

Artemis III: Safety Concerns

NASA is returning astronauts to the Moon's surface during *Artemis III* (2026).

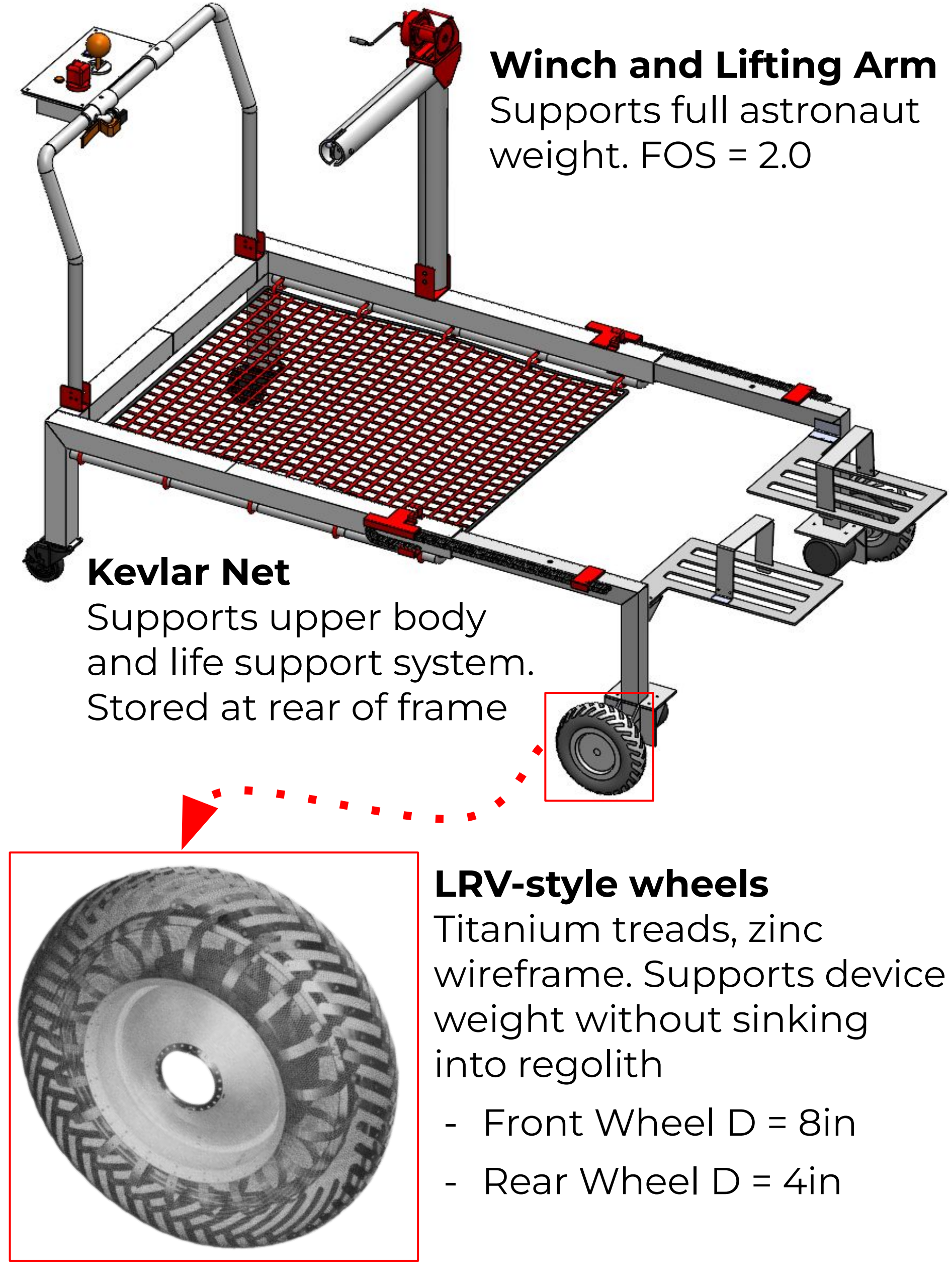
- In extravehicular activities (EVAs), astronauts will travel in pairs up to 2 kilometers from the lunar lander
- **No solution exists** to promptly rescue and return an incapacitated astronaut to the lunar lander
- Astronauts experience inhibited body movement and limited hand dexterity

SOTERIA's Capabilities

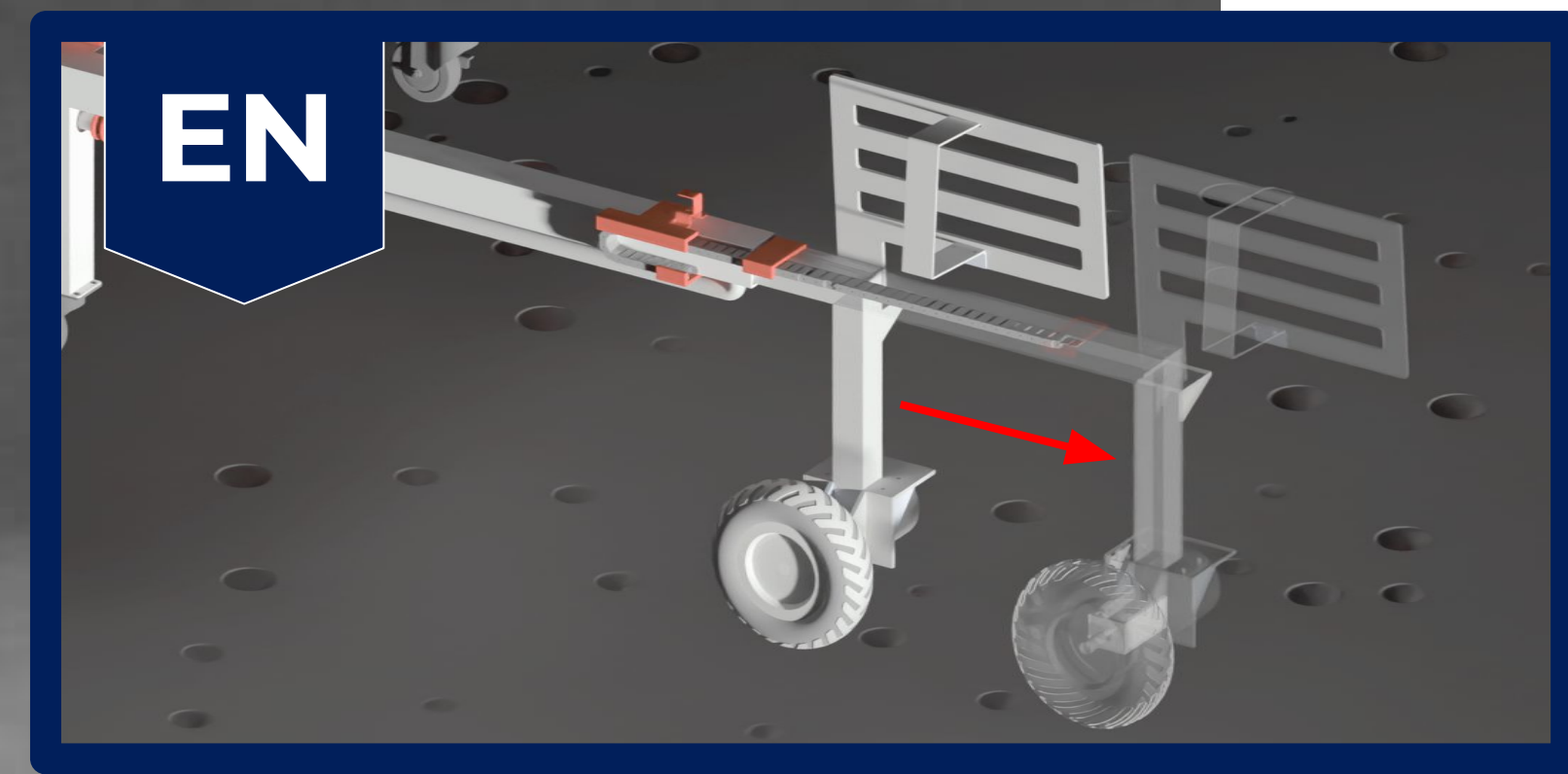
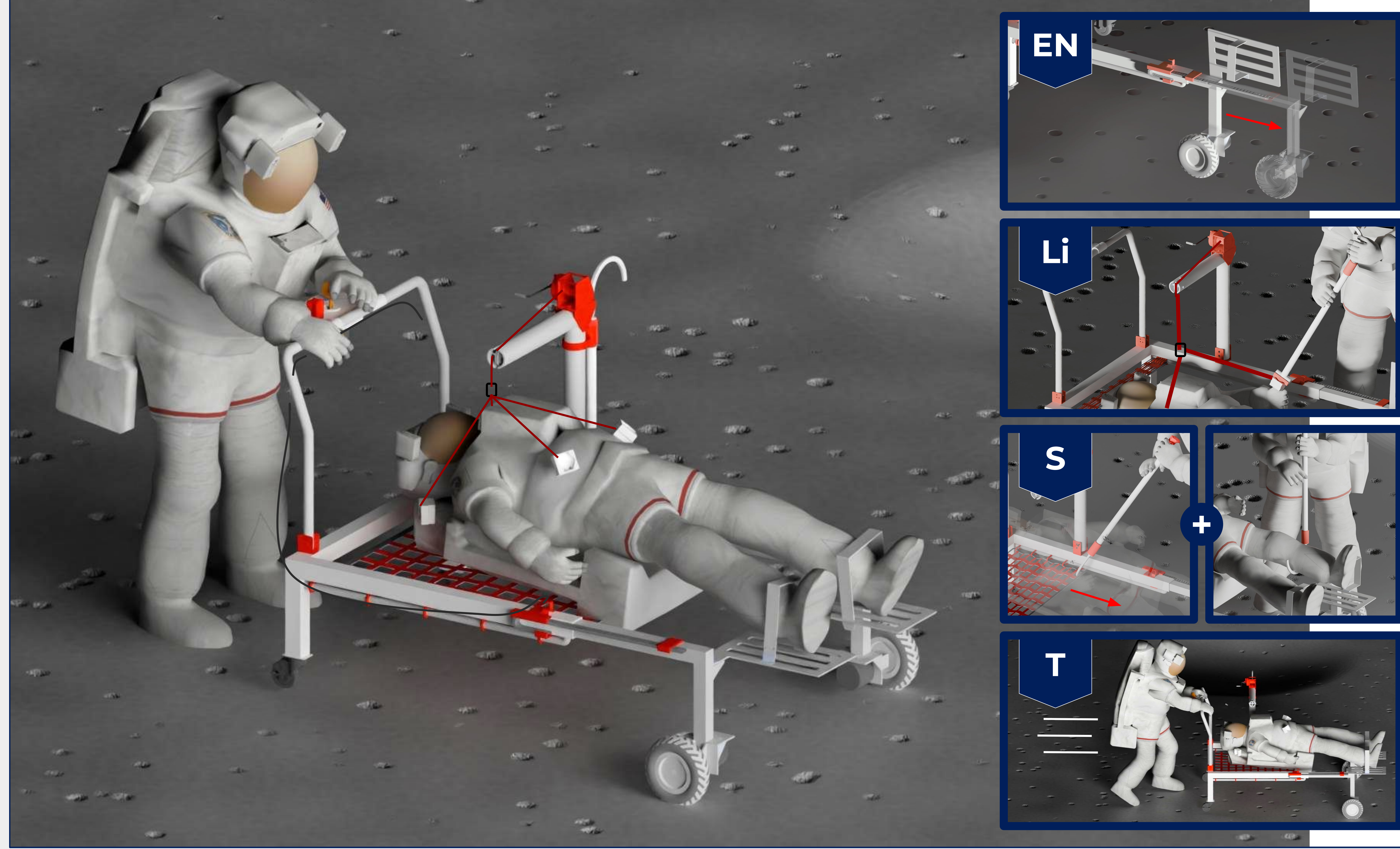
- 👉 Rescues the astronaut in under 5 minutes.
- 👉 Eliminates bending/kneeling movements from the rescuing astronaut
- 👉 Large form factor to accommodate limited glove dexterity and improve ergonomics
- 👉 Weighs 110 lbs and supports up to 750 lbs
- 👉 Accelerates to 3.85 mph and navigates 20° slopes
- 👉 Stores in 4x4x2.5 ft³

