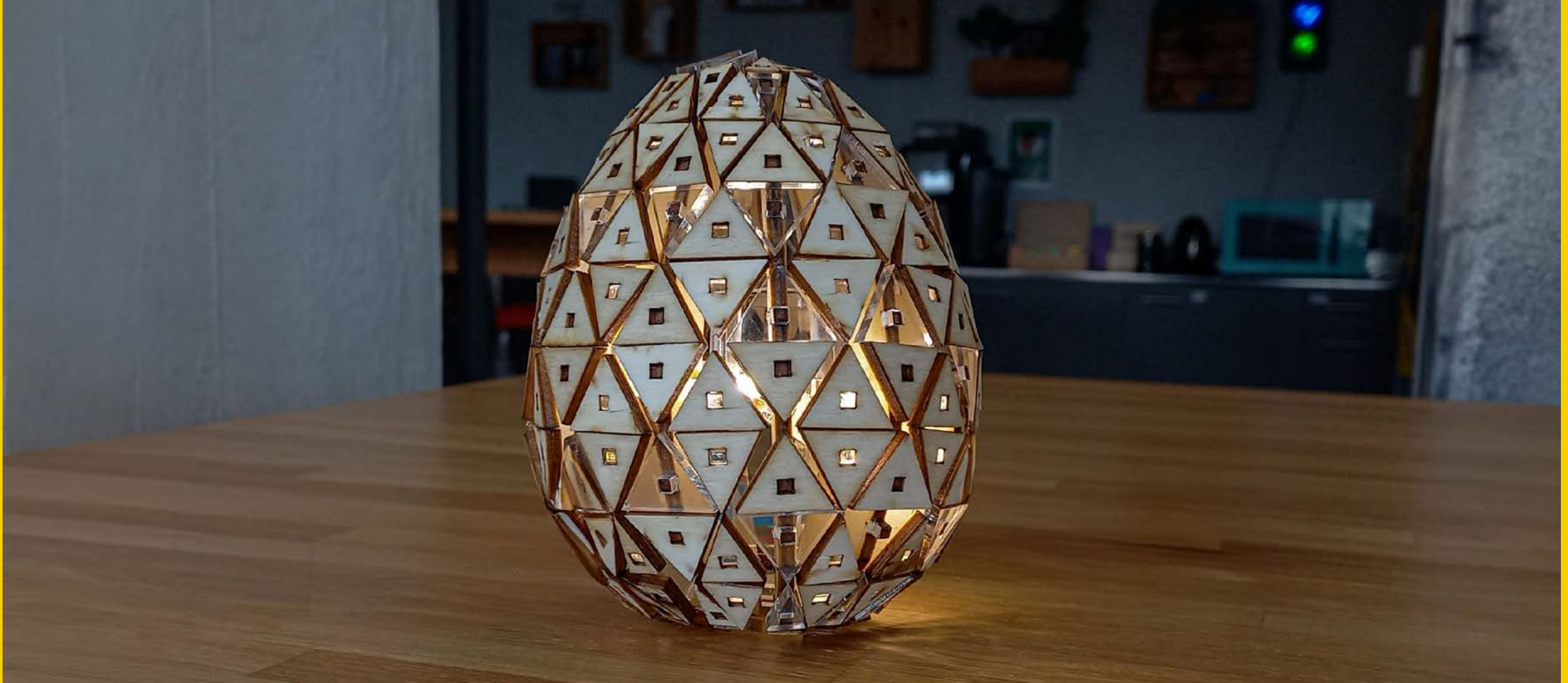


EASTER SPECIAL PROJECT

WOODEN EGG



OVERVIEW

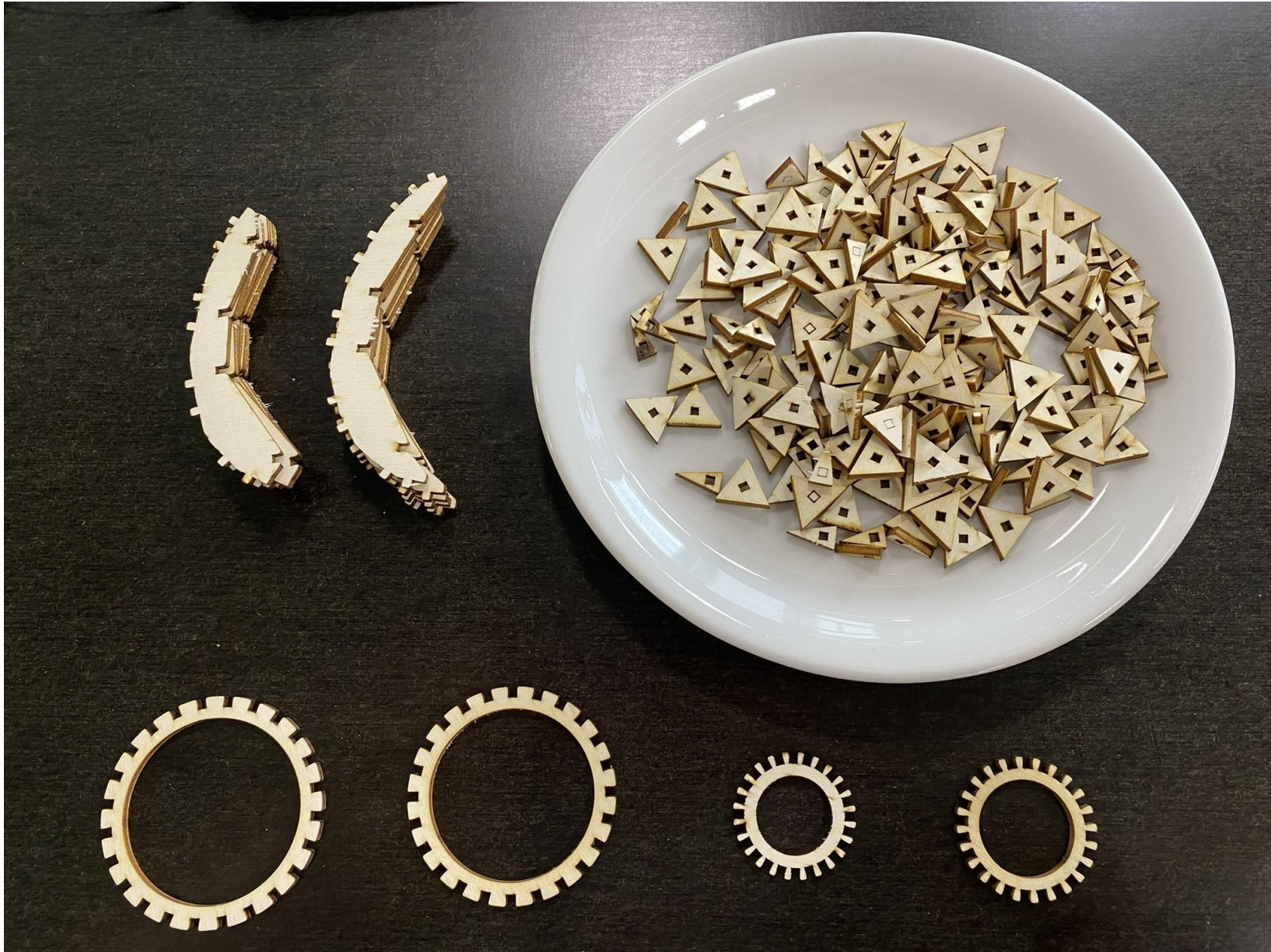
- **Level:** intermediate
- **Cost:** medium (∩ 10CHF, if acrylic 42CHF)
- **Machines:** laser cutter, soldering station
- **Tools/other:** wood hammer
- **Materials:**
 - 3mm plywood sheet → Makerspace Shop
 - 3mm acrylic sheet → Makerspace Shop
 - Electronic components:
 - 9V battery → Makerspace Shop

- ❑ battery clip → Makerspace Shop
- ❑ toggle switch → Makerspace Shop
- ❑ male and female jumper cables → Makerspace Shop
- ❑ heatshrink tube → Makerspace Electronics Room
- ❑ LEDs (any of your choice) or LED strip → Makerspace Shop
- ❑ resistors (for value look at instructions) → Makerspace Shop
- ❑ prototype board → Makerspace Shop

STEP 1:
MAKING THE EGG
[LASER CUTTER]

