



Advanced 3D-Printed Childs Prosthetic Hand

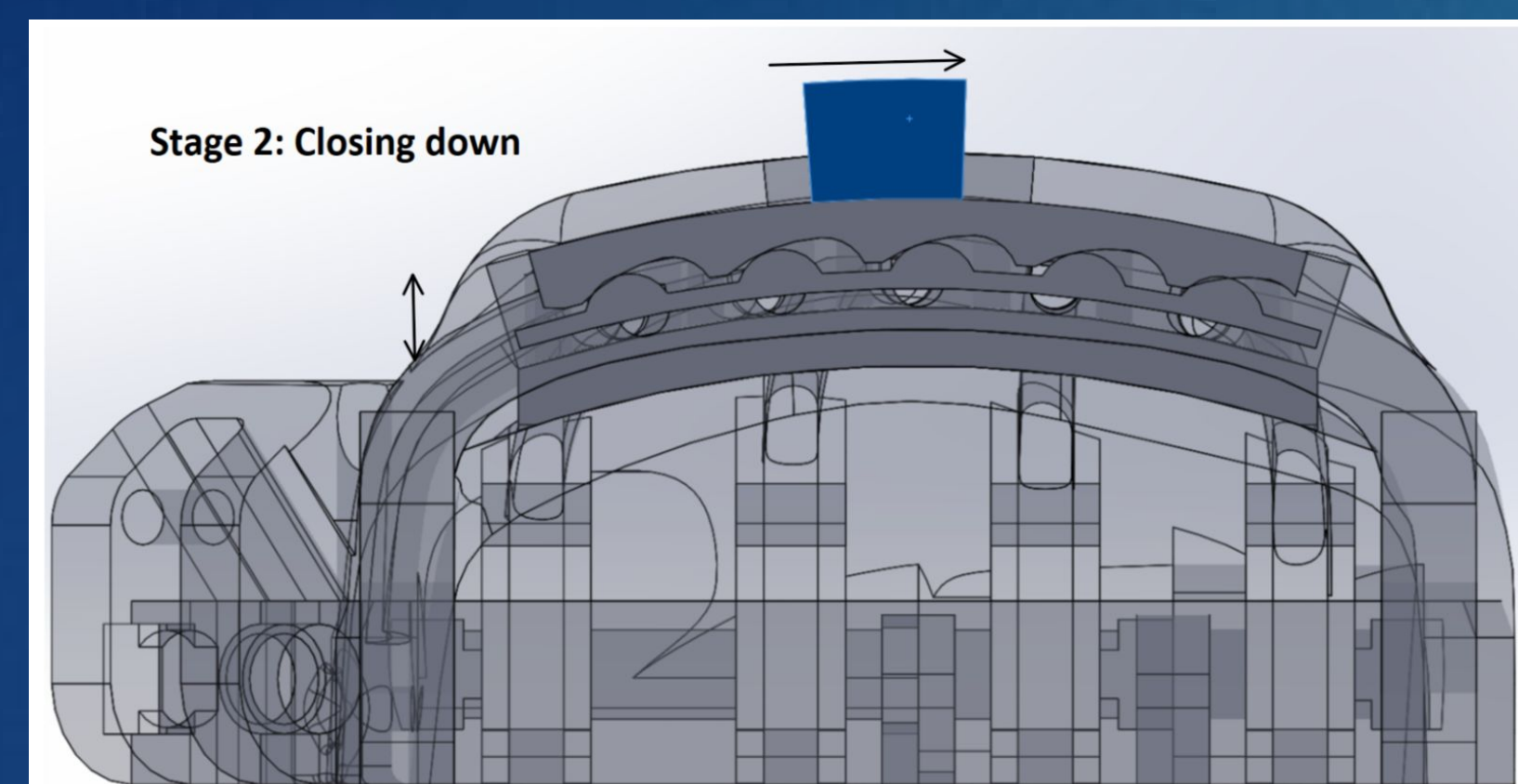
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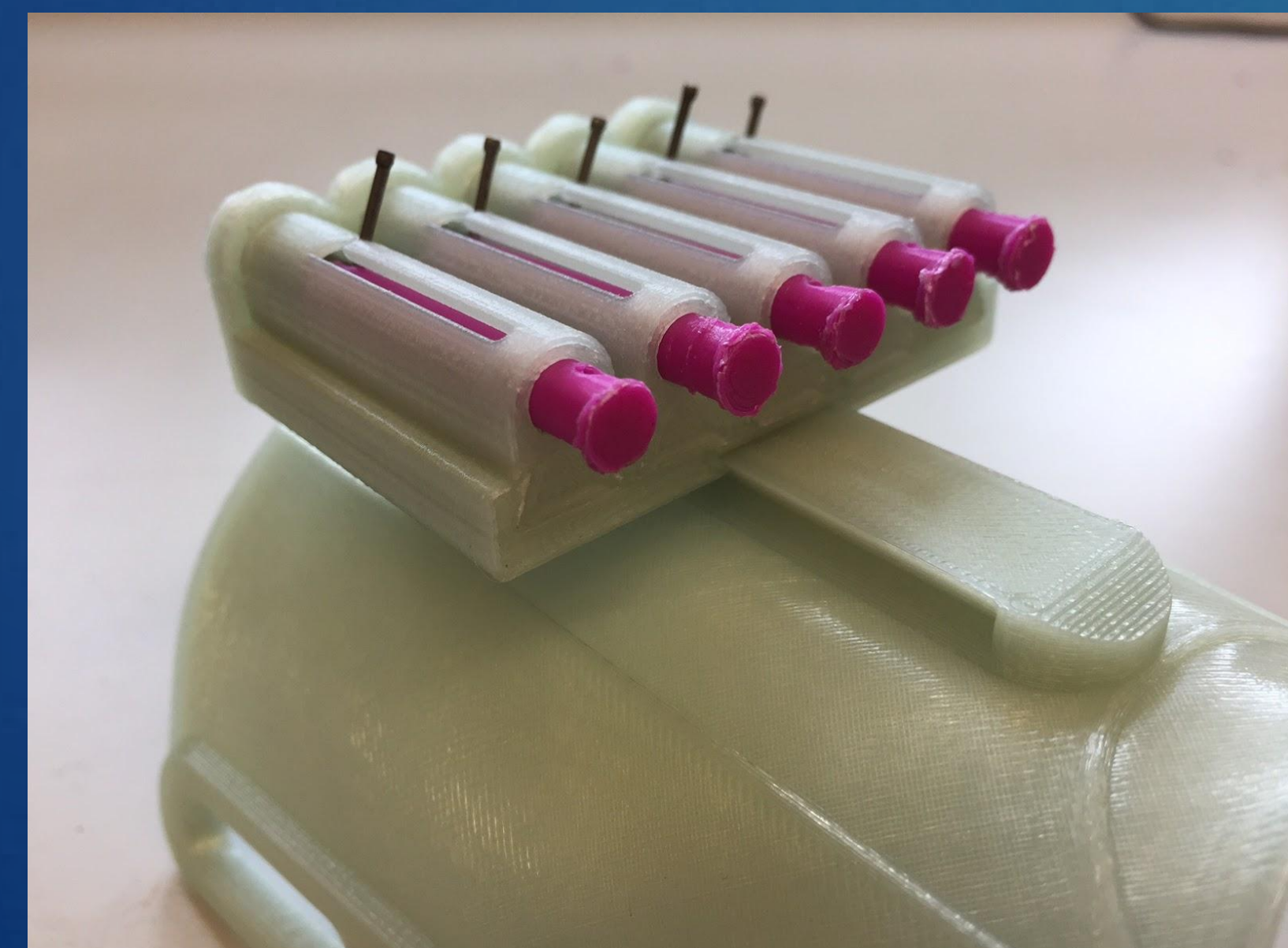
Background and Objective: Children's prosthetic hands are too expensive and are grown out of. Families have a choice to go for high tech expensive hands with high functionality or go with a low tech mechanical hand with low functionality at a low cost. We wanted to add a third choice, one with low cost and high functionality.

