

A NEW ELECTRICAL POWER SYSTEM ARCHITECTURE FOR DELFI-PQ

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Content

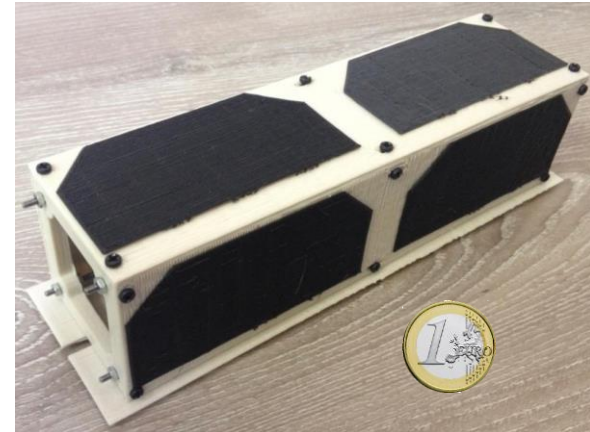
- PQ-9
- COTS Systems
- Delfi - PQ
- Proposed Solution



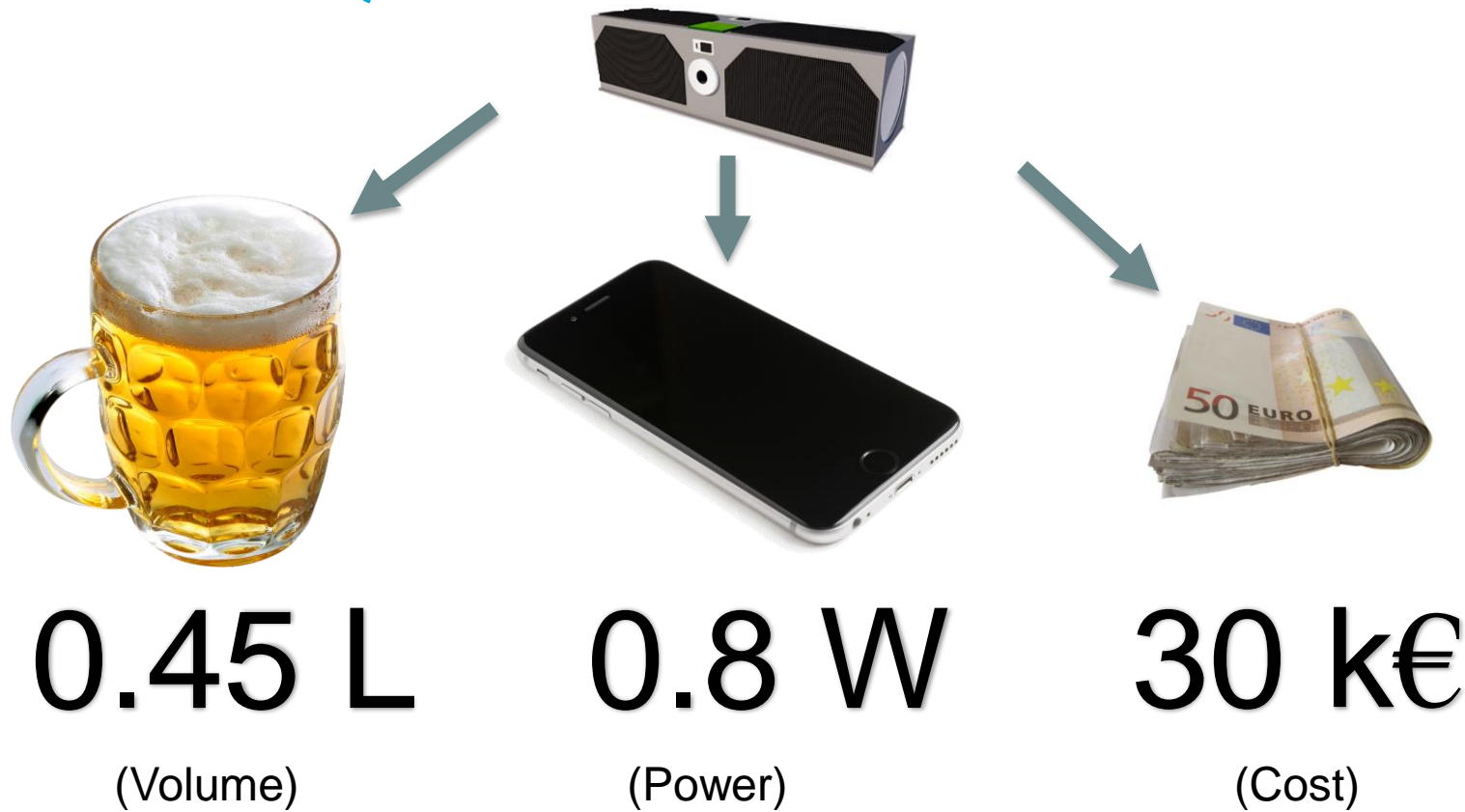
Ready, steady, go!

PQ9?

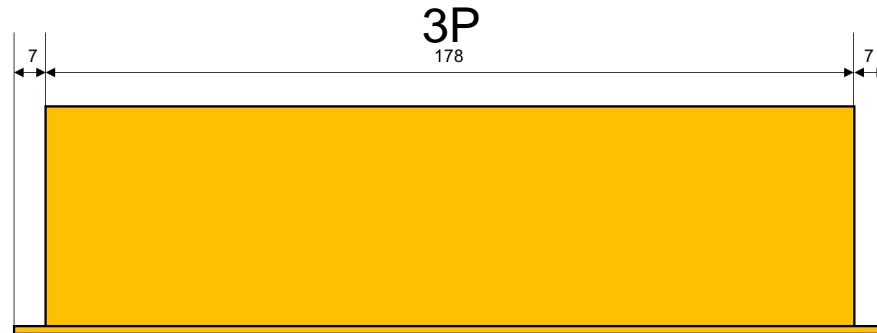
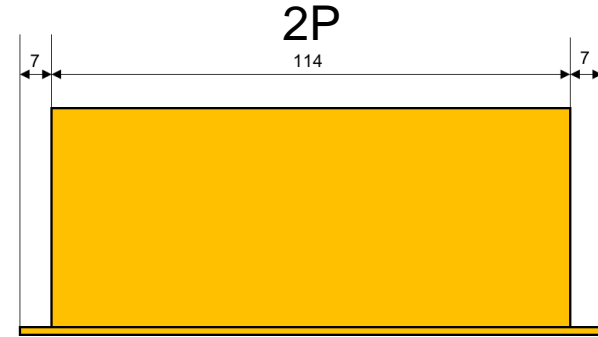
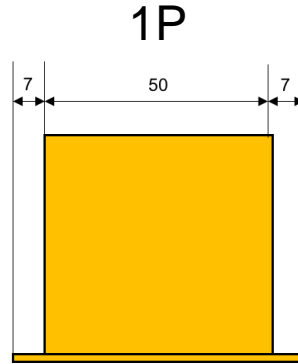
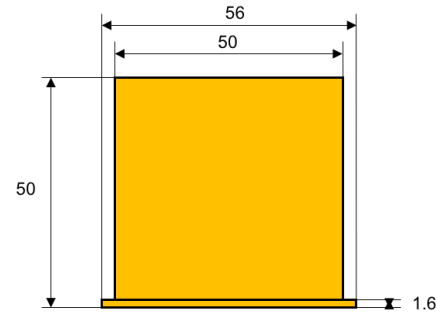
- (Yet Another) “Standard” for a satellite bus
- Designed for PocketQubes
 - Very small satellites, based on units of 5x5x5 cm
- Why smaller?
 - Have you seen ants?
 - Try deploying 100s of them...



