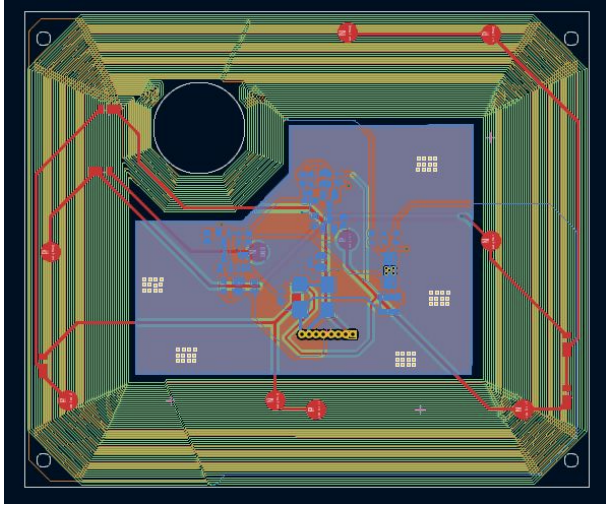


# Avionics Week 8 16/18-873F23



## Blockers

- FPrime requires WSL on Windows, Zephyr not supported on WSL

## Requirements

## Weekly Results

- Updated solar/torque coil boards
  - Selected LUX sensor instead of incidence angle
  - Selected GPS patch antenna to integrate
- Compiled Zephyr for PyCubed

## Next week

- Update Pycubed hardware
  - (Jetson relay, Jetson comm, solar sensor connections, redundant IMU)
- Continue Zephyr board configuration
- Continue Zephyr integration with FPrime

## Interfaces

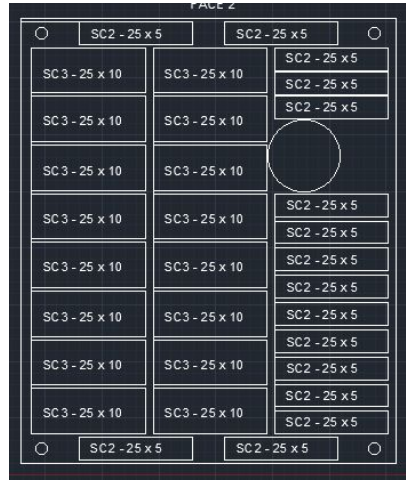
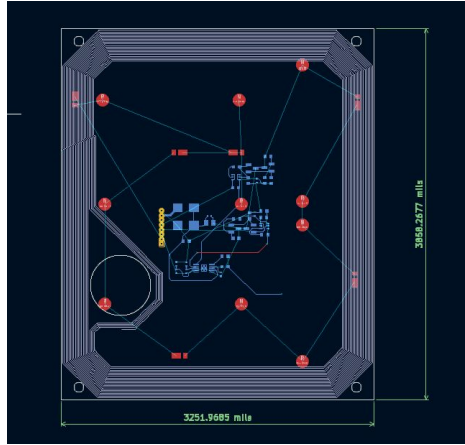
**Vision:** Jetson power estimations

**GNC:** Attitude workload for Jetson power estimate

**Ops:** PyCubed RFM driver

**Mech:** RFM antenna positions (keepouts)

# Avionics Week 8 16/18-873F23



## Blockers

- FPrime deployment setup

## Requirements

- 

## Weekly Results

- Solar cell layout for outer boards
- Torque coil boards v1
- Ordered parts for solar/torque board v1

## Next week

- JPL Meeting
- Update PyCubed hardware (solar sensor & Jetson support)
- FPrime deployment setup
- Driver development

## Interfaces

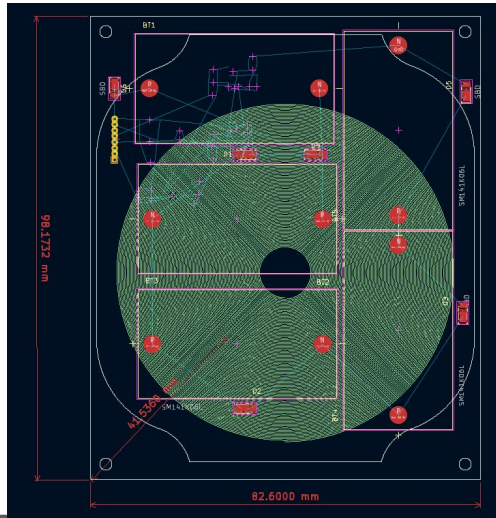
**Vision:** Communication interface between Jetson and PyCubed, Jetson power estimate

**GNC:** Attitude workload for Jetson power estimate

**Ops:** PyCubed RFM driver

**Mech:** Antenna keepouts, deployable panel outline and keepouts

# Avionics Week 8 16/18-873F23



## Blockers

- Mechanical: Camera keepout region, limit switches location for solar/torque coil boards.

