



instructables

## MeArm Robot Arm - Your Robot - V1.0



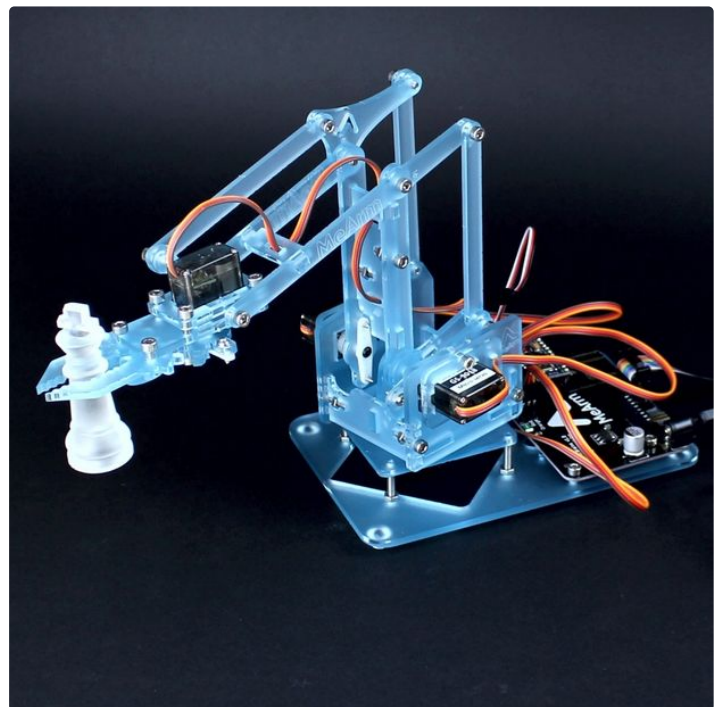
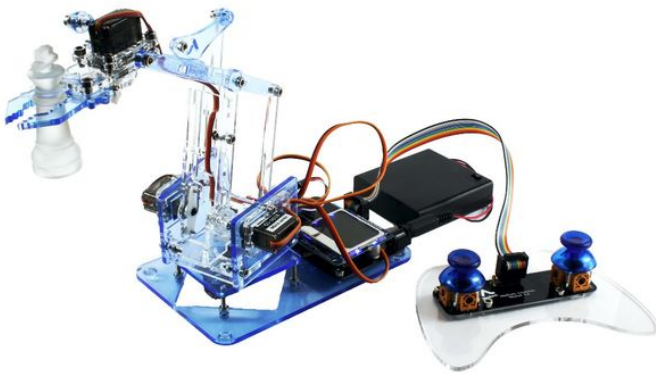
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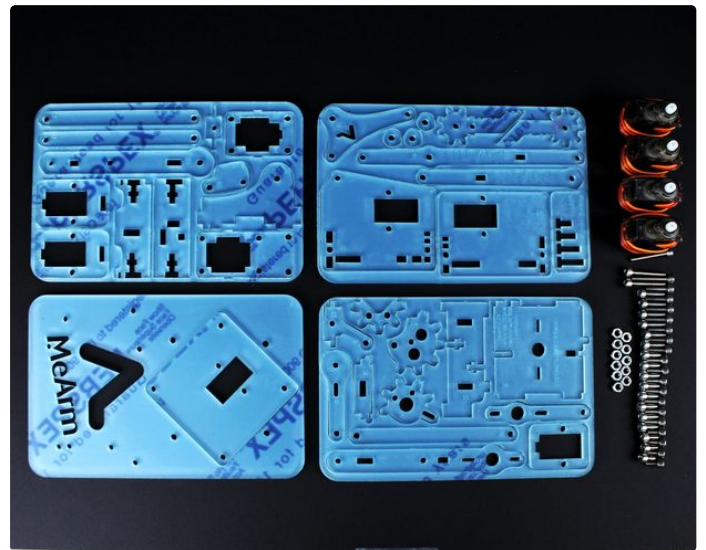
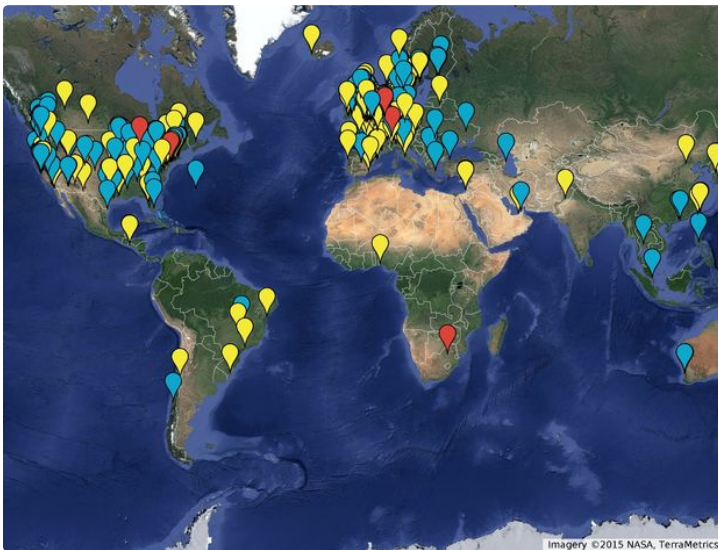
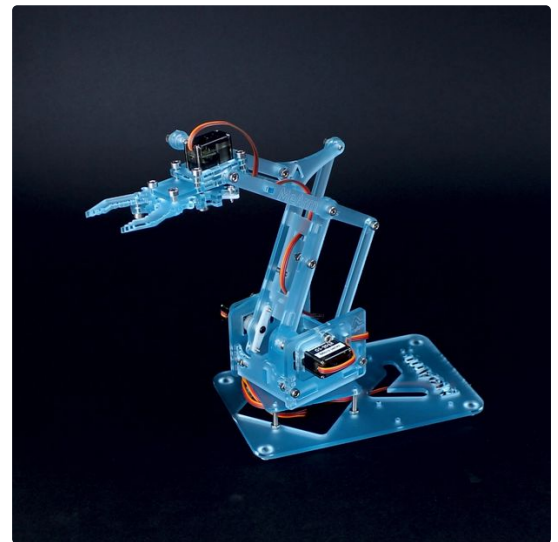
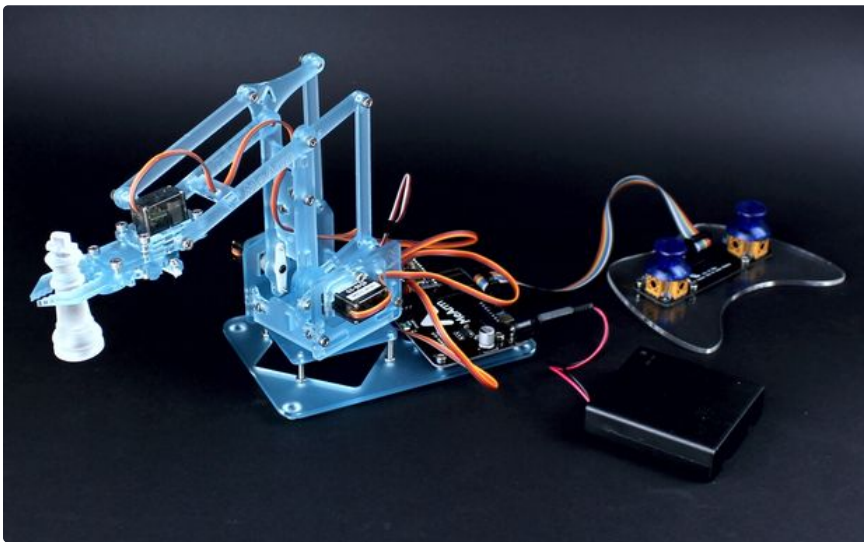
We have this available as a kit over on our store or you can cut your own!

This is version 1.0 of the build instructions for the MeArm Robot Arm. The MeArm first came to instructables in April 2014 when we claimed a second prize in the Robots Contest. Since then we've seen around 10,000 built all over the world! Just a handful

are shown on our map, but we're really proud that with the help of instructables we've become the world's first viral robot!

We've put together these instructions to complement those on our resources page.





## Step 1: Grab Your Files, Fire Up Your Lazors!

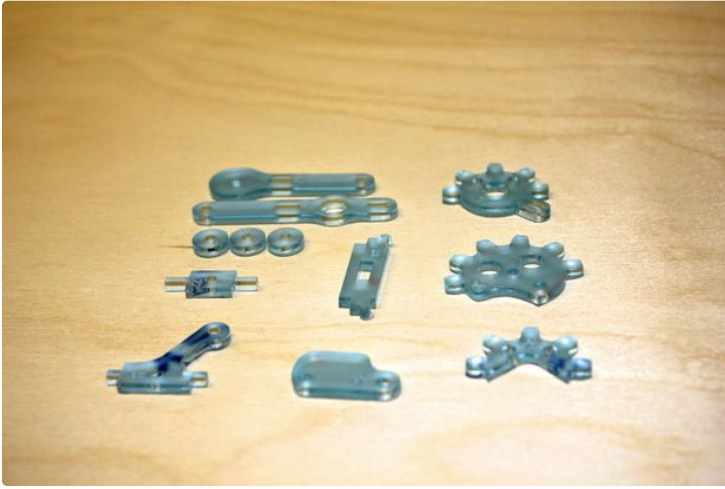
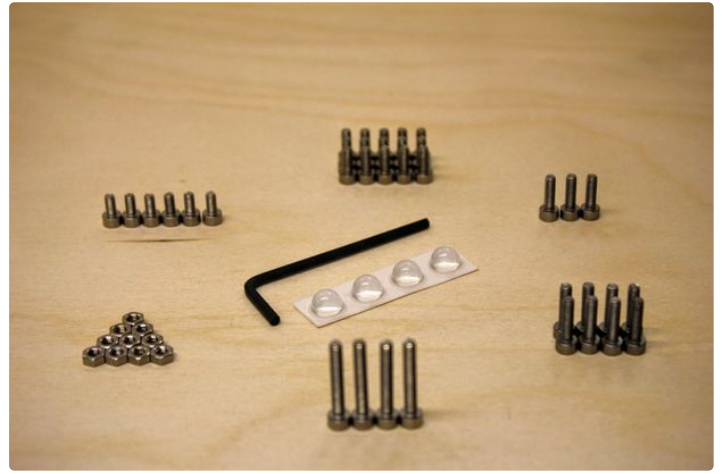
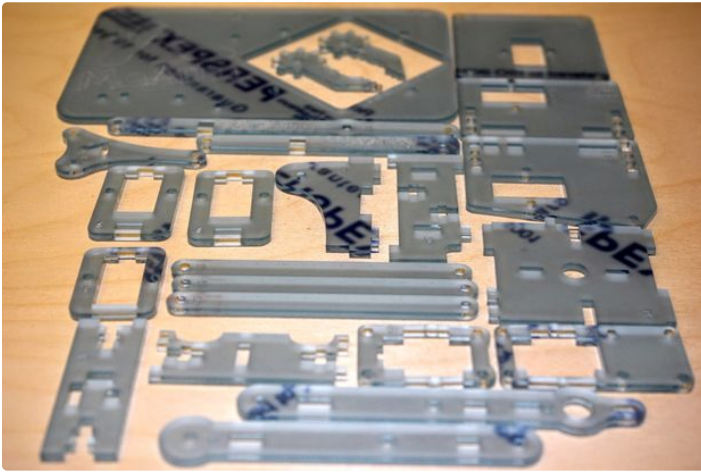
The MeArm is still and has pretty much always been open source hardware. So you can grab our files over at thingiverse. It's a .dxf file so it should work on most laser cutters and we've put a box around the parts so you can set it to the correct size. We use 3mm acrylic, but the design is fairly tolerant and we've seen it made in wood and even 3D printed.

You'll need a bunch of screws too. The current load out requires:

Nut x 11

- 6mm x 7
- 8mm x 15
- 10mm x 5
- 12mm x 8
- 20mm x 4

All M3 size, that's Metric 3mm. Which I understand can be tough to find in the states, but come on you made it to the moon, you can work out an appropriate alternative!



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## Step 2: Hold Up! Let's Calibrate!

If you've laser cut your parts or purchased one of our kits you'll really want to get it built. But first you need to complete a vital step. We need to calibrate the servos. Here we'll use our Brains Board, which is an Arduino compatible, but you can use anything that will generate a PWM signal to calibrate them. There's MeArm code available for Arduino, Raspberry Pi, Beaglebone Black, Sparkcore and Espruino.

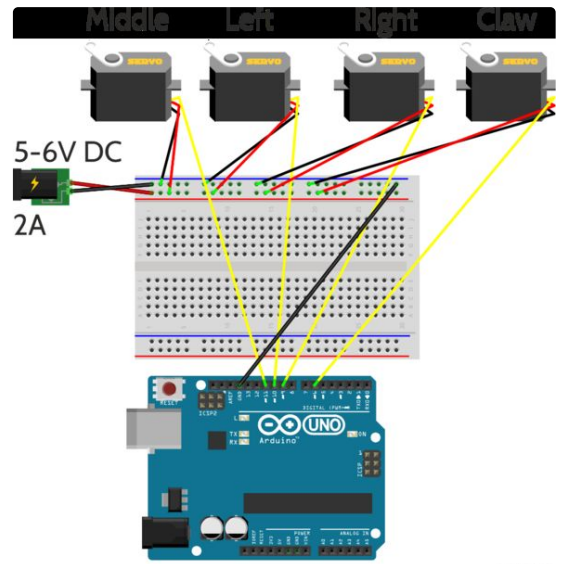
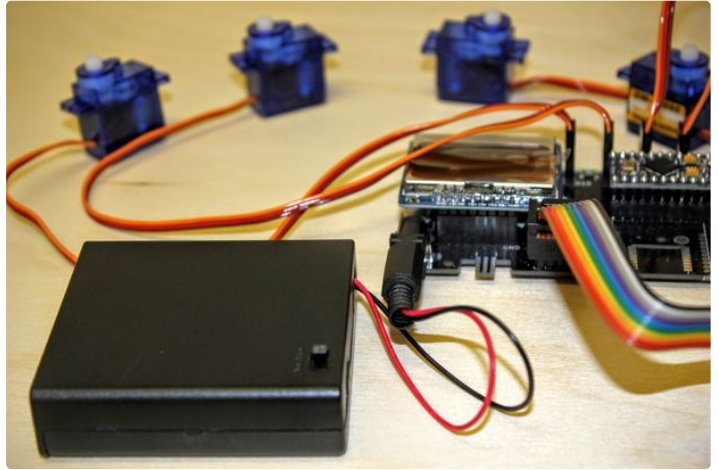
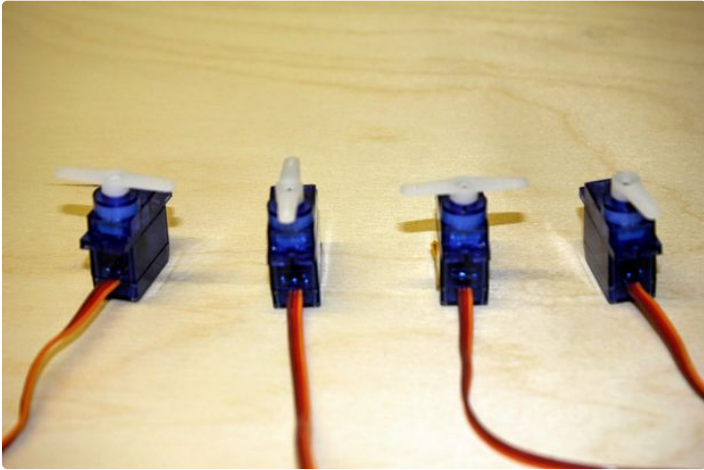
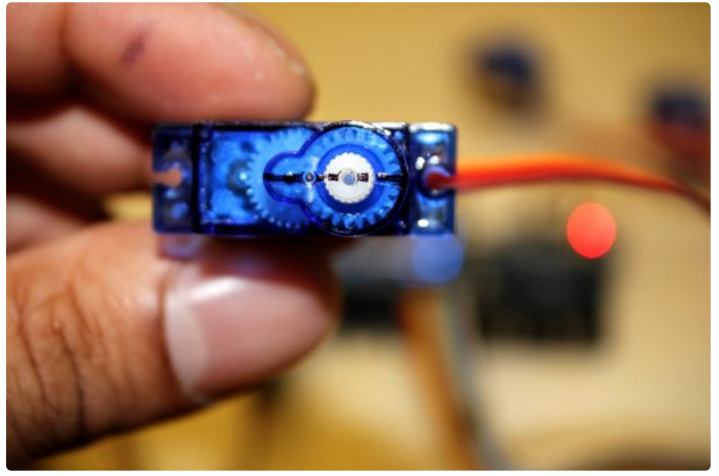
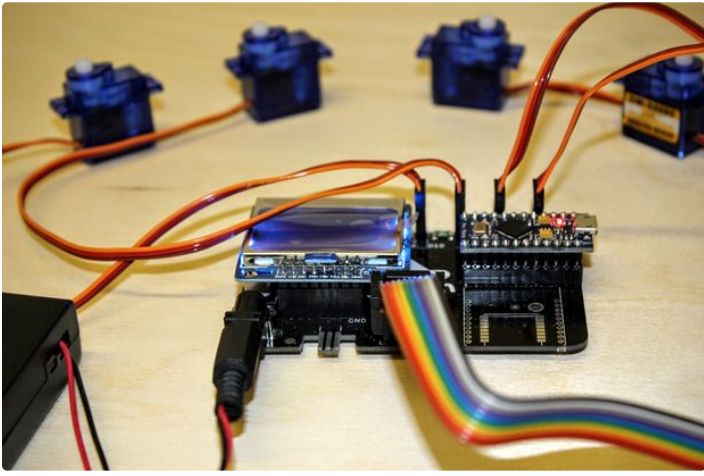
Using our Brains Board it will come programmed to go to the default positions. Which are 90, 90, 90 and 25 for the servos for the centre, left, right, and claw respectively. Mark a centre line onto the spindle and body of the servo and you can also mark them c, l, r, and c or by another system that will mean something to you.

**Don't be tempted to turn them by hand, the torque**

provided by your mighty strength could strip the servo gears. For the same reason it's really important that you do this process before building your MeArm.

If you're using an Arduino then the setup shown in the image above and this code will give you the same result. We use Codebender for our demo code and would love a t-shirt. So please use this link if you're going to open an account.

The most important part to realise in setting up your servos is that you're not able to power them via your microcontroller. You need a separate 5-6V 2A power supply, with a common ground to the micro controller. Check out the Arduino set up image for more info.



fritzing

### Step 3: Let's Go!

With your servos calibrated we can get cracking. Literally if you have one of our snap out packs!

You'll probably have to spend some time taking off the protective backing on the acrylic pieces. You can either do that as you go or all at once. Your call.

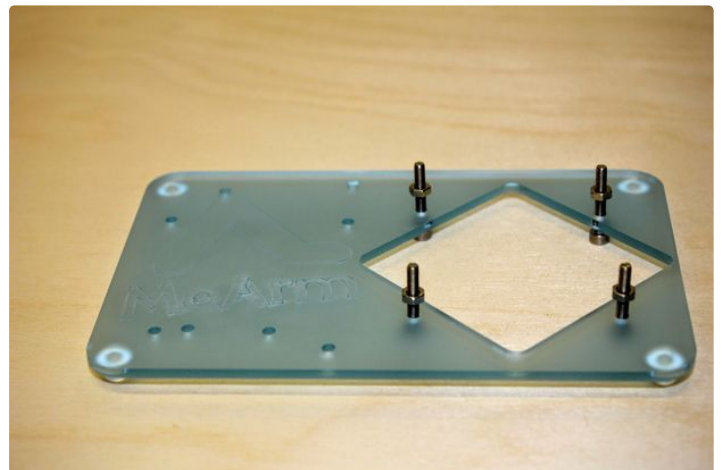
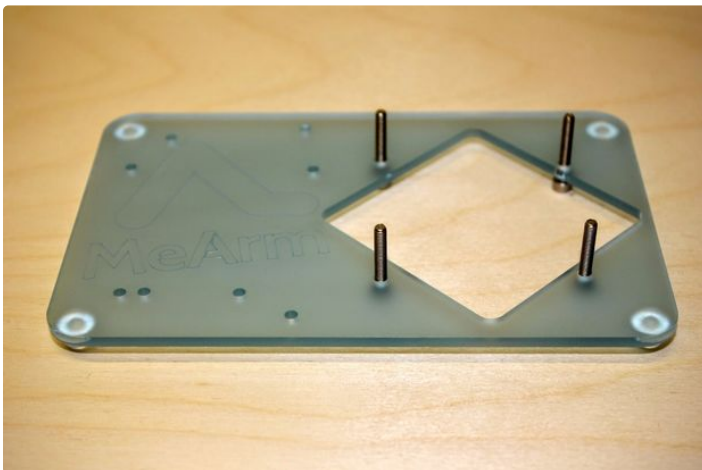
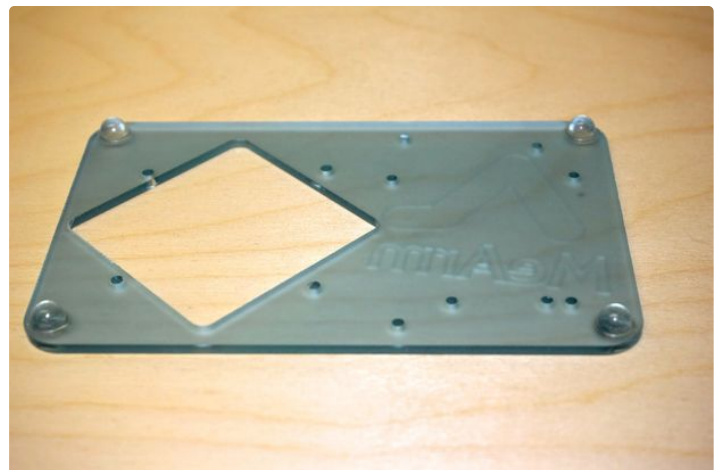
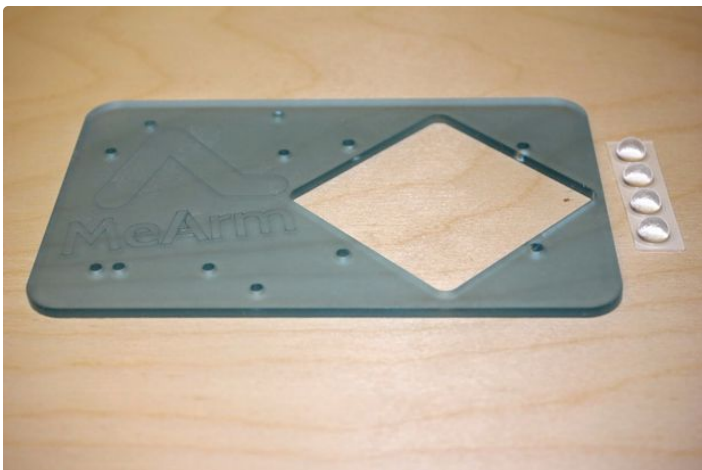
Locate the largest part (#1) and attach the sticky pad feet to its corners. Then insert the four 20mm screws from the underside and screw four nuts half way down them.

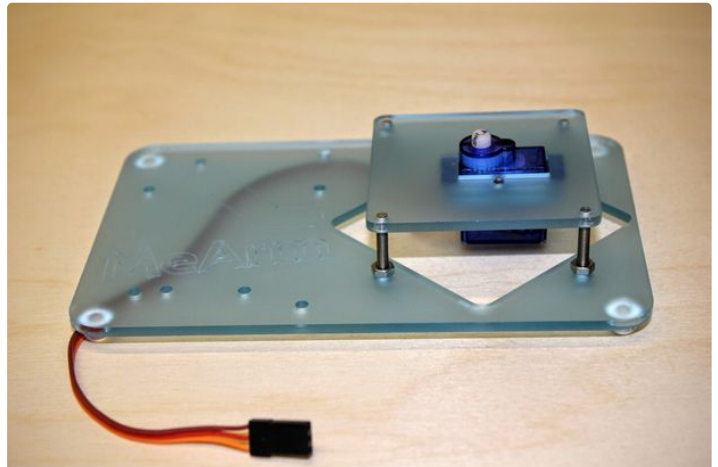
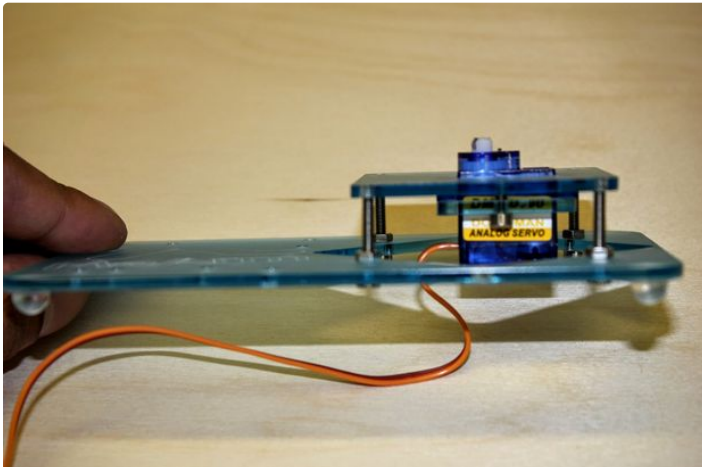
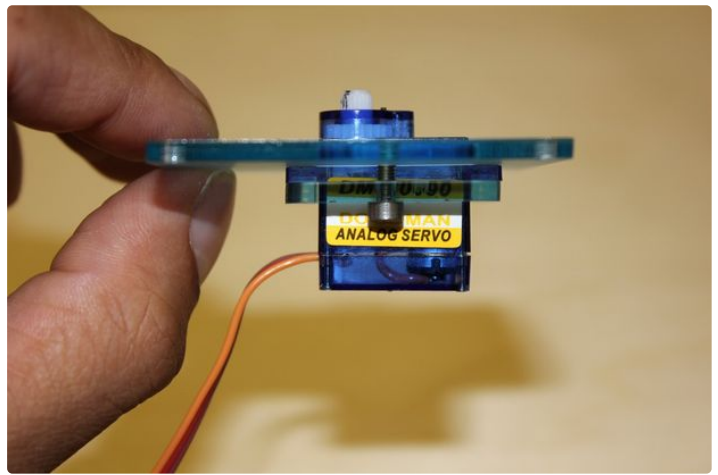
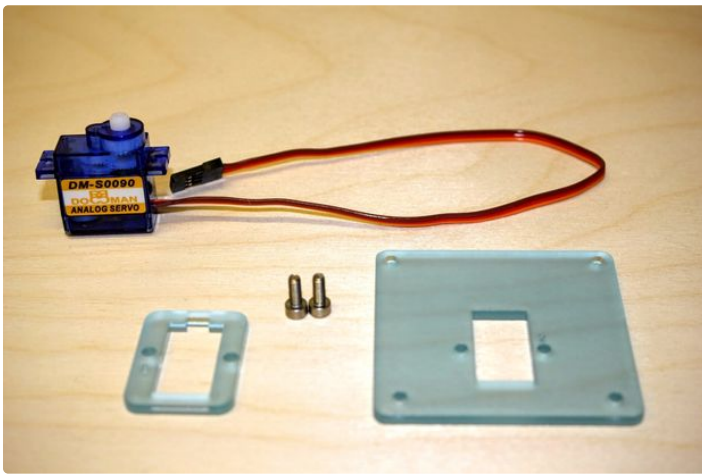
Now find part #2, #3, your centre servo, and two 8mm screws. Thread the servo through part #3, which we call a collar. Push the screws through the collar and then screw them into part #2.

The screws self tap into part #2, this means they cut

their own thread. On the MeArm there are two hole sizes one at around 3mm where you can push the screw through and the other at around 2.6mm where we want the screw to self tap. This is a method we borrowed from the amazing PlotClock by Joo.

Now we attach the servo / collar assembly to part #1 via the 20mm screws, these will self tap and the orientation of the holes on the parts should mean you can't get it the wrong way around. This is called Poka-yoke and is a method for fool proofing designs. If you have an early model v1.0 you'll see my attempt at this is over zealous as there is only 1/8 ways of getting it right (if you can't match up the holes flip the part over). Later version were tempered by the advice of Scott Pierce and have 1/2 ways.





#### Step 4: Left Side

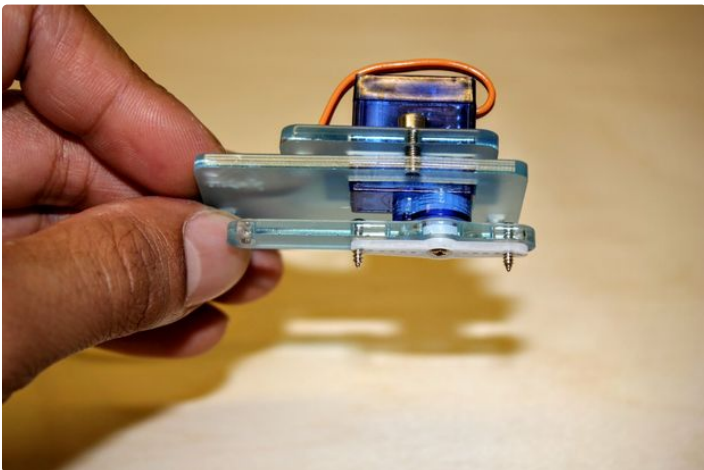
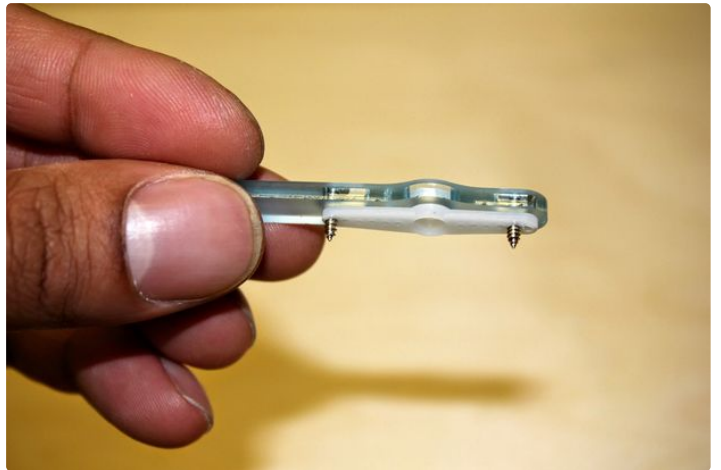
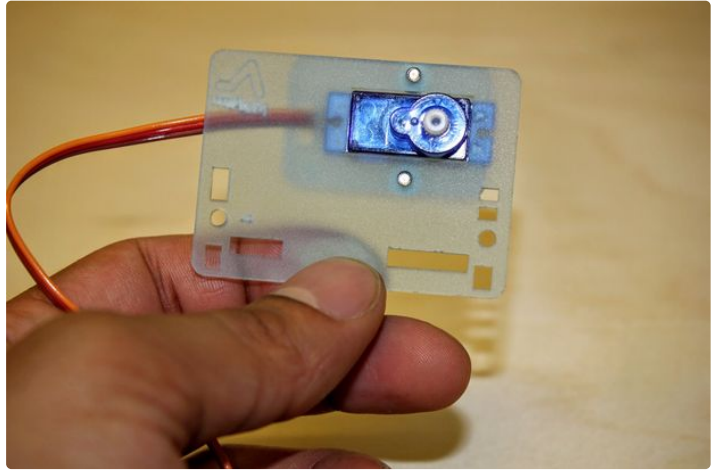
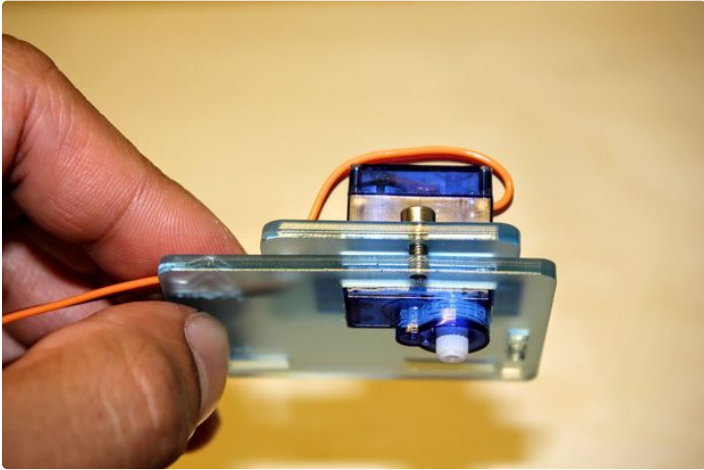
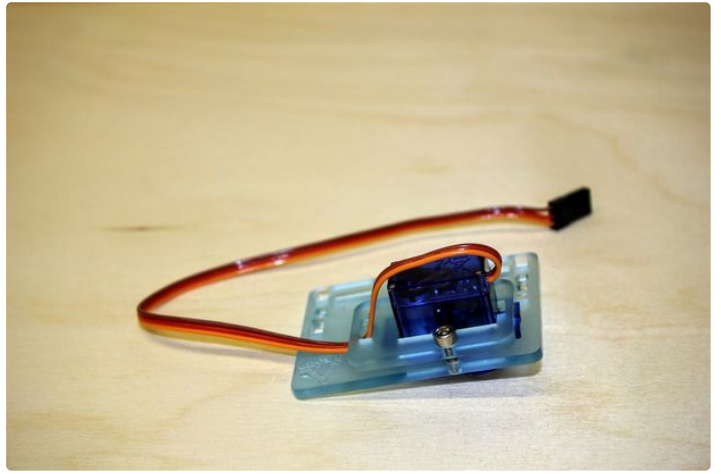
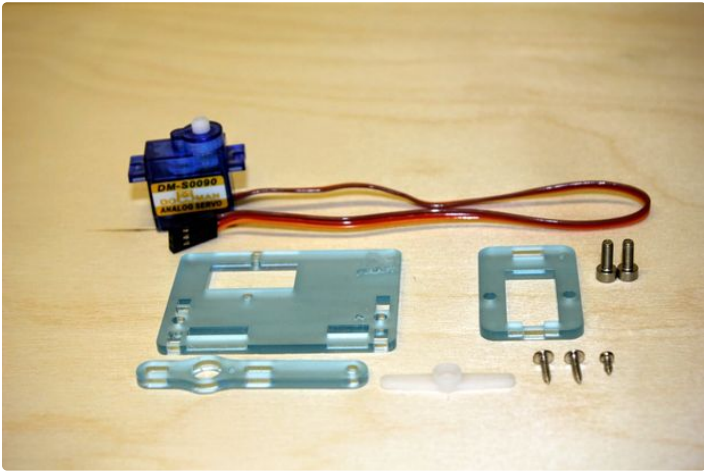
Now locate parts #4, #5, #6, left servo, two 8mm screws, and a servo fixing pack.

Thread the servo through the collar (part #5) and then the servo cable through the cable tidy hole. Screw the collar to part #4 using the 8mm screws **being careful not to over tighten**. You don't want the acrylic to bend, just hold the servo in place.

Now attach the servo fixing (the white thing, they're called horns) to the servo arm (#6) using the sharp screws from the servo fixing pack. These will self tap

into the white plastic servo horn. They can be a bit tricky so please be careful here. If you're building with a child then this is on time you'll want to get involved.

Attach the servo fixing to your calibrated servo as shown, it should be parallel with the longest side of part #4 and the lines you drew on earlier should still match up. Using the small machine screw from the servo pack secure it to the servo but again do not overtighten!



## Step 5: Right Side

The parts we want here are:

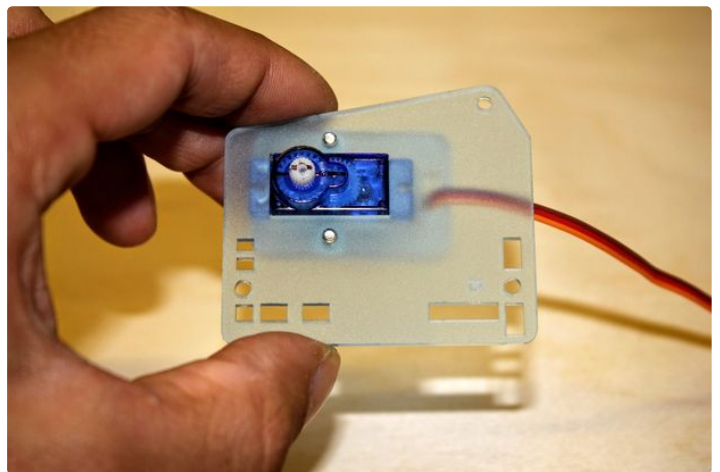
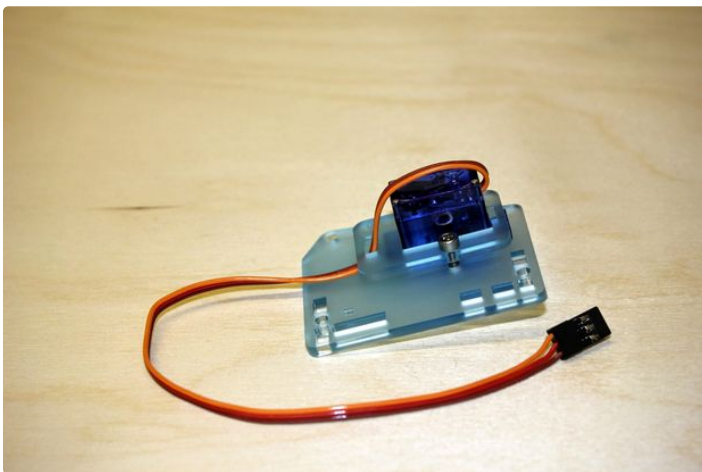
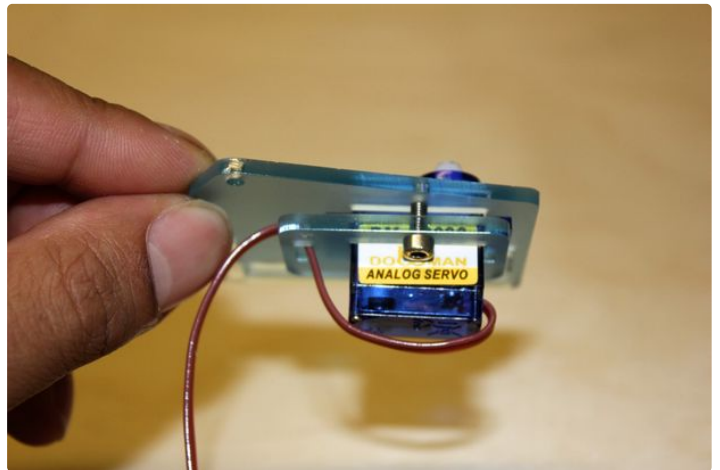
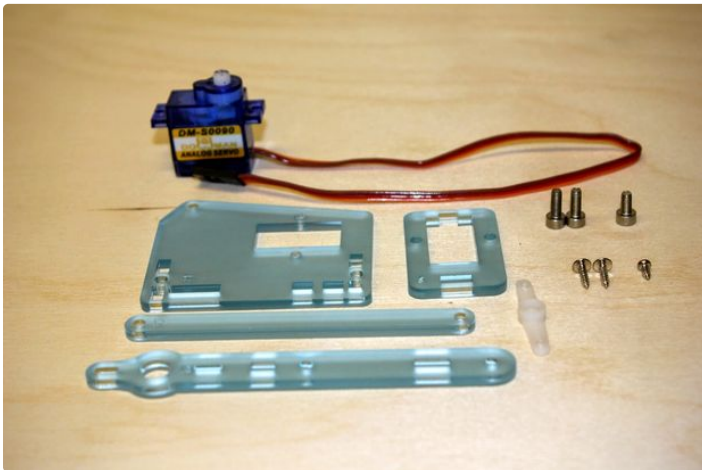
#5, #12, #13, #17, two 8mm screws, a 6mm screw, the right servo, and a servo fixings pack.

Thread the servo through the collar and the cable through the cable tidy as before attach to the side plate with the 8mm screws, again being careful not to break the plate by over tightening.

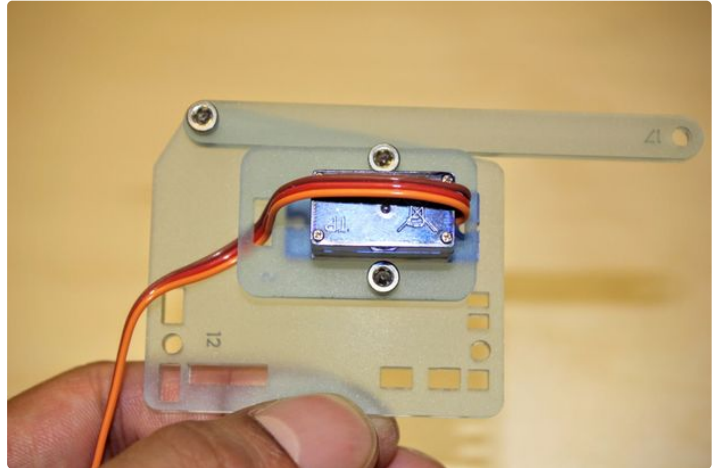
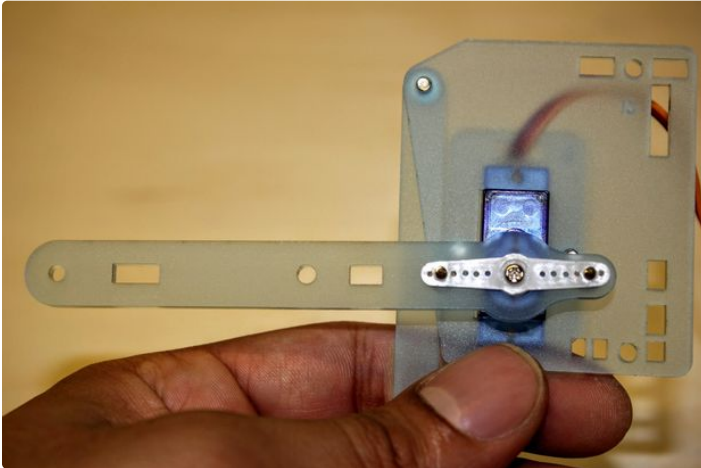
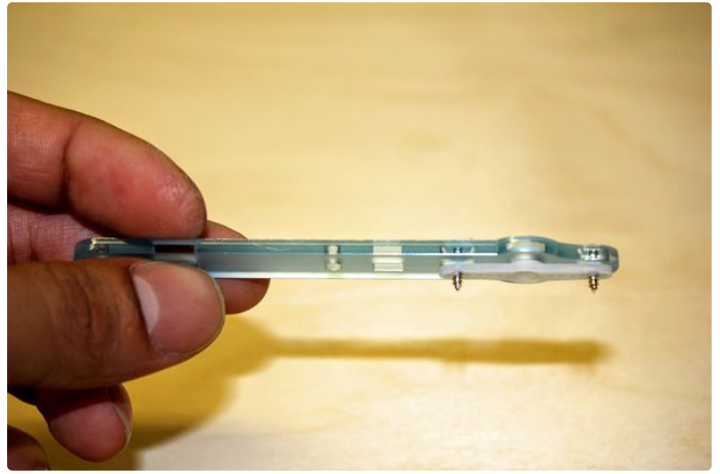
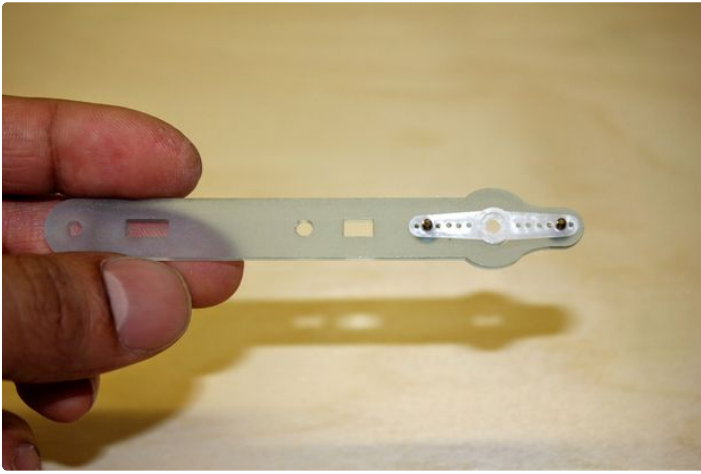
Attach the white servo horn to the servo arm (#13)

using the sharp screws as before. Attach this to the servo with the arm at 90 degrees to the longest side of the side plate. Again the black lines you made should line up.

Finally in this stage attach part #17 to the side plate using the 6mm screw.







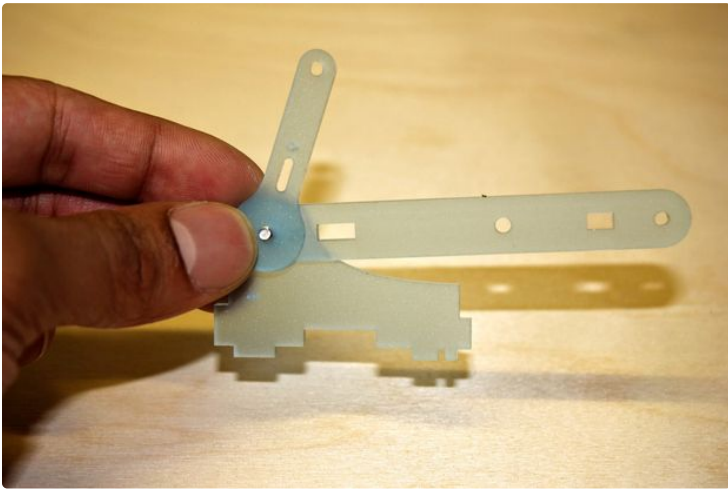
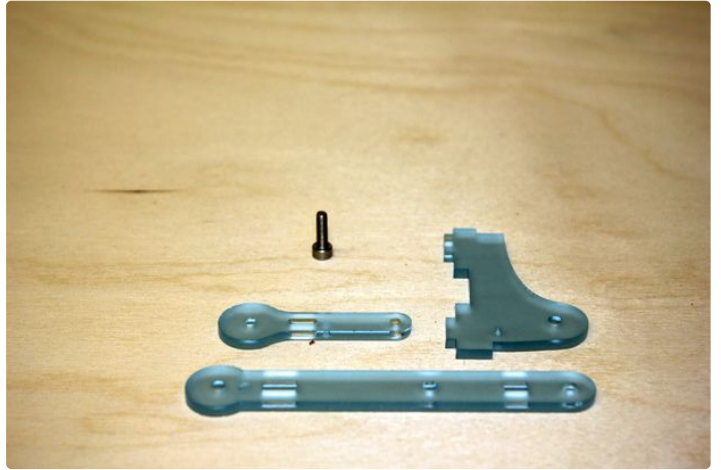
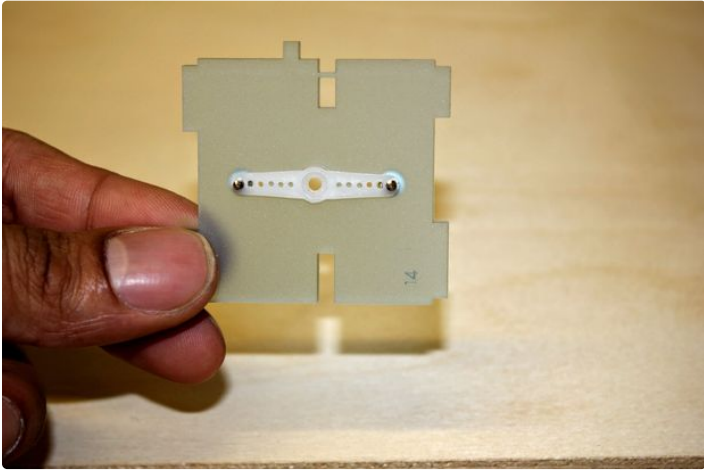
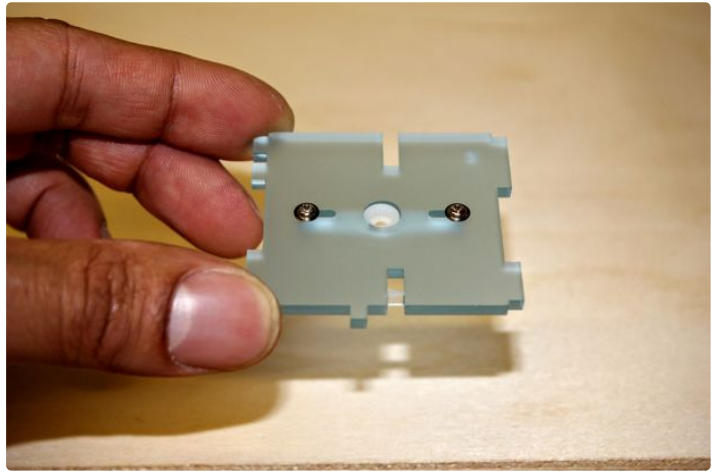
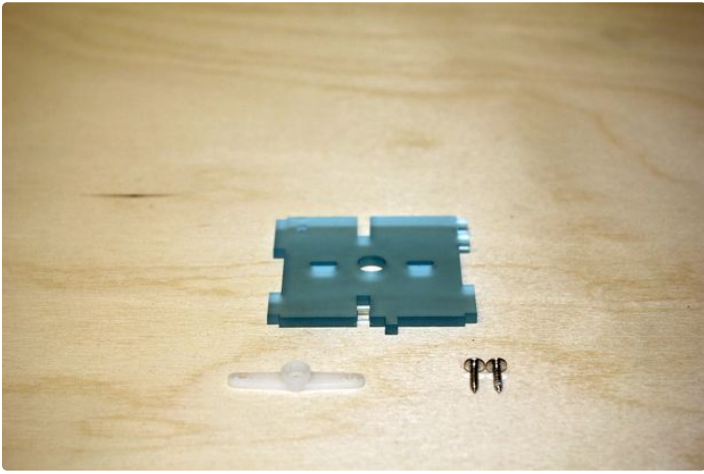
## Step 6: Build the Middle

These parts join the left and right sections together. We call them the base and the pig.

For the base find part #14 and a servo fixings pack. Carefully noting the orientation attach the servo horn using the sharp screws. At this stage offer it up to the left side piece to see if you've got things the right way around. The Poka-yoking should show you the way here.

For the pig find parts #8, #9, #10 and a 10mm screw.

Screw them together in the order shown, which should be #9, #10, #8 with the screw coming in from the #8 side and self tapping into #9. Sorry the ordering of that is confusing but this is honestly the first time I've written that down with the numbers! It's important that these move around the axis (the screw) in a straight path and that they move freely. If they don't move in a straight path then unscrew, hold them together and screw in again so that they are all as parallel as they can be.



## Step 7: Left to Middle

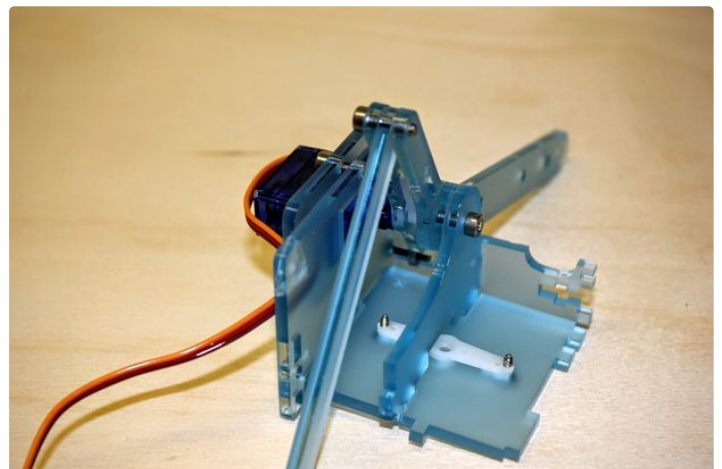
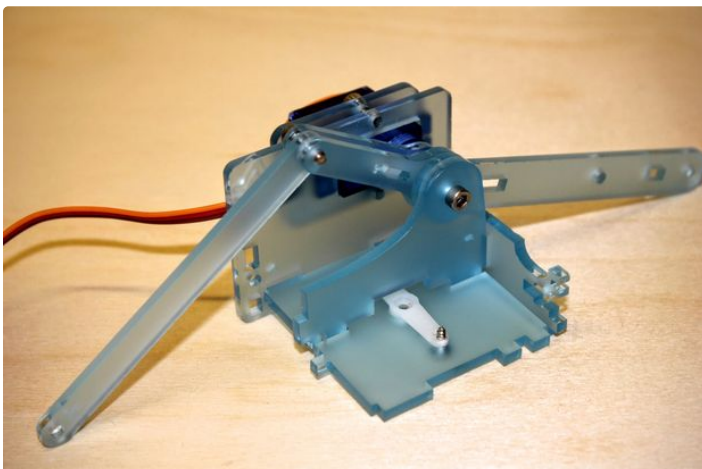
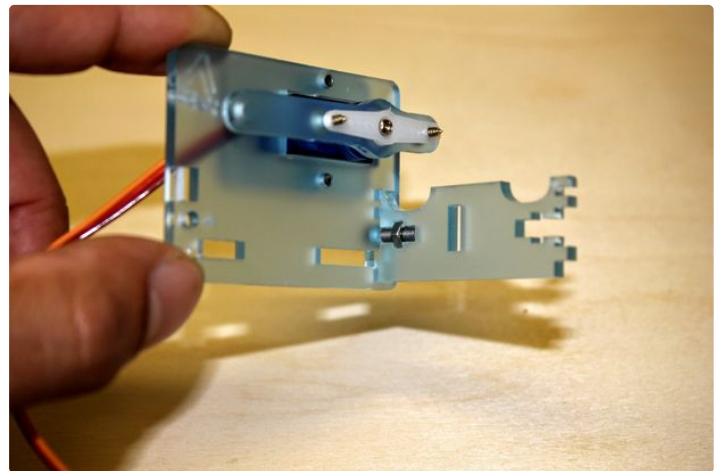
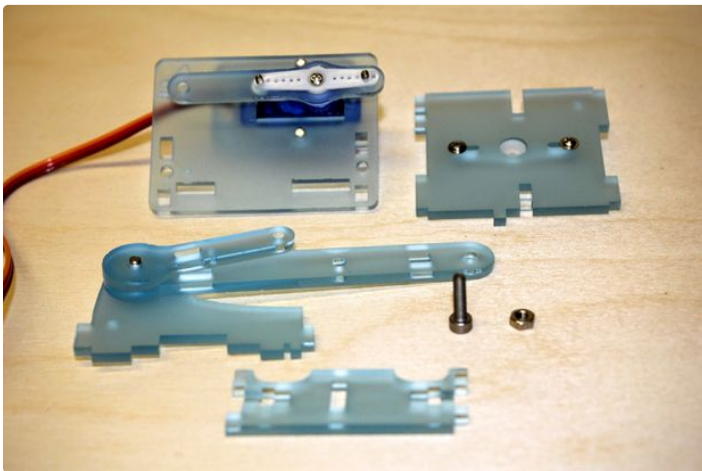
Now we want to start bringing the left and right parts together using the middle parts.

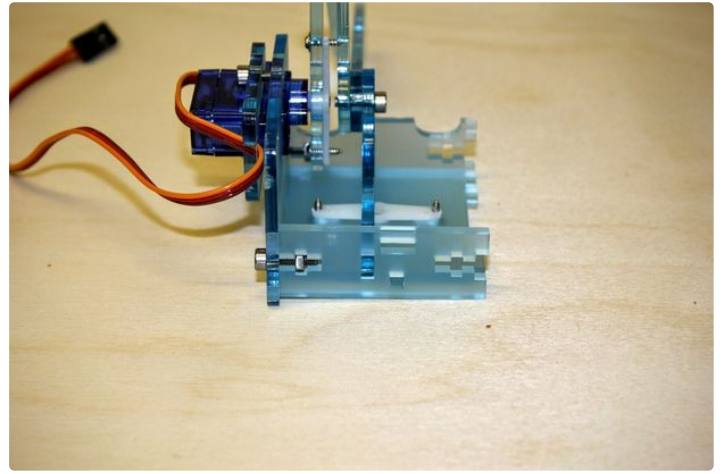
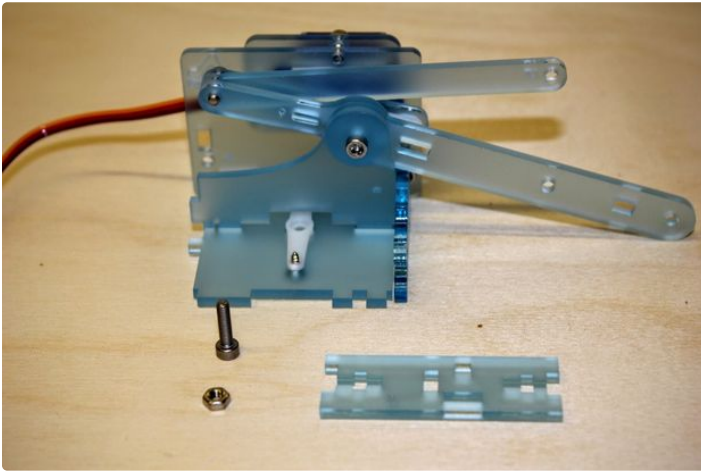
First attach the left assembly to part #7 with a 12mm screw and nut. The easiest way to do this is to push the 12mm screw through the left assembly and put the nut on half a turn or so. Put the slot in part #7 over the nut and start to tighten the screw. Do not over tighten.

You should see the slot for the pig on part #7 (the front strut). Place the pig into the slot then insert the base part into the slots on the left assembly and lever upwards to join the slots on the pig. Double check the servo horn here, if you've got it upside down you're going to be really annoyed later.

With the pig in place you can attach a lever (#17), an optional spacer (#20) to the servo lever (#6) and the lever on the pig (#9) together with a 12mm or 10mm screw depending on whether you need the spacer. The Doman Servos seen here don't require a spacer but the latest servos we use do. There are spares in our pack for this purpose.

Now attach the rear strut, part #11 using a 12mm screw and nut as on the front strut. It should slot over the rear of the pig and also the knobble on the base plate. Tighten this but leave a little slack as the adjustment will come in handy when you're mating the right hand part.





## Step 8: Attach Right

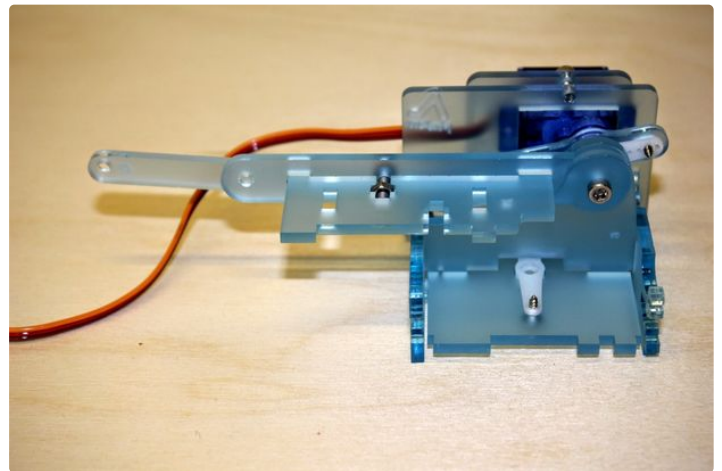
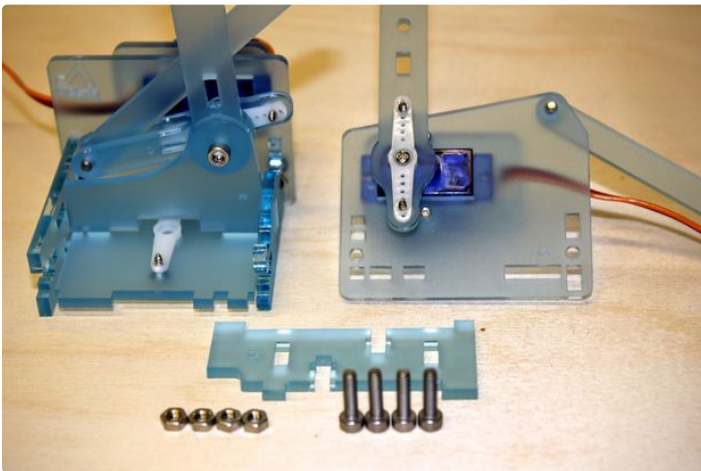
Now we mate the right side to our complex assembly, this also involves putting on the webbing part #15.

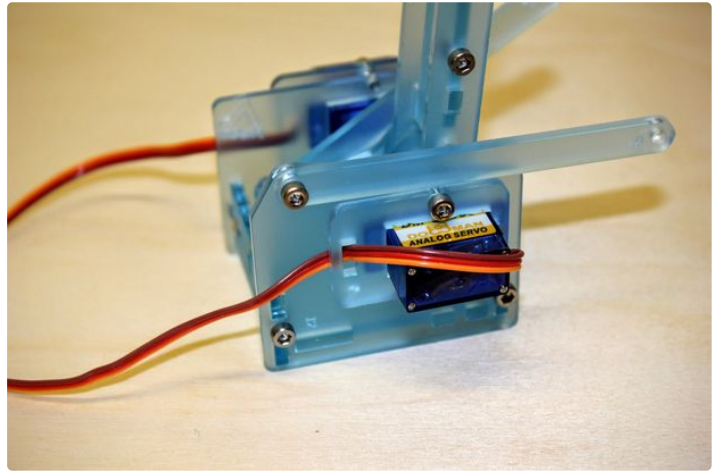
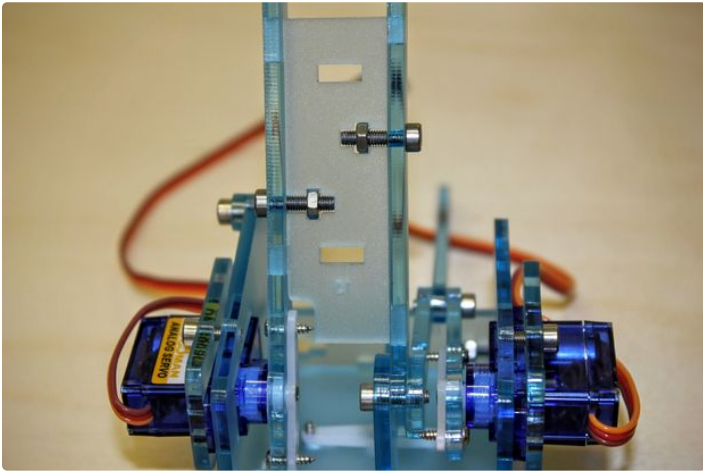
Attach part #15 to part #10 (on the pig) using a 12mm screw and nut.

Now comes attaching the right side to the rest of the assembly. You can put the 12mm screws and nuts through the right hand side before you try mating the

parts up, or you can leave them off and put them on afterwards. Here you're trying to get a number of parts in slots at the same time and it can be tricky

Take your time and be patient please. This step is the most tricky in the whole build. Once you've done this it gets easier I promise!



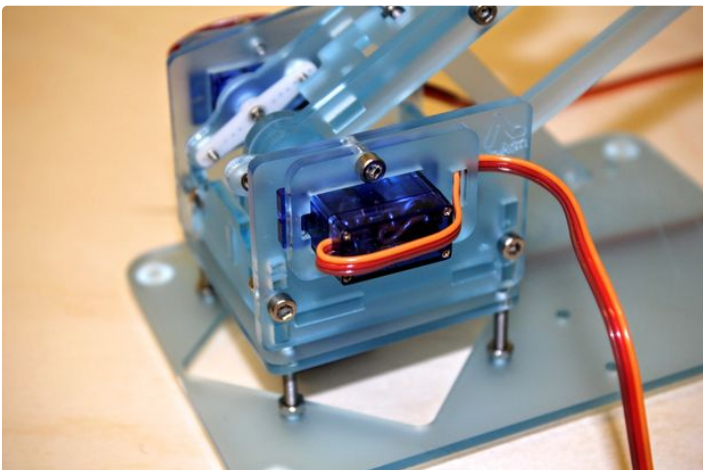
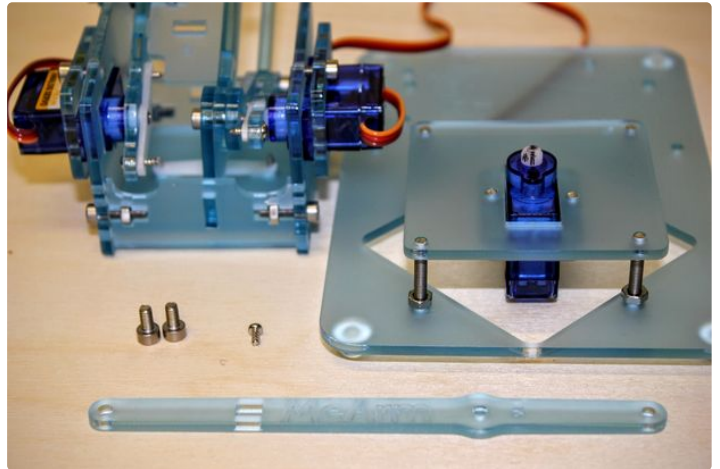
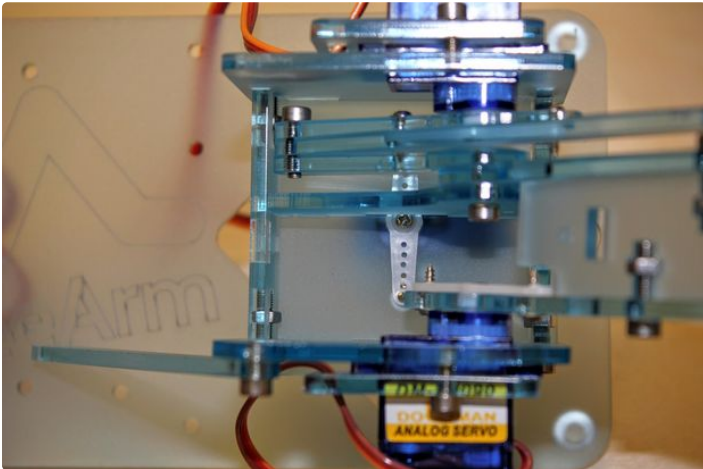


### Step 9: Attach to Base, Add Left Forearm

Now we have the lovely centre assembly complete we can screw it to the base.

This is a matter of mating the servo horn to the centre servo and securing with a screw.

Now we can add part #16 with the use of two 6mm screws. This will screw onto part #10 and onto #17. You should be able to move the servo easily with this new part!



## Step 10: Right Forearm

Next we build the right forearm.

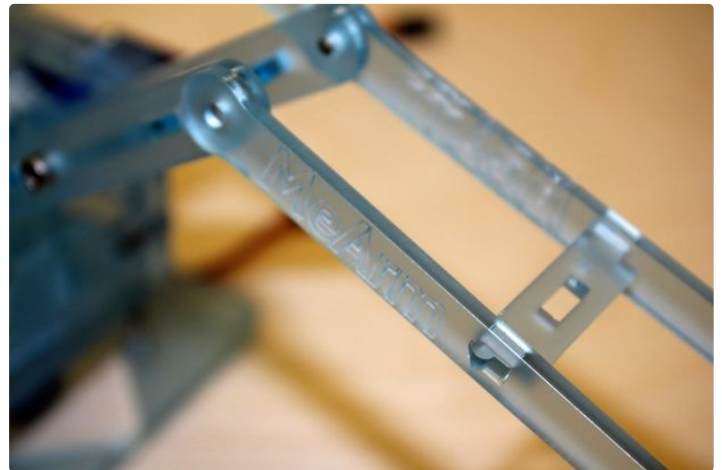
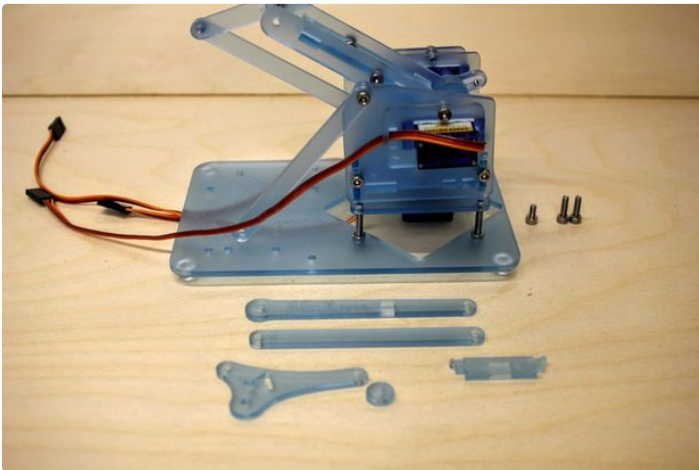
The first thing to do is hook part #18 onto the left forearm part that you've just attached and then onto the right forearm which we'll call part #31 as it seems it's not numbered!

Attach the triangular part #19 to part #31 and onto part #13 (the bit that's attached to the servo) with a 10mm screw. Don't over tighten as we need all these

parts to move freely.

Attach the back of part #19 to the part #17 attached to the right side plate, use a 10mm screw and a spacer (#20) inbetween.

Then attach the final part #17 to the inside front of part #19 with a 6mm screw.





## Step 11: Build the Claw!

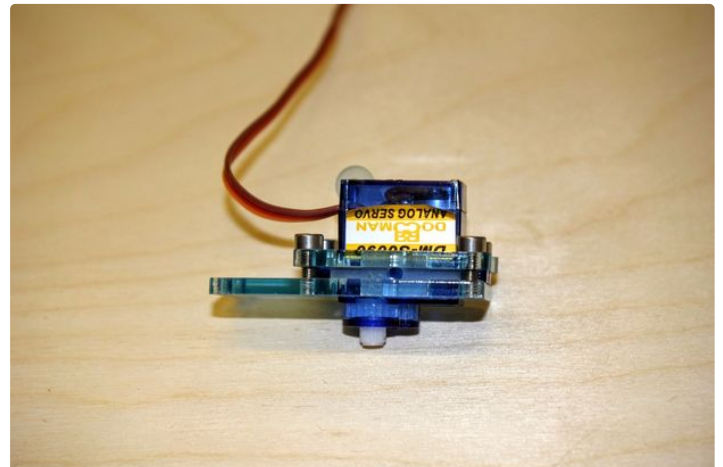
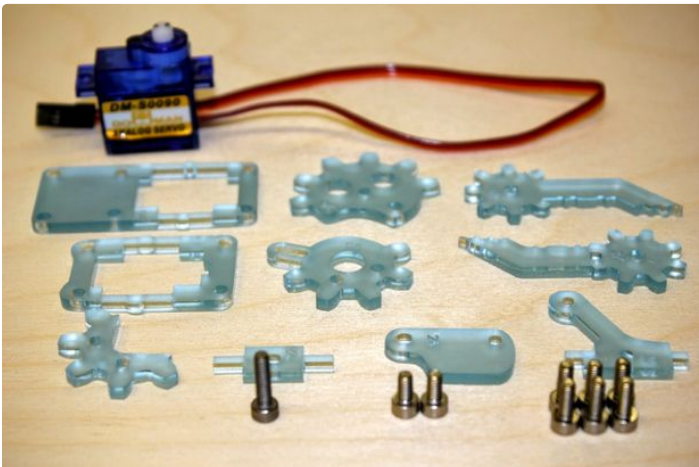
Thread the servo through the remaining collar, #21. Insert parts #22 and #23 into the side slots made by the servo and part #21 then using part #24 secure them with four 8mm nuts. Again be careful, we're nearly there, you don't want to break anything.

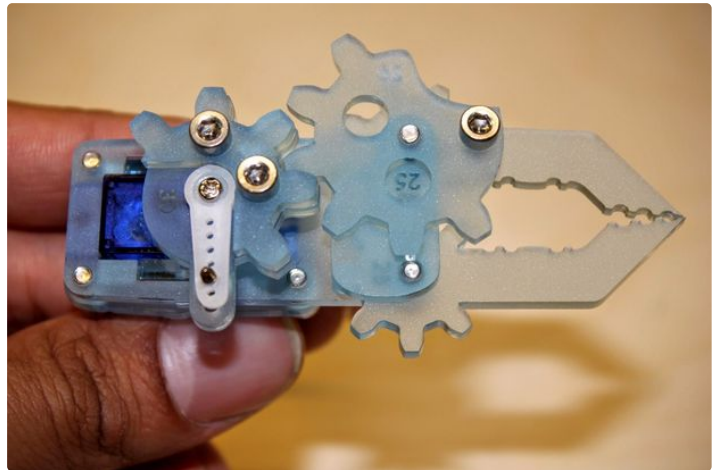
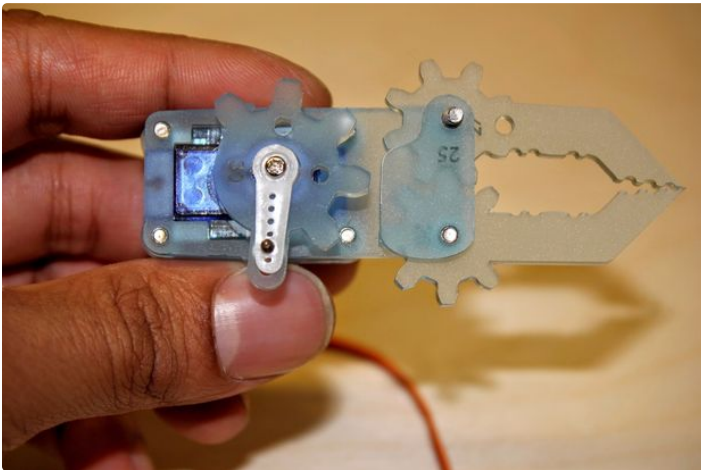
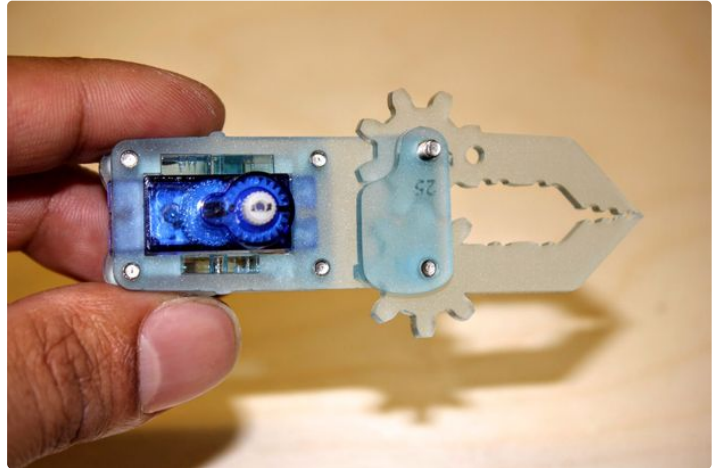
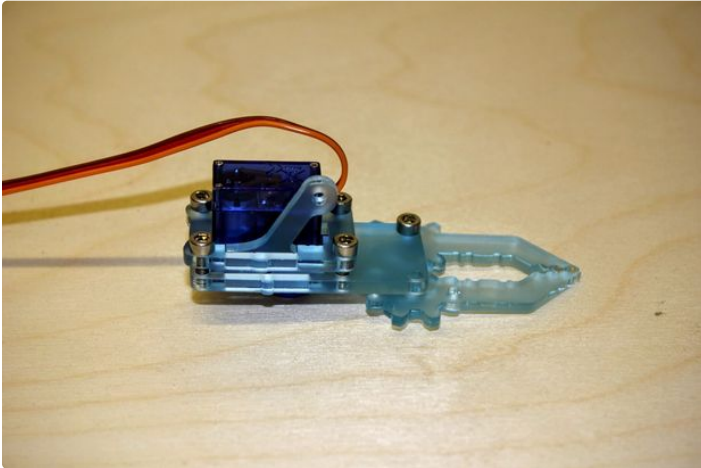
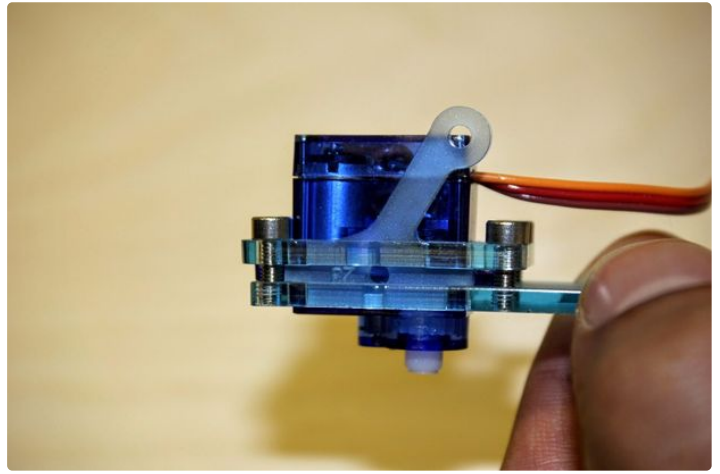
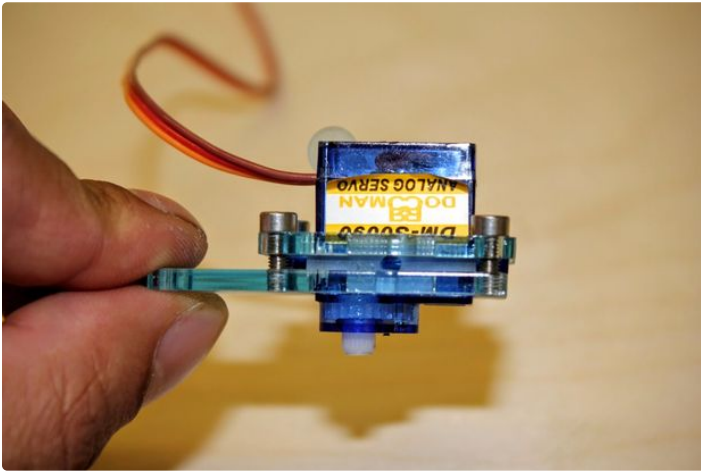
The next parts will be a little unsecured until the last screw is in place so don't worry if you drop something now. Secure part #28 through the left hand hole on the head assembly with an 8mm screw into part #25. Then mesh the gears on part #27 and place a 12mm

screw through it, the head assembly and part #25. This won't be secure yet but keeps it together.

Attach a servo horn to part #30 and secure it to the servo using the machine screw. Attach #29 onto #30 using two 6mm screws.

Now you can attach #26 to the loose 12mm screw and secure it to the extra hole in part #27 with an 8mm screw.





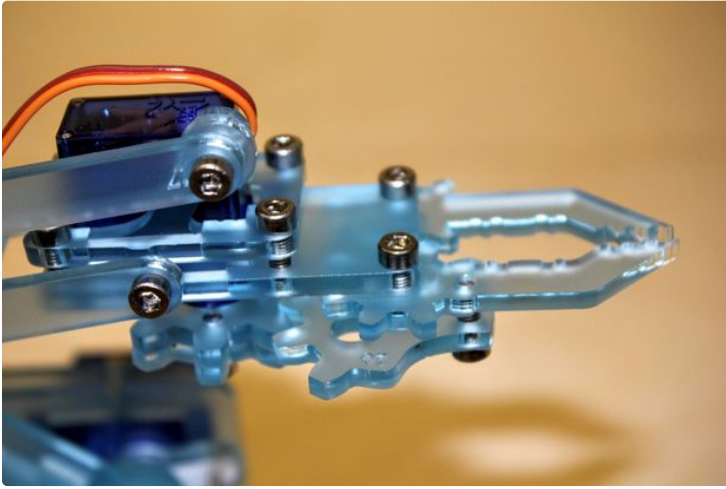
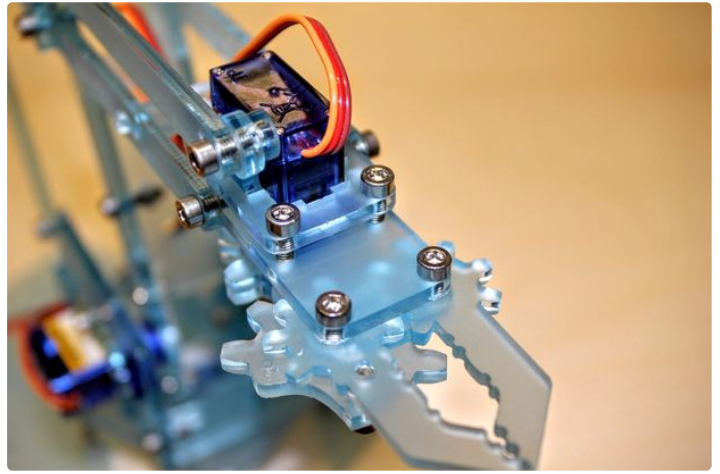
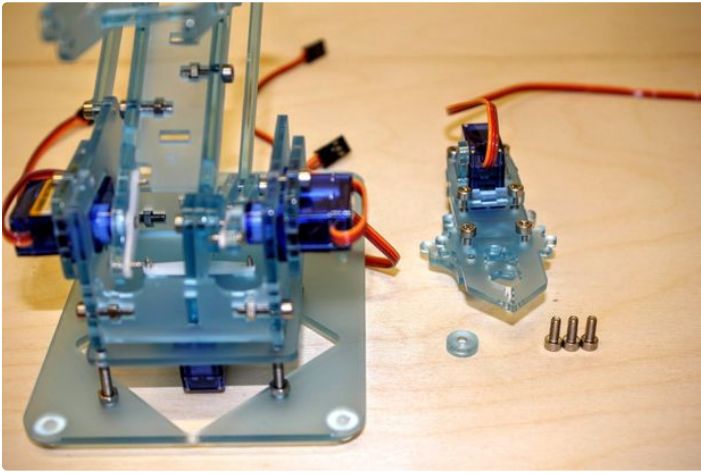
## Step 12: Add the Head

Last part is to attach the head.

This is secured by two 8mm screws through the forearms into parts #22 and #23 on the head. It might make it easier to slacken the 8mm screws on the head servo clam.

Now switch on and play!





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### Step 13: Trouble Shooting

This section will be filled in over time with common issues. If you have one let us know and we can add it.

Left servo arm appears stuck. Typically this is down to a stiff joint. The head assembly attachment is the one people forget.



I made it! my laser cutter shop only accepts coreldraw files. so I converted dxf to cdr. If anybody requiring cdr, they are attached.



---

can i have the dxf file



DXF Attached.



hello kindly send me the code for this project [espero.jethro@gmail.com](mailto:espero.jethro@gmail.com) pls help me for doing my project. thank you

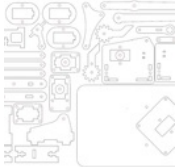
Do you have a pdf version of the cut out files?



yeah



There it is



Sir I would like to use your project to teach my kids, I work for FABLAB, I like your project. I would like to use your pictures and create a small manual for them on how to build it, but I will be making you as a reference if you don't mind



my email address is [africa.dintwe@gmail.com](mailto:africa.dintwe@gmail.com), you welcome to send me your reply via email. Thank you.

This is the 0.4 version, not the 1.0.



Sir I would like to use your project to teach my kids, I work for FABLAB, I like it. nice project.

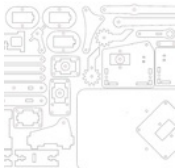
Can you give the actual dimensions of the parts? I 2D printed the dxf file on a 1:1 scale and the base of the MeArm Robot was relatively large compared to the one shown on the instructables. I compared the size to the arduino and the base came out to be x6 larger.

P.S. I'm trying to do this project by 2D printing out the file and engraving it onto acrylic glass and then cutting it out with a rotary tool.

Thanks in advance!



Here is the file



hi , can you tell me , the mearm robot can bring a tennis ball ? and if I change the servo SG90 blue to MG996 ?



Turned out great! I think the instructions on the mearm site are a bit more up to date. Love this project!



It appears that self tapping screw is introduced in v1.0. Don't buy wooden kit since self tapping doesn't really work on wood. Learned my lesson.



They've always been a feature, and never worked well in wood. Sorry about the kit you bought - always buy official! ;)

◦ can i know the coordinate frame for this robotic arm?



Awesome instructables .This is my version of MeArm ,wireless gesture control.

[//www.youtube.com/embed/098ebCTH1Ew](https://www.youtube.com/embed/098ebCTH1Ew)

◦ Can you put up an instructable on how you made the wireless gesture control?

◦ you can show code for you :)



Nice!

I started to mount one to control the Myo my friend posted on Instagram and he even talked a little bit with you but little project goes through stopped for lack of time hehe



I love this design! So simple and elegant.

My students will be building their own MeArm robots as part of a visual programming course this spring. Thanks for sharing!

-Bryan



◦ How about posting an 'stl' version so we can 3d print this?

◦ to do this, just import the DXF file by Sketch or any CAD and create some depths. But I think it will be more costly to print it (it takes about 180gr of 3D filament)

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When I was a kid having one of these was my dream till I got one of these old no idea what happened to it. But it was fun however I never really knew what kind of thing to do with it and the controls were not exactly the best. This one looks neat though and really takes me back 20 something years and probably not as loud as the servos used in this old thing.



Brilliant!



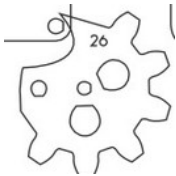
fantastic. It would also be great to cut this in aluminium!



Would love to see that, but I think you'd need bearings and some better servos!



I opened the .dxf file available on Thingiverse in both inkscape (open source, free) and Adobe Illustrator CS6. There appears to be problems with the file. The most notable issue is part 26. Part 26 appears to be missing a path point on the outer outline of the part.



It was made on Corel Draw and will import to laser cutters without problem. I've always found working with .dxf in Inkscape problematic, despite finding the program agreeable. I'll get a pdf exported on Monday and upload that, they seem to be the most robust format for sharing!