PocketQubes?



PocketQubes



Side View

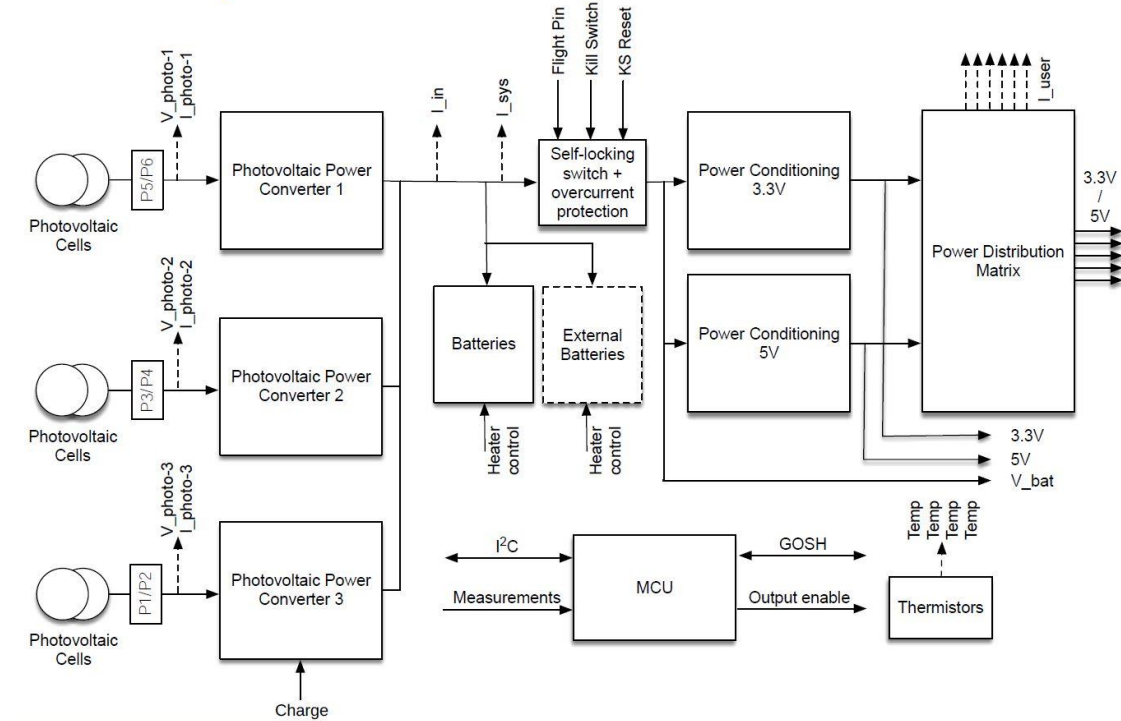
Power Generation Architectures

- S3R – Sequential Switching Shunt Regulator
 - Higher efficiency
 - Constant illumination and temperature
- MPPT – Maximum Power Point Tracker
 - Good for varying conditions

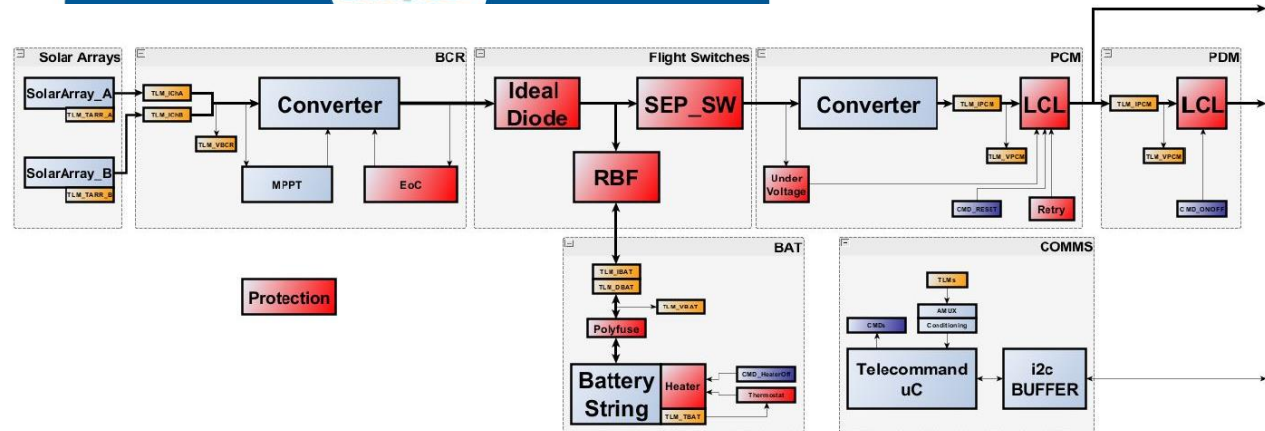
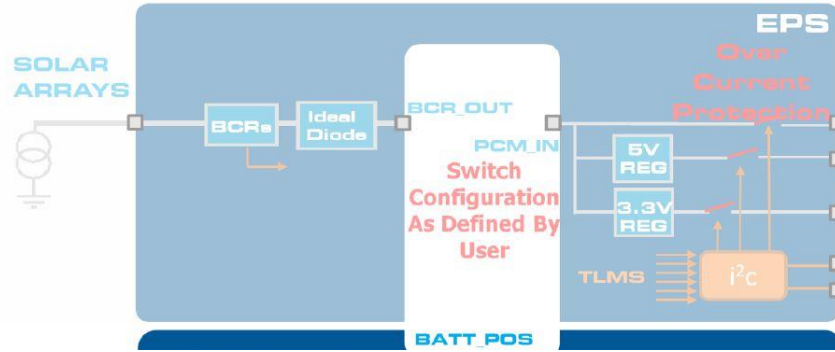
Power Storage and Distribution Architectures

