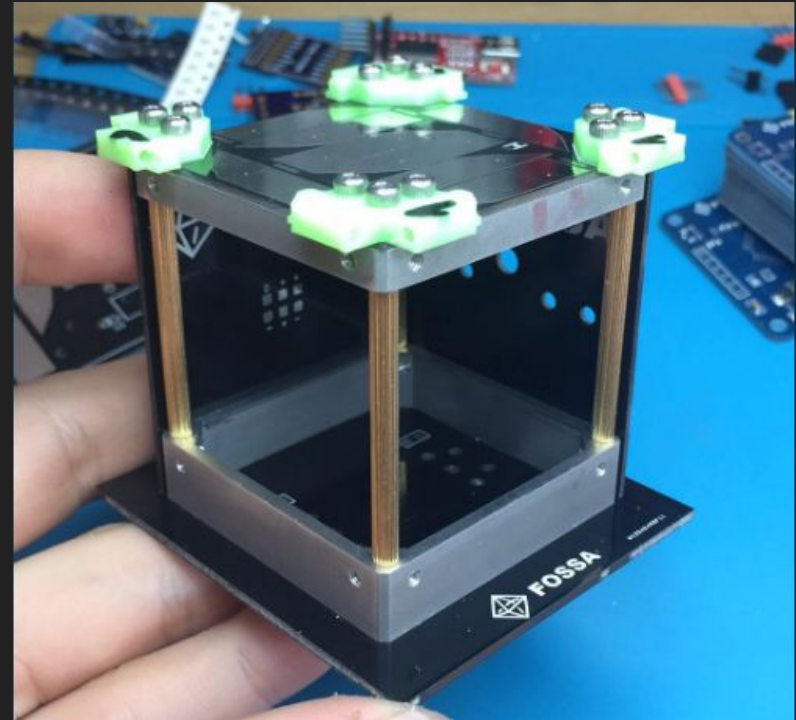
September 2018



Subsystems

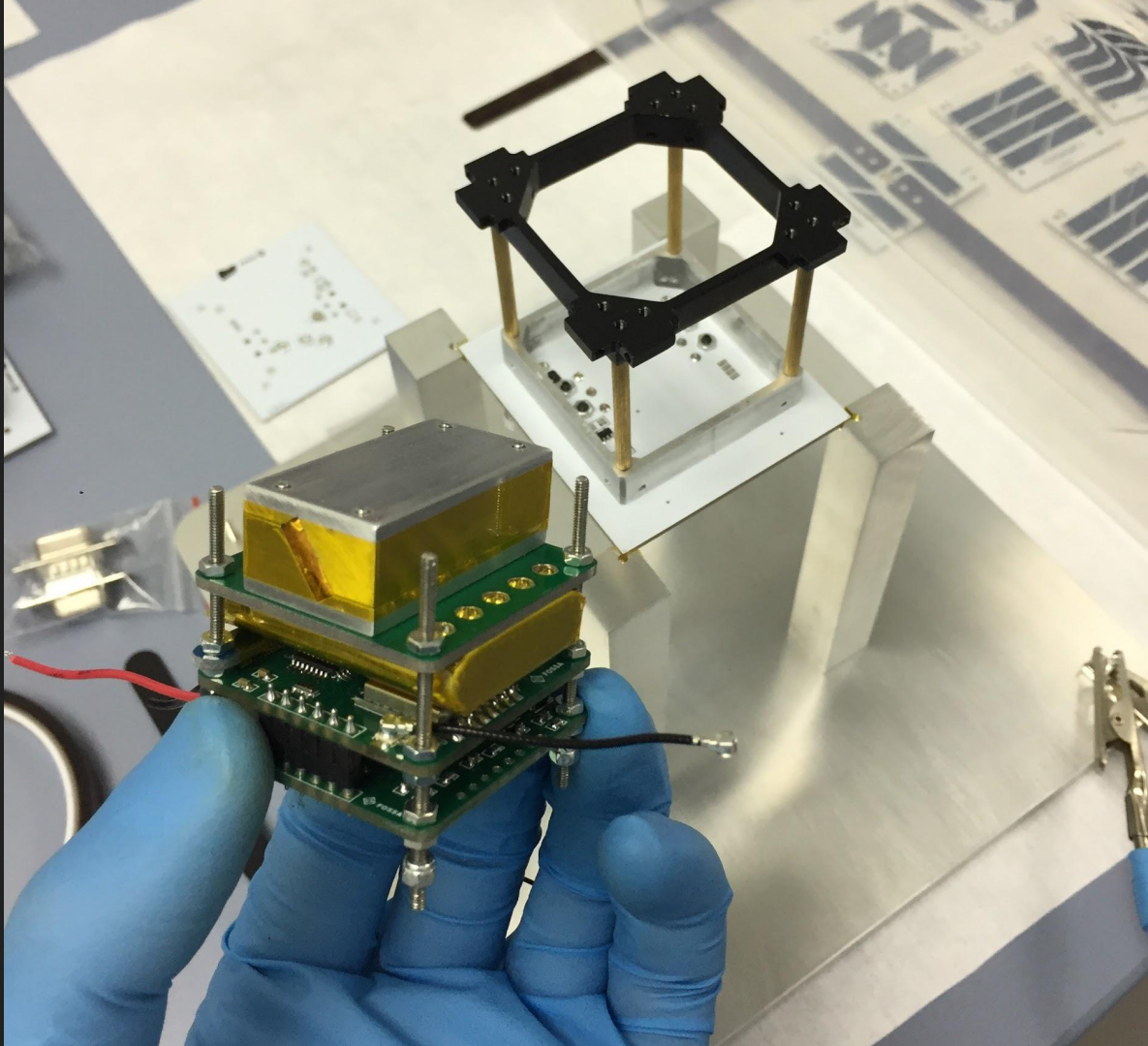
- Mechanical Structure
- Solar Panels
- Passive Attitude System
- Power System
- On-Board Computer
- Telecommunications

Mechanical Structure V1



Mechanical Structure V2

- AL6061
- FR4 Panels
- M2 Rod Stack
- 38x38mm Boards
- Internal Structures
- Brass Standoffs



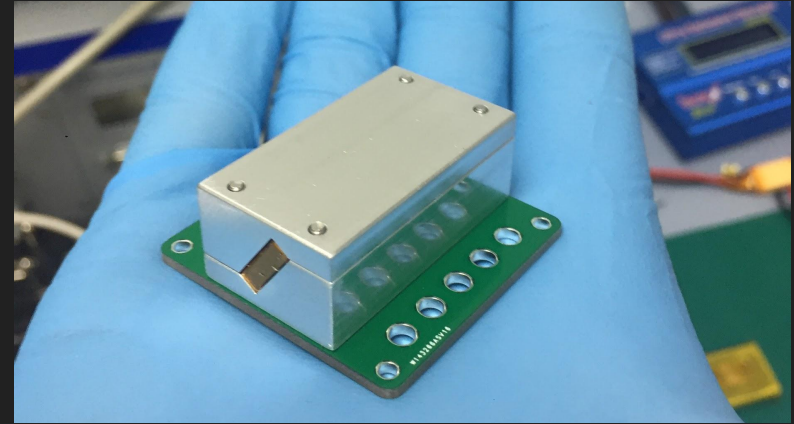
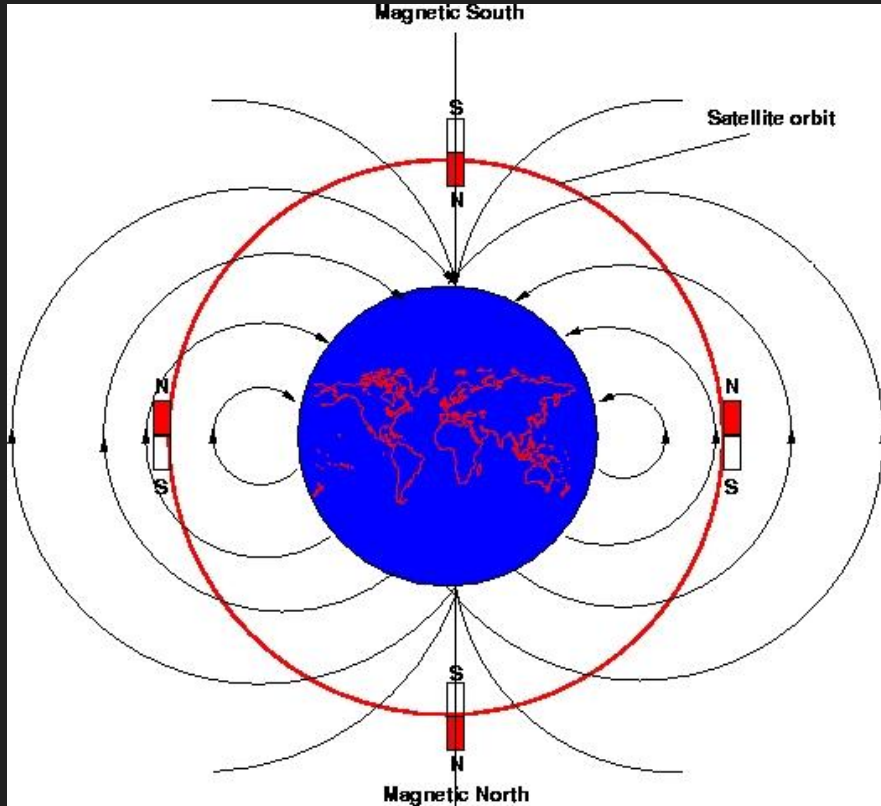
Solar Panels

