CyberBrick Animatronic Eyes Assembly Instructions

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Welcome to the Animatronic Eyes build. This is my first CyberBrick design, and I hope you enjoy the project.

Of note –

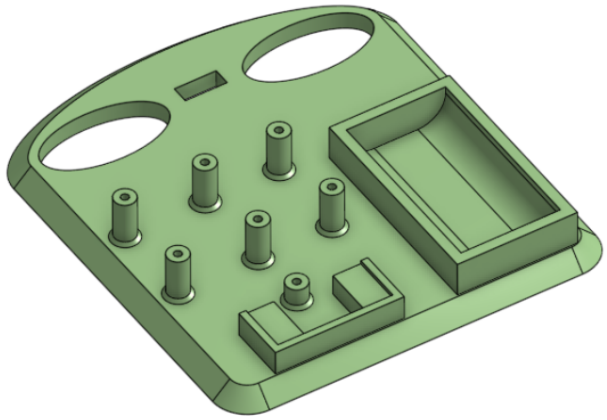
- Please read through all the instructions before starting the assembly. The building of this model is not difficult, but it is a little fiddly with some setup of the servo limits required.
- The official remote-control transmitter https://makerworld.com/en/models/1395991-cyberbrick-official-standard-remote#profileId-1446992 is used as the controller, although only the Left stick and Right Shoulder sticks are required. I found the transmitter used batteries VERY quickly, so I added the rechargeable battery conversion https://makerworld.com/en/models/1539477-battery-upgrade-for-cyberbrick-standard-remote#profileId-1615461 .
- Adding a small bit of the silicon grease to all the moving parts helps the movement to be smoother
- This is my first attempt at designing anything like this, and I drew from various sources for inspiration. The design of all the 3D printed parts are my own.
- The project is designed to be modular, and future expansion is planned with added functions. Each eyeball and eyelid has its own servo to allow, perhaps, for blinking or going cross-eyed, and these will come with future software configurations.
- I would love feedback and comments; please message me via Makerworld @PurpleShark or at my website, www.purpleshark.uk

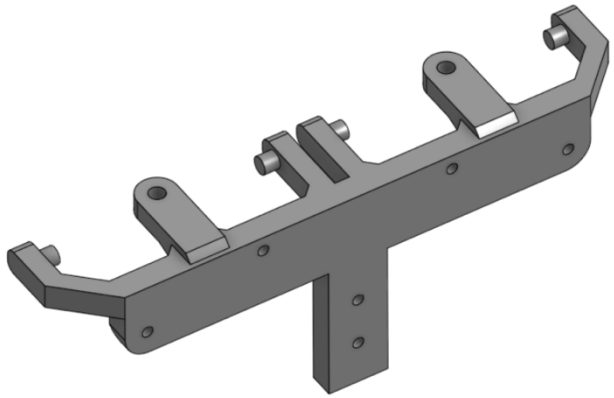
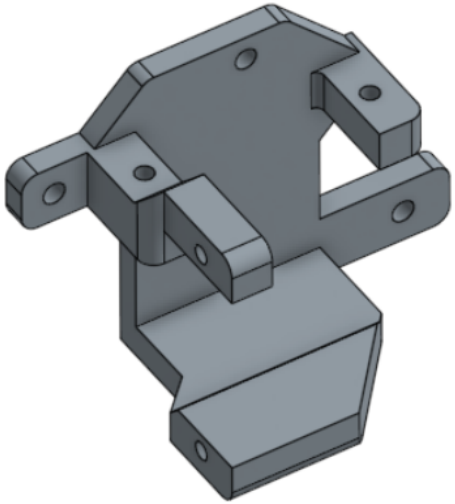
1. Required Tools

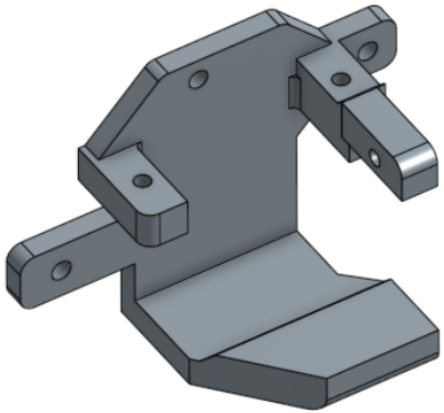
- Allen keys (hex wrenches):
  - 1.5mm
  - 2.0mm
- Spanner
  - 4.0mm
- Small screwdriver to fit the servo horns, Philips 0
- 2mm drill to enlarge the holes in the servo horns
- Tweezers
- De-burring tool or sharp knife

2. Bill Of Materials

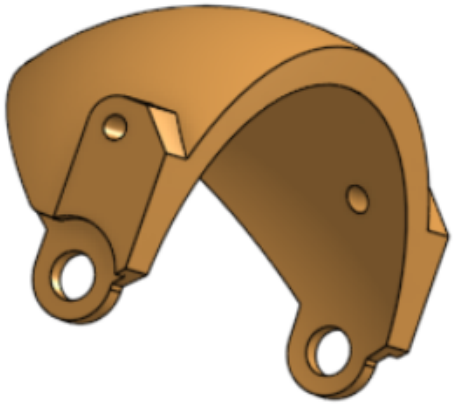
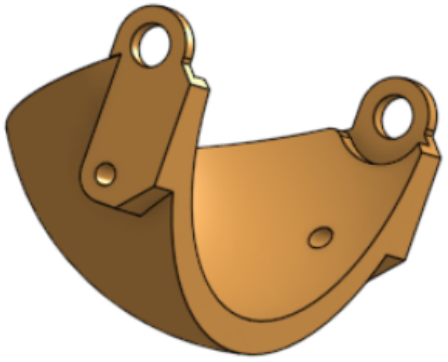
3D Printed Parts

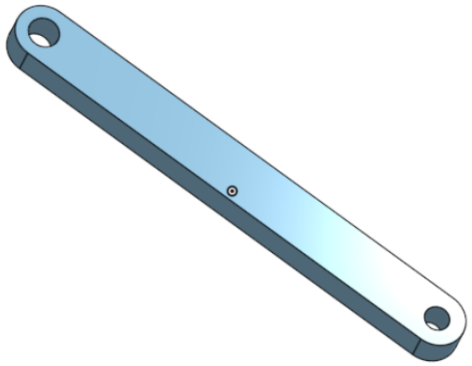
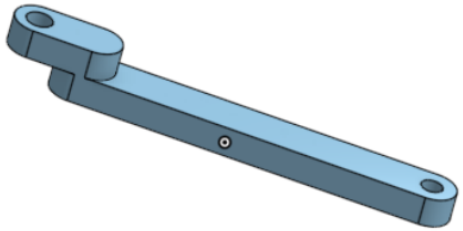
Qty	Description	STL file name
1	Base plate 	Base.stl
1	Cable retainer 	Wire keeper.stl

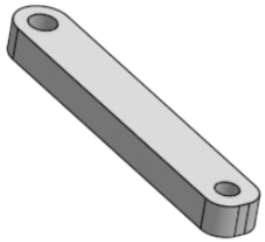
Qty	Description	STL file name
1	Main bracket 	Main bracket.stl
1	Left servo bracket 	L servo bracket.stl

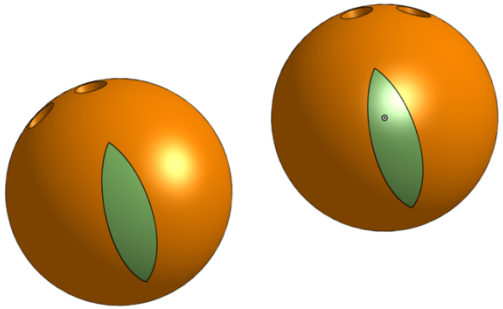
Qty	Description	STL file name
1	Right servo bracket 	R servo bracket.stl
1	Left eyeball regular 	L eyeball regular.stl

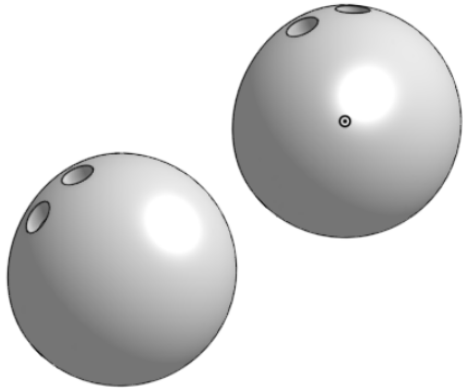
Qty	Description	STL file name
1	Right eyeball regular 	R eyeball regular.stl
2	Round pupil 	Regular pupil.stl

Qty	Description	STL file name
2	Top (inside) lid 	Inside lid.stl
2	Bottom (outside) lid 	Outside lid.stl

Qty	Description	STL file name
2	Eyelid bar 	Eyelid bar.stl
2	Eyelid bar cranked 	Eyelid bar cramk.stl

Qty	Description	STL file name
2	Eyeball bar 	Eyeball bar.stl

Alternative Eyeballs		
1 1 2	Left lizard eyeball Right lizard eyeball Lizard pupils 	L lizard eye.stl R lizard eye.stl Lizard pupil.stl

Qty	Description	STL file name
1 1	L eyeball plain R eyeball plain Plain eyeballs (no pupil for your own decoration) 	L plain eye.stl R plain eye.stl

Hardware

The CyberBrick Beginner Hardware Set contains all the required electronics and hardware, except for the items marked ** below. This hardware list is for the eyes only; the remote hardware is all part of the beginner set.

