Professional Engineering projects

Lars Osborne

LarsOsborne.com

HYDROS: Water Electrolysis Propulsion
Tethers Unlimited

- Design, manufacturing and test responsibility for pressure vessels, structure, cabling, fluid systems, avionics chassis, and spark transformer.
- Designed and tested prototype rocket engine for life cycle testing.
- Performed analysis for random vibe, thermal, and static loads.
- Designed and performed test for vibration, hydrostatic, fatigue, thermal cycling, leak, and shock.

Qualification and three flight models. Delivered to customer July 2018.

Software Defined Radio Tethers Unlimited

- Cognizant mechanical engineer for revolutionary small-sat Ka-band software-defined radio.
- Ka-band radio internal waveguide launch required tight tolerance stack between chassis and PCB geometry.
- Created thermal model for high power (40 W thermal) X-band transmitter using FEA and Simulink.
- Improved performance of S-band radios by design of RF shields and absorbers
- Performed integration and test of production radios for spacecraft

Prototype shown

SCOUT Imaging Satellite Spaceflight

- Responsible for all mechanical part inspection and resolving manufacturing issues
- Found and repaired propulsion tank leak without modifying pressure vessel via custom fitting
- Designed tooling for solar panel manufacturing
- Supported vibration, shock, and vacuum testing at all levels of integration
- Performed assembly of flight hardware

SHERPA satellite rideshare vehicle Spaceflight

- Responsible for fastener/nut selection, analysis, and testing on critical bolted joints

- Discovered existing fastener galling problem that would have damaged flight hardware. Developed and tested solution with no impact to schedule.

- Managed payload integration cleanroom

- SHERPA will deploy almost 100 separate satellites when launched
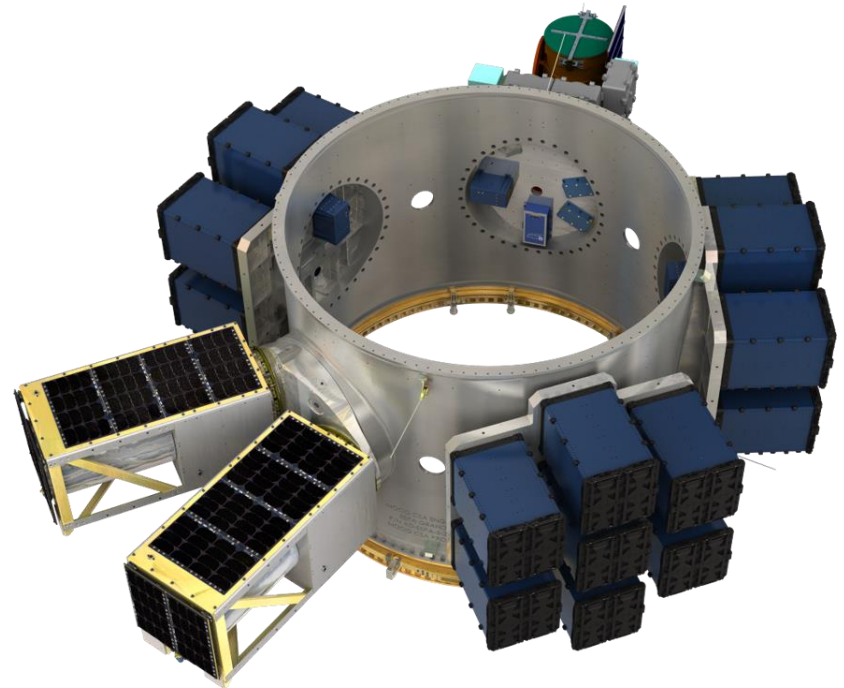
Robot Guide Wheels
Electroimpact

