Asteroid Mobility Using Screw-Powered Vehicles (SPV's)

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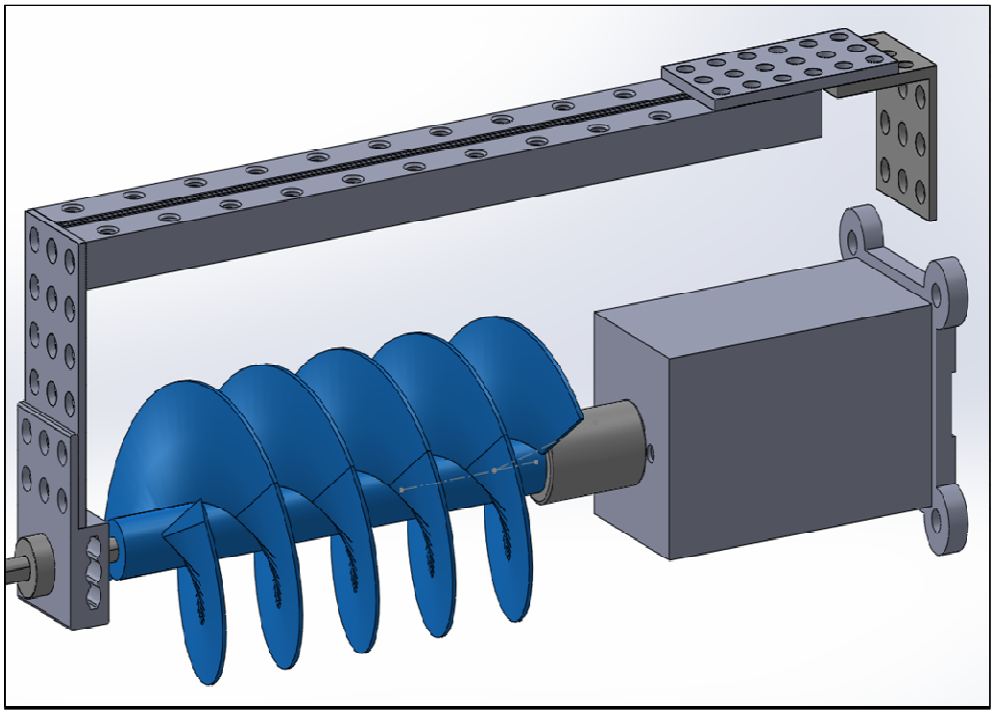
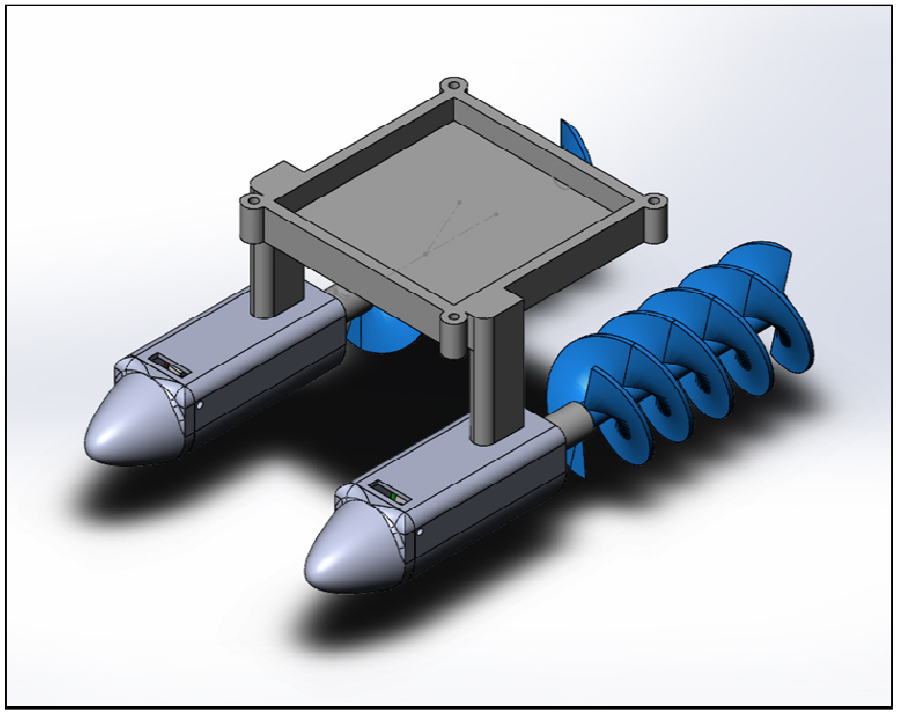
Motivation: Why SPV's?