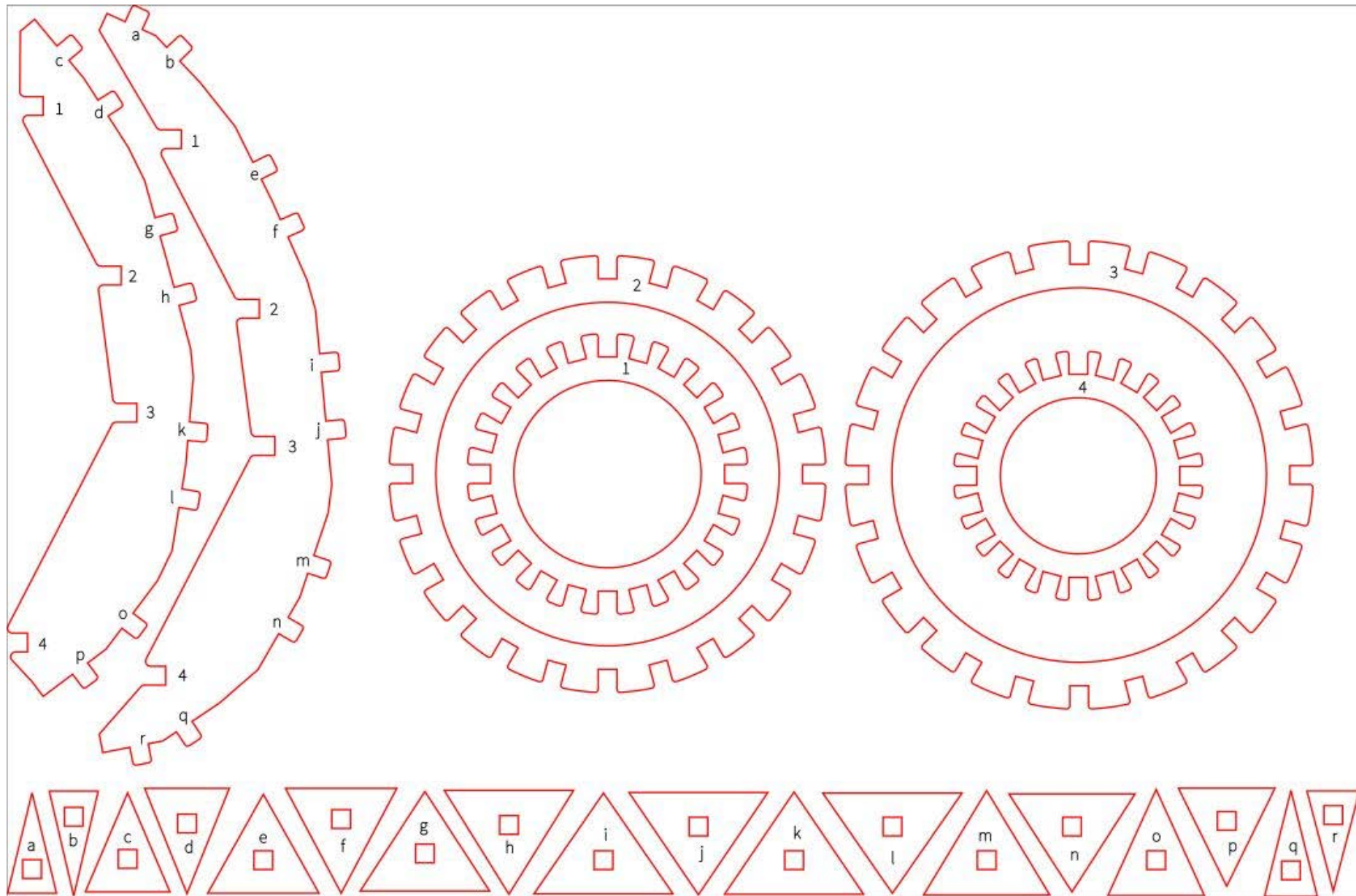


1. Grab the file from our website.
 - It's designed to fit snugly into the plywood sheet available at the Makerspace shop.
 - Plus, it's already set up with the right laser cutter settings.
 - Optionally, cut out some triangles from an acrylic sheet to add some flair and let the LED light shine through more.
2. Laser cut the pieces. In the end you should have:
 - 4 different rings, one of each, for the core structure
 - 12 sets of 2 ribs that connects to the rings
 - 18 sets of 12 triangles that connect to the core structure
3. Watch out: some triangles are tiny. When the cutting's done and you remove the main sheet, they might fall into the grid. If that happens, just ask a Makerspace Manager for help.