- Pair of wheels engages with rail to guide 28,000 lb mobile robot platform within inches of aircraft.
- Pneumatically pushes down with 3,500 lbf, (double 5" cylinder)
- Withstands side loads in excess of 3,500 lbs
- Integrated proximity sensors for detecting if the guide wheels are on rails
- Welded truss (white) made from AS 572 high strength steel and then machined
- Successfully integrated and tested on schedule

Vertical Axis Interlock Electroimpact
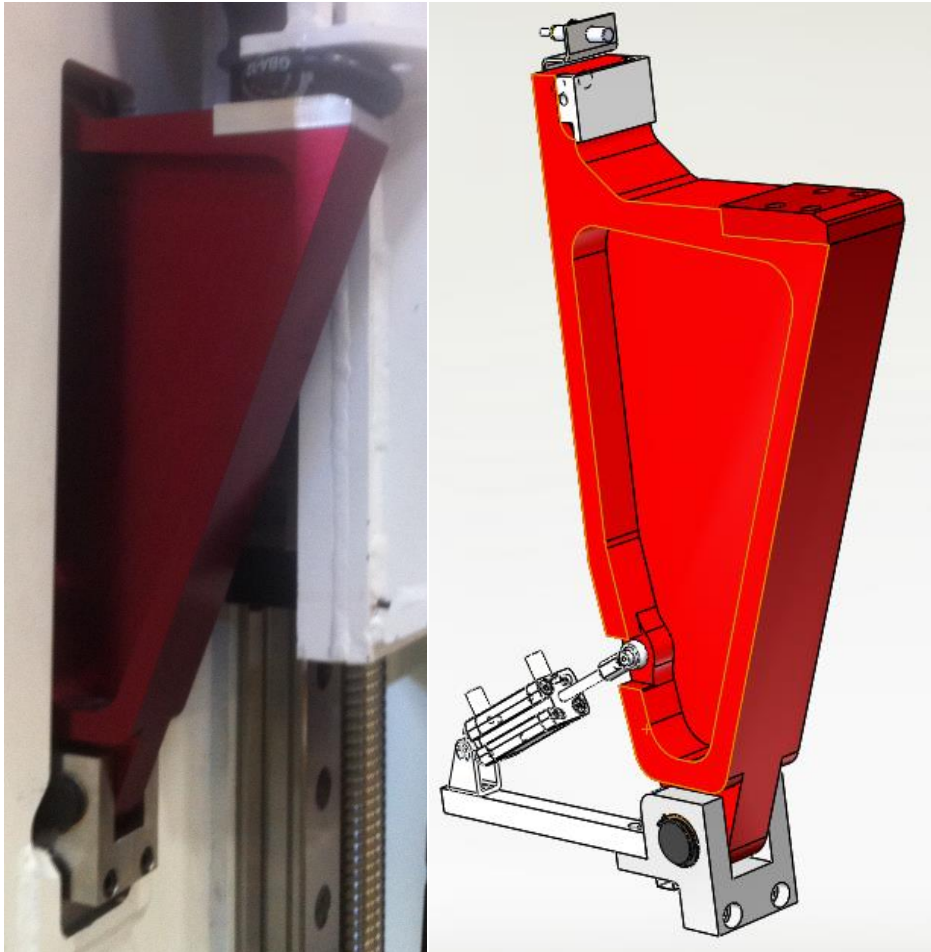
- Safety Critical system to protect personnel and aircraft
- Prevents programming error from destroying almost completed airplane
- Pneumatically retracts out of way of machine vertical axis
- Designed to withstand 26,000 lbf of compression
- Integrated and tested to 1.5 times design load
- Used 7075-T6 aluminum and 17-4 Stainless Steel
- Proximity sensors detect if extended or retracted

Rotary-Percussive Rock Drill
Honeybee Robotics

- Summer 2012
- Drills and collects powder from variety of rocks
- 2 motors
- 2 cm penetration depth
- Max speed 2000 rpm
- Percussion at 600 Hz
- Integrated and tested in prototype Mars Rover
- Began in June, delivered in August
- 3D printed Chassis

