



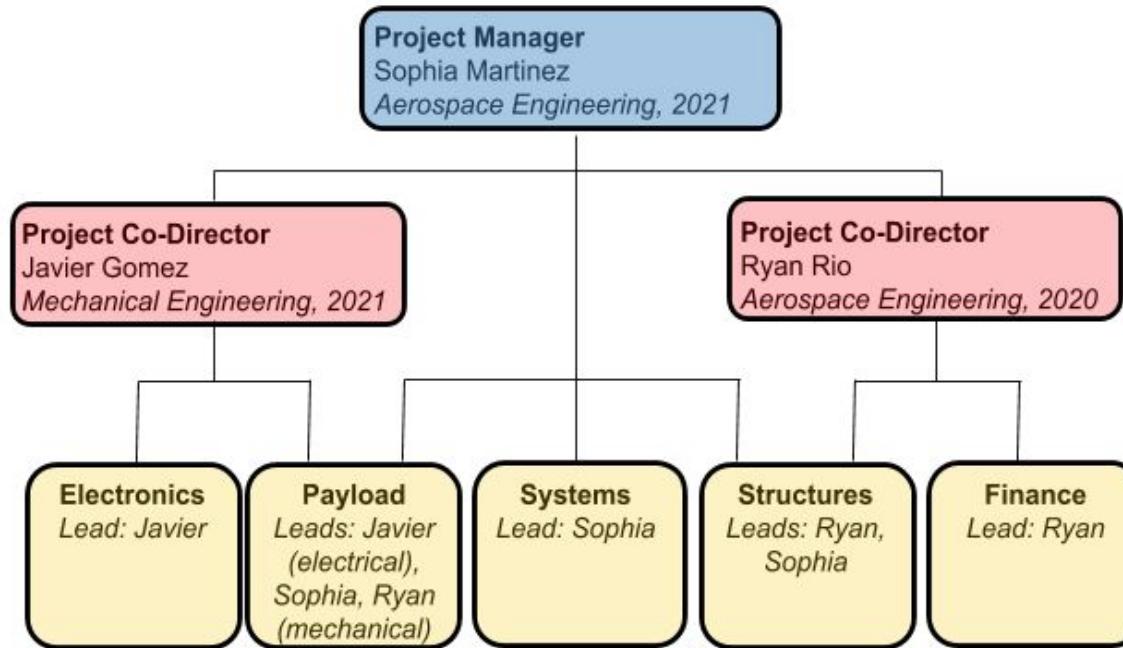
(LEXS)

Lunar Environment eXcavation Simulation



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Leadership

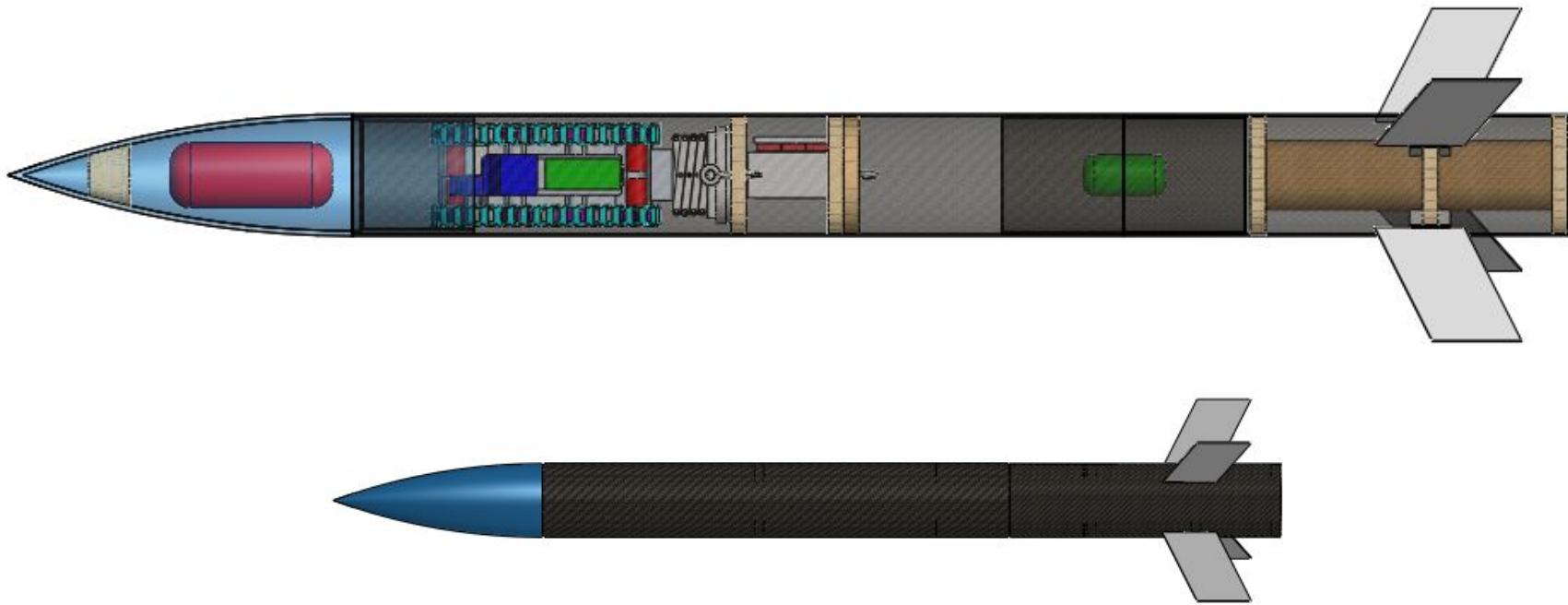


Launch Vehicle



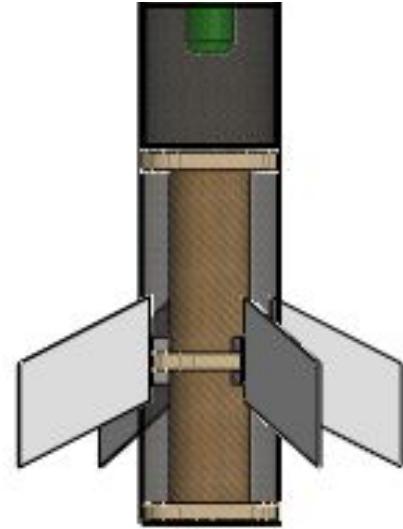
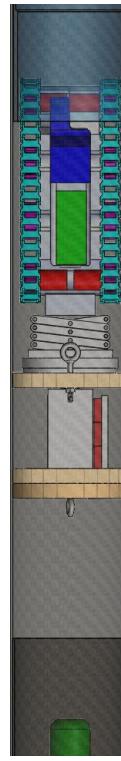
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Launch Vehicle Overview



