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Diverse Air-bearing Weightless eNvironment

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Problem Statement

A frictionless torque-free environment is required for spacecraft dynamics research, and can enable a diverse range of experiments involving satellite control systems. A spacecraft dynamics simulator uses air bearing technology to simulate a frictionless microgravity environment.

Objectives

1. Design & Build 6DOF Spacecraft Dynamics Simulator
2. Design & Build a High Precision Attitude Control System

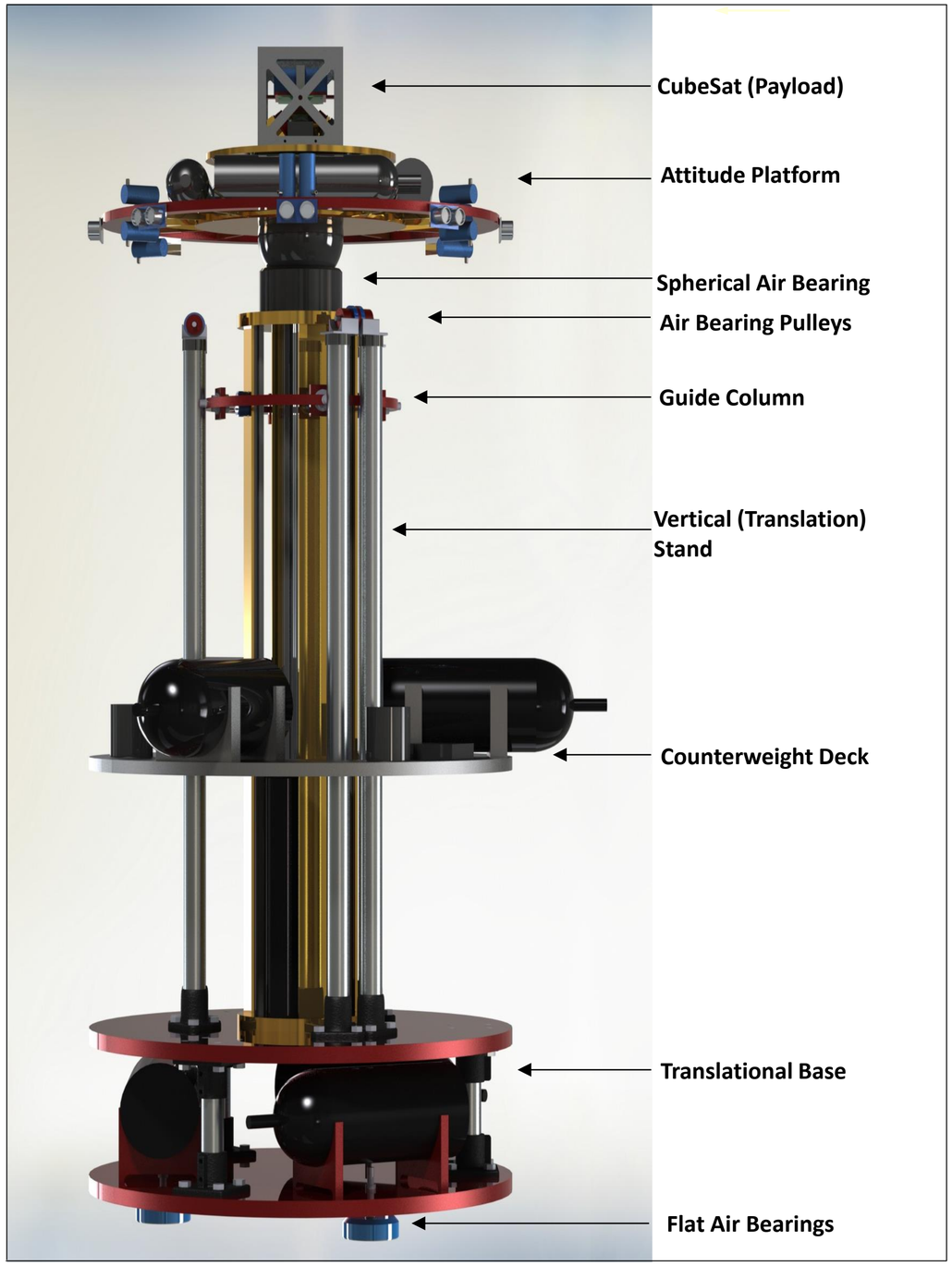
Simulator Features

- Carries a 10 kg payload
- Maximum Continuous Runtime: 30 minutes
- 6 Degrees of Freedom (DOF) Motion
  - 3.6 m x 5.9 m Horizontal Translation
  - 0.5 m Vertical Translation
  - 360º Yaw
  - ±45 º Pitch and Roll
- Frictionless Torque-free motion
- Simulates microgravity

CubeSat Features

- 1 U, 1 kg CubeSat
- 4 Reaction Wheels (Pyramidal Configuration)
- Maximum Continuous Runtime: 30 minutes
- 1º Pointing Accuracy
- 3º/s Slew Rate

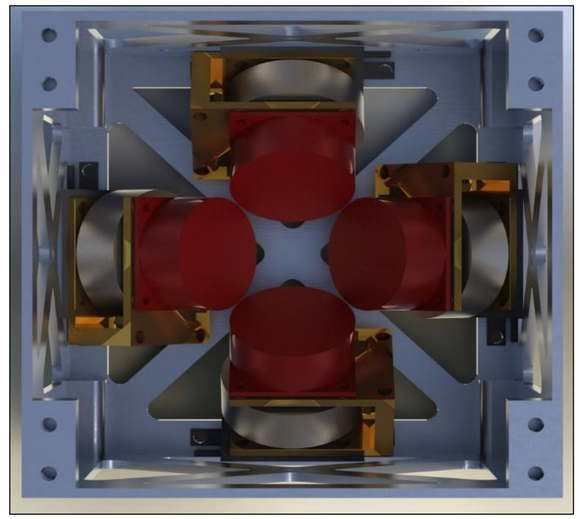
Simulator and Payload (CubeSat)



DAWN

Check us out on our website!

CubeSat



Control Systems

Simulator Control System

- 12 Supersonic Thrusters
- 1.1 N Thrust (each)

CubeSat Control System

- 4 Reaction Wheels – Pyramidal Configuration

Sponsors

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1. Northrop Grumman Corporation
2. NASA Florida Space Grant Consortium (FSGC)

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NORTHROP GRUMMAN

Engineering & Science Student Design Showcase at Florida Institute of Technology