5. Assemble everything, using the provided schematic (next slide) as your guide: start by attaching the triangles to “rib”, then, connect the vertical pieces (now with triangles attached) to the circular ones.

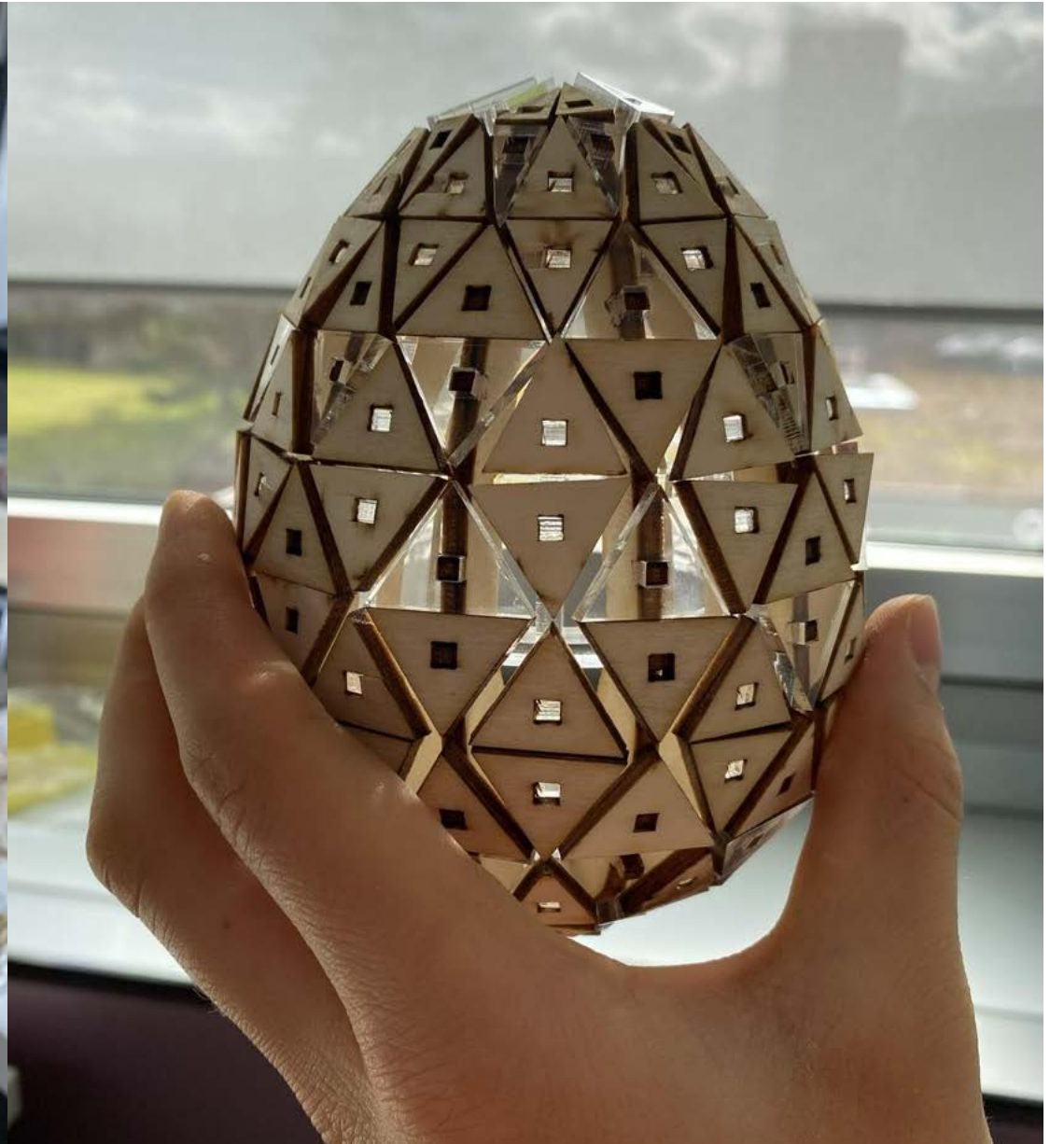
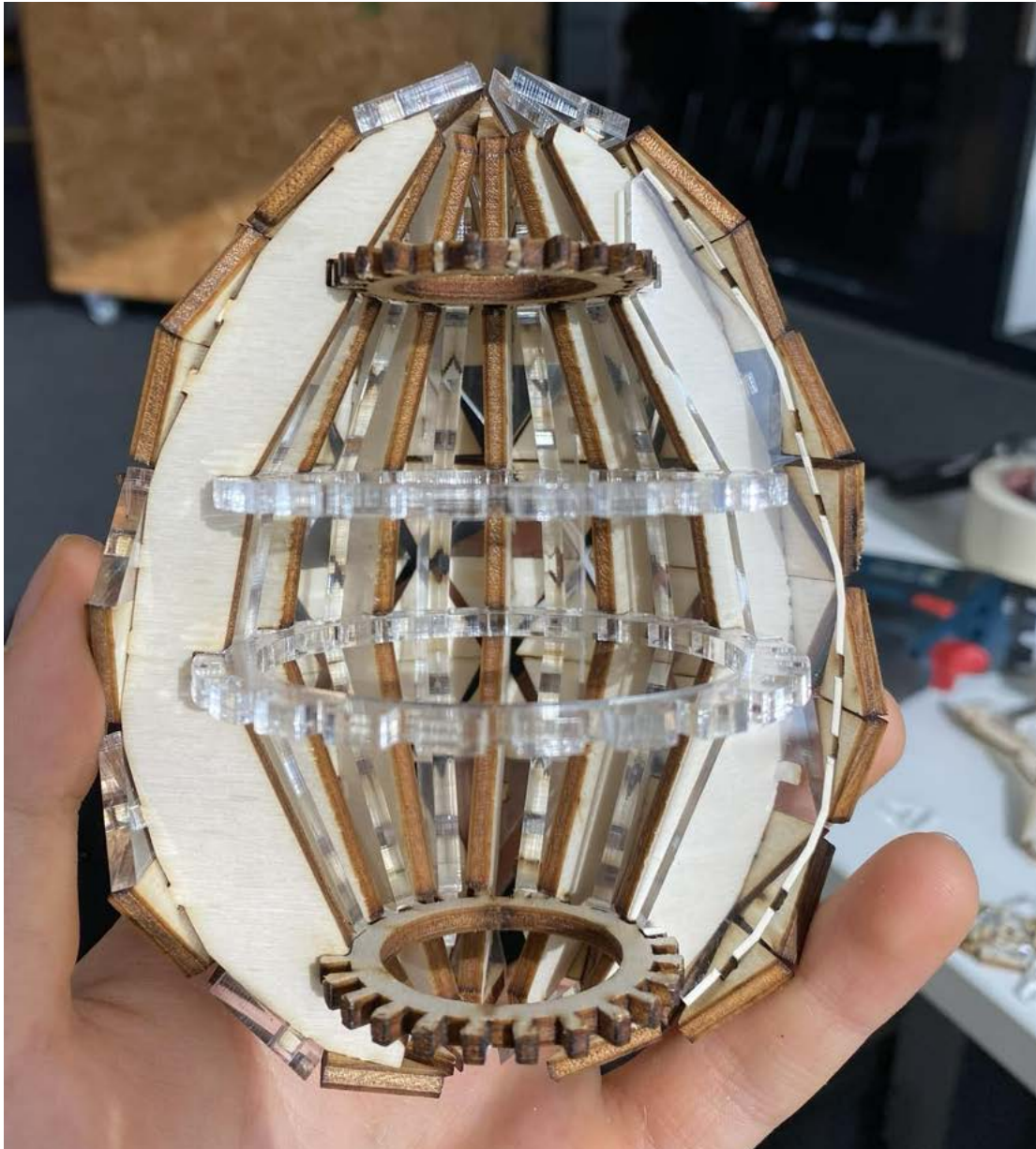




