



Articulated/Segmented Body Lunar Rover with Pivoting Joints



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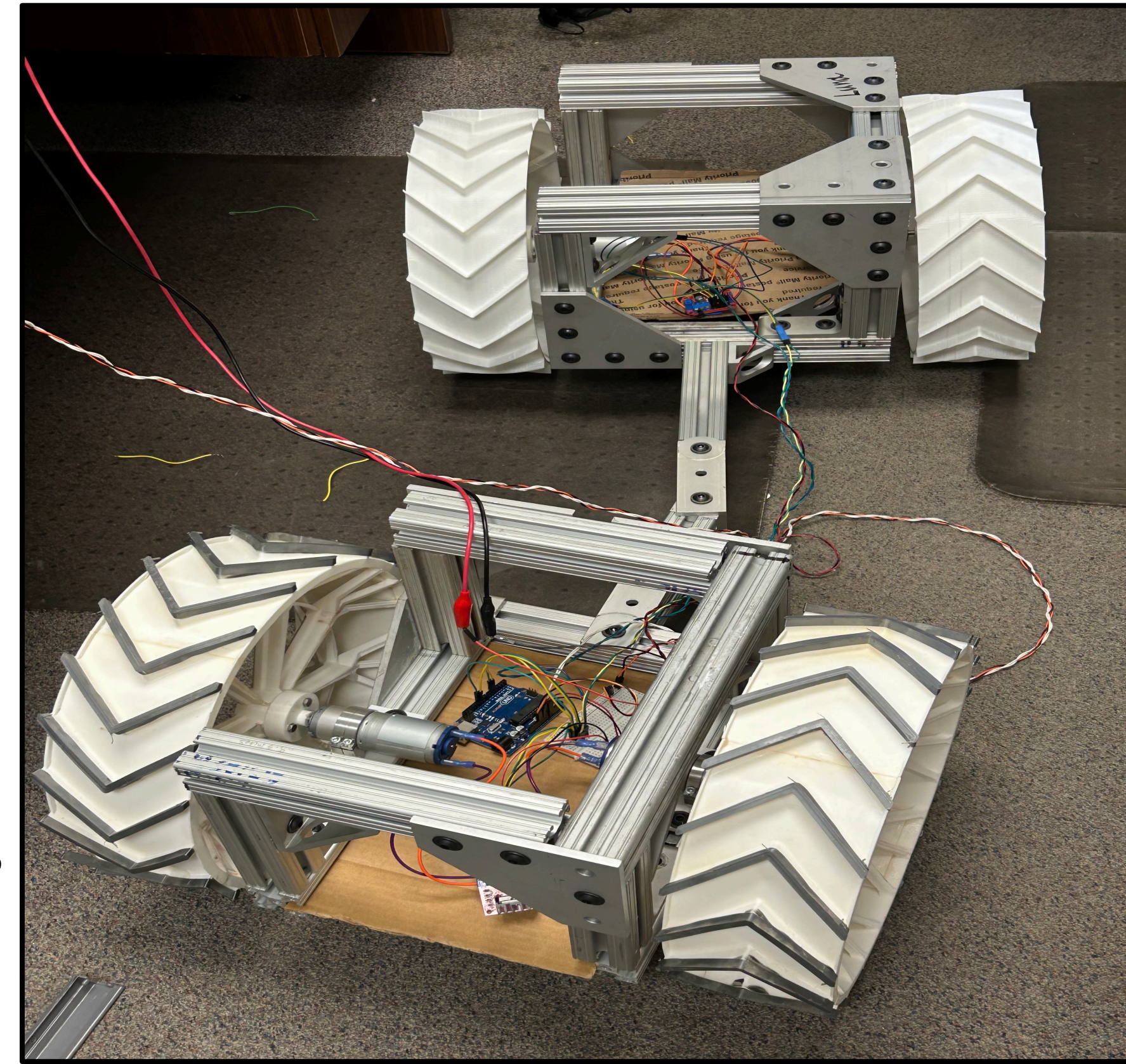
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Introduction

The University of Maryland's Space System Lab's has been tasked by NASA with developing inflatable wheels for lunar and mars rovers. Our job this summer was to develop and test an articulated/segmented body rover, to be used as a test bed for the inflatable wheels.

Project Goals

Build a rover that moves smoothly over tough terrains and prove its flexibility and reliability in various exploration missions.



Challenges

- Limited time as we were learning most things from scratch and building the rover at the same time.
- Understanding the axis of rotation we needed for the articulation and putting it together
- Designing the Rover as we had many ideas

Skills Acquired

- Arduino (programming)
- PWM(Pulse Width Modulation) Control
- Rotating positions for articulating joints
- 3D printing and using Fusion360 as CAD software
- Wiring and Electronics

Conclusion

After 9 weeks in the lab we were able to design and build an articulated rover with a joint that is able to steer using differential steering.

The joint was made up of both a hinge and pivoting joint that in theory should allow the rover to flex and turn smoothly over rough terrains but will be determined with more testing. Below we can see the three rovers from the space lab we used as a reference in building ours.

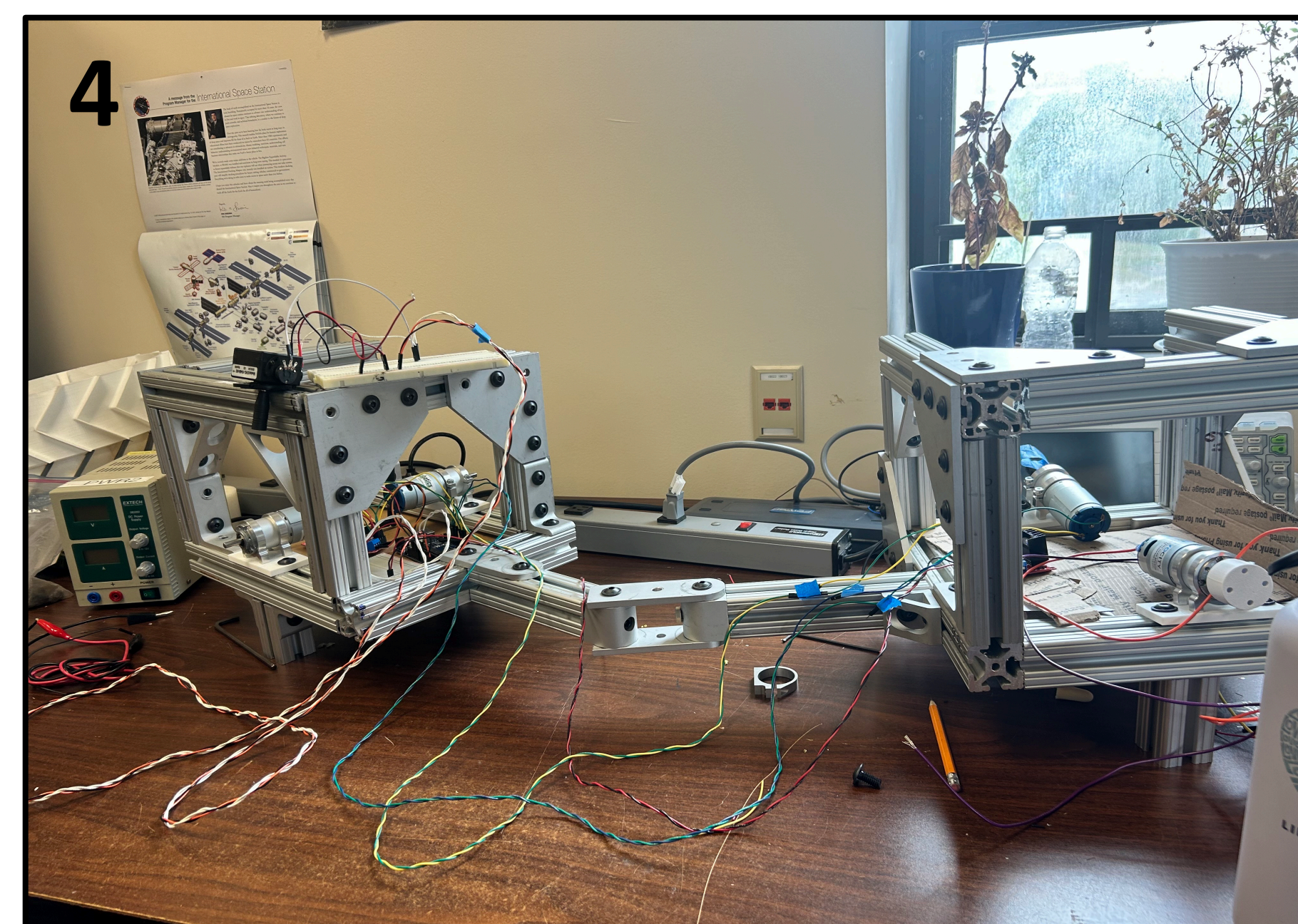
