RE-RASSOR Transporter

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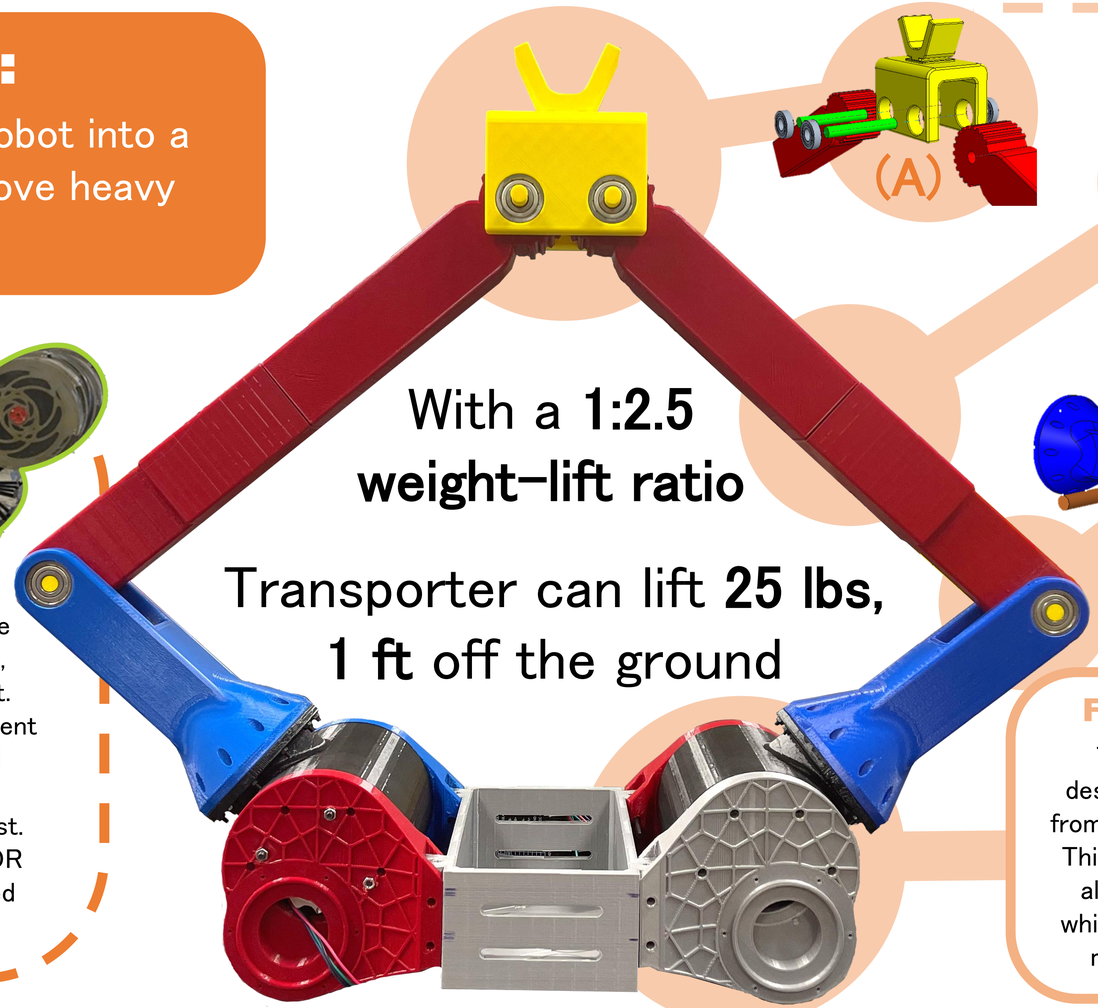
Project Objective:

Repurpose the RE-RASSOR mining robot into a transport system that can lift and move heavy payloads on the moon.

Research and Education Regolith Advanced Surface System Operation Robot

Due to the high cost of traveling to the moon, a NASA mining robot, RASSOR, could become a general-purpose robot. Astronauts could use RASSOR for different tasks by interchanging parts. This will reduce the amount machinery on the rocket, which in turn, decreases the cost. Our design is tested on the RE-RASSOR platform, a scaled down, fully 3D printed version of the original.



With a **1:2.5 weight-lift ratio**

Transporter can lift **25 lbs**, **1 ft** off the ground

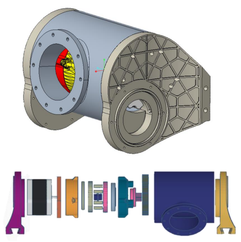
Component Assembly

Joints A and B had bearings and pins which were friction fit together to generate a smooth functionally while keeping the design easy to assemble

Link B is separated into two pieces to be printed on a standard 3D printer. The pieces are also friction fit together because the link will always be in compression

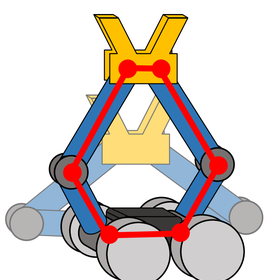
Florida Poly Shoulder

This project used a gearbox designed by a senior design team from Florida Polytechnic University. This gearbox has a cycloidal drive along with a planetary gearset, which allowed a NEMA 23 stepper motor an output of 25 ft-lbs.



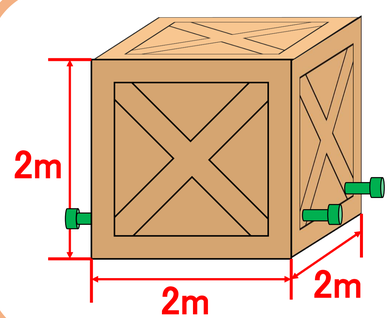
Exploded view of Shoulder

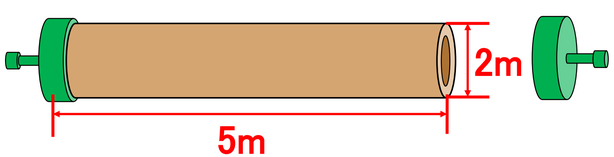
"6-bar" Lifting Mechanism



Motion from the lifting mechanism can be simplified to a 5-bar because of the 1:1 geared connection at the top

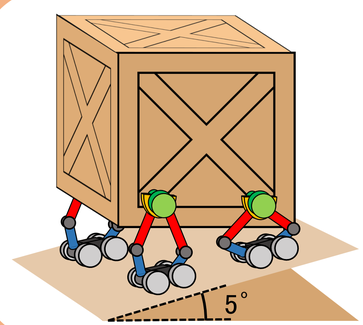
Payload and Connection





The two types of payloads are shown, the cube weighing 100 lbs and the hollow cylinder weighing 50 lbs. Each robot would need to lift 25 lbs.

Tilt Compensation



Since the 5-bar is not restricted on its vertical axis, the transporter can keep payloads balanced on 5 degree inclines. This design uses an IMU to detect the angle and an Arduino Mega to control the motors.