Qty	Description	Notes
1	Beginner Hardware Set	https://uk.store.bambulab.com/products/cyberbrick-hardware-kit?id=593289805821751303
1	Multi-function core board	
1	Remote control receiver shield	
1	Power switch module	
1	14500 7.4V 800mAh Li-ion battery	
1	00mm Wire with 2Pin XH2.54 Connectors	
27	M2.5x6 machine screw	
1	Lubricant grease	
1	180° 9g servo motor with clutch protection	
3 **	180° 9g servo motor with clutch protection	1 is included in the beginner set, 3 more are required (4 in total). https://uk.store.bambulab.com/products/9g-servo-motor-with-clutch-protection?id=505284261155450883
2 **	M3x10 machine screw	https://uk.store.bambulab.com/products/m3-socket-head-cap-machine-screws-shcs-1?id=41622217654332
2 **	M2x12 machine screw	https://uk.store.bambulab.com/products/m2-socket-head-cap-machine-screws-shcs?id=41630170742844
2 **	M2 nut	https://uk.store.bambulab.com/products/hex-nut?id=41692088860732

3. Assembly details

1. Obtain all the CyberBrick parts as listed above & print all the 3D plastic parts. PLA is fine for all items.

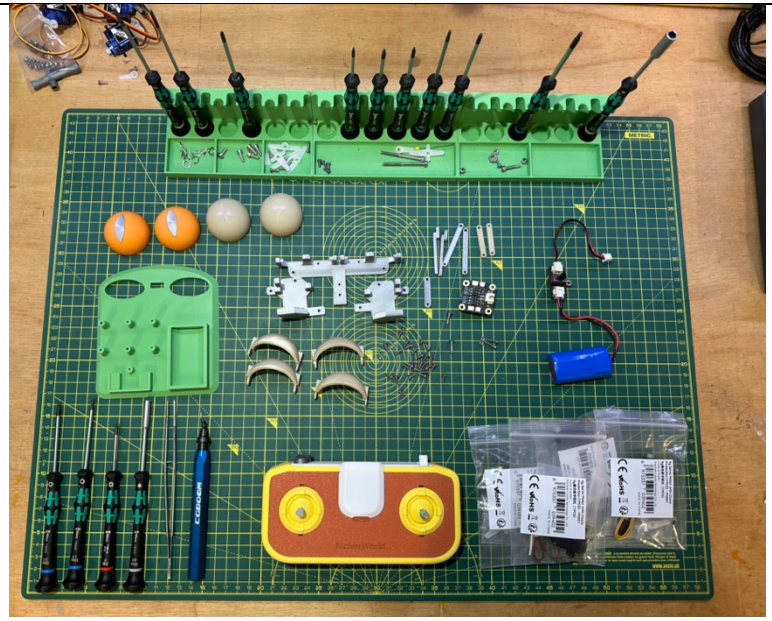
   Assemble the standard remote control as per the instructions.

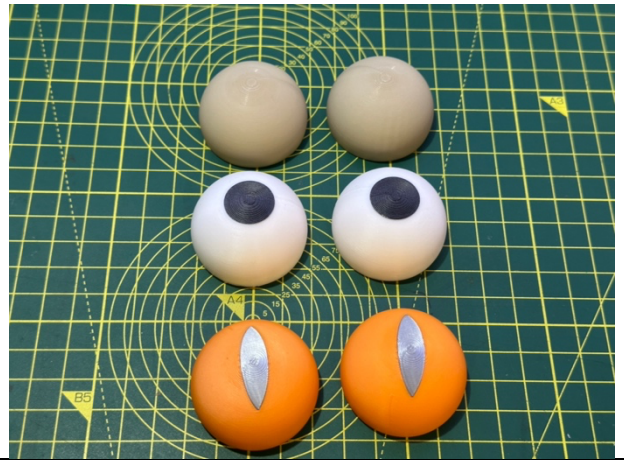
   3 options for the eyes are provided (plain with no pupils to be decorated as required, standard with round pupils, and lizard with slit pupils). Glue or decorate the eyeballs of your choice as desired.

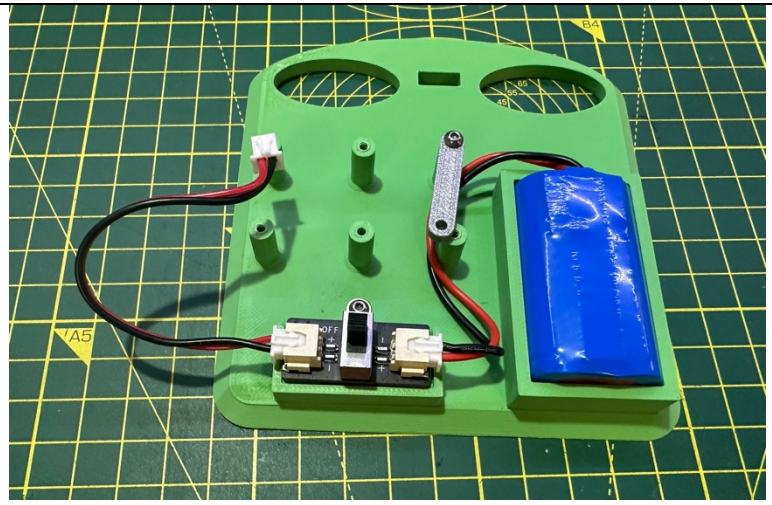
   Use the de-burring tool to remove any excess brim material. Make sure all the parts and holes are smooth.

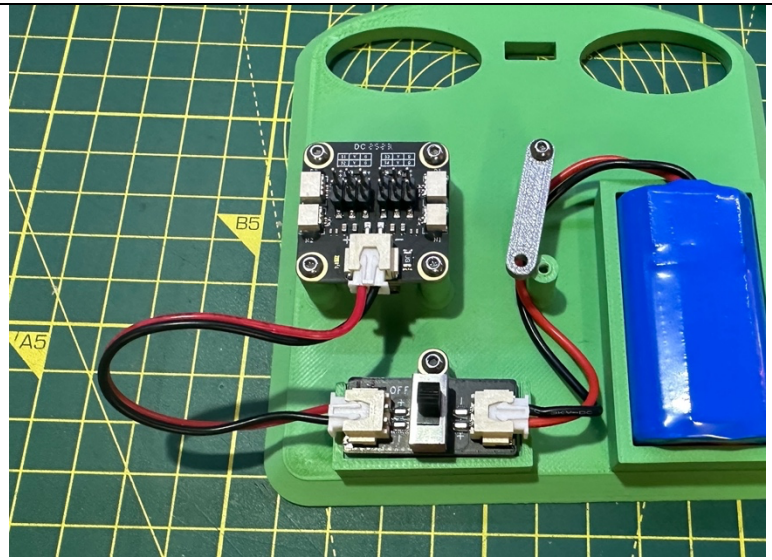
   Charge any rechargeable batteries so they are ready for use later.

   Note: all screws are M2.5 unless otherwise stated.



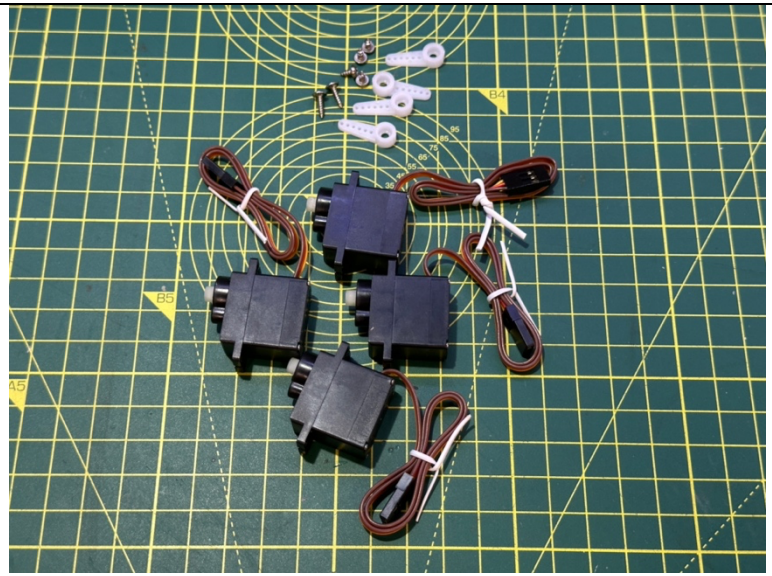


2. Start with the base and attach the cable holder at one end only. Leave loose enough to rotate.	
3. Place the battery into the holder and screw the switch into place. Attach the cable from the battery into the switch and the connector cable after the switch. Tuck the battery wires under the cable holder.	