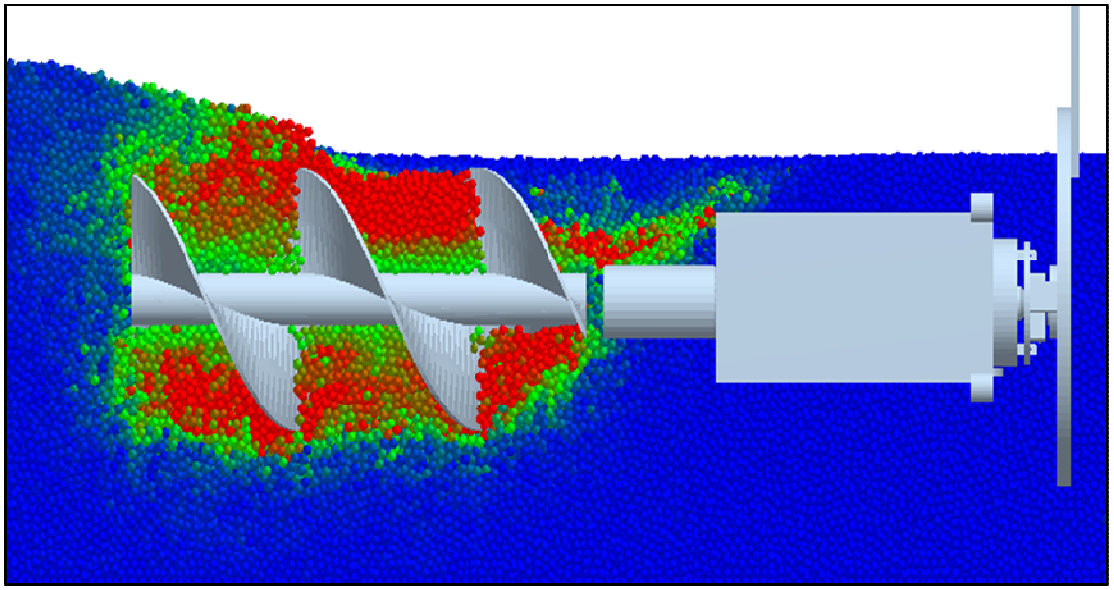
- SPV's are used for transportation on different terrestrial applications such as mud, snow, clay, and amphibious environments
- A gap remains in reimagining SPV transport for off-Earth environments and characterizing design aspects
- Goal: use experimental results to validate simulations for further research and studying the characteristics of how SPV's move and generate forces in granular environments

