

CUBESAT COMMUNICATION

Developing a Better Picosatellite Communication System

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Goal

- ① Develop an algorithm that increases the quality or quantity of infrared images sent from a CubeSat module to a base station.

Issues

- ⦿ Size – 10cm X 10cm X 10cm
- ⦿ Distance – 200 to 300 km above ground
- ⦿ Speed
- ⦿ Rotation
- ⦿ Memory – 2k RAM, 60k flash
- ⦿ Power – 1W average power

Previous Solutions

⦿ GeneSat1

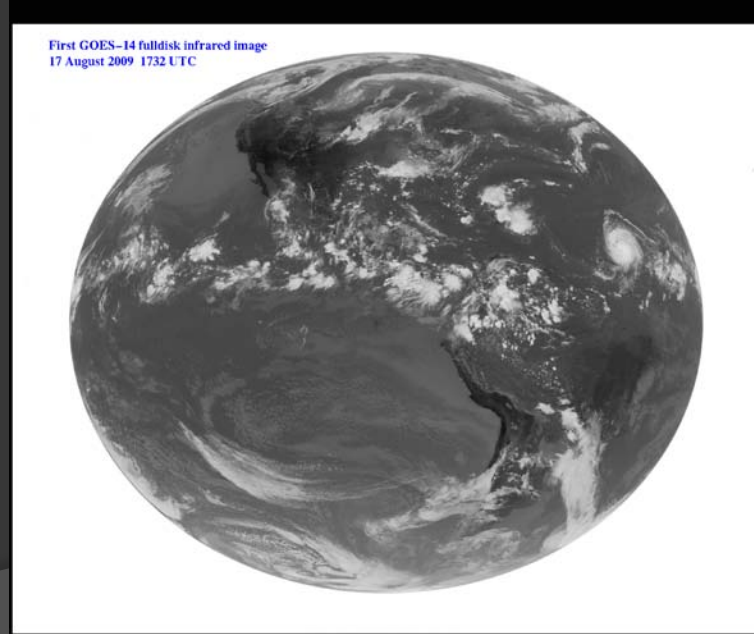
- Microhard MHX-2400 transceiver
 - Max of 83 kbps
- 410km high
 - 90 minute orbit
 - 3 minute average pass time
- Best case
 - 15 Mb per pass
 - 240 Mb per day

Our Satellite

- ◎ Gathers infrared images of Earth
 - FLIR tau 320 camera
 - 1.16 Mb per image
 - 25 to 30 Hz
 - 200 to 300 km high
 - Similar speed, but $\frac{1}{2}$ fov
 - Best case is about 6.5 images per pass

Our Approach

- ⦿ Focus on transmitting only good images
 - GPS – Correct location
 - Image processing – Space vs Earth, land vs sea
- ⦿ Compress images
 - Reduce from 256 grayscale
 - Reduce resolution



Next steps

- ⦿ Create an IR model of the Earth
- ⦿ Simulate image data from rotating camera
- ⦿ Test algorithm
- ⦿ Launch satellite
- ⦿ Arrays
 - Sensing space debris or plumes
 - Two cameras using displacement
 - One camera using time delay