- TrisolX Solar Cells (Not Recommended)
- Approx ½ Watt Power
- Deployable,
Aluminium Hinges





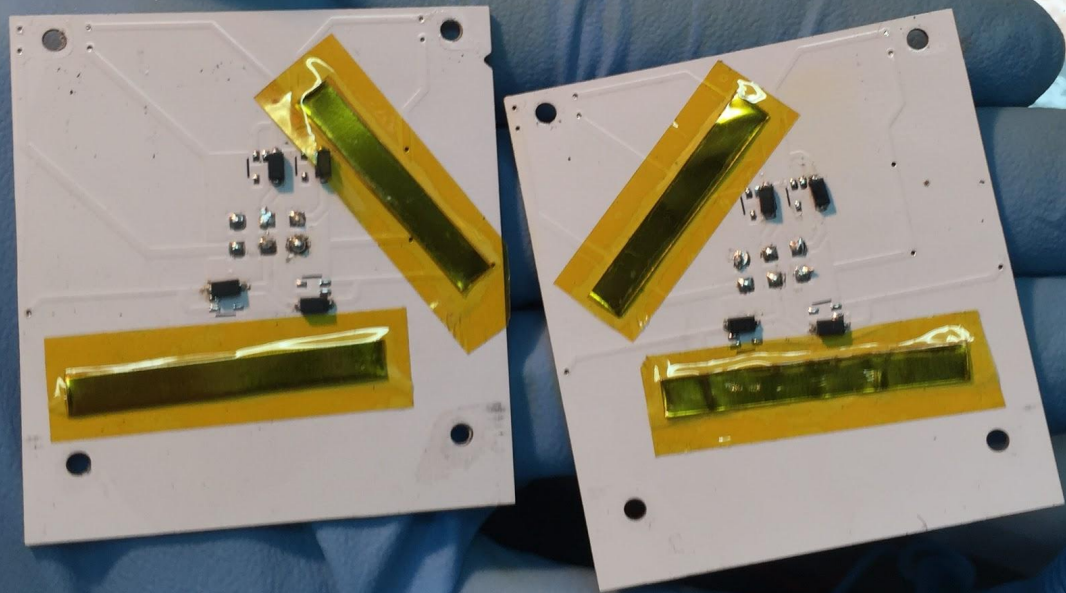
Passive Attitude Control



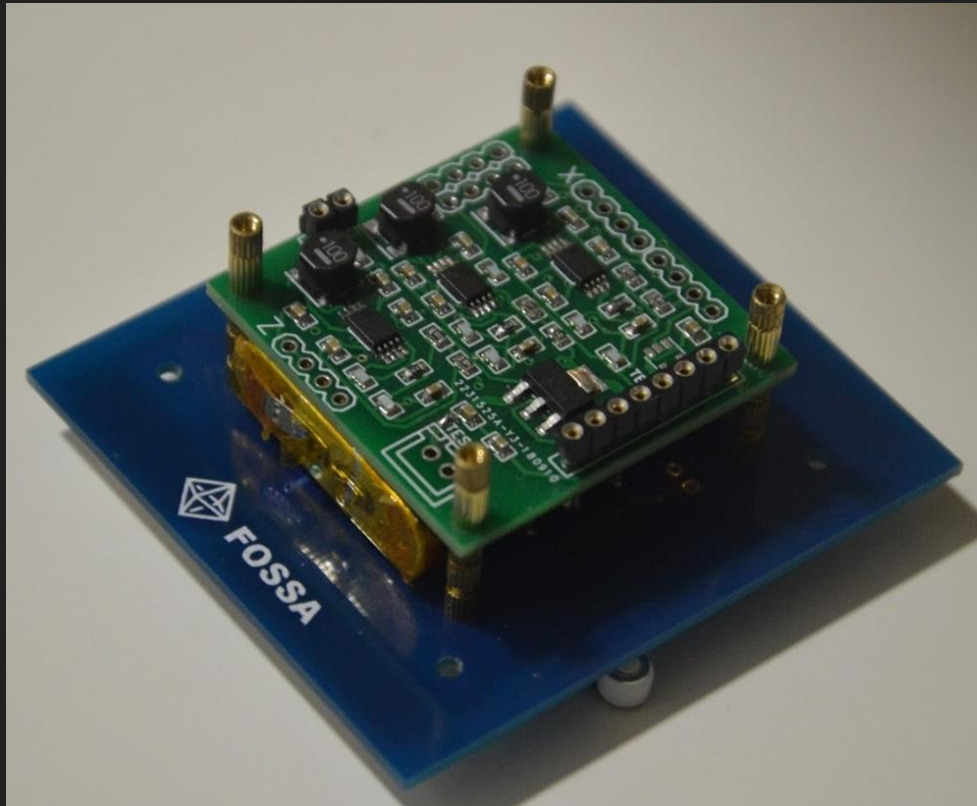
- Permanent Magnets
- Hysteresis Rods

Advantages:

