

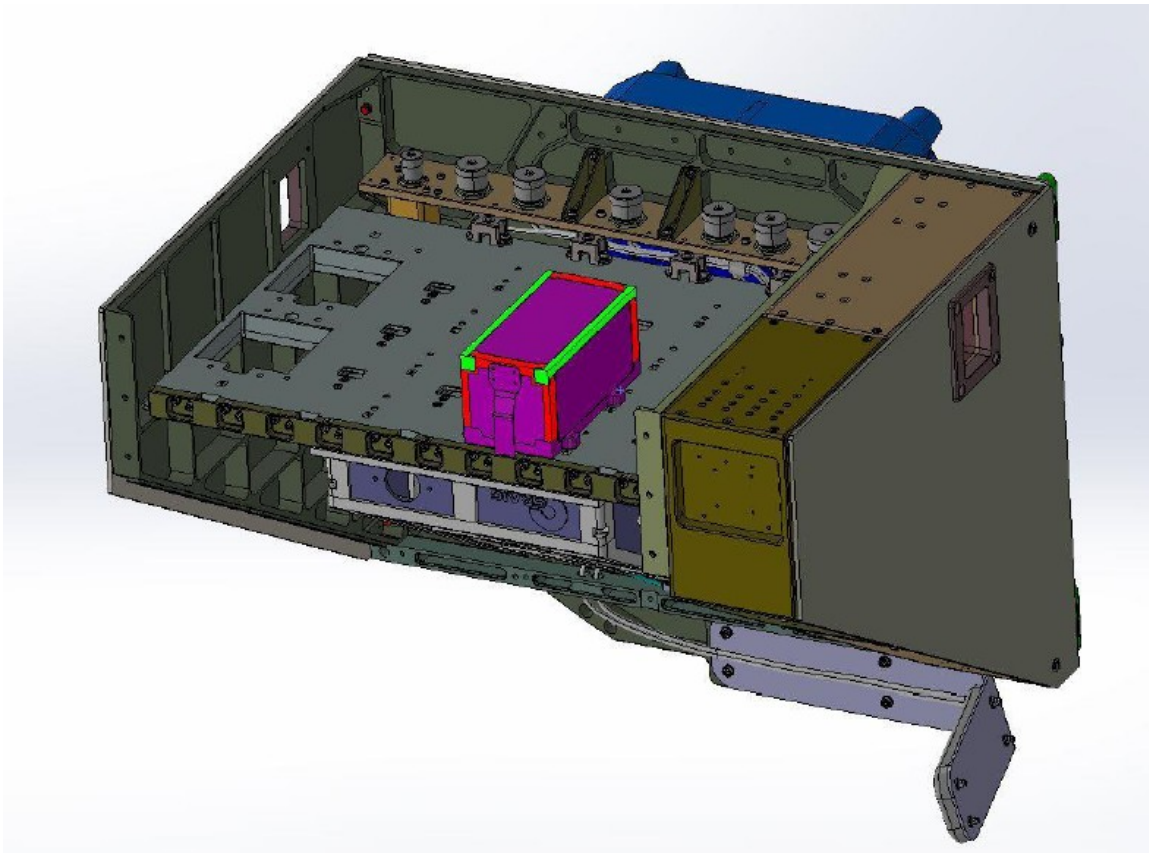
SAI-2 Experiment Technical Description

The overall goal of the SAI-2 mission is to test and operate a prototype sensor and software modules, together with platform hardware modules in space environment, to provide space heritage, and performance feedback for the design. The design elements to be tested include a sensor to detect molecular components, supercomputing module, a wireless advanced communication card and high performance software modules.

The satellite will be delivered to NanoRacks, Inc., no later than November-December. It will be carried as cargo for the International Space Station (ISS) aboard a launcher to be assigned and carried to the ISS. It will be installed on the ISS NanoRacks External Platform (NREP). Transmission will begin in early 2021, and cease 15 months later. After that, SAI-2 will be dismantled 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, giving an overall dimension of 10 cm X 10 cm X 20 cm.

Figure 1 shows the SAI-2 experiment installed on the NREP.



Command and Data Handling (CDH) Subsystem: The CDH board contains a Xilinx 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 Wi-Fi radio on a chip, with integrated Bluetooth. Both Wi-Fi and Bluetooth features will be used. The NREP Enclosure will function a Faraday Cage, preventing any leakage of Wi-Fi and Bluetooth emissions.

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 Wi-Fi and Bluetooth. The molecular sensors are the other hardware payloads. The high performance software module is embedded on the supercomputing module.