Lunabotics Robot – Montana State

- Designed and constructed from Sept 2011 to May 2012
- Team of 8 people
- Performed analysis for digging and locomotion, selected motors and gearboxes.
- Used multi-disciplinary education to facilitate communication and integration between different disciplines (ME, EE, CS)
- When we had trouble collecting dirt, came up with software fix to improve performance.
- Collected 16 kg of regolith in first round.
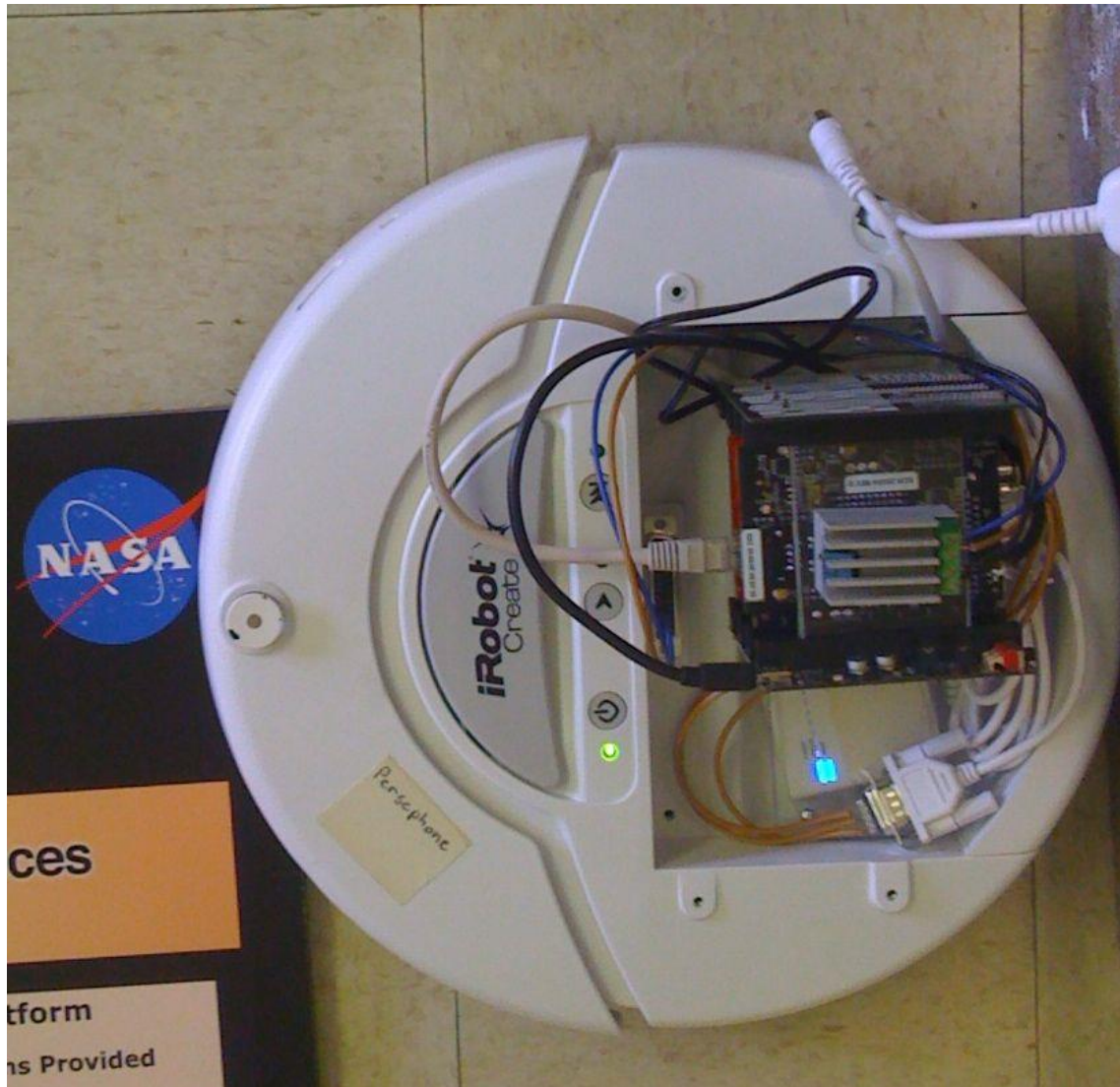
Lunar Micro Rover
Ames Robotics Academy