3D Model Designs





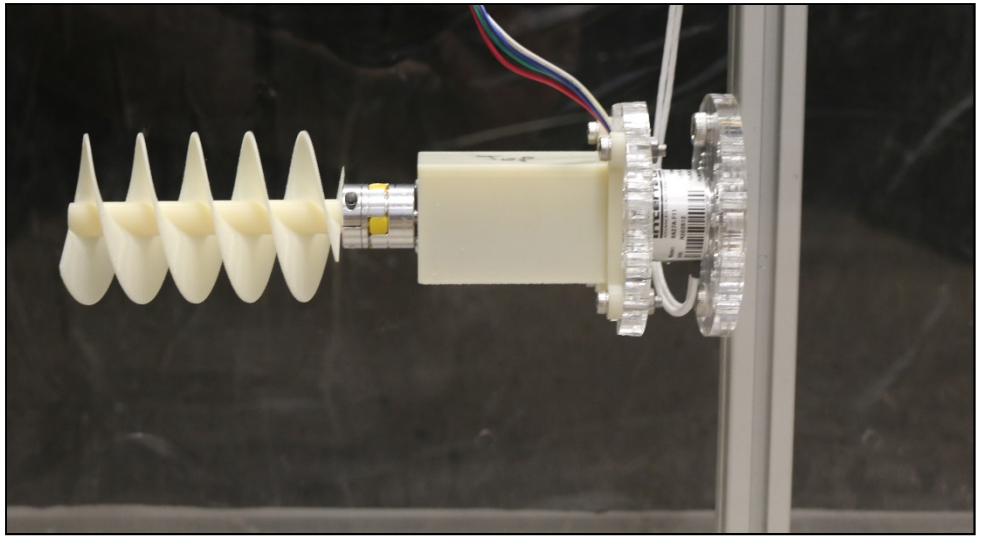
Simulations



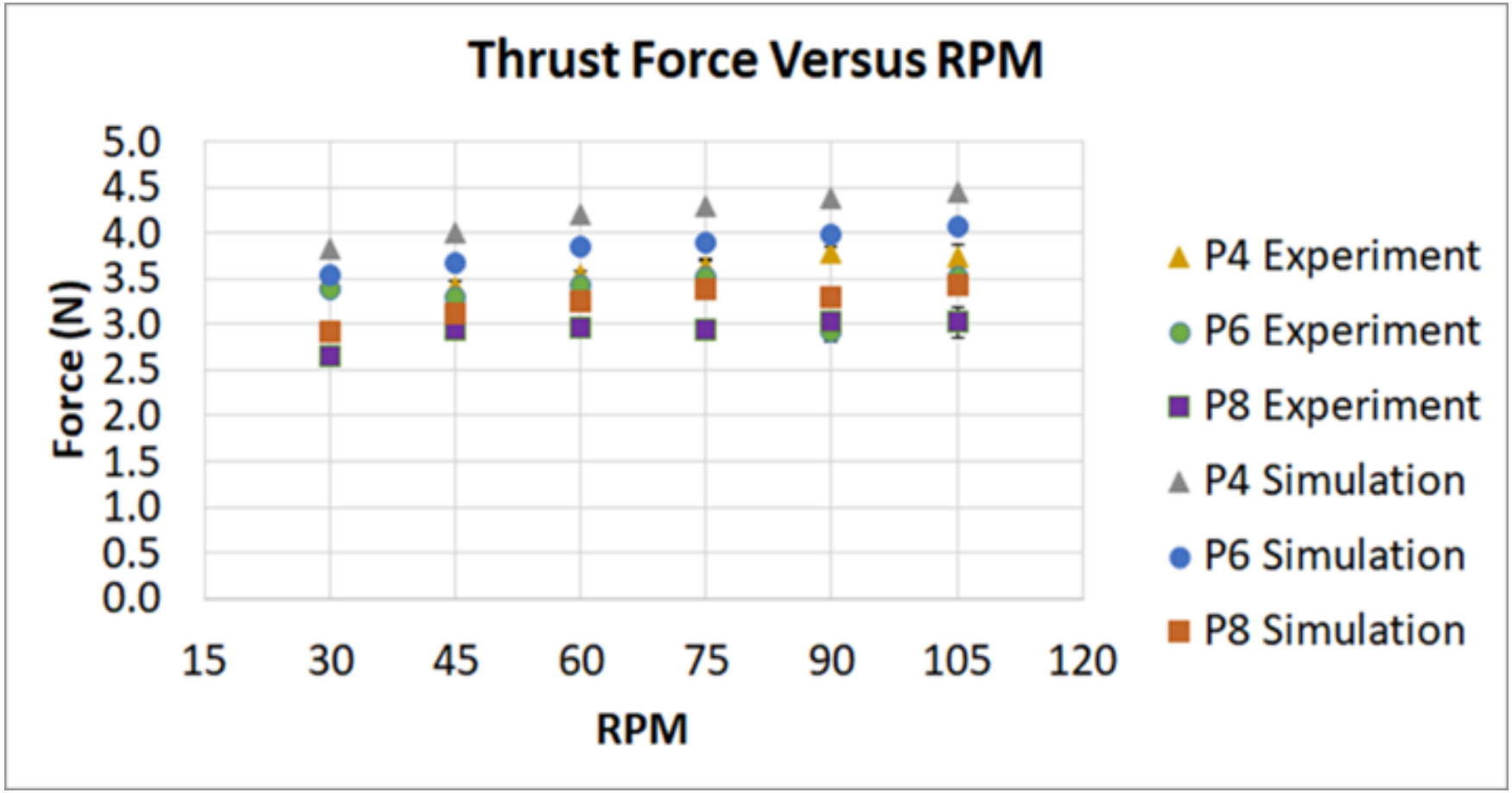
- EDEM software was used for static testing
- EDEM and ADAMS software was used for dynamic testing
- Particle size used: 2mm with a normal distribution with STDEV of 0.1mm and 1.1 aspect ratio