- No power
- Robust
- Simple and easy to design



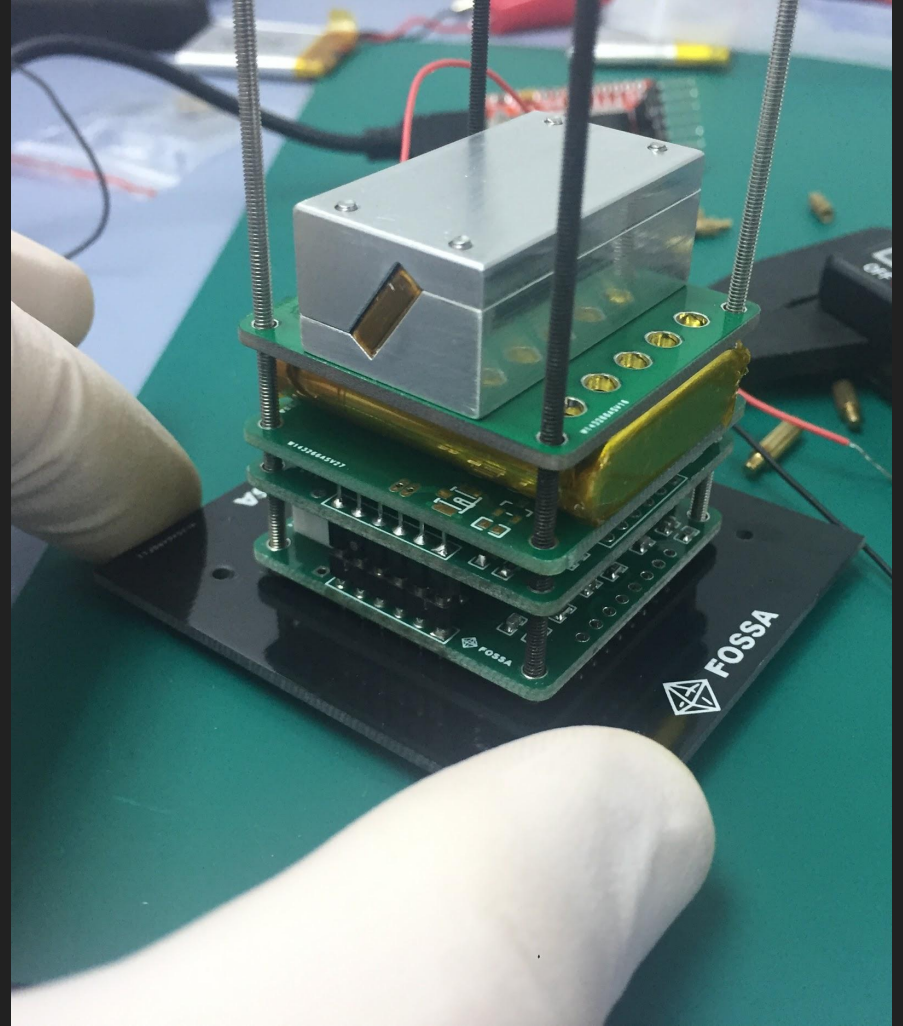
Power System

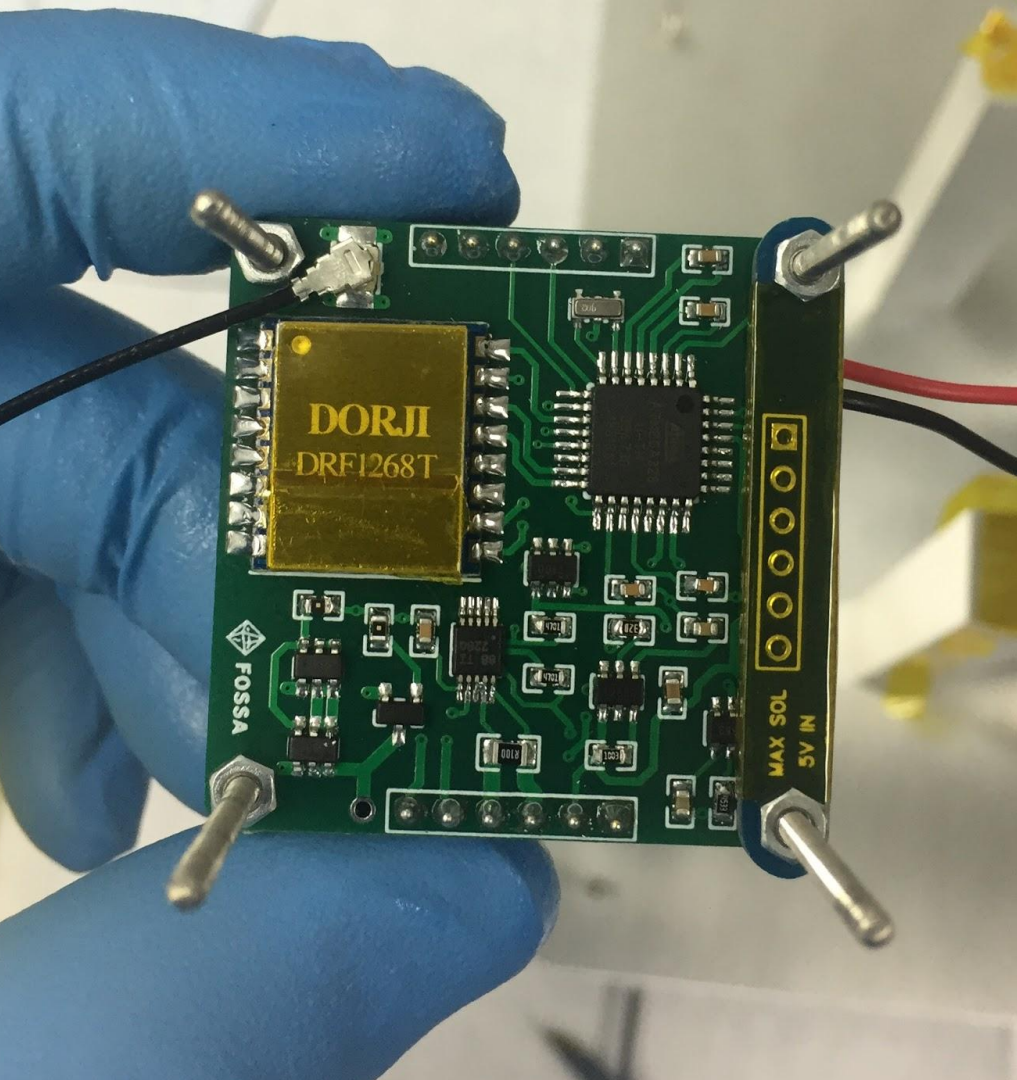


- SPV1040 MPPT
- LDO Regulator
- Li-Ion Battery
- Float Charge
4.1v

Battery

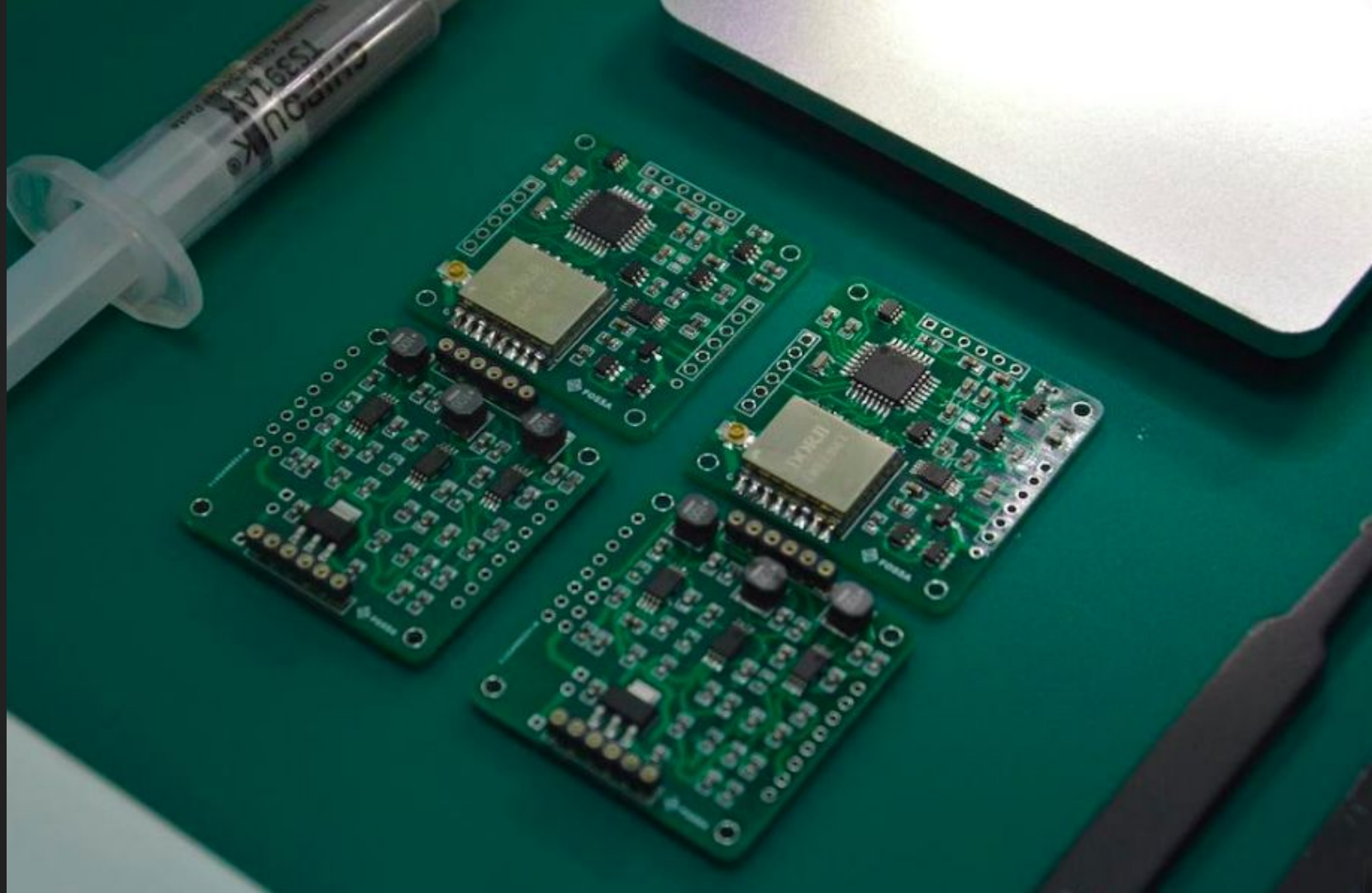
- NP-BX1
- Sony (Reputable)
- 29x40x9mm (Perfect Fit)