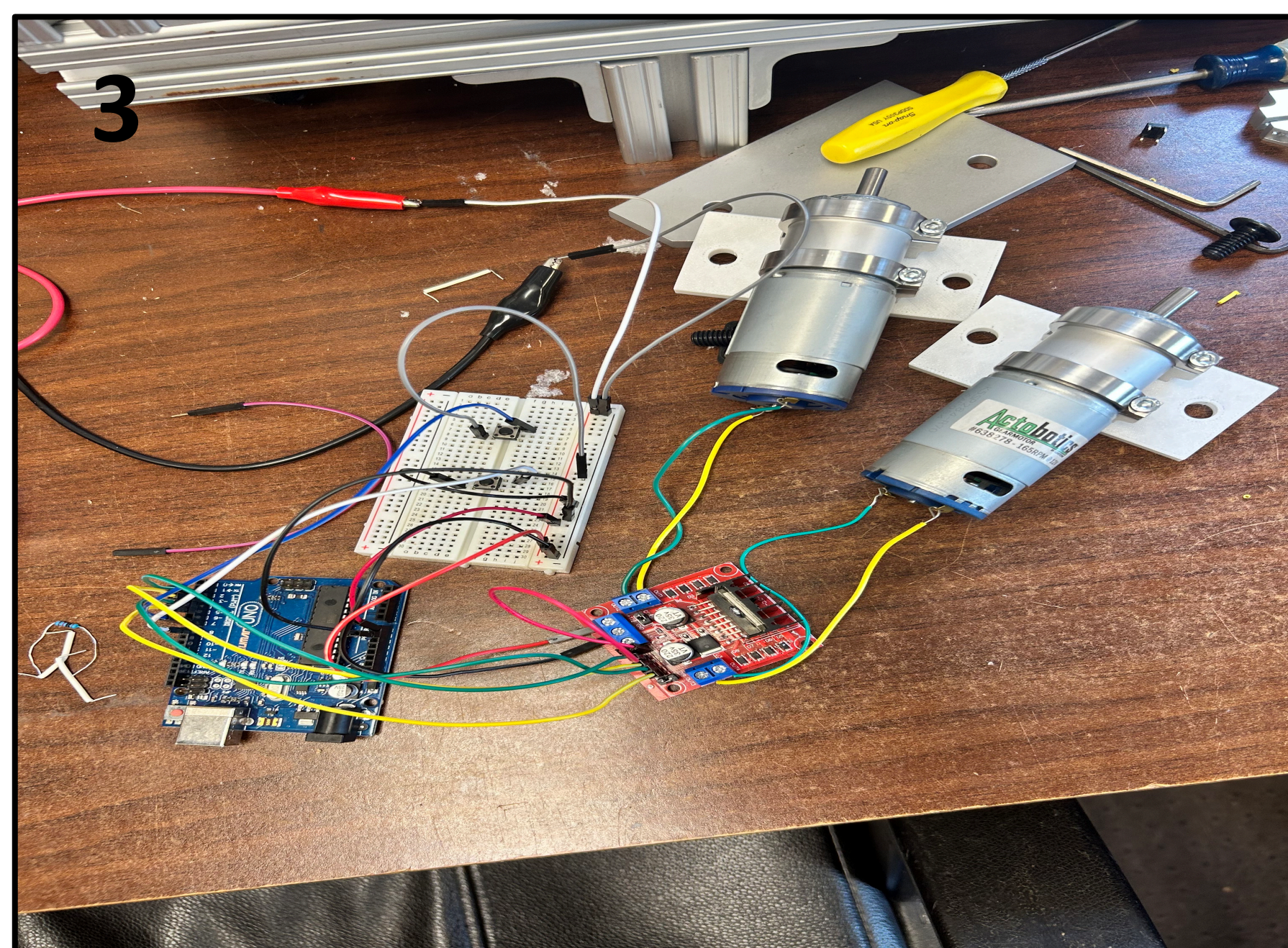
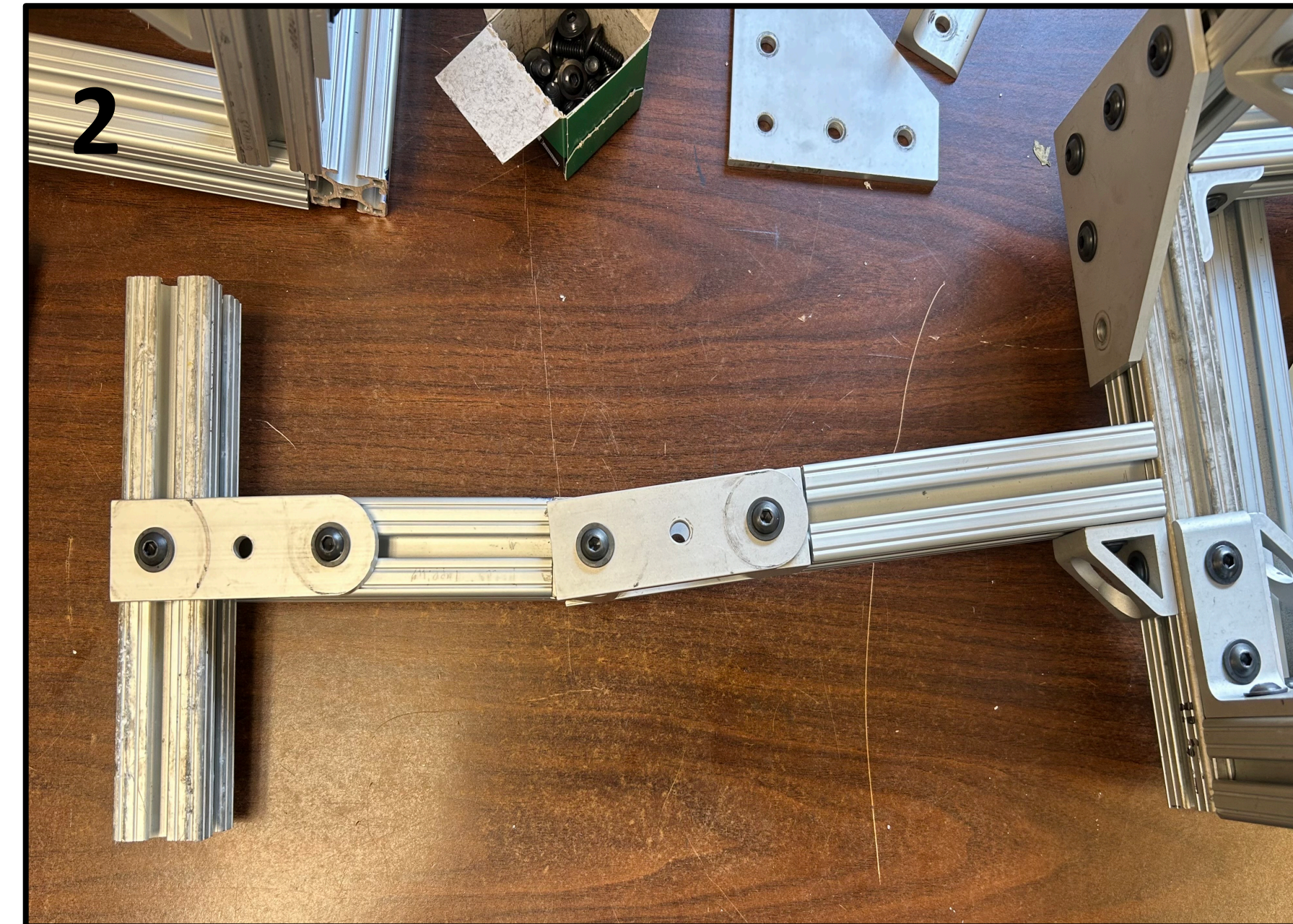
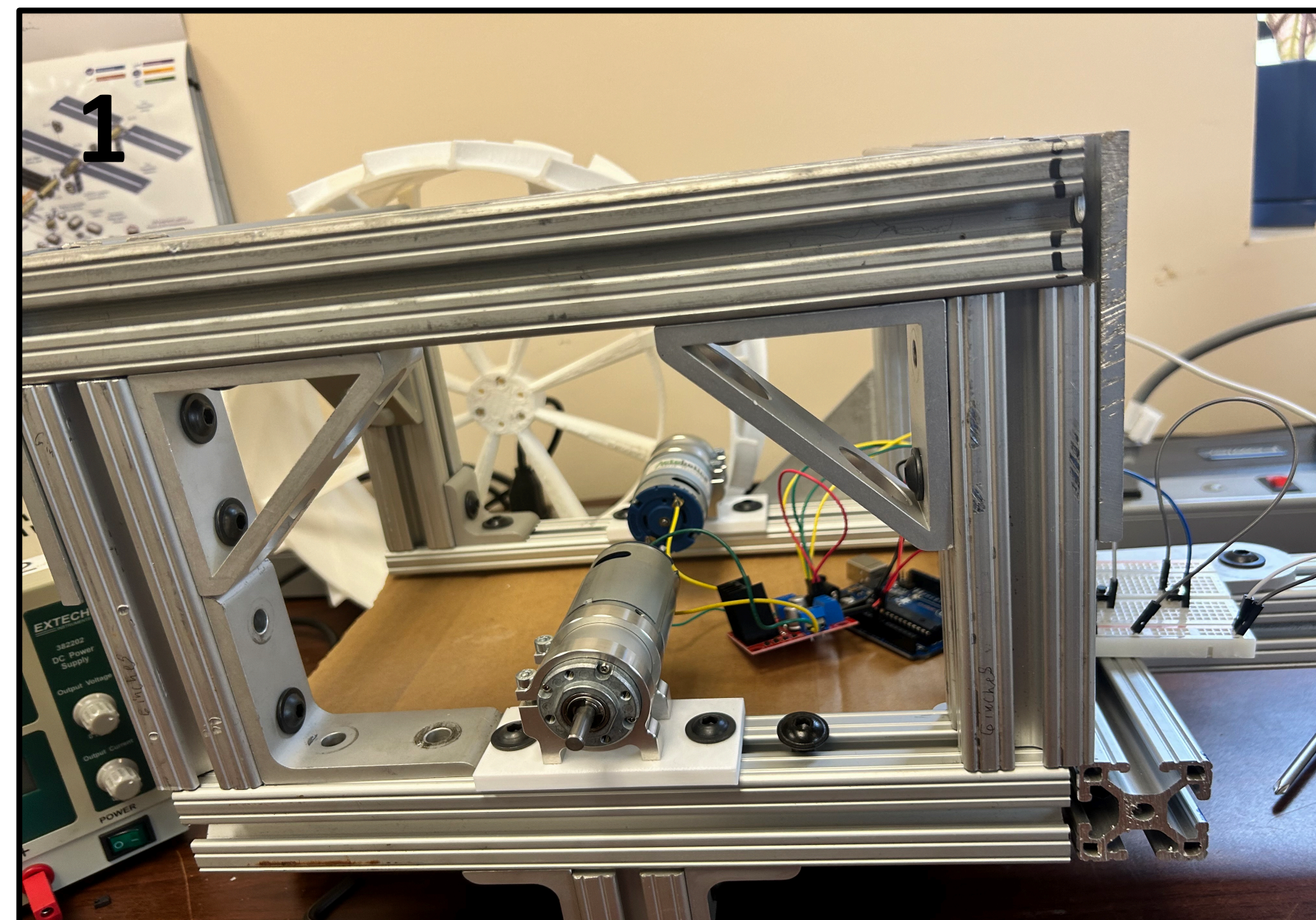


Fig 1: Box structures to hold circuitry and mount wheels

Fig 2: Articulating joint design with pivoting joint to rotate along the x and z axis

Fig 3: Motor circuitry

Fig 4; Prototype without wheels attached