## Requirements

- Mechanical: Mounting holes for internal stackup
- Vision: Camera interface selection

## Weekly Results

- Development of solar/torque coil boards
- Chose GPS module (easy integration to PyCubed)
- Power budget updates

## Next week

- Solar/Torque coil board
  - Finish the torque coil integration to PCB
  - Integrate selected solar sensor
- Plan PyCubed redesign
- Finish FPrime deployment setup

## Interfaces

**Vision:** Power estimates for Jetson, waiting for camera hat, connection adapters

**GNC:** FPrime development, solar sensor selection, GPS selection

**Ops:** None

**Mech:** Chose silicon solar cells, number of burn wires

To-do 15

In progress 8

Complete 13

Hardware 23

Develop Camera Mounts?

Master BOM

List of Data from Avionics for Ops

Rohan Raavi

GPU Payload Board (ML Board)

Rohit Banqal

Nischal Mahadeshwar Rohan Raavi

Solar Estimation for Solar Board Design

Harry Rosmann Rohit Banqal

+ New

Solar & Torque Coil Boards

Nischal Mahadeshwar

Choose solar sensor

Nischal Mahadeshwar

Karen Abruzzo Harry Rosmann

Update Block Diagram

Harry Rosmann

Burn Wire Mapping

Nischal Mahadeshwar

Plan PyCubed Redesign

Harry Rosmann

Nischal Mahadeshwar

Order GPS

Harry Rosmann

Power Budget

Harry Rosmann Rohit Banqal

Rohan Raavi Yifan Yan

Karen Abruzzo

PyCubed Hardware Overview

Harry Rosmann Rohit Banqal

Nischal Mahadeshwar

SOLVED: USING PYCUBED LORA;  
Meeting with Ops team for LoRA  
module selection and power  
consumption associated with it.

1

Find Suitable Jetson Carrier Board

Find solar boards

Specification of LoRA module  
recommended by OPS.

Nischal Mahadeshwar

Select IMU based on GNC  
requirements

Rohan Raavi Harry Rosmann

1

Integrate GPS into PyCubed

Harry Rosmann

Driver for RFM

Driver for Cameras

Driver for IMU

Driver for GPS

Driver for Torque Coils

Driver for Solar Sensors

Driver for SD Card

Driver for Watchdog

Driver for Jetson/Pycubed Comm

Driver for Burn Wires

+ New

Generate FPrime Executable



Karen Abruzzo



Yifan Yan



Rohan Raavi



Harry Rosmann

+ New

Configure FPrime to compile for  
PyCubed



Harry Rosmann

Driver Implementation Timeline



Harry Rosmann

+ New



Add cover Add comment

# Sprint Planning Timeline

Add new sprint

## ▼ @Next Wednesday for 🏃 Sprint #1 (11/1/2023)

Finish deployment setup for PyCubed

## ▼ @November 8, 2023 for 🏃➡ Sprint #2 (11/8/2023)

Driver for IMU

Driver for Torque Coils

Driver for Solar Sensors

Driver for Burn Wires

## ▼ @November 15, 2023 for Sprint 3

Driver for RFM

Driver for Jetson/Pycubed Comm

## ▼ @November 22, 2023 for Sprint 4

Driver for RFM

Driver for Jetson/Pycubed Comm

## ▼ @November 29, 2023 for Sprint 5

Driver for GPS

Driver for SD Card

## ▼ @December 6, 2023 for Sprint 6

Driver for GPS

Additional Overflow

# Avionics Week 6 16/18-873F23

```
s/Utils.dir/CRCChecker.cpp.obj  
[ 98%] Linking CXX static library ../../lib/pycubed/libUtils.a  
[ 98%] Built target Utils  
[ 98%] Generating TlmLinearChanComponentAc.cpp, TlmLinearChanComponentAc.hpp  
[100%] Generating TlmLinearChanComponentAi.xml  
Scanning dependencies of target Svc_TlmLinearChan  
[100%] Building CXX object Svc/TlmLinearChan/CMakeFiles/Svc_TlmLinearChan.dir/TlmLinearChan.cpp.obj  
[100%] Building CXX object Svc/TlmLinearChan/CMakeFiles/Svc_TlmLinearChan.dir/TlmLinearChanComponentAc.cpp.obj  
[100%] Linking CXX static library ../../lib/pycubed/libSvc_TlmLinearChan.a  
[100%] Built target Svc_TlmLinearChan
```

Successfully compiled FPrime for PyCubed

## Blockers

- None

## Requirements

- Keepouts for camera on solar boards

## Weekly Results

- Integrated toolchain to compile FPrime for ARM device
- Battery board verified and ordered

