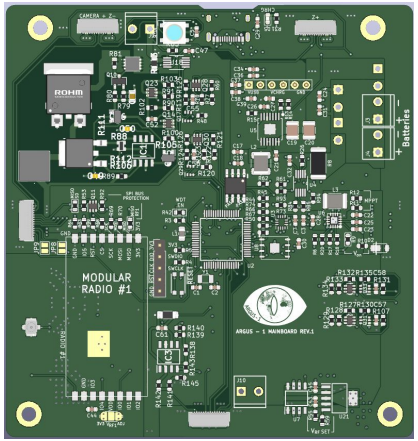
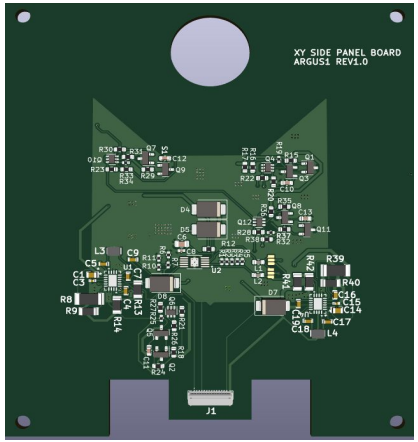
Avionics Week 3 16/18-873S23



PyCubed



XY Torque

Blockers

- New camera interface selection (vision/gnc)
- Top board keepout for the radio antenna

Weekly Results:

- V1 PyCubed & XY torque boards ready to order
- V1 Camera board (Z torque)
- V1 Battery Board

Next week:

- Order completed boards (after class today)
- Setup flight software repo for CircuitPython & deploy
- CircuitPython driver development
- Integration test planning
- Finalize Designs V1 deployable, camera, z-radiator boards

