

BLADE RUNNER 2049 JOI EMANATOR



This not a definitive guide. Especially for electronics I am by no means an expert. I simply described the way I designed and put it together.

Parts List

3d Printed

- 1x long shell
- 1x short shell
- 1x long shroud
- 1x short shroud
- 1x core
- 3x core cover
- 1x end stop
- 2x end cap
- 1x battery compartment
- 1x battery compartment lid
- 1x button and LED carrier
- 1x button
- 1x diffuser ring
- 1x diffuser centre

Structural

- 4x M1,4x3mm black Phillips-head screws
- 1x M1,4x5mm Phillips-head screw
- 6x M1,4x4mm grub screws
- 8x M1,4x2,3x2mm threaded inserts
- 1x 3x70mm linear bearing (ST3C)

Electronics

- 1x 3mm white LED
- 1x 6,5x6,5mm SMD momentary switch
- 1x bistable electronic switch
- 1x on/off switch
- 1x 4x100mm ribbon cable >3 lanes
- 4x CR1025 battery cells
- Cables in 4 different colours
- Aluminium foil
- Electrical tape

Paint

- Matte black model paint
- Silver model paint
- Matte clear spray paint

Tools

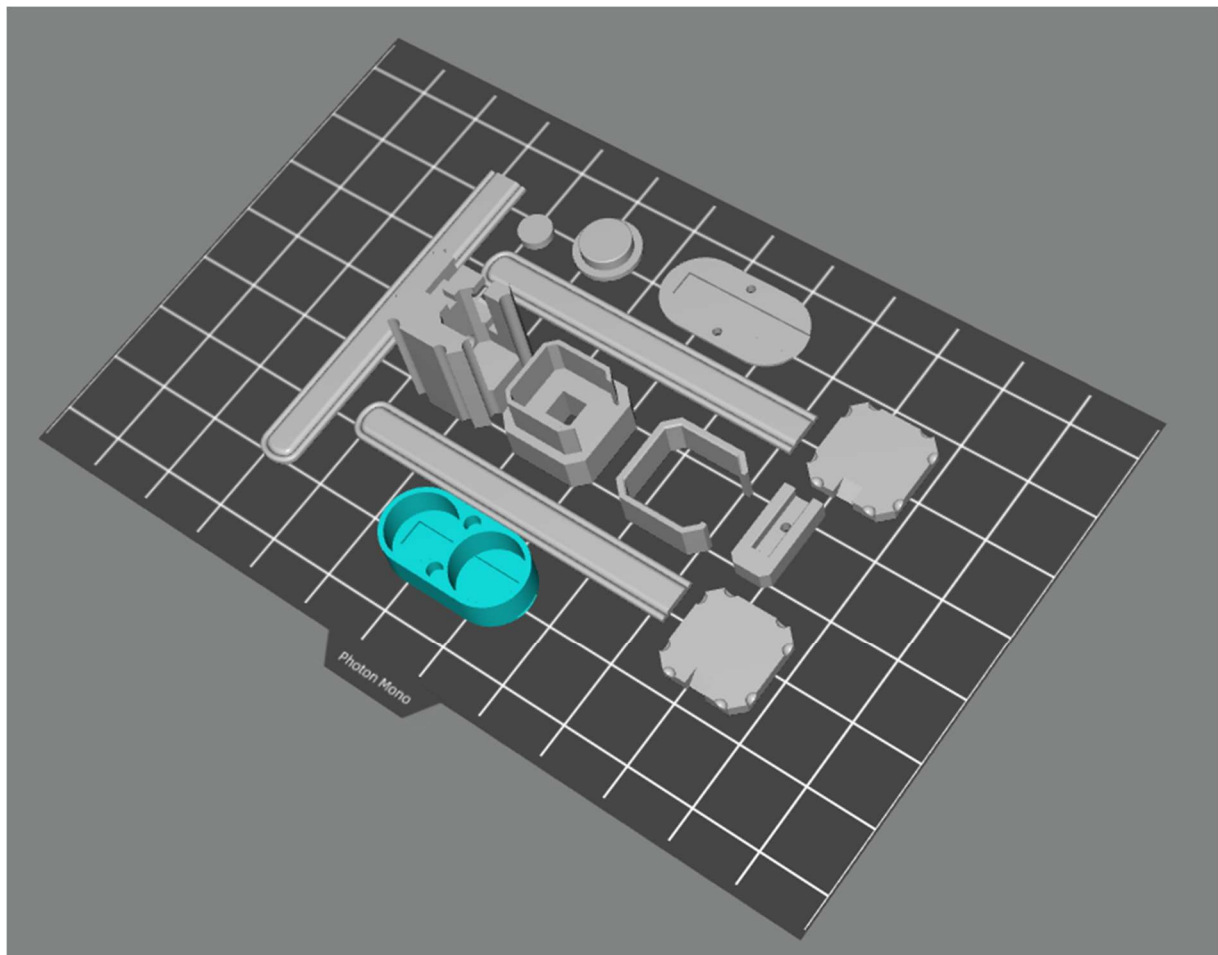
- SLA or SLS 3d-Printer (+accompanying equipment)
- Small files (round and flat)
- Paintbrush
- Small screwdrivers (Phillips- and flat-head)
- M1,4 tap
- CA glue
- Soldering iron

