Communications Subteam
Weekly Updates, Spring 2025

Week 1

Team Progress:

- Defined current progress and milestones for the first few weeks of Spring 2025
- Filed subsystem issues on GitHub for FSW, GS hardware, and GS SW / infrastructure
    - https://github.com/cmu-argus-2/FSW-mainboard/issues
    - https://github.com/cmu-argus-2/Comms-GS-Hardware/issues
    - https://github.com/cmu-argus-2/GSW-backend/issues
    - https://github.com/cmu-argus-2/Comms-GS-Database-Interface/issues

Individual Progress:

- Akshat Sahay:
    - Merged FSW updates for the v2 mainboards to main branch
        - https://github.com/cmu-argus-2/FSW-mainboard/pull/61
        - Contained HAL changes, driver changes and improved modularity within the comms task
        - Issues in other subsystems blocked merge and required some bug fixes, issue has been created to address these bugs
    - Started comms + CDH integration
        - Planned GS commands for CDH added in comms message database
        - Met with CDH FSW people (Ibrahima and Alexis) to discuss interfacing
- Adrian Walker:
    - Got GPS code onto FSW repo
        - Need to still create PR and merge
        - Mounted the GPS module to a current main board
        - Still need to test
    - Started trying to understand the licensing needed for the cubesat launch
    - Started reviewing board designs
        - Reviewed Battery Board V3

Week 2

Team Progress:

- More progress on FSW integration for the GPS subsystem
- Integrated FSW and GSW for processing new CDH commands (more details in FSW report)

Individual Progress:

- Adrian Walker:
    - FSW - GPS Integration
        - Initial HIL test completed

                - Need to get data as ints rather than strings for logging and latency
        - Avionics - Battery Board reviewed
        - Avionics - XY Board reviewed
- Akshat Sahay:
    - Integrated CDH with comms through the CommandQueue and ResponseQueue made by Alexis, with redesigned (better) comms state management
        - https://github.com/cmu-argus-2/FSW-mainboard/pull/109
        - https://github.com/cmu-argus-2/GSW-backend/tree/cdh_integration
        - GS code is pretty far from a PR right now, currently very hacked together
    - Added significant error handling into the comms application to discard faulty packets
    - Fixed telemetry frame on the SC and updated unpacking on the GS
    - Helped Ankita a little with MAX17205 hardware bring-up and FSW integration

Week 3

Team Progress:

- Even more progress on FSW integration for the GPS subsystem

Individual Progress:

- Adrian Walker:
    - FSW - GPS Integration
        - Made GPS driver changes
        - HIL testing?
            - Testing failed due to data formats
                - Resolved
            - Testing failed due to memory limitations
                - Ongoing
    - Reviewed XY Board
    - Reviewed Z+ Board
- Swati Anshu:
    - Onboarded
        - Read through GSW-backend repository
        - Read through FSW-mainboard state machine protocol
    - Created preliminary state machine for GS
    - Coding in progress for the GS state machine
    - Brainstormed ways to increase data transmission rate with Akshat
- Akshat Sahay:
    - Organization
        - Centralized all GS issues (hardware and software) into the GS software repo: https://github.com/cmu-argus-2/GSW-backend/issues
        - Onboarded Swati, full system and comms overview, initial TODOs assigned
    - Started integrating file transfers into the new comms FSW state machine

    - Brainstormed ways to increase data transmission rate with Swati
        - Current protocol has robust error detection but poor data rate
        - If packets are dropped in the middle of a pass, the SC defaults to heartbeat mode and the full cycle of a ground pass needs to repeat
        - Still no good solution for increasing data rate reliably with missed packets

Week 4

Team Progress:

- GS software in a significantly better state:
    - Centralized state machine for all operation modes
    - Integration with database / CMD interface to execute most commands
    - Minor bug fixes
- GPS FSW integrated into FSW build for v2 mainboards
- Started looking into FCC licensing:
    - Need to figure out how Form 312 is filed under
    - Need to start writing other documentation required for the submission

Individual Progress:

- Akshat Sahay:
    - Finished integrating new file transfer system (comms FSW SM and new packet structure), can now downlink files again
    - Helped in GPS integration into the FSW
    - Helped a little in mainboard debugging for ADCS FSW development
- Adrian Walker
    - GPS integration into FSW:
        - Solved data format issues with the data logger
        - Solved memory use issues with the driver
        - HIL Testing conducted and successful
        - Final PR to be created
    - GPS Spoofing:
        - Got HackRF One
        - Installed GNU Radio
        - Begun familiarizing myself with the tools so that I can implement the GPS spoofing for testing
        - Ordered external stable clock
    - HAM License:
        - Begun reviewing for the test
    - Z- Board review:
        - TODO
- Swati Anshu
    - Finished planning out and implementing the GS State Machine
    - Tested file downlink
    - Finished integration with db and ci. Tested functionality

    - Working on crc error bug
    - Begun review for HAM license test
    - Looking into FCC licensing

Week 5

Team Progress:

- Significant progress in GS software and database integration
    - Mostly feature complete
    - Working on deployment
- FCC licensing progress
    - Identified Part 5 license
    - Ascertained switch to 433 MHz
- GPS fully integrated and merged into main