4. Screw the Receiver and Multi-function core boards into place and attach the power cable.	

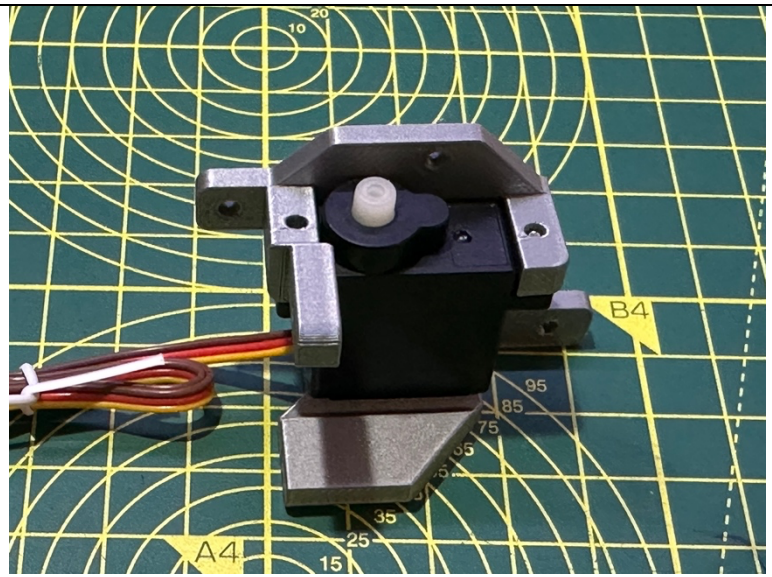
5. From the servo packets take:
    - 4x 180º servos
    - 4x short servo horns
    - 4x short screws
    - 2 long screws

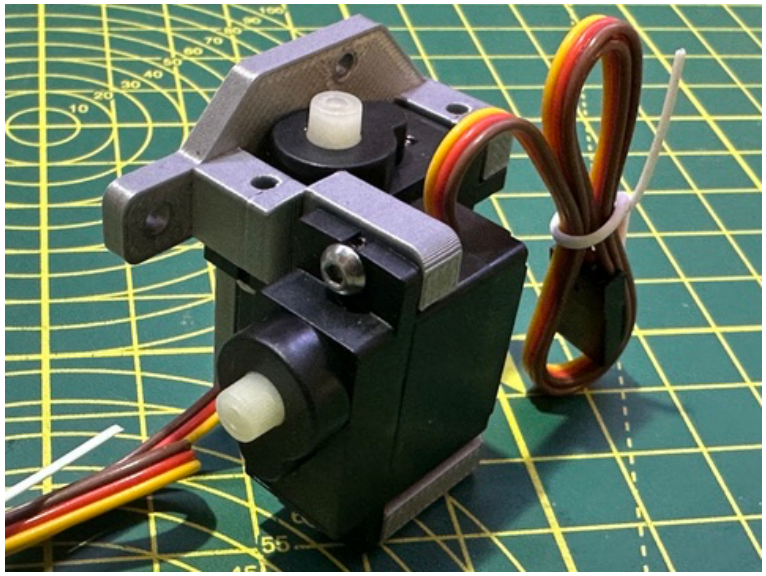
    In 2 of the servo horns, drill 2mm holes at the second from last position (the other 2 not drilled).

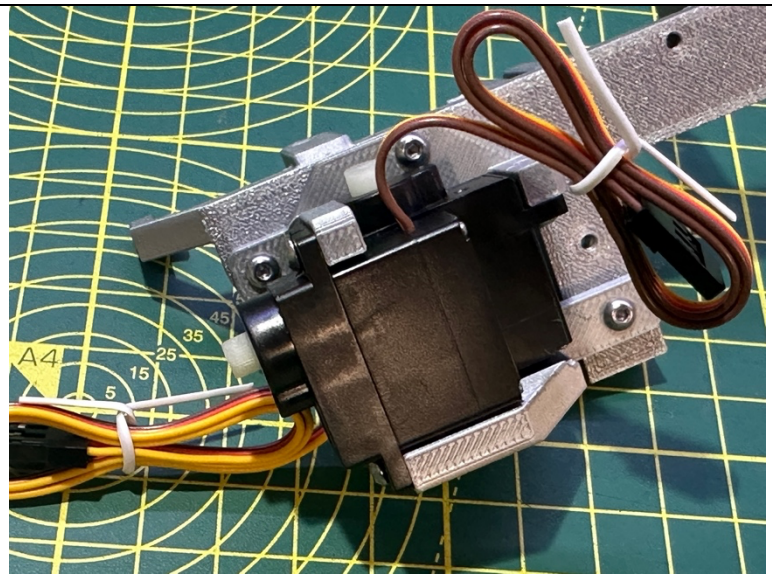


6. Mount the first servo to the L servo bracket with the screws from underneath.

   Then the second with the screws from above.

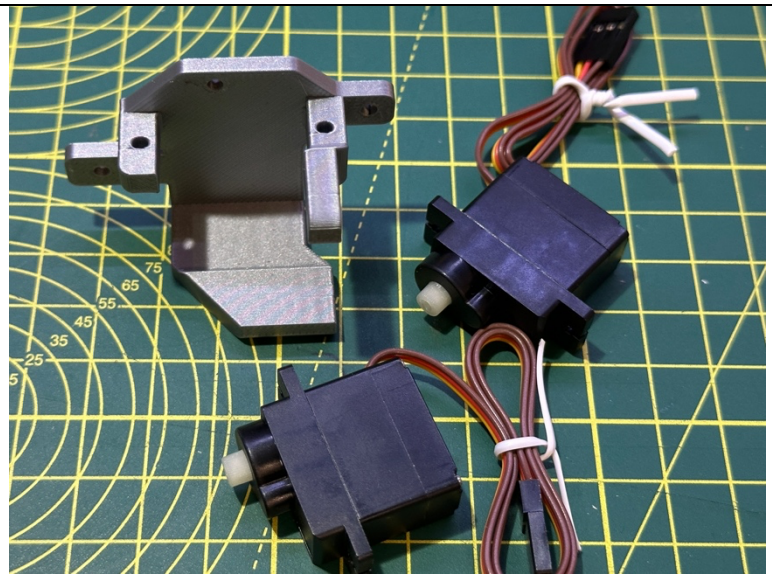


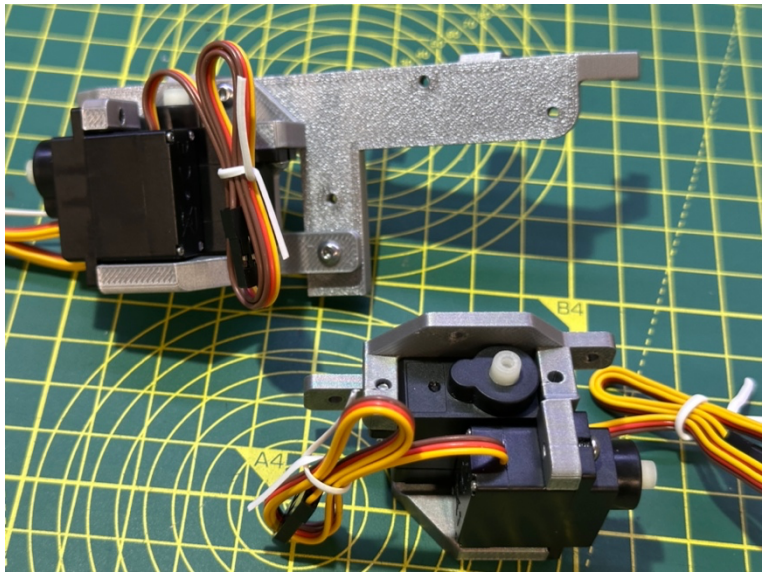


7. Fix the L servo bracket onto the main bracket with 3 screws.	

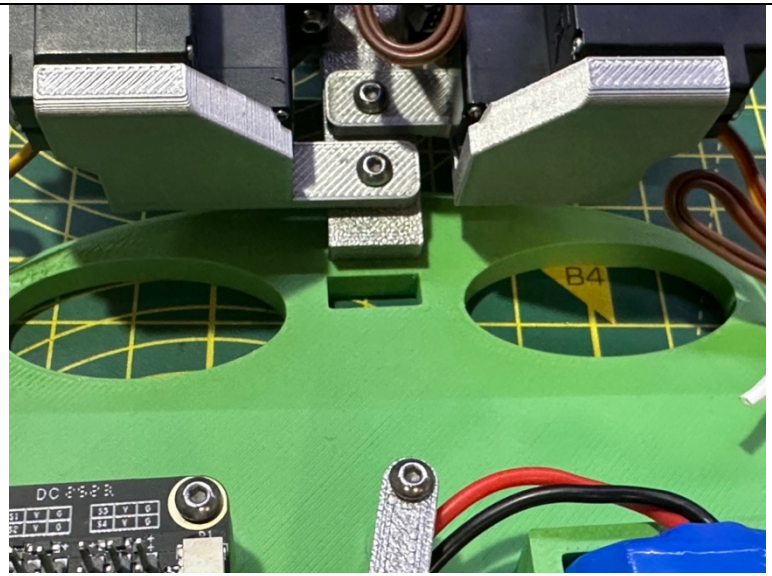
8. Repeat for the Right servo bracket.

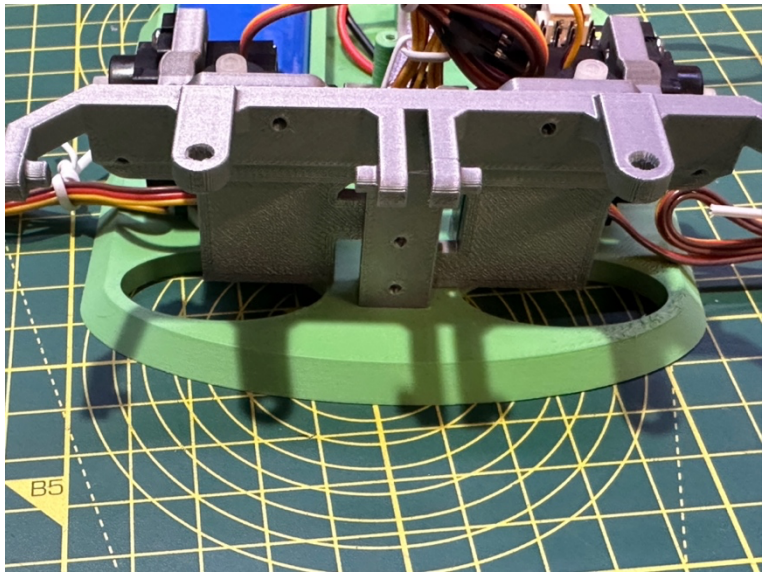
   The fix onto the main bracket





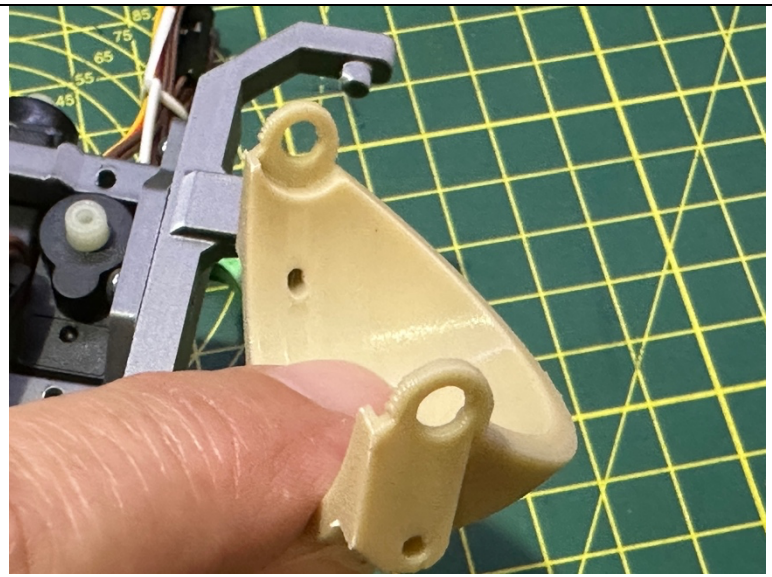
9. Insert the bottom of the main bracket into the hole in the base and push home.

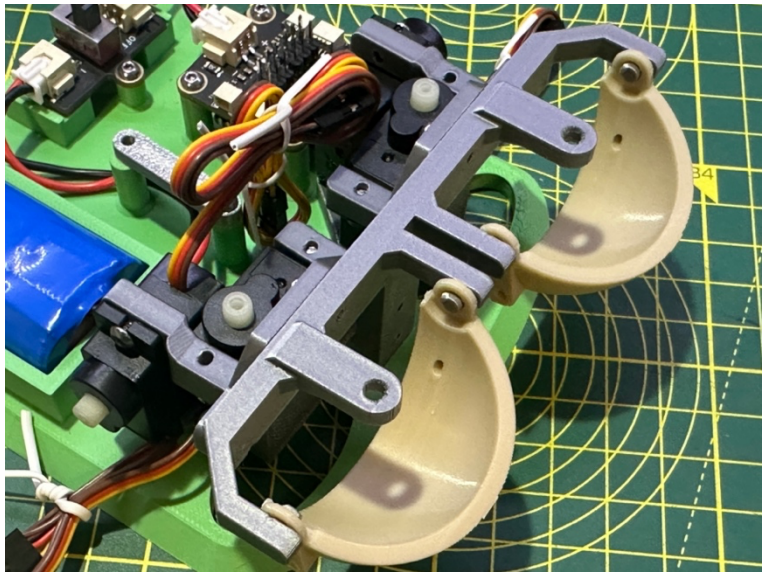




10. Clip the 2 bottom eyelids onto the main bracket. These are not handed and will fit either side. Make sure they move freely.

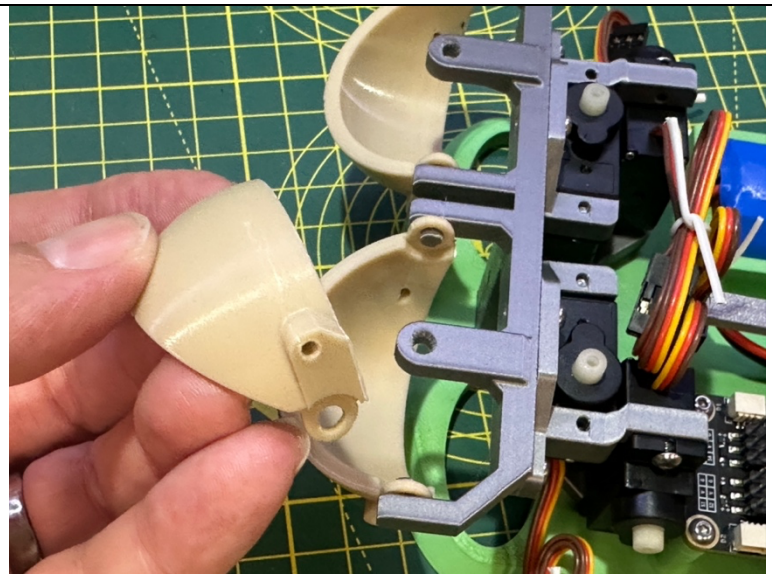
    A small amount of the grease can be applied onto the pins on the main bracket.

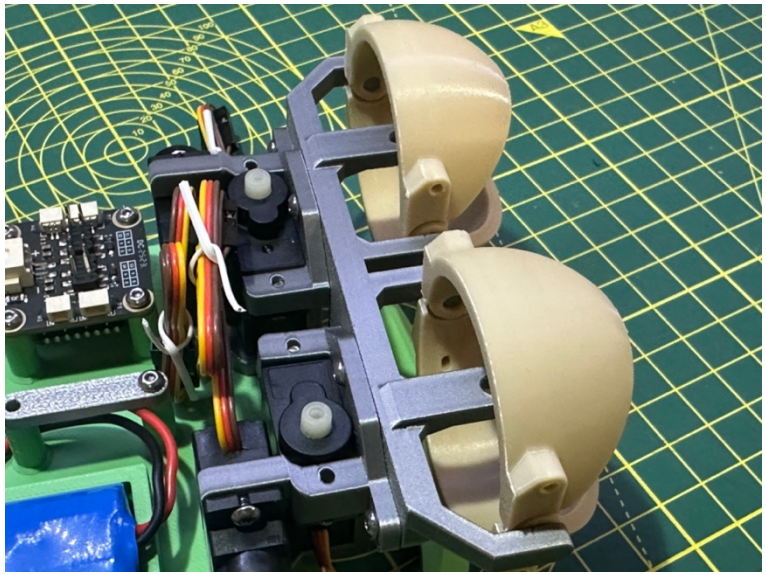




11. Clip the 2 top eyelids inside the bottom eyelids onto the main bracket. Make sure they move freely.

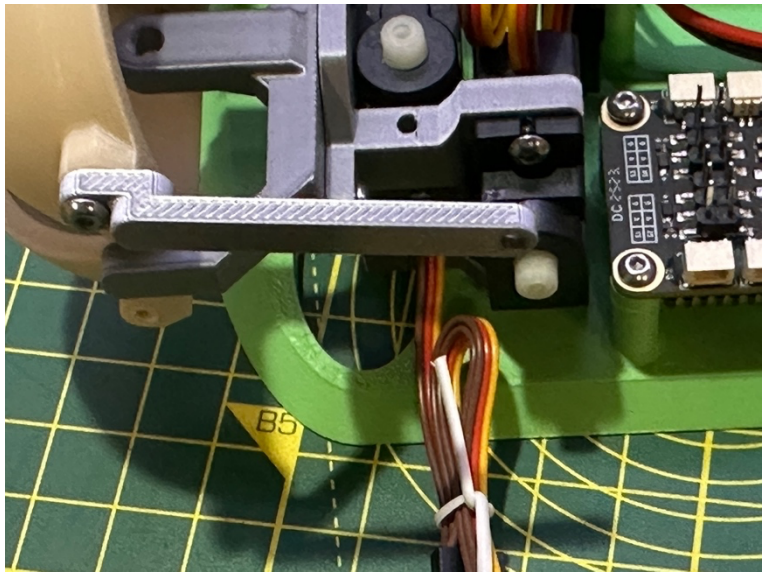
    A small amount of the grease can be applied between the eyelids.





