



# PUZZLES AND PROPS

## VOLUME 2

### Orb of Dragonkind assembly manual

<https://propsandbeyond.com/puzzles-and-props-volume-2/>

#### Printed parts:

Print all STL files from either the FDM (filament) or Resin folder, according to your printer type.

#### Tools needed:

- scissors
- CA glue (e.g. superglue)
- soldering iron (not necessary if you get the solderless LED Strip Connector)
- zip tie
- electrical tape

#### Additional parts:

*Example non-affiliate links for reference.*

- 9V battery
- clear nylon thread/string: <https://a.co/d/cbH6khE>
- 9V battery connector: <https://a.co/d/gM6OVB2>
- reed relay: <https://a.co/d/eBeAuEy>
- 12V led strip (choose any color you like): <https://a.co/d/h1ZbeGX>
- 6x3mm neodymium magnet: <https://a.co/d/gbuMy8p>
- female to female jumper wire: <https://a.co/d/ex11FTW>
- optional: Solderless LED Strip Connector <https://a.co/d/2bUSjPj>

Be sure to read the whole manual first, then proceed with the assembly.

Microcontroller version with the Orb *pulsing light* is coming as an update with project launch.

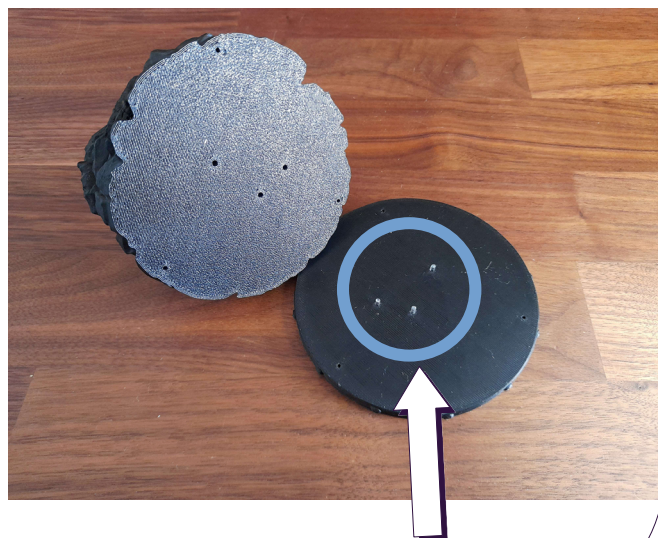
## 1.

Assemble the printed pieces from the BASE folder using CA glue.

- FDM (filament):
  - BOTTOM\_ISLAND\_BOTTOM with BOTTOM\_ISLAND\_TOP
  - TOP\_ISLAND\_BOTTOM with TOP\_ISLAND\_TOP
- Resin:
  - BOTTOM\_ISLAND\_BOTTOM\_PART\_A with BOTTOM\_ISLAND\_BOTTOM\_PART\_B
    - Then with BOTTOM\_ISLAND\_TOP
  - TOP\_ISLAND\_TOP\_PART\_A with TOP\_ISLAND\_TOP\_PART\_B
    - Then with TOP\_ISLAND\_BOTTOM

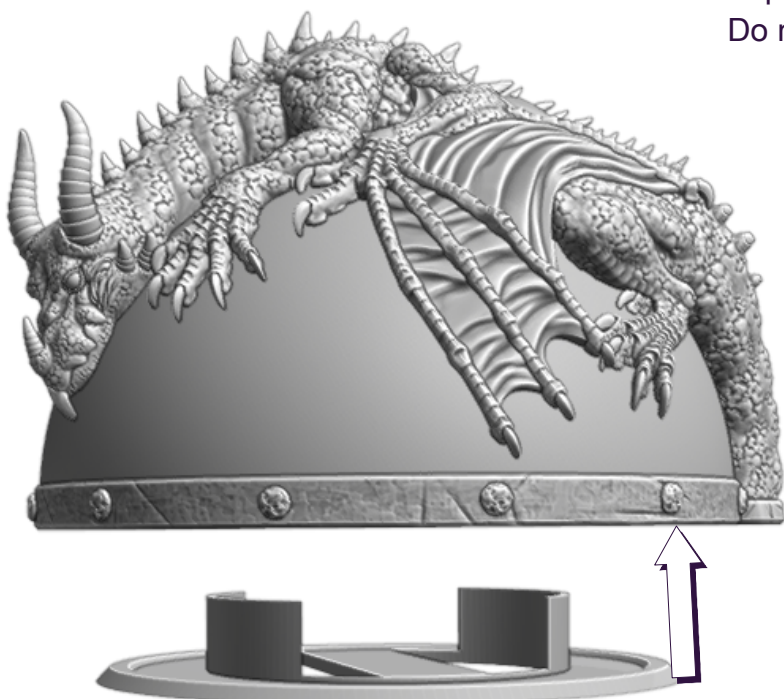
*Hint: You can use pieces of filament, toothpicks or similar pins to insert into the central guiding holes.*

