手i2

从图库下载 STL 文件：i2RightHand (https://inmoov.fr/inmoov-stl-parts-viewer/?bodyparts=i2RightHand) i2LeftHand (https://inmoov.fr/inmoov-stl-parts-viewer/?bodyparts=i2LeftHand)。

在打印所有部件之前，您应该打印一份校准器 (CALIBRATOR) (https://inmoov.fr/wp-content/uploads/2019/01/Calibrator.stl)，以检查部件是否能够拼合。如果您在拼合这些部件时遇到困难，可以调整切片软件的水平扩展设置来解决这个问题。此设置可能因切片机和打印机而异，但用户报告称，将其设置为 -0.15 是一个不错的起点。

以下是一只右手所需的零件清单和打印数量：

- 1个i2_CoverFingerV3
- 1x i2_FingersMoldX5V3
- 1个 i2_FingersTipX5V2
- 1个i2_FingersX5V1
- 1x i2_HandCoverV1
- 1个i2_PalmCoverV2
- 1x i2_PulleyX5V1
- 1x i2_WristGearV1
- 1个 i2_WristLargeV2

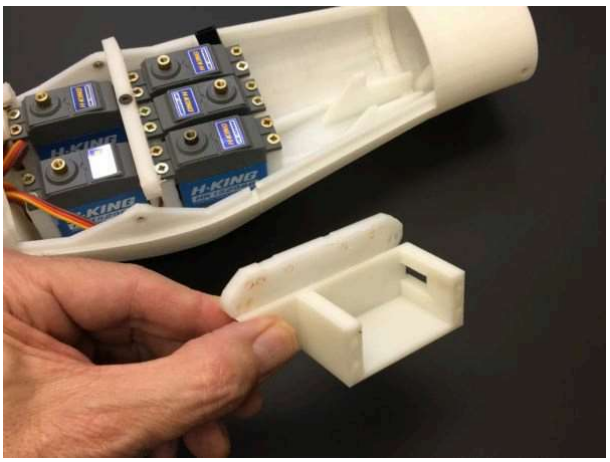
打印腕部大件、手指模具、手指、腕带、滑轮，最大分辨率 0.25，填充率为 30%，壁厚为 2 毫米，无支撑，无筏。

打印 CoverFinger、FingersTip、HandCover、PalmCover，最大分辨率 0.25，填充率为 30%，壁厚为 2 毫米，需要支撑，如果打印机需要，则需要筏。

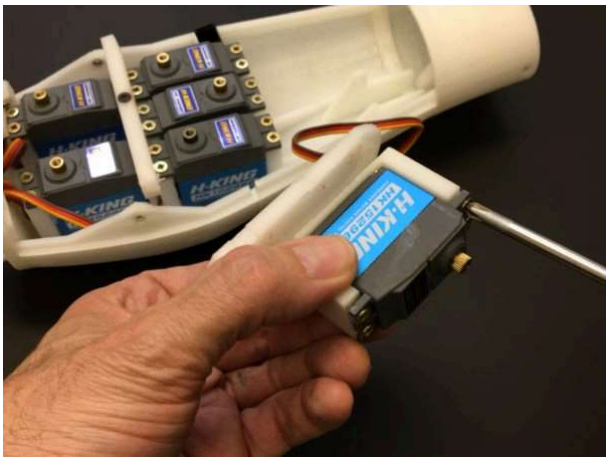
物料清单：

- 25个沉头螺钉M3 x 16mm
- 5 个 M3 x 4mm 沉头螺钉
- 1 个 M3 x 12mm 沉头螺钉
- 5 个平头螺钉 M1.5 x 4mm
- 5个膨胀弹簧3/16英寸x1-3/4或4.8毫米x44.5毫米
- 6x舵机 JX-6225MG 300度
- 1x 带状线 16 根 3 米
- 1 条编织鱼线 0.8 毫米 200 磅，3 米

