D-Ov2Evo - Main Frame

Parts List, Printing Tips

Last change: Aug 24, 2024

Parts List

Use these parts from the original MrBaddeley folder `MainFrame`:

- `Frontframeinsert.stl`
  Print 1, any material, no supports

Use these parts from the D-Ov2Evo folder Body:

- `Battery Mount Clamp 18650 x4.stl`
  Print 4, any material, on side, no supports
- `Battery Mount L 18650.stl`
  Print 1, any material, no supports
- `Battery Mount R 18650.stl`
  Print 1, any material, no supports
- `Main Frame Dynamixel 5WSpeakers.stl`
  Print 1, PETG, ABS or ASA, supports recommended
- `Main Servo Gear Dynamixel.stl`
  Print 1, any material, no supports
- `Rear Frame Insert.stl`
  Print 1, any material, no supports
- `Servo Base Dynamixel 0.0.stl` to `Servo Base Dynamixel -1.0.stl`
  You need one of these but probably need to print several or all, see below. Any material, no supports.
- `Top Frame Dynamixel 18650.stl`
  Print 1, any material, supports recommended

Hardware and Bought Parts List

Fasteners

- M3 square nuts (x16)
- M3x8mm countersunk bolt (x17)
- M3x6mm round head bolt (x12)
- M2x6mm self-tapping bolt (x6)
- M4x8mm countersunk bolt (x2)
- M4x12mm countersunk bolt (x2)
- M4 square nuts (x4)

Motors

- Pololu-4863 encoder motors (medium power, 12VDC, 20.4:1 gearbox) (x2)
- Dynamixel XL430-W250-T servo (x1)

Other Hardware

- Lead shot or steel bearings for ballast. 1-3mm diameter. Finer grain or dust is not recommended. How much you use is going to vary (heavier robots are more stable but drive slower and put more load on the bearings), but you will not need more than 3kg.
- 4mm Flange Motor Coupler H12D10 (x2)
- Bearing 6805-2RS (x2)
- 5mmx5mm rare metal magnets - cylinder (x4)

Other Bought Parts

- Keystone 1049 battery holder for dual 18650 batteries (x2)
- XT30 female plugs (x2)
- XT30 mount PCB (x2) — e.g. AliExpress, see pic:

- 18650 LiPo batteries (x4) — use the largest capacity (mAh) you can find
- 8 Ohm 5W speakers, this kind: These have an outside size of 70mm x 31mm x 16mm.

- Nano fans (20x20x6mm) 12V, e.g. AliExpress (x2)
- 2 component epoxy resin or epoxy glue
- AWG22 wire

Tools

- Screw drivers
- Soldering iron and solder
- Wire cutters and strippers
- Hot glue gun
- Super glue
- Loctite

Printing Tips

Material

We always recommend using ASA if you can print it (printer has an enclosure), but most of these can be printed in any material really, with one notable exception:

Main Frame: If you intend to use poured resin to fix the counterweight in the body, as we recommend, PLA+ is not a good idea at least for `Main Frame Dynamixel 5WSpeakers.stl`, because the resin gets hot when curing. So if you print everything else in PLA+, make sure this one is PETG at least.

Strength

All the load bearing parts (`Main Frame Dynamixel 5WSpeakers.stl`, `Main Servo Gear Dynamixel.stl`, `Top Frame Dynamixel 18650.stl`) should be printed in your printer's strength profile, or if it doesn't have one, with the following settings:

- Layer height: .2mm
- Perimeters: 6 or more
- Bottom layers: 6 or more

- Top layers: 6 or more

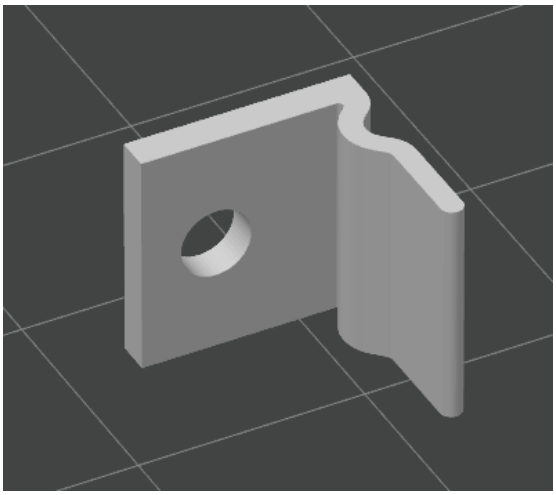
The inserts (`Frontframeinsert.stl`, `Rear Frame Insert.stl`) are visible and should be printed in the finest resolution your printer can offer, or even in resin.