Experiments

- Three 3D printed ABS screws with different diameter pitches
- Used a 12V Pololu motor driven by an Arduino Uno
- Experimental bed contained soda-lime glass beads

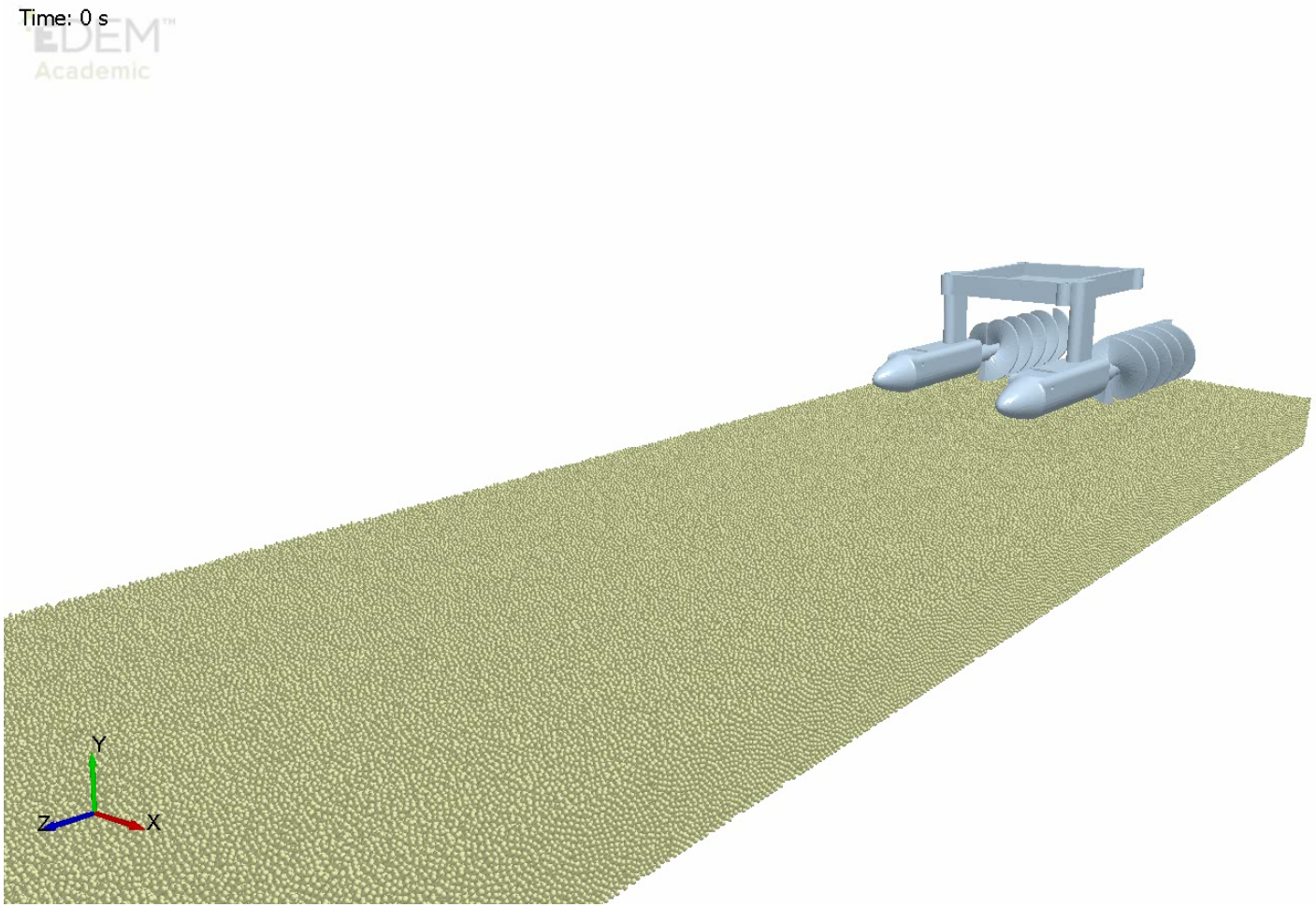


