ROSIsat

Radiation Orbital Shielding Investigation Satellite

ERØRA

Embry-Riddle Aeronautical University Daytona's first CubeSat designed entirely by students

Abstract

- CubeSats are becoming more popular for orbital missions as the cost of sending satellites into space decreases
- CubeSats are smaller than traditional satellites but still capable of important science-based missions at a lower cost
- ROSIsat will be the first student-built satellite for Embry-Riddle's Daytona Beach campus
- ROSIsat's main research mission is to shield onboard flight computer memory modules from space radiation using various materials and substances, including simulated Martian and Lunar regolith
- Most of the primary components of ROSIsat are being designed and integrated in-house, including the Chassis, On-Board Computer, Radiation Shielding Experiment and Magnetorquer.
- ROSIsat will provide students with educational, technical, scientific, and legal knowledge that can be applied in their academic and professional careers

Our Team

- Current Awarded Funding
  - Embry-Riddle College of Engineering: $8,000
  - Office of Undergraduate Research IGNITE Grant: $7,500
- 14 Freshmen and Sophomores, 10 Juniors and Seniors
  - Freshmen and Sophomores get hands-on experience early in their education
  - Juniors and Seniors can apply knowledge obtained in classes

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ERORA Executive Officers

President: Jackson Lamb | **Vice President**: JT Lozano

ROSIsat Lead: Jacob Lahue

Club Advisor: Professor Sean Crouse

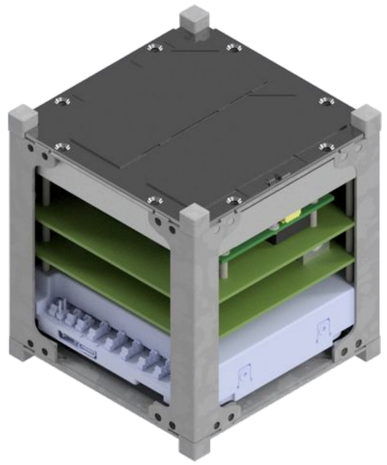

Fig. 1: ROSIsat Combined View

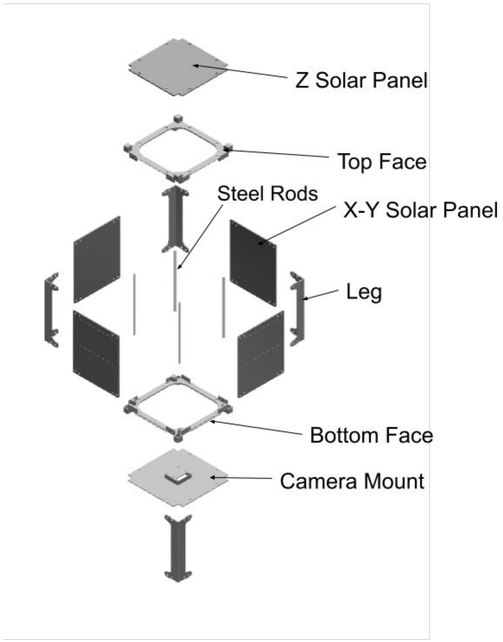

Fig. 2: ROSIsat Chassis Exploded View

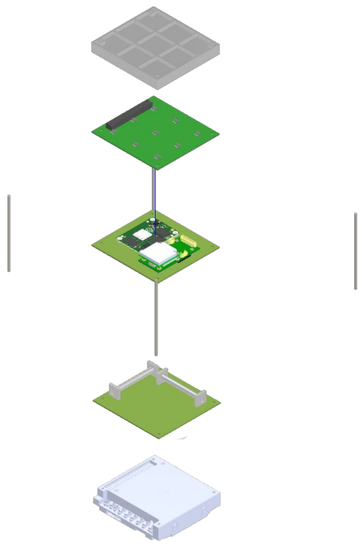

Fig. 3: Internal Components Exploded View

Payload

- ROSIsat aims to test different materials' efficiency as protection against solar radiation
- Materials will be mounted on Read-Only Memory chips containing random data strings
- The On-Board Computer (OBC) runs a program to check for bit errors caused by solar radiation, representing a material's failure to protect the chip
- The OBC writes a file with the amount of bit errors, which will be transmitted back to Earth for analysis.

Materials
Lead
Kevlar
Aerogel
Lunar Regolith Simulant
Martian Soil Simulant
Tungsten
Polyethylene
Control w/ Epoxy
Control w/o Epoxy

Fig. 4: Material List (Left)

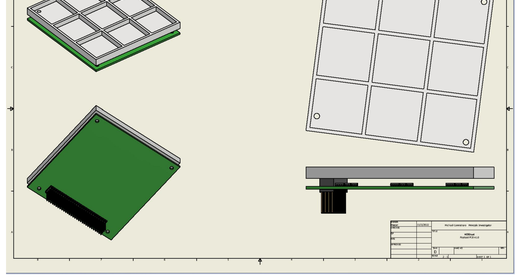

Fig. 5: Radiation Shielding Experiment (Right)

Magnetorquer Development

- ROSIsat will use 3 different magnetorquers to detumble and orient the satellite
- The X and Y-axis magnetorquers will be made out of a ferritic-core
- The Z-axis will be an open-air magnetorquer
- A design paper for the magnetorquers will be submitted to the *Beyond: Undergraduate Research Journal* in 2024
- Currently testing the first iteration of the X and Y magnetorquers