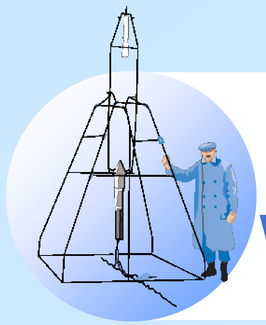


# autoNGC: Expand the Possibilities with Onboard Autonomy

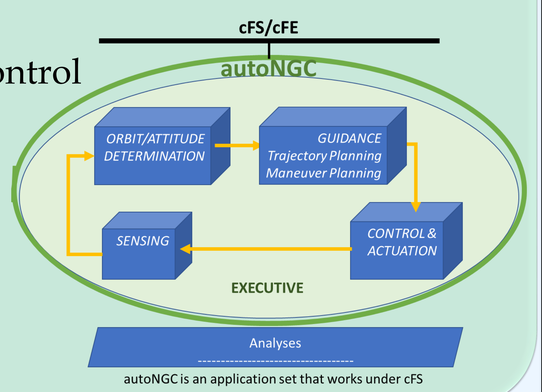
**PI: Sun Hur-Diaz, Code 595**

## autoNGC is an Enabling Technology – What is it?

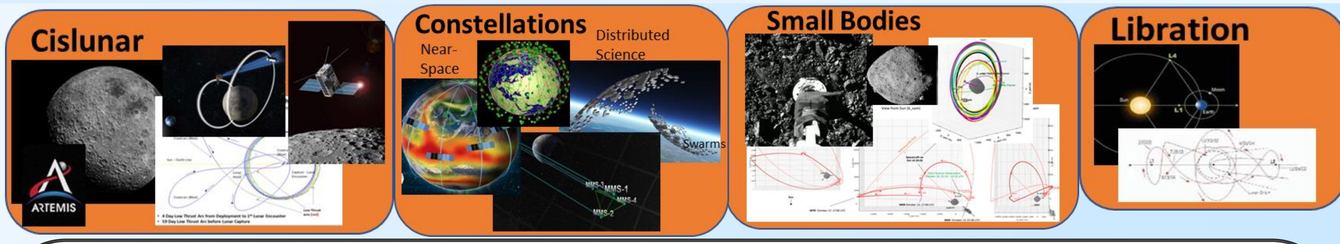
- An onboard Core Flight System (cFS) application suite and flight hardware solution that performs autonomous spacecraft navigation, guidance and control (NGC)
- Provides onboard navigation and enables autonomous onboard executive decision and control for spacecraft maneuvers
- Enables new mission capabilities: distributed system missions, in-space assembly, low latency mission operations, complex missions at far distances, lower reliance on ground assets, reduced operations cost

### Goals and Objectives

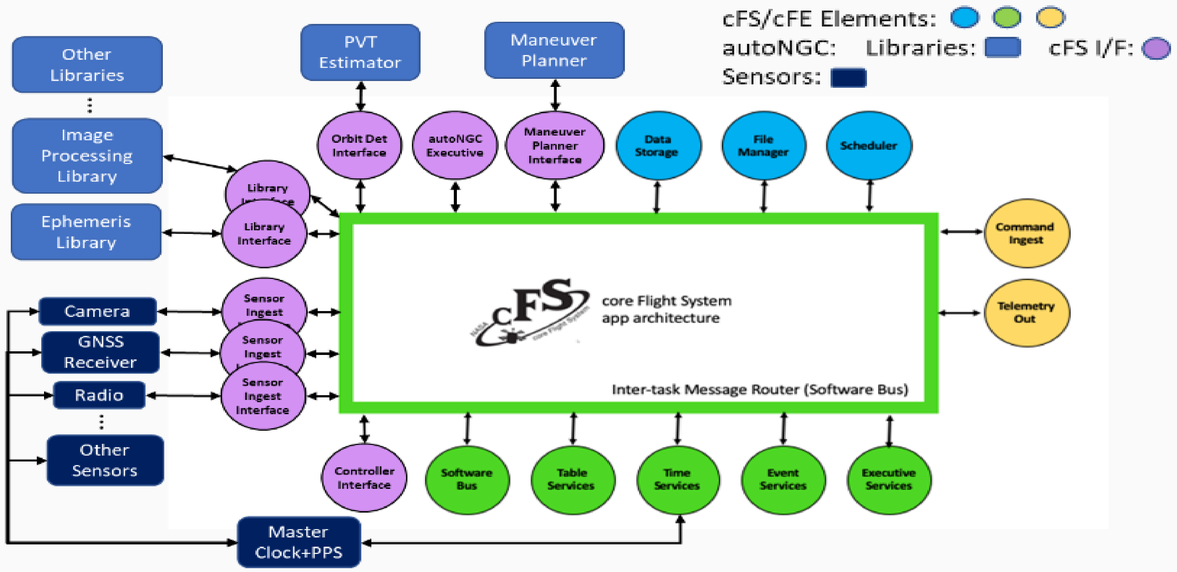
- Autonomous onboard navigation
- Autonomous onboard guidance & control
- Low SWAP-C
- Extensible
  - DSM Enabling
  - Multiple Orbital Regimes
  - Customizable – Plug-N-Play
  - Class B
- Fault Tolerant




autoNGC is an application set that works under cFS



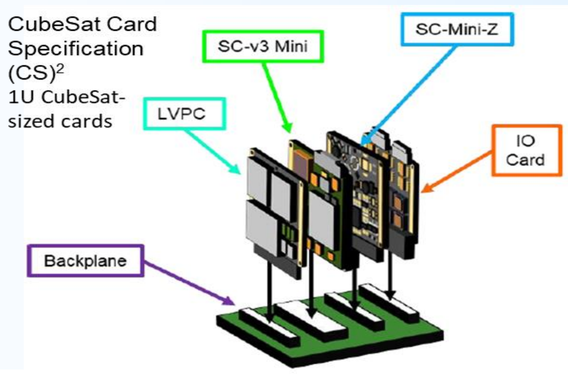

## autoNGC Flight Software on the Core Flight System (CFS) Plug-N-Play Architecture




## Multiple Options for Missions

Software architecture allows missions to:

- Implement individual or integrated software libraries/apps (e.g., GEONS, cGIANT) in their spacecraft flight software
- Insert a processor card loaded with the software on their avionics board
- Interface with the customizable autoNGC box built with GSFC's SpaceCube 3.0 Mini and SpaceCube Mini-Z compute boards




## 2024 Capabilities Plan

- Filter weak-signal GPS, camera images for optical navigation/terrain relative navigation, 1-way forward range/Doppler, accelerometer
- TRL 6 Flight Software (NPR 7150.2D Class B)
- TRL 6 ETU
- Testbed for software/processor/hardware-in-the-loop testing

**Additional capabilities continually being added**