



PROJECT OVERVIEW

LFED is an experimental VTOL inspired by NASA's Lunar Landing Research Vehicle. A central two-axis gimbaled jet offsets about 5/6 of the vehicle's weight and is used to cancel atmospheric drag. Four EDFs on the outer platform provide the remaining lunar-equivalent thrust and attitude control.

The outer platform can tilt independently of the offset system, so a given attitude / thrust combination produces the low-gravity translational response a lander would see on the Moon rather than normal Earth-hover dynamics.

Scope: flight-dynamics / GNC testbed for automated and operator-in-the-loop lunar landing research.

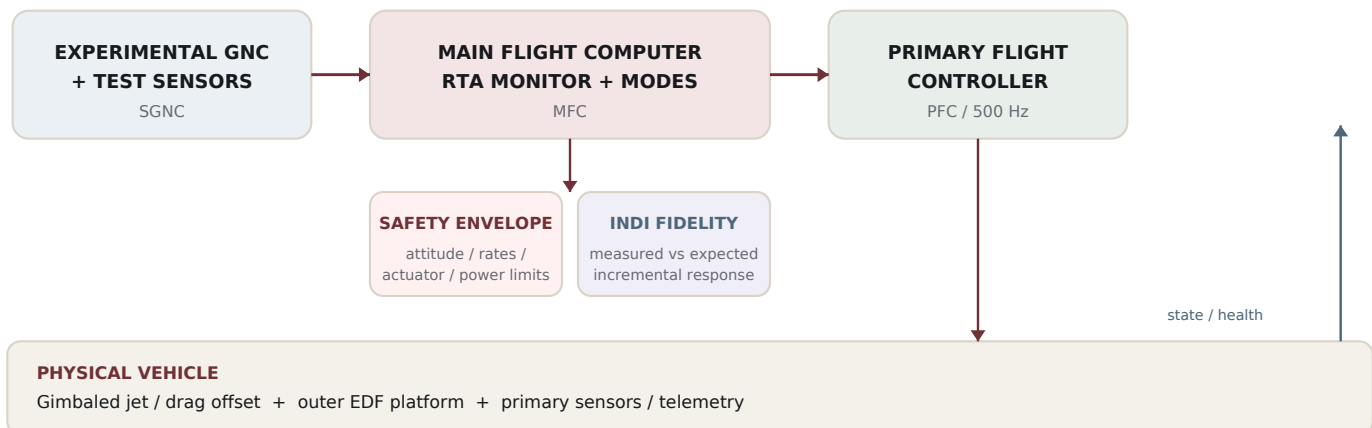
HOW THE LUNAR SIMULATION WORKS



- Offset system: gimbaled turbine carries ~5/6 of Earth weight and counters drag.
- Outer platform: four EDFs provide lander-like thrust / attitude control in the residual 1/6-g environment.
- The two systems are controlled separately, which is the key to reproducing lunar-style vehicle response.

FLIGHT SOFTWARE / TEST ARCHITECTURE

The experimental GNC computer — and its own sensors — can "sit in the driver's seat" without directly owning vehicle safety. It requests maneuvers; the Main Flight Computer supervises them; the Primary Flight Controller runs the fast inner loops. That keeps most of the safety burden out of the experimental layer and leaves more room for flexible, compute-heavy guidance and perception experiments.



Built, tested, and next

A few pieces of the build and test trail so far.



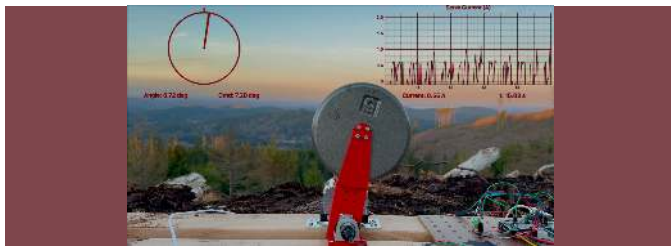
AERODYNAMIC EDF TEST RIG

Car-mounted rig for EDF thrust, AoA, airspeed, temperature and voltage characterization.



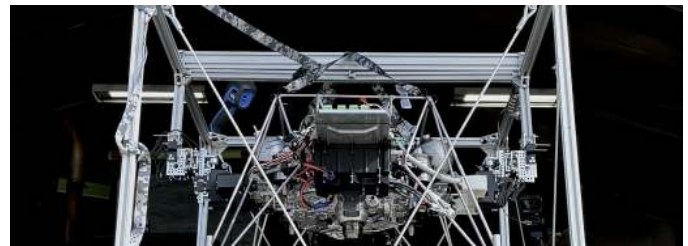
AERODYNAMIC EDF TEST RUN

Live telemetry from an aero run: load, airspeed, slip angle, temperature, current and voltage.



SERVO / GIMBAL STRESS TEST

Commanded vs measured servo angle with current draw logged under load.



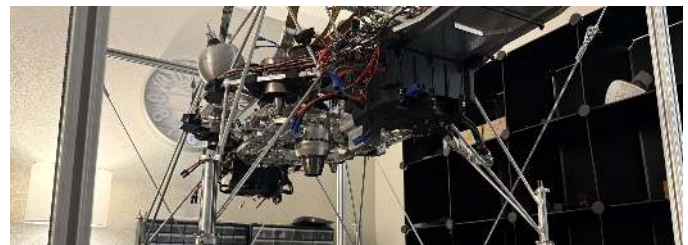
INTEGRATED STATIC TEST SETUP

Restrained stand for turbine runs and the upcoming closed-loop attitude control test.



TURBINE TEST THERMAL VIEW

Thermal view used to measure heating at vehicle-frame locations where sensitive hardware may be mounted.



INTEGRATION + GIMBAL CALIBRATION

Vehicle in the apartment "workshop" during electronics integration and gimbal sensor calibration.

WHAT I HAVE BUILT / TESTED

- Integrated ~40 lb airframe, landing gear, gimbal / offset hardware and outer EDF control platform.
- Aerodynamic EDF characterization rig and telemetry for unusual retro-propulsive operation.
- Jet turbine ground runs with restrained vehicle hardware and thermal observation.
- Distributed SGNC / MFC / PFC software, HIL setup, telemetry and calibration tooling.

NEXT UP

Tethered attitude control test

Close the loop on the full vehicle while it is still mechanically constrained.

- Sensor → controller → actuator loop closes on full vehicle hardware
- Signs, mixing and mode logic behave correctly
- Controller remains bounded under tethered disturbances