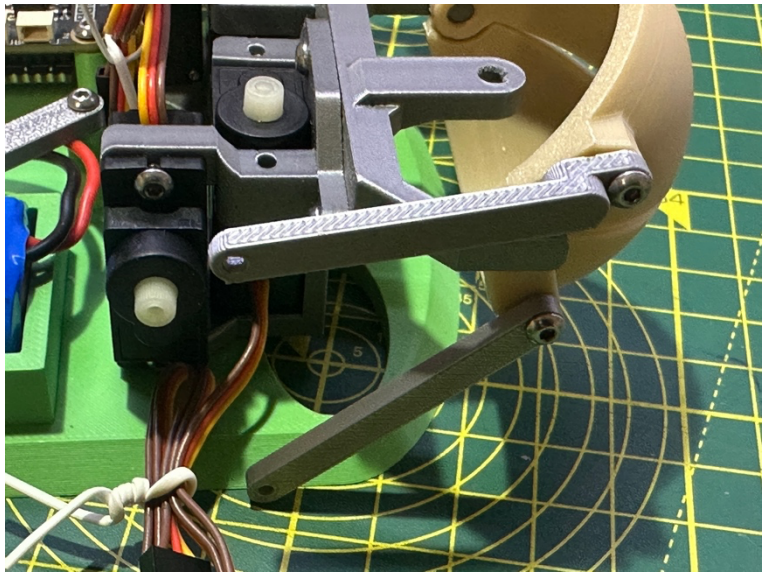
12. Fix the 2 cranked eyelid bars onto the eyelids. Make sure they can move freely.

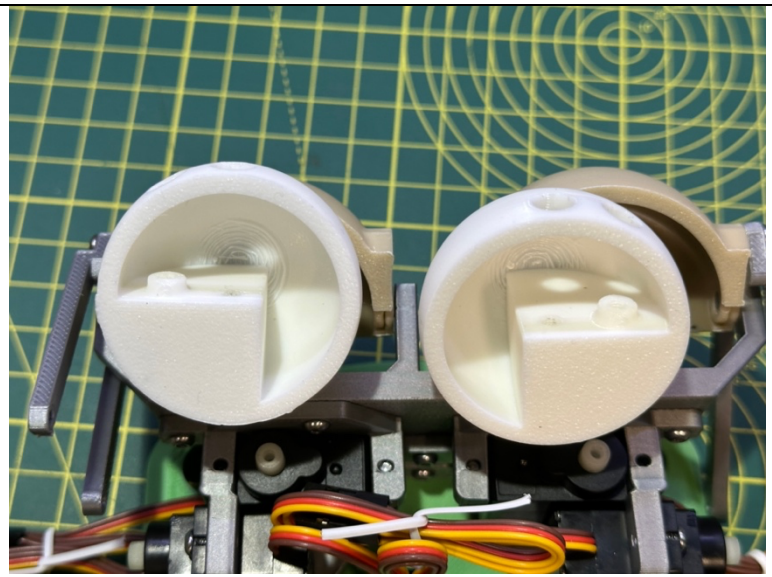
    A small amount of the grease can be applied.



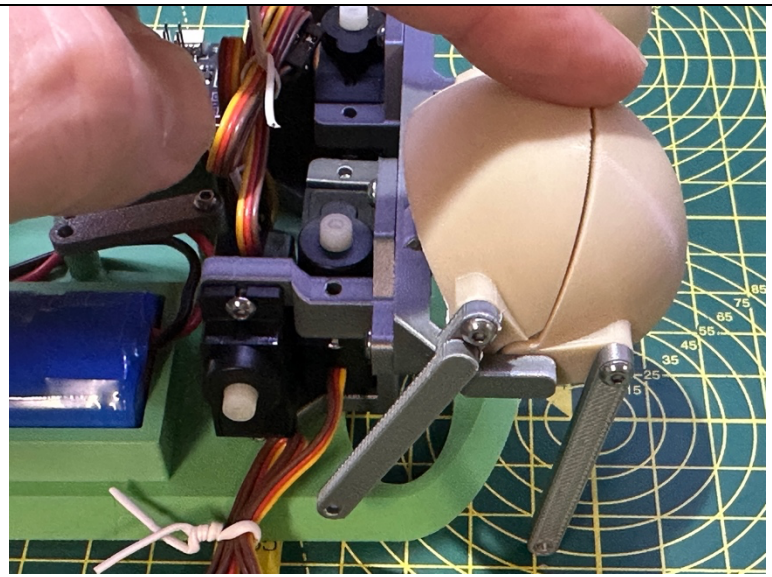
13. Fix the 2 straight eyelid bars onto the eyelids. The holes are different sizes, and the screws will only fit into the larger holes. Make sure they can move freely.

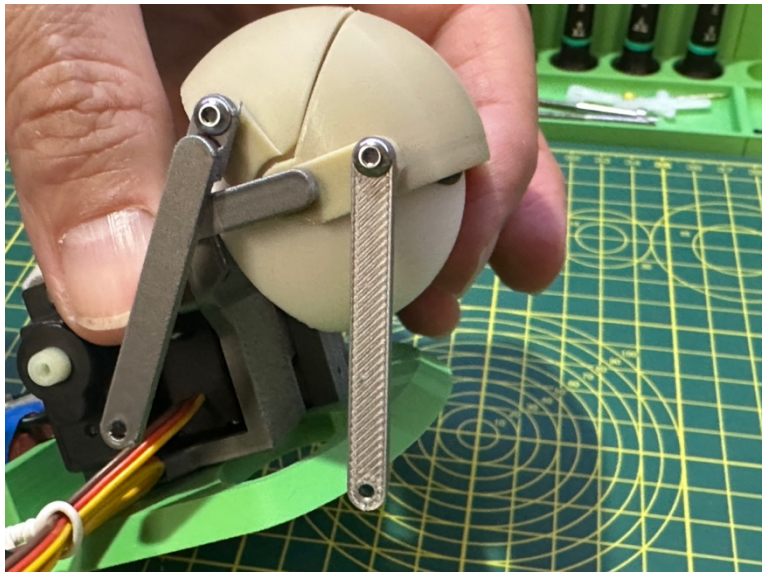
    A small amount of the grease can be applied.



14. The eyeballs are handed; Left and Right. Ensure the correct one is used for each side.	

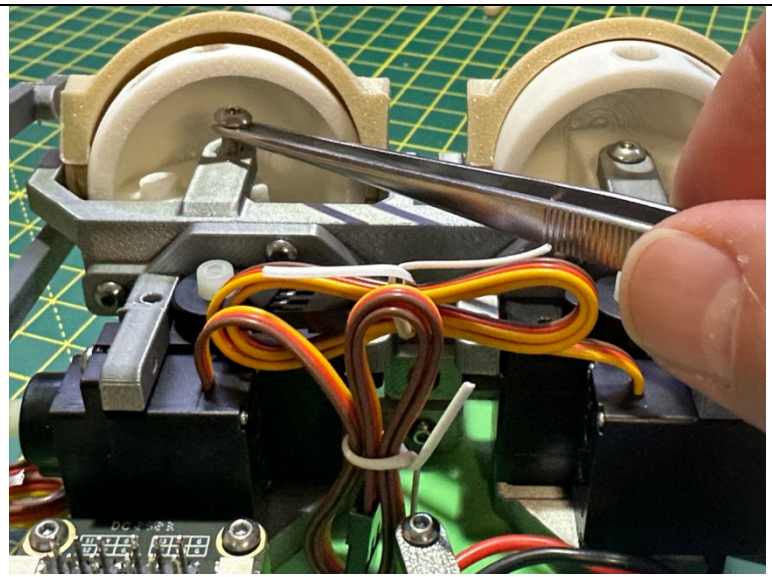
15. Lift the eyelids to the topmost position and the eyeball will then fit into place from underneath. Repeat for the other side.

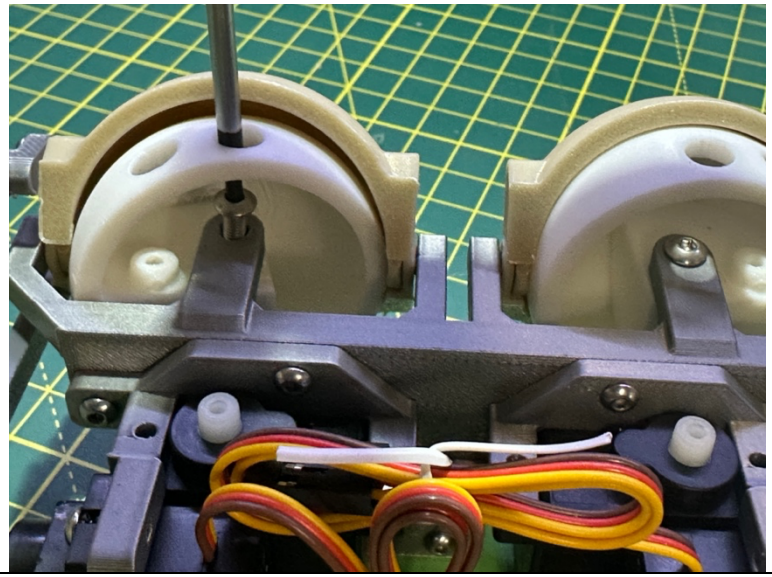




16. Use the tweezers to position an M3 screw and fix with an Allen key through the top hole. Ensure the eyeball is free to rotate. Repeat for the other side.

    A small amount of the grease can be applied.

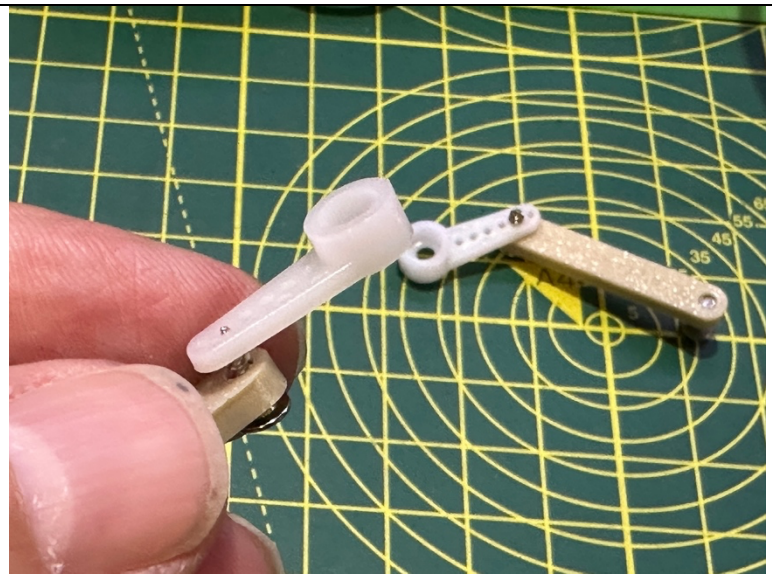


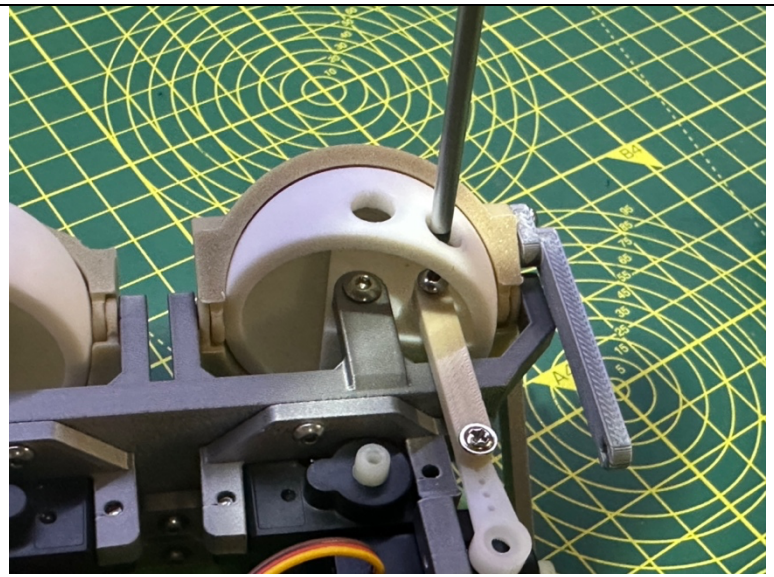


17. Take the 2 servo horns that have NOT been drilled and fix to the eyeball bars using the longer screws from the servo packs through the smaller hole in each bar. Place a machine screw into the larger hole of each bar and the second to last hole in each servo horn.

    Ensure the bars are free to move.

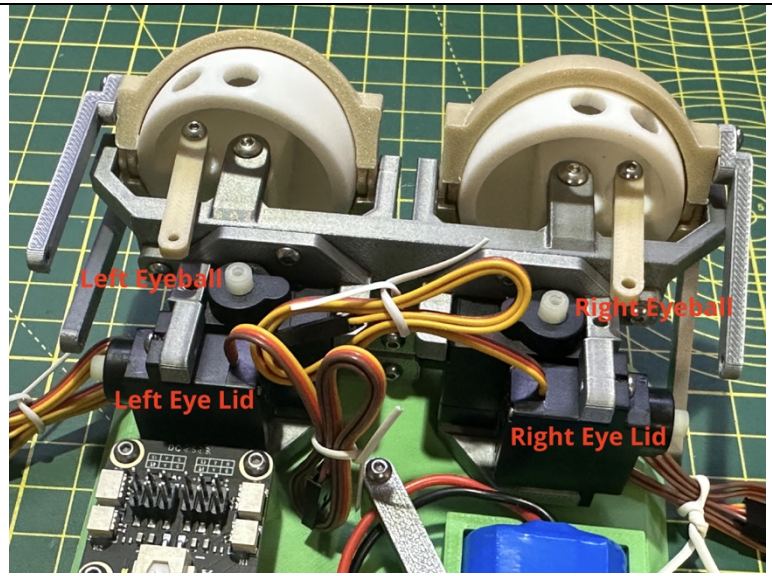
    A small amount of the grease can be applied.

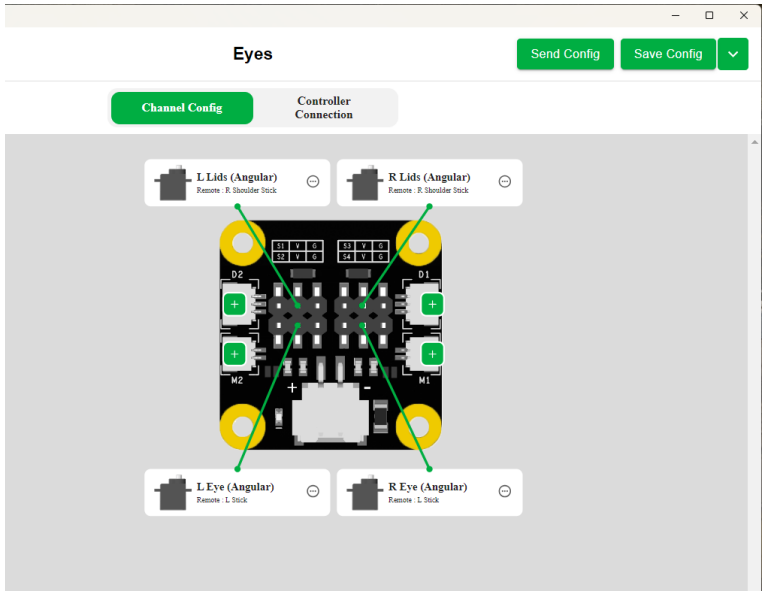


18. Fix one bar into each eyeball. Ensure the bars are free to move. DO NOT fix the servo horns onto the servos yet. Repeat for the other side. A small amount of the grease can be applied.	

