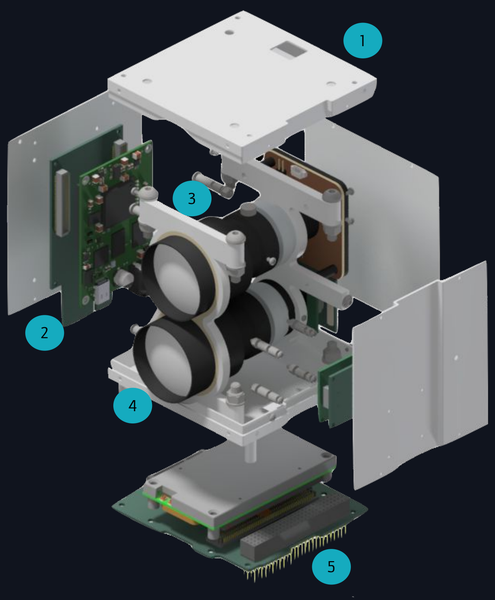
MOCI Payload

A Custom and COTS Solution

Hardware Overview

The MOCI Payload, “Bionicle”, features a primary and secondary redundant imaging system, a dedicated FPGA, and a NVIDIA TX2.



1. Payload Housing
2. Opal Kelly XEM7310 FPGA & Interface Board
3. GomSpace NanoCam with 70mm lens ~18m GSD
4. Custom ~6.4m GSD Camera with 70mm lens (PicoCam)
5. NVIDIA Jetson TX2 & CORe GPU Interface Board (CORGI).

Electronic Design

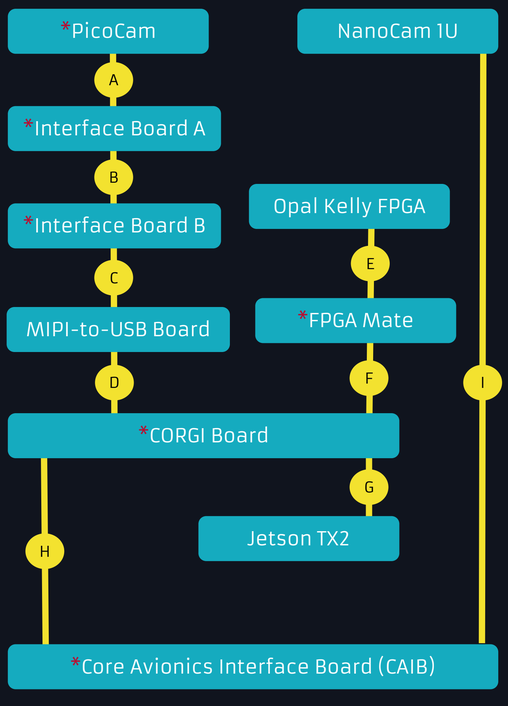
Bionicle, the MOCI payload, is highly optimized for Structure from Motion and Image processing in orbit.

The main control of the MOCI payload is the NVIDIA Jetson TX2 Module, which itself is controlled by the OBC via I2C and SPI. The TX2 controls the primary imaging system, dubbed the "Picocam," via USB. The Picocam is the e-con Systems See3CAM_CU135, which uses an ONsemi 1/3.2" AR1335 CMOS sensor with 4208H x 3120V active pixels.

To satisfy spatial constraints, two custom boards for the Picocam are being designed by the SSRL to do the following:

- Interface to the MIPI sensor module
- Interface with the MIPI-to-USB Cypress CX3 module.

After ~40 images of a target are acquired via point-tracking, the TX2 will control the Opal Kelly XEM7310 FPGA via I2C and PCIe to perform Feature Extraction/Matching. Next, the TX2 will perform SFM and surface reconstruction algorithms.



Label	Interfaces	Type(s)
A	LSS Connection	MIPI, 5v, GND
B	Ribbon Cable LSS Connection	MIPI, 5v, GND
C	Ribbon Cable LSS Connection	MIPI, 5v, GND
D	USB-C	USB, 5v, GND
E	Direct Interface	PCIe, I2C, 5v, GND
F	Direct Interface	PCIe, I2C, 5v, GND
G	Direct Interface	I2C, SPI, 12v, GND
H	PC/104+	I2C, SPI, 12v, GND
I	Ribbon Cable	I2C, CAN, 3v3, GND