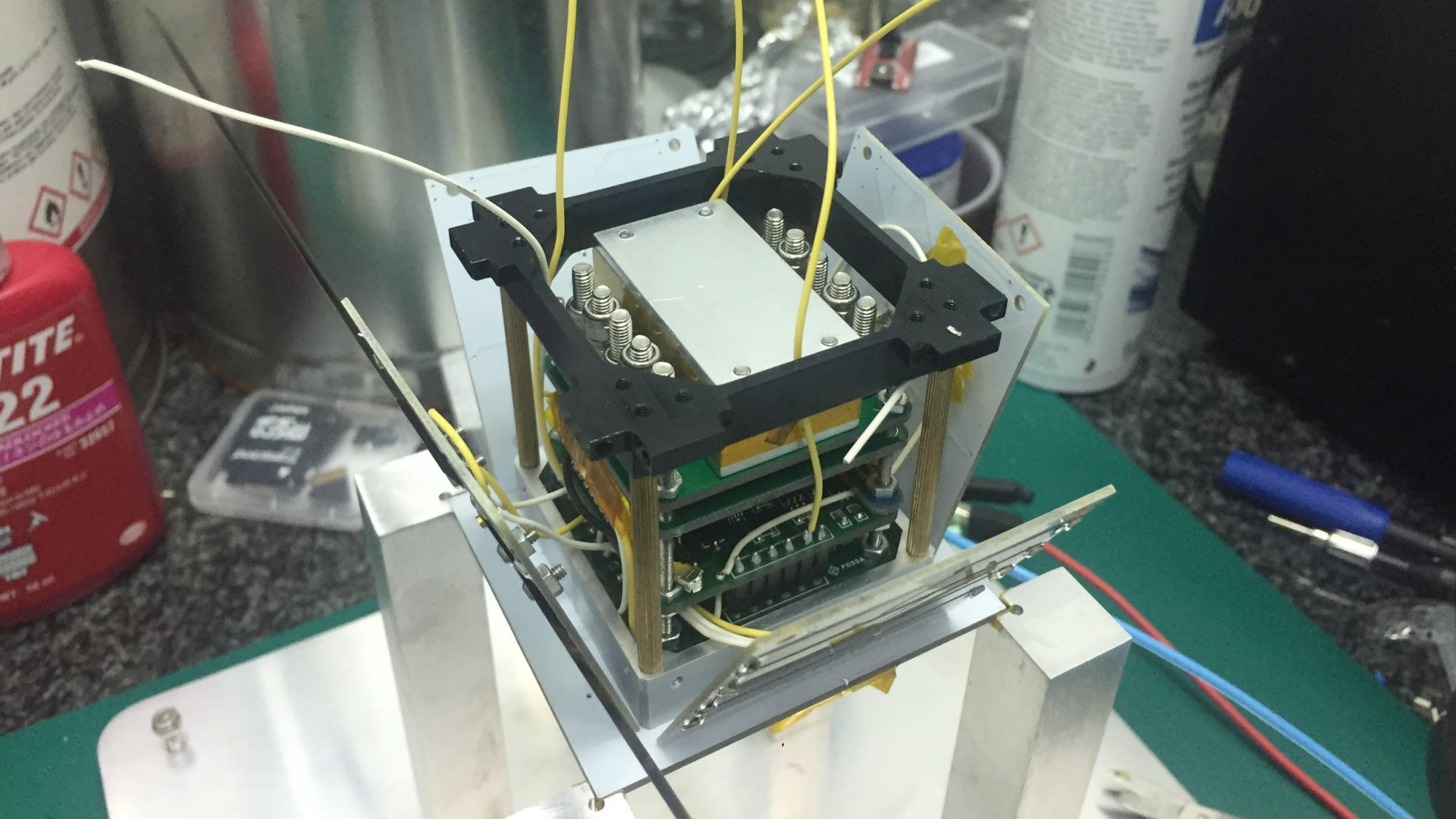




OBC / COMMS

- Atmega328P-AU
- SX1268T TCXO!
- INA226
- TMP100
- TPS2553
- MAX6369
- Deployment Mosfets





TITE.
22

FORSA

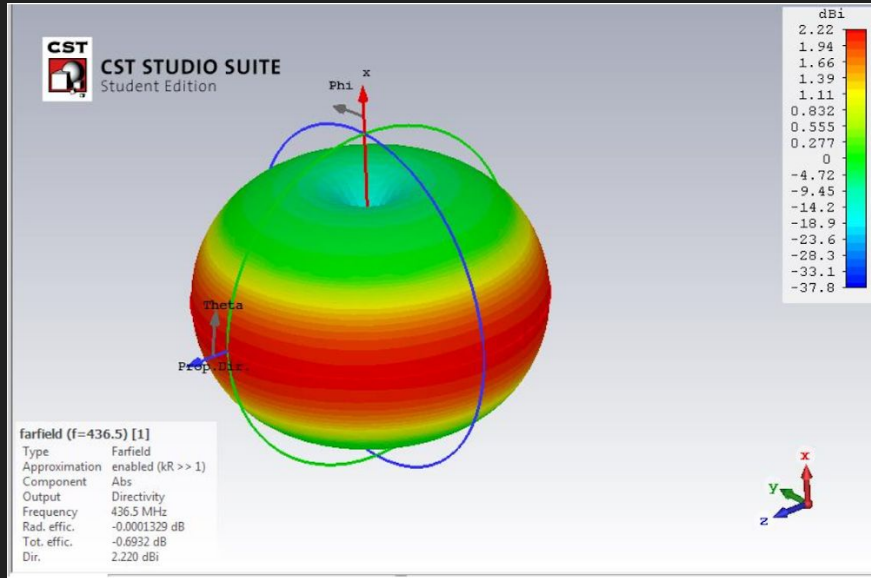
RF Setup

- Single 436.7 MHz Uplink & Downlink Freq.
- LoRa Uplink & Downlink 125K0 KX1D
- GFSK Uplink 10K0 F1D
- RTTY Downlink 182H0 F1B

Functionality

- Repeat Amateur Messages in various configurations
- Request different LoRa configurations
- Request Satellite Info / Sensors
- AES-128 Encrypted Uplink

Link Budget / Antenna

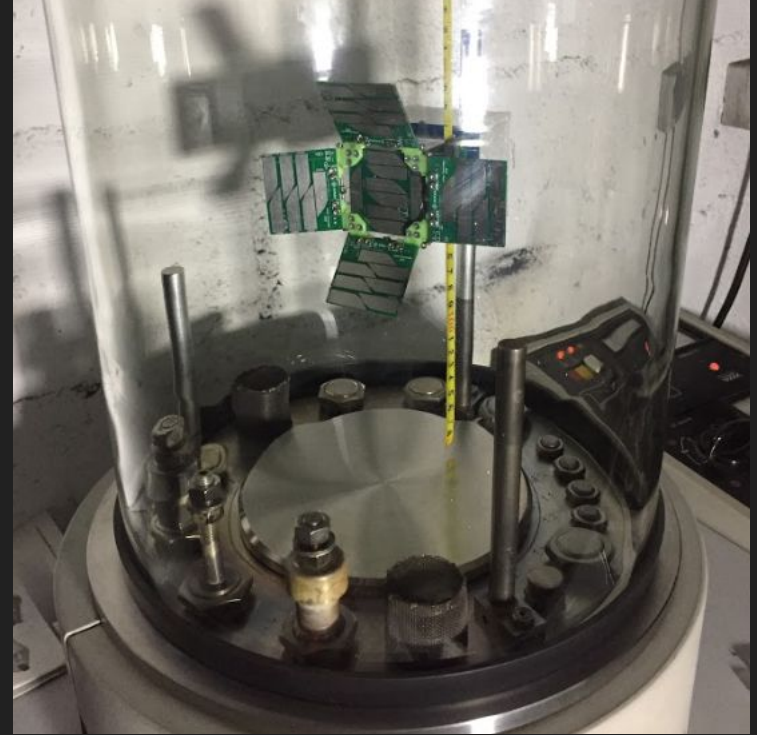


- Tape Measure Dipole
- > 3db Margin at Horizon using a wire antenna
- $\approx 158\text{db}$ Link
- 10mW Uplink

