Project Sponsor:

JPL

(Jet Propulsion Laboratory)

SMARTCubeS Connector & Test Stand

Team JALATT

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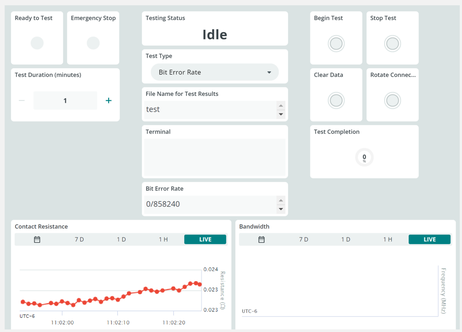
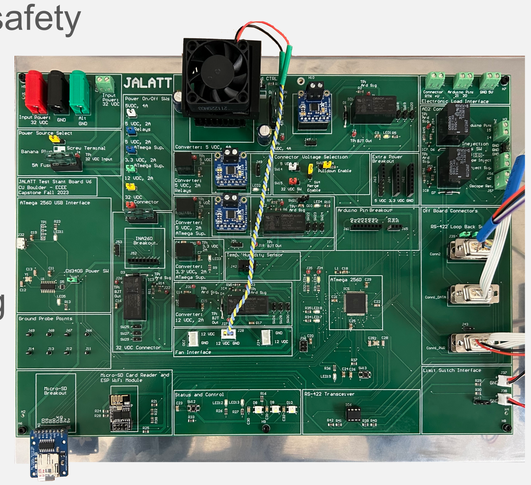
Development Journey

- Designed several PCBs for Connector, Power, RS-422, E-load, and ATmega

- Revised hardware and software to fix measurement errors and improve data rates
- Developed a 3D-printed connector holder to simulate the hinge motion of SMARTCUBEs while allowing easy insertion & rotation
- Added a WiFi module and website user interface to more easily control test system and view real-time results

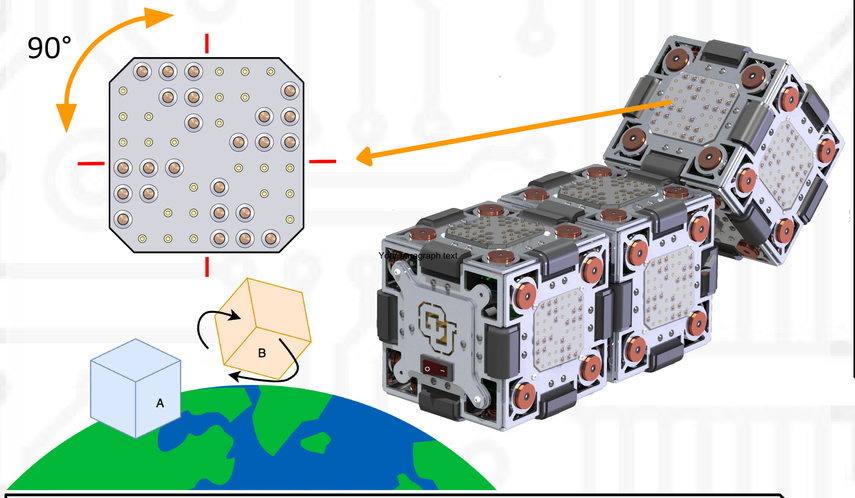


- Our biggest challenges were working with high power while automating each test and maintaining safety
- Combined separate PCBs into a final main PCB to reduce wiring and improve look of test stand



Objective

Design and test a 90° rotatable electrical connector that provides power and communication between "SMARTCUBE" CubeSats



Key Requirements

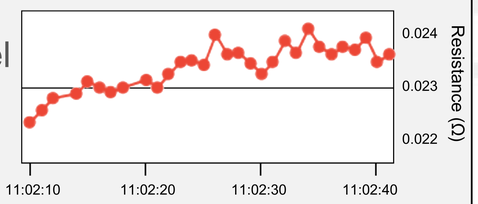
- The connector shall support power transfer at a current of up to 3 A at 32 VDC
- The connector shall be capable of communication and data transfer
- The connector shall be capable of transmitting power and data while mated in any 90 degree increment
- The connector shall have a contact resistance of less than 100 mΩ per channel

Special Thanks to: JPL, Thomas DiSarro, Andrew Berg, Tyler Davidson, Eric Bogatin, Lauren Darling, Nick DeCicco, and ECEE Faculty

Testing and Data

Channel Contact Resistance:

Requirement:
<100 mΩ per channel
Measurement:
22 mΩ per channel

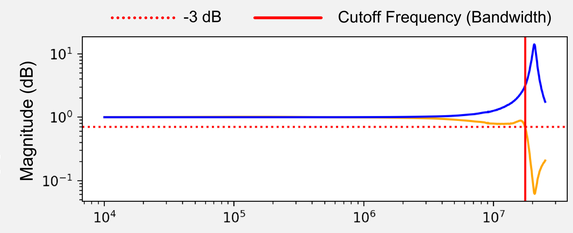


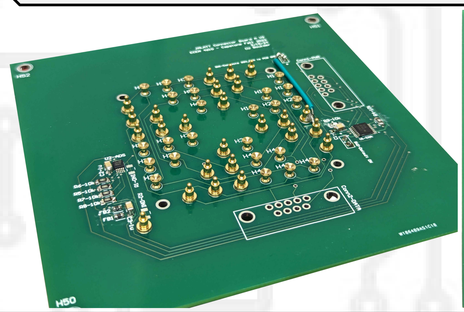
Bit Error Rate:

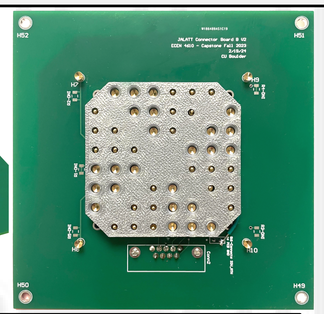
Requirement: 0 errors in 24 hours at 1 Mbps
Measurement: 0 errors in 1 hour at 0.02 Mbps*

Bandwidth:

Requirement:
>10 MHz
Measurement:
17.57 MHz







Future Work

- Integrate connector into mechanical SMARTCUBEs design
- Reduce connector footprint
- Component and material selection for TVAC and Vibe Testing, focusing on flight heritage
- Evaluate test stand results on other connector designs