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Components

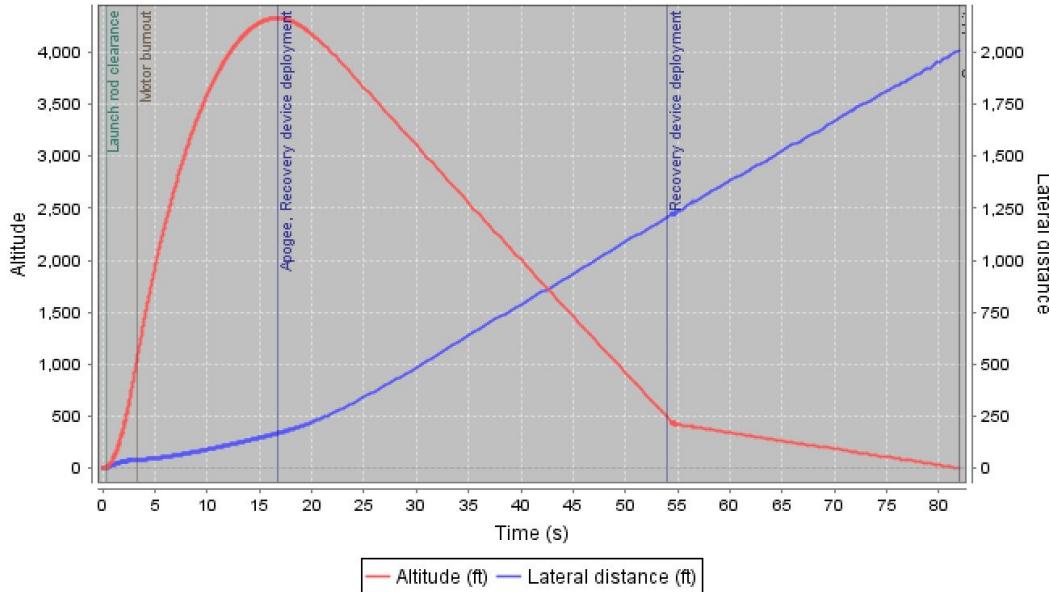


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Flight Simulations

8 ft, 10*, 20 mph

Custom



- Apogee: 4359
- Stability: 2.44 cal
- Thrust to Weight Ratio: 6.822
- Drift from Apogee: 1899.11 ft

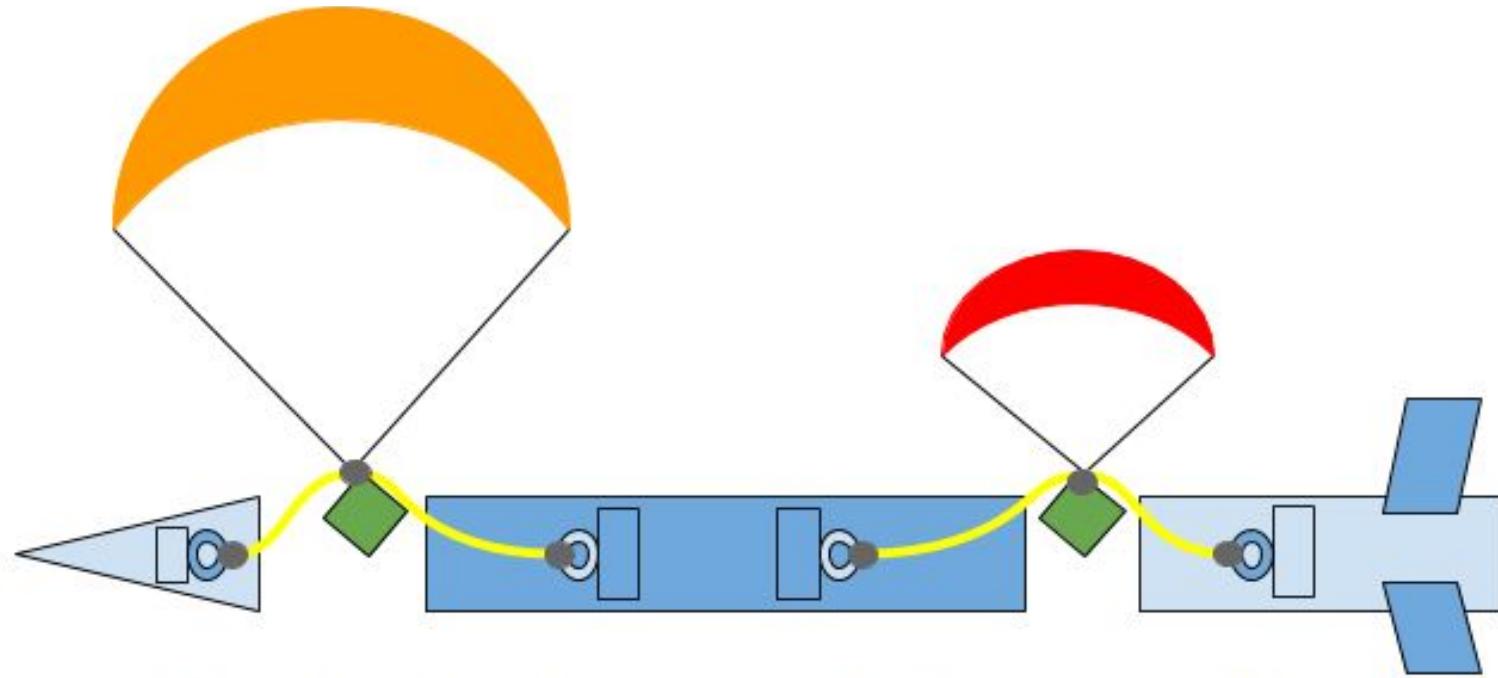


Recovery Subsystem



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Recovery Subsystem Overview



00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F

00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F



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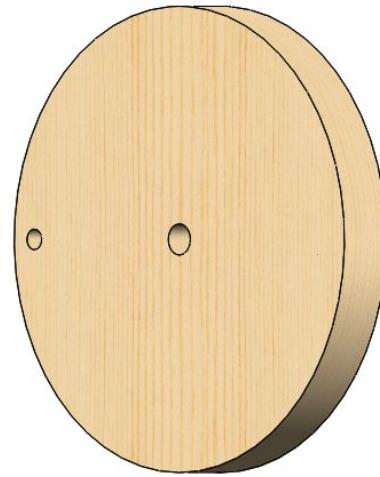
Recovery Hardware