*But do not close the holes that go all the way through.*



2.

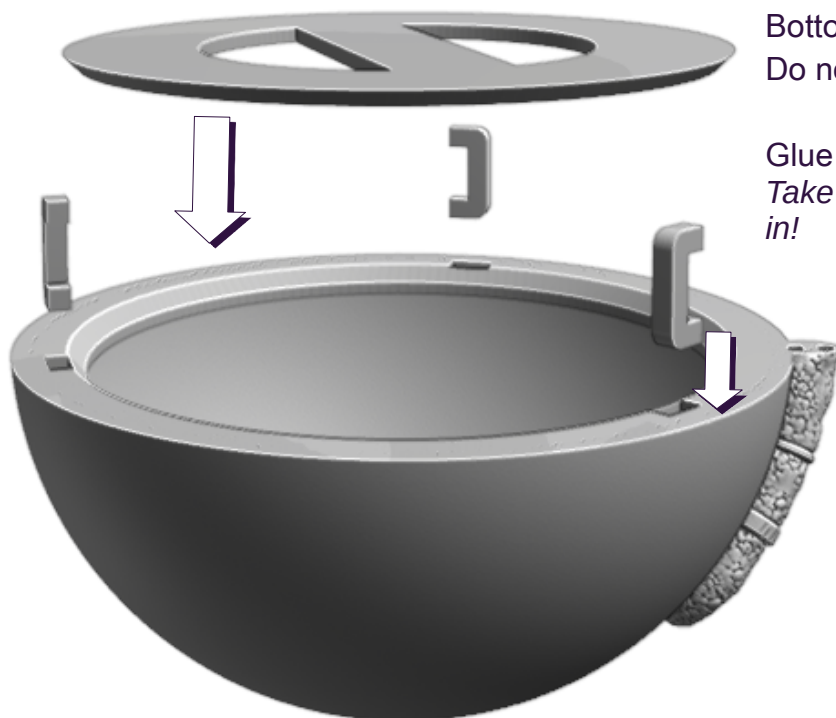
Top half of orb - assembly reference.  
Do not glue in the holder.



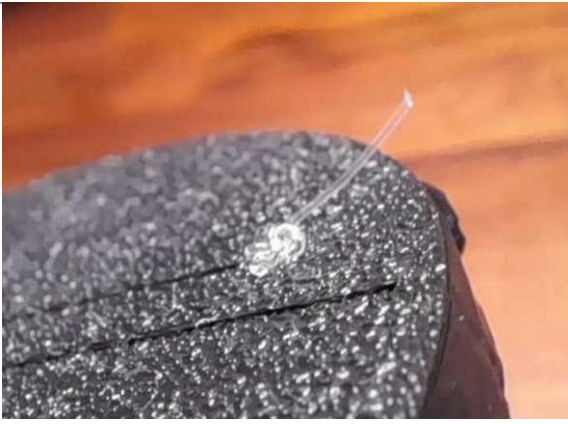
3.

Bottom half of orb - assembly reference.  
Do not glue in the holder.

Glue in the **clip** parts.  
*Take note of the direction they are aligned in!*



4.



Cut 3 nylon thread pieces roughly 30 centimeters / 1 foot long each. On one end of each piece, make a strong knot.

*Hint: you can stack knots one upon another and add a dab of glue to make sure the knot does not untie. You can also run the knot over a lighter to melt it secure.*

Then, guide the pieces through the **assembled bottom base**, so that the knots are at the bottom and the threads are pointing up. Pull the knots into the holes so the base stands flat.

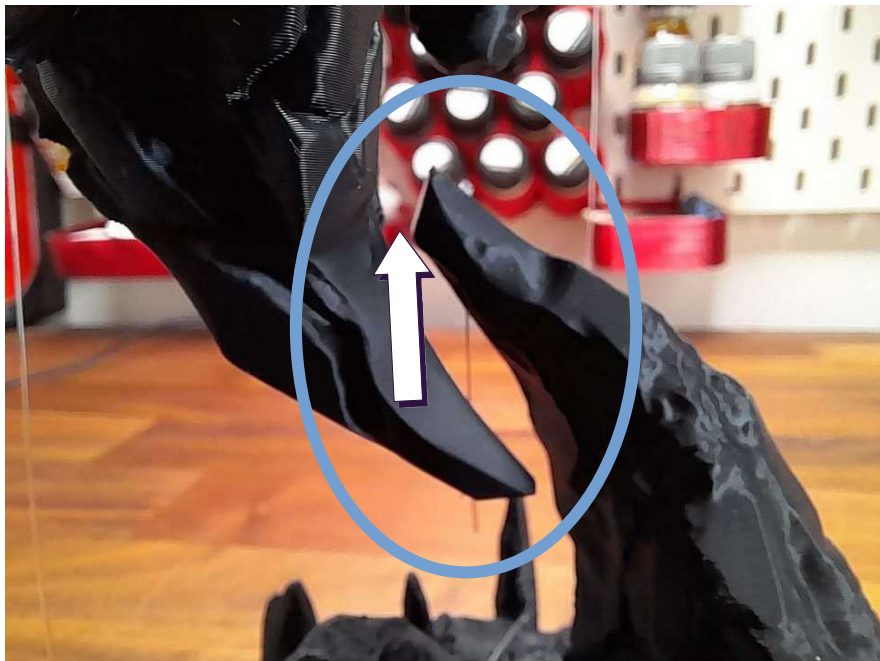
5.

Cut a nylon thread roughly 10 centimeters / 4 inches long.

On one end of the piece, make a knot, securing it as in step 2.

Guide the nylon thread from the bottom to the top of the biggest center rock on the **assembled bottom base** and lightly pull it into the hole to hide the knot.

*Hint: You can use a dab of superglue to keep it in place if you want.*



Now, guide the thread through the biggest center rock on the **assembled top base** and pull it through the hole. Take a look at the reference image to make sure you thread it in the correct direction.

Leave some space between the **top and bottom assembled bases**, and tie a knot at the other end of the nylon thread. Secure it as in step 2.



6.



Once the center thread is secured, repeat the same process with the longer nylon threads. See reference image if you're lost.

Tighten the three threads firmly, but not so strong that the center thread breaks.

*Optional: There are printable pins you can wedge into the holes and adjust the tension, but you can use some CA glue to secure the threads.*

## ELECTRONICS PART STARTS HERE

7.

Once that is done you should be able to lift the model and turn it upside down without it falling apart.



Glue one 6mm diameter magnet in center. The polarity of the magnet does not matter in this case.



8.

