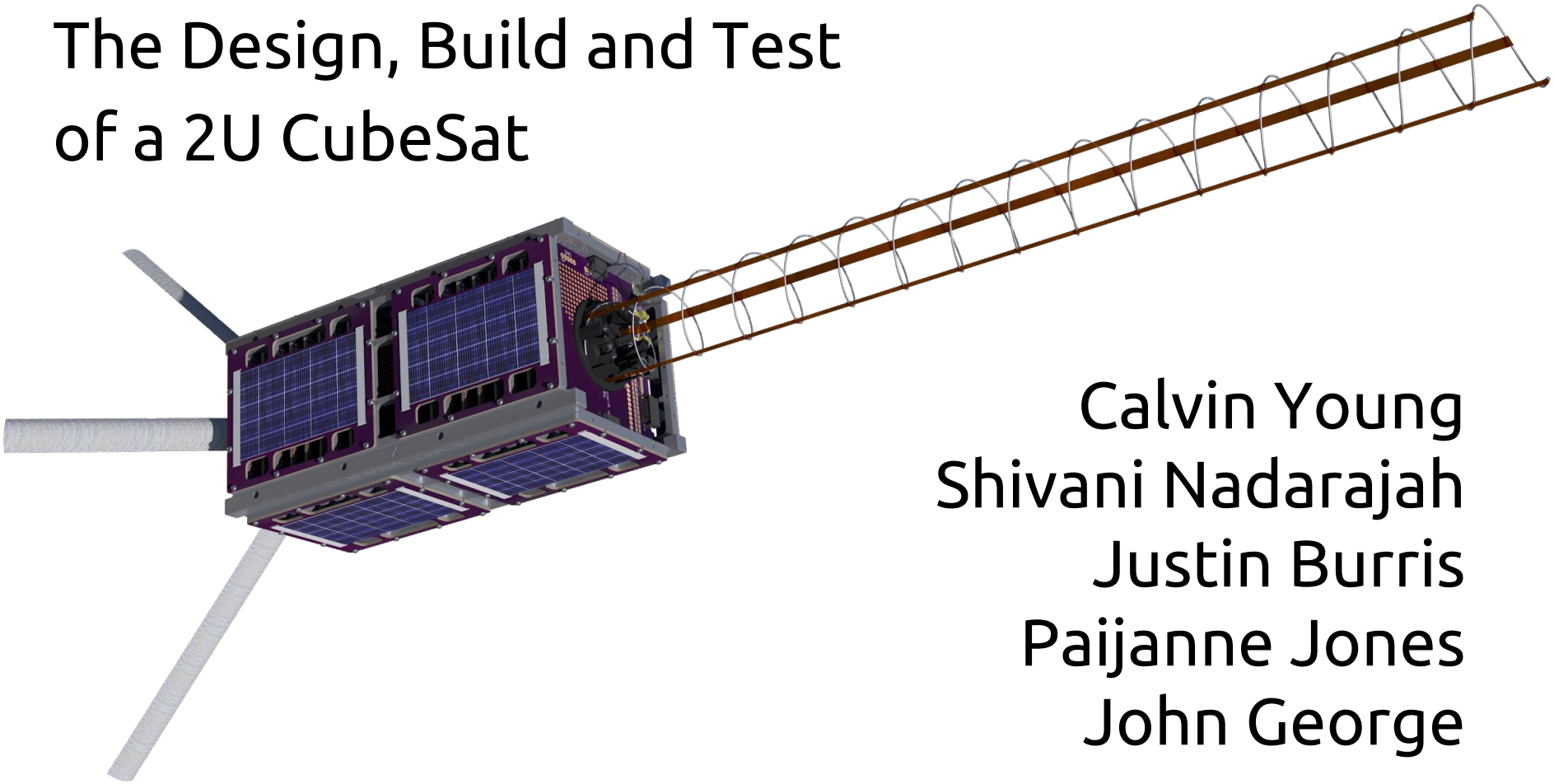
# OreSat: Oregon's First Satellite


PSU's Open Source

# Space Program

# Undergraduate Team Experience Award

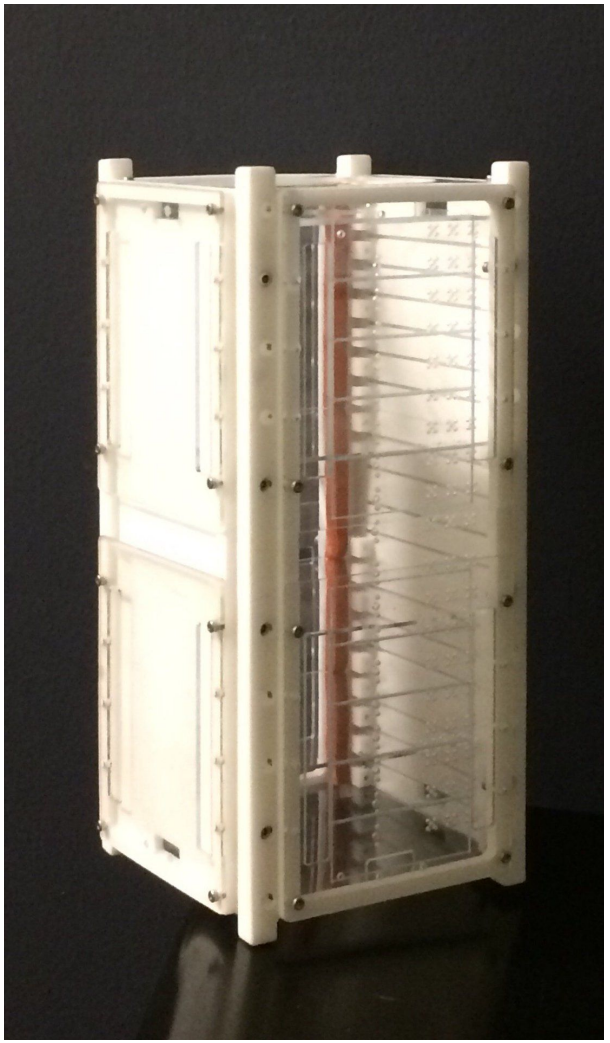
## OreSat Structural Design: The Design, Build and Test of a 2U CubeSat