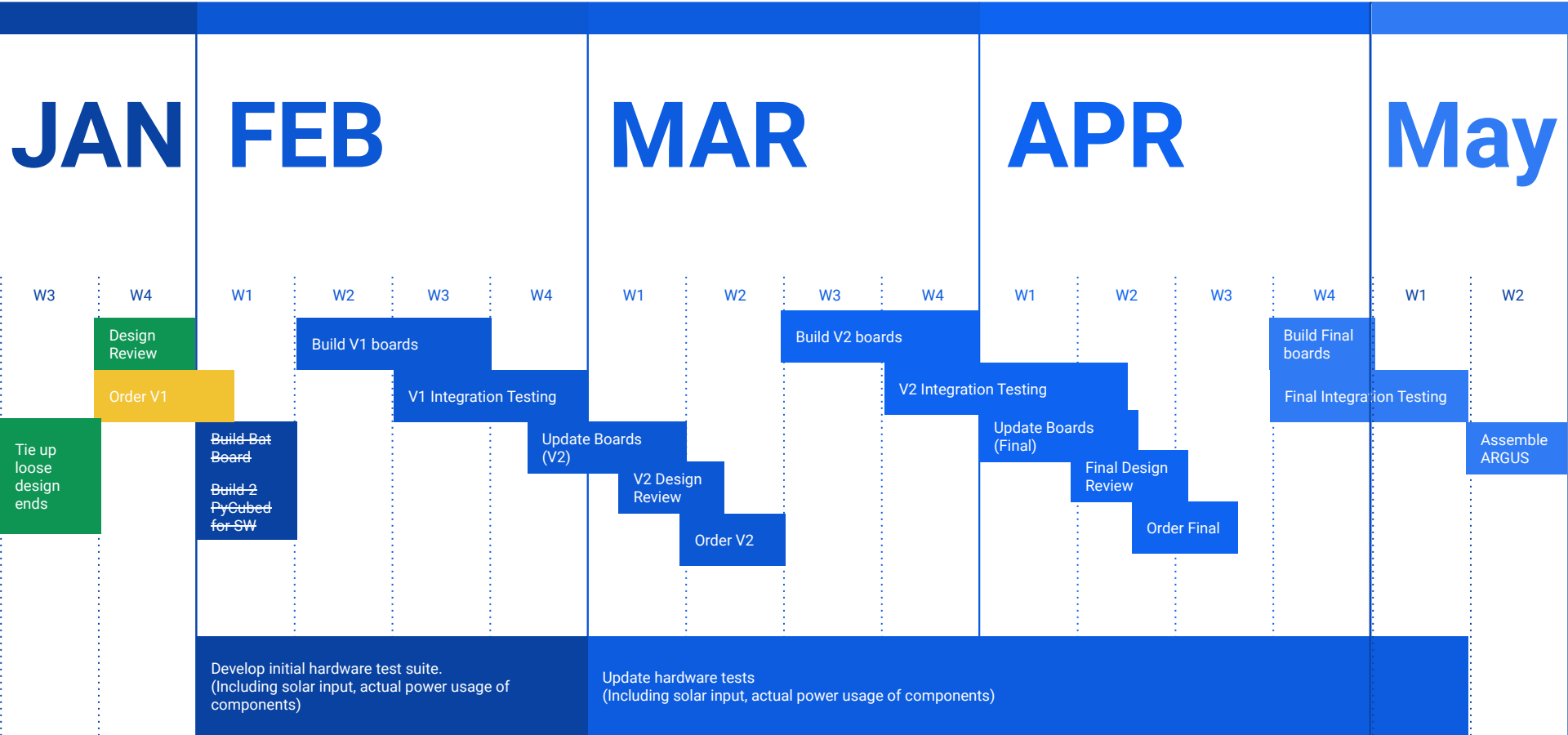
Interfaces

Vision/GNC - None

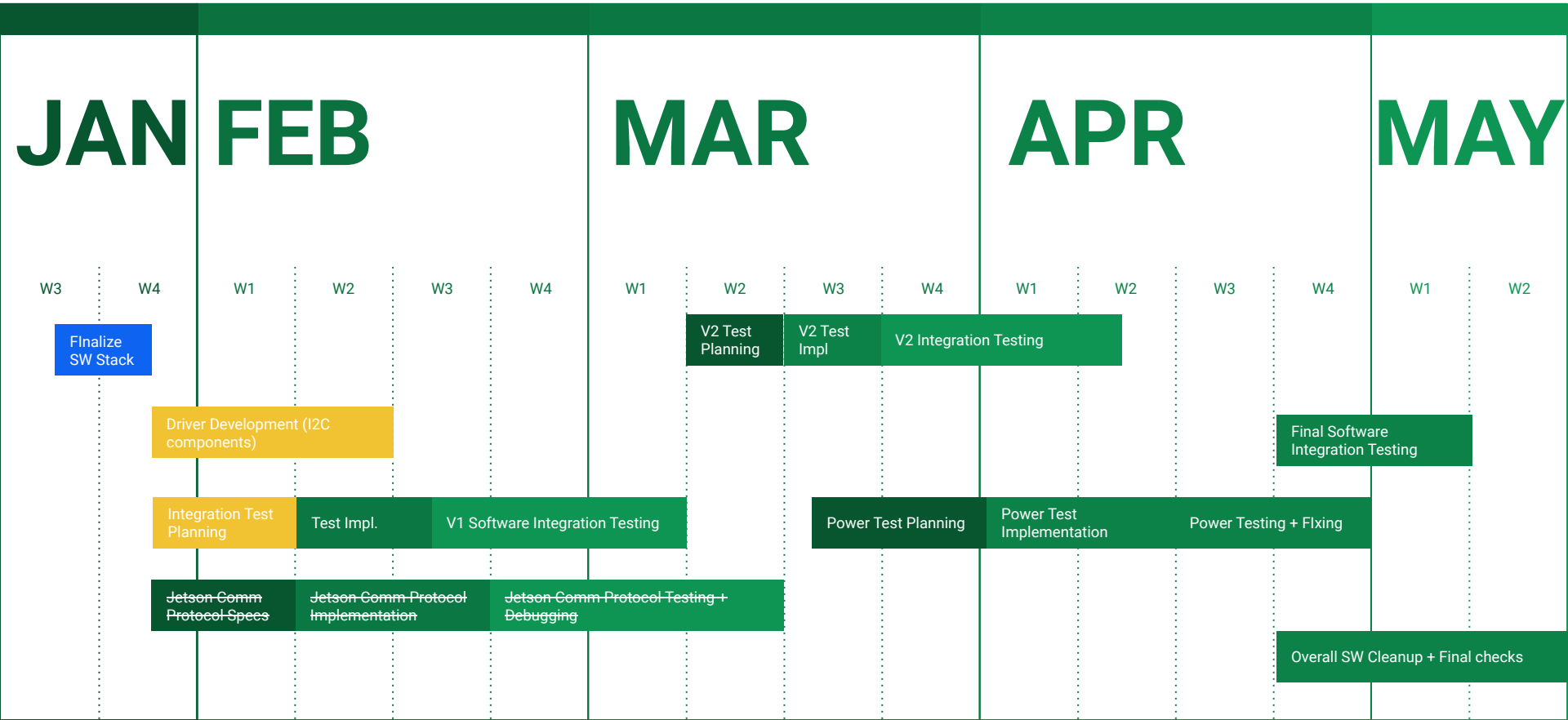
Ops - Discuss CircuitPython Integration

Mech - Updated cutouts for deployables/z outers

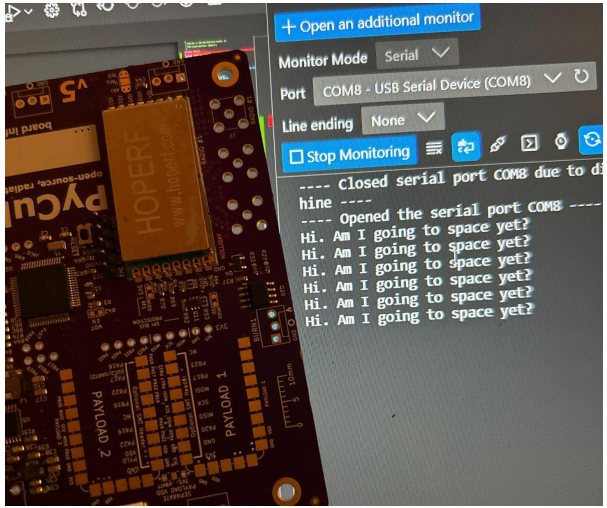
Hardware Timeline



Software Timeline



Avionics Week 11 16/18-873F23



Blockers

- None

Requirements

- Antenna (RFM, GPS) keepouts
- New camera keepouts out outer boards

Weekly Results

- Hello World with PyCubed/Zephyr
- Successful build with FPrime/Zephyr
- Hardware block diagram 2.0
- Initial power measurement for Jetson
    - 2 cores vs 4 cores in 7W => ~50% power savings on cores

Next week

- Build Fprime/Zephyr/PyCubed (total integration)
- Start driver development for FPrime
- Jetson power estimates
- Hardware, hardware, hardware

Interfaces

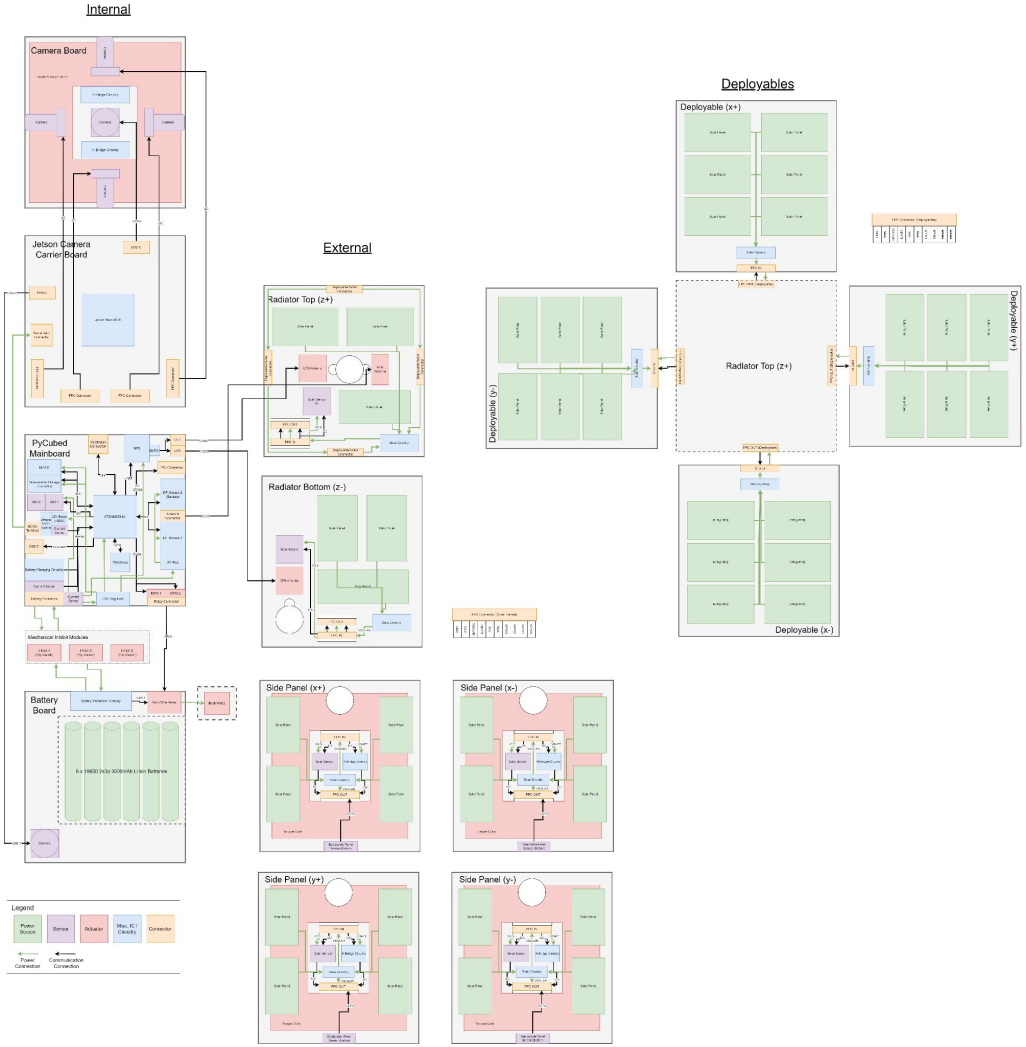
Vision: Jetson power estimations

GNC: Attitude workload for Jetson power estimate

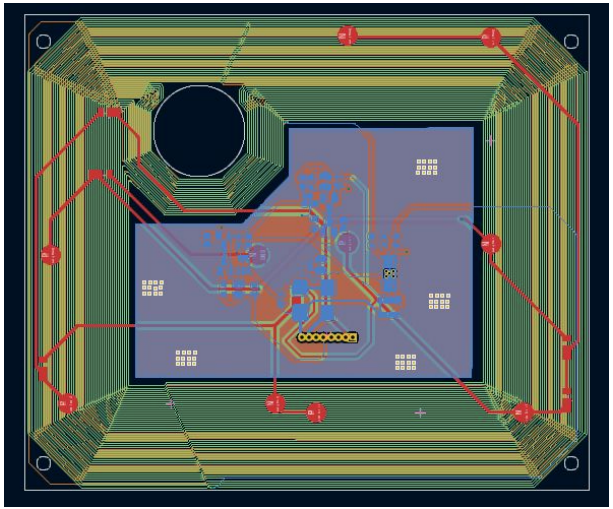
Ops:

Mechanical: Cable management discussions

Diagram Link



Avionics Week 10 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 hardware

Next week

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

Interfaces

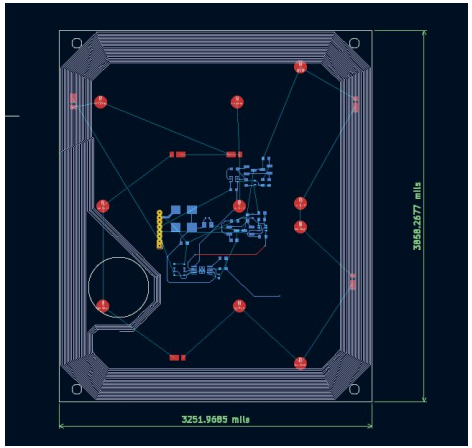
Vision: Jetson power estimations

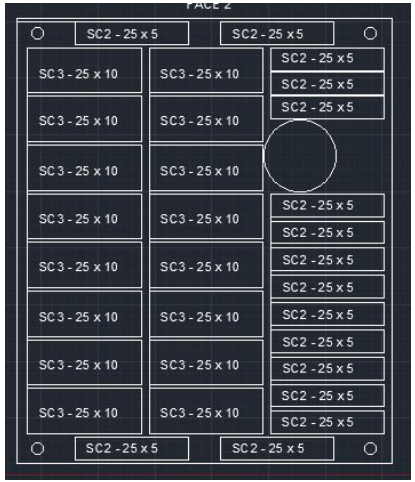
GNC: Attitude workload for Jetson power estimate