- 10 week program (Summer 2011)
- Large Student team
- Developed test plans for mobility system
- Developed system-wide requirements document
- Created rover deployment concepts for use with commercial lunar landers
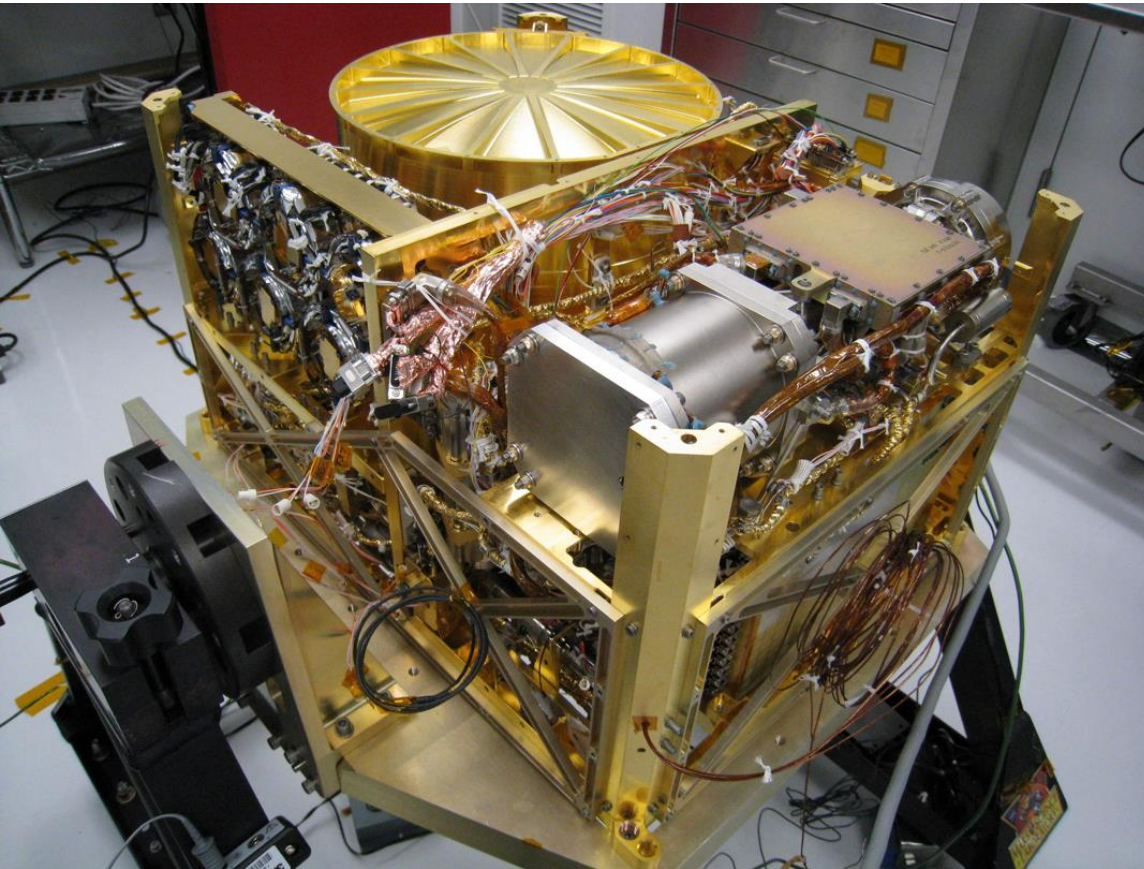
Swarming Robotic System
MSFC Robotics Academy

- 5 work-week program (summer 2010)
- Part of small student team
- Integrated electronics into mobility platform
- Developed position tracking methods for robot
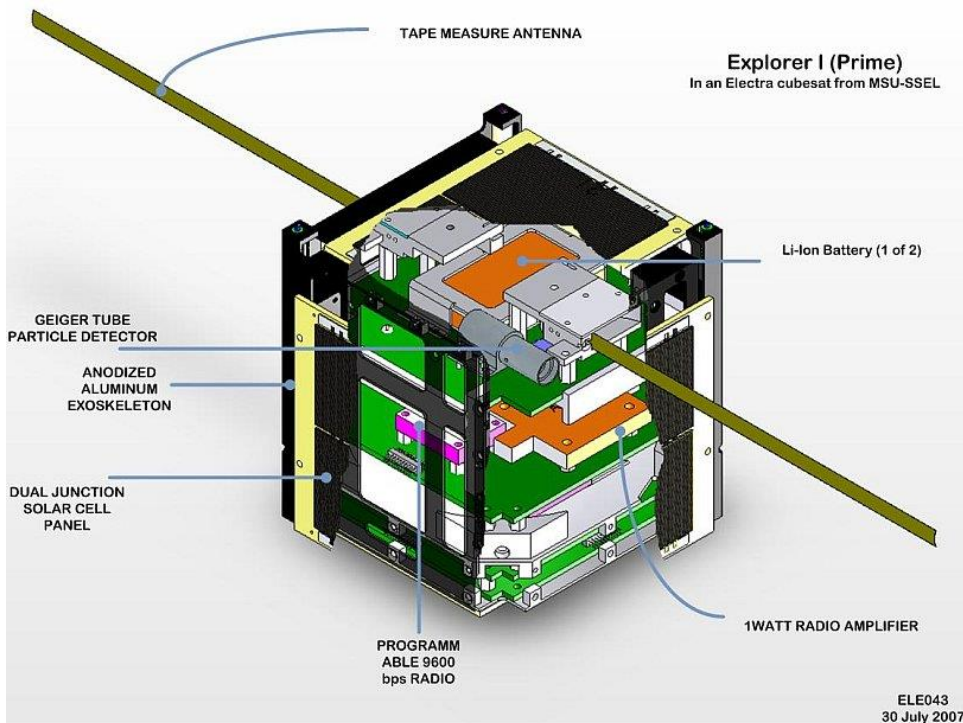- Gained inside understanding of NASA research and development

MSL Software testing
Jet Propulsion Laboratory

- 10 week program (Summer 2009)
- Developed software testing plans for the two analytical instruments onboard the Mars Science Laboratory
- Executed software tests on simulations and test bed hardware models of instruments

Explorer 1 Prime Cubesat
Montana State University

Explorer I (Prime)
In an Electra cubesat from MSU-SSEL

TAPE MEASURE ANTENNA

Li-Ion Battery (1 of 2)

GEIGER TUBE PARTICLE DETECTOR

ANODIZED ALUMINUM EXOSKELETON

DUAL JUNCTION SOLAR CELL PANEL

1WATT RADIO AMPLIFIER

PROGRAMMABLE 9600 bps RADIO

ELE043
30 July 2007

- 2007-2009
- As payload engineer, worked with EE's to increase data quality from geiger tubes that were historical artifacts (Owned by Dr. Van Allen)
- Performed FEA on key components of spacecraft structure.
- Responsible engineer for implementing Attitude control system design
- Discovered critical flaw in magnet alignment
- Launch 1 had Launcher Malfunction
- Flight Unit 2 Launched 10-30-2011, Lived for more than one year