“In-House” Manufacturing



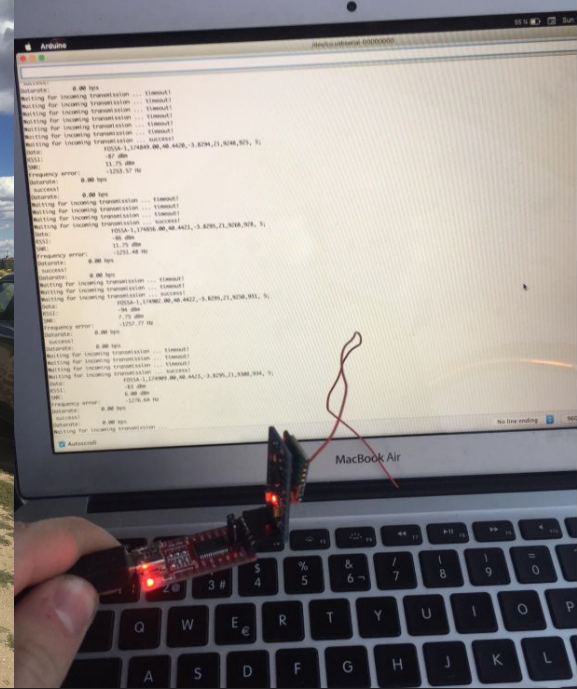
Initial Testing Facilities



Final Facilities



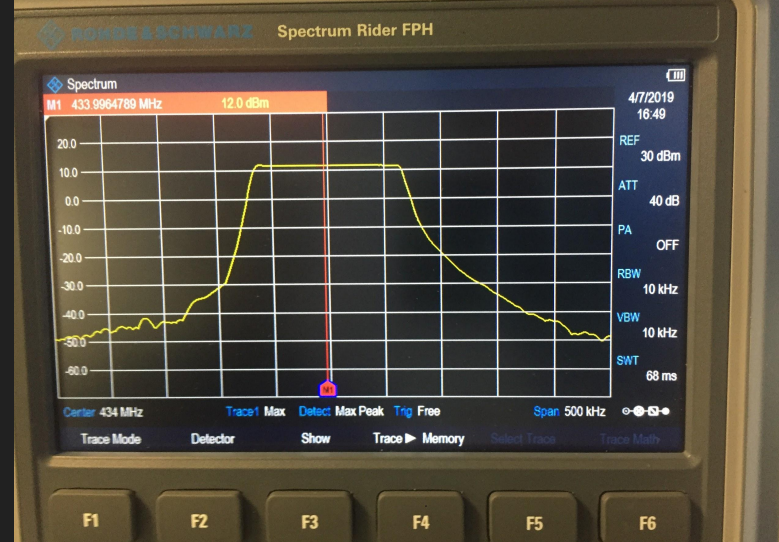
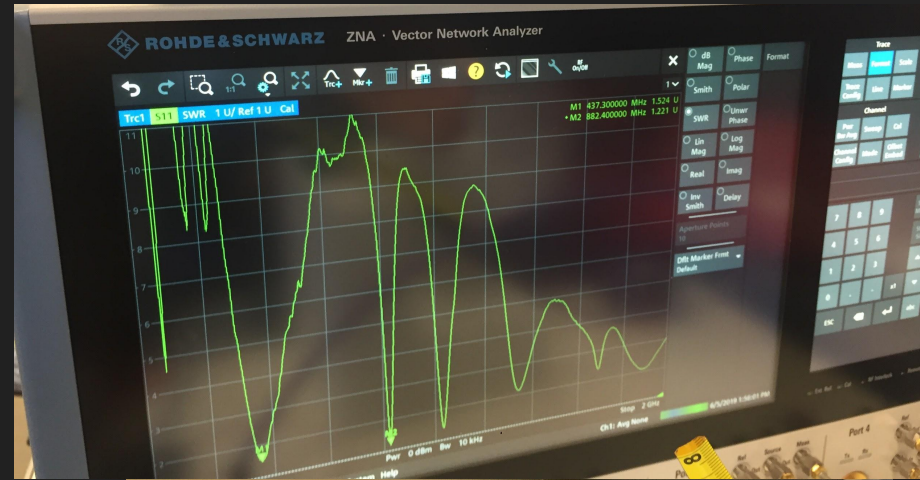
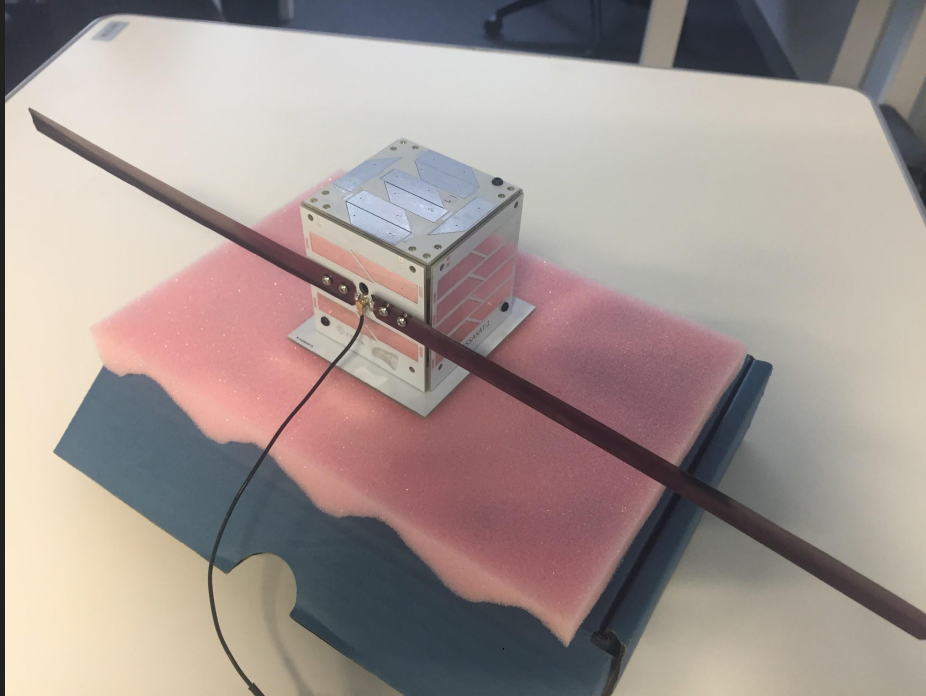
Field Testing