Capacity: 1400 lbs



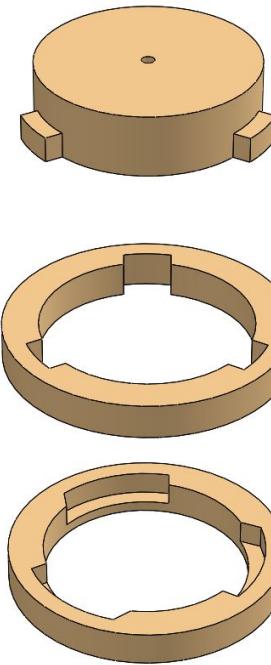
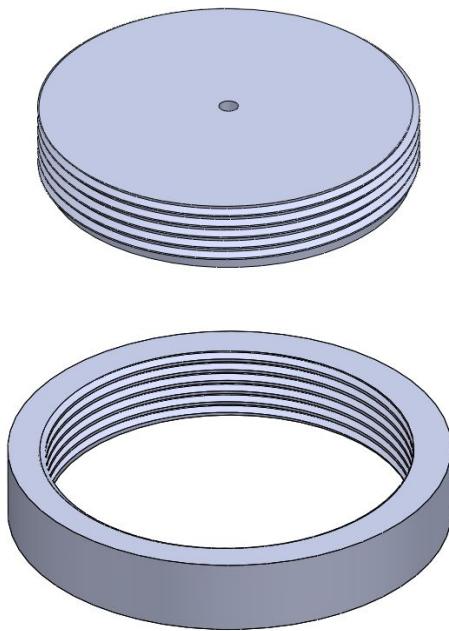
Vertical Capacity: 2100 lbs



Resin Type:	Viscosity (cpl)	Density (g/cm3) (20 °C)	Gelling time (min.)	Elongation at break (%)	Hardness (Barkol)
Epoxy	156	1.2	110-130	1.0	66

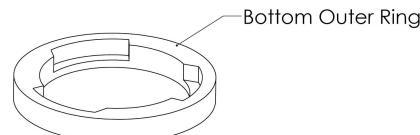
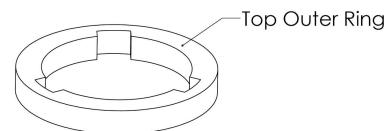
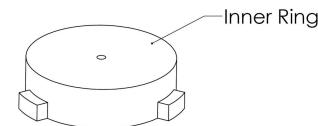
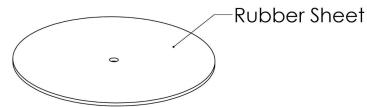
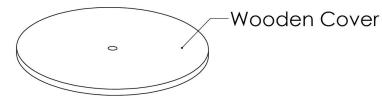


Locking Mechanism



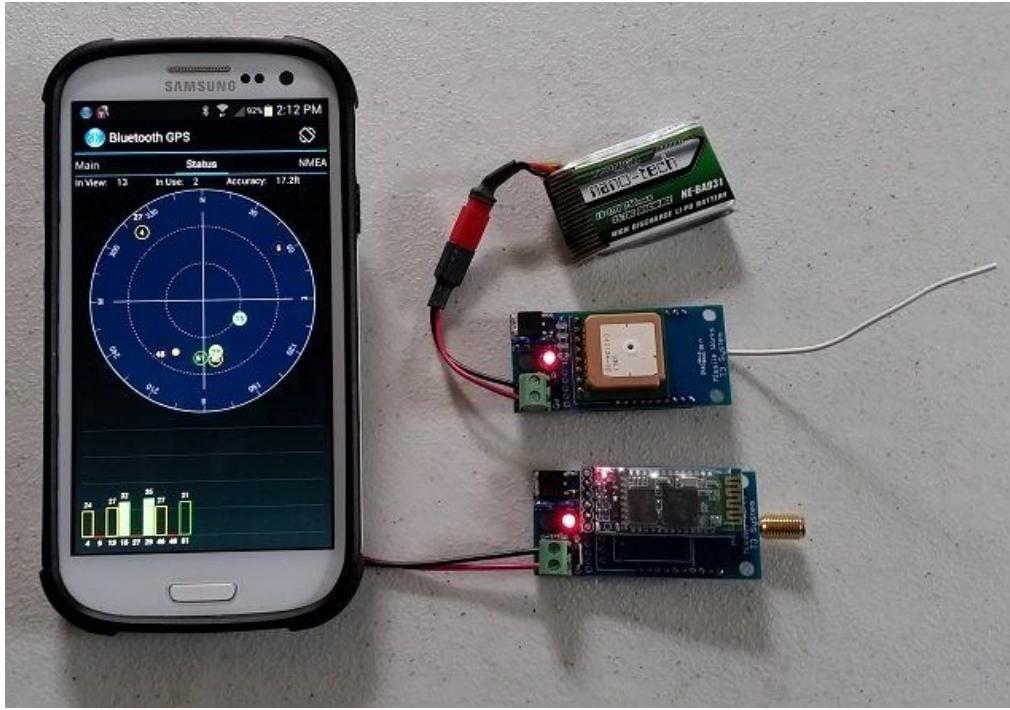
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Locking Mechanism Cont.



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GPS Tracker

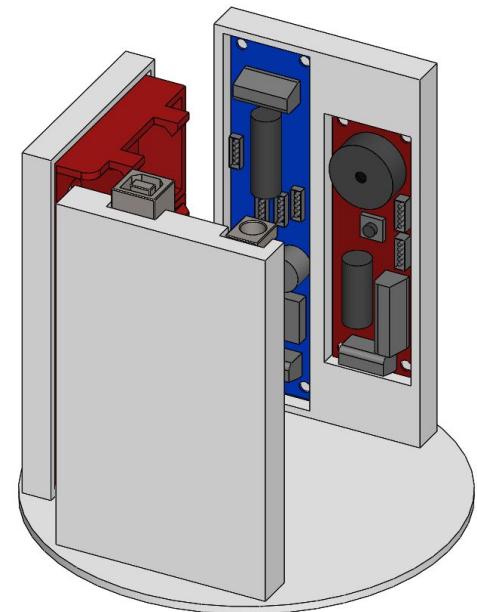
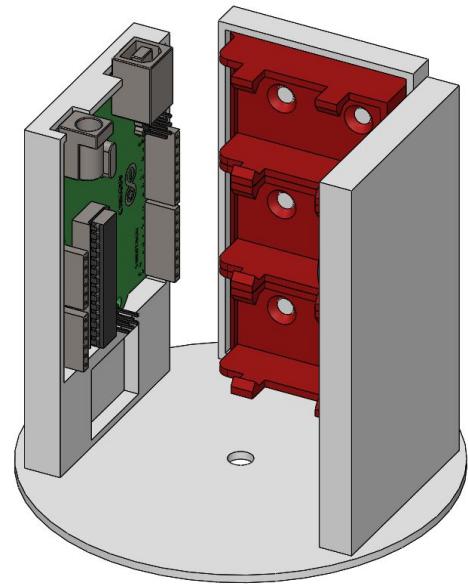
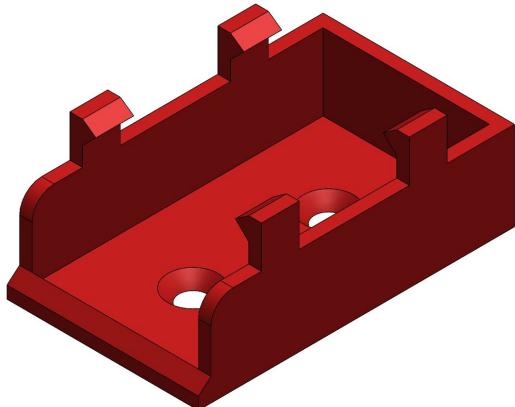