Durable, Lightweight Frame

6061-T6 Aluminum
Provides strength while minimizing mass. FOS = 1.5



ENLIST - Crewmember Rescue Procedure



ExtEND

- Unlock telescoping beams using lever
- Extend frame length with motor

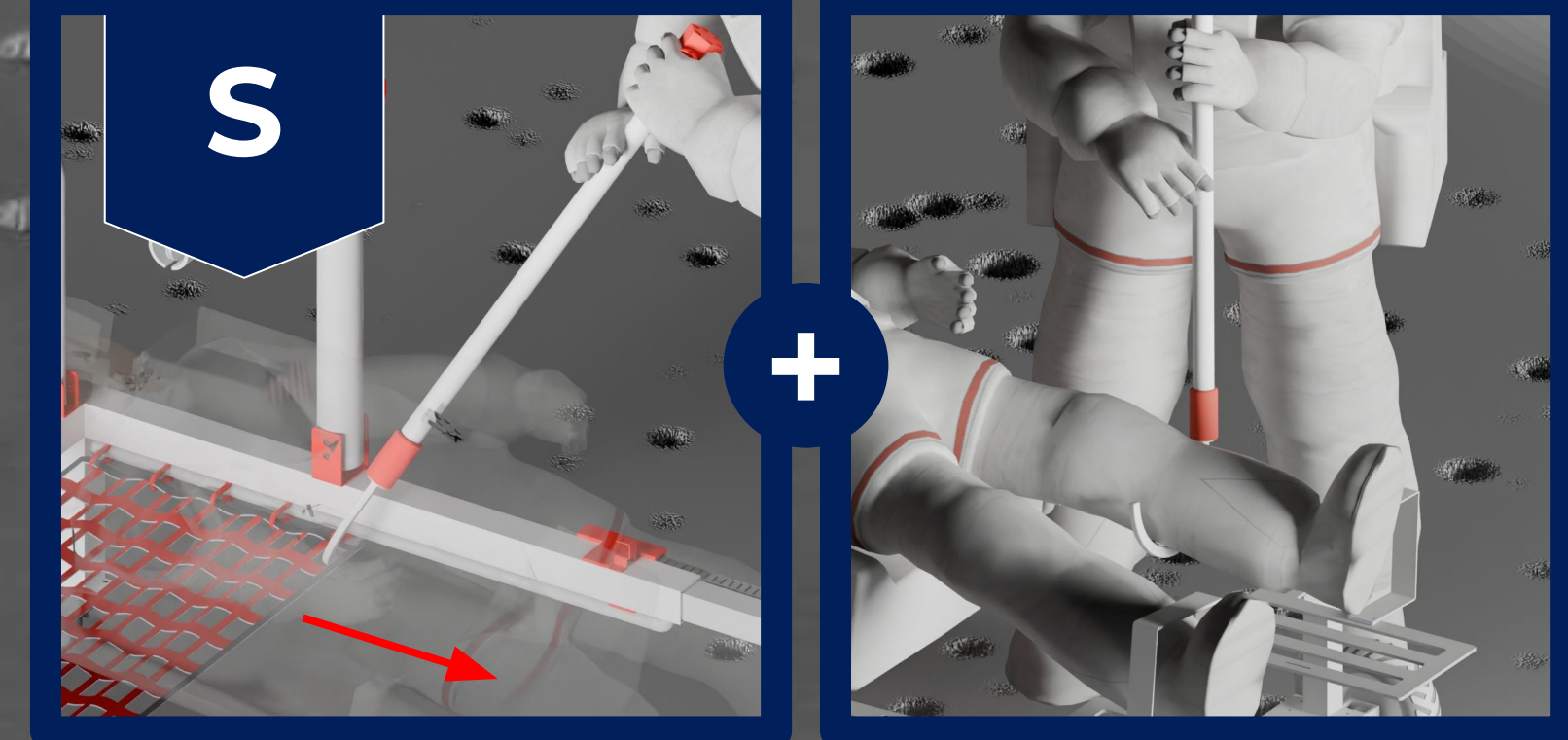
00:30



Lift

- Attach carabiners to spacesuit
- Crank winch to lift astronaut above net

02:28



Secure

- Stretch net under life support system
- Lift and latch legs into footrests

01:29

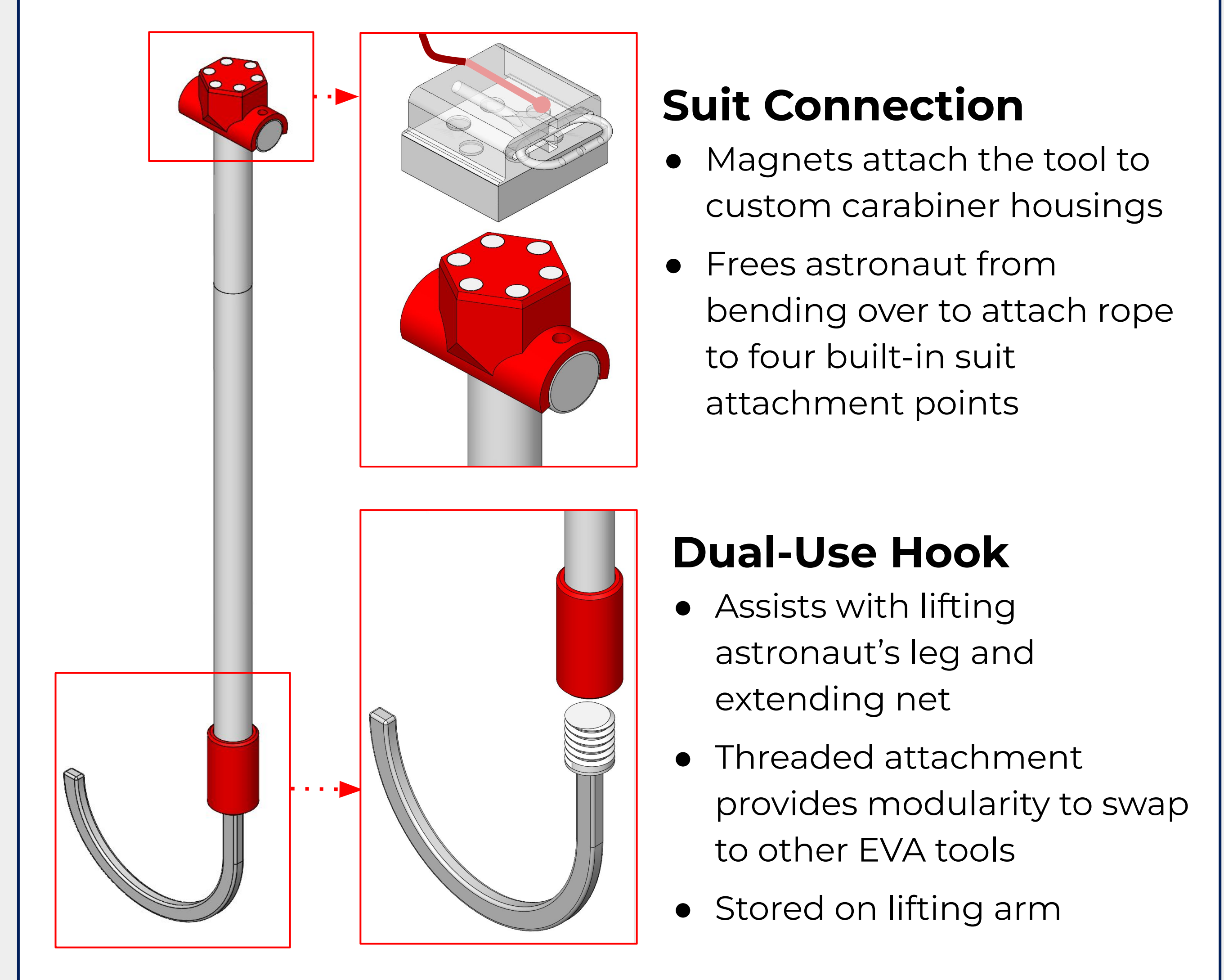


Transport

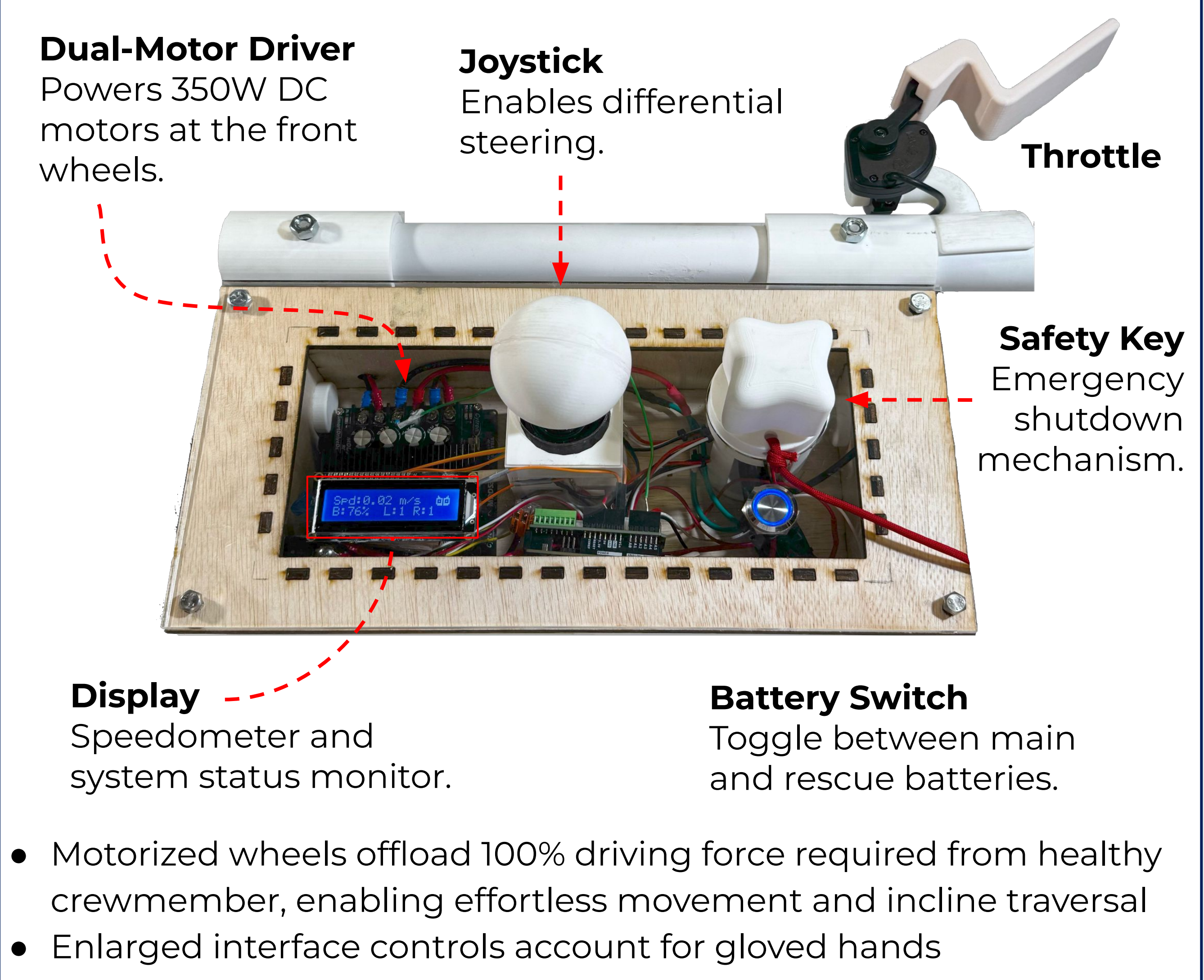
- Activate rescue mode on battery
- Drive astronaut back to lunar lander

19:36

Assistive Rescue Tools



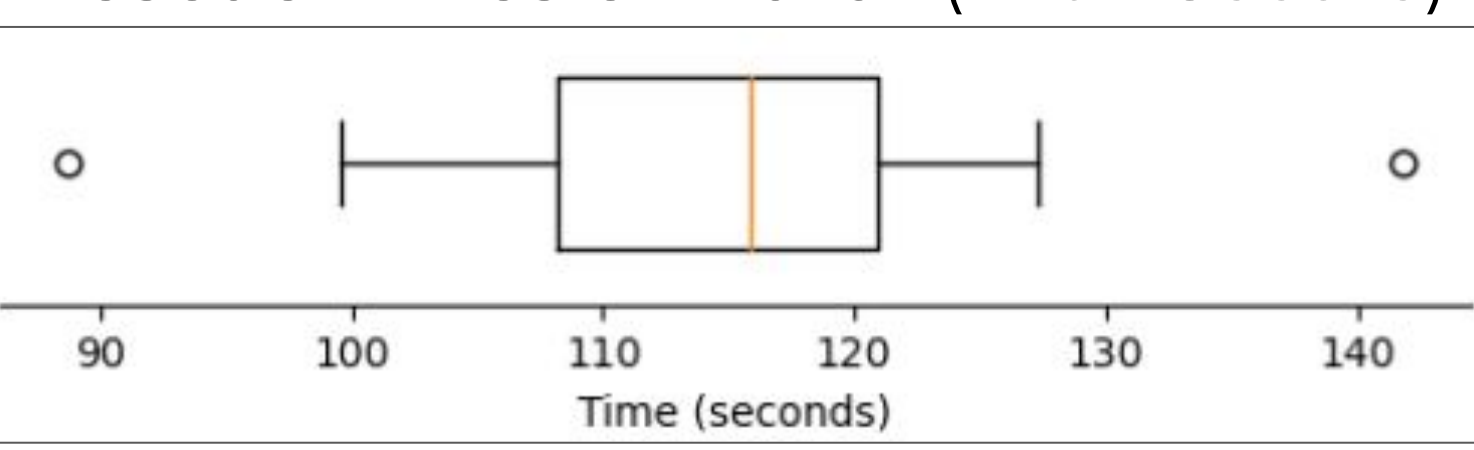
Motor + Mechanical Control



User Testing

Users timed through Lift and Secure steps. Fourteen trials were conducted.

Rescue Times on Earth (Lift + Secure)



Earth rescue times are scaled by the Earth-Moon walking speed ratio to account for hindrance from EVA suit and reduced gravity.

Scaling factor = $\frac{3.0 \text{ mph}}{1.4 \text{ mph}} = 2.14$

Avg. Earth rescue time: 1 min 56 secs.
Avg. Moon rescue time: 3 mins 57 secs.

Acknowledgements

With gratitude to our mentors: Anne Vaughan (NASA), Dr. David Trevas (Rice), Dr. Gary Woods (Rice) and sponsors: Rice University, OEDK, Texas Space Grant Consortium