步骤1

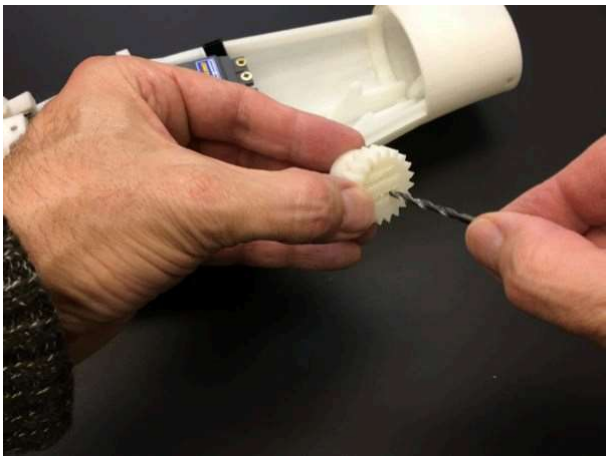


将腕部伺服支架粘到 RobCableFront 上



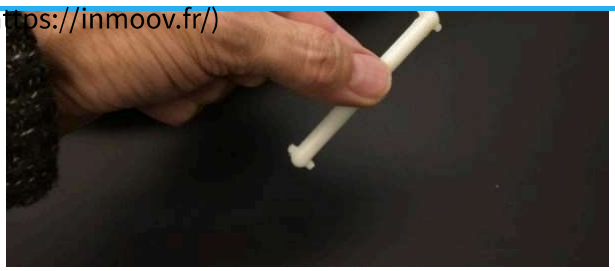
用 4 个螺钉安装伺服电机

如果需要，用 M3 钻头重新钻孔

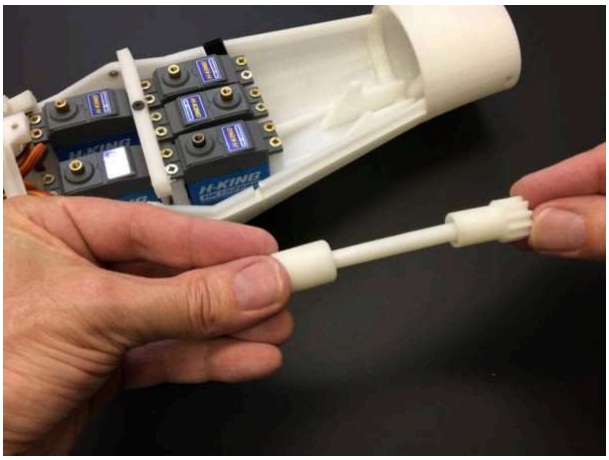


重新钻孔，以便 M3 PTFE 管穿过它们

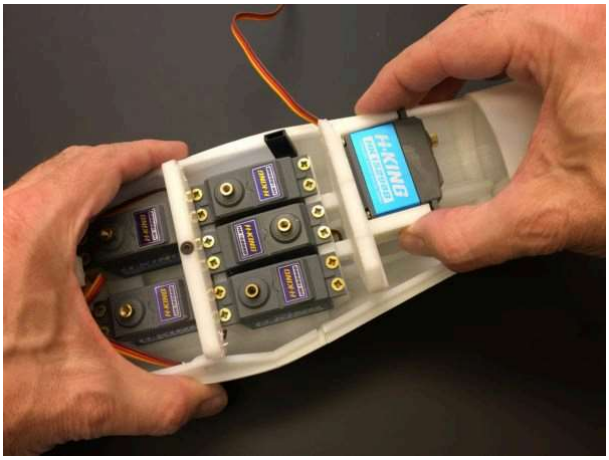
使用 M3 钻头重新钻孔



将两个轴打印部件粘合在一起

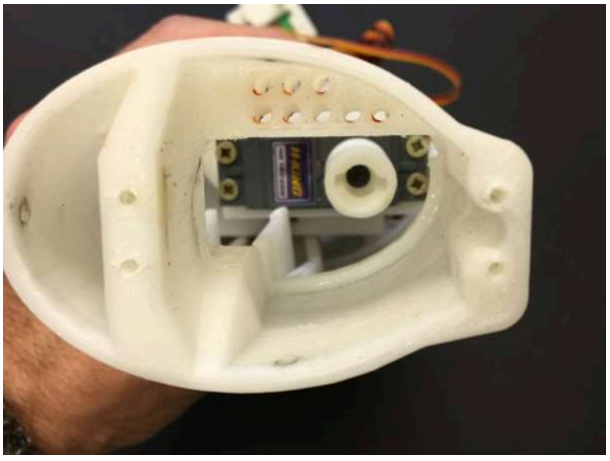


检查以确保轴正确安装在两个印刷齿轮中

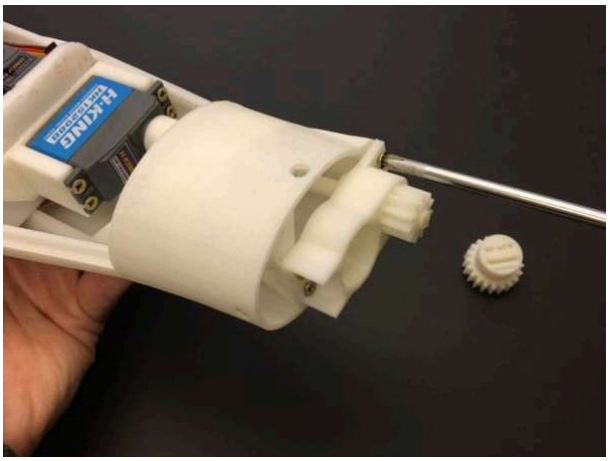


将 RobCableFront 和伺服支架安装到伺服床上

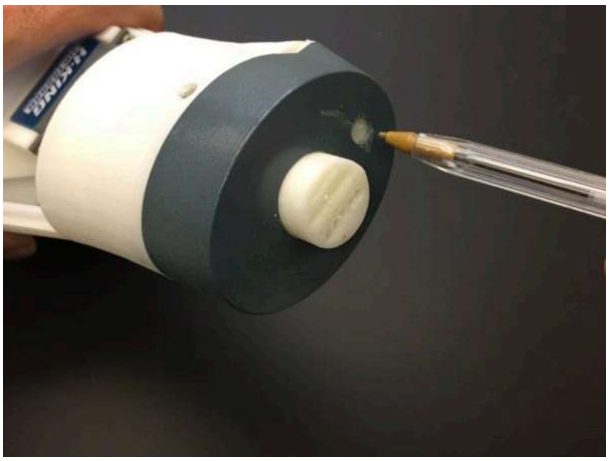
此视图向您展示了 WristGear 的组装以及各个部件如何组合在一起



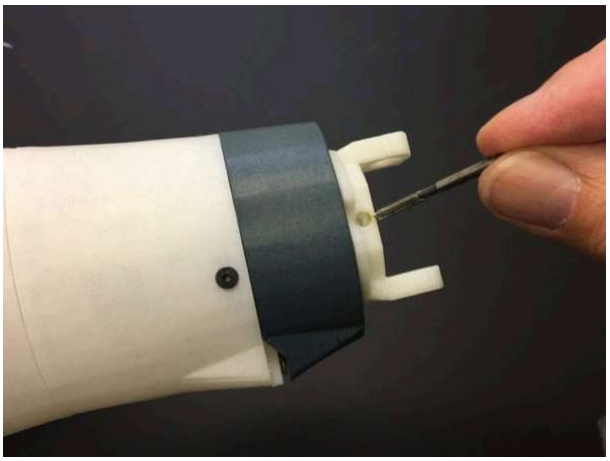
将舵机角度设置为大约 90 度（HK15298B）或 150 度（JX-6225MG）。（即舵机总角度的中间值）。您可以使用此脚本 (http://www.inmoov.fr/wp-content/uploads/2013/10/Arduino-Schetch-servo-zerorestmax.txt)进行设置。用 3 毫米螺钉将组件末端安装到舵机轴上。



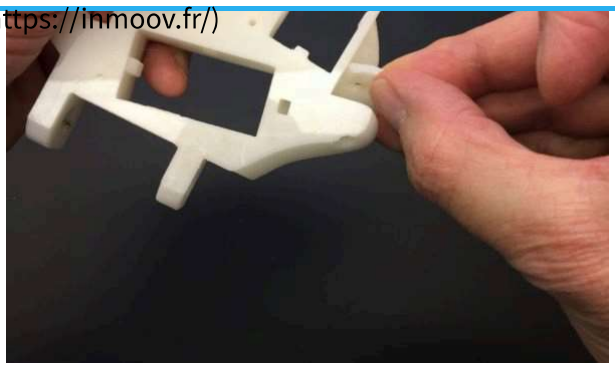
按图示组装主齿轮



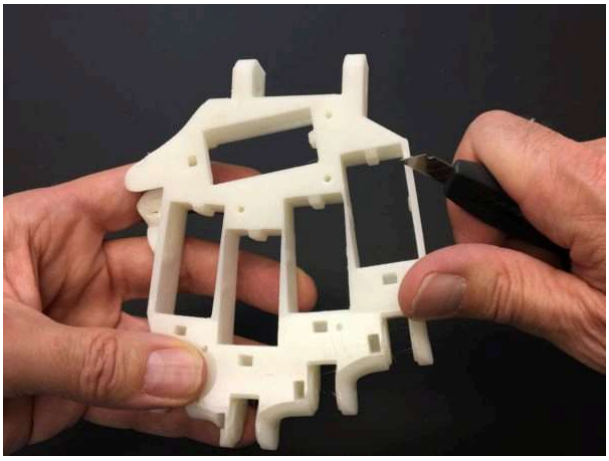
注意小齿轮的头部必须适合 RotaWrist2 的预留孔



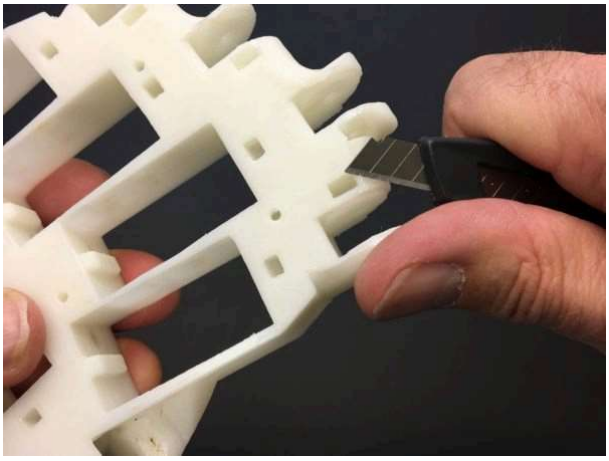
使用 M3 螺丝刀将主齿轮与 RotaWrist3 对齐，然后添加 M3 x 12 毫米螺钉将它们固定在一起



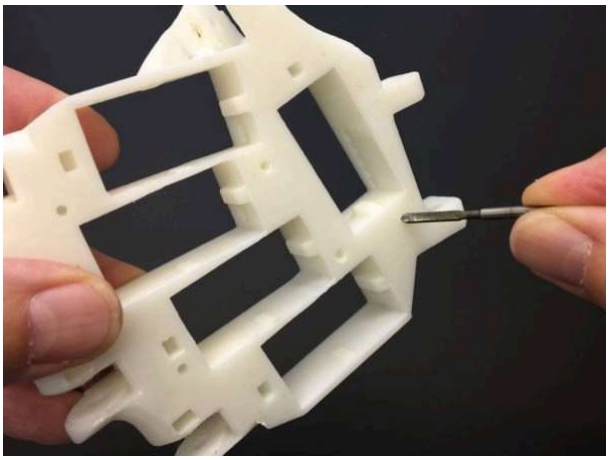
删除那块打印的预支撑，你不再需要它了



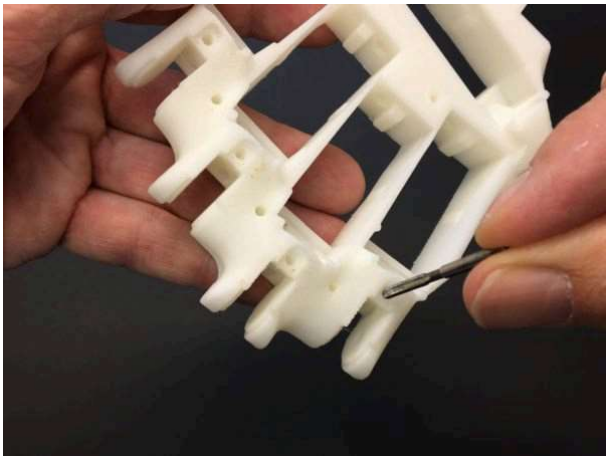
用锋利的刀片，必要时清理边缘



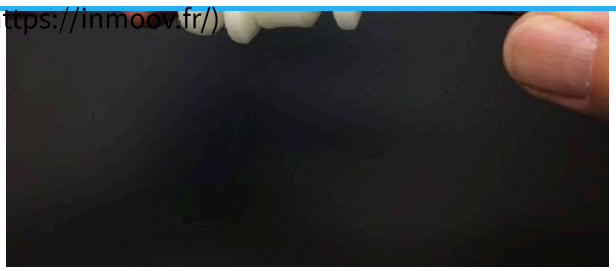
使用 M8 钻头重新钻孔 WristLarge



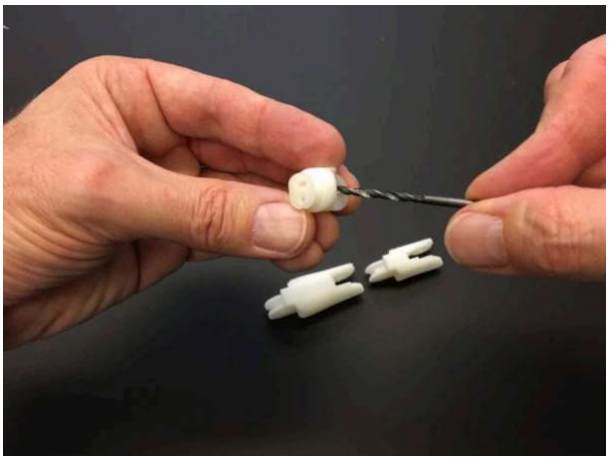
使用 M3 丝锥，在将要固定手盖的地方准备一些 M3 x 16 毫米螺丝孔



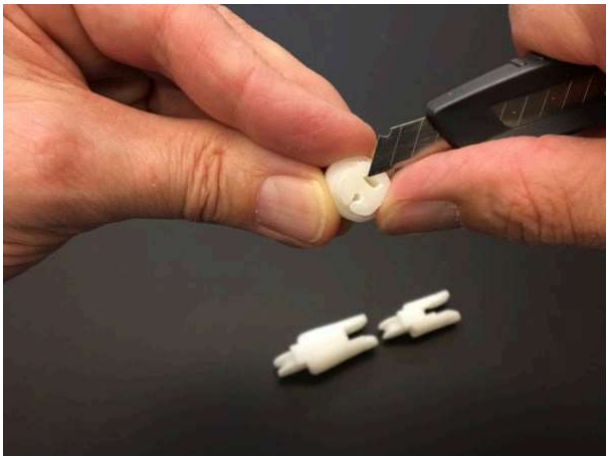
使用 M3 丝锥，为安装弹簧的 M3 x 16 毫米螺钉准备孔



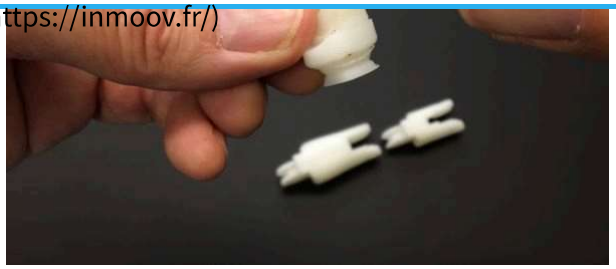
使用 M3 钻头，清理连接每个手指的所有孔



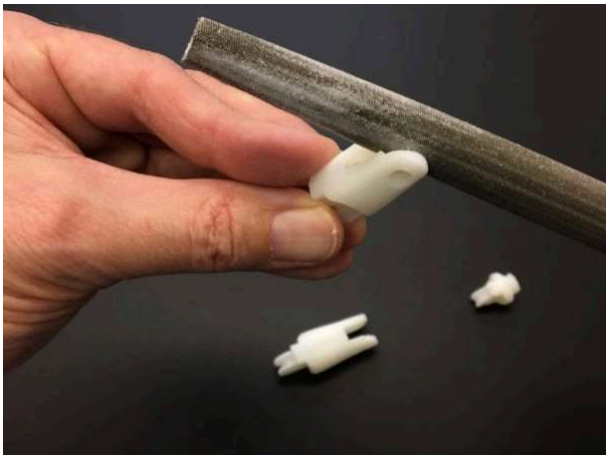
With a M3 drill bit, clear up all the holes of each 3 sections of all fingers



