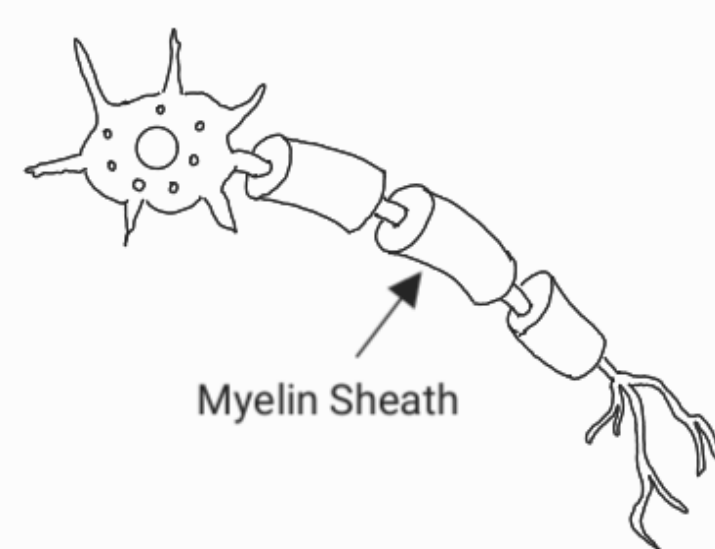


Objective

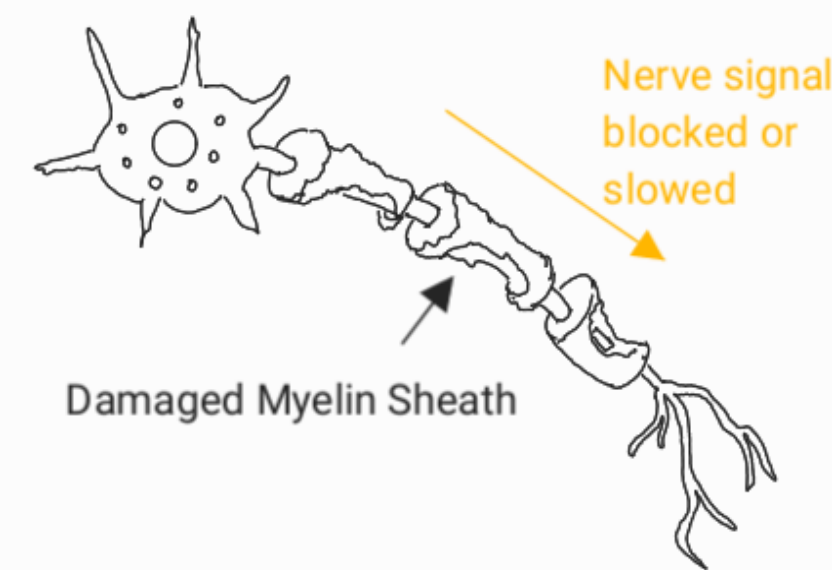
To create a partial-propulsion full-leg exoskeleton.