- BCR / BDR modules
- Regulated Busses
- Battery Protection
 - Solar Panel to Battery

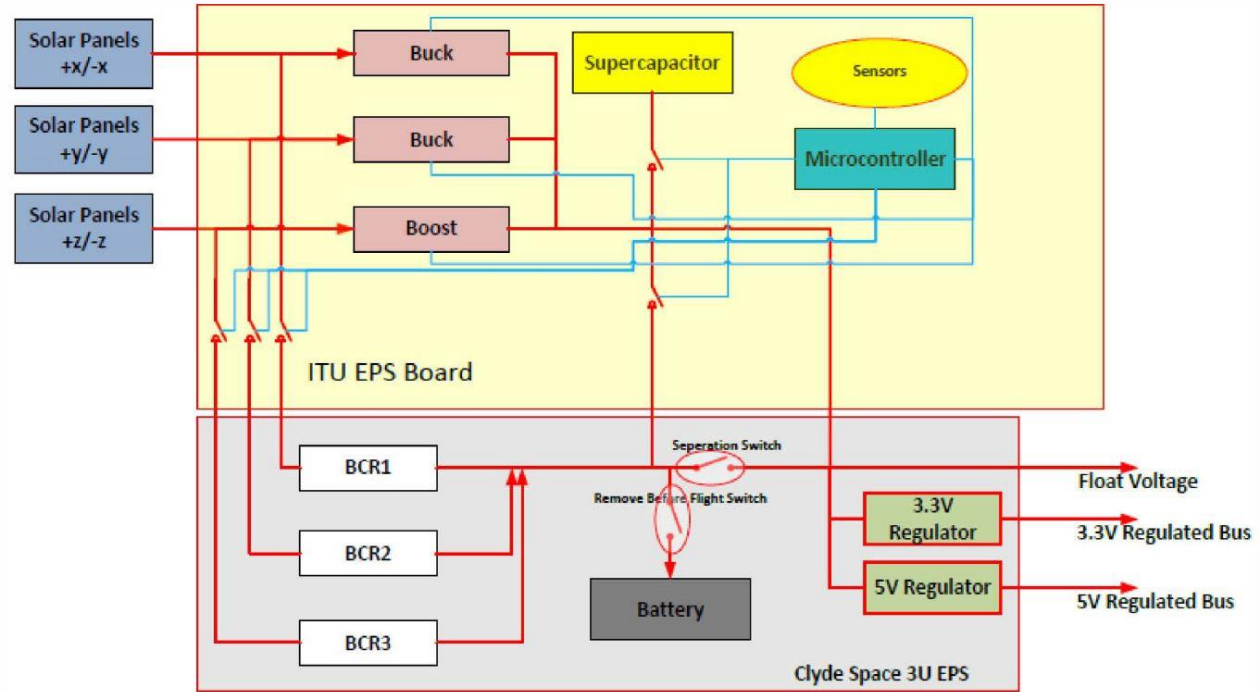
COTS Systems



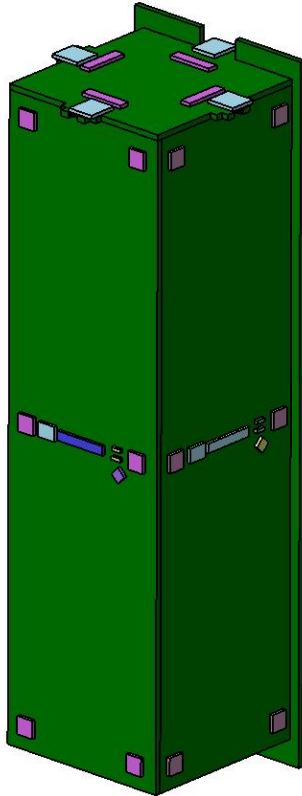
COTS Systems



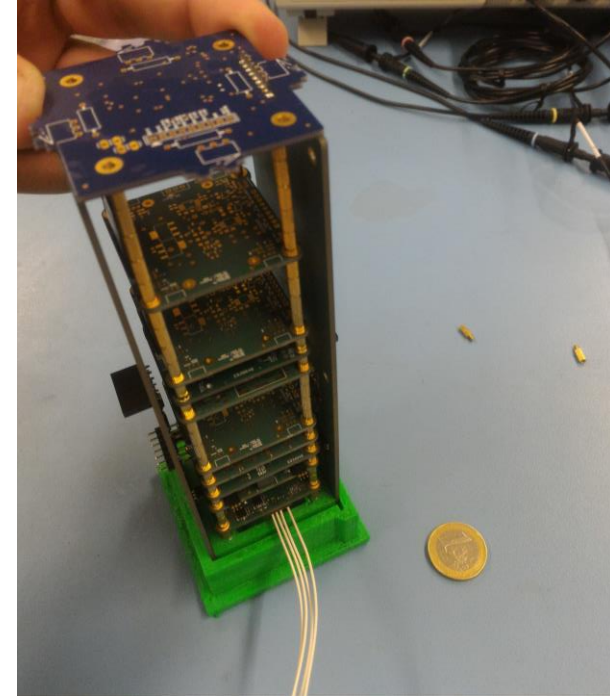
COTS Systems



Delfi-PQ

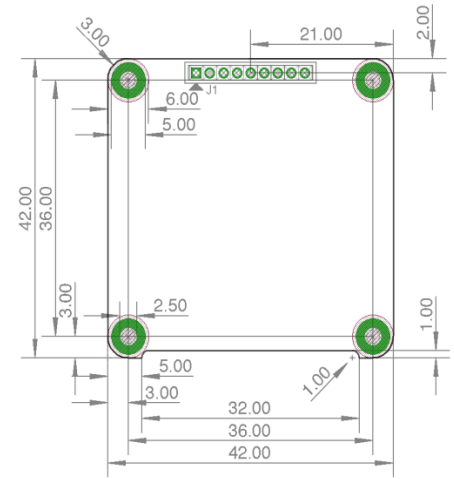


- 3P Satellite
 - uPropulsion
 - Lensless Imager
 - Radiation Meas.
 - Navigation
-
- 178mm
50mmx50mm