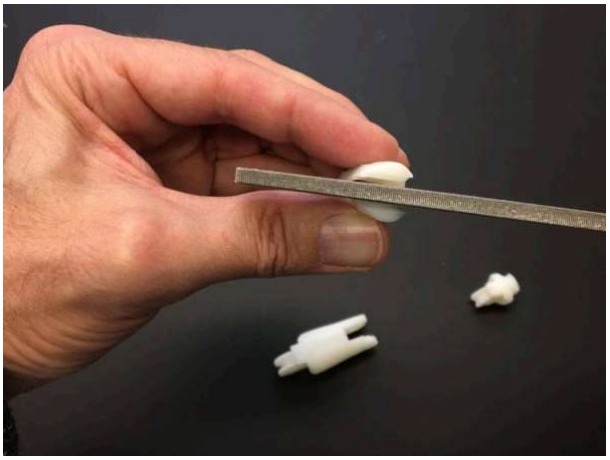
With a sharp blade, clear up the exit for the hall sensor



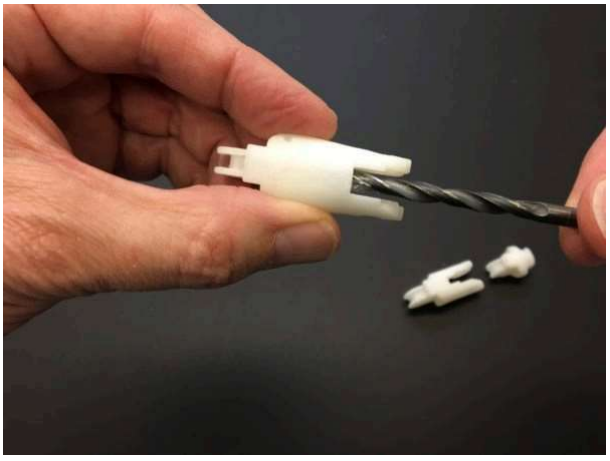
With a M1.5 drill bit, clear up the hole where the end of the spring will be attached



With a fill, make sure the three sections of each finger fits and moves really smoothly. This is super important to have good working fingers



With a M5.5 drill bit, clear up this finger section to allow the spring to run through properly



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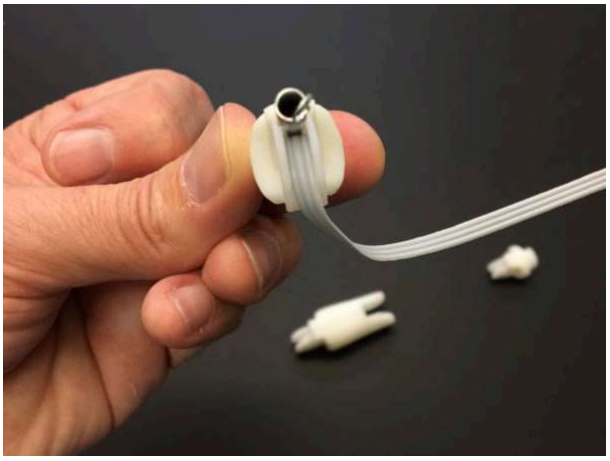
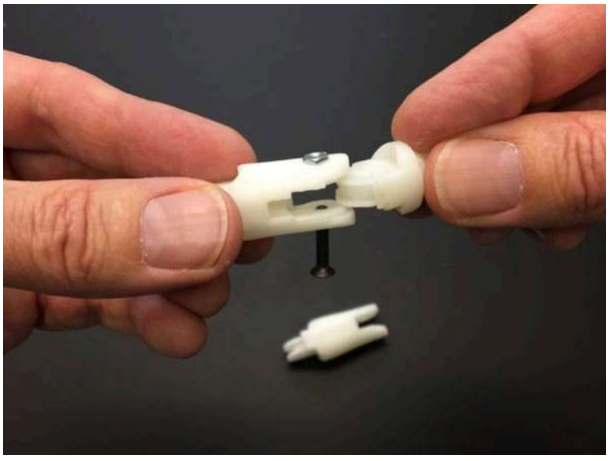
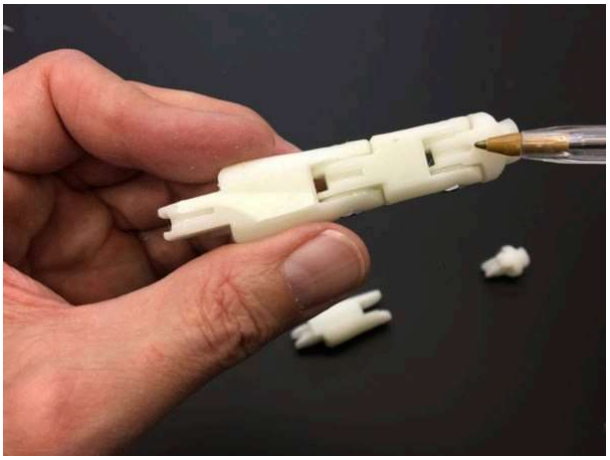


This is to show you how the spring and the three sensor wires will be mounted in each finger section

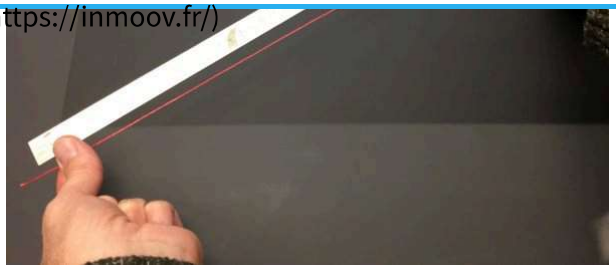
Make sure a needle can slide through each finger section as shown, otherwise clear up the holes



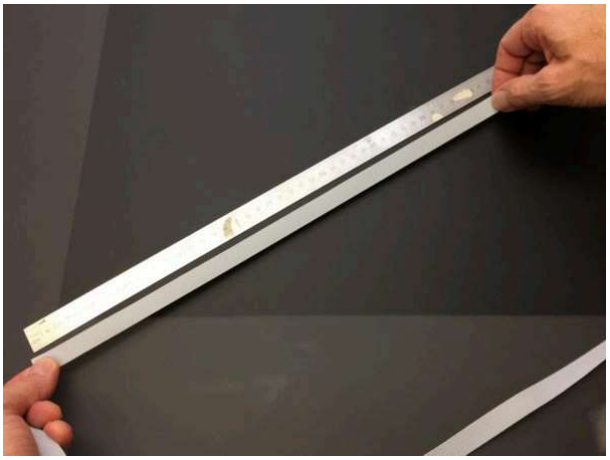
Add and mount finger sections together using M3 x 16 mm screws and bolts



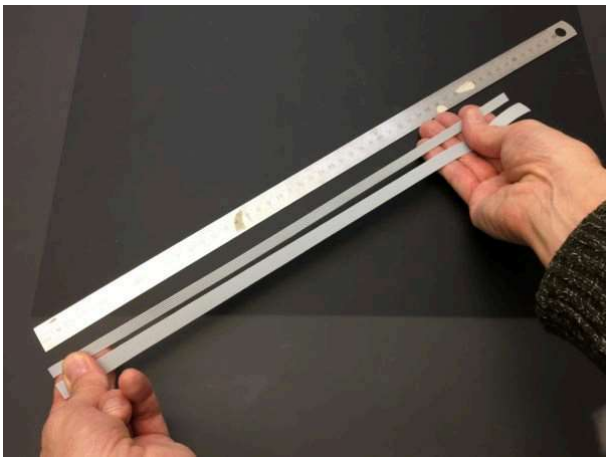
Make sure the entrances for the braided fishing line are cleared up as well

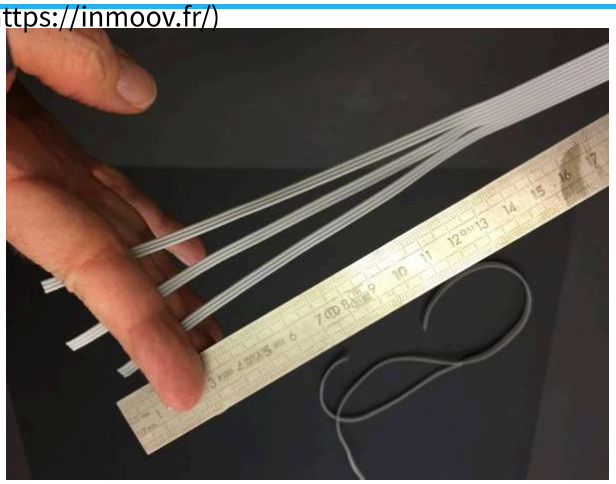


Prepare 5 length of 50cm of braided fishing line (0.8mm 200LB) You can find that product if you type in google search with these key words: braided fishing line 0.8mm 200LB

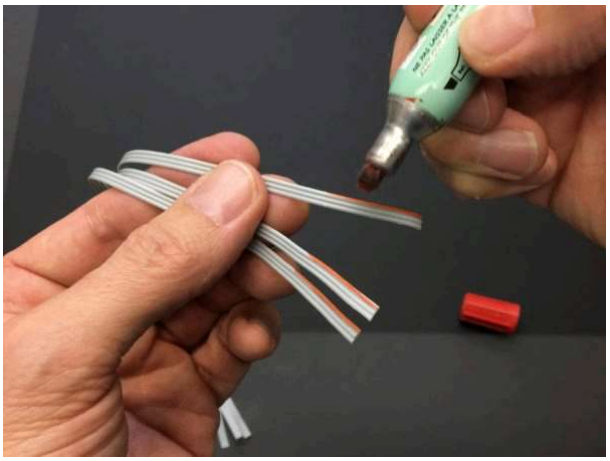


Prepare a length of ribbon cable of 40cm. You can google search with these keywords: ribbon cable 16 pin (make sure to get the most flexible and thin as possible)