Technologies:

Grip Lock:

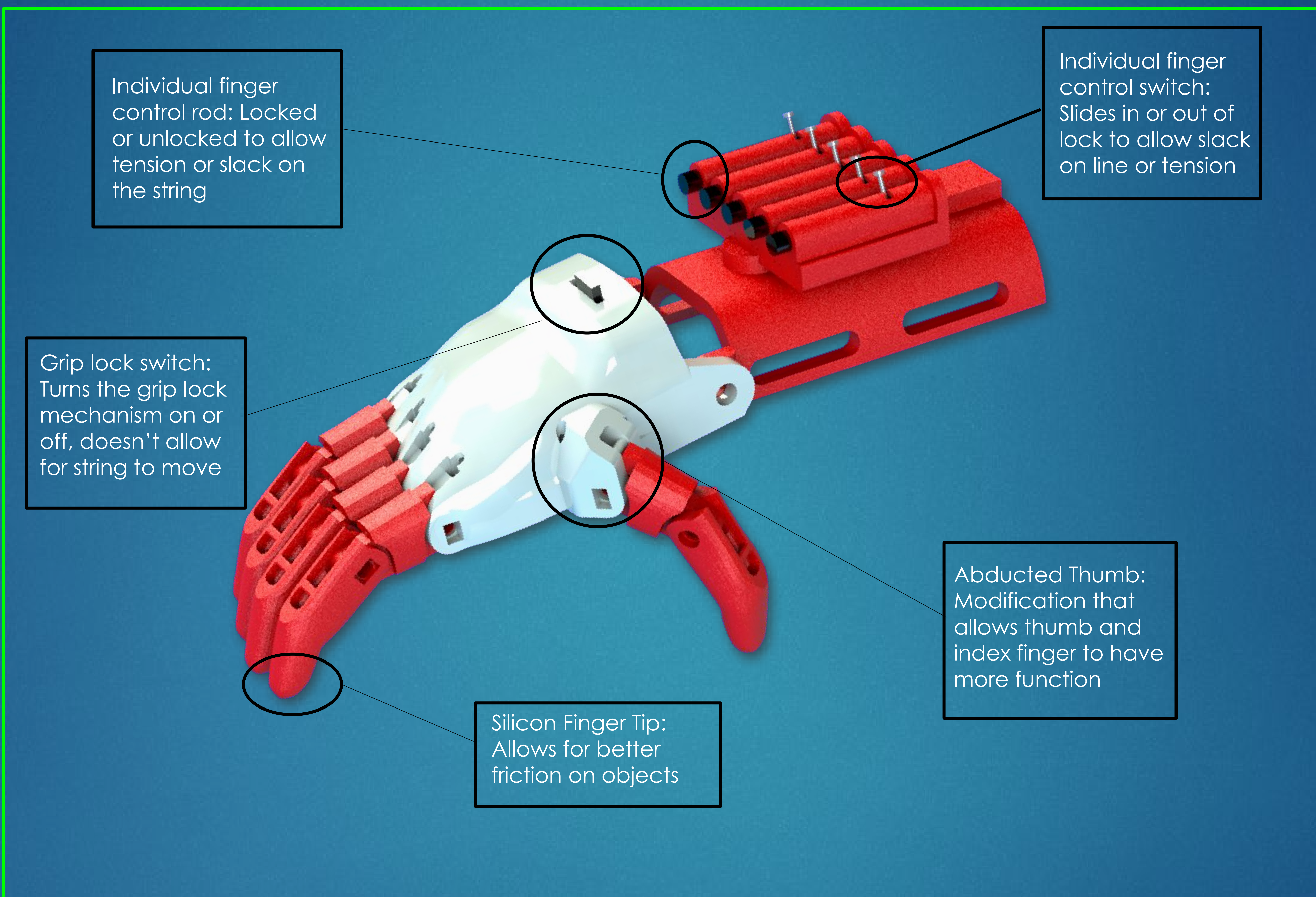


Individual Finger Control:



Design Requirements:

- Size: Needs to be small and compact for kids
- Parts: Limited on parts to reduce chances of breaking
- Power: Needs to be body powered rather than electric motors
- Simplicity: Needs to be 3D printable and able to be put together easily



Individual finger control rod: Locked or unlocked to allow tension or slack on the string

Individual finger control switch: Slides in or out of lock to allow slack on line or tension

Grip lock switch: Turns the grip lock mechanism on or off, doesn't allow for string to move

Abducted Thumb: Modification that allows thumb and index finger to have more function

Silicon Finger Tip: Allows for better friction on objects

Estimated Cost to produce hand:

Material Used	Quantity Used	Unit Cost	Total Price of Material Used
PLA	~17.2m	\$0.225/m	\$3.87
Braided fishing wire	~3.66m	\$0.078/m	\$0.29
Nylon String	~1.83m	\$0.086/m	\$0.16
Sheet metal screws	5 screws	\$0.074/screw	\$0.37
springs	5 springs	\$0.452/spring	\$2.26

Estimated Total Cost to Produce our Prosthetic Hand: \$6.95

Conclusion: A one of a kind method for individual finger control and grip lock on a body powered mechanical hand was created for the purpose of making prosthetic hands with high function and affordability.

Future Work:

- Switchless individual control
- Streamline grip lock interface
- Silicon to replicate skin
- Implement more aesthetic design
- Improved Comfort

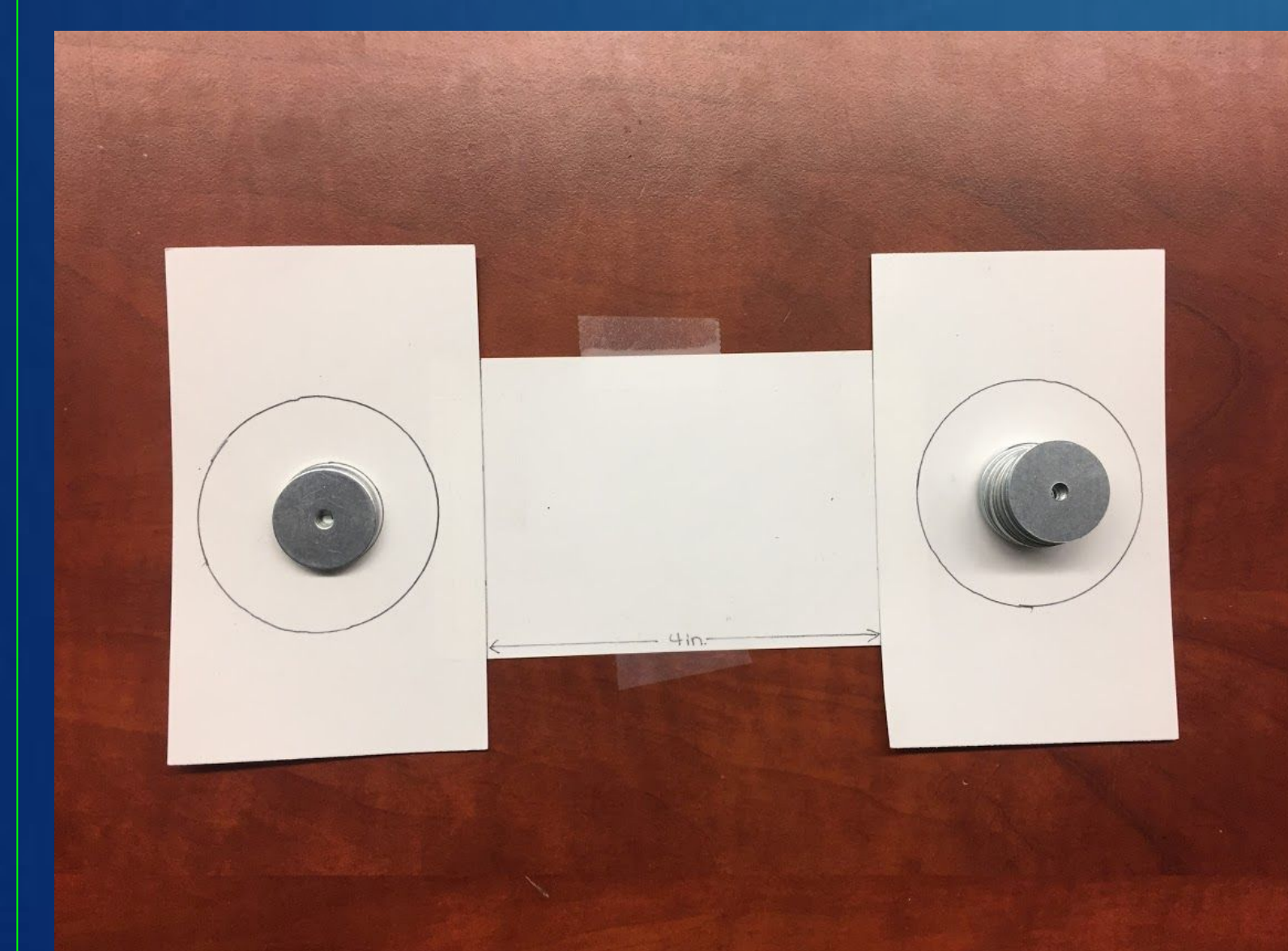
References

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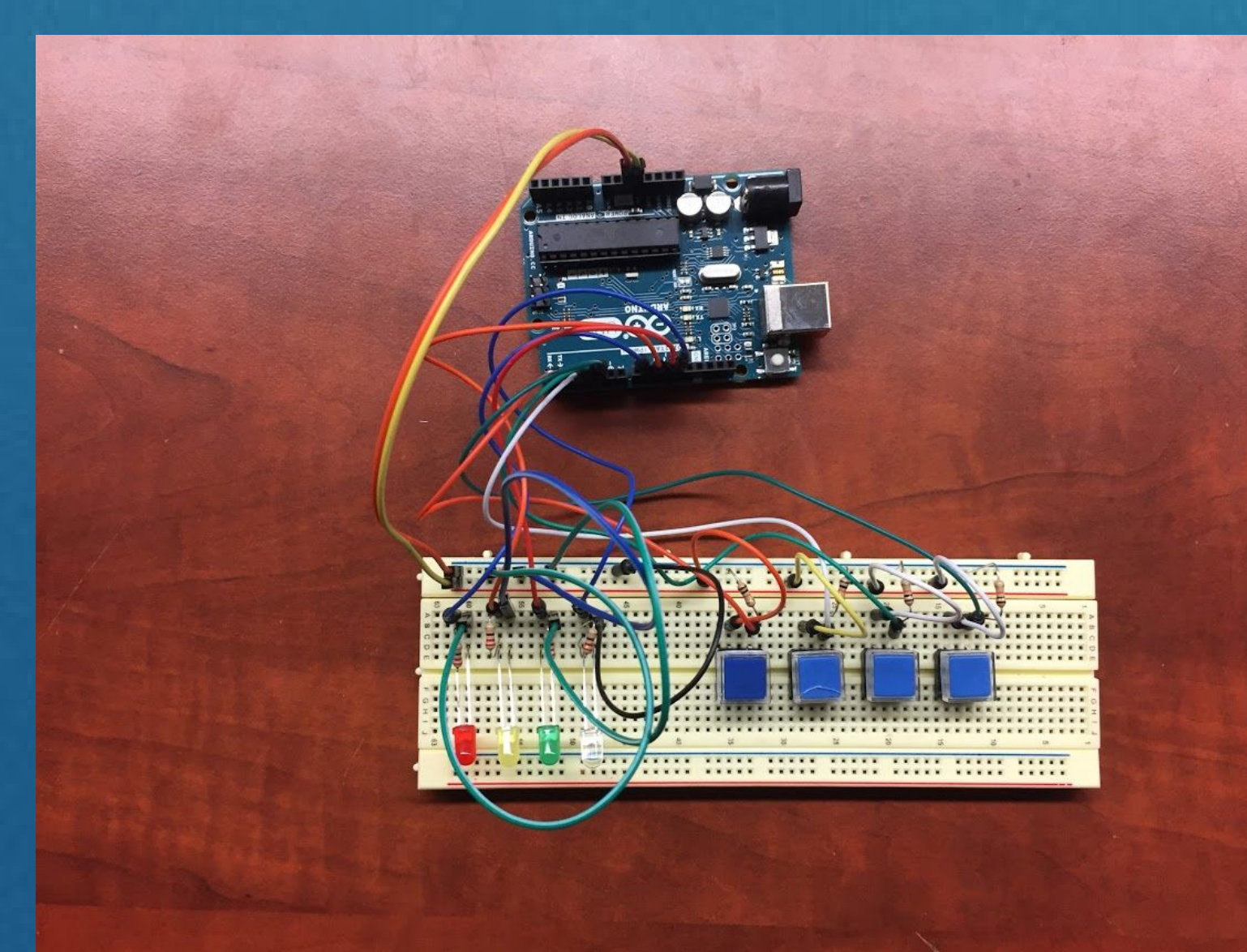
Grip Precision Test:



Grip Force Test:



Button Selection Precision



Tests and Results:

Stacking washers test
 -Modified Prosthetic: 9.4 of 15 washers stacked
 -Standard Prosthetic:9.2 of 15 washers stacked
 Overall Advantage: Negligible
 Observations: Using two fingers reduced likelihood of stack being knocked over

Patterned Button Test
 -Modified Prosthetic: 97.6% Accurate
 -Standard Prosthetic:30.7%
 Overall Advantage: Significant [66.9% improvement]
 Observations: Using two fingers reduced likelihood of stack being knocked over