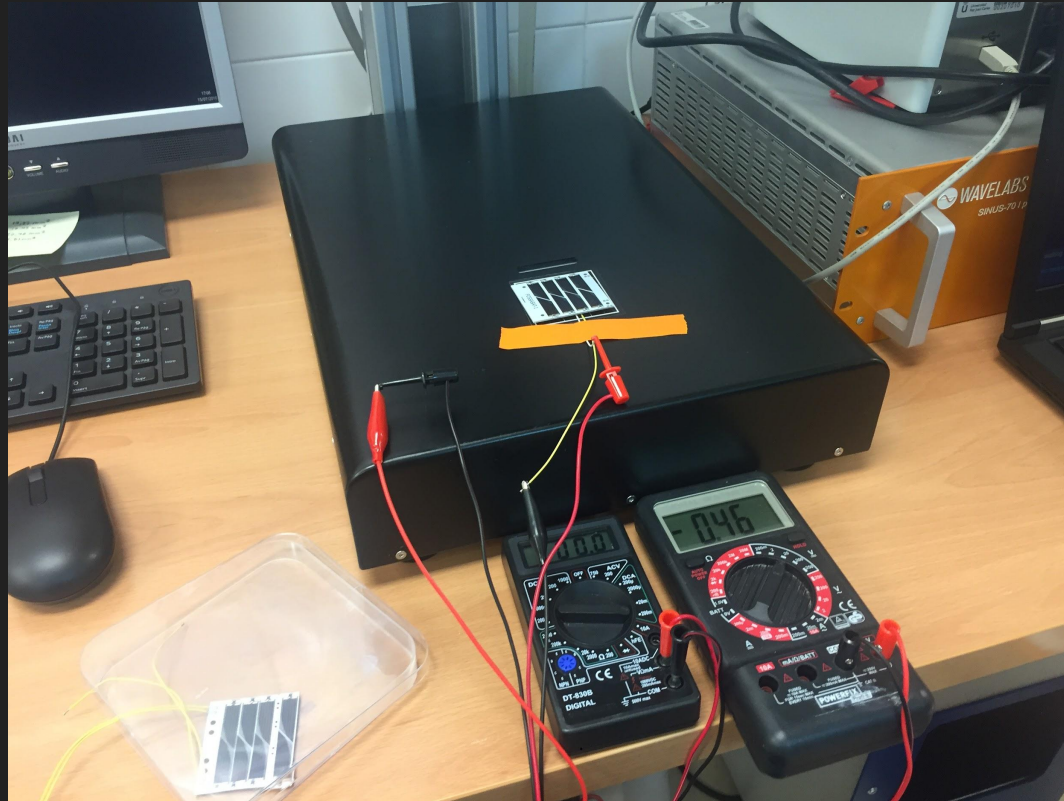


489km at 25mW & SF7
180km at 10mW & RTTY

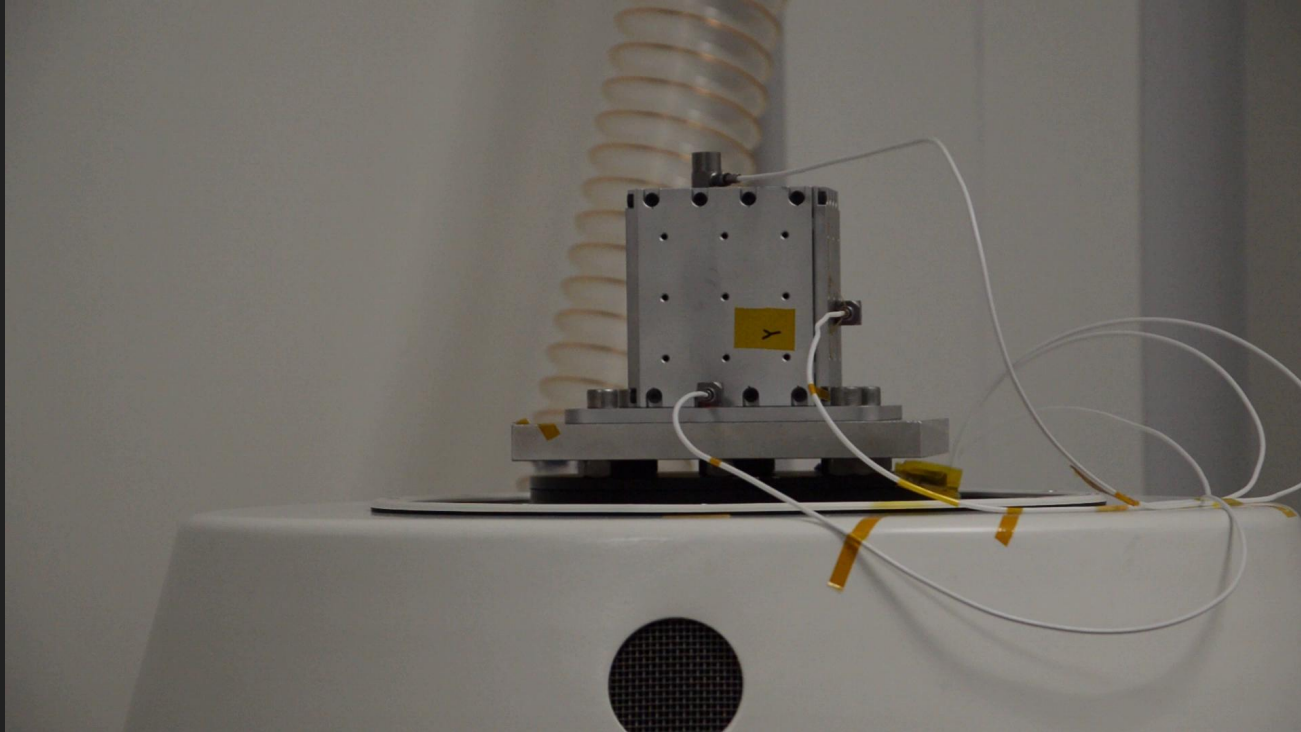
Antenna / RF Testing

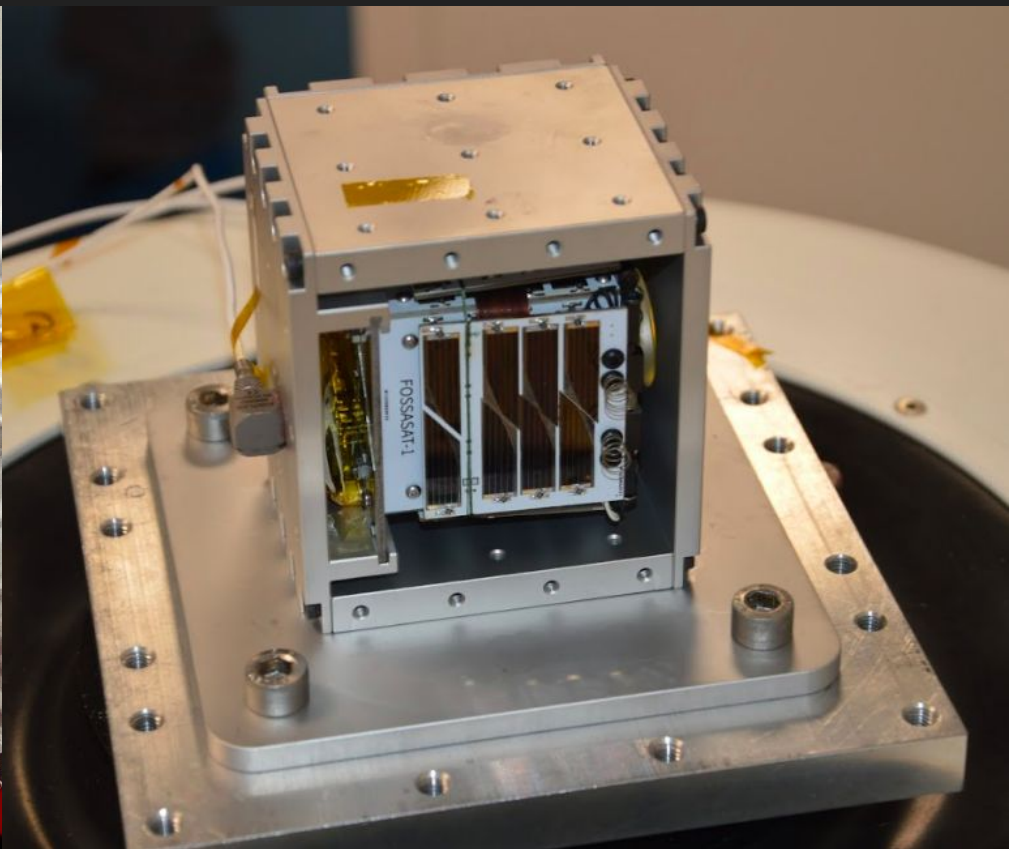


Electronics / Solar Panel Testing

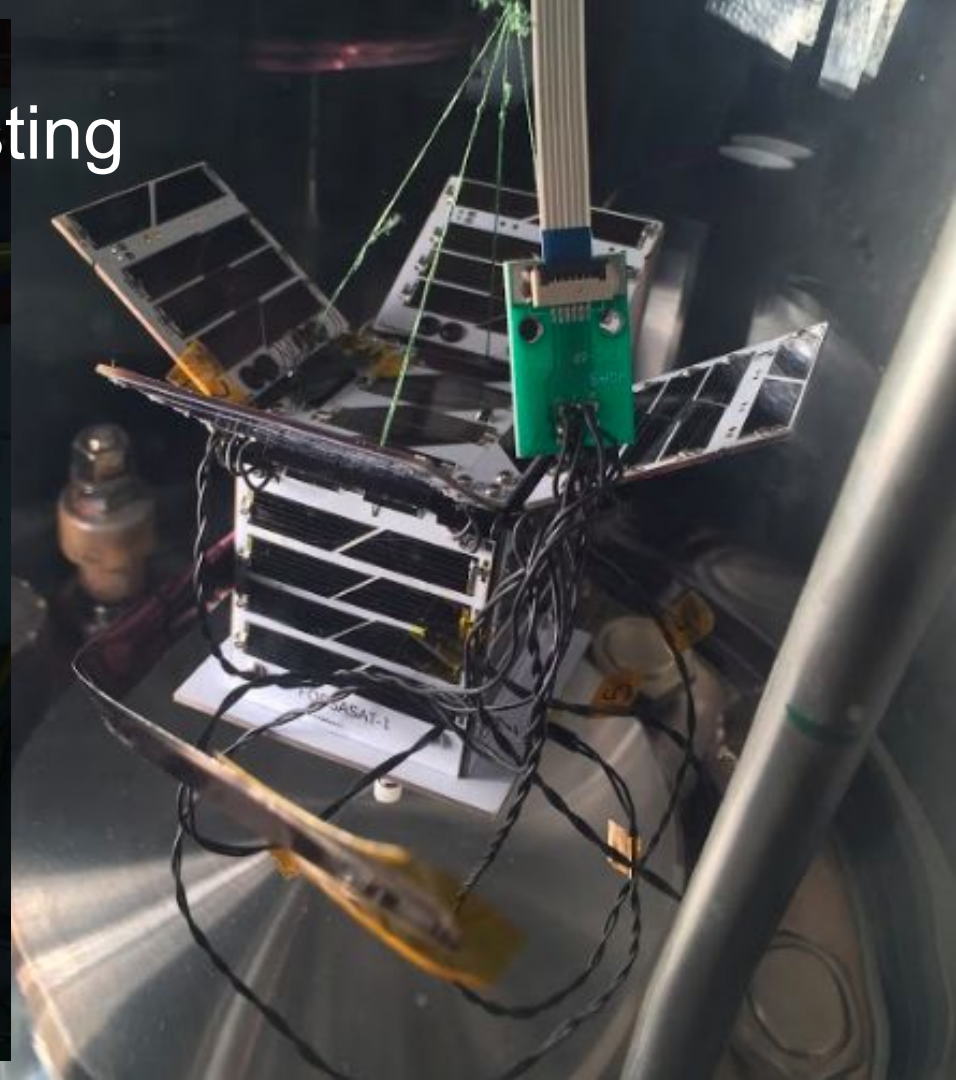
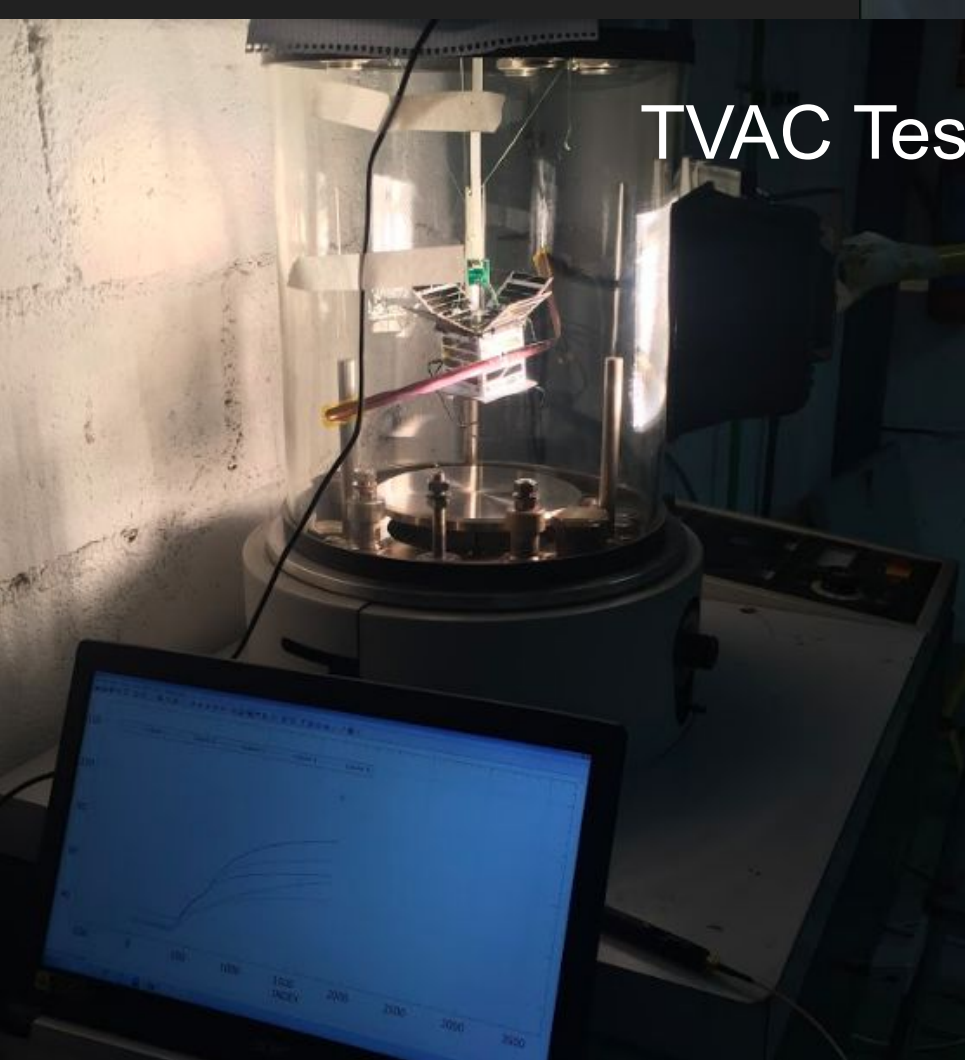