## Next week

- Flash one of the Pycubed boards with FPrime (need toolchain to output executable)
- Implement a blink test on Pycubed board using FPrime
  - IMU data
- Develop and order torque coil boards

## Interfaces

**Vision:** Software support for interfacing with cameras using Jetson. 6 Camera HAT board discussion.

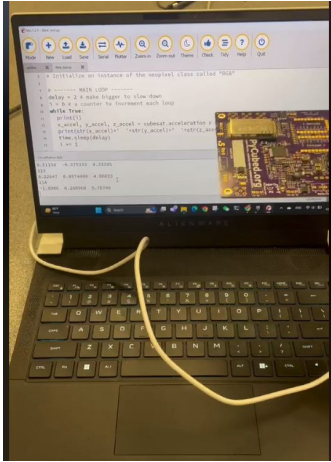
**GNC:** Get GNC setup to start developing flight software

**Ops:** Develop RFM interface on FPrime

**Mech:** Deployables, solar cells, mounting holes



# Avionics Week 5 16/18-873F23



## Collecting IMU data:

<https://drive.google.com/file/d/1Q1CBaLEFpnNZ1WbjKNR-YIwaFHF0KiW/view?usp=sharing>

## Blockers

- 

## Requirements

- Mechanical: Need to know internal layout of cameras so we can adjust board designs

## Weekly Results

- 2 more PyCubed assembled and powered successfully
- Basic example codes tested - NeoPixel, IMU

## Next week

- FPrime onboarding, run FPrime on PyCubed
- Start development of Solar Cell/ Magnetic torque coil board.
- Start development of battery board.

## Interfaces

**Vision:** Software support for interfacing with cameras using Jetson

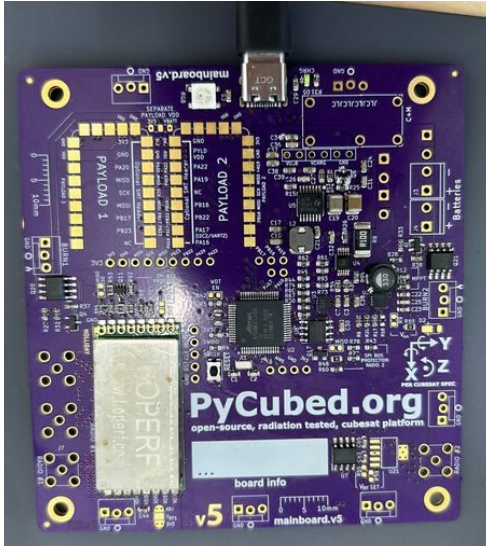
**GNC:** F' meeting

**Ops:** F' & RFM meeting

**Mech:** Internal layout, deployables, solar cells



# Avionics Week 4 16/18-873F23



## Blockers

- Camera selection for hardware development

## Requirements

- Actual compute module power consumption

## Weekly Results

- First PyCubed assembled and powered successfully
- Updates to power budget

## Next week

- Initial interfaces test on PyCubed module.
- Build 2 more PyCubed boards.
- Start designing Camera/ Solar and magnetic torque coil boards.
- Evaluate off the shelf/ design the Carrier Board for Jetson compute Module.

## Interfaces

**Vision:** Communication interface with ML module and control module

**GNC:** Meeting about software stack

**Ops:** Meeting about software stack

**Mech:** Fitting all six cameras with telephoto lens inside the CubeSat (PCB outline and arrangement)

# Avionics Week 3 16/18-873F23

## Block Diagram V1.1

## Blockers

- Waiting for the PyCubed board to arrive
- Parts selections for more accurate power budget estimation

## Weekly Results

- Created initial estimated Power Budget for major components
- Created more Fleshed Out Block Diagram
- Did initial Research on PyCubed Software Stack and F Prime Flight Software
- Started Designing the Drivers for Magnetic Torque Coils

## Next week

- Select software stack - CircuitPython or F Prime
- Talk with GNC Team about dividing Software Work
- Build pycubed boards for initial integration testing.

