-Oresat Overview

-Cubesat definition

-mission

-design

-importance of antennas in design

-Capstone overview

-deployable antennas

-goals

-constraints

-Turnstile

-inspiration

-gom

-elfin

-deployment prototypes

-hinge

-tape steel/c1008 spring steel

-tape holder

-design requirements update

-4 wires per pole

-increased space budget

-nonconductive structural element

-current design

-increased footprint of deployment structure

-deployment structure mounting to end card

-tape springs

-doubled in size

-bistability

-material selection

-fiberglass manufacturing

-wire/fr4 integration

-Burn wires

-Conceptual design of burn wires and integration into deployment structure

-ME411 testing

-Helical Antenna

Used to stream high definition video from orbit, directional dependant. Manufactured of Beryllium copper because of

-inspiration

Secondary antenna for high gain, s-band reception.

-constraints/challenges

Manufacturing: helical gets tighter radius as it is coiled, expands after rolled on a mandrel. Deployed helix must have reasonable rigidity to return to straight form after satellite rotates orientation. Helix had to compress into very small space, limited to small wire diameters.

-rf characteristics/research into mechanical effect on antenna performance. Must fit inside nanoracks launcher parameters.

Progressive windings, conical windings found to provide too high of bandwidth, not worth pursuing

-prototype models/simulations

Prototypes of deployment mechanism made on 3d printer, assembled with pins and springs.

-manufacturing prototype springs

First try making springs was in house on manual lathe, did not come out with consistent geometry.

-contracting spring manufacturer

Dependable spring was able to manufacture consistent springs to our specs for testing.

-design of deployment mechanism

3 prong, spring loaded holder, inspiration from () Must accommodate for 3 strands of kapton tape and spring out at same time after burn wire is broken. Windings of spring could not be tangled so the clearance in holder must be tight enough to keep them on top of one another.

-iterating on tether design

Began with cloth material, did not compress enough, needed thinner material so kapton tape was used.

-Future work

-Turnstile:

-Turnstile tape spring optimization

-final deployment structure

-burn wire integration

-Helical

-polyimide bonding

-keep iterating on deployment structure/design for manufacturability

-testing

-high speed deployment video

-vibration testing

-halt testing/stress relaxation

-rf testing and optimization

-Burnwire

-further burn wire integration into deployment designs

-uv effects on nylon burnwire in case of deployment failure