

GNC Progress Documentation

Week 1 (Jan 13 - Jan 17)

Subsystem Progress

- Decided short term goals for the subsystem
- Decided the global state-machine execution relevant to ADCS in FSW

Individual Progress

Karthik Karumanchi

- Identified a potential IC for RW to replace the STM32, motor driver and encoder
- Caught up to RW work from the previous semester
- Worked with FSW team to decide on the state-machine for FSW

Derek Fan

- Added additional unit tests for corner cases: Issue #63
- Removed software conflicts with CircuitPython: Issue #82
- Conceptualized the remaining ADCS task structure in FSW

Arvind Car

- Caught up to Vision work from the previous semester/year

Amaar Quadri

- Created and set up the GNC-Payload repo, moved all relevant code there
<https://github.com/cmu-argus-2/GNC-Payload/issues/2>
- Helped other team members get up to speed on orbit determination codebase
- Began looking into earth engine downloader for creating datasets
<https://github.com/cmu-argus-2/GNC-Payload/issues/16>

(Contributors not signed up for the course)

Pedro Cachim

- No progress

Frederik Markus

- Caught up to Vision work from previous semester/year

Week 2 (Jan 20 - Jan 24)

Individual Progress

Karthik Karumanchi

- Placed order for a sensorless FOC chip
- Started translated MEKF implementation to FSW
 - Added gyro, sun sensor and magnetometer ([Issue #75](#))
 - Added an orbit propagation function ([Issue #89](#))

Arvind Car

- Set up scripts to train and evaluate the RCnet and LDnet pipelines, and converted absolute paths to relative paths in the code base (Issue [#13](#) and [#14](#)) (https://github.com/cmu-argus-2/GNC-Payload/tree/Merged_Vision_Pipeline)

Amaar Quadri

- Set up a google cloud project for earth engine downloader, wrote a bash script to create a basic dataset, and copied the dataset to the workstation (<https://github.com/cmu-argus-2/GNC-Payload/issues/16>)
- Got image simulator + ML inference + NLS OD pipeline working (<https://github.com/cmu-argus-2/GNC-Payload/issues/20>)

(Contributors not signed up for the course)

Pedro Cachim

- Merged MEKF to main (w/ Tushaar's help). Joined MEKF/attitude controller simulations: PR #47
- Work on RW/magnetorquer controller: PR #49
- Added option to initialize sim spin-stabilized/sun-pointed: PR #49

Frederik Markus

- Worked on implementing the vision training ground and better understanding what already exists for eedl. On the GNC-Payload repo: PR #18 and issues #9, #14, #16, #17
- Started implementing the filter pipeline (at the moment only position and velocity) No PR yet for this.

Derek Fan

- Tuned controller parameters in SIL for sun-pointing task

- Working on restructuring ADCS app: Issue #94

Week 3 (Jan 26 - Jan 31)

Individual Progress

Karthik Karumanchi

- Calibrated MCF8315C sensorless FOC chip for RW speed control ([Issue #4](#))
 - RW speed control works on the dev kit. Actual board yet to be designed
- Ran a magnetorquer - magnetometer settling time analysis ([Issue #134](#))
 - Data collection frequency was too low and the test needs to be re-run

Arvind Car

- Incorporated Salient Region Analysis code to add more regions ([commit](#))

Amaar Quadri

- Downloaded new dataset with lower cloud cover
- Debugging OD pipeline
- Bug fixes in vision inference code

(Contributors not signed up for the course)

Pedro Cachim

- PR#49: RW controller, Sun Sensor eclipse function
- PR#52 (in the works): gravity gradient torque, plotting cleanup, aerodrag torque, dynamic perturbation fixes

Frederik Markus

- Helped Amaar on his eedl PR
- Set up tooling on the GNC-Payload codebase
- Worked on combined state filter

Derek Fan

- Tested ADCS task on mainboard-fixed library and task-related issues.
- Began fixing numpy-ulab and other circuitpython-related discrepancies (e.g. matrix multiplication)

Week 4 (Feb 03 - Feb 07)

Individual Progress

Karthik Karumanchi

- Ran Reaction Wheel for 3 days at max speed without issues
 - Spoke to Adrian and made a plan for a RW board
- FSW progress:
 - Architecture for the ADCS task with an MEKF (Issues [#75](#), [#94](#))
 - Orbit propagation module to propagate position between GPS (Issue [#89](#))
 - Both tasks above linked to PR [#102](#)

Arvind Car

Amaar Quadri

- More bug fixes in vision inference code
- Refactor OD pipeline to allow easily replaying data
<https://github.com/cmu-argus-2/GNC-Payload/issues/33>
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(Contributors not signed up for the course)

Pedro Cachim

Frederik Markus

- Working on the combined state EKF
- Some bug fixes

Derek Fan