## Interfaces

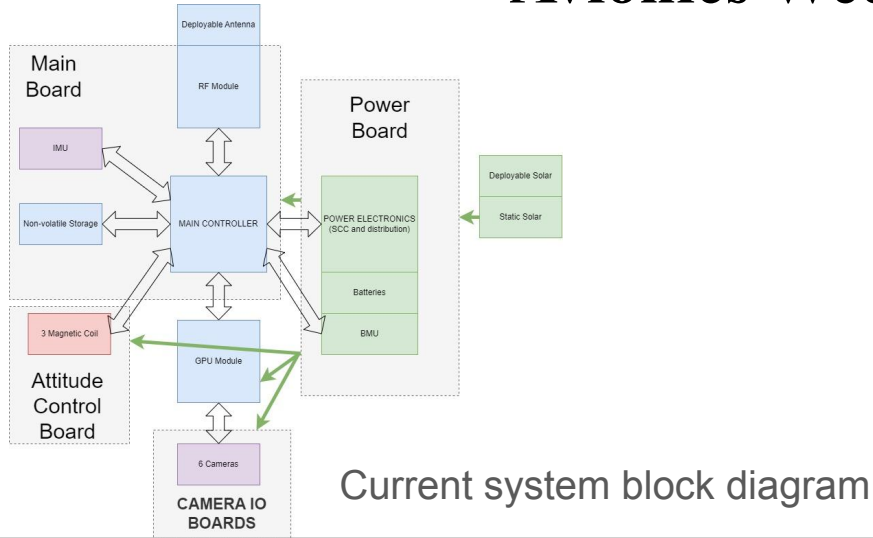
**Vision:** Compute module(s?) and camera selection

**GNC:** Division of software work, torque coil specifications

**Ops:** Develop command and data list for transmission

**Mech:** None

# Avionics Week 2 16/18-873F23



Current system block diagram

## Blockers

- None

## Requirements

- Camera and Processor specs from vision team
- IMU and Coil requirements from GNC team

## Weekly Results

- Created block system level diagram
- Discussed with all other teams about primary requirements
- Updated requirements

## Next week

- Get PyCube board running and run simple interface code with available sensors or other boards
- Solar estimation to determine whether we need deployable panels
- Power source and drain calculations with burst usage availability

## Interfaces

### Vision

- Camera and Processor Specs
- # of cameras and duty cycle

### GNC

- Power consumption of magnetic torque coils
- Orbit estimation for determining solar power, comm time

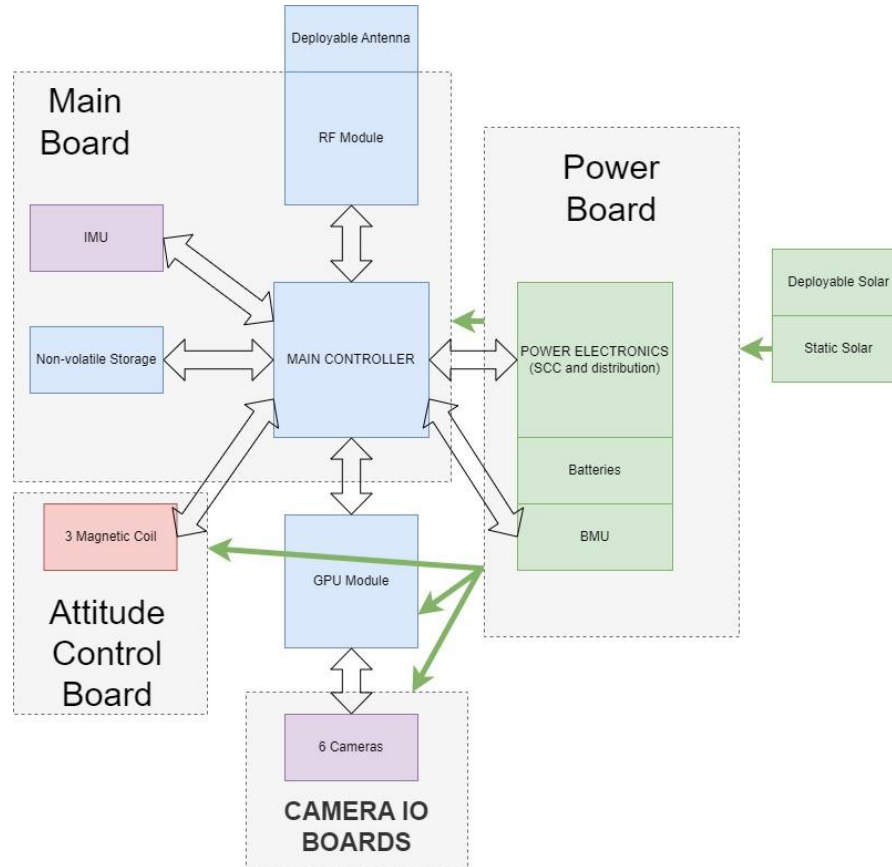
### Ops

- Data input and output
- Detailed power consumption for RF Module

### Mech

- Board dimensions and mounting options
- Deployable Switches

# Hardware Block Diagram



# Avionics Week X 16/18-873F23

Blockers



Weekly Results:

Interfaces

Vision

GNC

Ops

Mech

Next week: