# GNC Quad Chart

October 09 2024

Ground Track (Green: Start Red: End)

Angular Velocity [deg/s]
- X Angular Velocity
- Y Angular Velocity
- Z Angular Velocity
- L2 Norm of Angular Velocity

Generated Power vs. Time for LTDN of 10pm, Mean: 2.79 W

Mean Generated Power vs. Local Time of Descending Node
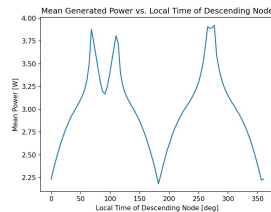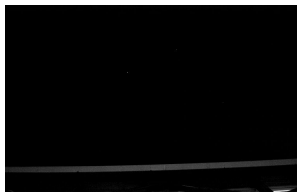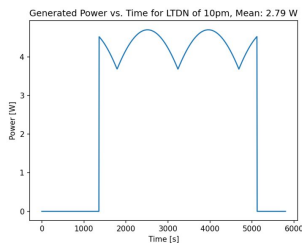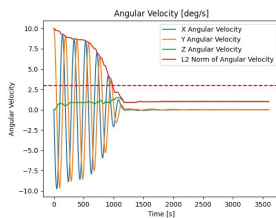
**External Tools Needed:**

**Blockers:**

- ESC RPM Sensor still in the mail ➝ can't find most efficient angular speed for RW without angular speed measurements.
- Midterms

**Progress:**

*Simulation:*
- Core C++ sim ready and going through code review & unit testing
- Detumbling simulation
- Incident Solar power estimation sim ready and in review
    - Takes solar panel facet info and sweeps over LTDN and design parameters

*Reaction Wheel:*
- Spun up 2.5" motor with same ESC as UC Davis paper proposed

**Plan for the Upcoming Week:**
1. Sun-pointing, Earth-pointing Sim scenarios
2. RW, magnetorquer trade-off

**Interfaces:**

1. **Camera Qty & Placement** : 4 cameras (including 1 star tracker)
    a. Estimated to be along ±Z and ±Y
2. **RW power constraints**
    a. Avionics–what can we afford?

# Kanban

## Backlog 12 (Estimate: 100)
This item hasn't been started

**GNC-Simulation #14**
Pointing Error Budget

**Draft**
Enumerate mission scenarios and modes

**GNC-Simulation #11**
Magnetorquer sizing
100

**GNC-Simulation #22**
Compute geodetic coordinates from ECI

**Draft**
Test OpenMV startracker camera in schenley park

**Draft**
Evaluate NASA COTS Startracker software

**GNC-Simulation #23**
Sim ground track plot convert position from ECI to ECEF

**GNC-Simulation #25**
Sim plotting: account for earth's eccentricity when computing lat/lon

**GNC-Simulation #26**
Disperse initial orbit/position/velocity

**GNC-Simulation #27**
Sim C++ bindings: look into pass-by-reference to avoid eigen copies

**GNC-Simulation #28**
Sim SRP: Shadow function for SRP acceleration

+ Add item

## Ready 2 (Estimate: 0)
This is ready to be picked up

**Draft**
Multiplicative EKF for Attitude Implementation

**Draft**
Spin Stabilized Lyapunov Attitude Controller

+ Add item

## In progress 11 / 6 (Estimate: 210)
This is actively being worked on

**GNC-Simulation #17**
Star Tracker Camera Spec-ing Analysis
P0  100

**GNC-Simulation #10**
PNP-Based Orbit Determination Implementation
P1  100  M

**GNC-Simulation #9**
RW Sizing
P1  M

**Draft**
Study Pixel Truncation Error's Impact on Orbit Determination

**Draft**
System architecture diagram created

**GNC-Simulation #16**
Orbit Determination Debugging

**GNC-Simulation #12**
Core Sim Performance

**GNC-Simulation #13**
Python Sim Validation

**Draft**
Debug sim detumbling scenario
10

**Draft**
Implement Spin-stabilized scenario

**Draft**
RW Sizing: implement more complex model in sim

+ Add item

## In review 2 / 5 (Estimate: 20)
This item is in review

**GNC-Simulation #18**
Solar Power Generation Model
P1  S

**Draft**
Solar Array Study
20

+ Add item

## Done 2 (Estimate: 10)
This has been completed

**GNC-Simulation #15**
Orbit Determination

**Draft**
Integrate detumbling controllers in sim
10

+ Add item