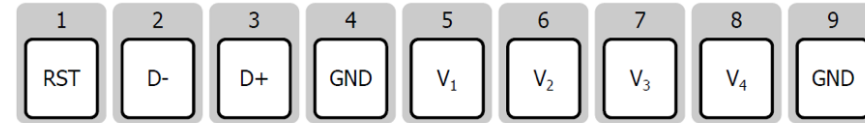
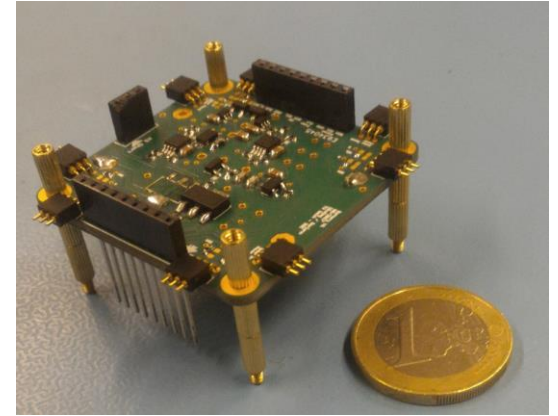
PQ9

- Describes
 - Board form factor
 - Interconnections
- Open access via GitHub
 - <https://github.com/DelfiSpace/PQ9-Template>
 - Board template (EAGLE – PCB)
 - “Interface Control Document” (almost there...)
 - Basic software



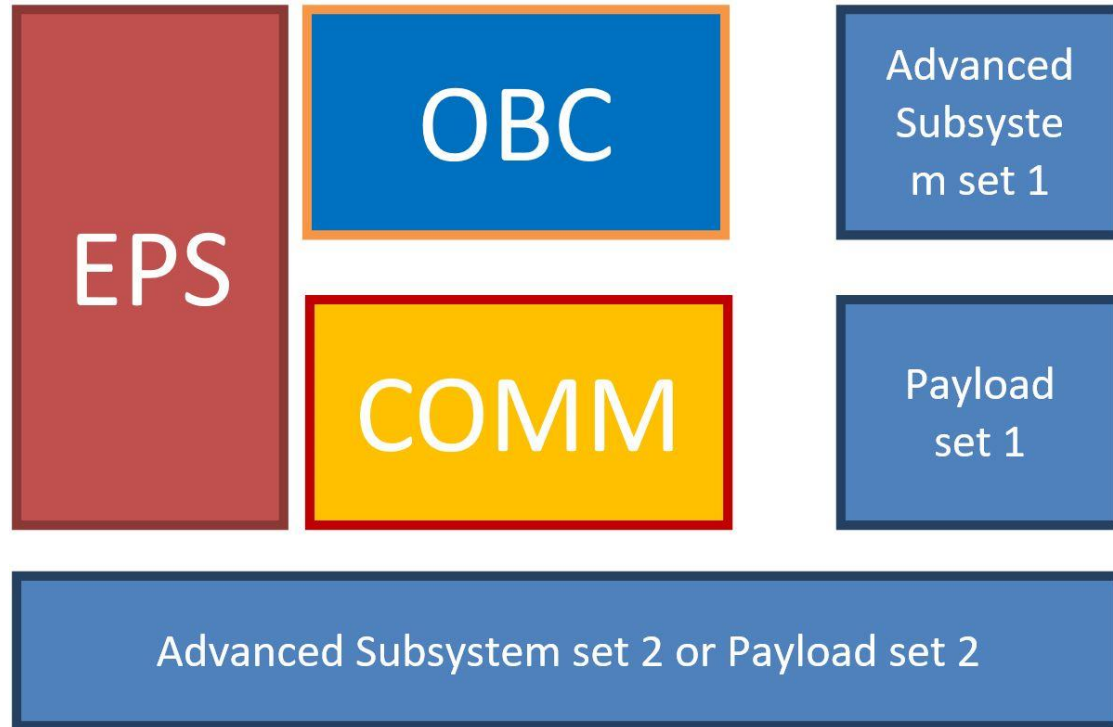
Satellite bus

- Minimalistic approach
- As small as possible
- As simple as possible
- As robust as possible

