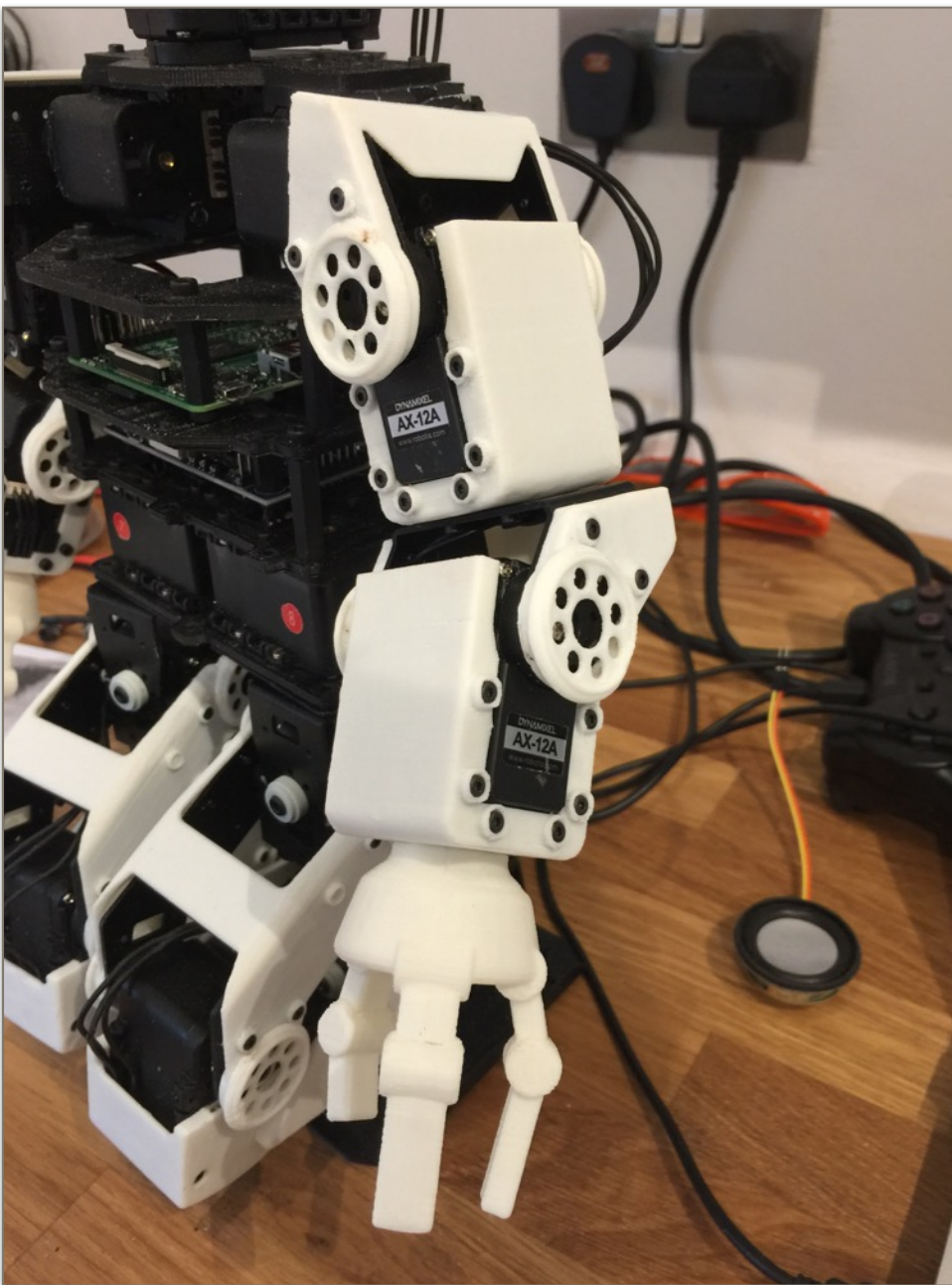


# HR-OS1 Customised Hand Assembly Instructions

The stock armour for HR-OS1 is difficult to print with a home 3D printer. In general they require a significant amount of support and they take a very long time to print.

I have created the following design that is easy to print on a home 3D printer. With a decent one it is also possible to print without support and the print times are not measured in week-ends. The design is fairly modular, allowing for further updates and part swaps.

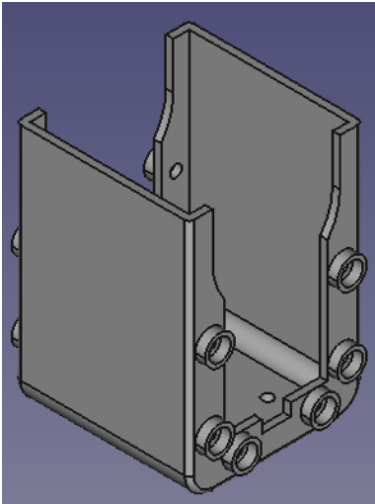
Here is a final assembly of the hand:



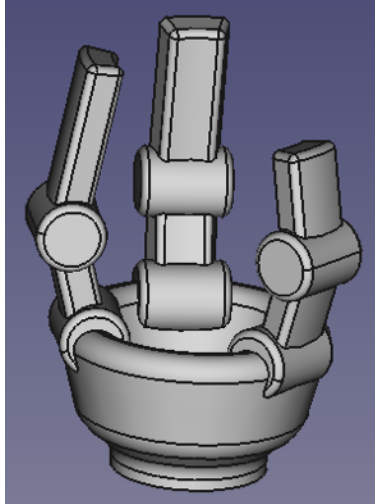
The assembly also features a different cable routing that is less obtrusive and protective.

## Here is what you need for the assembly (for one hand):

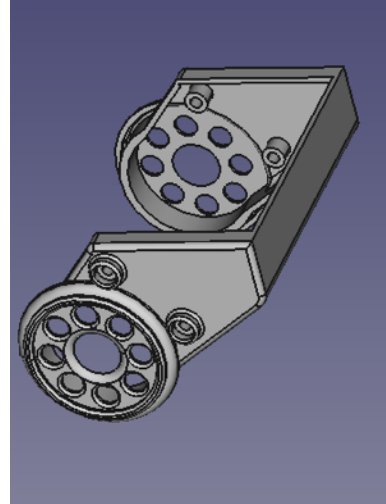
2 x Hand Cover:



1 x Claw:



2 x Elbow cover

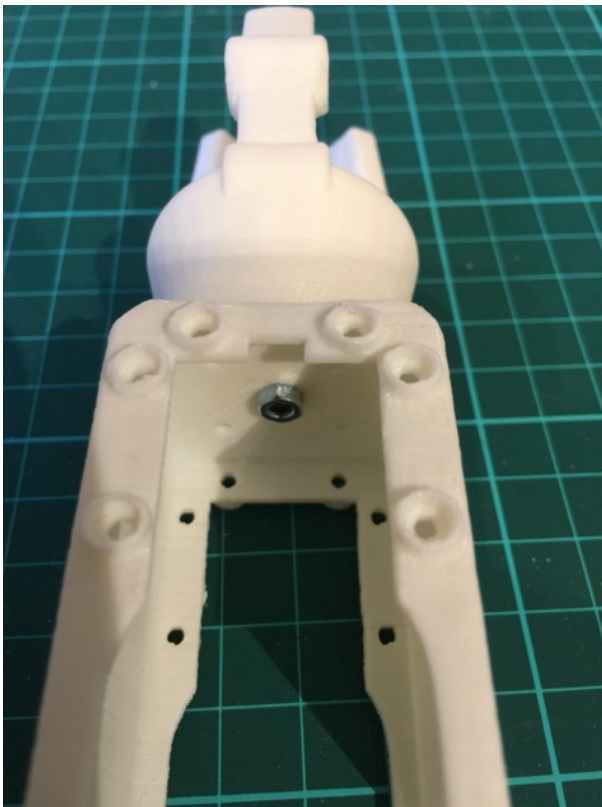


(these are the stock parts from Trossen Robotics - I plan to have some small updates to; see later in the TODO list)

The following instructions will assemble the left hand of the robot. For right hand just follow the same instructions, but in a mirror.