Ops: PyCubed RFM driver

Mech: RFM antenna positions (keepouts)

Avionics Week 9 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

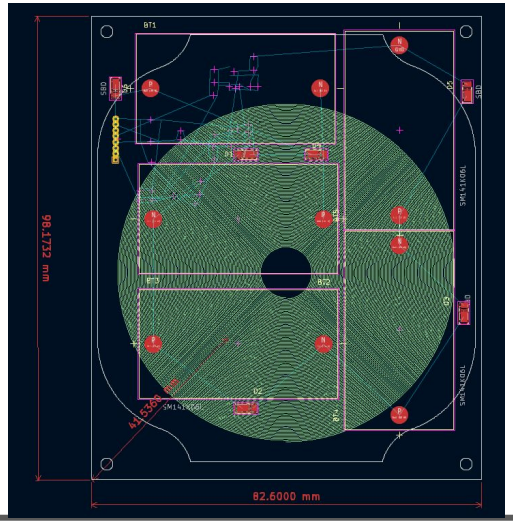
Next week

- 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

To-do

- Develop Camera Mounts?
- Master BOM
- List of Data from Avionics for Ops
  - Rohan Raavi
- GPU Payload Board (ML Board)
  - Rohit Bangal
  - . Nischal Mahadeshwar
  - Rohan Raavi
- Solar Estimation for Solar Board Design
  - Harry Rosmann
  - Rohit Bangal

+ New

In progress

- 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 Bangal
  - Rohan Raavi
  - Yifan Yan
  - Karen Abruzzo

Complete

- PyCubed Hardware Overview
  - Harry Rosmann
  - Rohit Bangal
  - . 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

▼ Software 13 ••• +

- 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

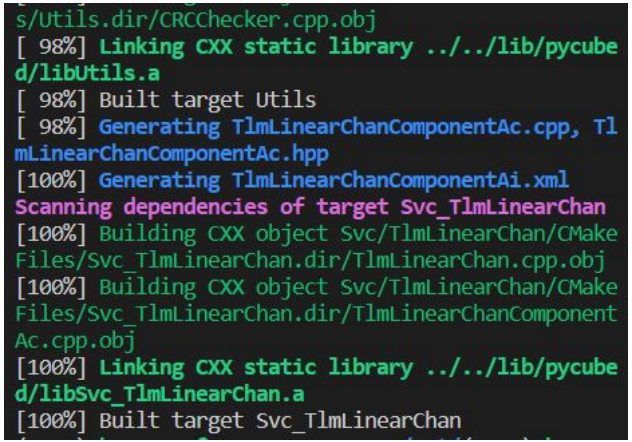
Driver for SD Card

▼ @December 6, 2023 for Sprint 6

Driver for GPS

Additional Overflow

Avionics Week 6 16/18-873F23



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

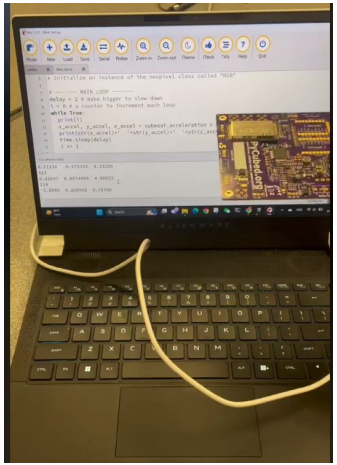
Vision: Software support for interfacing with cameras using Jetson. 6 Camera HAT board discussion.