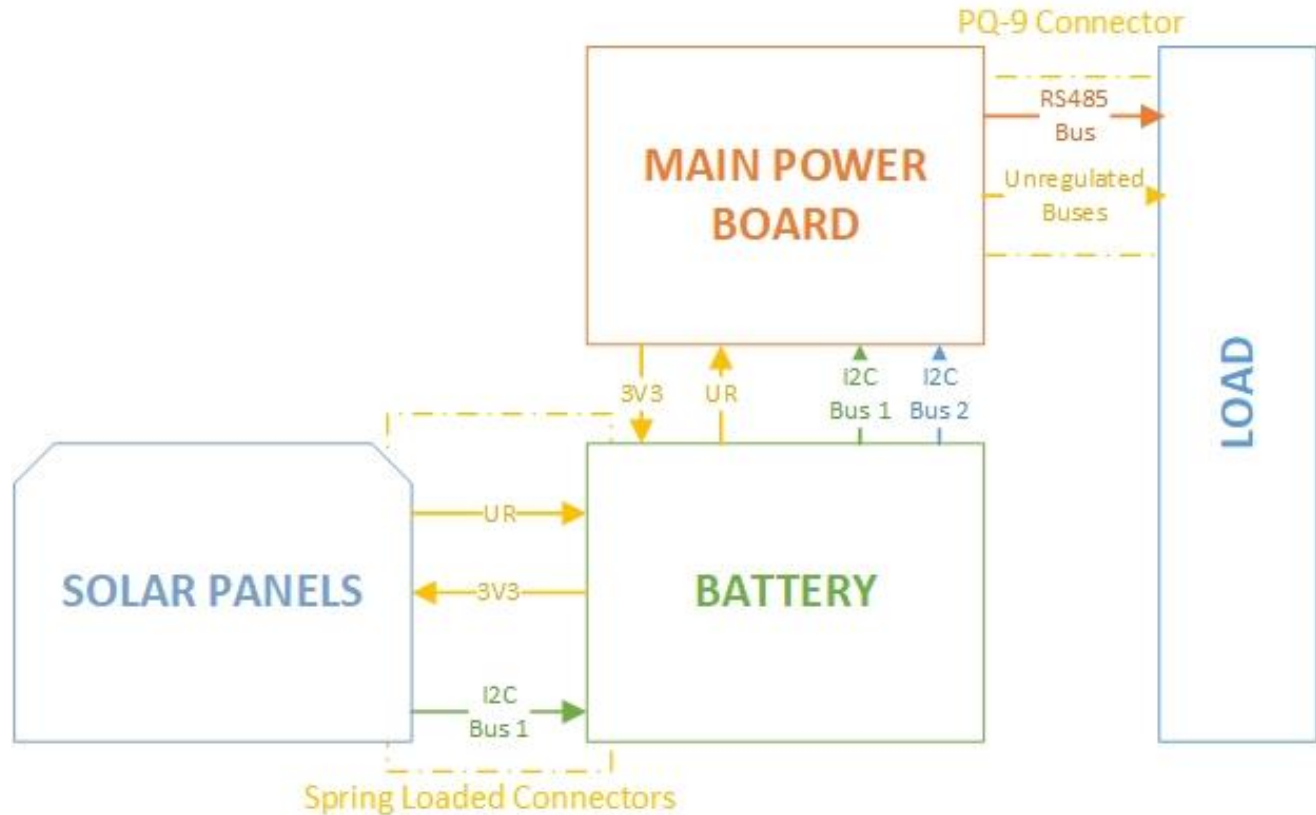


Pin	Signal	Function
1	RESET	System reset when pulled high – nominal ground
2	D-	RS-485 inverting signal
3	D+	RS-485 non-inverting signal
4	GND	Ground
5	V ₁	Power
6	V ₂	Power
7	V ₃	Power
8	V ₄	Power
9	GND	Ground

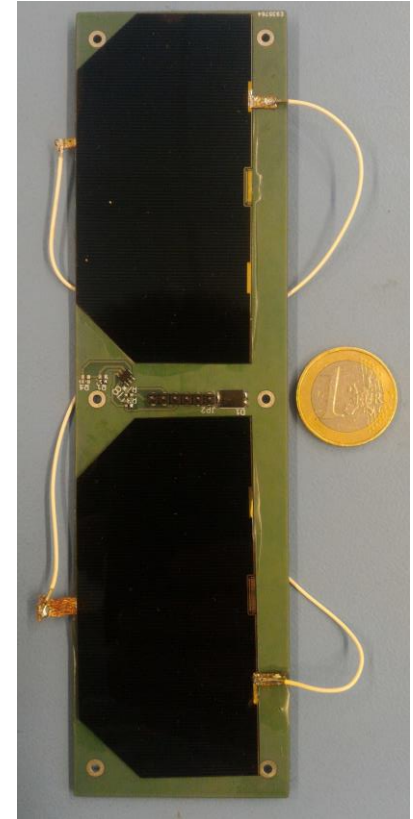
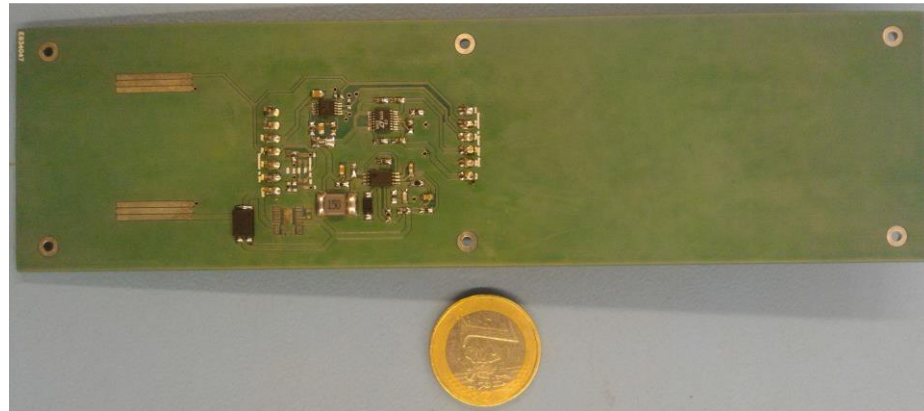
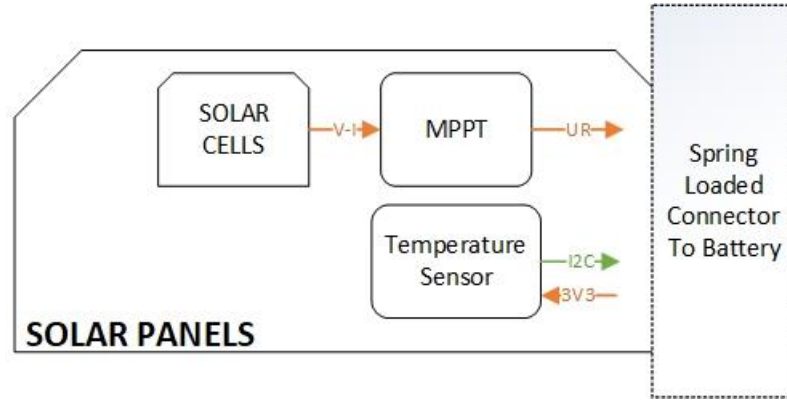
System Architecture



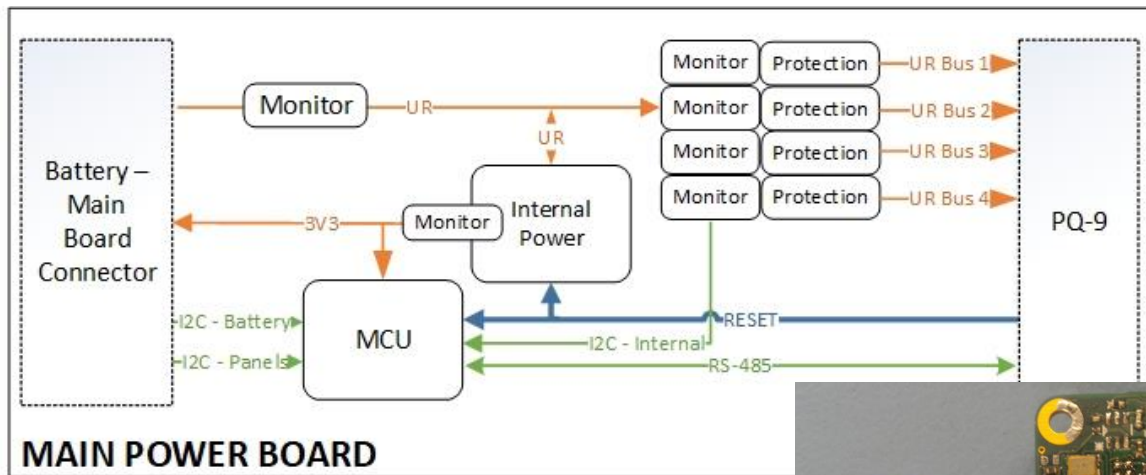
Proposed Solution



Proposed Solution

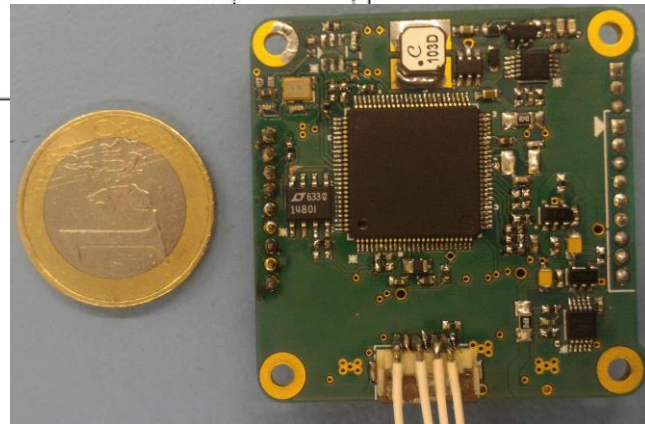


Proposed Solution

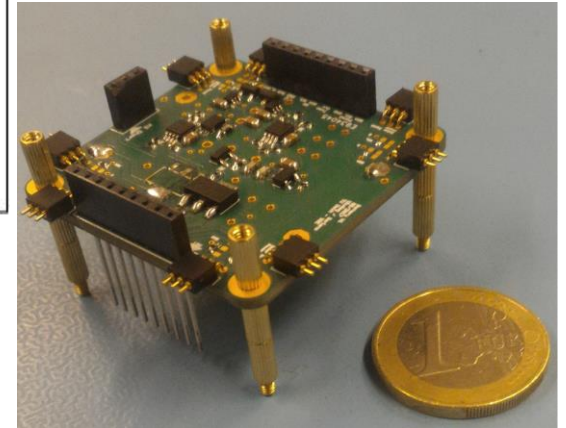
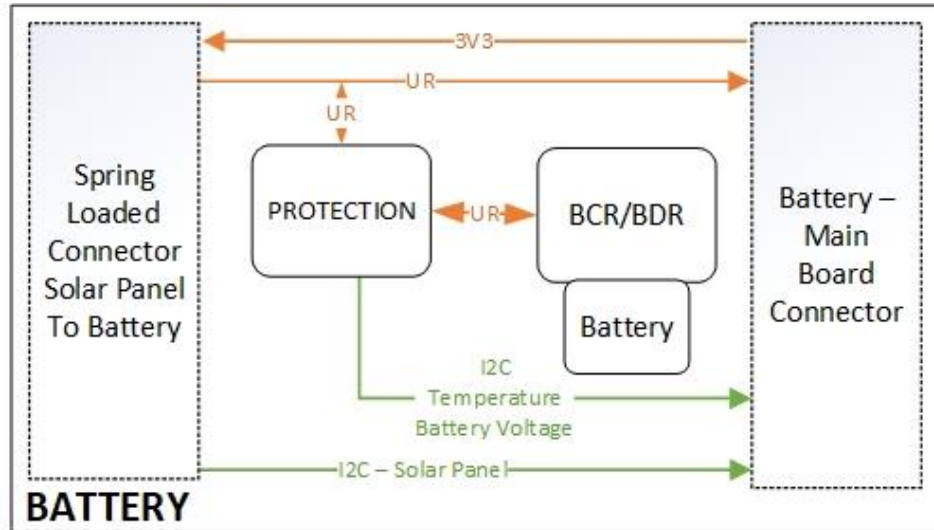