Background

Normal Nerve



Multiple Sclerosis



Current Exoskeleton Designs



Keeogo



MAK

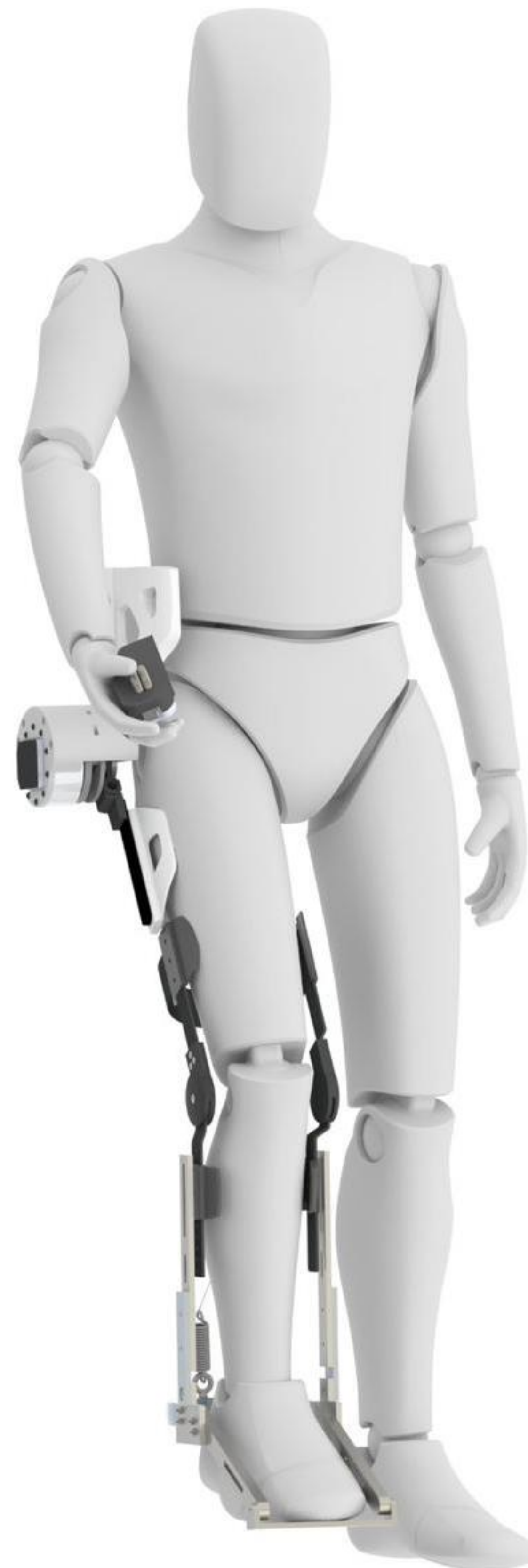
Value Proposition

- Current designs focus on aiding in joint stability or propulsion but fail to meet our client's specific needs of both stability and propulsion.
- Our goal is to create an exoskeleton with joint stabilization and partial propulsion to assist our client with walking across flat terrain to aid in improving his quality of life.

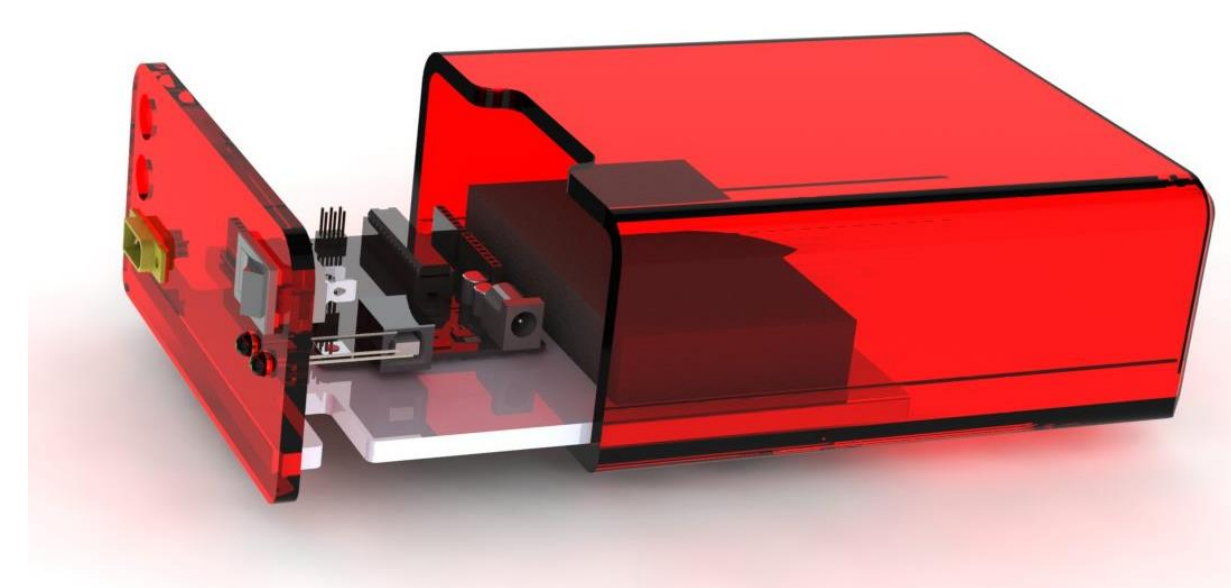
Key Requirements

1. Usable across flat terrain
2. Stabilize all joints
3. Partially assist gait cycle (10 Nm propulsion)
4. <3 kg weight of leg components
5. Self-don product in under 5 minutes
6. Batter powered (min. battery life: 10 min.)

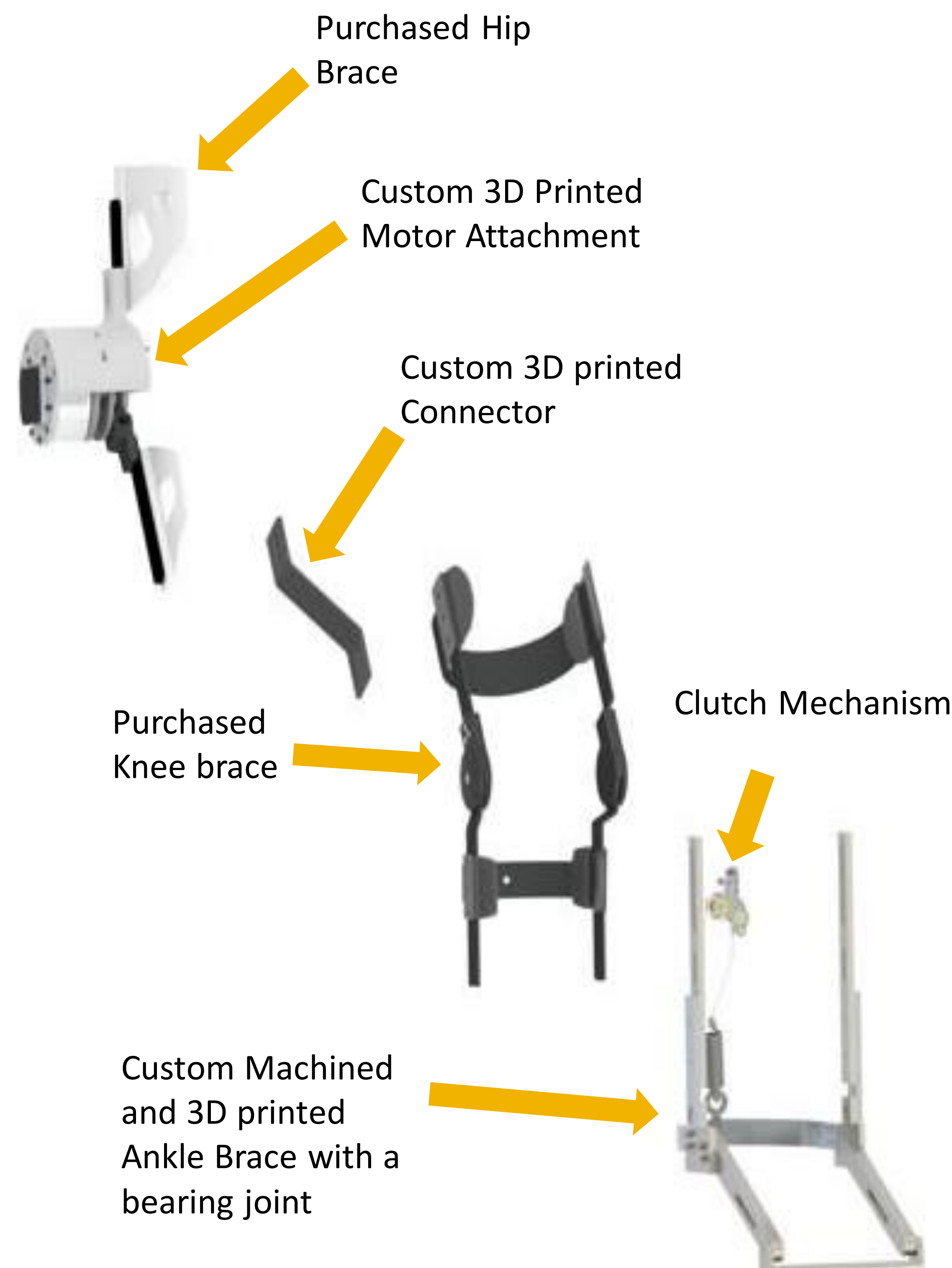
Final Design



Electronic Housing



Housing containing the Arduino and its auxiliary power of AA batteries.

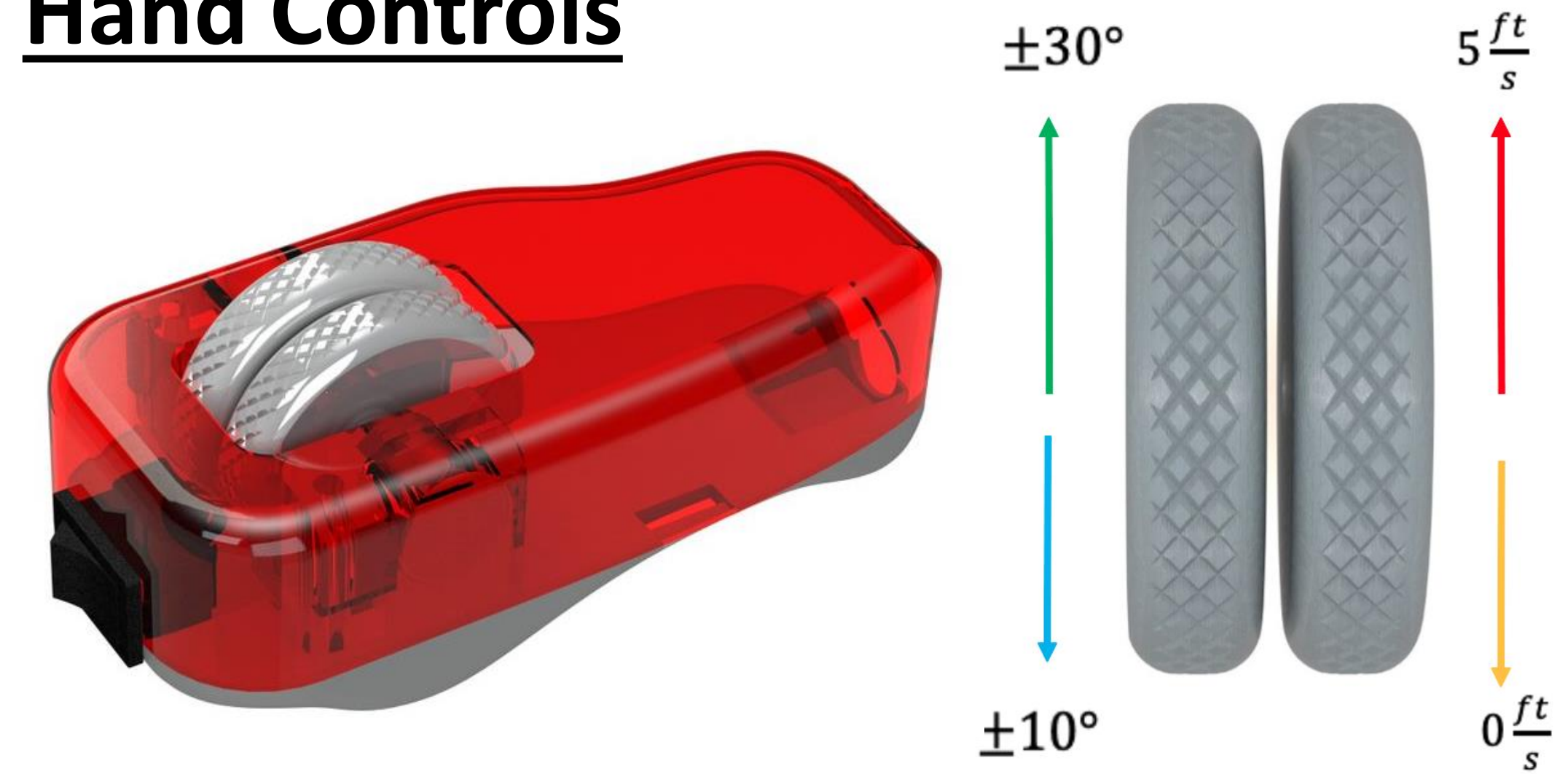


Clutch Mechanism



Ratcheting Clutch mechanism: invented by Steven H. Collins, M. Bruce Wiggins, and Gregory S. Sawicki.

Hand Controls



Left. Render of the hand-held controller for the motor.

Right. Graphic of the scroll bars that control the angle and speed of the motor.

Project Summary

In summation, this device successfully addressed our client's main requirements, as well as having additional design improvements, including propulsion assistance at the ankle. This project could go on to be further modified to be usable by other individuals and help many others affected by similar conditions as our client.



Team Pictured left to right:
Parker Daniel,
Rachel Stanley,
Devin Sheehan,
Alexandra
Cunningham,
Melissa Huchet

Future Recommendations

1. Waterproofing for outdoor use or exercise applications
2. Adjustable and durable hip-to-knee stepdown
3. Add an IMU on the left leg to create a feedback loop for the hip propulsion

Acknowledgements

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