### 1. Claw assembly

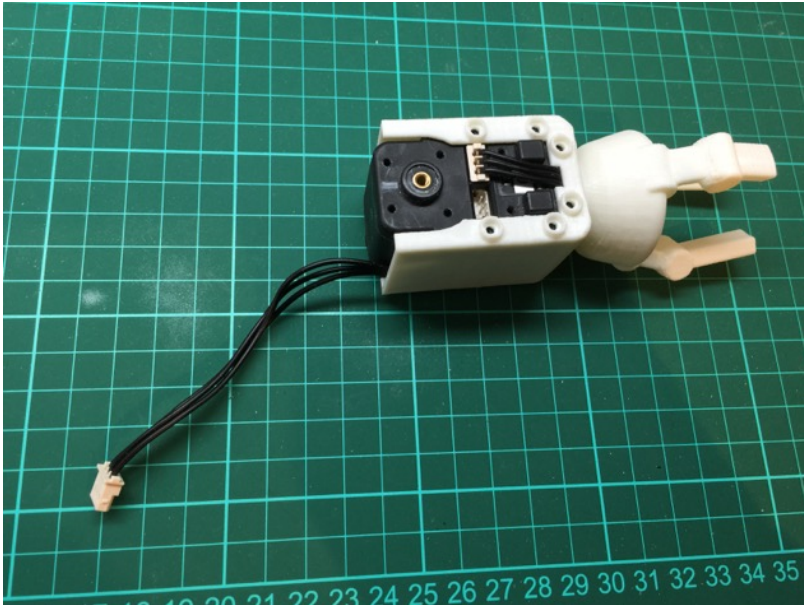
First assemble one claw and one hand cover using an M3 x 6mm screw and a nut:



Make sure the thumb of the claw (the shorter one) is aligned with the notch in the hand cover. That notch will be used to guide the cables.

## 2. Mount the elbow servo:

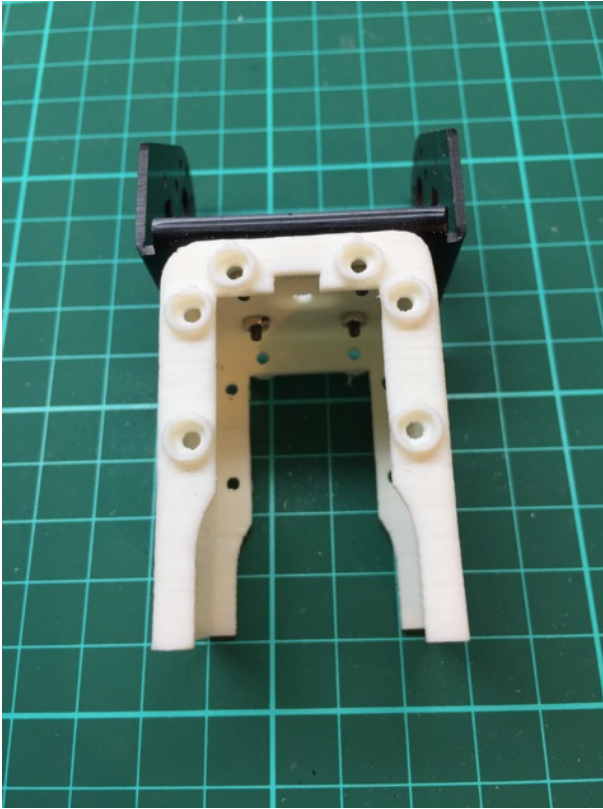
Place a 20cm cable on the elbow servo and route it towards the bottom of the servo, then on the side as shown in the next picture. Slide the servo in the cover and secure it with 12 M2x6mm screws (6 on one side and 6 on the other side):



The cable should go through the small notch between the two holes on the bottom on the cover, then onto the side of the servo.

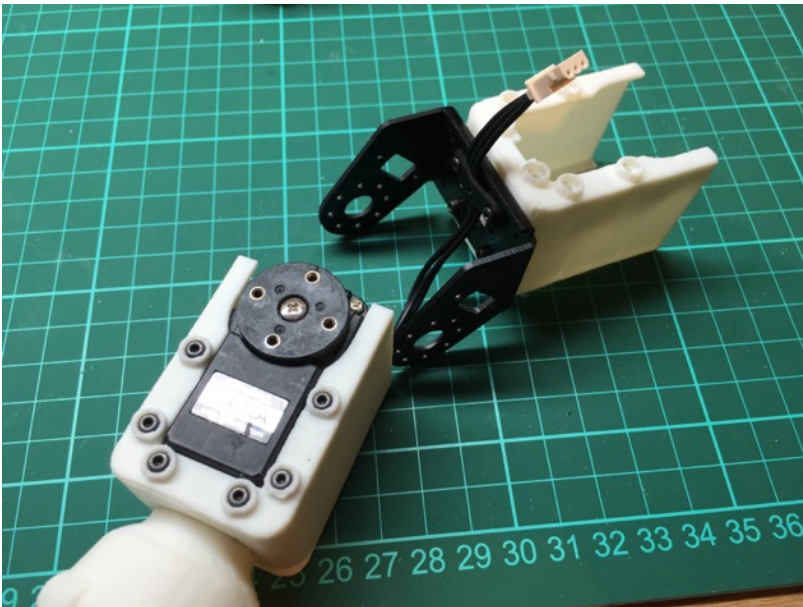
## 3. Assemble the elbow frame

Assemble the second servo cover with an F1 45° bracket using 2 M2x6mm screws and nuts as in the picture bellow. Only the lower screws should be assembled, leave the upper screws empty for this time. Screws are on the bracket side, nuts are on the servo cover side. Please pay attention to the orientation of the 45° bracket in respect to the notch in the servo cover.