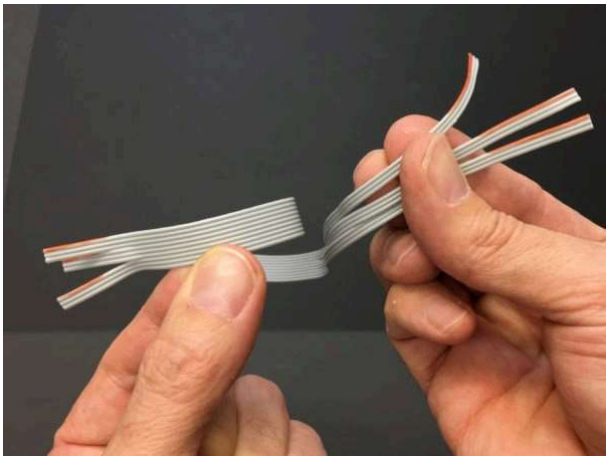


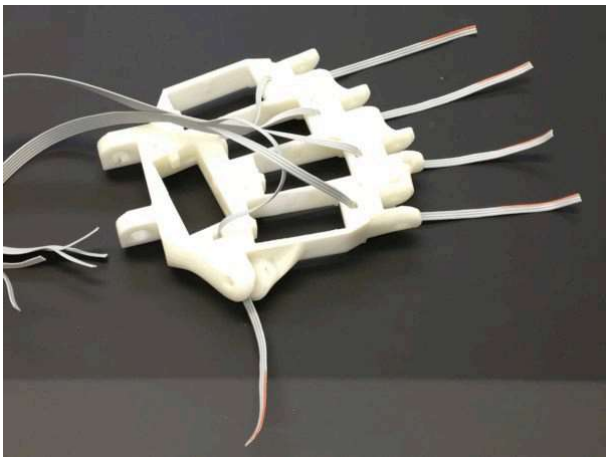


Remove completely 1 wire from the 10 wires section. Separate the 9 wires section to have three sections of 3 wires on a 15cm length

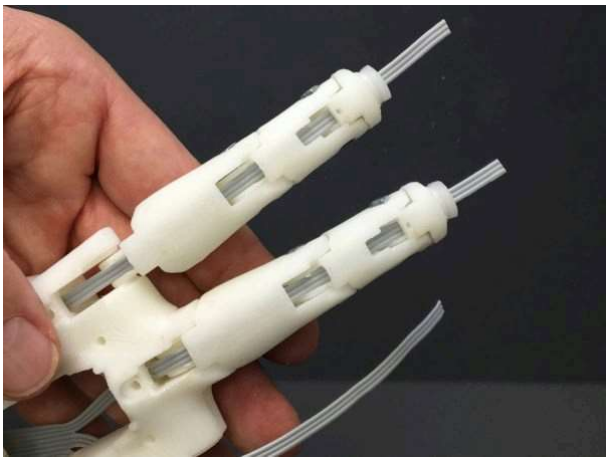


With a red marker, color one wire on each section. We will assume these are the positive (+) wires

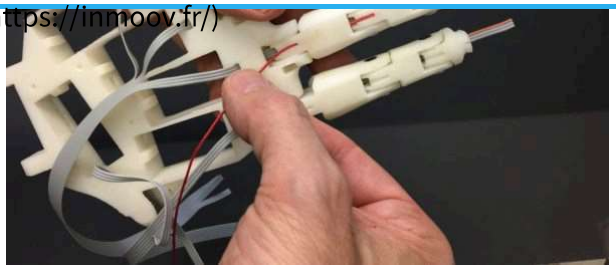




Run through WristLarge each 5 ribbon sections



Run the ribbons through each fingers, look out not to mount the fingers upside down. Also note that each finger are similar, only the thumb differs with it's shape.



Now run the braided fishing lines through each fingers. To make the fishing line stiff on the end tip, it is useful to add some superglue.

Add superglue on a 1 cm length of the braided fishing line.

Wait until it is completely dry and cut the glued section in the middle, this will ensure a strong and thin tip.

By pulling the fishing line as shown into the V groove of the finger tip, you can get attached

Now run the other tip of the fishing line into the hole of WristLarge

This is to show you how it should look like. On my picture I haven't done the thumb yet, but you can do it. All five fingers can be done at the same time.

If you haven't done it, clear up the 3mm bolt casings for the next step

It's now time to add the M3 x 16 mm screws and their respective bolts to assemble the fingers to WristLarge. Start with Majeure finger, then Index finger, Ring finger, Pinky and finish with Thumb

Set the mini clamp on the groove of the printed bolt

Run through the main gear the largest ribbon

Place and screw the palm cover with 3 screws of M3 x 16 mm

When screwing the palm cover, make sure to set neatly your ribbons in the grooves and really avoid pinching them

Now run the M2.5 PTFE tubes through the main gear Teflon pipes ID1.5MM X OD2.5MM (https://fr.aliexpress.com/item/32730855848.html?spm=a2g0s.9042311.0.0.3b966c37jungcW) The PTFE tubes are with the following lengths: Thumb 335mm Index 300mm Middle 300mm Ring 300mm Pinky 360mm

Run the tube through the the servo bed holes. Approach the tube to the servo shaft at about 1.5cm

Run the fishing line through the tube

And place the end of the tube into the reserved hole until it cannot go further

Repeat the operation for each finger

Now get your 5 springs Springs 3/16"x1-3/4 (https://www.ebay.com/itm/200pc-Spring-Assortment-Set-Compression-Carburetor-Extension-Z1T1/264399686883?epid=19011685359&hash=item3d8f730ce3:g:BGUAAOSwRrJdLUQ5)

Run the fishing line through the spring hole of the main finger section

Run the spring through the second finger section

Get 5 small screws, I used some from the servos that are mounted in the eye mechanism, the diameter of these screws is about 2mm

Cut with pliers the screw to be a maximum total length of 4mm

Hold the spring in place

And mount that small screw to set the spring in place. Make sure the screw is not piercing the three ribbon wires

Get or cut five screws of 3mm with a maximum length of 4mm

Pull the fishing line to get the spring tip to be in place and mount the screw. Note, I use a black magnet on my screw driver to ease the action of setting the screw

Before tightening the screw, withdraw the fishing line

Finish tightening. Make sure you are not piercing the three ribbon wires

Get two needles

Fold the last section of the finger at maximum and run the first needle through the finger and spring until it comes out on the other side.

