Docket #: S25-014

Spacecraft Dynamics, Navigation and Control Library

Researchers from Stanford's Space Rendezvous Lab are developing a software codebase to facilitate high-fidelity spacecraft control simulations. As space technology continues to gain traction in both investment and academia, this library has the potential to reduce costs associated with developing and maintaining navigation and control systems for both ground-based and on-orbit missions.

The proposed software includes algorithms for spacecraft dynamics, navigation, and control. Written in C/C++, it features implementations for orbit propagation, Kalman filtering, navigation, impulsive control, and sensor and actuator modeling.

This codebase will be particularly valuable for emerging space applications and market sectors such as space logistics, manufacturing, defense, and remote sensing.

Stage of Development: Prototype

Applications

- **High-fidelity simulations** for verification and autonomy stacks for spacecraft controls
- **Support ground-based mission operations**
- **Support on-orbit mission operations**

Advantages

- Can include state-of-the-art models

Publications

- Bell, T., D'Amico, S.; Event-Driven Simulation for Rapid Iterative Development of Distributed Space Flight Software; *IEEE Aerospace Conference* 2025.

Innovators

- Institutional Work

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