

Spacecraft Flight Deck Simulator: Neutral Buoyancy Docking Simulation

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Introduction

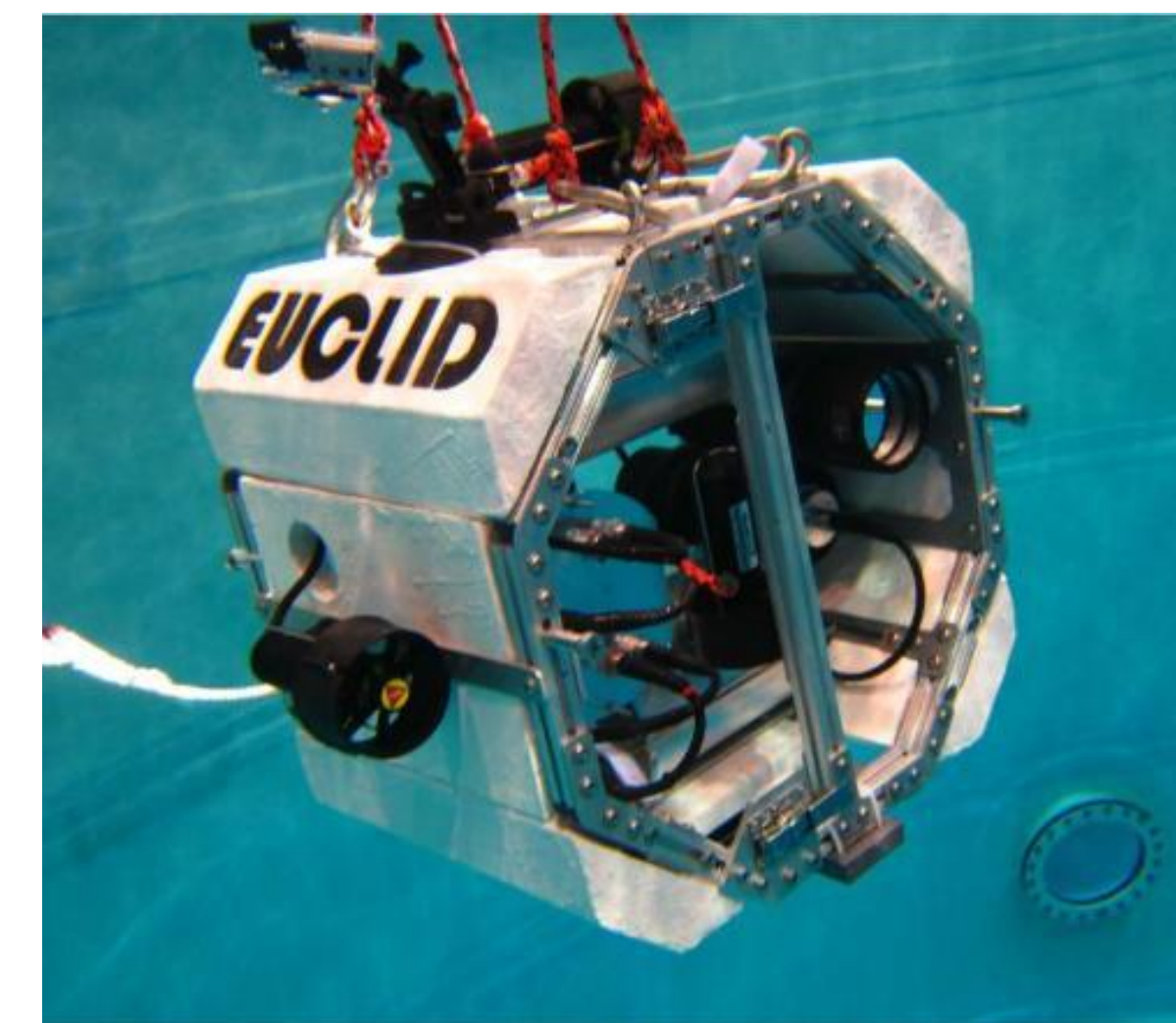
In 1998, the Space Systems Laboratory received a mock-up Shuttle aft flight deck to support the Ranger Shuttle flight experiment. The dimensions and layout of the mock-up were identical to the real flight deck, but was only adequate for simulation of local telerobotic operation. Since the conclusion of the Shuttle program, the flight deck has been repurposed to accommodate the objectives and missions of today's space program. The flight deck now contains updated controllers, displays, and peripherals that mimics modern spacecrafts. SFS has also been networked with SSL's multiple robotic manipulators and free flyers for local simulation and testing in neutral buoyancy.