Fold the second section of the finger and run the second needle through the finger and the spring until it goes through. This allows to set adapted tension on each finger section

Cut the needles with a small pliers

Put a drop of super glue to ensure the needle won't come out anymore

Time to do the same with the thumb, there is only two finger sections, so the spring is less in tension and doesn't require needles

The other difference with the thumb, is that we set the screw into the cover which then holds the spring in place. Make sure not to pierce the wires. Although my picture shows the HandCover being already attached, don't attach it yet, you still need to access the inside

Let’s solder the hall sensor to the wires. Start soldering the middle wire. Note the position of the sensor on my picture, because one side is positive and the other is negative. HALL sensors AH3503 (https://fr.aliexpress.com/item/32899671134.html?src=google&src=google&albch=shopping&acnt=494-037-6276&isdl=y&slnk=&plac=&mtctp=&albbt=Google_7_shopping&aff_platform=google&aff_short_key=UneMJZVf&&albagn=888888&albcp=6459793138&albag=77316928277&trgt=743612850714&crea=fr32899671134&netw=u&device=c&gclid=CjwKCAiA_f3uBRAmEiwAzPuaM3NMls2FXydvh7C1B073Ng0wvuwxhDTT_k_XjAtt_-IML73q4LzrOxoCUzkQAvD_BwE&gclsrc=aw.ds)

Protect your solder with a small piece of tape. I used Kapton tape. This is delicate to do.

Solder the second and third wire and wrap them up with tape

When wrapping the tape, you shouldn't make it thicker than the ribbon itself, otherwise you will have trouble pushing it down for the next step.

Push it back into the finger tip carefully

这是指尖应该伸出的长度

你可以拉动手掌中的电线，帮助自己将霍尔传感器推回到尖端

将钓鱼线缠绕在凹槽周围，然后小心地将手指末端拧到传感器上。

注意，手指末端印有小螺纹，可以顺时针旋转至指尖。请勿用力过猛，否则螺纹会损坏。

完成每个手指的操作。

你可以用一些 16x3mm 的螺丝安装手指盖。虽然我的图片显示手指盖已经装好了，但先不要装，你仍然需要打开内部。

是时候把每根线焊接到 NervoBoard 的传感器板上了。拇指放在“0”上，食指放在“1”上，大拇指放在“2”上，无名指放在“3”上，小指放在“4”上。

您可以在此页面上查看有关传感器连接的更多信息：https://inmoov.fr/test-your-finger-sensor/ (https://inmoov.fr/test-your-finger-sensor/)

这里你可以看到我放置迷你模拟板的位置。你还可以在滑轮上看到，带小垫圈的螺丝是如何将鱼线用一个结固定住的。要做到这一点，你需要在你想要剪断鱼线的地方涂上一些胶水。

要做到这一点，你需要在你想要剪断的编织线上涂点胶水，让接触胶固化。胶水可以让剪断更容易。

按照我在图中的方式拉动你的钓鱼线，它应该会形成一个大结。

拧紧结，将螺钉和垫圈放在结上，并在拧紧螺钉时保持结被拉住。

(https://www.kjmagnet.com.cn/product/magnet-2.5mm-1mm_3-2.5-01-N52N)

让它穿过2毫米。我使用了双组分透明RTV硅胶 Ecoflex™ 00-10

用硅胶套件将每个指尖上的模制部件粘合起来

将磁铁的南极朝向霍尔传感器，插入硅胶模制尖端的复位孔中。请使用木质牙签，因为任何金属工具都会粘在磁铁上。这项工作很精细，必须操作到位才能获得正确的结果。用一滴硅胶套装固定磁铁位置，并等待其干燥。使用此页面 https://inmoov.fr/test-your-finger-sensor/测试您的传感器。 (https://inmoov.fr/test-your-finger-sensor/)

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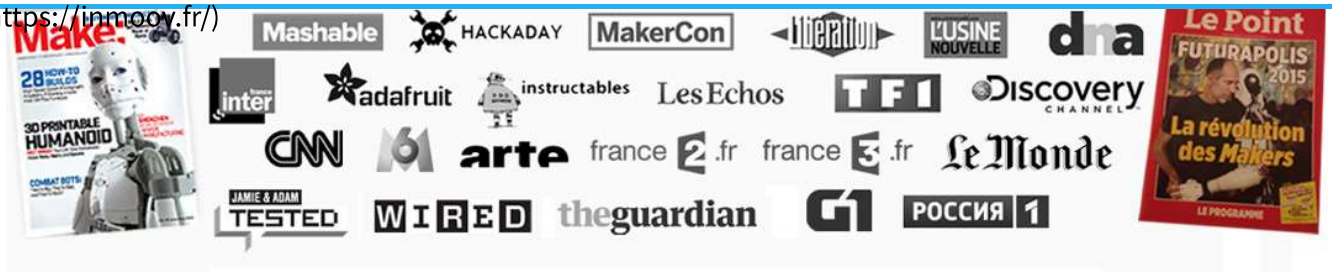

(https://www.inmoov.fr/on-the-net/)