All other parts can be printed any way you please.

Orientation and Supports

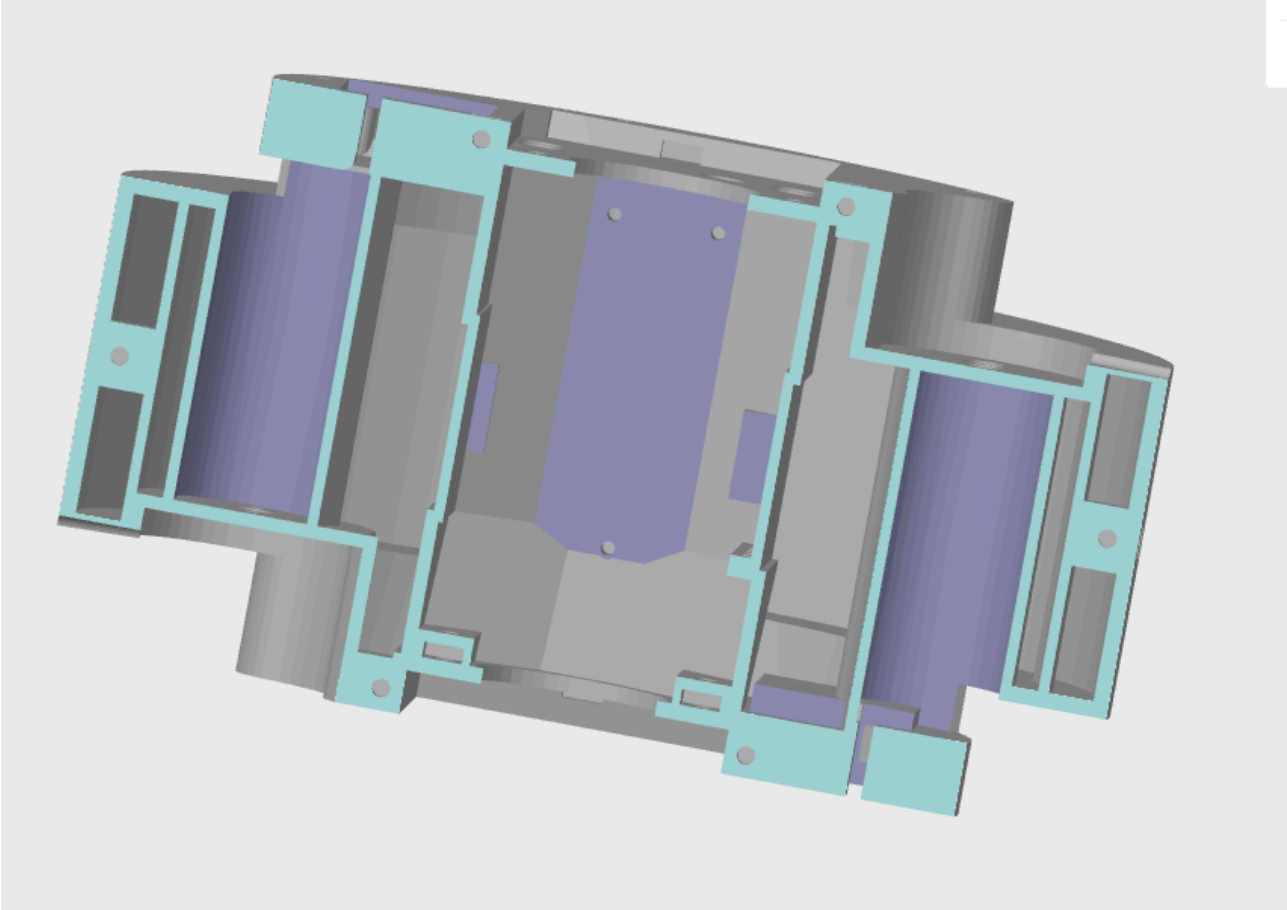
Contrary to Mr Baddeley's practice, these parts are **not oriented the way they should be printed**, but your printer's auto-orient feature will take care of that for most items.

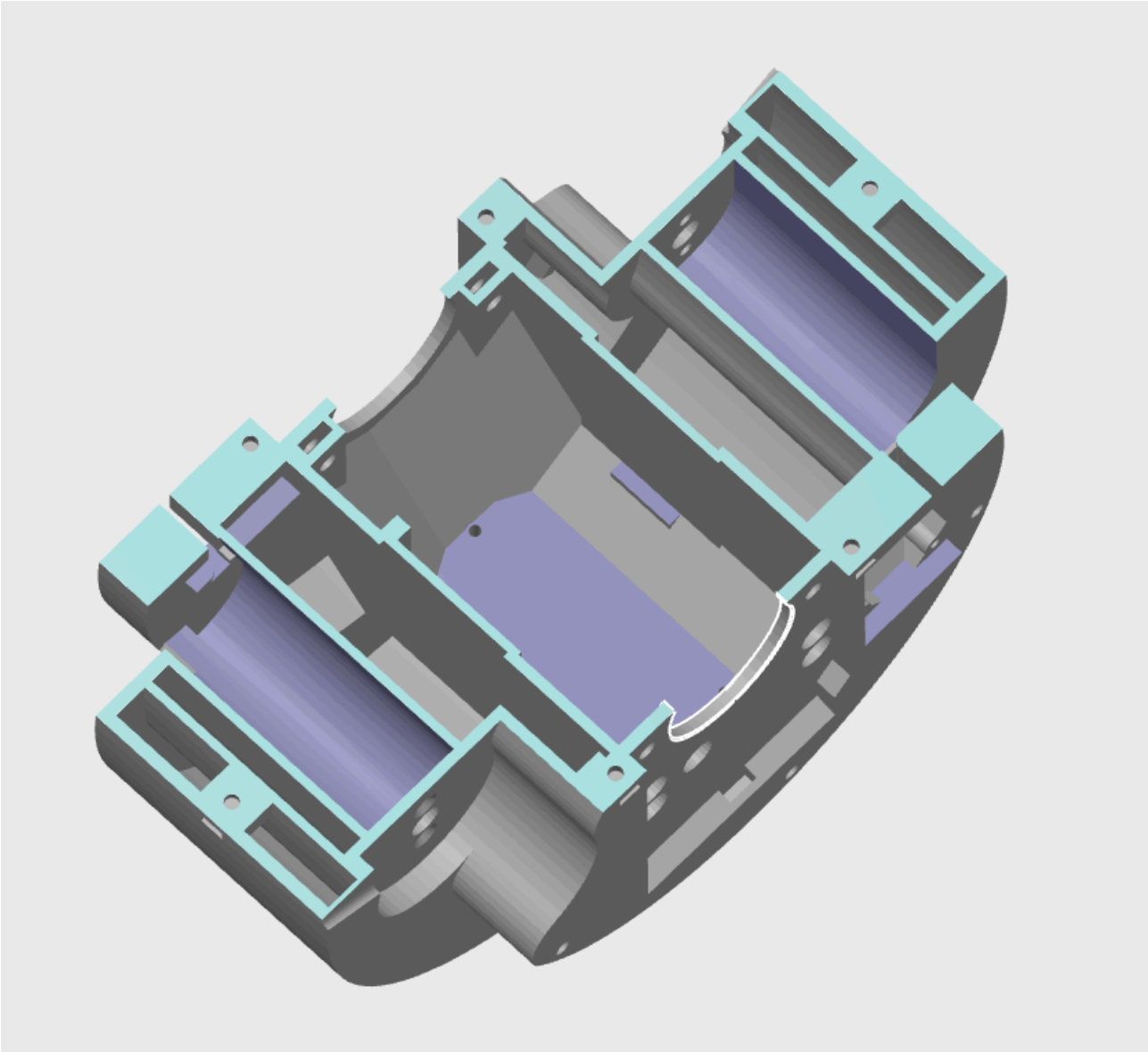
Notable exception: `Battery Mount Clamp 18650 x4.stl` should be printed on the side, to strengthen it in the direction it will take the highest load, like so:



No supports are needed for most parts, with the following notable exceptions:

`Main Frame Dynamixel 5WSpeakers.stl` should get manual supports, painted on the surfaces marked in green in the pictures here (and the surfaces marked in turquoise are those the print stands on:





`Top Frame Dynamixel 18650.stl` should get automatic supports.

Assembly

Please refer to the tutorial video for assembly instructions. In short and for reference:

Main Frame

1. Fill the main frame with about 1kg of ballast. Fix the ballast by pouring some epoxy resin on top, or if you don't have experience with resin you can also use epoxy glue. In this case we recommend self-mixing dual barrel epoxy syringes. Let cure.
2. When the resin has cured, insert 12 square M3 nuts into the recesses around the body (3 on each side, 6 on top) and fix with hot glue.

3. Insert 2 square M4 nuts into the recesses at the top of the droid (left side, where the frame insert goes) and fix with hot glue.

4. Break open the loudspeakers with a flathead screwdriver and lever out the inner plastic frame with the actual speaker. Clear the holes of the plastic frame, these are glued in and often something stays stuck.
5. Insert the loudspeakers into the openings on both sides of the main frame and fasten with 4x round head screws each.
6. Insert the two Pololu motors into the motor wells. This is a tight fit; if needed, remove the rear plastic cap over the encoder. Fix with 2x M3 countersunk bolts each.

Servo

1. Screw the main servo gear onto the servo front using the screws that come with the servo.
2. Insert the servo into one of the Servo Bases. Use the one without a number for now. Fasten it with 3 of the screws that come with the servo.
3. Insert the servo base with the servo into the main frame and fasten it with 3 M3 countersunk bolts. These should self tap. Be careful not to overtighten.
4. Later when you add the main bar, you may need to replace the servo base by a different one; these lower the servo deeper into the body in .2mm steps. You want a tight fit for the main bar but you don't want to put too much pressure onto the servo gear. If you feel pressure use a base with a bigger number.

Frame Inserts

1. Insert two M4 square nuts into the rear frame insert and (verrrrry carefully) fix with hot glue, don't overspill!
2. Push the large bearings into both inserts.
3. Screw the rear frame insert into the frame with M4x8mm bolts.

Battery Boxes

1. Solder the XT30 female connectors onto the holder PCBs.
2. Bridge the -/+ pins on one end of each battery holder by soldering a wire across.
3. Solder two wires to the -/+ pins on the other side of the battery holder.
4. Thread the wires through the passage on the printed battery mounts.
5. Solder the wires to an XT30 connector/PCB assembly each, so that the battery pack's + connects to the square end of the XT30 connector and the - connects to the chamfered end.
6. Fix the battery holders to the printed battery mounts using round head screws.
7. Fix the connector PCBs to the printed battery mounts using M2 self-tapping screws.

Top Frame

1. Add the 4 battery mount clamps to the top frame by fastening them with M3 countersunk screws (from the bottom) and adding a square nut on the top. They should orient so that their flat part points towards the front and back of the droid, while their 90° raised part points towards each other. If you want you can fix the screws in place by adding a drop of Loctite to the nuts on top.
2. Add the fans by fixing them with self-tapping bolts from the underside. The fan output should point into the round air vents.

3. Screw the top frame to the bottom frame using 6 M3 countersunk bolts.
4. Superglue 4 5x5 round neodymium magnets into the recesses on the left and right.