

AIM: Ames Imaging Module Spacecraft Camera

Readiness level:
☐ TRL 1-3: Concept
☐ TRL 4-6: Prototype
☒ TRL 7-9: Demonstrated

NASA Ames Instrumentation Workshop

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Science-grade imaging on COTS budgets

Why develop a new space camera?

- Existing terrestrial COTS cameras are not designed for space applications. Though they have been flown successfully in LEO, designs that do not take into account thermal, EMC, radiation tolerance, power, bandwidth etc. are risky particularly for longer duration and beyond-LEO applications.
- Existing space grade cameras tend to be relatively large and are often too costly for the typically constrained budgets of smaller missions

What is the AIM aiming at?

- Provide similar environmental tolerance, imaging and data handling capabilities as existing ~\$1M space cameras, with an order of magnitude lower mass and power requirements and several orders of magnitude less cost.

What is the AIM?

- Single-board construction, 1" image format, 2048x2048 resolution. Can be constructed with a monochrome or color 12-bit science-grade image sensor as required. Uses ~1W peak, 0.5W during image readout, 0.1W idle. Size 2.5" square, 0.75" thick. Mass = 56g, not including housing or lens. FPGA-based reconfigurable architecture allows deep customization and easy integration – versions using 115.2kbps RS422, hyperspectral LED bank control, 1.2Mbit/s LVTTTL serial and 10MBit/s direct generation of CCSDS I/Q radio data all implemented with no hardware mods required to the board.

Next Steps:

- Potential flights on SOAREX-9 (suborbital) and TechEdSat 6 (ISS). Part of NIRVSS instrument for Resource Prospector mission (Lunar polar lander). Future support for color CMOS image sensors and InGaAs infrared image sensors is intended.



Technology / Application

Funding /
Timeline

FY14: Design, fabrication and initial bring-up
 FY15: Flew on RISE helium balloon (90000 feet), Flew on Black Brant IX as part of the SOAREX-8 payload, Tested in GRC chamber and at NASA JSC as part of the NIRVSS instrument during the RP15 rover trials
 Funded by NIRVSS WBS and two consecutive CIF awards (FY14 & FY15)

POC

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