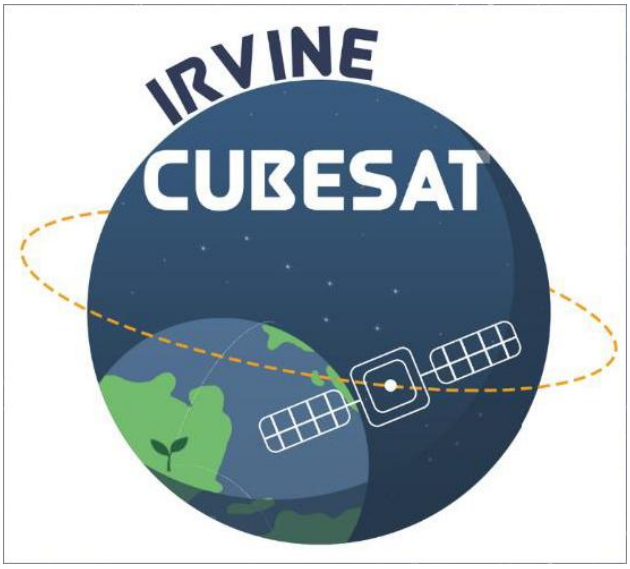
IRVINE02 CubeSat
Mission Description



Program Management and Mission Overview

Project Manager: Tinh Tran

Foreign Government or Space Agency Participation: The Ecuadorian Space Agency (EXA) will provide many of the necessary parts for the CubeSat, including the batteries and the solar panels. NASA will control the launch vehicle, which will be launched from the western coast of the United States (location TBD).

Schedule of Upcoming Mission Milestones:
Mission kickoff date: September 6, 2017
Design review date: October 13, 2017
Delivery date: August 1, 2018
Tentative Launch Date: August 31, 2018

Mission Overview:
IRVINE02 will be dispensed from a PPOD 3U CubeSat dispenser into an estimated orbit of 500 km Apogee and 500 km Perigee with an inclination of 97 degrees. The mission is expected to remain in orbit for a maximum of up to 4.923 years. During this time, the main payload will communicate using laser diodes. IRVINE02 will also continue taking pictures of celestial objects, as well as collecting other data using our sun sensors, GPS, and other equipment.

Proposed Launch Date:
August 30, 2018

Mission Duration:
Normal mission operations will take place until contact is lost, or some other mission detrimental factor causes a failure of essential systems. The natural decay time of the CubeSat is under 4.923 years.

Launch and deployment profile, including all parking, transfer, and operational orbits with apogee, perigee, and inclination:

The launch vehicle will be dispensing various payloads into a nearly circular 500 km polar orbit near sun-synchronous orbit.

IRVINE02 will decay from an orbit defined as follows:

Perigee: 500 km

Apogee: 500 km

Orbital Inclination: 97 degrees

Spacecraft Description

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Physical description of the spacecraft: IRVINE02 conforms to the 1U CubeSat specification, with a launch mass of 1.3 kg. Basic physical dimensions are 100mm x 100mm x 106mm, with two solar panels with 170mm x 85mm x 2mm extended dimensions. The IRVINE02 solar panel structure is comprised of two 100mm x 100mm plates that are extended. The solar arrays are spring-loaded and burn-wire deployed. Power storage is provided by Lithium-Ion cells. The batteries will be recharged by solar cells mounted on the body of the satellite and on the two deployable solar panels. IRVINE02 altitude is approximately determined using the magnetic field vector, measured by onboard magnetometers. The IRVINE02's altitude will be controlled by a 3-axis magnetorquer controller.

Total satellite mass at launch, including all propellants and fluids: 1.3 kg

Dry mass of satellites at launch, excluding solid rocket motor propellants: 1.3 kg

Description of all propulsion systems (cold gas, monopropellant, bipropellant, electric, nuclear): There is an electric thruster (one Accion Systems TILE-50) and there will be 3 magnetorquers on board, to adjust the orientation and heading of the cubesat.

Identification, including mass and pressure, of all fluids (liquids and gases) planned to be on board and a description of the fluid loading plan or strategies, excluding fluids in sealed heat pipes: The cubesat will contain 4.6 grams of ionic liquid propellant. Ionic liquids are salts comprising organic cations (imidazolium, ammonium, pyrrolidinium) associated with inorganic anions (Cl-, AlCl4-, PF6-, BF4-, NTf2-, DCA-) or organic anions (CH3COO-, CH3SO3-), which are liquid around room temperature. It is non-volatile, non-flammable and stable at high temperatures (up to 200^{o} C), a very good conductor and very stable with water and oxygen. The propellant will be unpressurized and already loaded into the propulsion system by the manufacturer.

Fluids in Pressurized Batteries: None