Simulations vs. Experiments



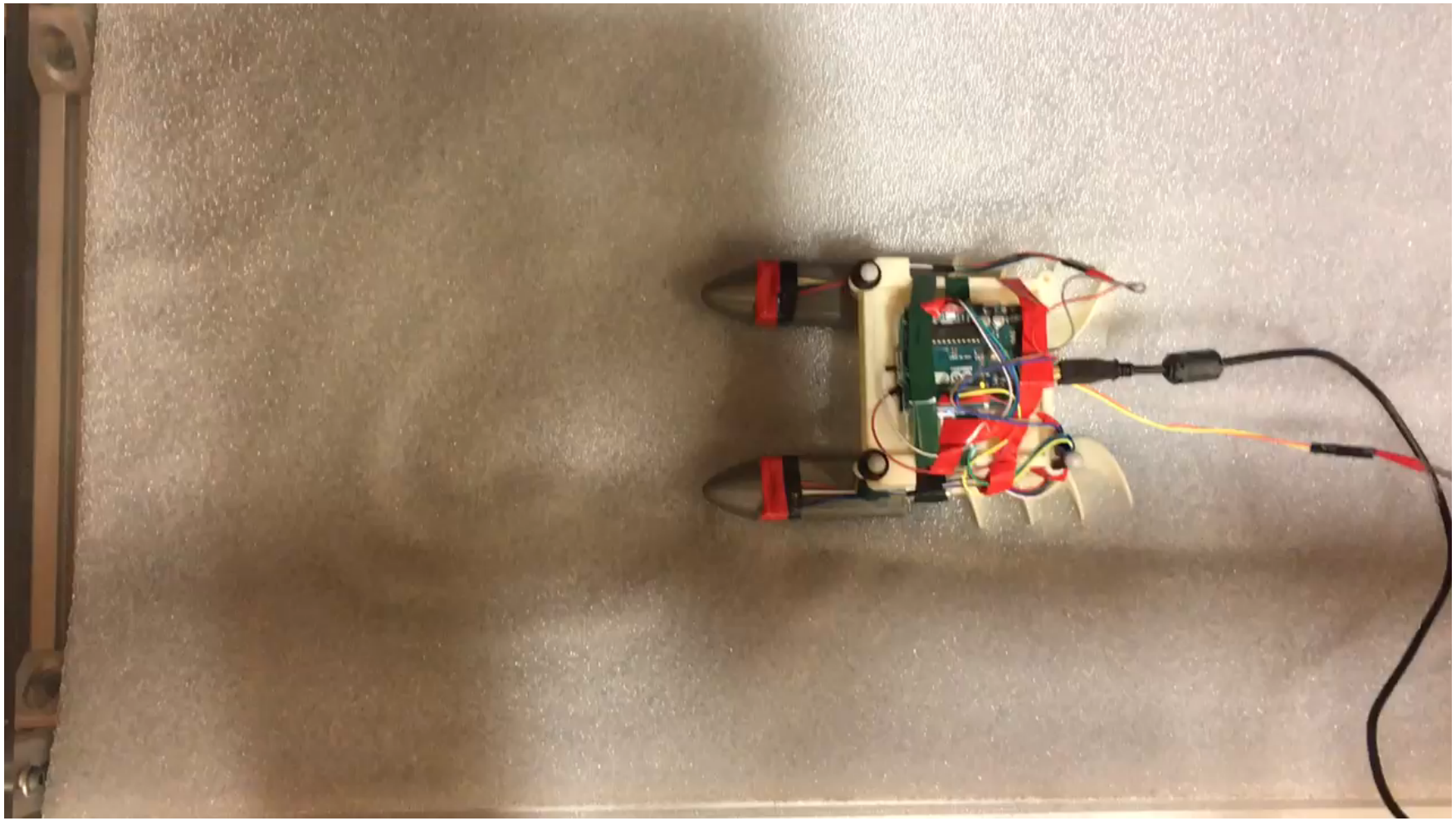
Future Work

- Use current design and results of full body to assist in optimization



EDEM Academic

Future Work



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