

MiniRHex Assembly Instructions

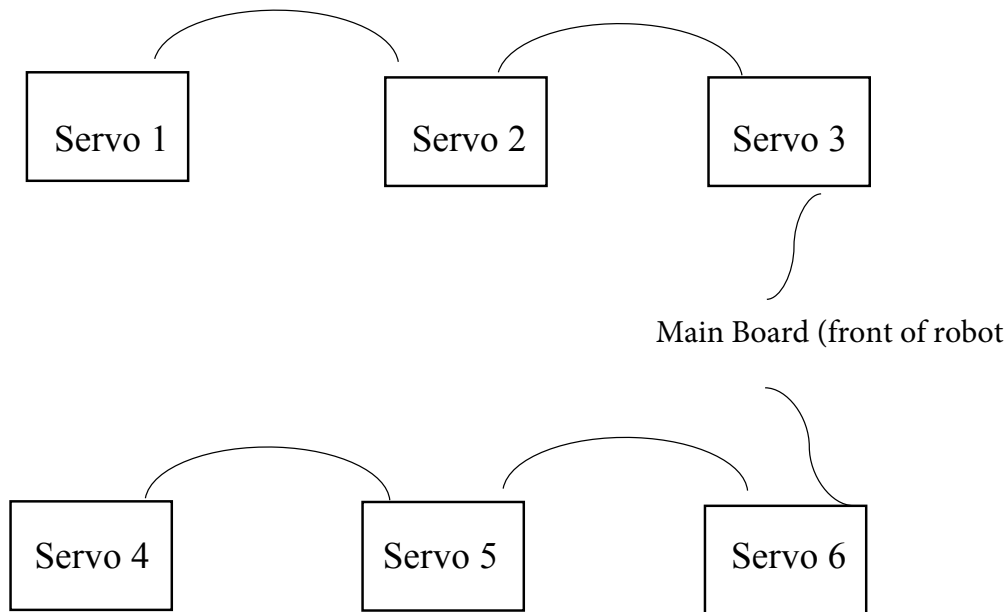
1. Solidworks files available in /CAD
 - a. Any updated or changed SolidWorks parts will be uploaded here
2. Look at the MiniRhexHardware file to see the needed parts and links to the items.
 - a. McMaster: M3 locknuts, button head screws, and spacer; 3mm acrylic
 - b. Amazon: Battery, Plastidip, charger, and battery connectors
 - c. Robotis: Main board, Dynamixels, Bluetooth(optional)
3. Print the following (PLA), .stl files can be found in /CAD/STL
 - a. 6 servo sleeve parts, for best results print with the back side on the build plate
 - b. 4 shaft-edge parts,
 - c. 2 shaft-mid parts,
 - d. 1 battery case part,
 - e. 6 leg parts.
 - f. if you have access to an Ultimaker 3 Extended printer gcode can be found in /STL
4. Open base.sldprt and save as a .dxf file. Use this file to laser cut 3-mm thick acrylic to serve as the foundation for the robot.
5. Prepare the mainboard for use.
 - a. Solder the battery connector onto **one positive pinhole and one negative pinhole** for power. The location on the board is indicated below.



6. First, connect the battery case and mainboard to the foundation, with the USB port facing outwards
 - a. Connections:
 - i. Battery case: **M3 button head x 10 mm, M3 nut**
 - ii. Mainboard: **M3 spacer, M3 button head x 10 mm, M3 lock nut**

- b. Battery case is near the center of the foundation.
 - c. **The mainboard's micro-USB port should face out.**
 - d. The mainboard will be towards the **front** of the robot.
7. Next, prepare the legs by using Plastidip (either dip or spray) and coating each of the six legs until high friction surface forms on each leg.
- a. Between each coat, let dry for at least one hour.
 - b. Make sure the dip is evenly coated around the leg.
 - c. **Do not cover the through holes for the screws.**
8. Connect four of the six legs to edge shafts (shorter shafts).
- a. Align the leg through holes with the holes on the cut-out portion of the shaft.
 - b. Connection: **M3 socket head x 10 mm**
 - c. For two of the four connections, **be sure to switch the orientation of the leg** because those will be attached to the opposite side of the robot.
9. Connect the other two legs to the mid shafts (longer shaft).
- a. Align the leg through holes with the holes on the cut-out portion of the shaft.
 - b. Connection: **M3 socket head x 10 mm**
 - c. For one of the two connections, **be sure to switch the orientation of the leg** because those will be attached to the opposite side of the robot.
10. Connect **each shaft-leg apparatus** to the Dynamixel XL-320 servo motor.
- a. Orientation: Make sure the half circle each leg forms **faces the front of the robot: towards the side with the mainboard.**
 - b. Detach the center screw in the servo horn, and pry off the horn itself.
 - i. The horn looks like a small, black plastic cylinder.
 - c. Align the 4 through holes on the servo horn with the 4 extruded pieces on the shaft face (the shaft length doesn't matter).
 - d. Align the horn (now connected to the leg apparatus) to its key on the body of the servo.
 - i. Once the horn is flush against the body, connect the horn/shaft/leg apparatus to the servo motor.
 - ii. Connection: **center screw that came with the servo**

11. Take electronic wires that come with the servos, and connect them like in the image below.



12. Slide each servo into a servo sleeve.

13. Connect each servo sleeve to the foundation.

- Orientation: **Be sure all legs face forward (semicircle faces the mainboard).**
- Connection: **M3 button head x 10 mm, M3 nut**

14. Connect the servos to the mainboard.

- Connect such that no wires interfere with leg rotation.

15. Charge battery(ies) and check voltage(s).

16. Upload code using the micro-USB port.