Vibration Testing

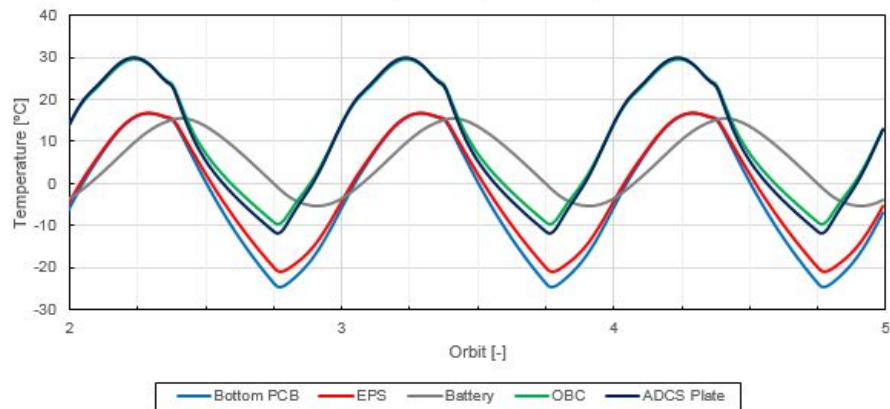




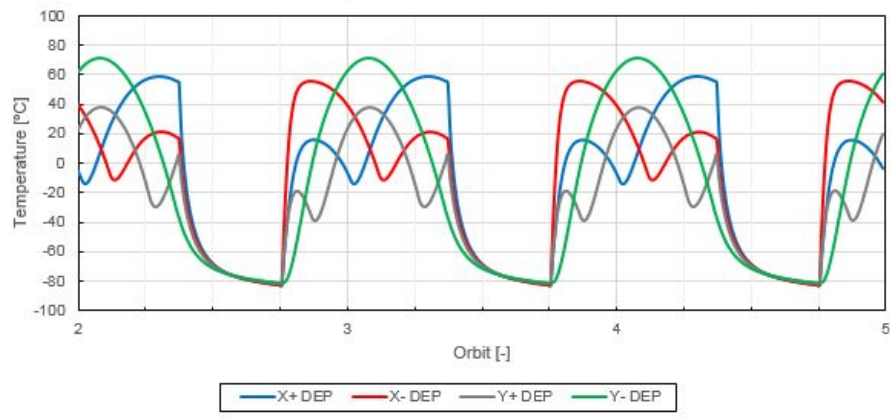
TVAC Testing



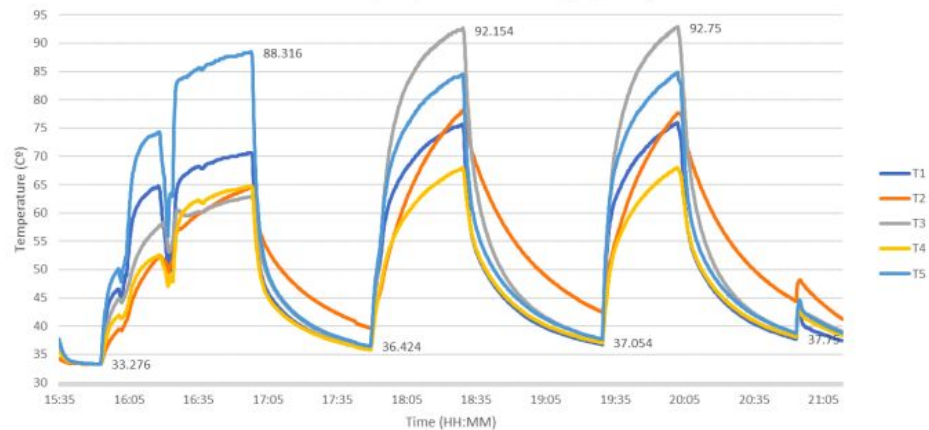
Internal systems (Cold case)



Deployable panels (Cold case)



FossaSat-1, Temperature vs Time (Adjusted)

