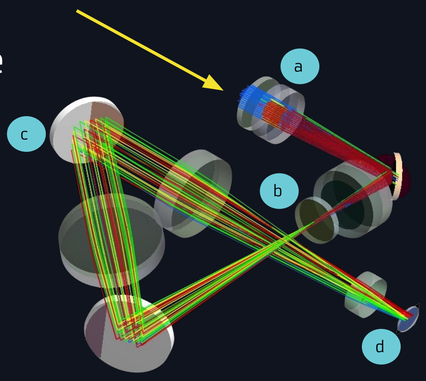
SPOC Payload

A Pushbroom Hyperspectral Imager

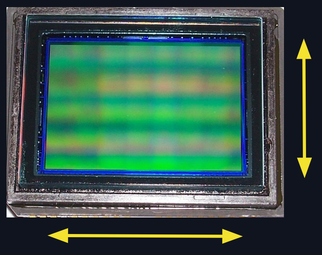
Optical Design

The primary payload of SPOC, known as the SPOCeye, consists of a

a. 400nm Longpass Filter
b. Single Slit
c. 150 line/mm Blazed Diffraction Grating
d. 480x720 CMOS Sensor



After entering the 400 nm longpass filter (a), light passes through the single slit (b). The single slit creates a 97.52 km x 130 m swath. The swath reflects off the blazed diffraction grating (c) and splits light into respective wavelengths. The CMOS sensor (d) images the diffracted light.

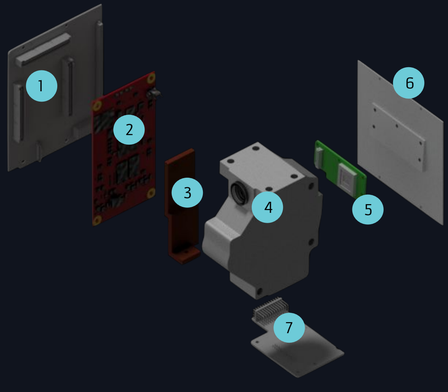


Electronic Design

The SPOC payload, dubbed the "SPOCeye," consists of seven components:

- One Avnet Picozed 7Z015 Industrial Grade System-on-Module (2)
- Three components developed by Cloudland Instruments:
  - The Motherboard (1)
  - The Spacecraft Interface board (7)
  - The CMOS board (5), ONsemi MT9V034 CMOS Digital Image Sensor with 752H x 480V active pixels
- Mechanical/structural components (3), (6), and the optical housing (4).

The Spacecraft Interface Board connects the SPOCeye to the OBC via RS-422 and an LVDS connection similar to QSPI. The Picozed 7Z015 is based on the Xilinx Zynq®-7000 and controls the payload internally. The Cloudland Motherboard regulates power from the main satellite bus to power the Picozed and CMOS



Mechanical Design

The SPOCEye optical housing features a clamshell design with the ability to focus the lenses and adjust diffraction angles after the payload has been integrated. All metal parts will be made with a CNC machine. Lenses will be fixed to Ultem 9085 plastic with Vibra-Tite, to account for vibrations and thermal expansion. The lens assembly will finally be housed in custom optical metal tubes.