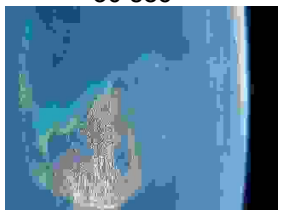
W11: Updates:

- Image transmission between Pis

Lossless
40 min

640x480 image,
95% JPEG
compression
1 min @ 915 MHz,
125 kHz BW, SF 7

97% JPEG
compression
30 sec



Possible Blockers:

- Ground station antenna mount is taking longer than desired.
- Bitrates/BWs for past missions with RFM98.
- Risk: RF power FET may only be rated for 20V. Currently running at 19.8V?

Milestones:

This week
- GS boards ready to order/ordered
- Porting GS software to work on Pi
- Image transmission between Pis
- Image compression format/level
- Reverse engineered RF module amplifier

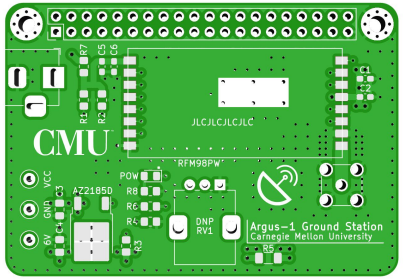
Next week
- Assemble GS boards

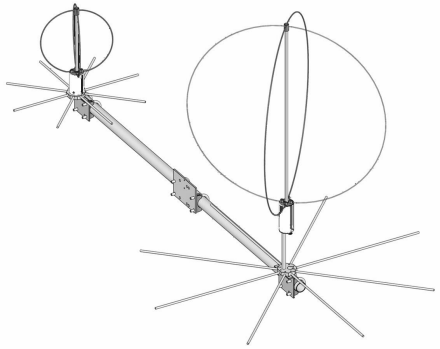
Cross Team Info:

- GNC: Comms protocol / message scheduling
  - D.J. working on statechart
- Vision: Image compression / format

W10: Updates:

- Board redesign finished, will order soon
- Ordered a lot of GS hardware





Possible Blockers:

- Ground station installation progress moving slower than we would like

Milestones:

This week

- Response from AMSAT
- Porting GS software (Arduino to C for RPi)
- Board redesign complete, order this week
- Satellite antenna demo

Next week

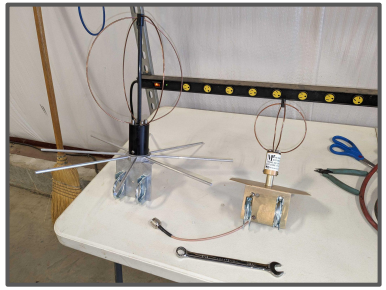
- GS software testing
- Continue GS software development (Mature protocols and send large packets, i.e. images)

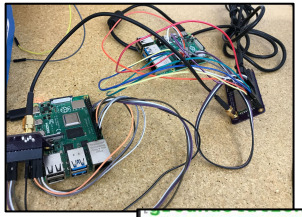
Cross Team Info:

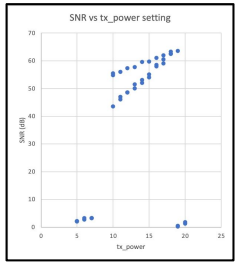
- GNC: Comms protocol / message scheduling
- Mech: Sat antenna mount
- Avionics & Mechanical: GPS antenna mount

W9: Updates:

- Antennas assembled (not mounted)
- LoRa communication between two ground stations








```
From: 2
Received: b'Hello there!'
RSSI: -122.87; SNR: 59.0
From: 2
Received: b'D.J. said hello!'
RSSI: -121.8; SNR: 57.0
```

Possible Blockers:

- Permission to drill holes in building
- Anechoic chamber

Milestones:

This week

- Antennas assembled
- GS equipment at Gascola site
- GS board redesign
- Module to module RF comms
- More communication with AMSAT person

Next week

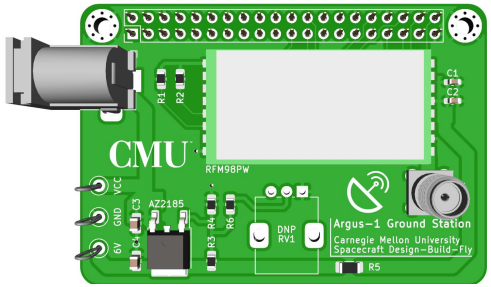
- Order new GS board
- Satellite antenna demo + testing

Cross Team Info:

- Mechanical:
  Satellite antenna v0

W8: Updates:

- GS board redesign
- 1 more HAM licensee - Congrats DJ!