4.5W

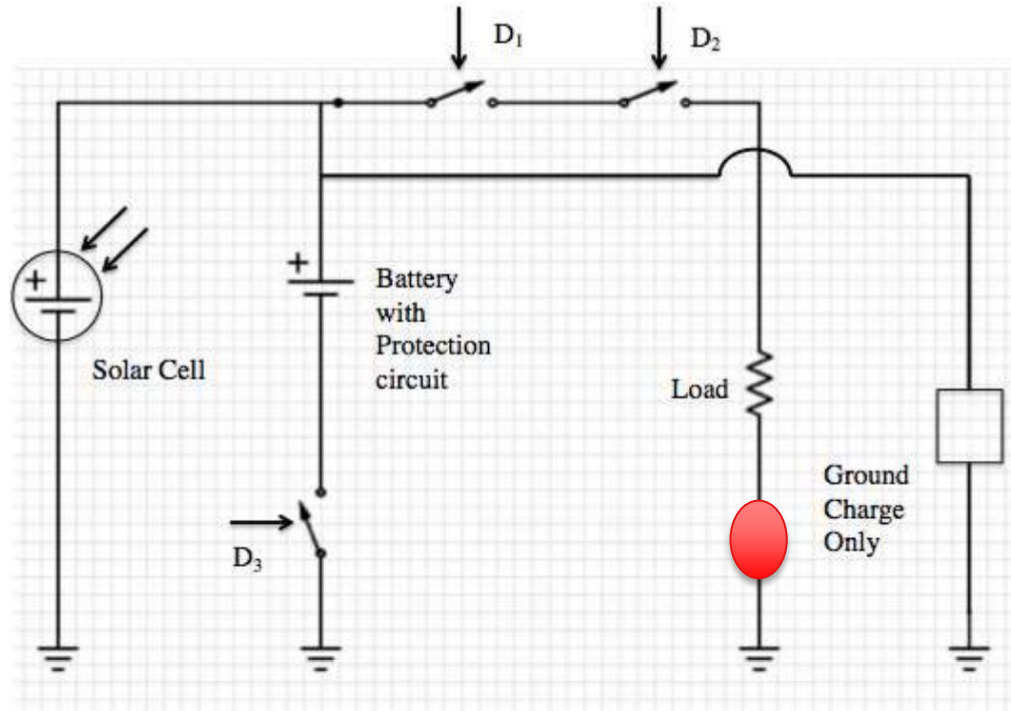
4 Bus Unregulated Busses



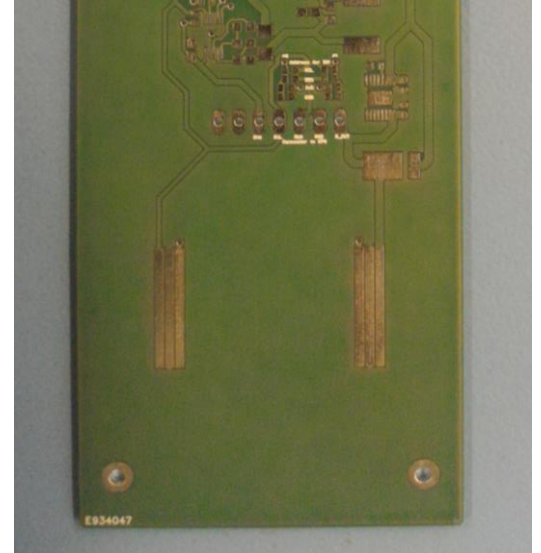
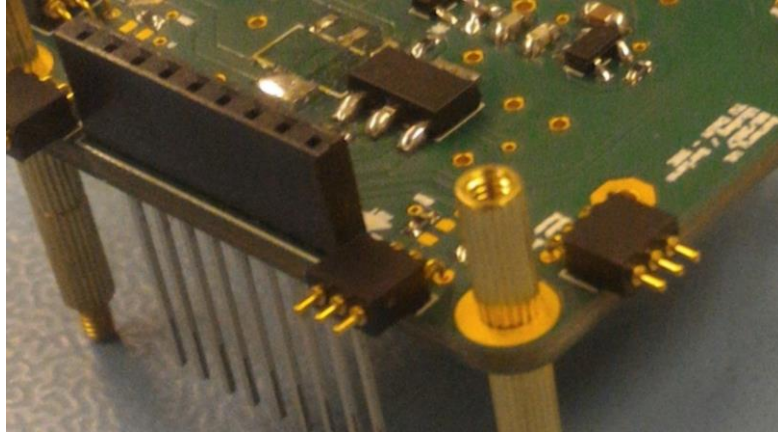
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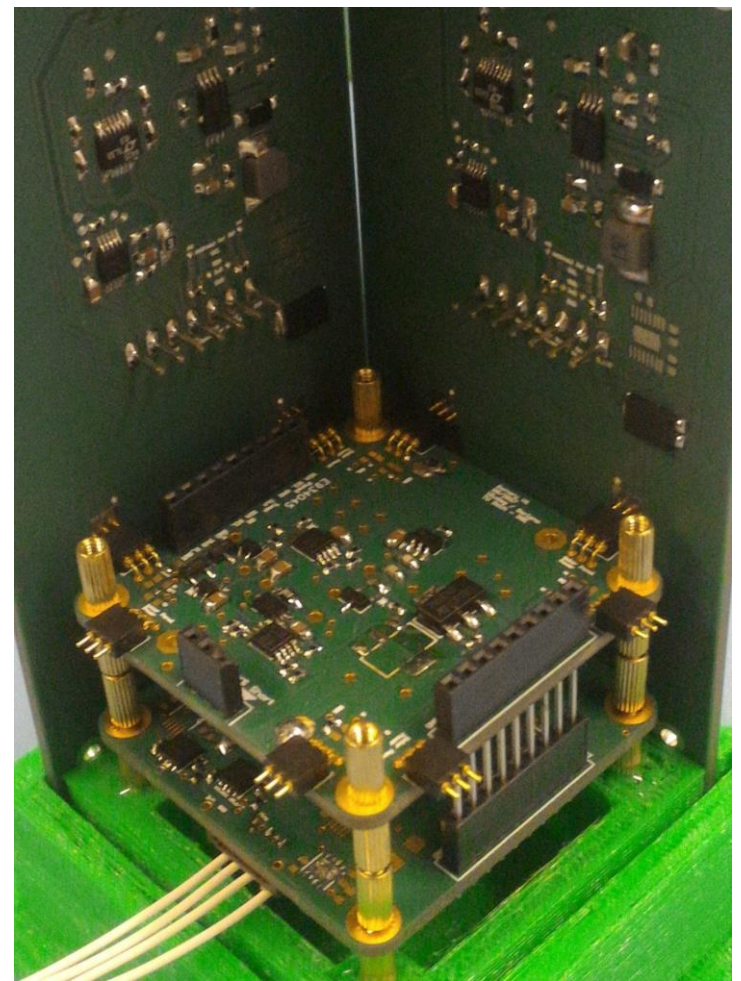
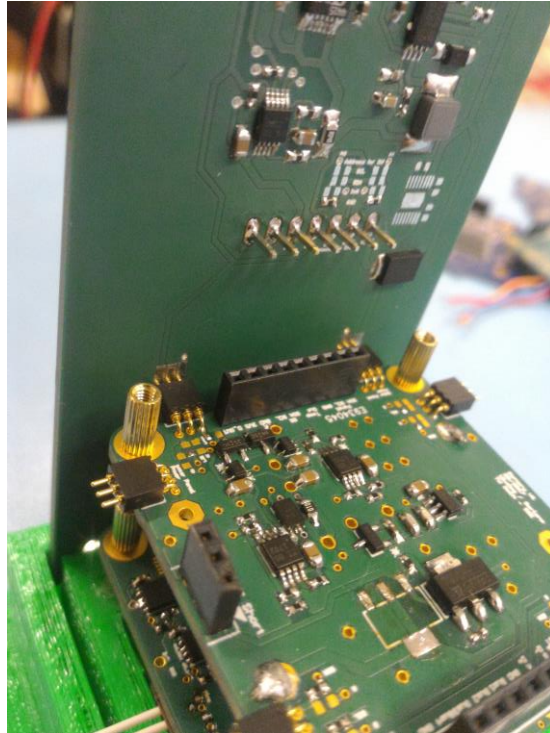
Compatibility



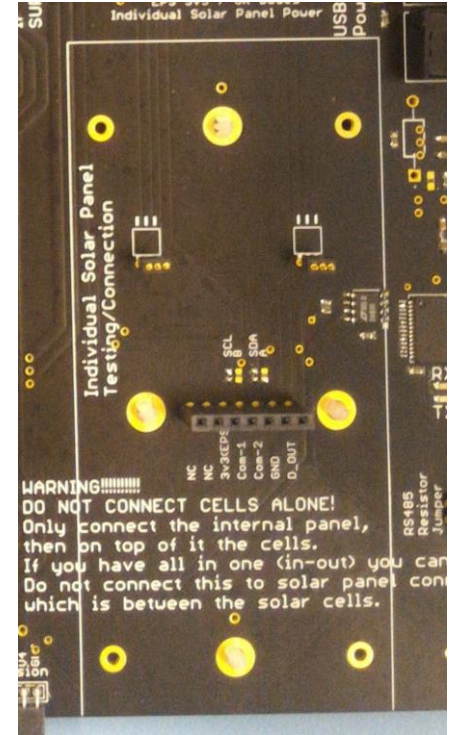
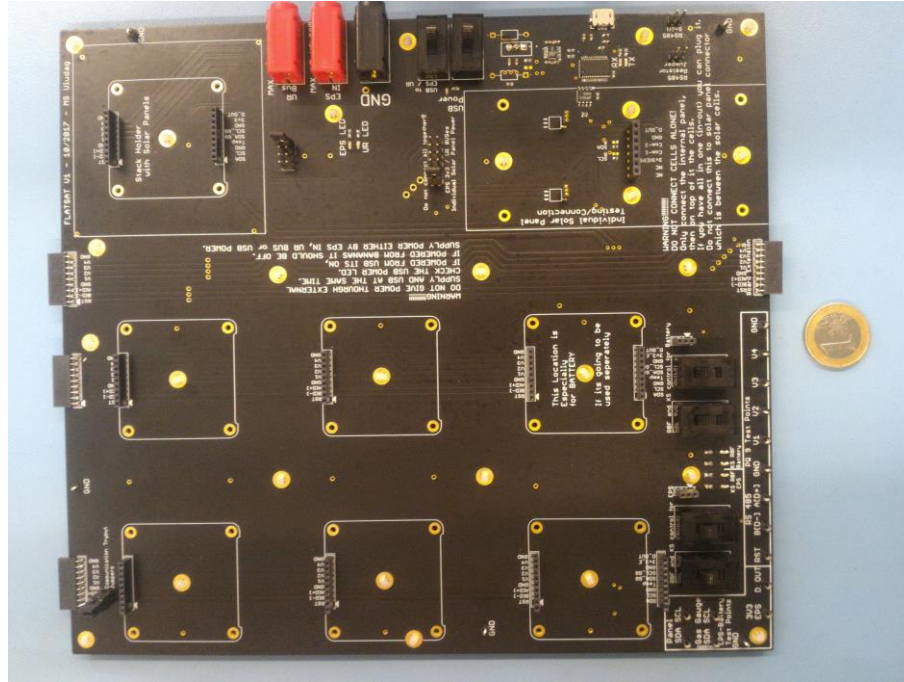
Interface



Interface

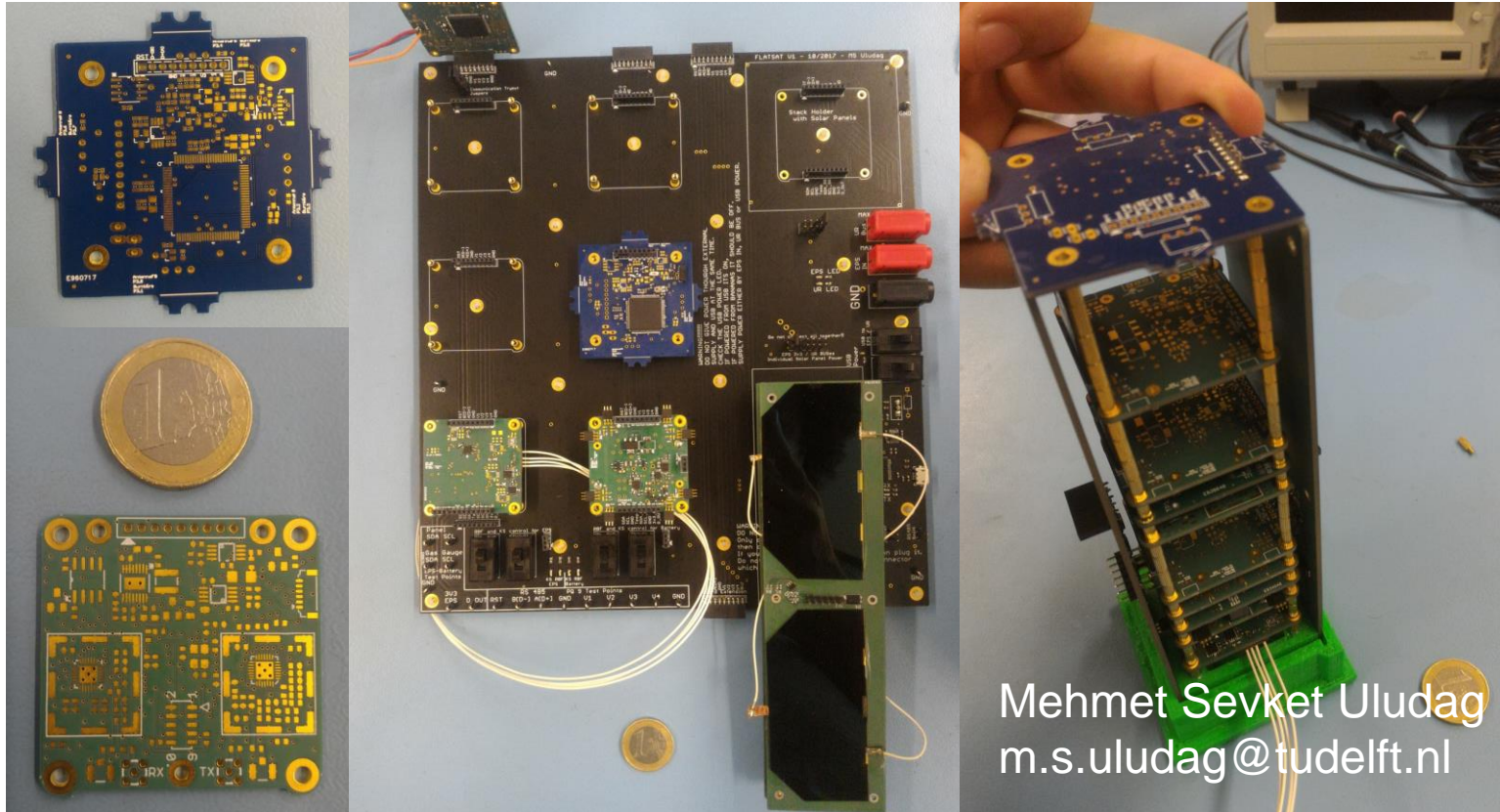


Functionality Check & Testing



Questions?

<https://twitter.com/delfispace>
<http://www.delfispace.nl/delfi-pg>



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