Hands with EMG for Low-cost Prosthetics: Elastic and Rigid

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Vision

- The average cost for myoelectric prosthetics ranges from $20,000 to $60,000
  - Made of hard, specialized materials
- X-Limb made of completely flexible 3D printing filament that more closely models a real human hand
  - Comes at the expense of lower durability and power

Our team is working to determine the optimal balance between hard and soft materials that provides the benefits of soft robotics while still retaining the functionality and durability of more standard prosthetics.

Design Criteria

Functional	• The hand must have grips that assist with activities of daily living; pinch, tripod, power, etc. • With 45-65 newtons of grasping force
Accessible	• Comprised of commercially available materials, totalling to less than $200 • Able to be printed and assembled with minimal effort
Comfortable	• Does not cause unnecessary stress on the user • Less than 400 grams of weight • 80% smaller than the average hand

Materials and Methods

All designs were printed on an Aquila Voxellab X3 and Creality CR-6 SE using:

PETG	TPU 95A
PLA	TPE

Methods

Needs Identification → Design Criteria

Design Criteria → Low-Fidelity Prototype

Low-Fidelity Prototype → SOLIDWORKS CAD

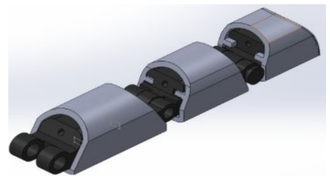
SOLIDWORKS CAD → Printing

Printing → Test against Criteria

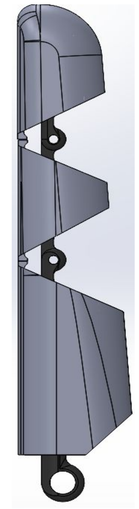
Future Work

Short-term	Finalize and test complete hand design with code against activities of daily life
Stretch-goal	Design classification model for recognizing user intention based on EMG sensor readings
Continuous	Continue client outreach efforts

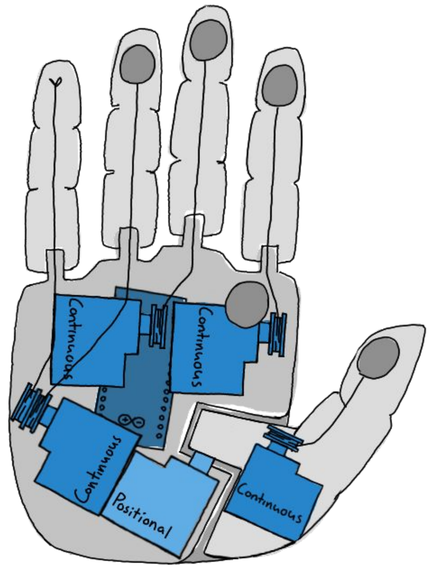
Spool Design

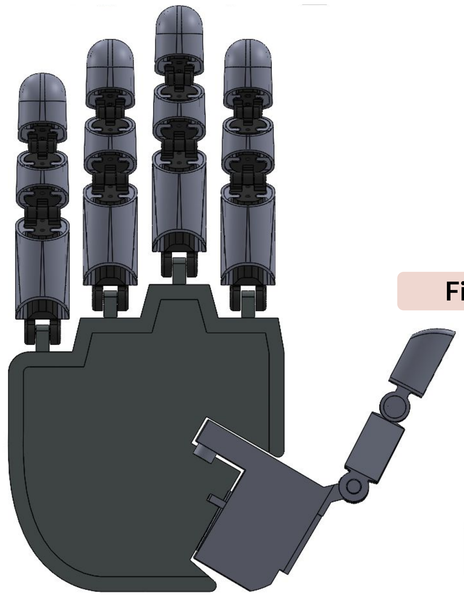


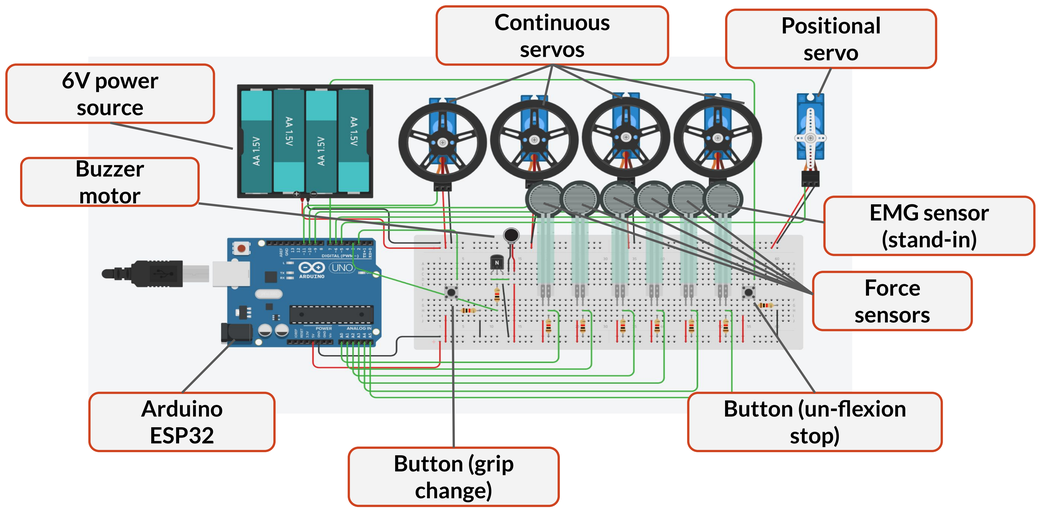
Alternative Finger Design

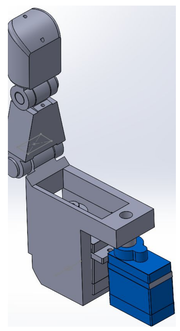


Final Finger Design









Thumb design with Servo Motors

References

Myo-Team

Acknowledgements

We are thankful for Dr. Ashley Taylor, Dr. Robert Stone, and the Myo-Electric team for their dedication and support for this project!