SAI-1 Experiment Technical Description

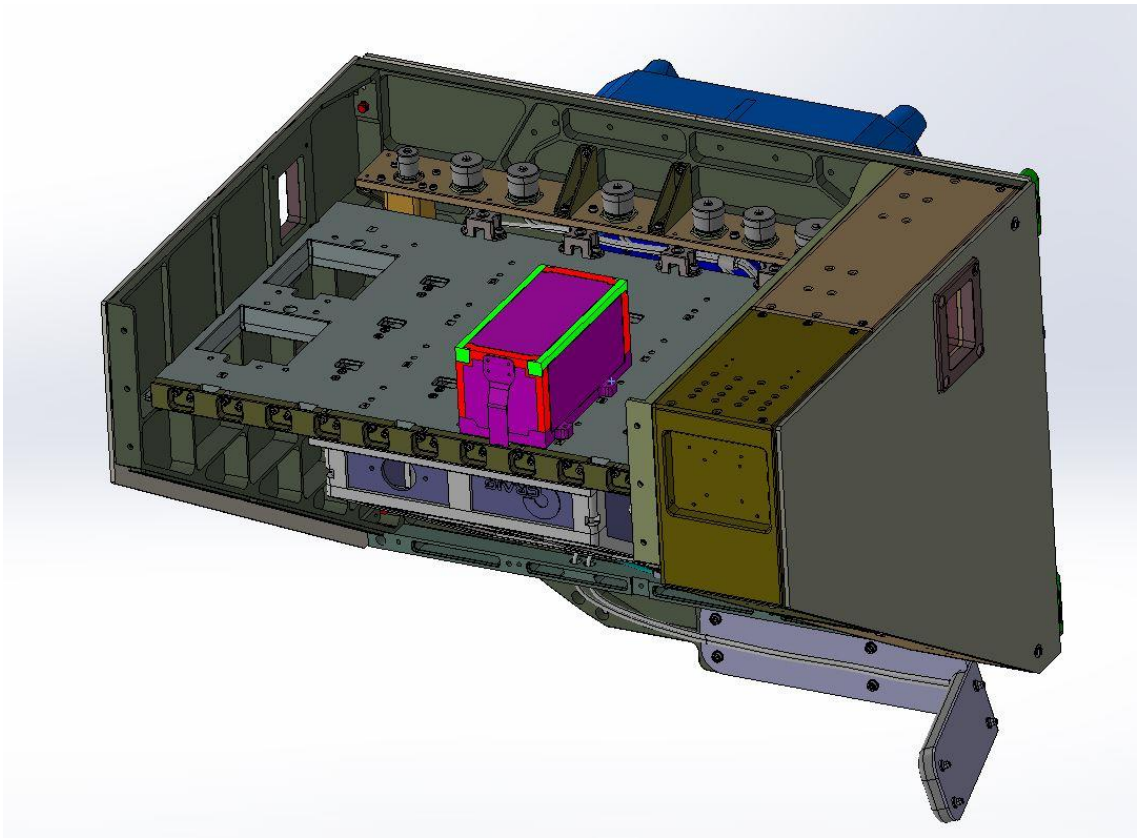
The overall goal of the SAI-1 mission, is to test and operate a prototype spacecraft bus in a space environment, to provide space heritage, and performance feedback for the design. The design elements to be tested include a supercomputing module, a spacecraft controller, and wireless communication between internal modules using Wifi and Bluetooth.

The satellite will be delivered to NanoRacks, Inc., no later than October 5. It will be carried as cargo for the International Space Station (ISS) aboard the Antares NG-10, and launched from Wallops Flight Facility, Wallops Island, VA November 17, 2018 and carried to the ISS. It will be installed on the ISS NanoRacks External Platform (NREP). Transmission will begin in early 2019, and cease 15 months later. After that, SAI-1 will be dismounted from the NREP and returned to Earth.

The experiment is not free flying, it will be attached to the NREP. It is made in the form of a single 2U cubesat, 2 connected 10 cm X 10 cm X 10 cm CubeSat modules (giving an overall dimension of 10 cm X 10 cm X 20 cm.)

Figure 1 shows the SAI-1 experiment installed on the NREP.

Figure 1 SAI 1 Installation Overview



SAI-1 Experiment Technical Description

Command and Data Handling (CDH) Subsystem: The CDH board contains a XILink 64 bit A52 dual R5 processor for all command and data handling functions. It connects wirelessly to other modules within the experiment, and by serial connector to the NREP.

Communications Subsystem: The experiment will communicate with Space AI mission operations via a UHF downlink and uplink, using an Analog Devices AD9375 transceiver mounted on the CDH board, and CCSDS protocol. Communications through the NanoRacks External Platform will also be available.

Communications among boards inside the experiment will utilize the Cypress CYW4354 Wifi radio on a chip, with integrated Bluetooth. Both Wifi and Bluetooth features will be used.

The NREP Enclosure will function a Faraday Cage, preventing any leakage of Wifi and Bluetooth emissions. An analysis of emissions is provided as an exhibit to the application.

Electrical Power Subsystem (EPS): Electrical power is supplied from the NREP, and distributed by the EPS to each of the active subsystems.

Thermal Control Subsystem (TCS): Thermal control is passive. Thermal radiation and conduction from the outer surfaces will maintain the experiment components within an acceptable temperature range.

Structure Subsystem: The structure is fabricated of 6061 Aluminum.

Payload Subsystem: The payload includes the supercomputing module, the GPU module, and the Cypress WYW4354 units that provide wireless communication between internal modules using Wifi and Bluetooth.