## 4. Assemble the elbow

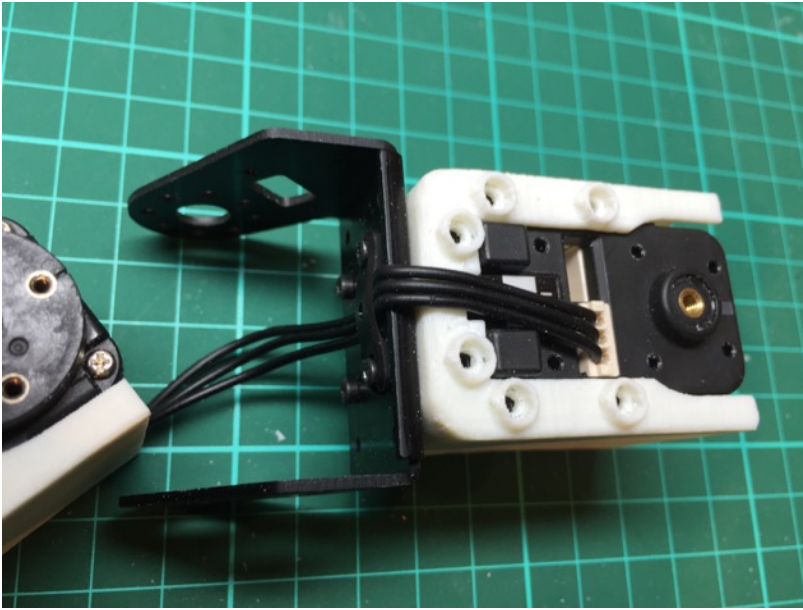
This part is a little bit more tricky so please read carefully.



Use a plastic cable guide and fix it in the upper holes of the elbow assembly on the inside of the F1 bracket as in the picture above using 2 M2x6mm screws and nuts. Nuts should be on the servo cover side as in the case of the first two screws you assembled earlier. Make sure you also route the cable through the cable guide and that you leave enough cable to reach the connector in the servo that will be mounted in the second cover. Don't tighten the screws yet - make sure the cable still can slide through the cable guide. We will adjust in the next steps the length of the cable.

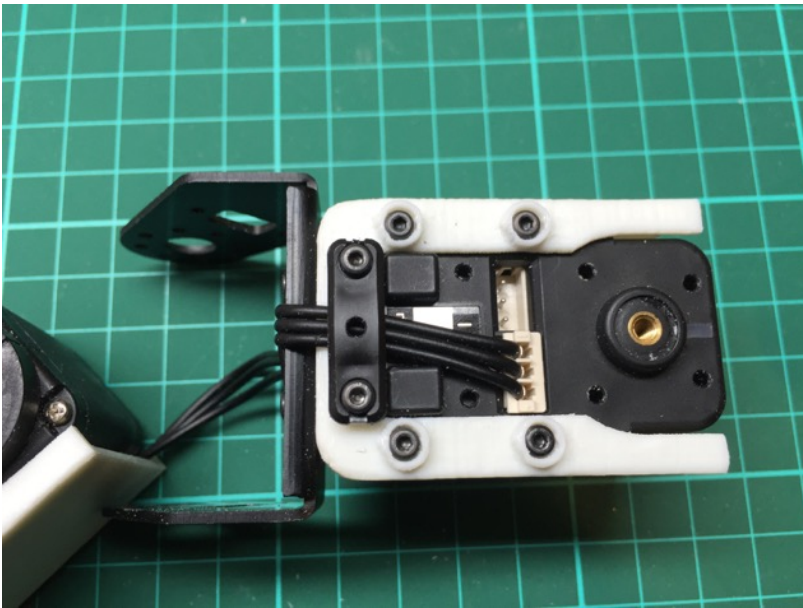


Add the servo in the cover - but do not fix it with the screws. Connect the cable to the servo and then pull the cable so that it is only as long as to sit flat on the new servo.

