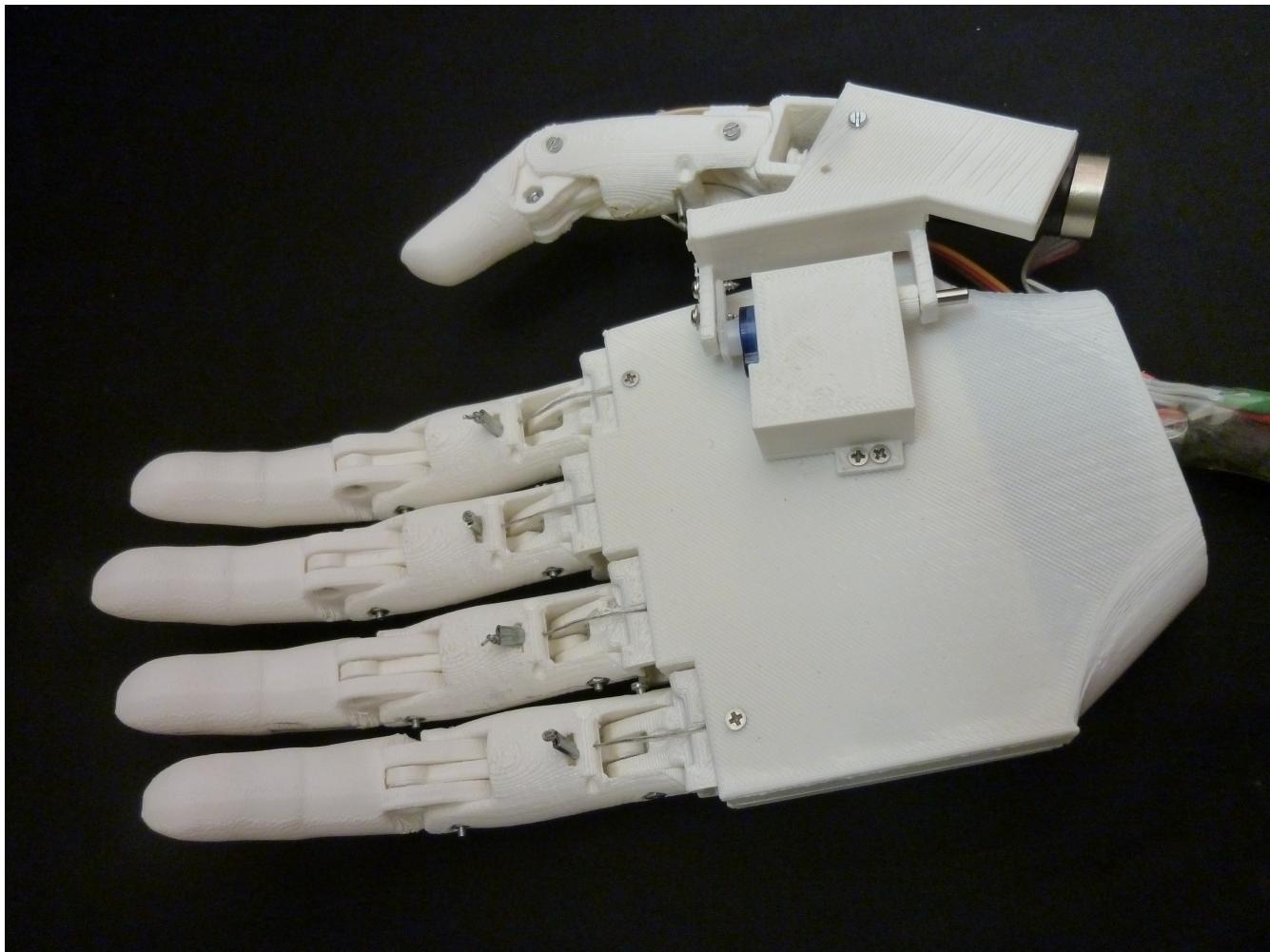


# Tact Hand

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The tact hand is an open-source myoelectric prosthetic hand project. It was developed by Patrick Slade in the Bretl Research Lab at UIUC. The goal is to provide instructions on how to construct a complete functional myoelectric prosthetic hand with the mechanical hand, including motors, costing less than \$100 and a full myoelectric system including the hand costing \$250. The Tact hand has been shown to have comparable performance to current commercial prosthetic hands costing \$30,000 - \$100,000. This low-cost goal is achieved by using 3D printing of the parts and common mechanical parts. Instructions on parts and assembly can be found below.

#### Parts List

Part Name	Quantity	Cost (total)	Source
ABS Plastic Spool	0.25 kg	\$10	Amazon.com
Escap 16 Coreless DC Gear Motor	5	\$60	Ebay.com
M2 Screw 6mm length	30	\$5	Amazon.com
M2 Screw 12mm length	10	\$5	Amazon.com
M2 Screw 20mm length	10	\$5	Amazon.com
M2 Nut	50	\$4.48	Amazon.com
Steel Cable	10 ft	\$5.50	McMaster-Carr Part #: 3423T22
Towerpro SG90 Servo	1	\$2.50	Amazon.com
Misc. Rubber Band Bag	1	\$0.99	Amazon.com
<b>Total Cost:</b>		<b>\$99.48</b>	

#### Printed Parts List

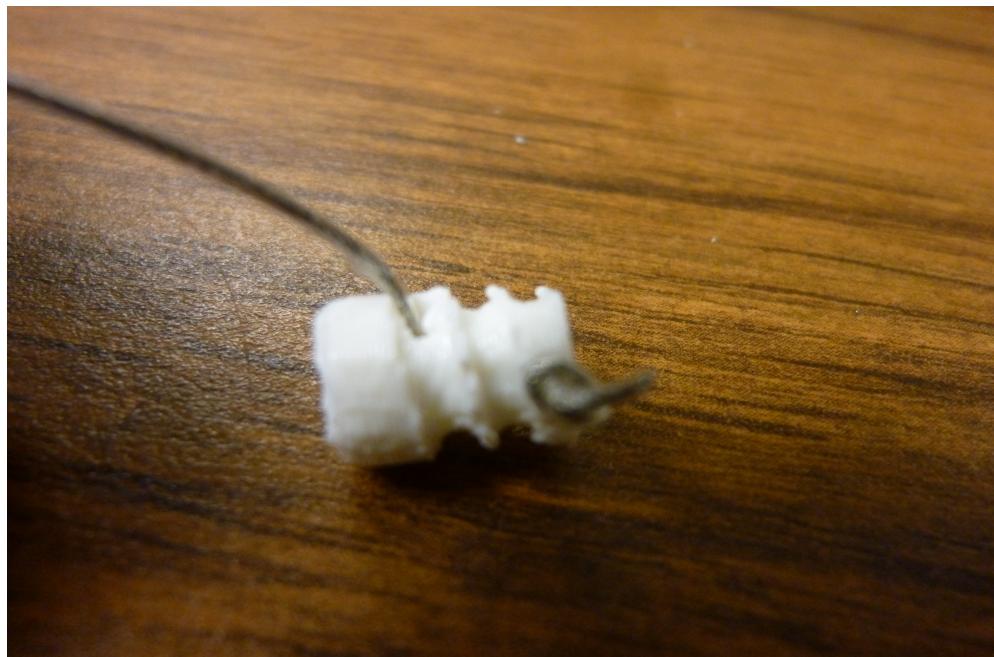
Hand Part	Number Printed	Print Infill Percentage	Resolution (mm)
Finger1	4	10	0.2
Finger2	5	10	0.2
Hand1	1	10	0.2
Hand2	1	10	0.2
Linkage	5	10	0.2
MotorHousing	5	10	0.2
Thumb	1	10	0.2
ThumbHinge	1	10	0.2
ThumbMount	1	10	0.2
Spool	5	100	0.1

# Assembly

We begin the assembly process by collecting all the components together. Gather the following tools as well: phillips or flat head screw driver (depends on your type of screws), two needle nose pliers, superglue, and wire cutters.



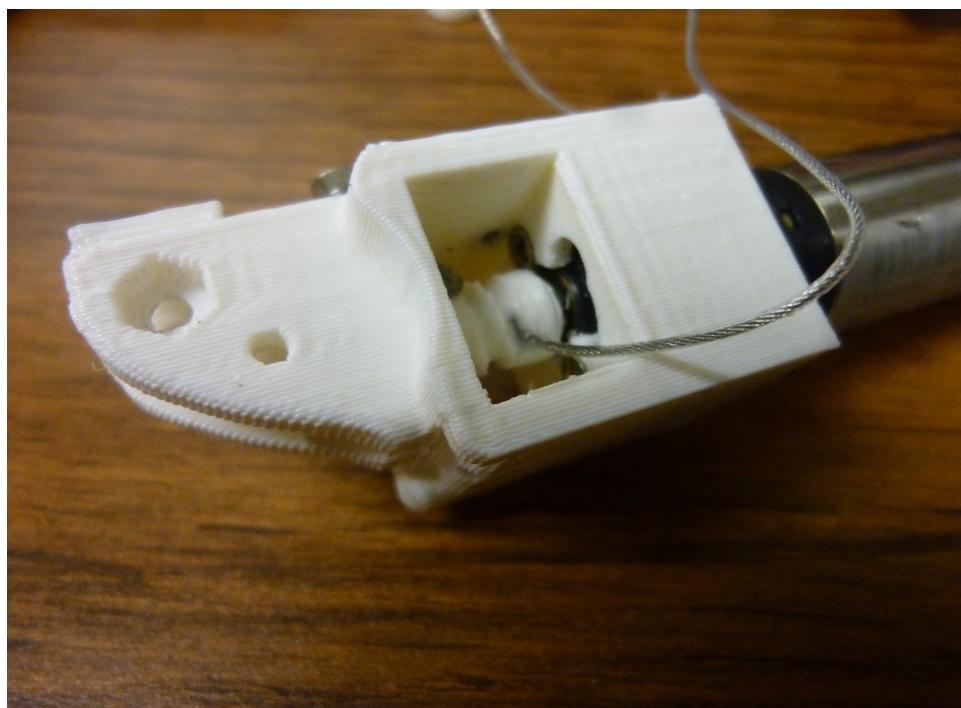
We will begin assembly on a finger. First take your length of steel cable, tie a knot at one end, and dot it with glue to ensure it doesn't slip. Take the spool and pull the cable through the smaller hole by the top of the part so that it starts on the outside diameter of the spool and pokes out on the inside of the spool diameter. Now pull the rest of the cable through until just the knot is left at the outside of the hole. Send the free end of the cable through the larger hole in the spool, beginning on the inside the diameter of the spool and exiting to the outer edge of the spool. Confirm that you have done this correctly with the next picture.



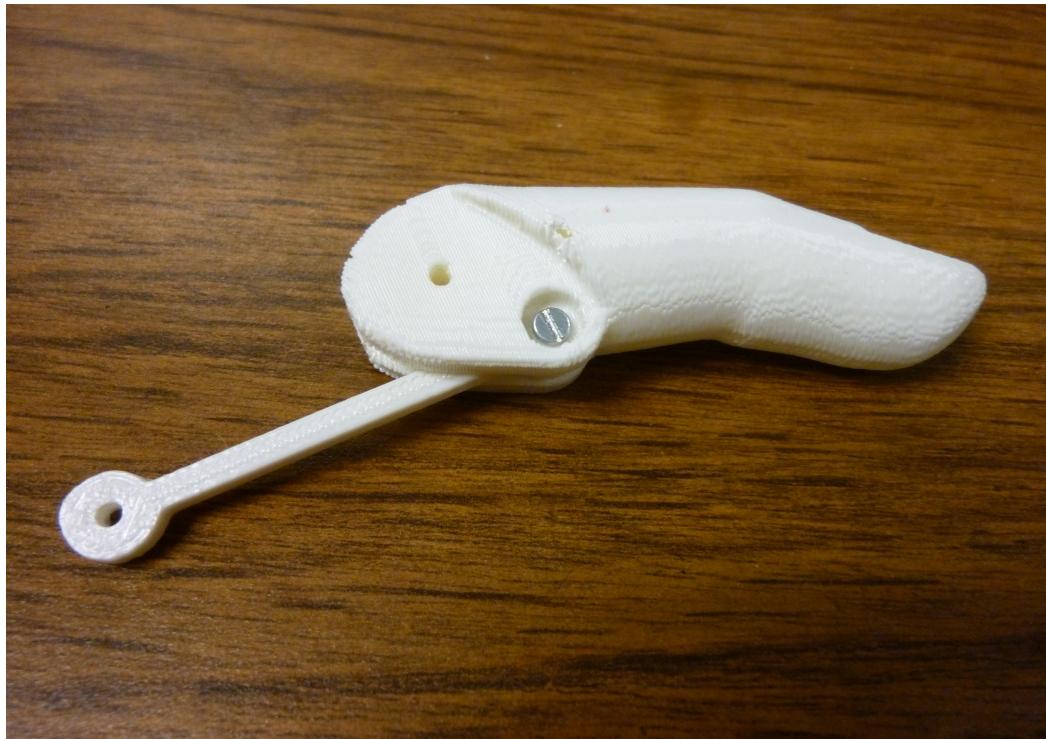
Take a motor and press fit the spool onto the shaft of the motor. Ensure that you have lined up the flat part of the motor shaft with the flat part of the spool. If this is not aligned correctly you will not be able to press fit the spool onto the motor shaft and could risk damaging the spool. Refer to the next image to check if this was done correctly.



Now take the motor housing piece. Insert two 6mm M2 screws into the small holes on either side of the larger opening. Push the motor/spool combination up through this larger hole and screw in the motor to the housing.



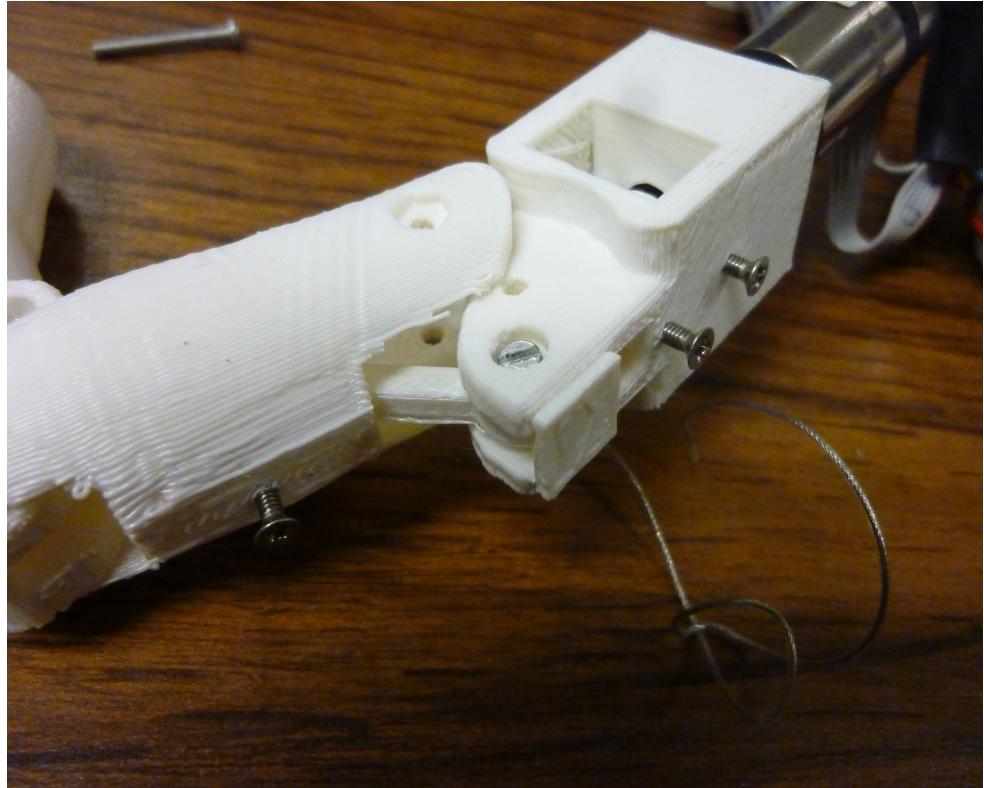
Gather both the finger tip part and the linkage. Using an 12mm M2 screw and nut fasten the linkage into the slot in the finger tip part. Make sure it is loose enough to still rotate freely.



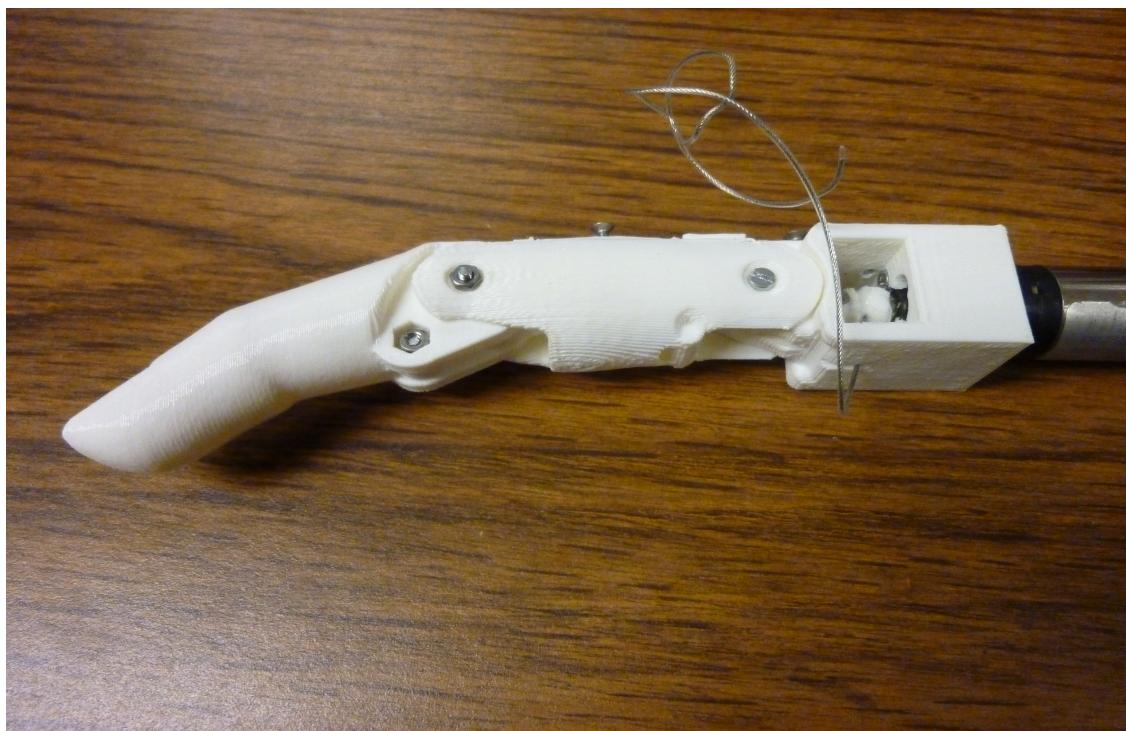
Now take the lower portion of the finger and slide the linkage and finger combination inside of it. Watch the orientation. Screw the two finger pieces together through the remaining hole in the finger tip part with a 20mm M2 screw.



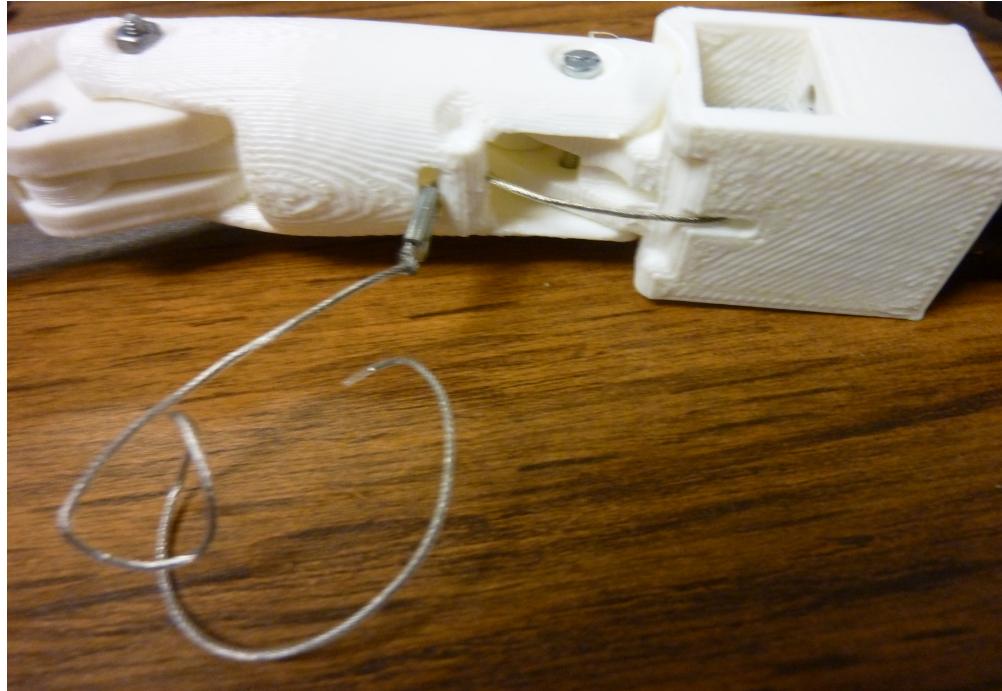
Take the partially assembled motor housing and finger parts and affix the free end of the linkage to the appropriate hole in the motor housing using a 12mm M2 screw. You will have to bend the finger fully to be able to do this.



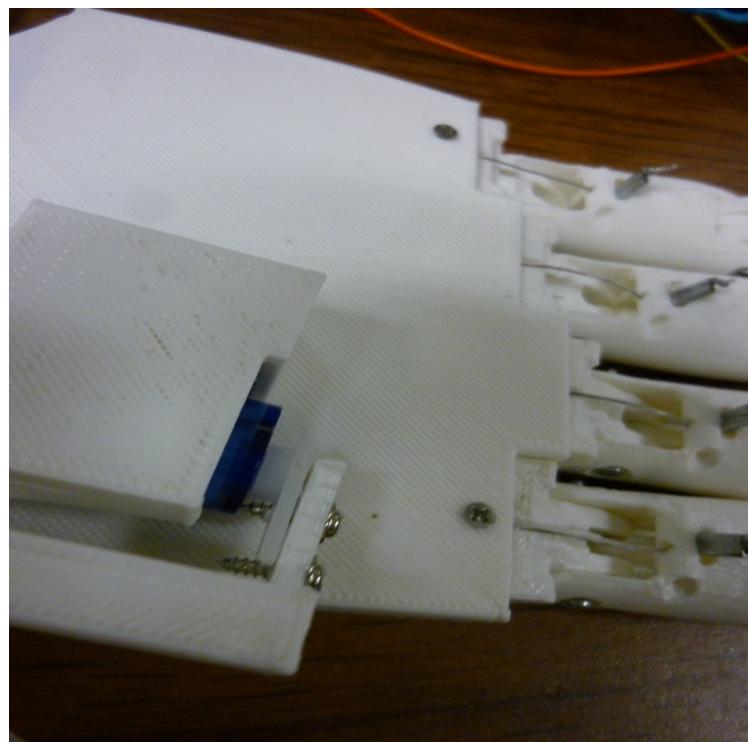
Now affix the remaining hole in the lower portion of the finger to the remaining hole in the motor housing using a 20mm M2 screw.



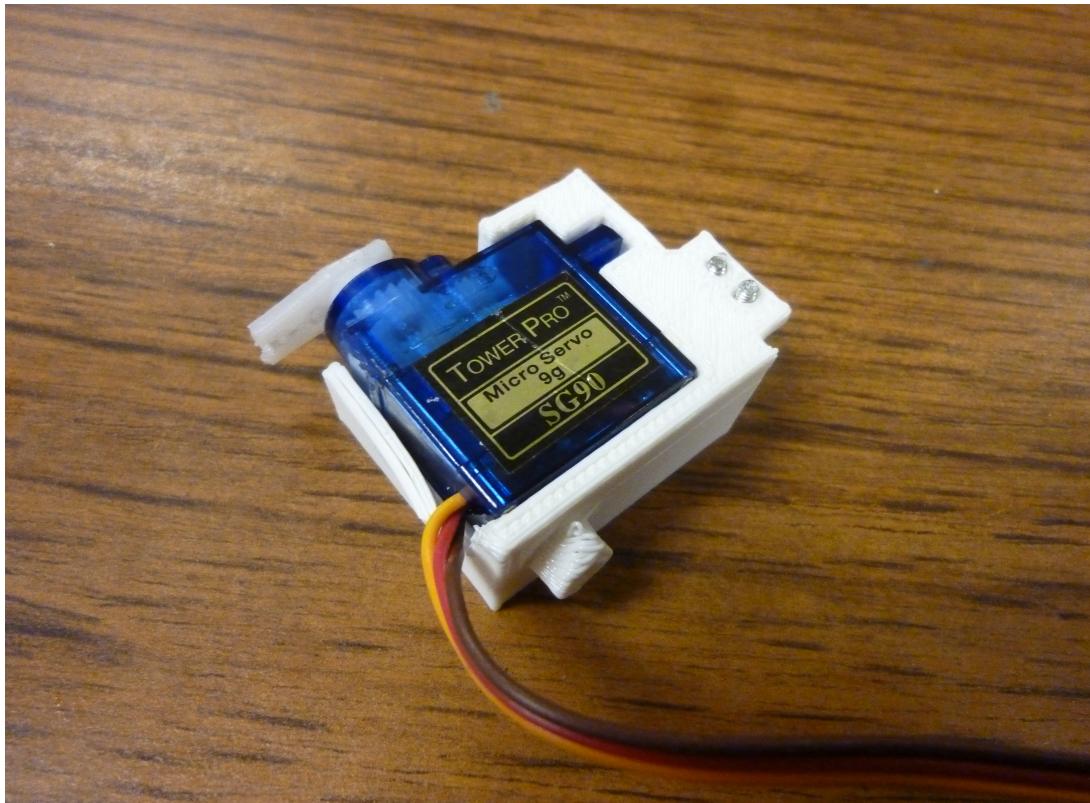
Now route the length of cable remaining out of the inside of the motor housing and up through the hole in the cylindrical part of the lower finger piece. Take a wire crimp or tie a knot in the steel cable and add a dot of glue for strength. Use the wire cutters to clip excess cable.



Repeat this finger assembly process for all fingers and the thumb. Note that the thumb has a different finger tip piece but the rest remains the exact same. Once all the fingers are assembled, take both hand parts and lay them flat. Note that one has 4 holes. This is the back plate of the hand. Line up all the motors in this part and affix each one to the back plate using a 6mm M2 screw. Then take the front plate and affix it to the two appropriate fingers with 6mm M2 screws.



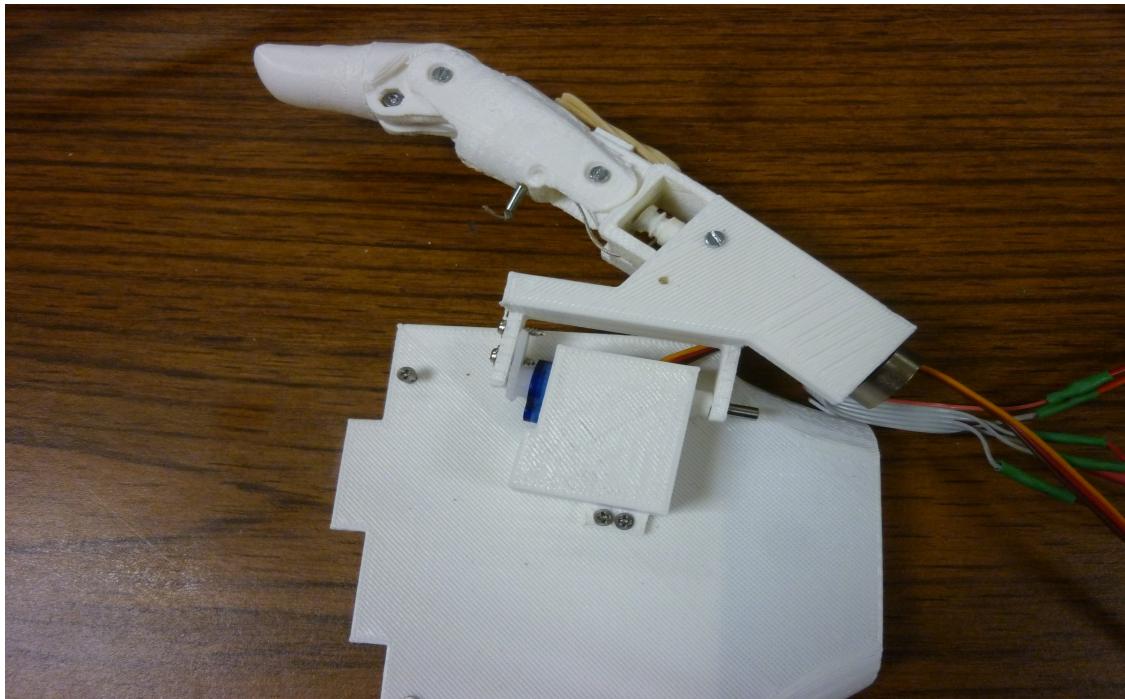
To assemble the completed thumb finger to the body of the hand, first find the servo and the servo holder printed piece. They should press fit together.



Next take the small part that mounts between the servo and the thumb and attach it to the corresponding hole in the thumb piece using a 6mm M2 screw.



Now assemble the thumb bracket onto the servo using the two screws given with the thumb servo. Attach this assembly onto the front part of the hand with two 6mm M2 screws.



You have now completed the hand.