3d print parts

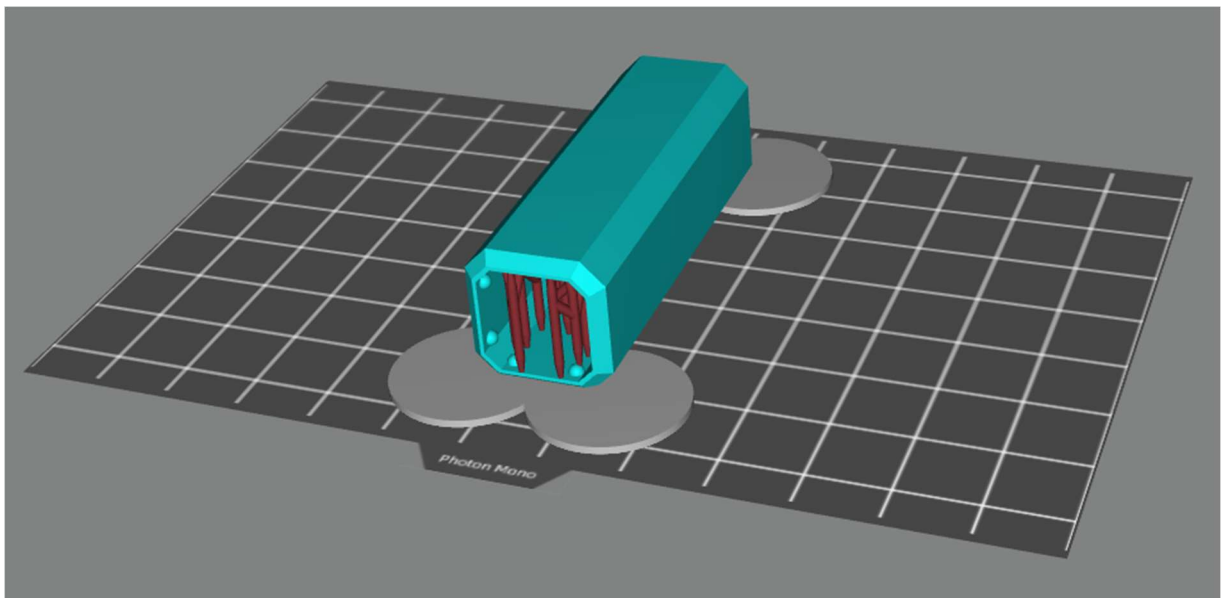
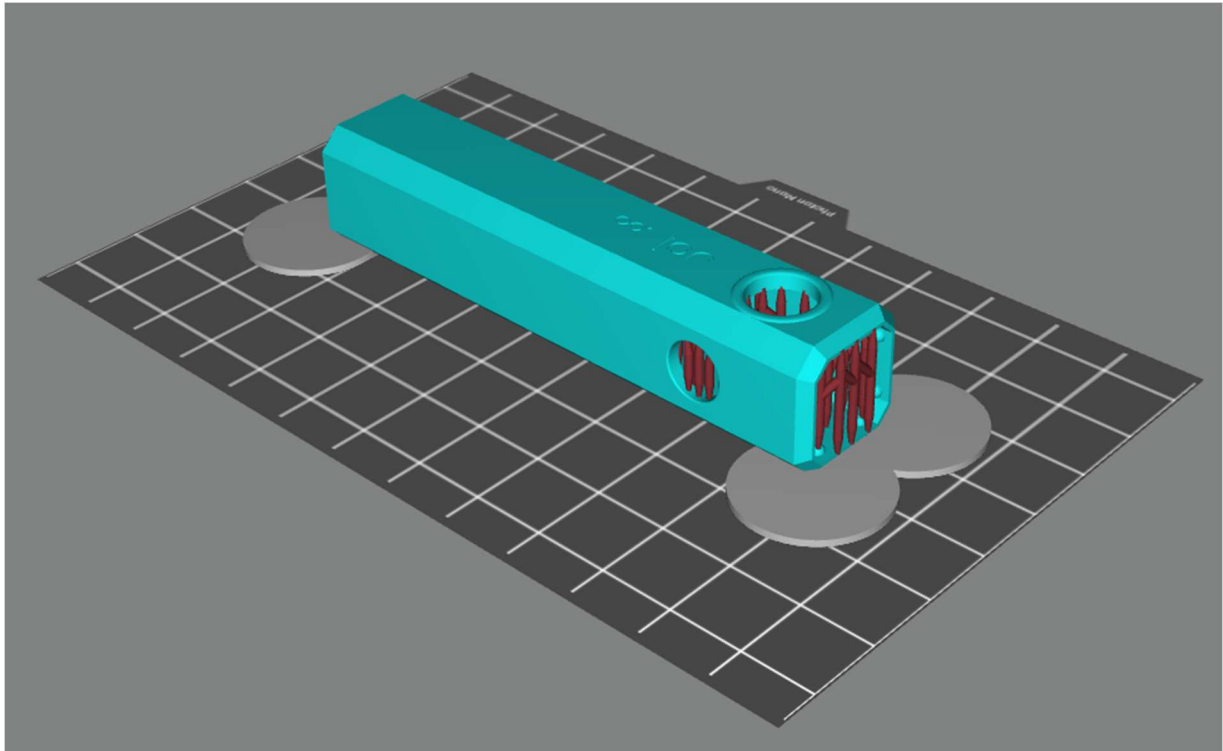
I printed all my parts on an Anycubic Photon Mono SLA printer. Due to the fine detail on the model, as well as one translucent part I would highly discourage printing this on an FDM printer.

All parts except the diffuser ring can be printed in any opaque resin, for example black.

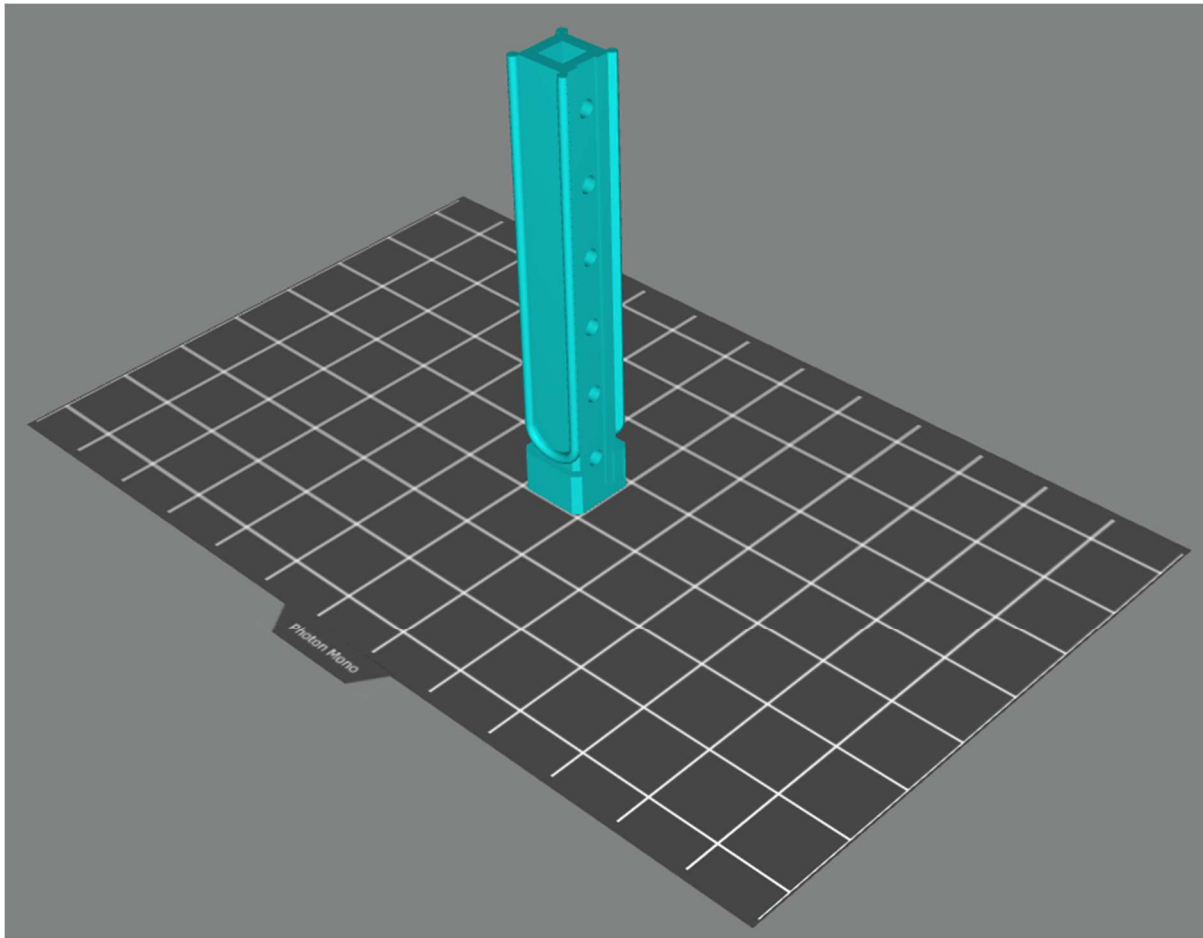
Most of the small parts can be printed without support flat on the build plate:



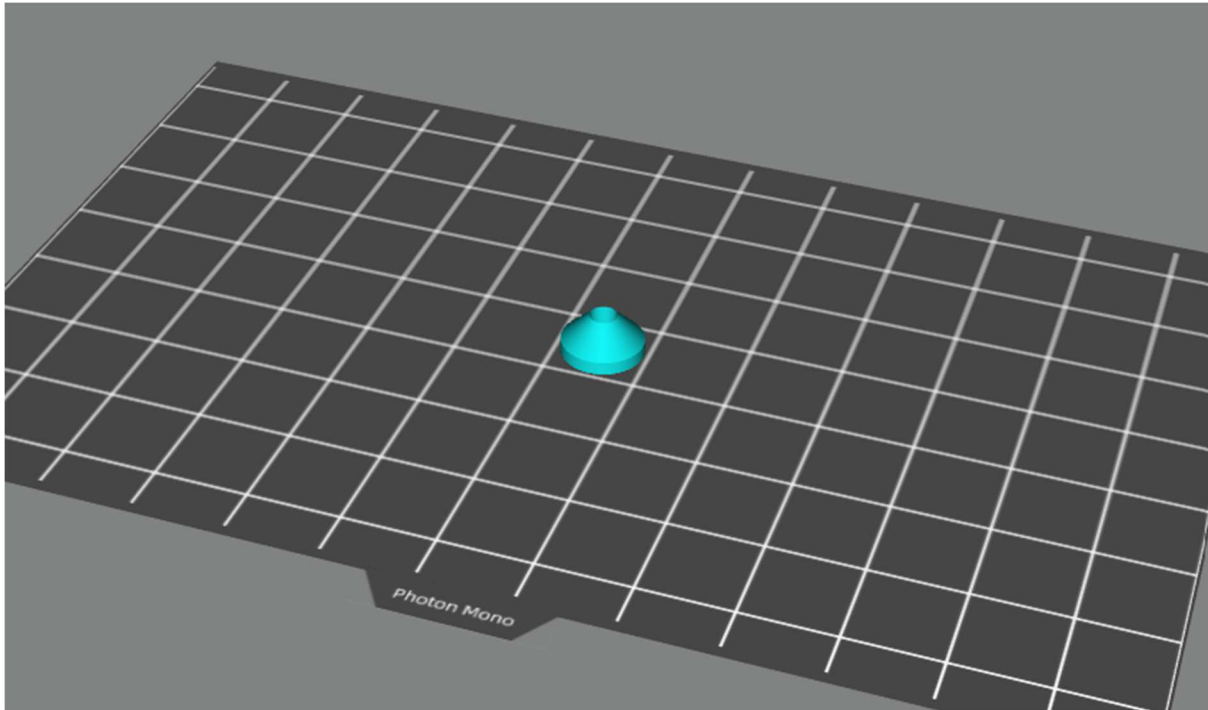
The two shells (long and short) can also be printed flat on the build plate, although due to the high aspect ratio of the models I needed extra raft support at both ends to avoid it peeling off during printing. The 3d files include the support disk I used for that. Due to the overhang internal supports will also be needed.



The core should be printed vertically, so it prints without any supports. It will take longer but it's worth it.



The diffuser ring should be printed in translucent resin. I added a hint of blue UV dye to the resin to counteract the slight yellowing clear resin often undergoes, as well as adding some blue to the LEDs light.



Paint

Matte black

I used Revell enamel model paint (number 8)

- Long shell
- Short shell
- Core
- End caps
- Button
- Diffuser centre



Silver

I also used Revell enamel model paint (number 91) however a shinier silver/chrome would be more accurate to the real prop.

- Long shroud
- Short shroud
- Core covers



All painted parts are also given a coat of matte clear spray paint.

The remaining parts can be left unpainted, as they are entirely internal.

Assemble

The assembly is done with a mix of glue and screws/threaded inserts.

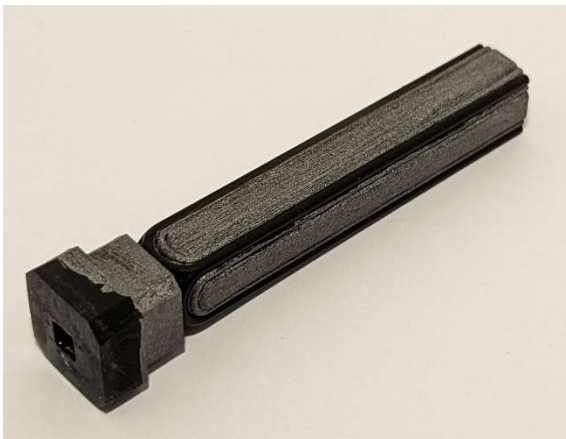
For glue I used CA glue, which works great for rigidity, although you need to remain cognisant of the fact that it sets very quickly. Make sure all the parts fit together nicely before putting glue on anything.

At M1,4 the screws are very small so some fine motor skills will be necessary.

1. Glue the core covers onto the core.
Due to them being very thin, the covers are likely warped, so you'll need to put glue along the entire length to glue them down straight.



2. Glue the core into the short shroud.
Make sure that the glue covers both the sides and the base and that the core slots in all the way.



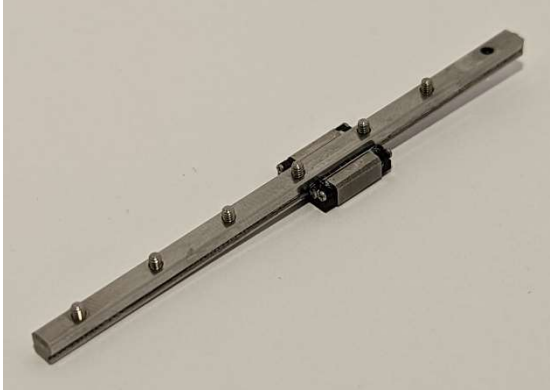
3. Screw 6 M1,4x3mm grub screws into the linear rail.

!!! Be careful to not remove the carriage from the rail !!!

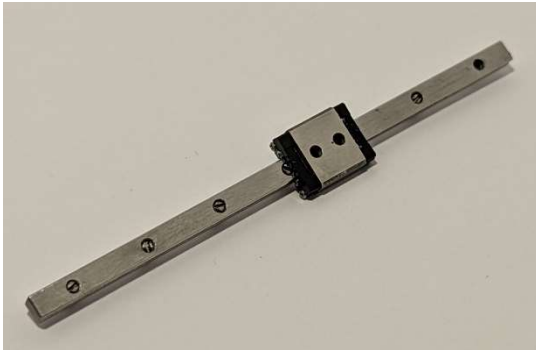
It is possible to put it back on, but handling 0,8mm ball bearings is not fun, even for someone with good fine motor skills. DON'T ASK ME HOW I KNOW.

The rail comes with rubber end stops and I recommend keeping them on for as long as possible.

The holes in the rail should already be tapped, but I needed to give the threads another pass with an M1,4 tap. The rail is made of hardened steel so that might be a bit of a timesink.

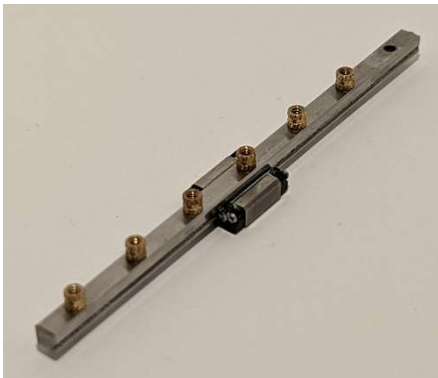


Make sure that the screws go all the way in and don't stop the carriage from moving along smoothly.



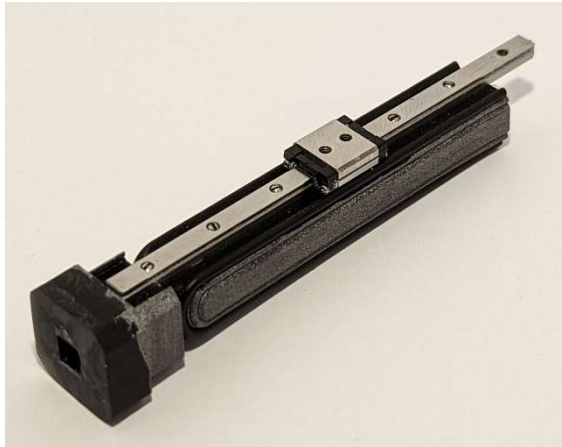
4. Add the threaded inserts to the rail

As the threads on the rail and the threads on the inserts need to line up, the inserts are added to the rail directly.

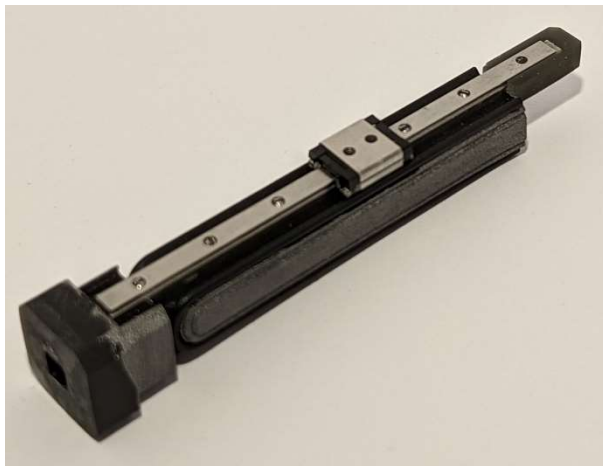


5. Fit the rail onto the core.

The inserts can just be press-fitted into the corresponding holes on the core, no glue should be necessary. I needed to widen the holes a bit for them to fit. It should be pressed all the way down, so that the rail makes contact with the core.



6. Add the end stop with an M1,4x4mm Phillips-screw.



7. Glue the short shroud into the short shell.

Make sure that the glue covers both the sides and the base and that the short shroud slots in all the way. Also make sure that everything is lined up and straight.



8. Glue the long shroud into the long shell.



If you're going to add electronics, the next 2 steps will be completed later and can be ignored for now.

9. Screw the rail carriage to the long shell using 2 M1,4x3mm Phillips-head screws. I had to file down a bit of flashing at the very end of the screws to make sure they don't interfere with the rail motion.



10. Press the diffuser centre into the diffuser ring. This can also be glued in, but for me a press fit was enough.



The end caps press into both ends and are meant to be removable.

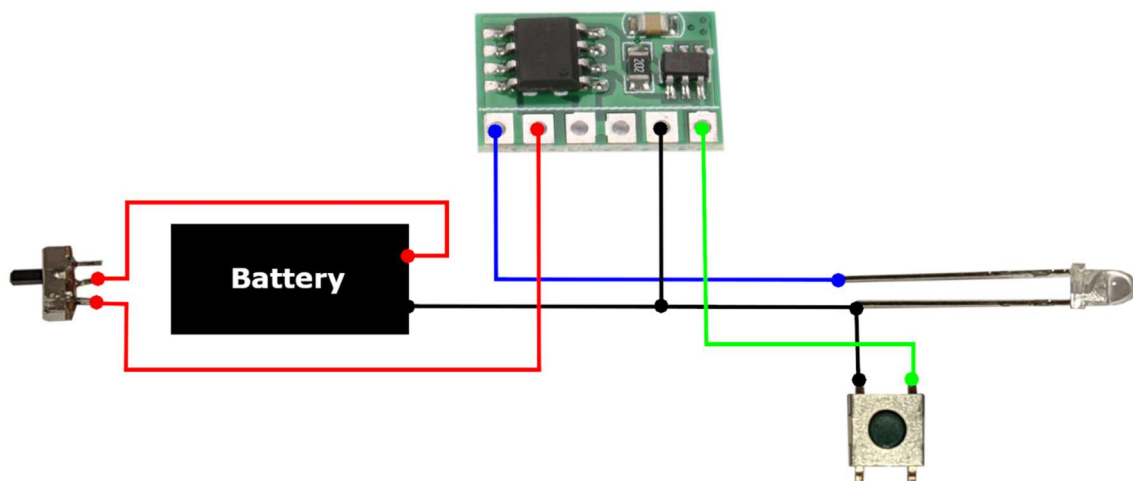
Electronics

Disclaimer: due to the very limited internal volume, the electronics work is very small and fiddly. I will happily take feedback and tips for improving the design. You can contact me in the RPF thread linked at the end of this document.

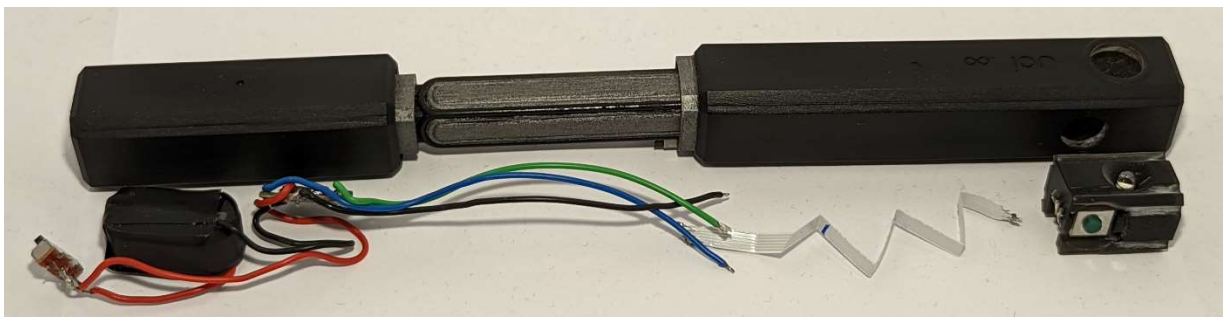
Cables:

- 100mm ribbon
- 60mm red
- 90mm red
- 90mm black
- 80mm black
- 80mm green
- 15mm green
- 90mm blue

Cabling diagram:



Layout:



Battery case:

The battery case is made for 4 CR1025 cells. That many batteries aren't necessary for powering just the LED, but the larger case fills out the inner volume well, so that's what I went for. The 3d files also include a case for 2 CR1025s which is assembled almost identically.

1. Mount two M1,4x2,3x2mm threaded inserts to the case body.
These may hold just with friction, but if not, they can be glued in with a small amount of CA glue.



2. Thread a 4mm strip of aluminium foil through the slots at the base of the case.
You may need to fold the foil over a few times to add some thickness.
I also added some 5x5mm spacers made of foil to ensure good contact to the battery cells.



3. Add the CR1025 battery cells.



4. Add some more 5x5mm spacers.

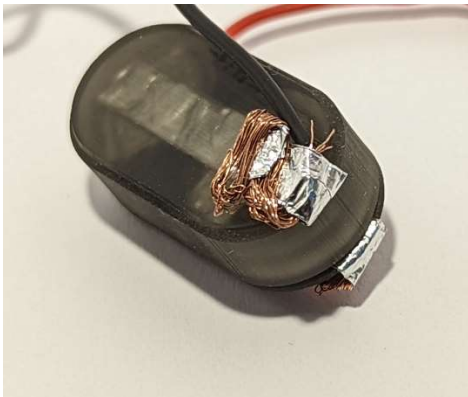


5. Add another 4mm foil strip and screw the lid on with 2 M1,4x3mm screws.



6. Add two cables, one red, one black to the aluminium strips. If you added the batteries in the same orientation as seen in the pictures the red cable should go on the contact towards the lid.

Wrap the stripped cables ends and the aluminium around each other a few times to make sure they don't come apart.

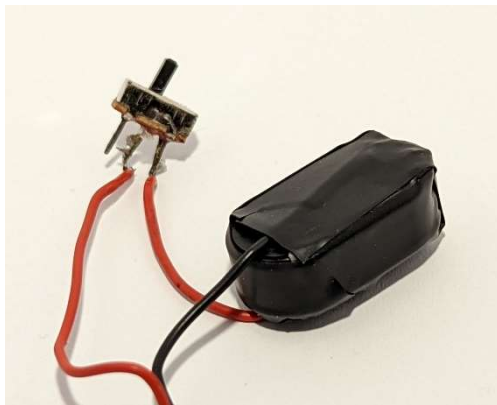


7. Wrap everything in electrical tape.



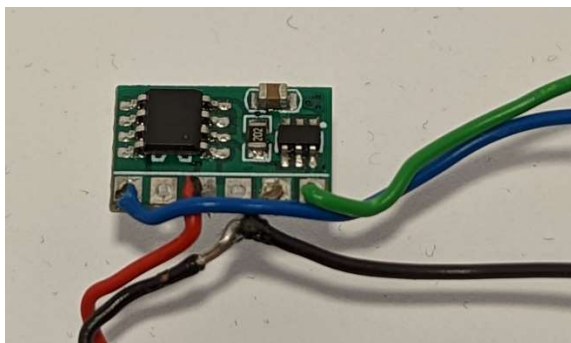
On/off switch:

This switch is not strictly necessary, but as the switch board takes a very small amount of constant current, I added it to prevent the batteries from constantly draining. It should be positioned at the very end of the Emanator to enable access by just removing the end cap.



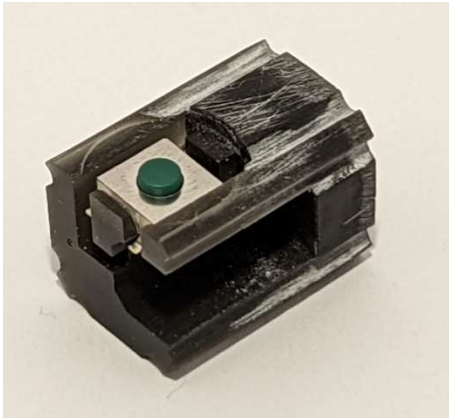
Garosa Electronic Switch:

This step is relatively easy but be sure to keep track of cable colours for future steps. Also notice that the black cable is two cables connected to the same pad. Leave some slack in the red and black cables so that the battery assembly can be pulled out once everything is assembled.

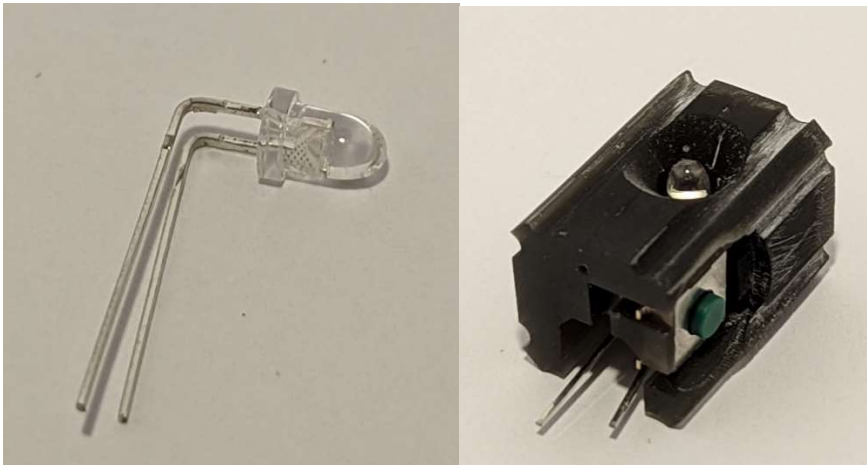


LED/switch assembly:

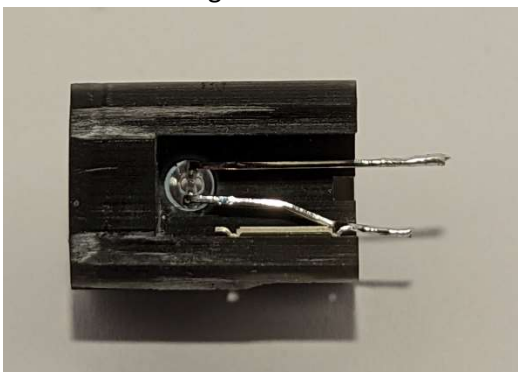
1. Glue the switch to the carriage:
A small dot of CA glue will do, this is mostly to hold it in place.



2. Add the LED:
Bend the LED legs at 90° about 4mm below the LED.
Make sure the short leg is towards the switch once inserted.

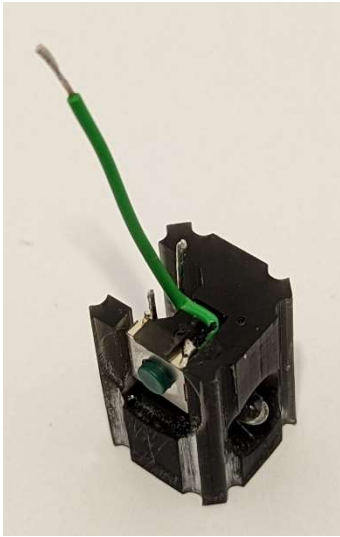


3. Solder LED to switch:
Bend the short leg towards the switch and solder them together.

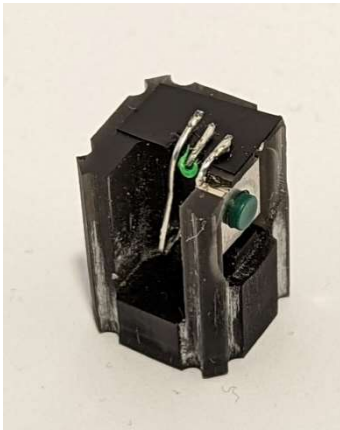


4. Add the cable:

Solder a green cable to the other leg of the switch and route it through the channel in the carriage. It should be between the LED legs. The cable can be clipped to the length of the long LED leg and stripped at the end.



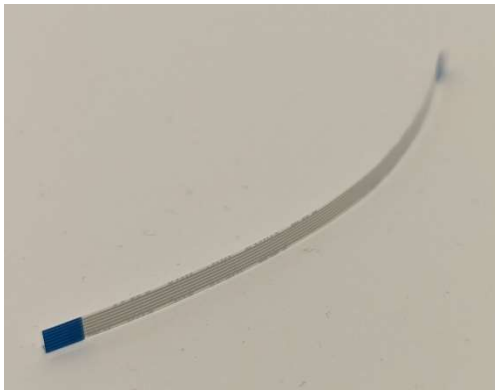
5. Add electrical tape and fold upwards:



Ribbon cable:

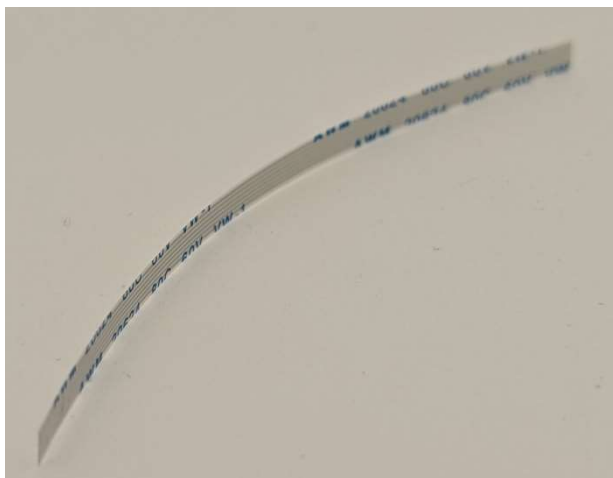
I'll be the first to admit that this solution is very janky but finding actual single component ribbon connectors in the size I needed turned out to be very hard so the parts will be soldered together. That also means that after the following steps the prop cannot be taken apart without desoldering the ribbon cable.

The ribbon cable should be 100mm long and not wider than 4mm. It needs a minimum of 3 traces. Mine has 6 traces and I used them in pairs.

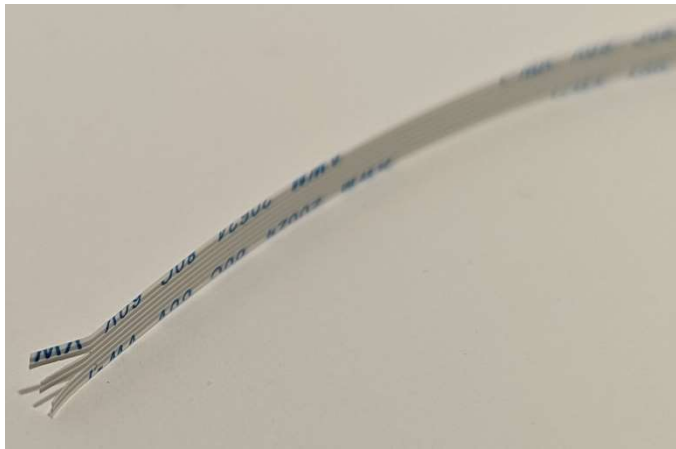


1. Remove heat resistant ends:

The plastic at the solder-points needs to be molten off so the blue heat resistant ends need to be cut off.

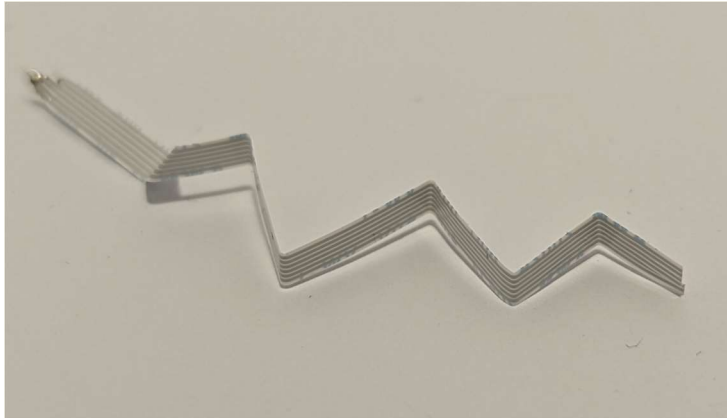
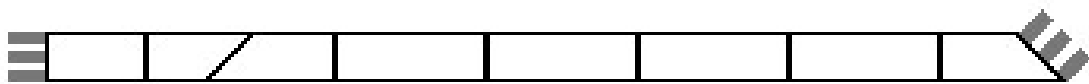


2. Separate trace ends:
Cut along the cable traces to separate them. Take very precise care to not cut through the traces.



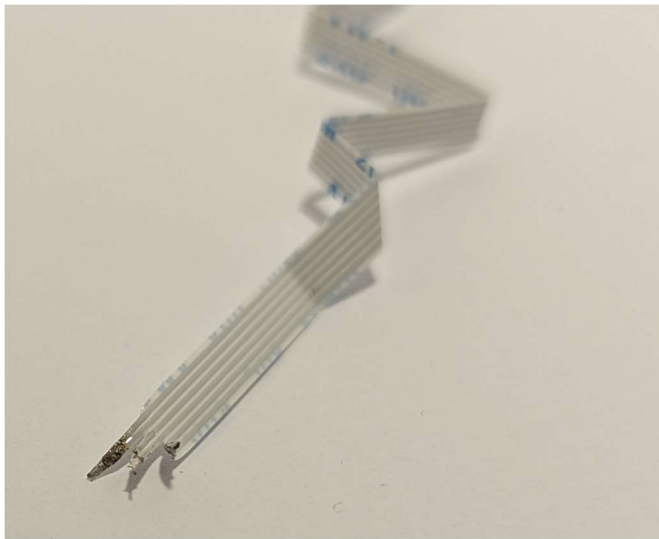
3. Fold the cable according to the pattern:
I recommend marking one of the traces on each end to make sure you end up connecting the right ones together later on.

Pattern:



4. Tin the ends.

Melt away the plastic and tin the exposed traces with solder. Be careful to not add too much heat to the traces, as they are very thin and can melt under too much heat.



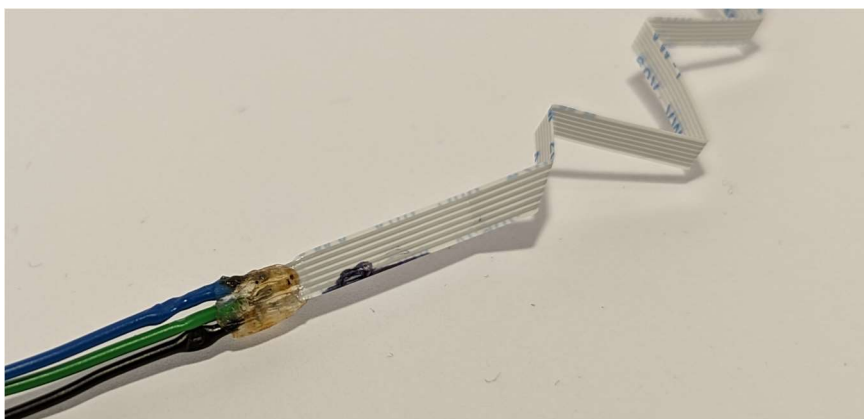
5. Solder the cables to the long end of the ribbon cable:

Make sure that the cables match up with the order in which they need to connect to the LED/switch assembly.



6. Add some hot glue to the cable ends:

This avoids them contacting on accident. Make sure that the glue blob isn't too wide and still fits into the channel in the core.



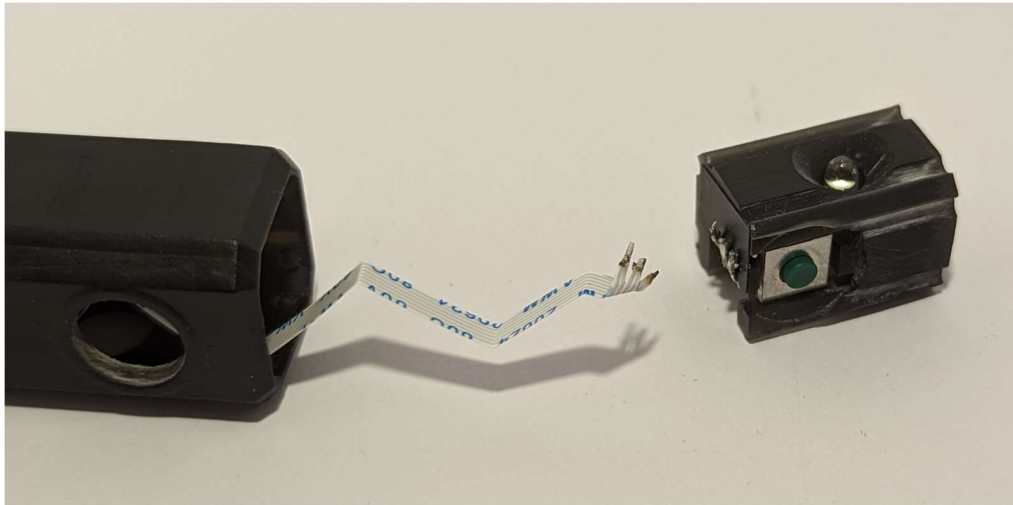
7. Thread the ribbon and the cables through the core:
For this you'll also insert the switch circuit and the battery assembly into the short shell. Lay out all the parts beforehand and fold all the cables into shape so that they all fit into the shell.



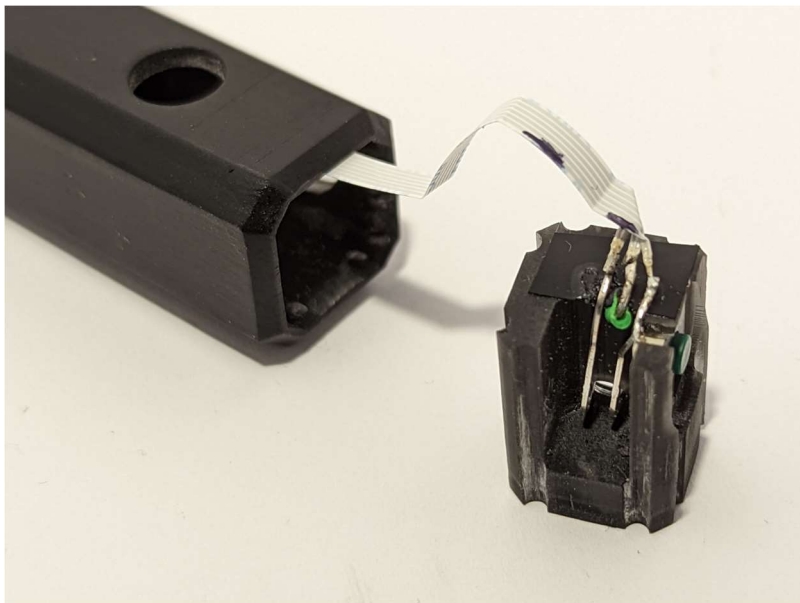
8. Mount the long shell with 2 M1,4x3mm Phillips screws.
Tighten them as far as possible without interfering with the linear rail movement. If that is to lose, file down the ends of the screws until you can get them nice and tight without interfering with the rail.



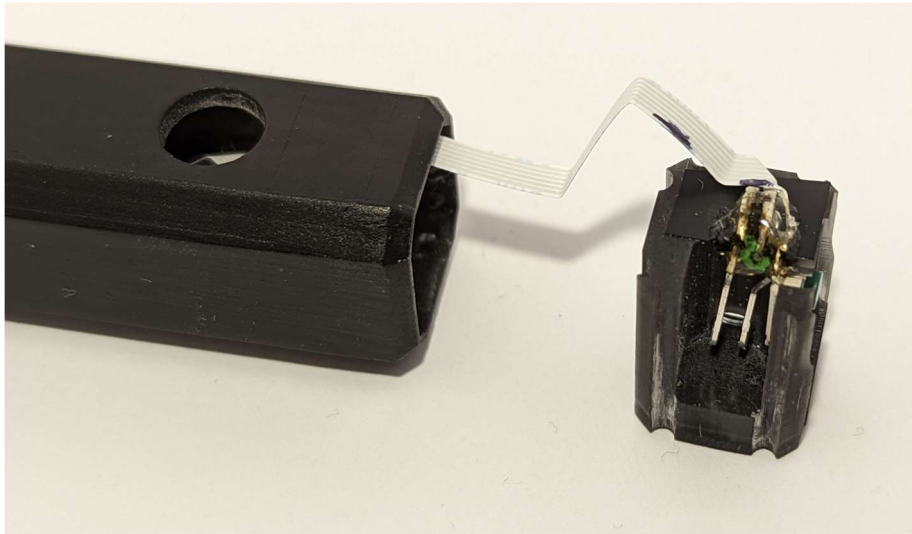
9. Check which way the ribbon matches up with the LED/switch assembly:



10. Solder the ribbon to the LED/switch:



11. Add some hot glue on the solder joints:



12. Insert the button and slot in the LED/switch assembly until the LED is in the centre of its corresponding hole:



13. Insert the translucent ring:
Make sure that the ring fits into its hole relatively loosely, as forcing it in can cause the brittle resin to crack around the edge.



14. Add the end caps and you're done!



Links:

M1,4x3mm Phillips screws black: <https://www.ebay.de/itm/173899092409?var=472636389618>

M1,4x5mm Phillips screws black: <https://www.ebay.de/itm/173899092409?var=472636389624>

M1,4x4mm grub screws: <https://www.ebay.de/itm/353772805660?var=623137793932>

M1,4x2,3x2mm threaded inserts:

<https://de.aliexpress.com/item/4000152985464.html?spm=a2g0s.8937460.0.0.3adf2e0eTE3jqV&gatewayAdapt=glo2deu>

3x70mm linear guiderail:

<https://de.aliexpress.com/item/1005001504319518.html?spm=a2g0s.8937460.0.0.20c62e0eHOKIOZ&gatewayAdapt=glo2deu>

3mm white LED: https://www.reichelt.de/led-3-mm-bedrahtet-weiss-2850-mcd-25--evl-1224utcp230790.html?ACTION=3&GROUPID=3018&ARTICLE=230790&START=0&OFFSET=16&ARTICLE=230790&trstct=pol_5&nbc=1&SID=9370dc8be13831534be53ffbd6a24fc2eb83282eae1ea81689971

6,5mm momentary switch: <https://www.reichelt.de/smd-kurzhubtaster-vert-montage-hoehe-3-1mm-taster-9313-p44509.html>

Bistable switch board: https://www.amazon.de/Electronic-Bistable-Self-Locking-Release-Household/dp/B07NPPD2D6?pd_rd_w=hr5vz&content-id=amzn1.sym.49b0691e-305e-42dc-92a7-9a9f892940e8&pf_rd_p=49b0691e-305e-42dc-92a7-9a9f892940e8&pf_rd_r=0DSACMHXB2KXP8S52Z73&pd_rd_wg=fwXUO&pd_rd_r=2497d517-245f-4fcc-8696-abf61ce57b46&pd_rd_i=B07NPPD2D6&pvc=1&ref=pbap_d_rp_1_t

On/off switch: https://www.reichelt.de/schiebeschalter-1x-um-stehend-print-rm-2-54-ss-esp101-p112178.html?&trstct=pol_7&nbc=1

4x100mm ribbon cable: <https://www.ebay.de/itm/272241020388>

These Links are simply the parts I used. Some of them may only ship to Germany. Most of the things I bought on eBay are probably available on AliExpress for international options.

RPF Thread: <https://www.therpf.com/forums/threads/blade-runner-2049-joi-emenator.283474/page-10>

Me: <https://linktr.ee/MatterWiz>