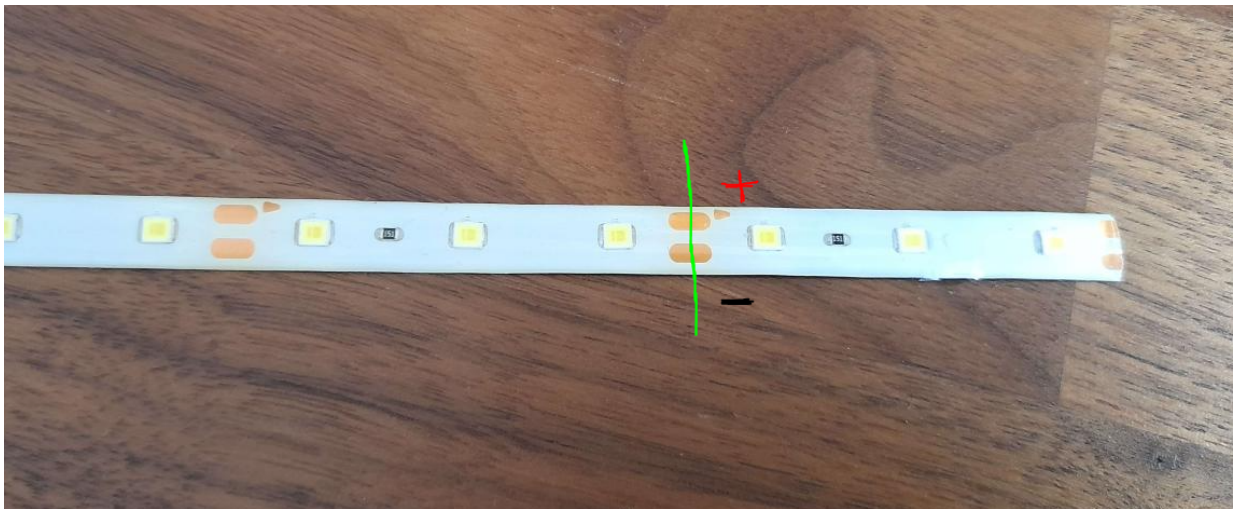


Cut the LED strip to desired length. Roughly 20 centimeters / 8 inches will be fine, depending on the LED strip you choose and the number of sections it has.

*Hint: See image below for reference on where to cut safely.*

Cut the insulation to get to the soldering pads.

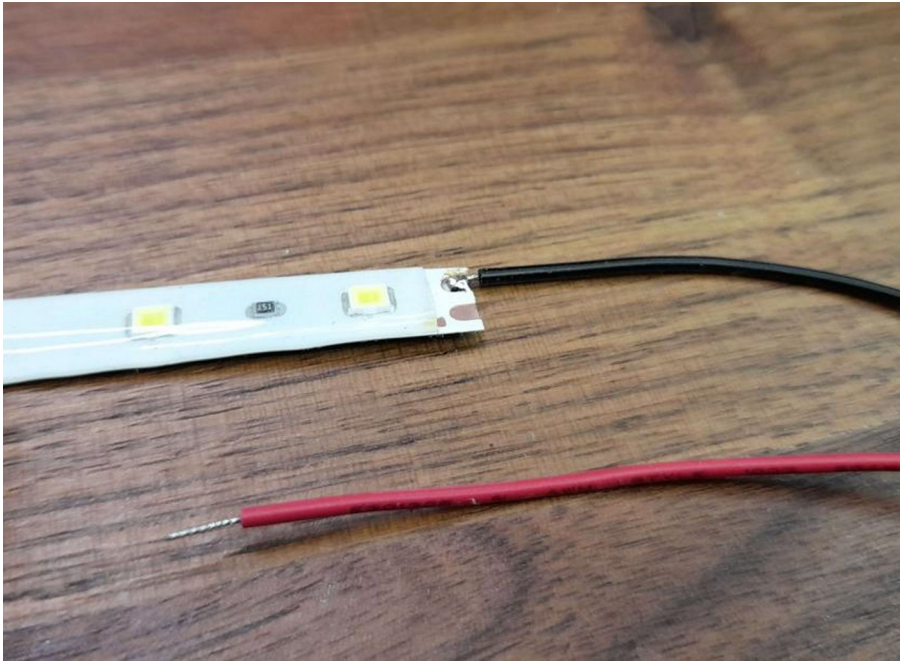
Prepare black and red wire from the 9V battery connector.



Your LED Strip should have a guide on where it's ok to cut it supplied by the manufacturer. See image above to for a general idea where cutting will not break your strip.

## Soldering version

9.



Solder the black wire from the battery connector to the negative pad on the LED strip.

Cut the end of one of the jumper wires and expose the wire. Solder the exposed end of the jumper wire to the positive pad of the LED strip.

*Make sure you are soldering in a well ventilated area!*

## No soldering version

9.

No images here yet, sorry!  
If you happen to follow this assembly path,  
please send us a pictures so we can update  
the manual.

Clamp the solderless LED strip connector so that the red wire goes on the positive pad of the LED strip and the black wire goes on the negative pad.

Twist the black wire from the LED strip connector and black wire from the battery connector.

Cover the connection with electrical tape.

Cut the end of one of the jumper wire and expose the wire.

Twist the red wire from the LED strip connector and the exposed end of the jumper wire.

Cover the connection with electrical tape.

How to twist wire without soldering example:

<https://www.youtube.com/watch?v=N8F6KcfB9Go>



## 10.

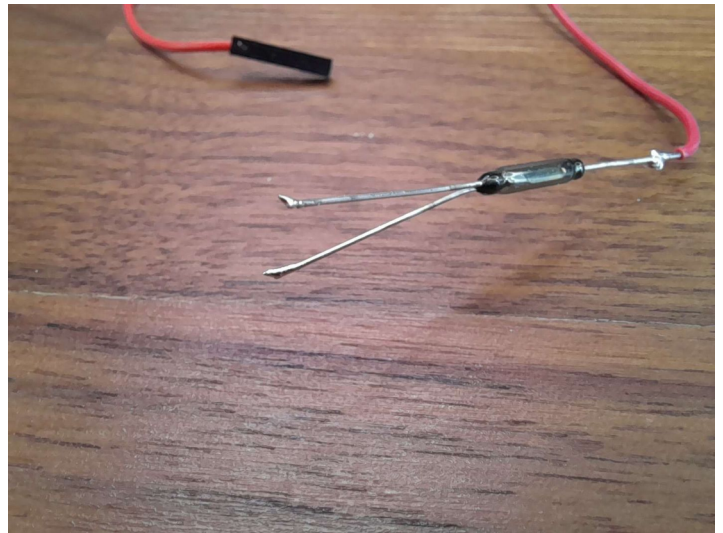
### Soldering:

Solder the end of the red wire from the battery connector to the single wire side of the reed relay.

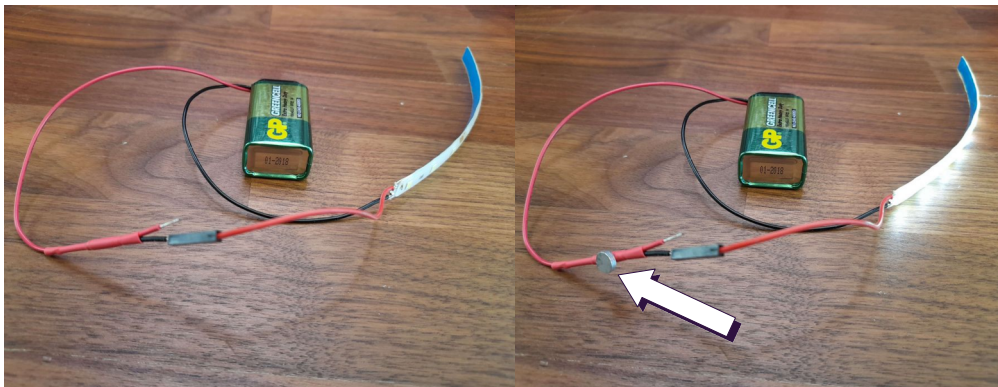
### No soldering:

Wrap the end of the red wire from the battery connector to the single wire side of the reed relay.

Secure it tightly with electrical tape.



## 11.



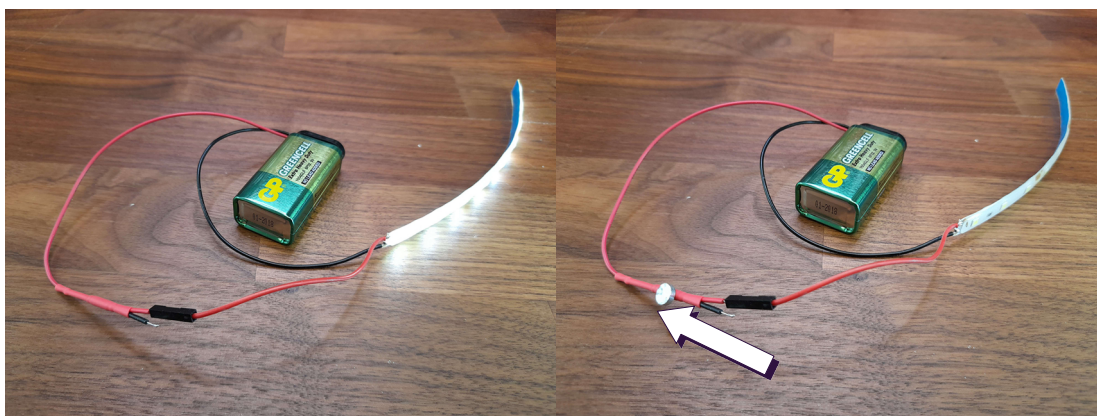
As we are using a 3 wire reed relay, it allows you to choose how the prop behaves. It can either turn the LED strip on or off when the magnet is close.

The default state of the circuit will be with the magnet affecting the relay when the orb is placed on the base. It can either light up when lifted or light up when placed in the base. You will need to test the wiring for your reed relay.

1. Plug the 9V battery in the 9V battery connector.
2. Insert one of the free wires from the reed relay into the female connector of the jumper wire attached to the LED strip.
3. Place a magnet on the reed relay and observe the LED strip (as if the orb was placed in the base)

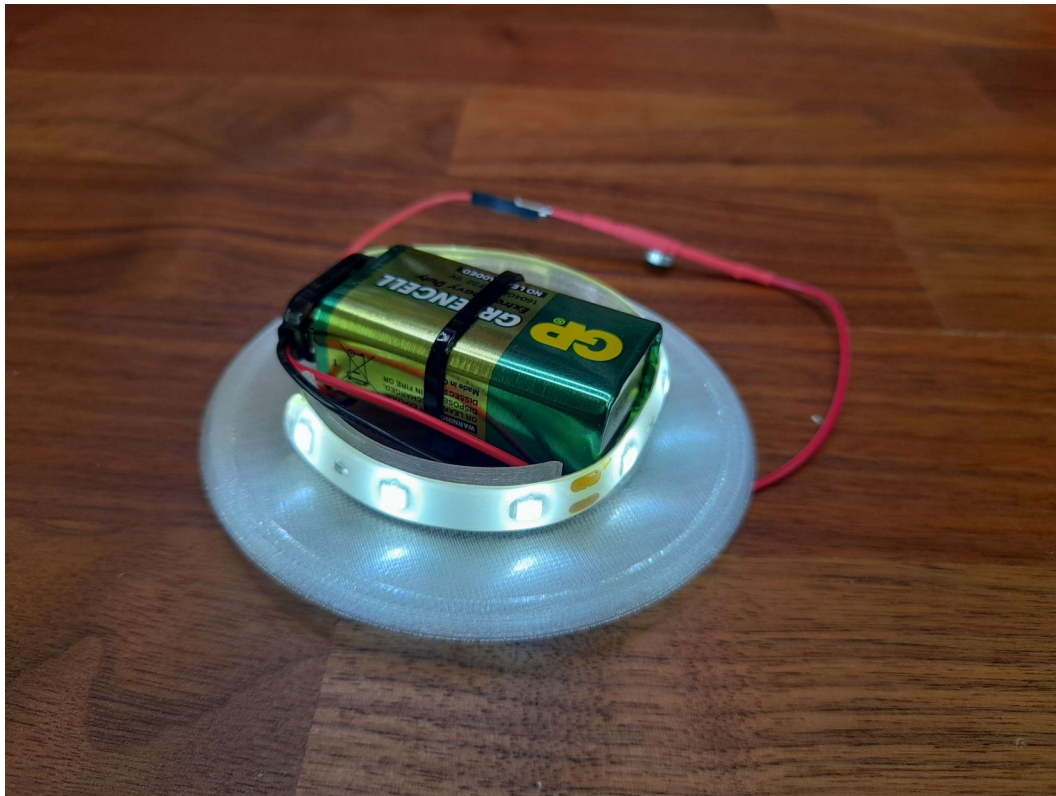
If the behaviour of the LED strip is not according to your liking, you can insert the other free wire from the reed relay into the female jumper wire connector.

*Hint: You can use a heatshrink tube to insulate everything.*





12.



Now when you know your circuit works as you'd like, pack it nicely in the **holder** and secure it with a zip tie.

Make sure the LED lights are facing outwards.

13.

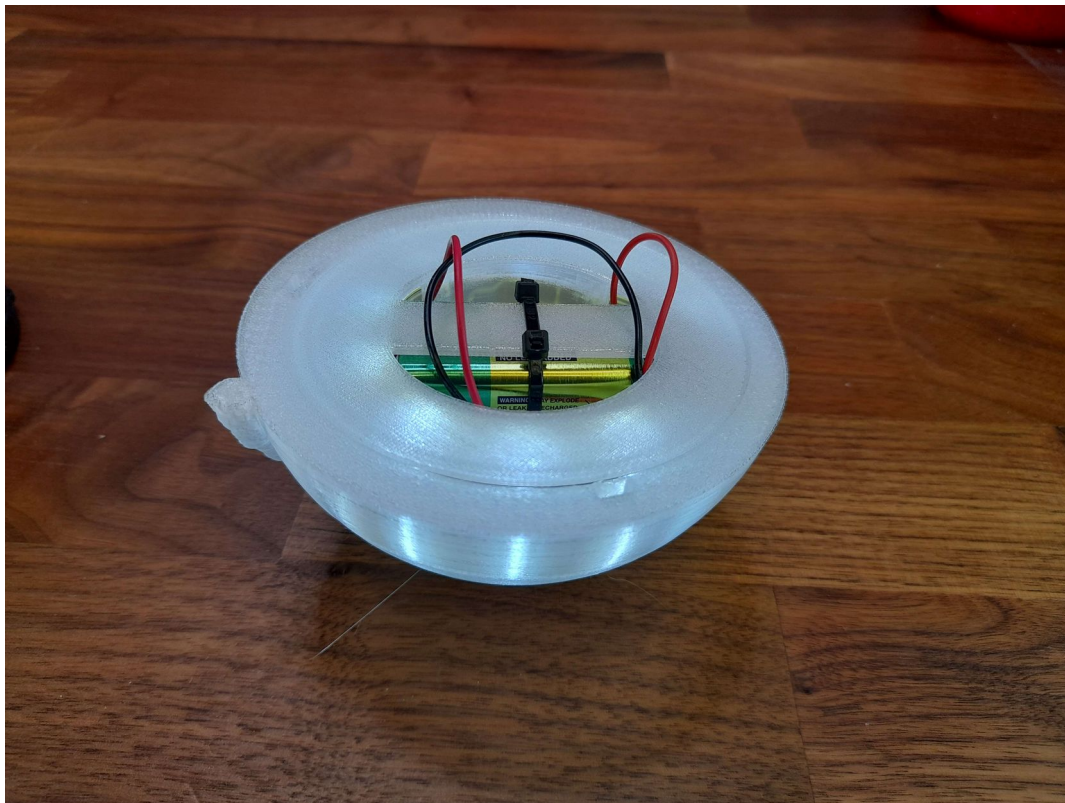


Glue the reed relay on the inside of the bottom half of the sphere.

The exact position is not crucial if the magnet is strong enough

*Hint: use a piece of Blu Tack or some similar temporary adhesive to test the position of the reed relay in the sphere.*

14.



Done!

*Optional: you can use a longer LED strip and line both sphere halves with lights.*



The example above is wired so it closes the circuit with lifting. This makes the orb light up when taken from the base.