19. Plug the 4 servos into the receiver board as shown in the diagram.

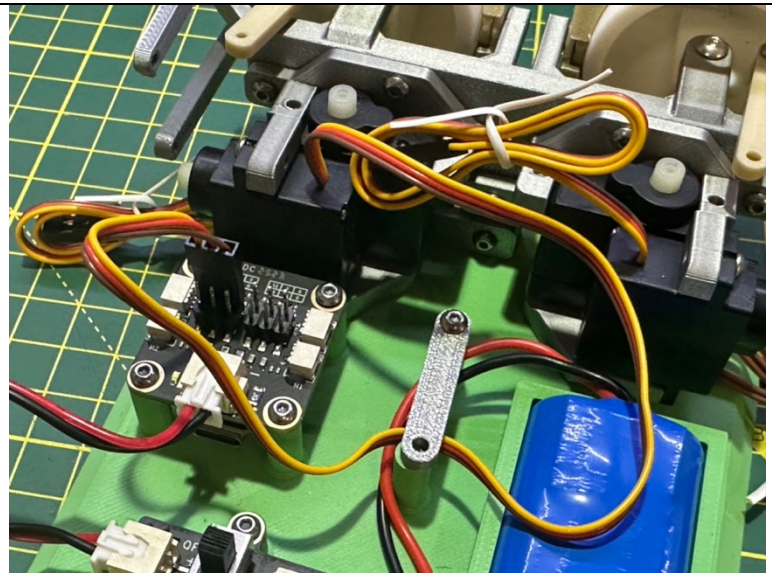
    - Top left – Left eyelids
    - Top right – Right eyelids
    - Bottom left – Left eyeball
    - Bottom right – Right eyeball

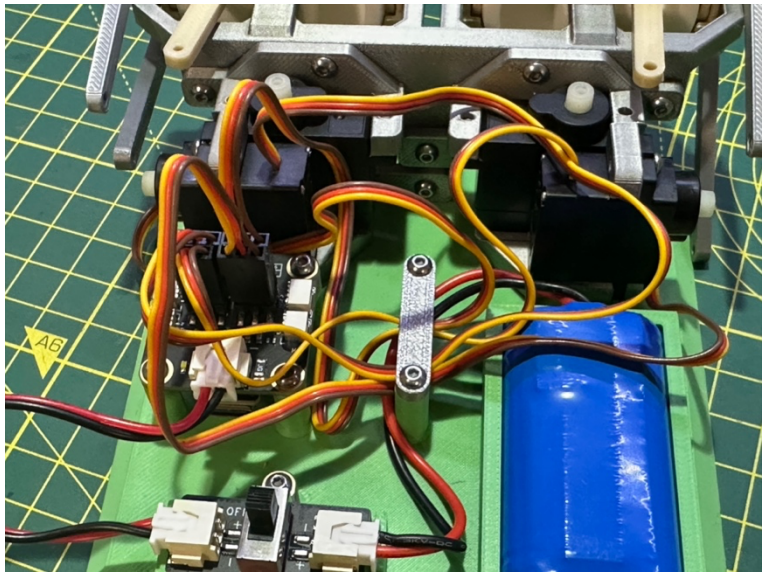


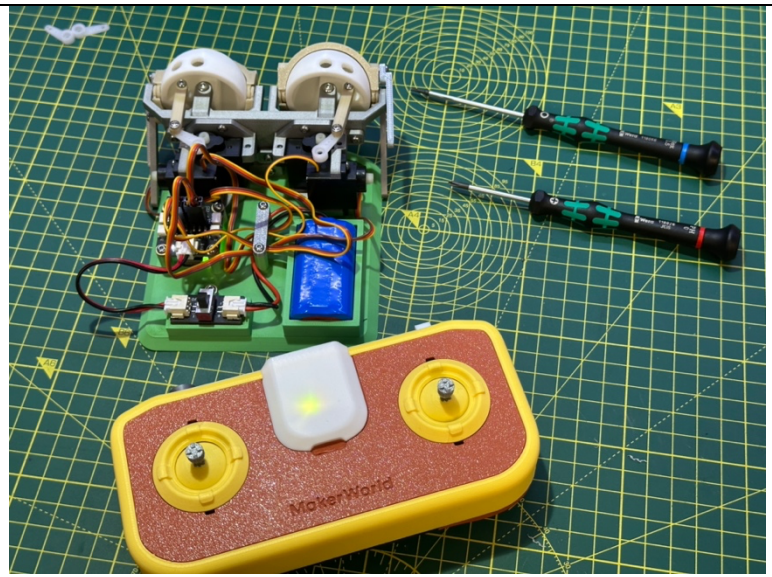
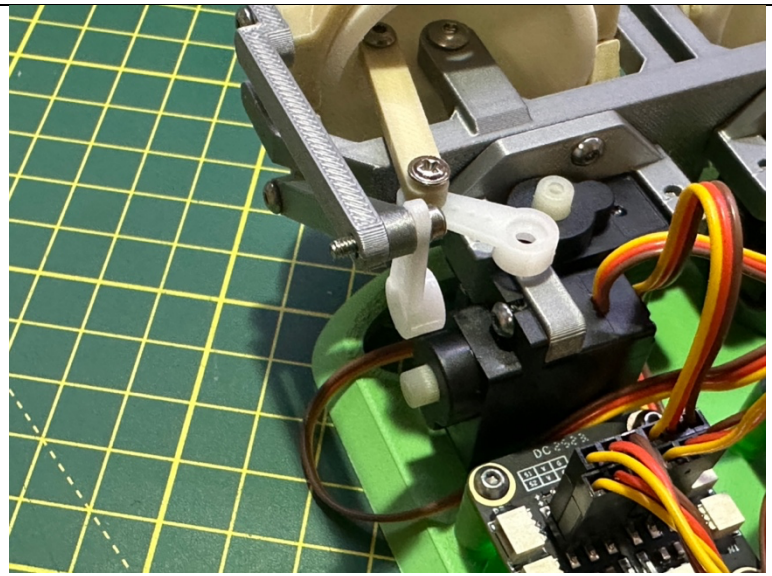


20. As each servo is connected, pass the wire under the cable holder.

    When all the servos are in place, secure the last side of the cable holder.





21. Power-up both the Transmitter and Receiver. Use the eyes.json file to configure both the Transmitter and Receiver (see below for more details if not sure how to do this). Operate both the Left stick (left and right) and the Right Shoulder stick (up and down) to make sure all the servos operate. Release the sticks, allow the servos to come to the centre positions and then power down.	
22. Take an M2 machine screw and pass through the drilled hole in one of the remaining servo horns. Then pass the screw through the holes in the eyelid bars and connect them together. Secure the machine in place with an M2 nut. Repeat for the other side. Ensure the bars are free to move. A small amount of the grease can be applied.	

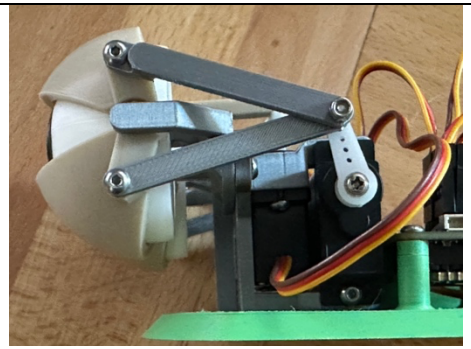
23. Place the servo horns onto the servos in the positions shown (servos are all in centre positions).

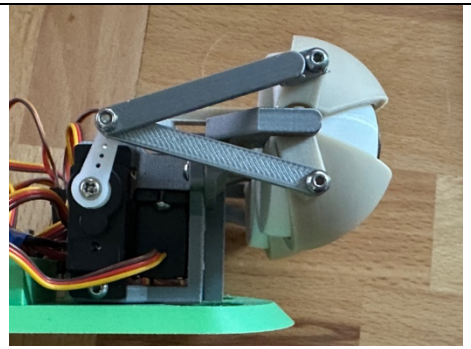
    Initially, only push the horns into place lightly. Then power-up the Transmitter and Receiver, and the eyeball and eyelid functions should operate correctly. If necessary, remove and refit the servo horns until the functions are correct.

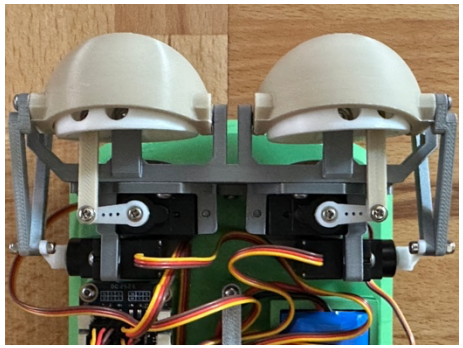
    Note: it appears the servos have slight variations in operation and fine adjustment maybe required within the CyberBrick's software; alter the max. and min. angle for each servo to obtain the exact settings required. These settings will require a "little" patience and some trial-and-error!

    When happy with the servo settings, secure the horns onto the servos with the small screws from the servo packs.