Missile Works
Tiny Telematics
Tracker



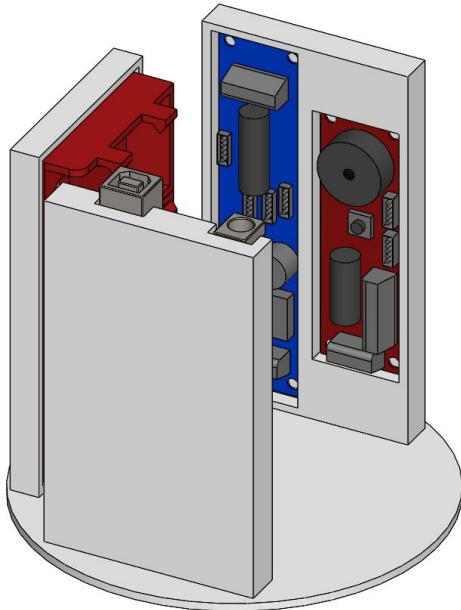
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Avionics Sled



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Redundancy



3 altimeter choices

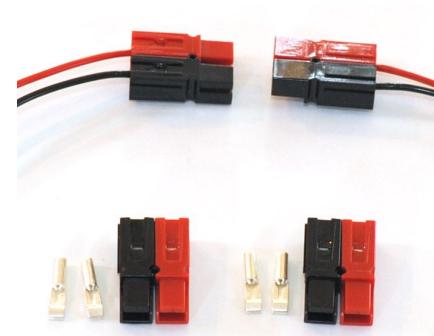
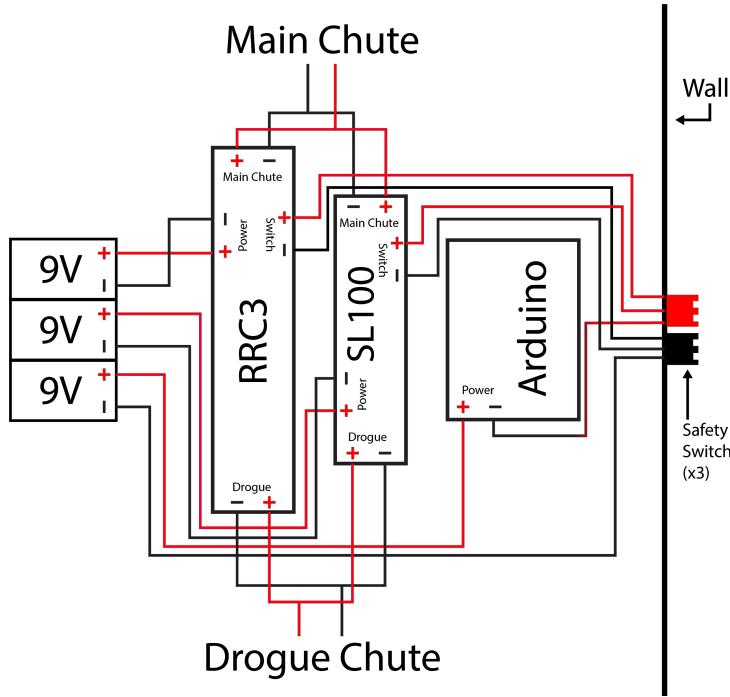
- Entacore AIM Altimeter
- Stratologger SL100 Altimeter
- RRC3 Sports Altimeter

Four 0.163" diameter vent holes



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Switches



Anderson Powerpole
Connector Switches



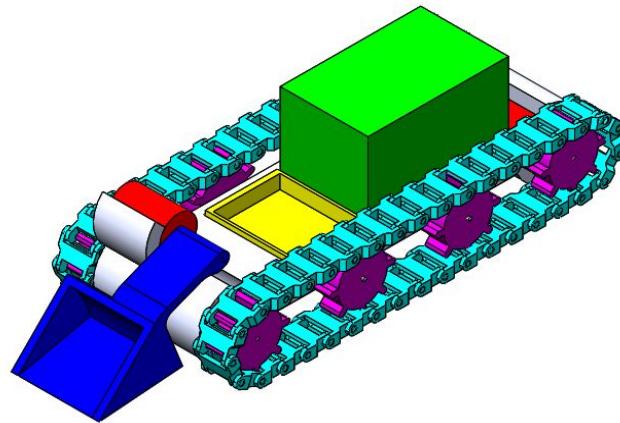
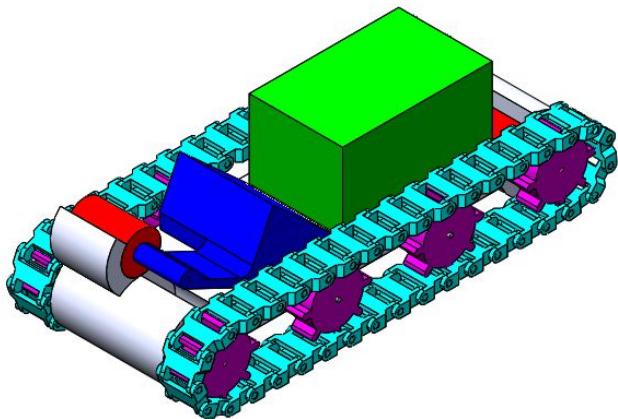
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Scientific Payload



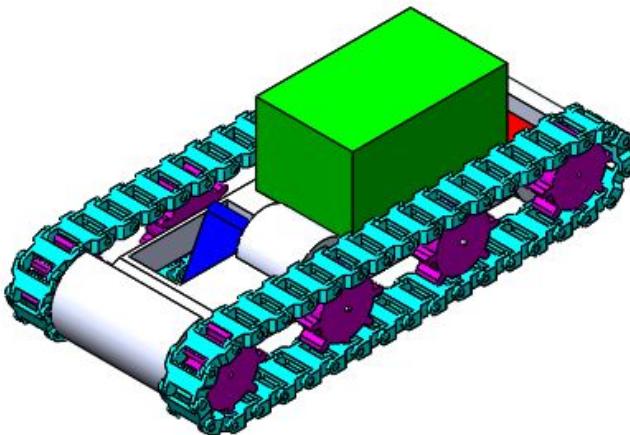
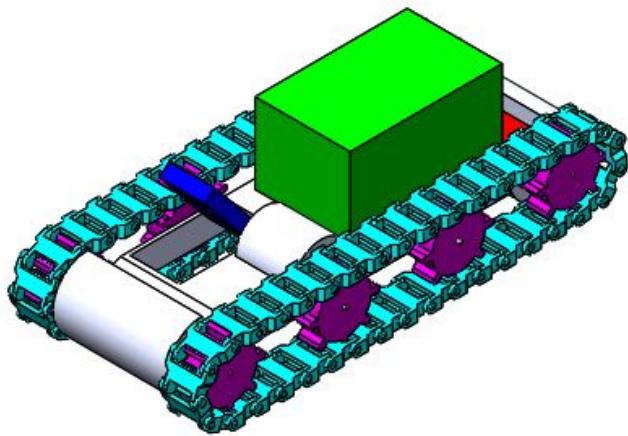
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Leading Collection Arm



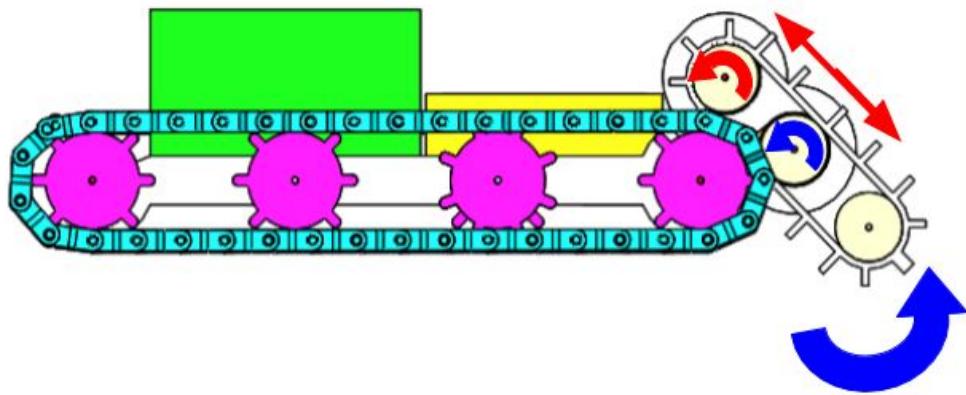
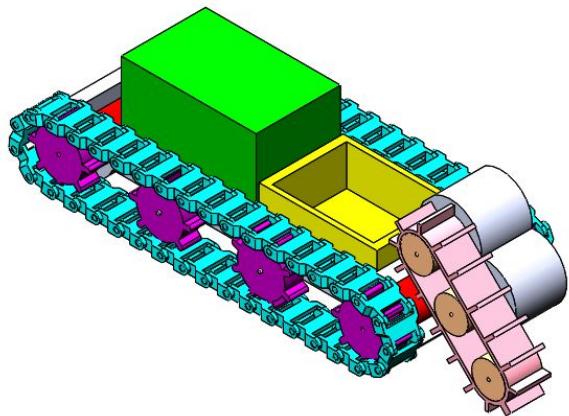
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Under Belly Collection Arm



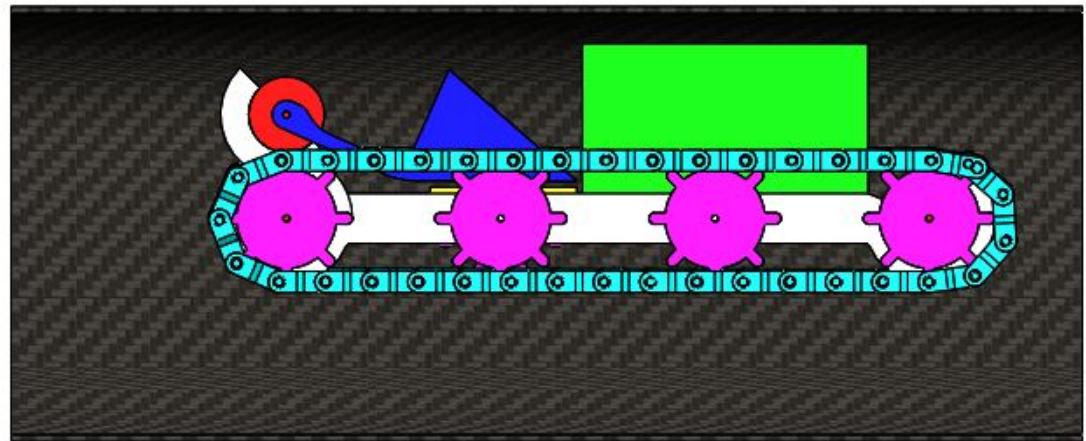
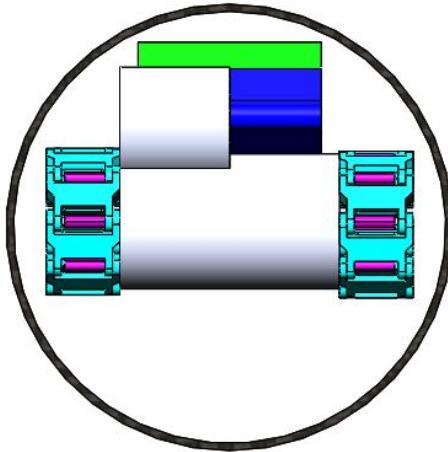
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Conveyor Transport Mechanism



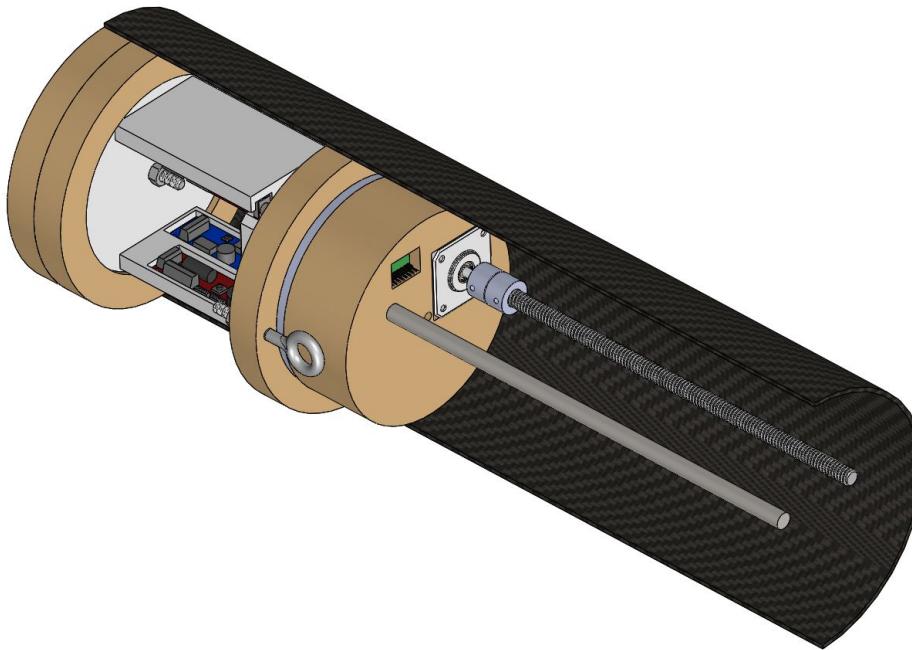
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Leading Design Choices



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Rover Ejection Assembly (REA) Summary



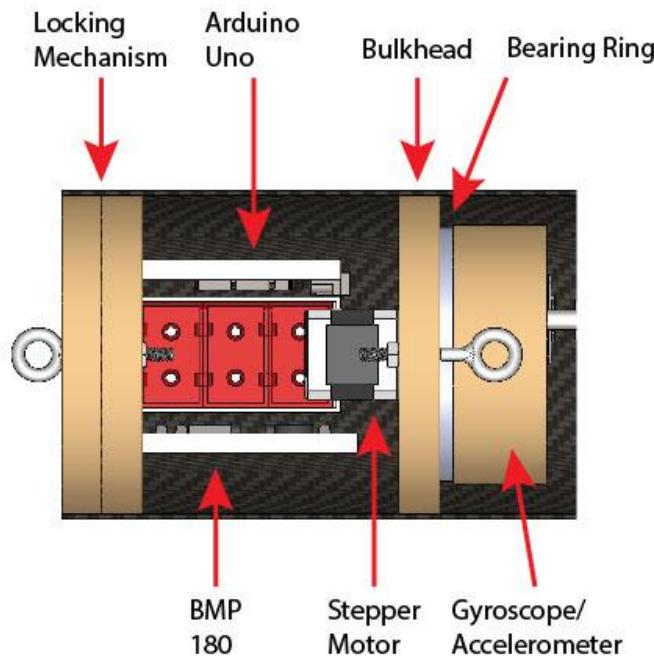
REA Objectives

- Retention
- Orientation
- Deployment



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Orientation

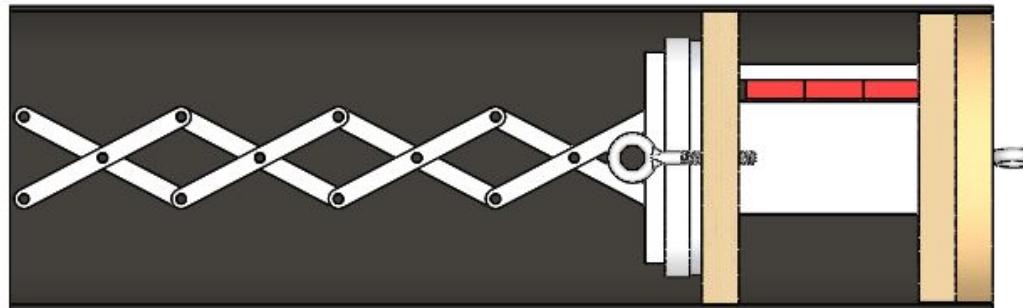
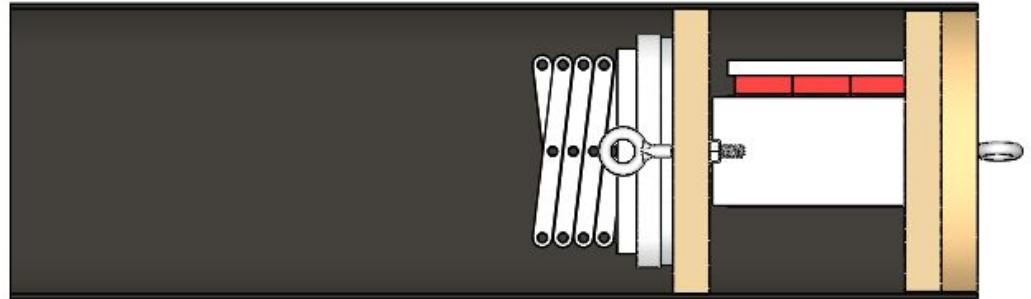
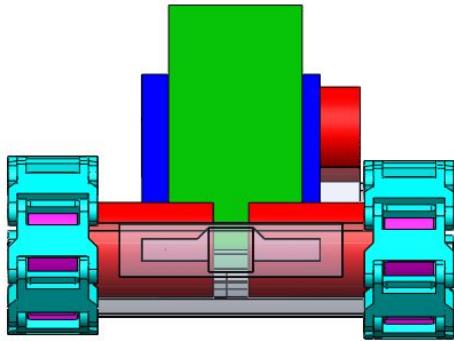


REA Major Events

- Calibration
- Apogee
- Landing
- Orient
- Deploy

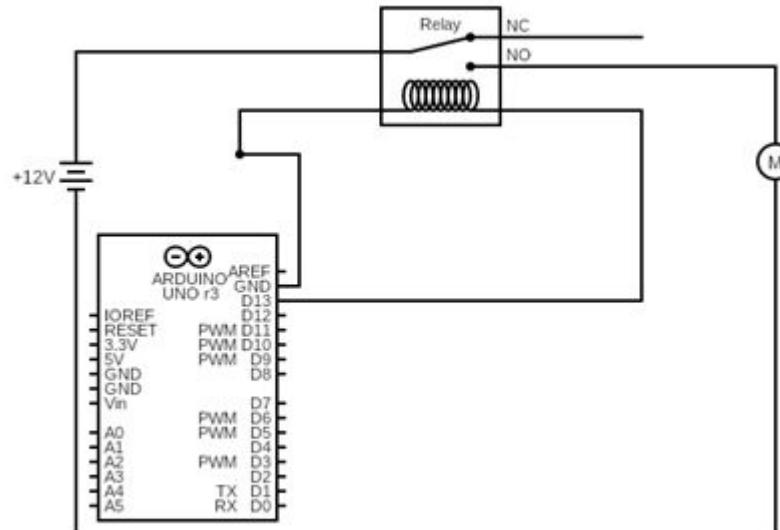


Scissor Jack



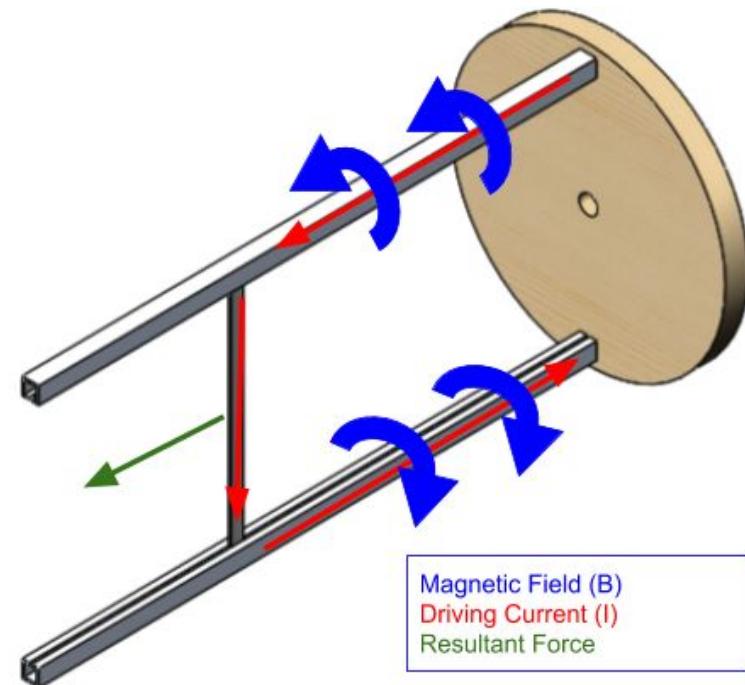
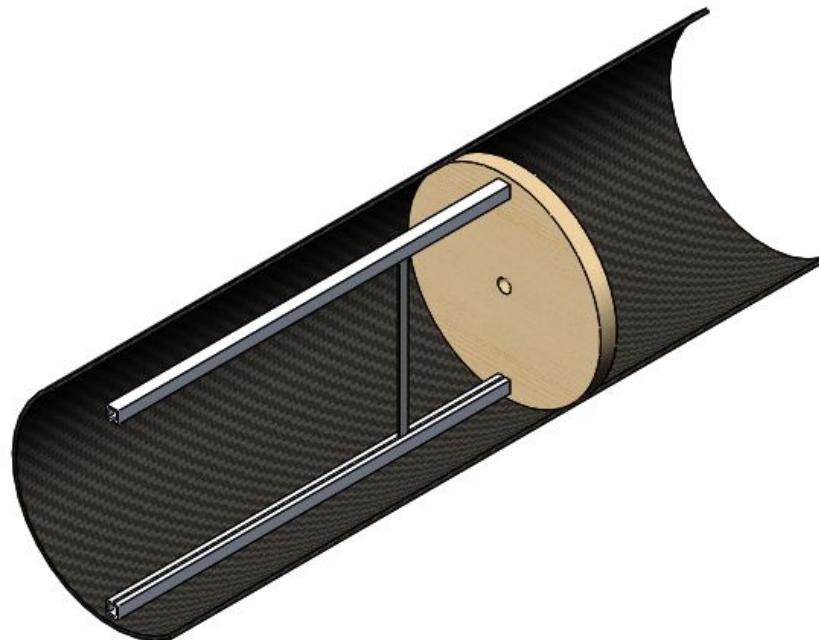
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Electromagnetic



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Rail Gun

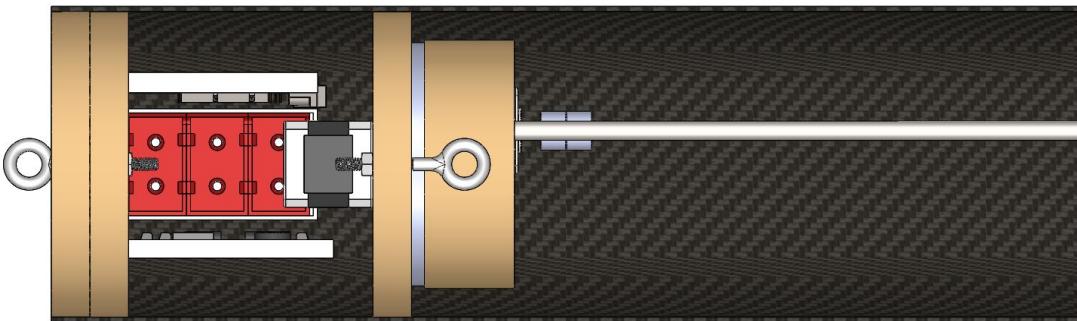
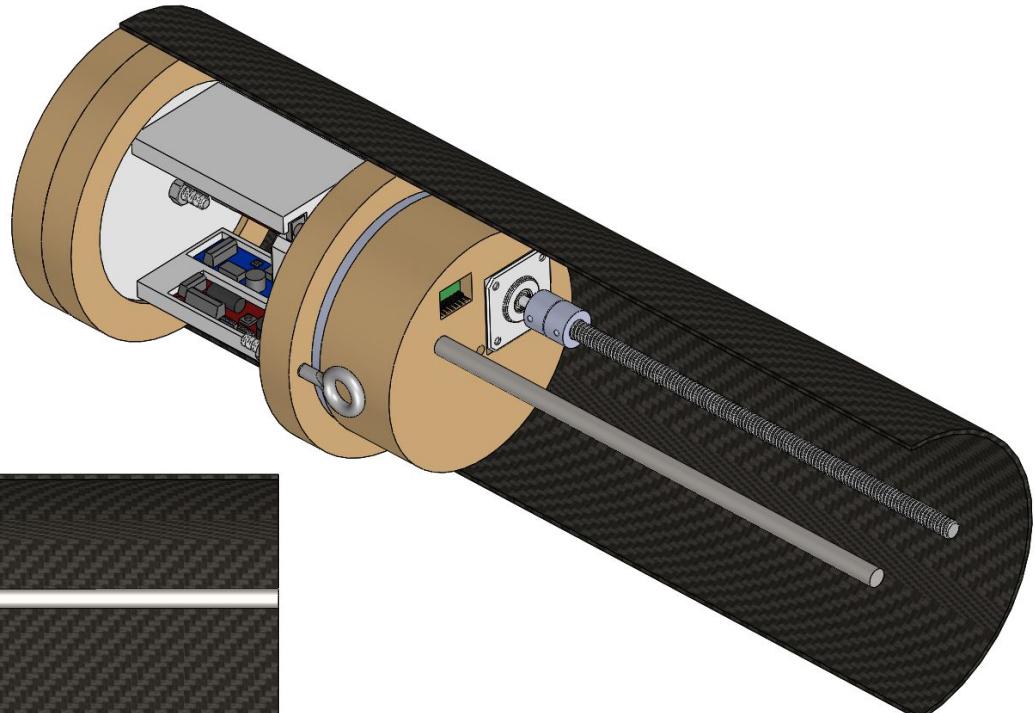


Magnetic Field (B)
Driving Current (I)
Resultant Force



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Rotating Lead Screw



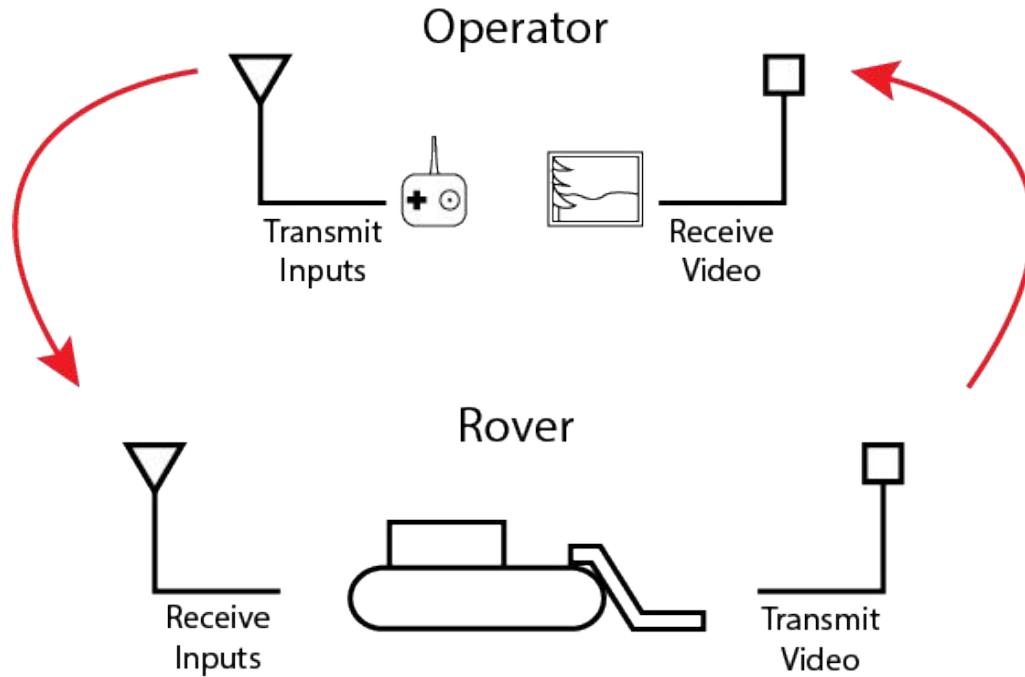
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Electronics Overview

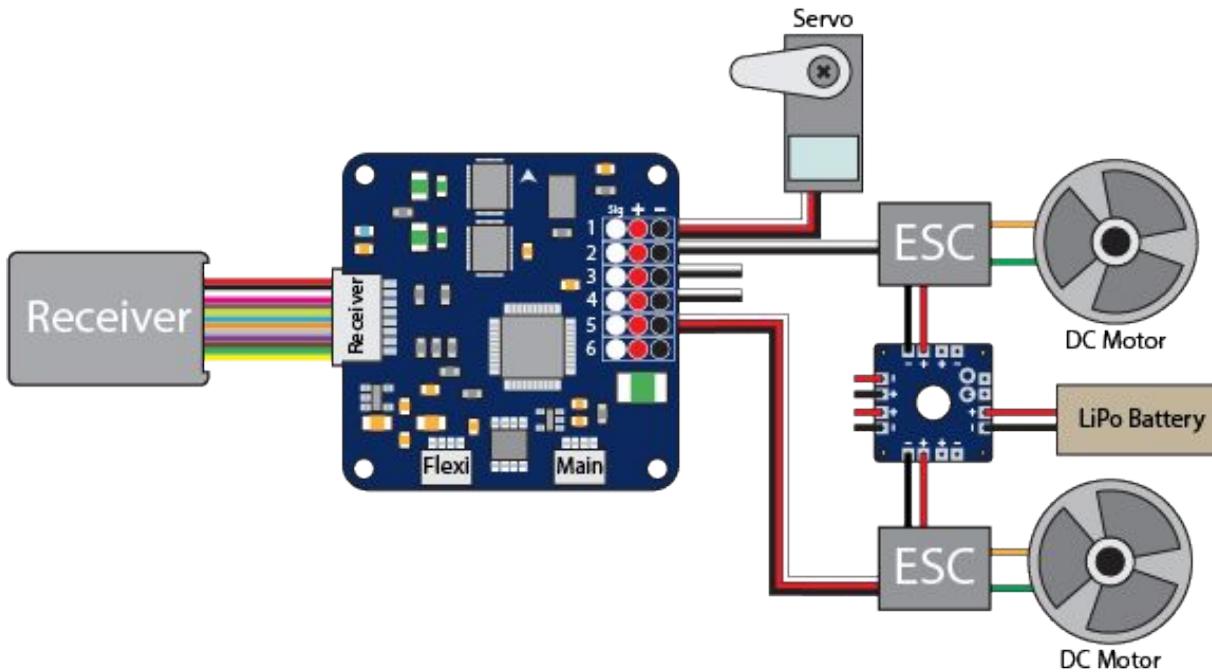
- Involves RF communication between driver and rover
- Rover electronics divided into two sections
 - Controls
 - Receives inputs from driver
 - Processes inputs and sends signals to motors
 - Power receiver, controller, and motors
 - Video Transmission
 - Send video feedback to driver
 - Power camera and transmitter



Communication



Controls



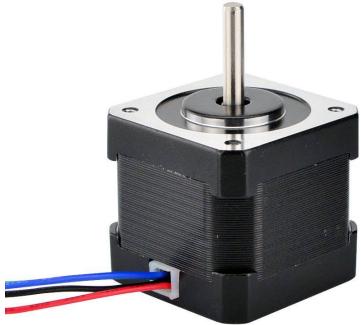
Operates on 2.4GHz with frequency hopping

- R8EF 2.4GHz
- CC3D
- Electronic Speed Controller (ESC)
- High Torque Servo
- 4x 380 Brushless DC Motor
- 5200mAh 7.4V 2S LiPo
- Power Distribution Board

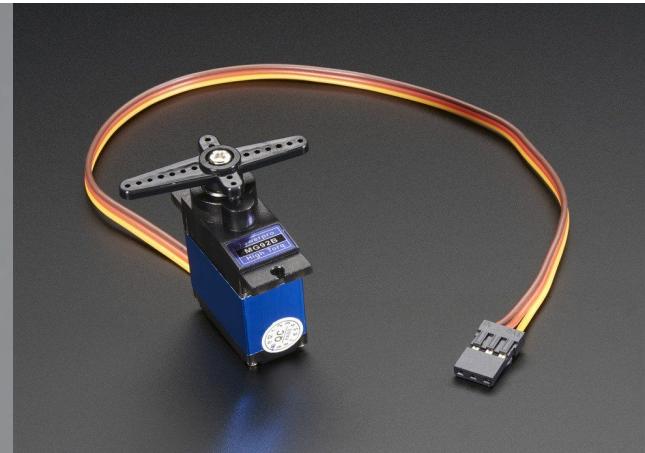


Motors

REA



Rover



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Autonomy



Success with autonomy will replace RF communication as it is simpler to implement and reduces electronic complexity



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Power Supply

Section	Part	Max Voltage (V)	Current Draw (mA)
Controls	380 DC Motor	6.6 - 7.2	80
	380 DC Motor	6.6 - 7.2	80
	380 DC Motor	6.6 - 7.2	80
	380 DC Motor	6.6 - 7.2	80
	Servo Motor	5	80
	CC3D	N/A	60
	Receiver	10	30
Video	Total	-	490
	Transmitter	7.4 - 25.2	90
	Camera	5	90
	Total	-	180

- LiPos will be used due to their high energy per unit volume
- LiPos will be identified using bright red 3D printed plastic enclosures
- A minimum of 4 hour constant use battery life
- Controls
 - 2200mAh
 - ~4.5 hours
- Video
 - 1200mAh
 - ~6.7 hours



Questions?



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