Possible Blockers:

- Labspace access needed for antenna prototypes and equipment migration
- Ground Station antenna mount

Milestones:

This week
- Link Budget v0.5 (lives in wiki)
- GS antenna - eggbeater
- Will move GS hardware into RES lab
- Got response from AMSAT
- Reverse engineering HopeRF module

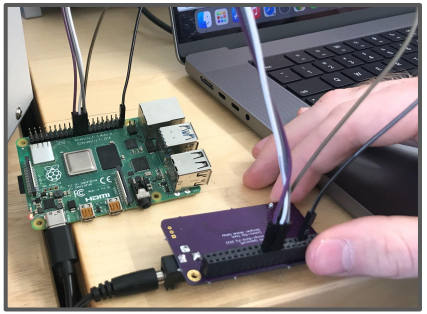
Next week
- Order new GS boards
- Prototype satellite antenna (V-dipole)

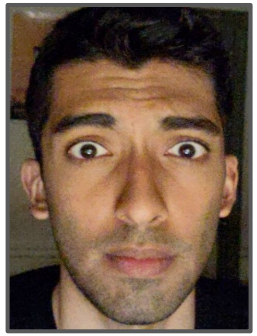
Cross Team Info:

- Avionics:
  Progress on FPrime?
  Power path from battery to radio?

W7: Updates:

- Tested GS boards, works but needs redesign
- 1 more HAM licensee - Congrats Neil !
- Ground station inventory





Possible Blockers:

- Labspace access needed for antenna prototypes and equipment migration
- Eagerly awaiting link-budget class
- Expectations for design review?

Milestones:

This week

- Link budget v0.3
- Comms Block Diagram v0.1
- GS board bringup

Next week

- Update on link budget
- Check on ground station facilities progress
- GS board redesign
- Data transmission between GS boards

Cross Team Info:

- Mechanical: Continue development for sat antenna
- GNC: Comms protocol / message scheduling

W6: Updates:

- Socket-based comms development environment in C
- Ground Station site visit.

```
Packet sent from cubesat!

Version number: 0
Packet type: 0
Secondary header flag: 0
APID: 110
Sequence flag: 3
Sequence count: 0
Data length: 200
```

Possible Blockers:

- Pis for ground station development & benchtop module <> module communication

Milestones:

This week

- Developing packet protocol
- Developed initial packet transmission simulation
- Visited ground station site, planned antenna, mount

Next week

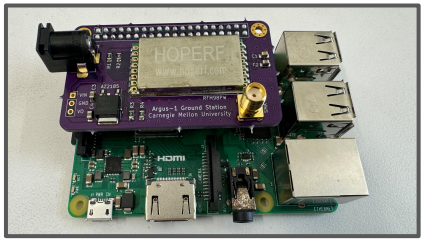
- Update on link budget
- Expanding digital packet transmission simulation with message payloads
- GS board bringup using a Pi

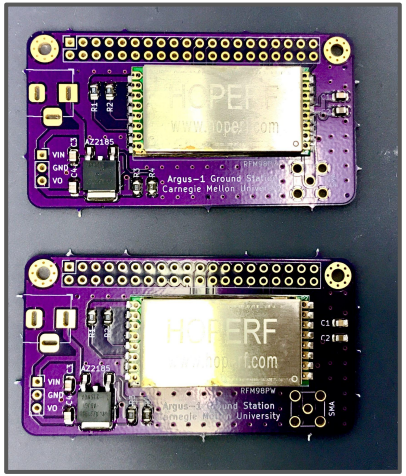
Cross Team Info:

- Avionics: meeting on satellite RF software + using FPrime for it
- GNC: meeting to decide data to/from satellite, message scheduling
- Vision: image format & compression

W5: Updates:

- Assembled 2 x Ground Station pHATs
- Link Budget v0.2
- SQL Command Database





Possible Blockers:

- Access to 2 x Raspberry Pis (2, 3, 4, Zero) for initial LoRa communication

Milestones:

This week

- Ground station pHAT assembly
- Link budget v0.2

Next week

- Continue initial satellite <> ground station command database file
- Setup demonstration of satellite <> ground station communication (Digital only, packet passing)
- Assemble another ground station pHAT

Cross Team Info:

- Continue to send DJ command/telemetry variables (Vbat, sensor outputs)
- GNC: Attitude control & detumbling

W4: Updates:

- Selected the CSDC Space Packet Protocol for the satellite <> ground station communication

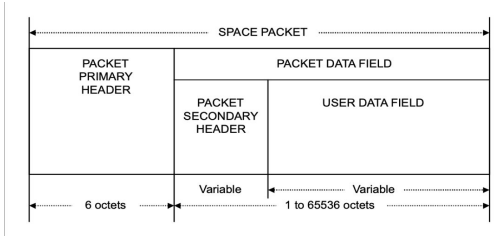
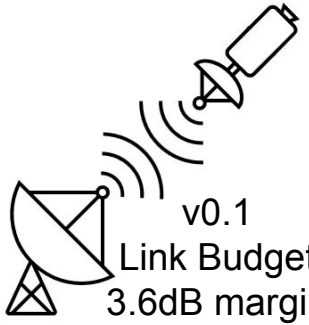


Fig. 1: SPP



v0.1
Link Budget
3.6dB margin

Possible Blockers:

- Access to lab / ground station inventory

Milestones:

This week

- Link Budget v0.1
- SPP + low level RF libraries
- Antenna trade study / analysis

Next week

- Link Budget v0.2
- RF pHAT assembly, board bringup
- Pi-Pi RF communication

Cross Team Info:

Vision

- Image transmission format
- May need to transmit image in parts (dividing in 4 parts should transmit in 4 passes)

- Any data that teams will need to communicate from ground <> satellite, please share with D.J.
- Will develop database with message IDs and data field formatting.

W3: Updates:

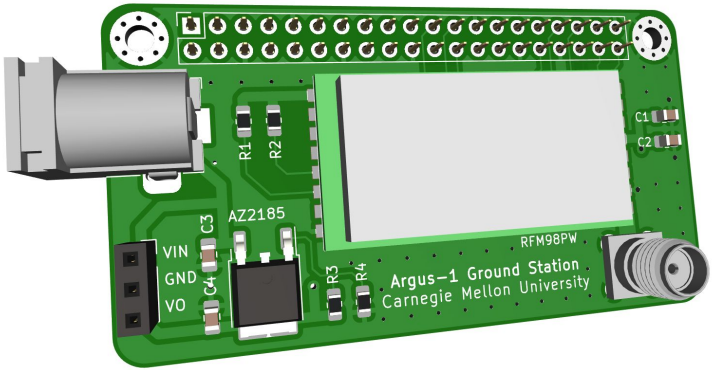


Fig. 1: Groundstation Pi pHAT

Possible Blockers:

- LoRa use and licensing in U.S. ?
- Experimental license ?
- ISM bands ?

Milestones:

- v1.0 ground station schematic and PCB
- Subdivision of responsibilities for Comms team
- v0.0 ground station GUI

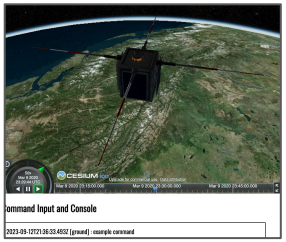


Fig. 2: GS GUI

Cross Team Info:

Comms Team Point of Contacts

- RF Power Use: Jason
- Antenna: Tim
- RF Software: DJ

Cross Team Interfaces/Dependencies

- Mechanical: Antenna
- GNC: GS to sat information
- Avionics: RF software + protocols

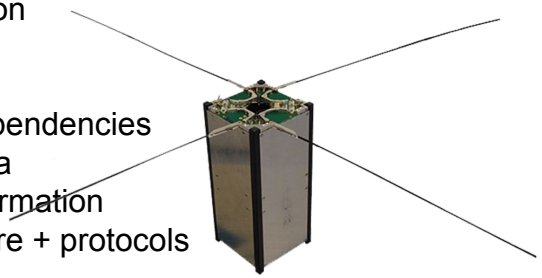


Fig. 3: Turnstile Antenna