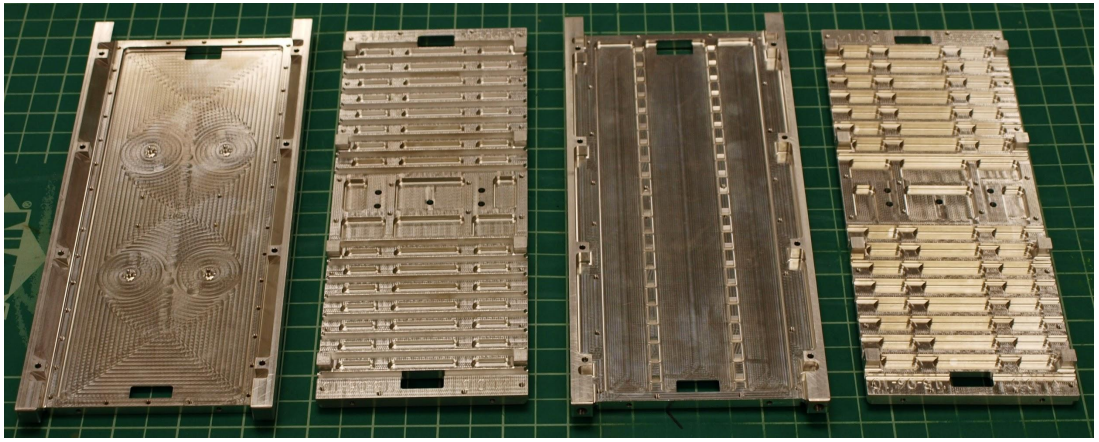


Calvin Young
Shivani Nadarajah
Justin Burris
Paijanne Jones
John George

# Satellite Structure

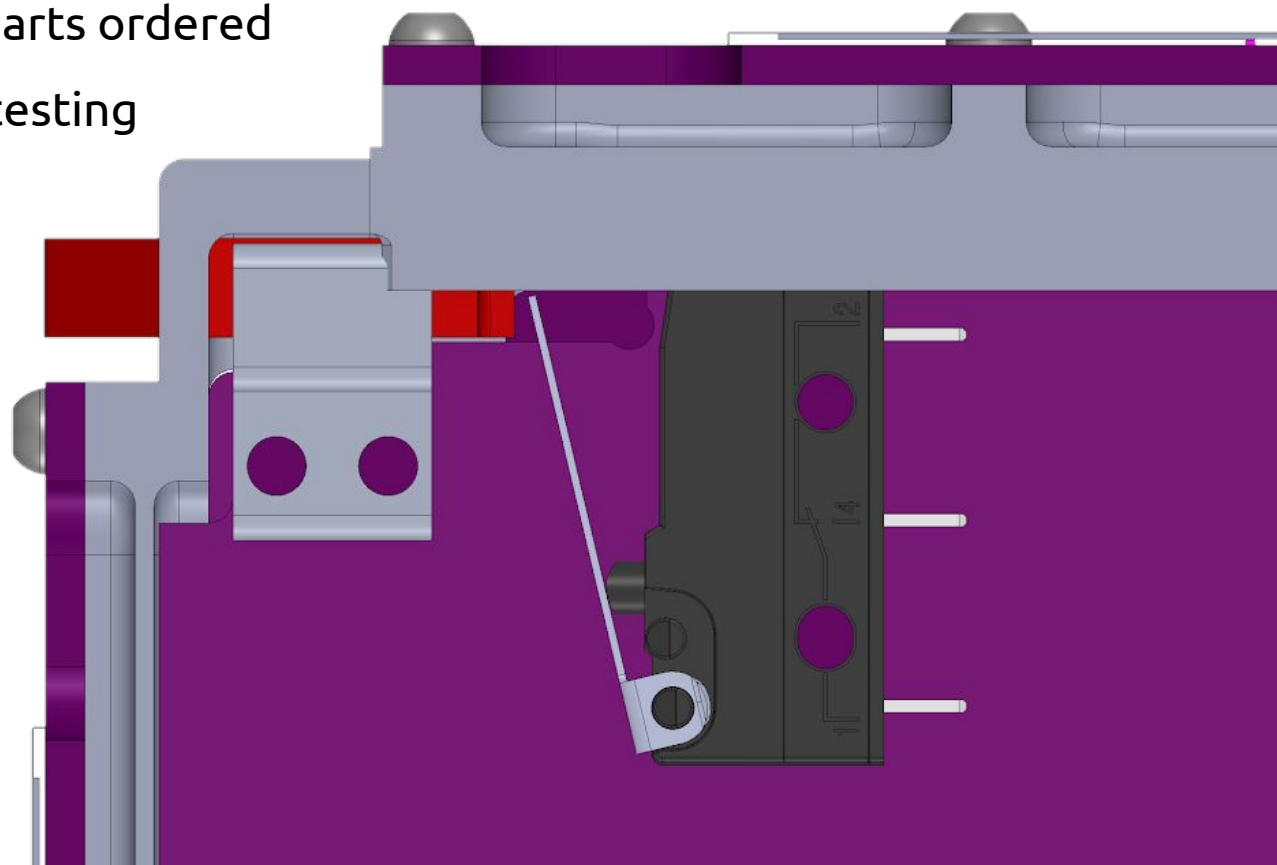
- server rack design with backplane
- modular design; extensible and open-source
- 20 card slots + reaction wheels
- 8 solar panel boards
- deployable antennas on +/- Z faces
- edges of boards conduct thermal energy
- 3D printed and CNC aluminum prototypes





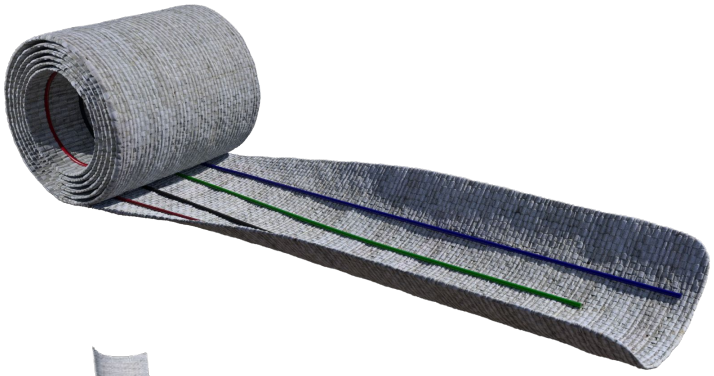
# Mechanical Inhibit Switches

- inhibit switches located on deployment rails
- disables onboard electronics until deployed
- conforms to CubeSat design specifications
- designs completed, parts ordered
- insufficient time for testing



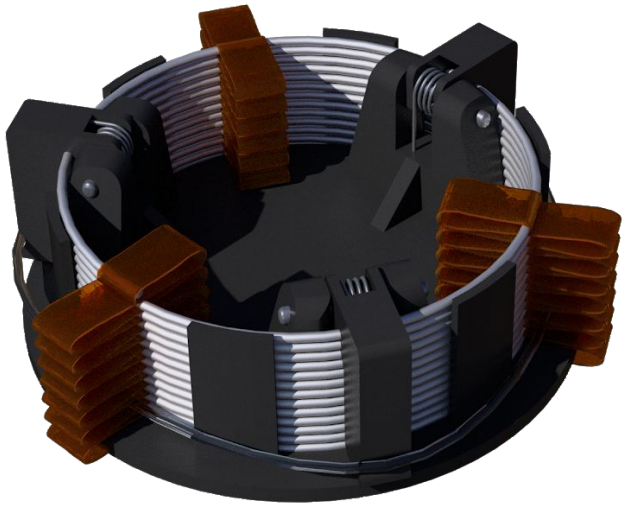
# Deployable Antennas: Turnstile

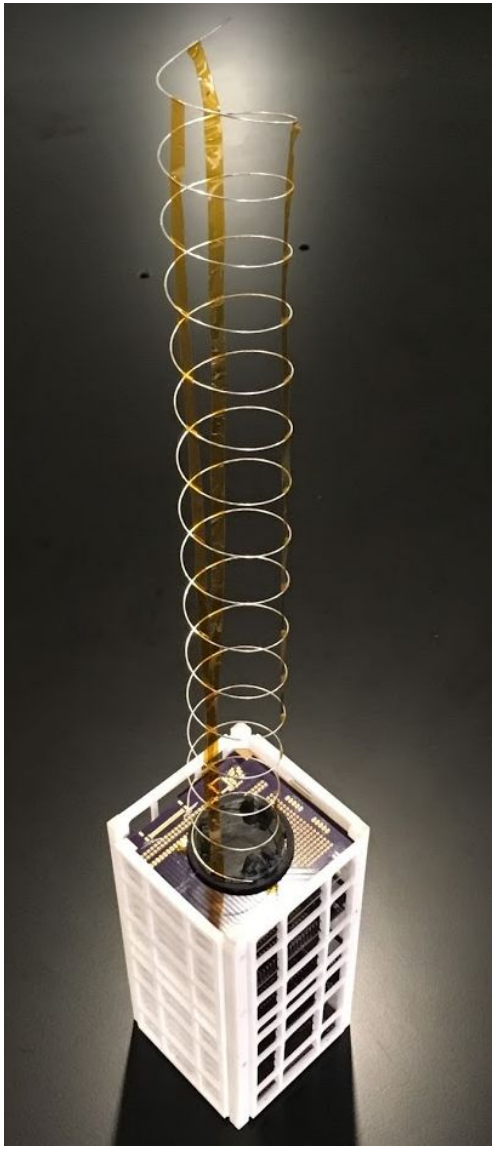
- four non-conductive fiberglass tape springs
- stowed in flat cylinder
- constrained by nylon burn wire
- four conductors on each spring
- omni-directional antenna arrays
- carries all signals except video
- canted to 35 degrees



# Deployable Antennas: Helical

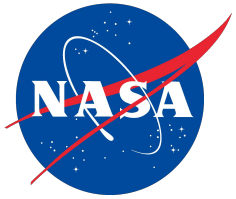
- 2.4 GHz WiFi signal to transmit live HD video, enabling space-based STEM outreach
- three hinged deployment mechanisms constrained by nylon burnwire
- polyamide tethers constrain length and pitch, add structural rigidity and vibration damping
- deploys > 450 mm
- stowes < 15 mm





# Special Thanks

## Andrew Greenberg and Glenn LeBrasseur
for sponsoring the project and herding all of the electrons




## Gerald Recktenwald
for providing fantastic guidance as our faculty advisor


## Dependable Springs
for the precise manufacturing of our helical antennas

## HP Dynamics Lab
for their generous assistance with all things vibration


## HP Model Shop
for supplying high-quality design prototypes

## Oregon Space Grant Consortium
for making this all a possibility

Portland State
UNIVERSITY