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-YIwaFHFr0KiW/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

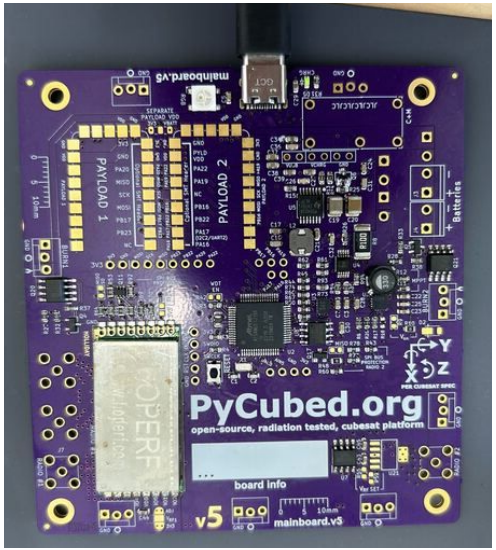
Vision: Software support for interfacing with cameras using Jetson

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

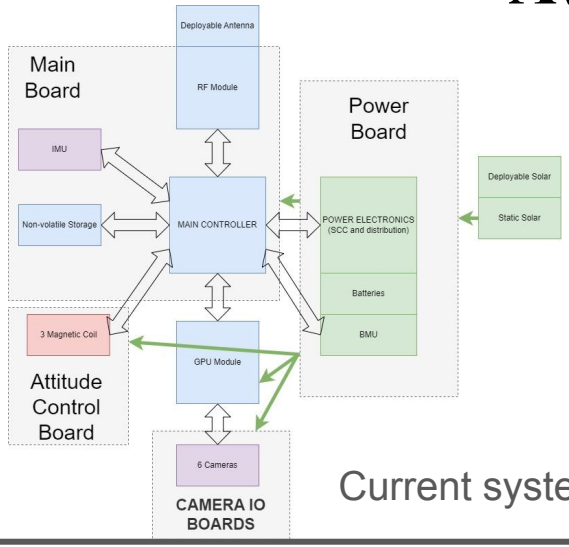
Vision: Compute module(s?) and camera selection

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

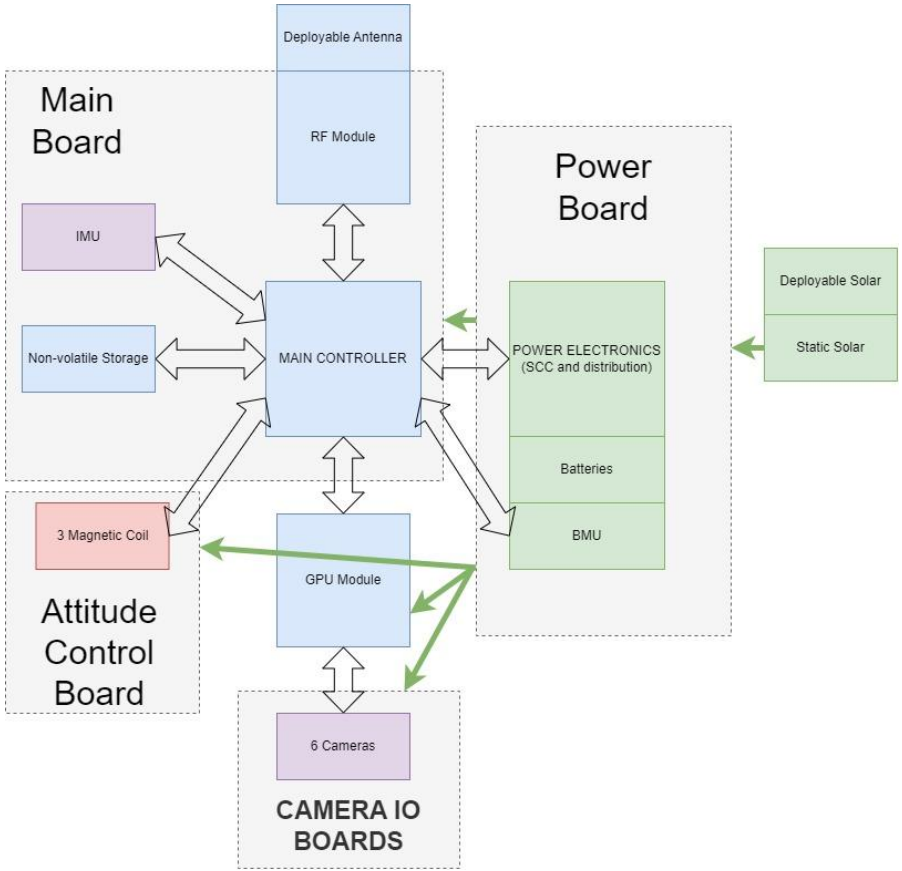
Ops

- 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:

Next week:

Interfaces

Vision

GNC

Ops

Mech