    Build Finished! ☺



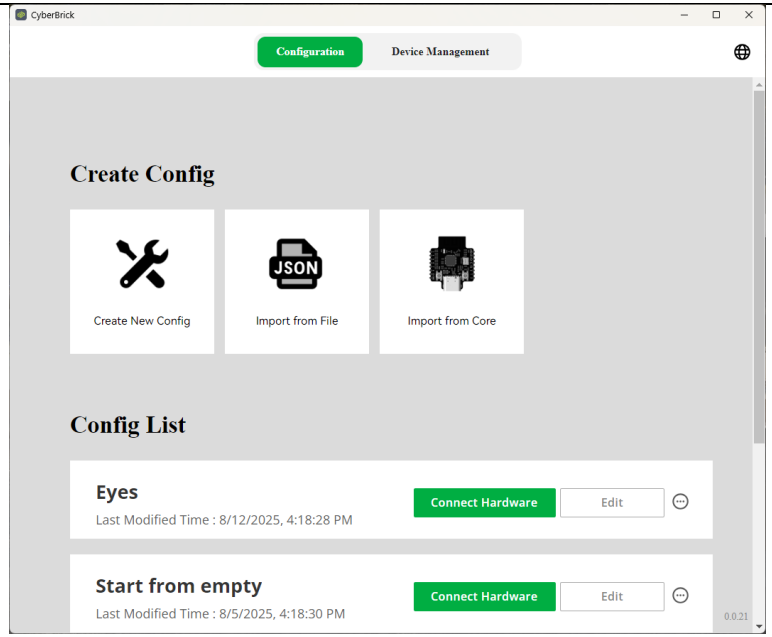


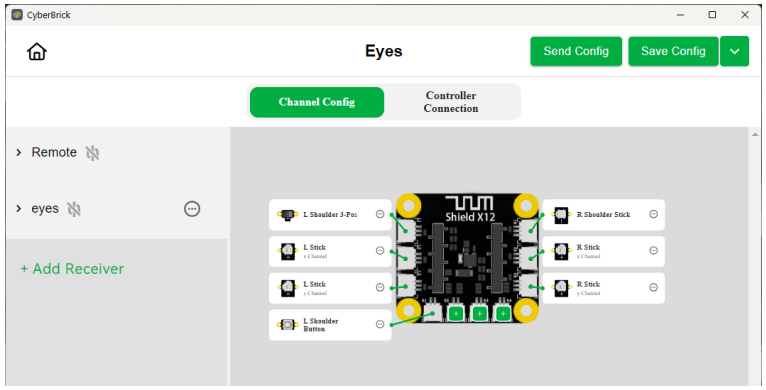


4. CyberBrick software setup

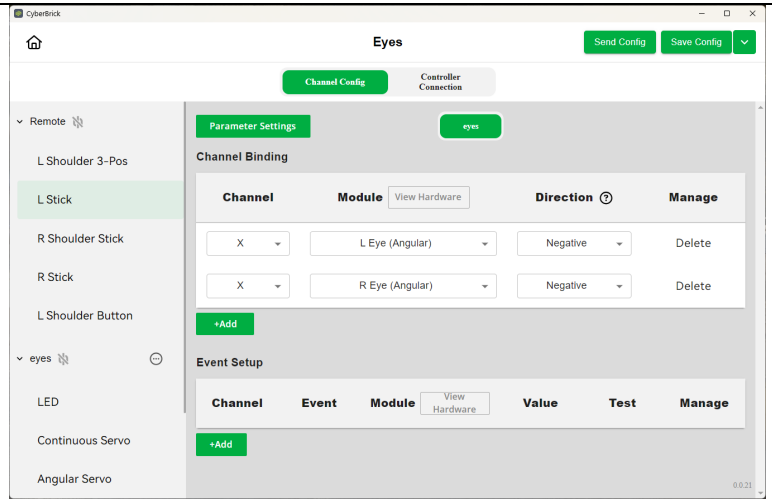
1. I'm very new to CyberBricks, but these are the steps I followed (I used a PC):

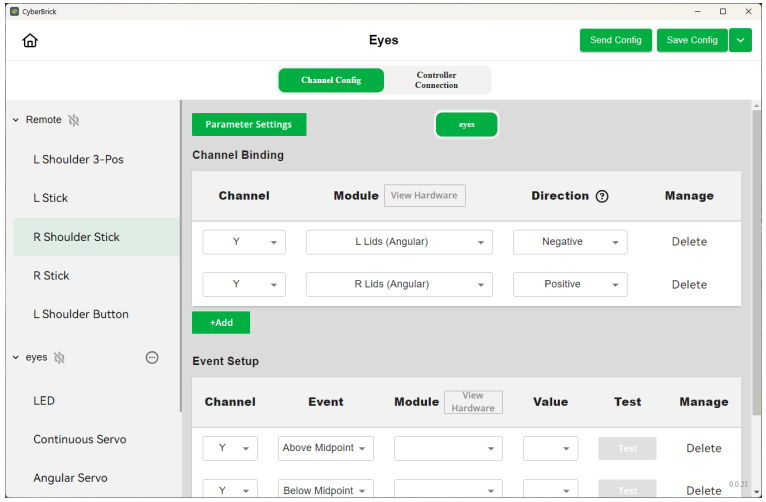
    - Install the software & open the eyes.jsaon file. Click the edit box.
    - The transmitter shown is the standard CyberBricks config that worked just fine.





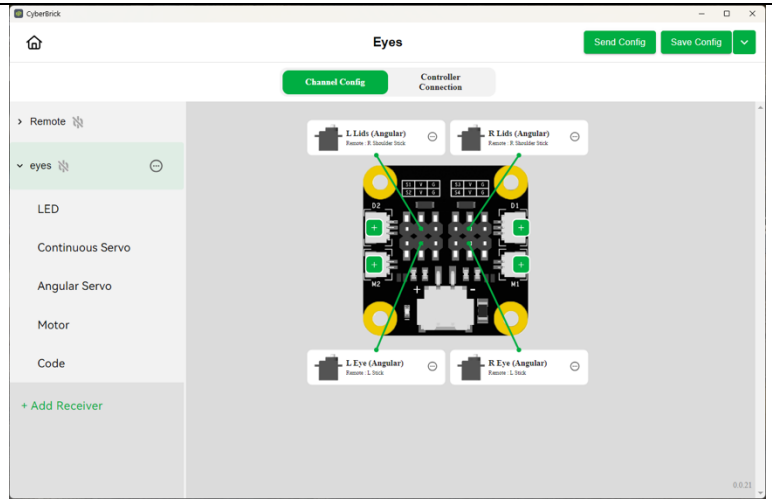
2. Within the remote, the L stick and R Shoulder Sticks are setup as shown.

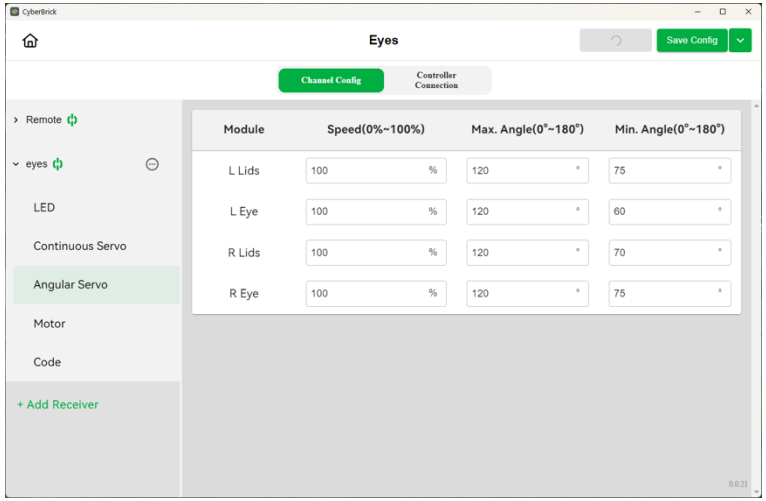




3. Within the Receiver (eyes), the 4 servos are connected and configured as shown.

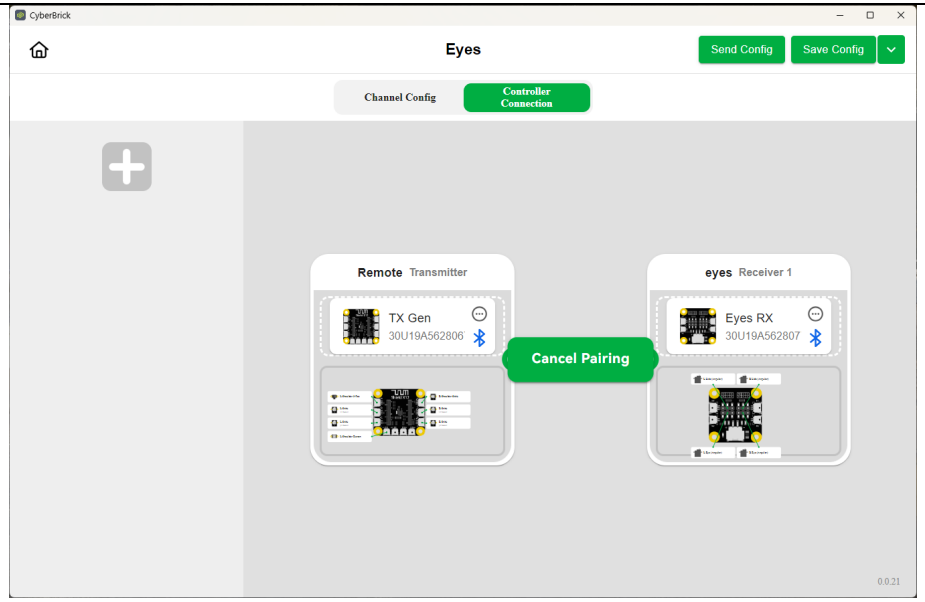
   As mentioned above, the Max. and Min. angles may need adjusting to suit the servos installation.





4. Power-up and connect the transmitter and receiver to the PC via Bluetooth. Then send the config across to the system.

   All should now be good to go!



These are a few pictures of the assembled eye mech, should any points be unclear: