UCI CubeSat II

Alok Virkar, Joseph Leonor, Laia Ferrer, Thi Anh Le Tran, Jason Won, Gilberto Hernandez, Josh Baldwin, Diane Phung

Advisor: Manuel Gamero Castano

Background

CubeSat's are Nano satellites which usually have the volume of 1000 cubic centimeters. The satellites are used to conduct research in space. The CubeSat program began in 1999 at Cal Poly San Luis Obispo and currently over 100 universities and many companies are partaking in building them. They are typically piggy backed with a launch provider and sent to space.

1U Size CubeSat

Goal And Objectives

The goal is to **build** a 2U size (2000 cubic cm) CubeSat which will test 3 different technologies or experiments.

- The first experiment is to **measure visible air pollution** over parts of Asia and The Middle East.
- The second experiment will prove that **electrospray technology** can be used for attitude control and to obtain a desired orbit and orientation.
- The third experiment is to test the a **variable space emissivity radiator** so it can manage heat transfer between space and the satellite. It is in collaboration with the spacecraft thermal team.

Requirements

Camera Requirements:

A camera which can capture an area of 100 km x 100 km

A camera which can operate in drastic temperature changes and resist radiation

Thruster Requirements:

The CubeSat should be lightweight, small, and stable

Thermal Radiator:

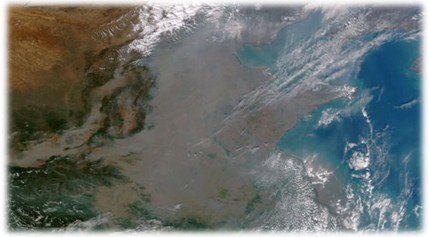
250 grams of Titanium Oxide for coating

Arduino Micro Controller

Innovation

Camera:

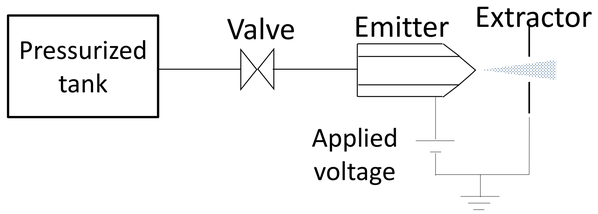
The amount of pollution and the flow of hazy polluted clouds needs to be tracked to manage harm to local agricultural areas.



A satellite image of the polluted atmosphere of China

Thrusters:

The CubeSat will be testing the new electrospray technology which will enable the satellite to navigate during orbit. The Electrospray will be used for the first time to stabilize the satellite, move between orbits, and control orientation of the satellite.



Electrospray Block Diagram

Bigger Picture

The bigger picture from the camera project will be **to highlight the visible damage** that fossil fuels have already had on the Earth's Atmosphere. The thrusters are testing a **new technology** which reduces the weight and complexity of common electric thrusters. The thermal radiator will provide a solution to effective and efficient heat absorption and rejection in space.

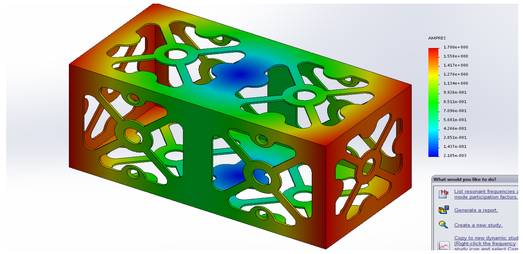
Next Steps

Thrusters:

- Vacuum Chamber Testing
- Design the optimal location on CubeSat for thrusters

Satellite:

- Design Layout of solar cells
- Design the Communication system
- Create the power circuit



Current Status

The structures team is compiling all SolidWorks models and fitting them parametrically allocating space for future subsystems.

The Power team is obtaining and confirming all necessary components to obtain the required voltage.

The Solar panels team is designing circuit of the solar panels.

The Thrusters Team is conducting experiments on the electrospray thruster design.