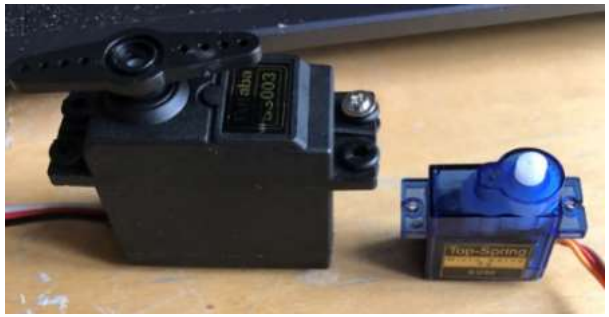
MrBaddeley
R2D2 version 2 Interface Arm instructions
Version 0.1 (Draft)

https://www.patreon.com/user?u=4294285
for other parts and instructions

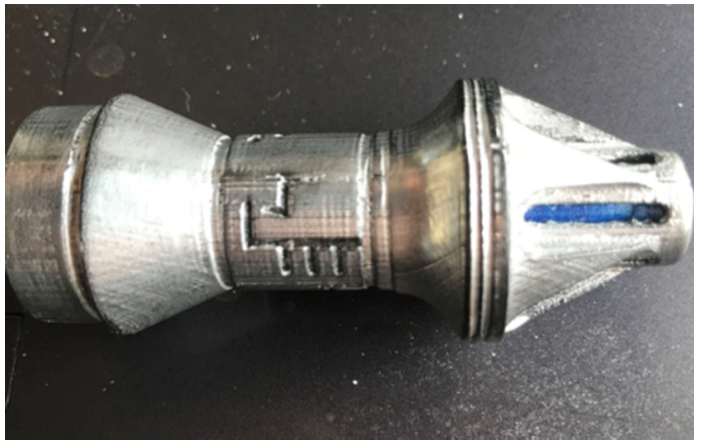
Features…

Fully printed and modular fitting to R2D2ver2, easy swap / maintenance.



Uses S3003 and SG90 standard servos

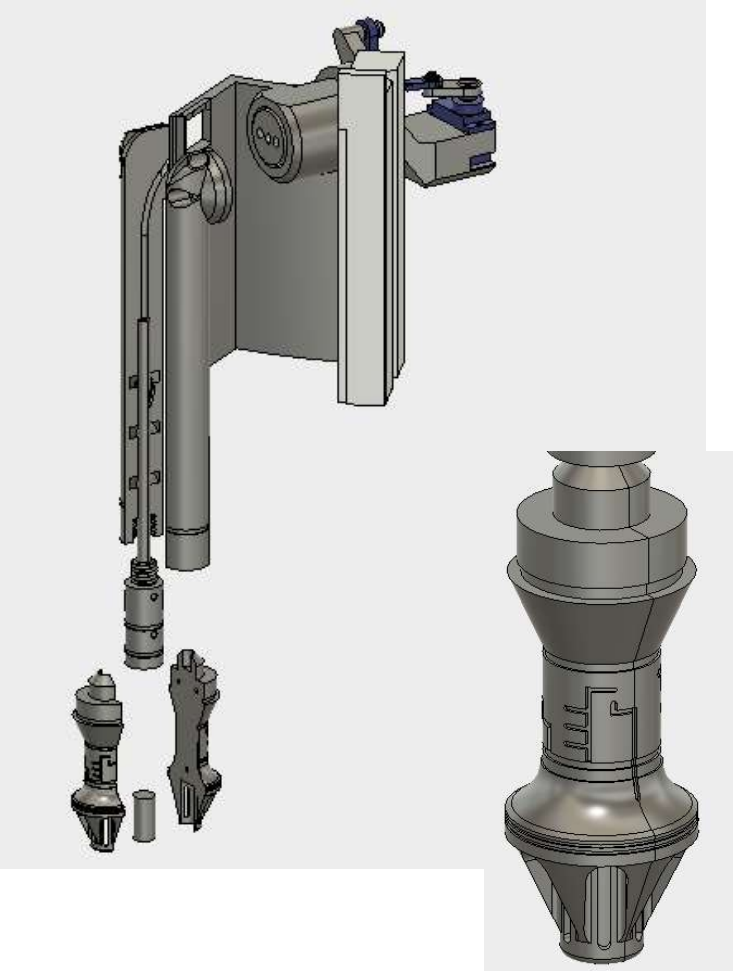
Uses 1.75mm nylon filament as the drive “cable”



Designed for screen accuracy and scale.

Arm and Interface animated, comes out and spins.

MrBaddeley R23D printed holoprojector instructions.



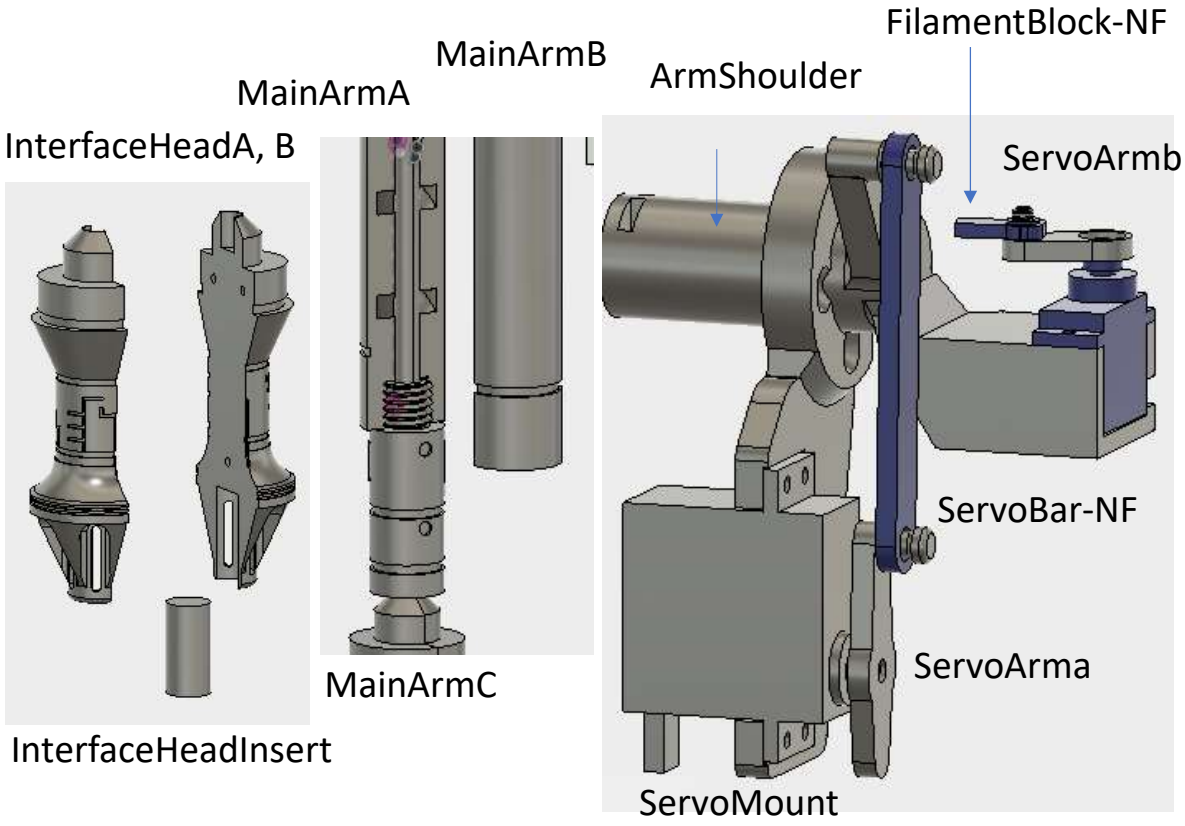
Firstly the basics, all parts are printed in ABS, I used 3 outer layers on 25% infill for the most part. I did the Servo Arms with 45% infill for strength. I would recommend high resolution for external parts (.1 or .2 layer) .3 for anything you can't see. A couple of parts are printed in Ninjaflex Cheetham (I've used NinjaFlex Cheetham throughout, just not realised, I bought some NinjaFlex and it was "floppy" so Cheetham is slightly more rigid and easier to print). The Ninja Flex is for the "blue" parts shown. Basically the bar which lifts the arm, the servo connector for both ends of the filament cable. I've add "NF" to the end of the descriptions for the Ninjaflex parts. The size and simplicity of the design is down to a small Ninjaflex hinge on the grippers which attaches to the cable. Once you've got the parts, it's an easy assembly.

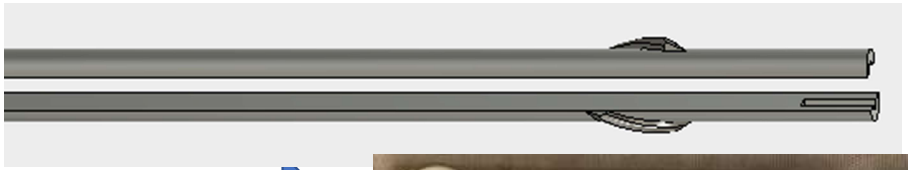
Hardware wise, a couple of M4 bolts (I use countersunk hex type) around 15 mm should do with some square nuts to hold the arm on. Some M3 bolts (around 9mm).
The inner spiral and rod both need some smoothing and finishing with fine sandpaper. Critical to this build is the smoothness which the Arm moves out and rotates so please sand / smooth until you get a nice movement before gluing.

1.75mm nylon filament is also needed as the cable which runs through the arm to control the Interface.

Firstly print and familiarise yourself with the build. All parts are printed only once.

Firstly, assemble (Glue) IntRodA to B. This is critical it's aligned and smooth. After fitting, take some time with fine sandpaper to smooth the rod (which rotates) and the Screw part. This runs inside the groove in MainArmA&B. Print these next, MainArmA and B, then, again smooth the inside and you can test the rod inside the grooves holding the pieces together before you glue. You want as smooth as possible for the "in/Out" and the twist with very little effort. You can fit a piece of filament to IntRodA/B to test this, I used Nylon. Once you're happy, glue the MainArmA and MainArmB together ensuring no glue drips into the grooves. Let this set correctly then you can slide the rod in from the end with the "Screw Grooves". MainArmC then should just screw into the MainArmA/B holding the rod in. This enables access later for maintenance of if the nylon filament comes loose. After this you've pretty much assembled the Arm and Mechanism.

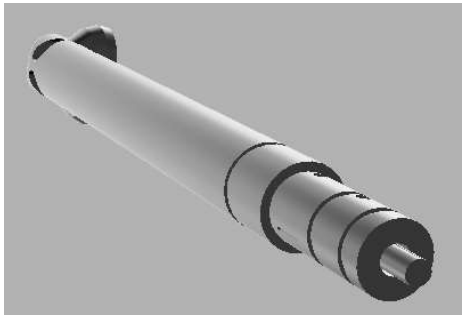




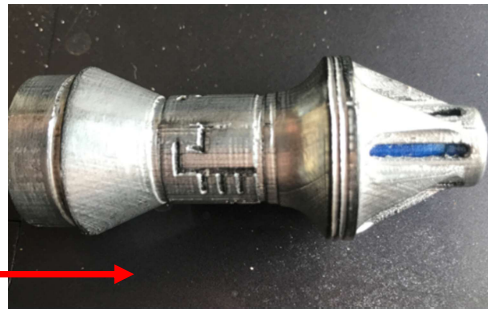
IntRodA & B

Assembled

Assembling the arm…



Once you've glued (or welded) the main arm parts, you should have something like this. Make sure a 1.75mm length of filament (I used nylon but please experiment) moves freely through the centre channel and is firmly attached to the rod. (I used a small blob of SuperGlue to attach the Nylon Filament to the Rod). You can unscrew MainArmC obviously at any point if you need access.



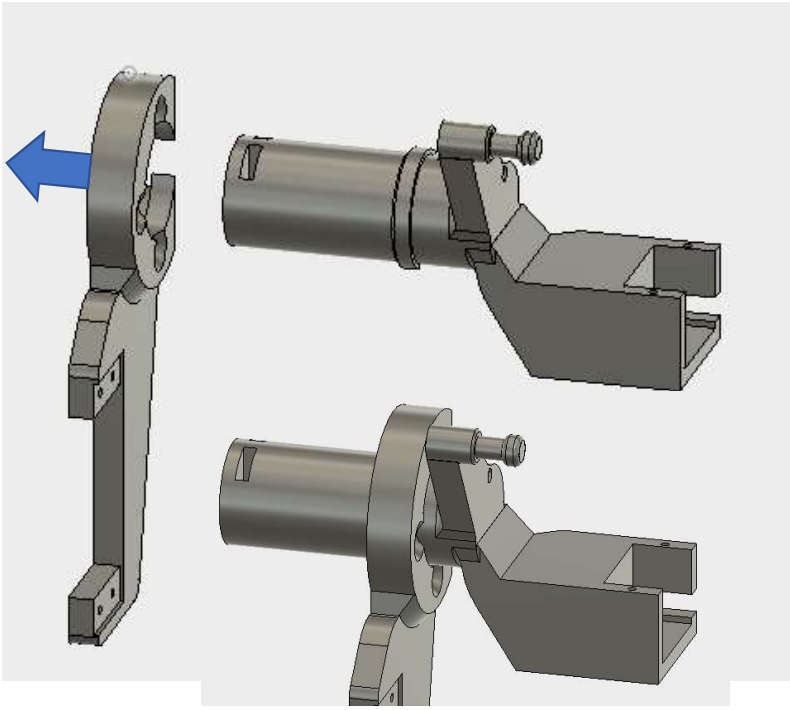
Next you need to print InterfaceHeadA, B and the InterfaceInsert. The Insert is for painting so you can paint this blue for accuracy. Assembly is obvious, A glues to B and the insert sliding into the end. I would suggest painting the parts (I use black base and Rub n Buff for the Silver) before the Insert goes in. This gives you the Interface head ready to attach to the Rod.

Finally, when you're happy with it, glue to Interface Head onto the Interface Rod and make sure it's central / rotates but doesn't seem off centre.

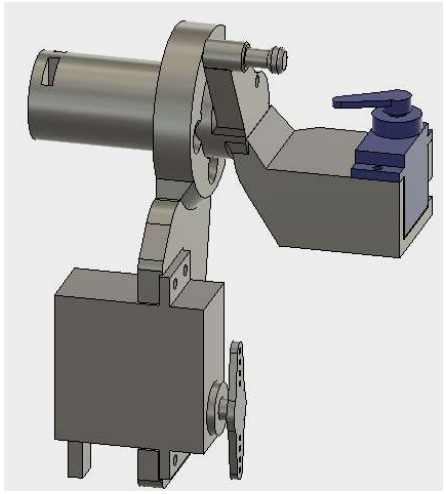
This effectively gives you the Interface Arm assembly and you can test pulling and pushing the nylon cable to ensure it functions smoothly and rotates.

The servo bit…

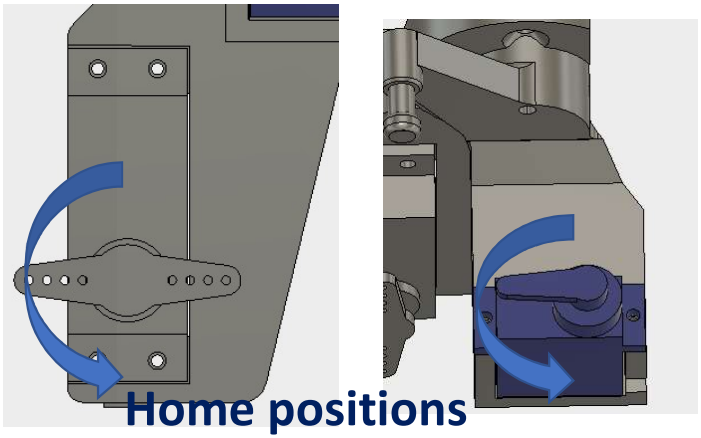
Firstly assemble the shoulder and the Servo mount. These fit together as shown in the diagram. Firstly they're a tight fit and secondly you're trying to get the Servo mount past the "shoulder". This is done by rotating the shoulder (there's a cutout which matches) and then a little bit of gentle force. The Servo mount is fairly tough so don't worry too much about breaking it, just a little flex should do it. Then spin it back so it's roughly like the diagram.



Next screw the two servos into the frames. Each servo should be supplied with screws. These should fit the frame / holes and grip. Select the control arms from the servo packs as shown in the diagram.

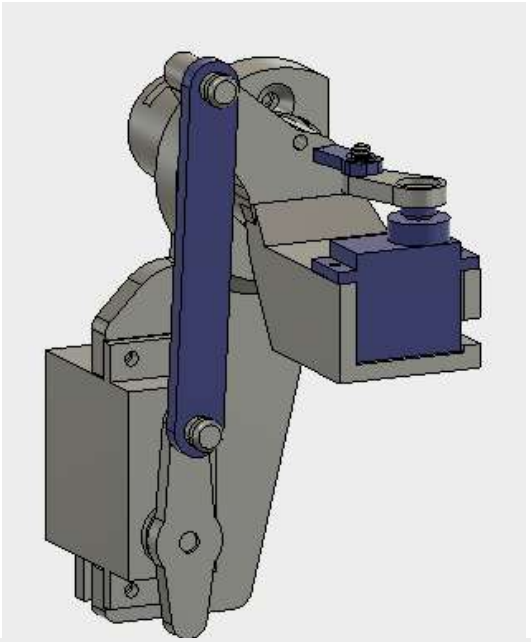


Put the control arms onto the servo and you can gently spin the servo so the position is correct. The "home" (centre) position should be as shown.



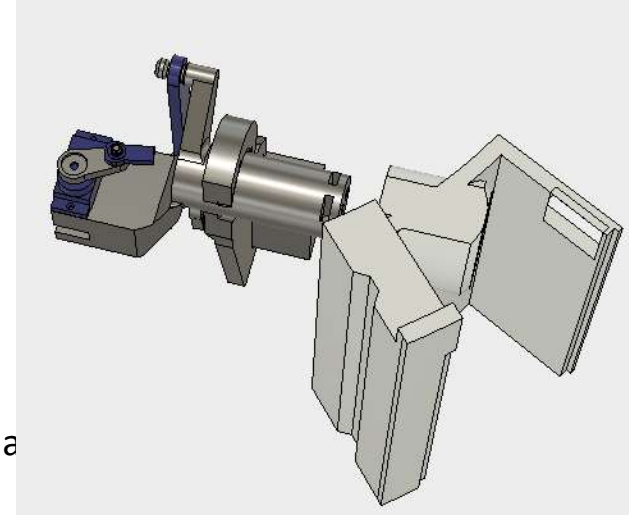
Next attach the two Servoarms over the ones supplied with the Servos and screw into place.

The servo bit continues …



Now, push the two NinjaFlex parts onto the mechanism as shown. The Servo Bar connects the large Servo to the Shoulder mechanism and the filament block is for controlling the gripper. Drop two M4 square nuts into the two slots in the shoulder, this is where the arm will screw to when you're ready to fit the whole assembly (which is about now!).

Take this assembly to the main body, This fits into the hole in the large side panels at the top (easy to access with the dome removed). Push the mechanism into the hole fully and you'll see three screw holes for small) 2mm or 3mm self tappers, which hold the ServoMount to the main frame. You'll need to move the large servo to get access to all the holes, but gently tighten (don't over tighten, you can put some screw locktite but I didn't bother). This should securely hold the frame in with the face which has the M4 holes in, just flush (slightly protruding) the hole inside the large panels.



Next take your arm and thread the 1.75mm Nylon filament through the centre hole in the ArmShoulder until the arm is in postion. Next take 2x M4 bolts and push them into the arm holes and tighten up (again without over tightening) to secure the arm to the shoulder.

The Arm should now be securely fitted to the frame and the servo should lift and drop the arm if you gently manually move it. Adjust and fit the nylon cable for the interface a to the smaller servo and Job Done!

Supported and tested by Sean Lavigne, Jay Williams, Steven Elford, Robert Gusek, Rob Dinniwell, Joseph Masci, Sam D. Fenimore, LarryJ, tevans, Rick Davis, Brendan Faulkner, Nicolas Carré, Ben Langley, Mathieu Saint-marc, Chistopher Edwards, Mark Oram, Tim Parr, Jon Haag, John Gardener, Ryan Roehitch, Oiva Ranta, Wes Thierry, Robert Bean, Mitchell Young, Jake Danible, Simon Ruel, William Meyer, Brian Bishop, Danny Olsson, Rob Saey, Steve Nuitall, Gregory Welch, Ben W Bell, Tarak Sallini, James Van Dusen, Jospeh Powell. James Dyer, Joe Gravelle, Pierre-Alain Ney, Mauro Santini and Brian.