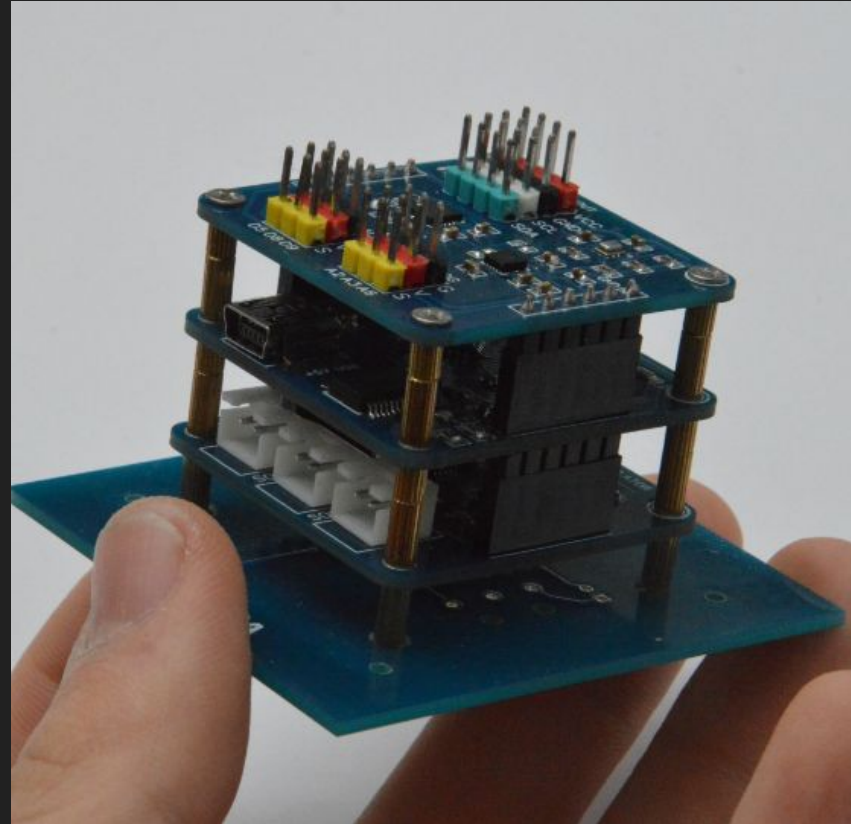
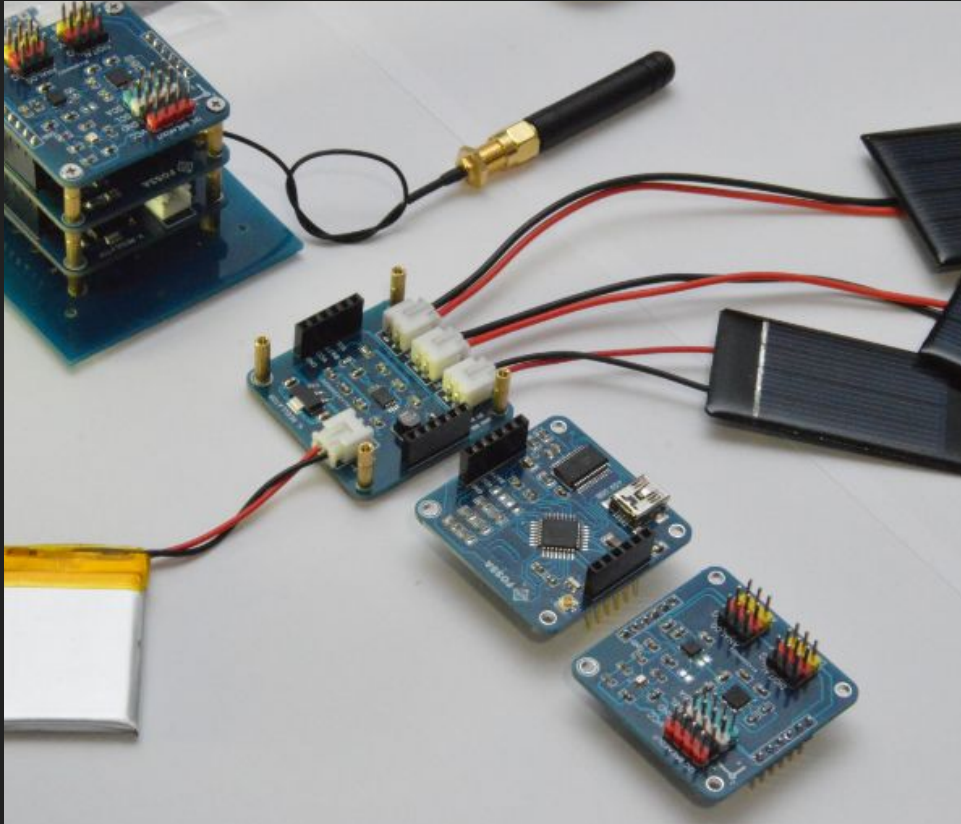


Authorizations (Consult Github)

- IARU
- ITU (API A)
- Spanish Ministry of Economy and Business

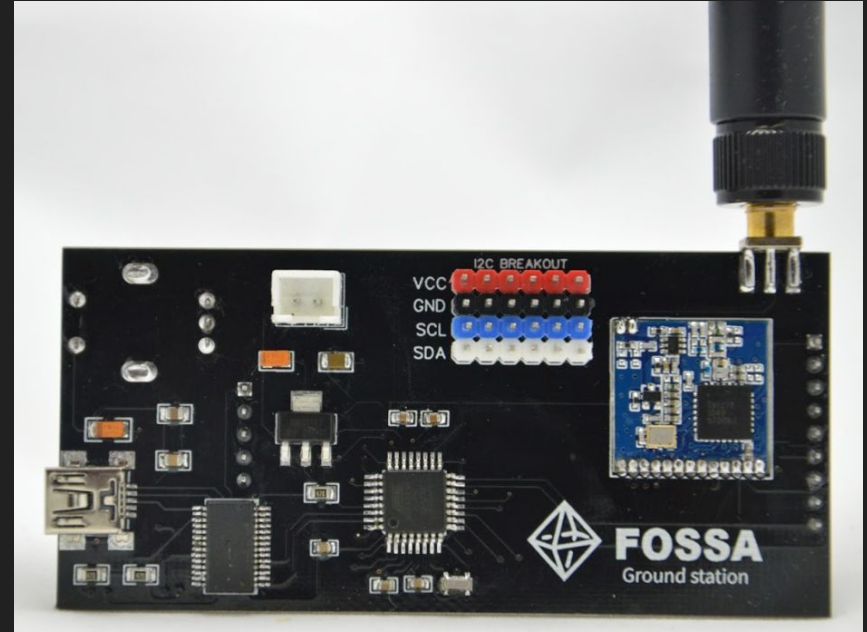


Educational kits





Receiver Development Kits



Workshops



Open Source

Bambofy / FOSSASAT-1

Watch 15 Star 51 Fork 2

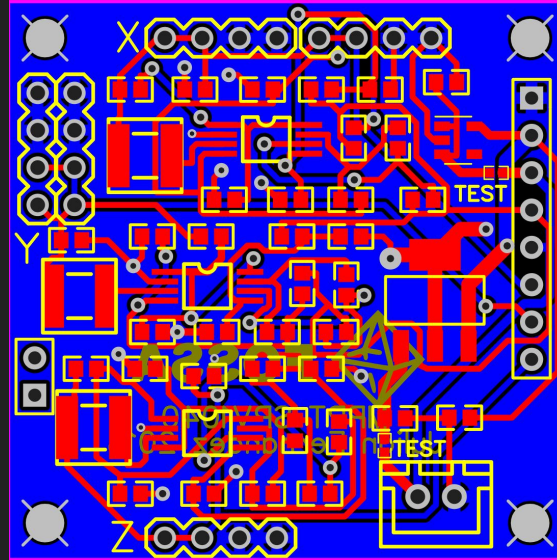
Code Issues 1 Pull requests 0 Projects 0 Wiki Insights

No description, website, or topics provided.

141 commits 1 branch 0 releases 3 contributors GPL-3.0

Branch: master New pull request Create new file Upload files Find File Clone or download

Juliantech5	Added Orbital Decay and Reentry predictions	Latest commit 91a66af 16 days ago
Code	Implement ITA2 standard (requires change to messaging format)	6 months ago
FOSSA Documents	Added Orbital Decay and Reentry predictions	16 days ago
FOSSA STK	Add files via upload	16 days ago
FossaCube Files	Update README.md	16 days ago
Hardware	Add files via upload	16 days ago
Media	Updated README.md	16 days ago
.gitattributes	Imported previous work	8 months ago
.gitignore	Finalized documentation for the beacon and flowchart generated for t...	8 months ago
CONTRIBUTING.md	Imported previous work	8 months ago
LICENSE	Imported previous work	8 months ago
PULL_REQUEST_TEMPLATE.md	Imported previous work	8 months ago
README.md	Updated README	4 months ago





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Julian@Fossa.Systems