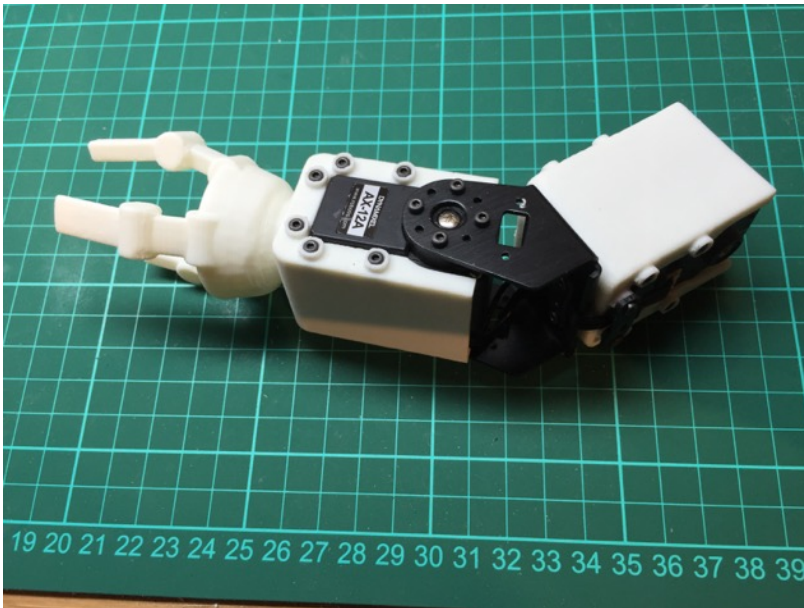


Disconnect the servo, then take it out. Now tighten the screws.

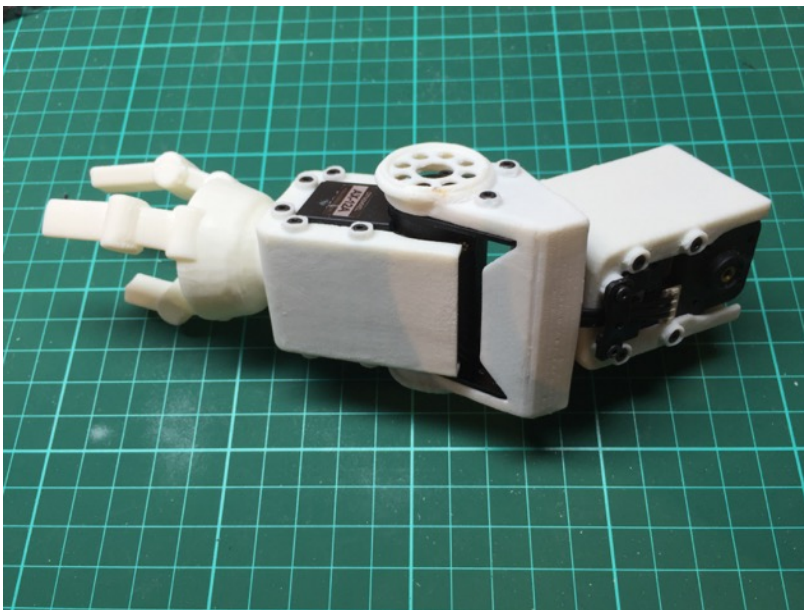
Place the second servo back in the cover and reconnect the cable to it. Place another cable guide on the lower two holes in the servo and screw everything with 12 screws (6 on one side, 6 on the other side):



Now fold the cable neatly inside the F1 bracket and fix the F1 bracket to the servo using the normal approach: 4 M2x6mm screws on the horn and one M3x10mm on the bearing using the hub assembly parts (bearing and 2 washers):



Finally add an elbow cover over the F1 bracket making sure that the cable sits inside and the joint can move freely without being hindered by the cable:



## 5. Assembling the shoulder

Screw another F1 45° bracket on the shoulder servo (as in the original design).

Then mount the arm assembled earlier onto the F1 bracket using 4 M2x6 screws and one M3x10 on the bearing side using also the hub assembly - just like in the original HR-OS1 design.



Mount a second 45° cover onto the F1 bracket:



And connect a 20cm cable from the servo to the shoulder pitch servo.

Once the design of the outer shell for the body will be completed this cable might run differently.

# TODO

1. An updated elbow cover that is a little higher so that it covers also the F1 bracket and matches nicely the servo brackets.
2. An updated routing of the shoulder servo cables so that they are less visible.