EUCLID

EUCLID stands for: Exo-SPHERES Underwater Closed Loop Inspection and Docking. Some features of EUCLID are:

- Free-flying robot
- Inspired by SPHERES/Exo-SPHERES
- 6 DOF
- Onboard Camera
- Capability for tandem operation with manipulators



ROS Integration

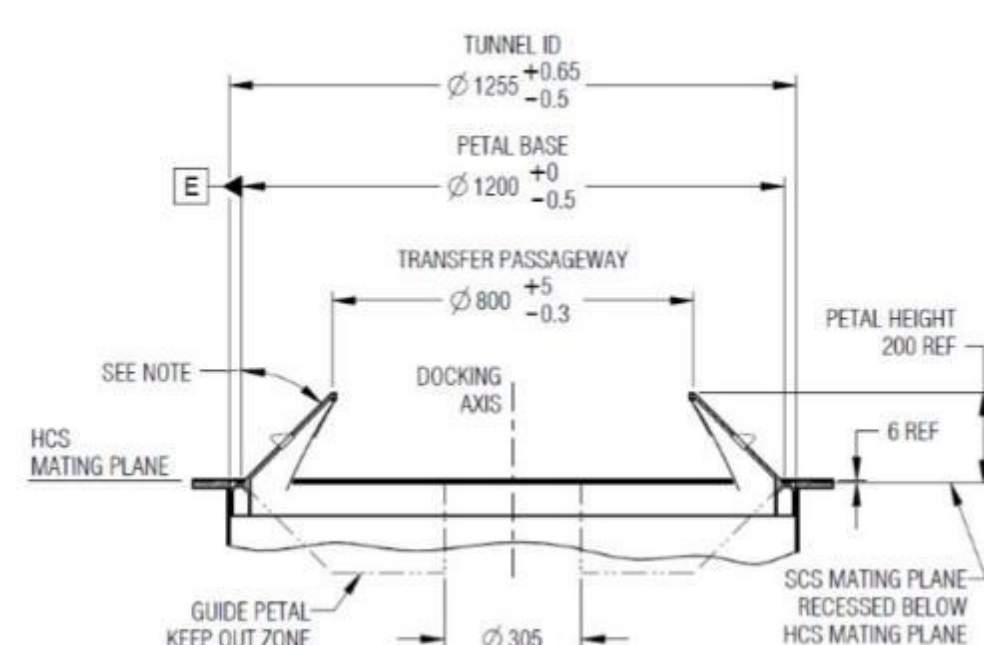
Using ROS, a complete overhaul of EUCLID's software was performed to allow for task specific modularity. Doing this allows crucial data such as attitude readings, safety status, thruster commands, etc. to be shared across existing and new infrastructure. EUCLID is a free flying robot making teleoperation important. The basis of this was to:

- Understand how the hand-controllers interact with ROS
- Make the data from the hand-controllers available across ROS
- Convert the shared data into appropriate motor commands
- Facilitate and parse data to be sent upstream or downstream



Design of the Docking Adapter

The docking adapter that was designed, replicates a static model of the International Docking Adapter. Following IDSS IDD Revision E, the adapter was created to the standard, then scaled down to accommodate EUCLID.



Future Work

The ROS integration on EUCLID has been rapid and moves closer to completion each day. Once the remaining code has been developed and debugged, EUCLID will be ready for its first test run.



Acknowledgments

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