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

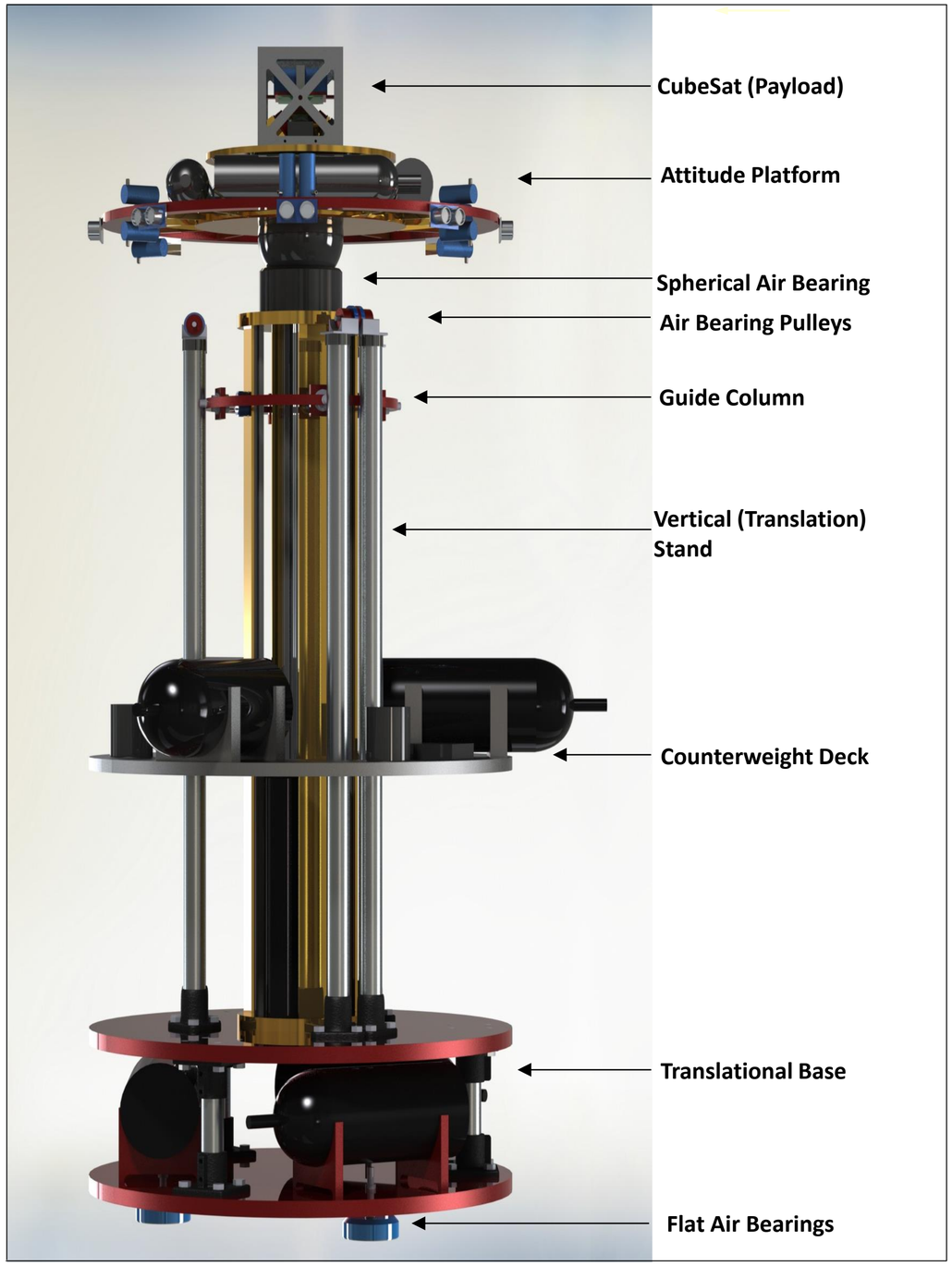
Simulator Features

- 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

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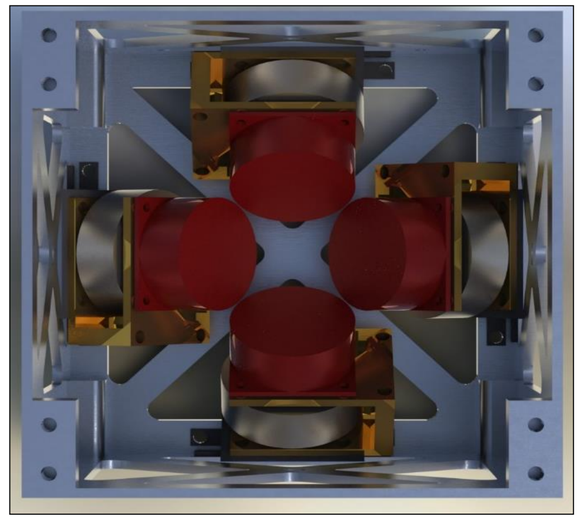
CubeSat



Control Systems

Simulator Control System

- 12 Supersonic Thrusters
- 1.1 N Thrust (each)

CubeSat Control System

- 4 Reaction Wheels – Pyramidal Configuration

Sponsors

We would like to thank our sponsors:

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

For their support and generosity towards this project.

Acknowledgements

We would like to thank the FIT Machine Shop, Ali Hassani (PhD student), and Laurie Guiser (Student Project Director) for their support and guidance throughout the course of this project.

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