

TRANSPORTABLE UNMANNED LUNAR SPACECRAFT (T.U.L.S.)

Leonardo Arrigoni, David Avalos, Matthew Cahill, Nicholas Finale, Parker Gerlander, Srajat Rastogi, James Wnek

UF UNIVERSITY of FLORIDA

Concept of Operations

- **Phase 0:** Pre-Launch Operations
- **Phase 1:** Launch & Lunar Delivery via Starship or SLS
- **Phase 2:** 600 km Round Trip Mission
 - SPOT Robot Exploration
 - Emergency supply delivery

Propulsion

- 2x 870-lbf LOX/Methane Main Engines
- 12x 100-lbf LOX/Methane RCS Engines
- 2x 4ft Spherical Cryogenic Propellant Tanks
- 2x 19in. Spherical COPV Helium Tanks

Power & Electrical

- PEM Fuel Cell (27-33 VDC), 1-8kW
- Lithium Ion Battery (24-32.8 VDC), 2,368W
- CUI VFB600 DC-DC Converter (700W)
- TERMA PCU Power Bus (2400W)

Comms & Tracking

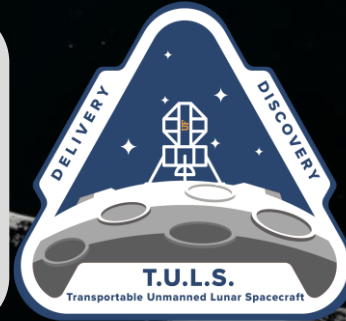
- 2x X-Band helix high gain iso-flux antenna
- LMS8001 4-port Companion Transducer

Mechanisms & Structures

- Flexible payload system with multiple deployment configurations
- Telescoping legs with pressurized metal bellows shock absorbers
- Lightweight Al6061 main structure
- Fixed engine mounts for maximum durability

Overall

- **Dry Mass:** 1171.7 kg
- **Wet Mass:** 1996.3 kg
- **Project Budget:** \$1.13B
- **Unit Cost:** \$213M



Guidance, Navigation, & Control

- GSFL-16KS Flash Lidar (6 km range)
- 3x RW-1.0 Reaction Wheels (1 Nm)
- 2x AR3000 Altimeters (3 km range)
- 2x Orion USB 3.0 Cameras (Redwire Space)
- 2x Lynx Flight Computers (Raug Space)
- Landmark 007 IMU
- T1 Star Tracker
- nanoSSOC-A60 Sun Sensor
- HSNS Horizon Sensor
- OCXD for GEO Atomic Clock

Environmental

- Active mechanically pumped ammonia-coolant system
- Aluminum 1060 radiator panels
- SOLIMIDE HT340 vibroacoustic absorption foam