6. Finish up:

- Option 1: If you're planning to put lights inside, leave the last triangle unattached to each vertical piece. This way, you'll have a "hole" at the bottom where you can slide in your electronics.
- Option 2: Attach all the triangles to close up the egg. And that's it, you're done!





STEP 2:

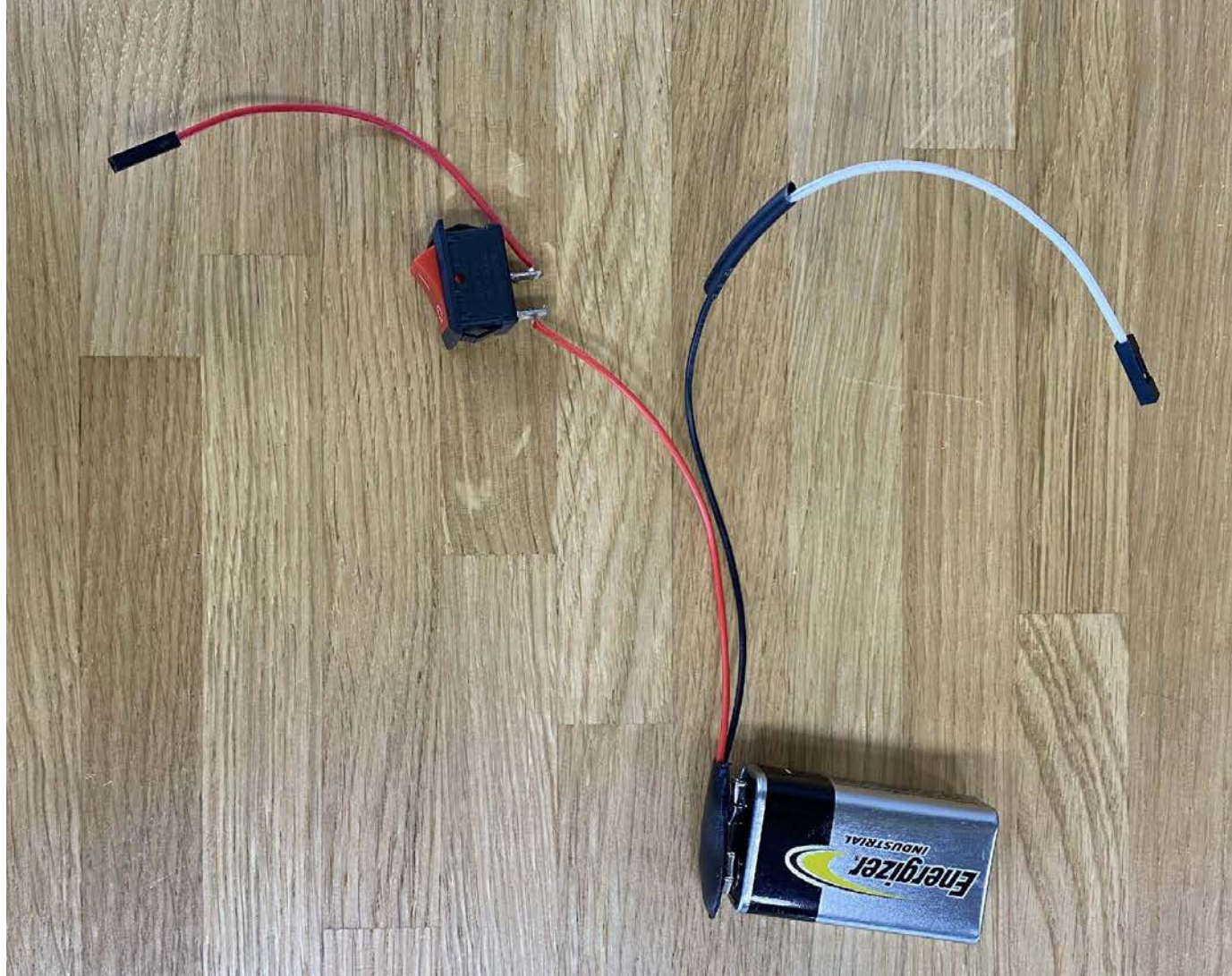
MAKING THE LIGHTS [ELECTRONICS STATION]



Two options are presented here: one using multiple random LEDs that you can freely choose and one using an LED strip. First, we prepare the main circuit:

1. Solder the red cable of the battery holder on one pin of the toggle switch.
2. Take a female jumper wire (preferably red). Cut one side of it and strand the wire to expose the conductor. Solder the exposed part of the jumper wire on the other pin of the toggle switch.
3. Place a small piece of heatshrink tube over the black cable of the battery holder.
4. Take a female jumper wire (preferably black). Cut one side of it and strand the wire to expose the conductor.
5. Join together through soldering the exposed part of the jumper wire to the black wire of the battery holder.
6. Move the heatshrink tube over the solder joint and use the heatgun to secure it.

Your final setup should look something like this:

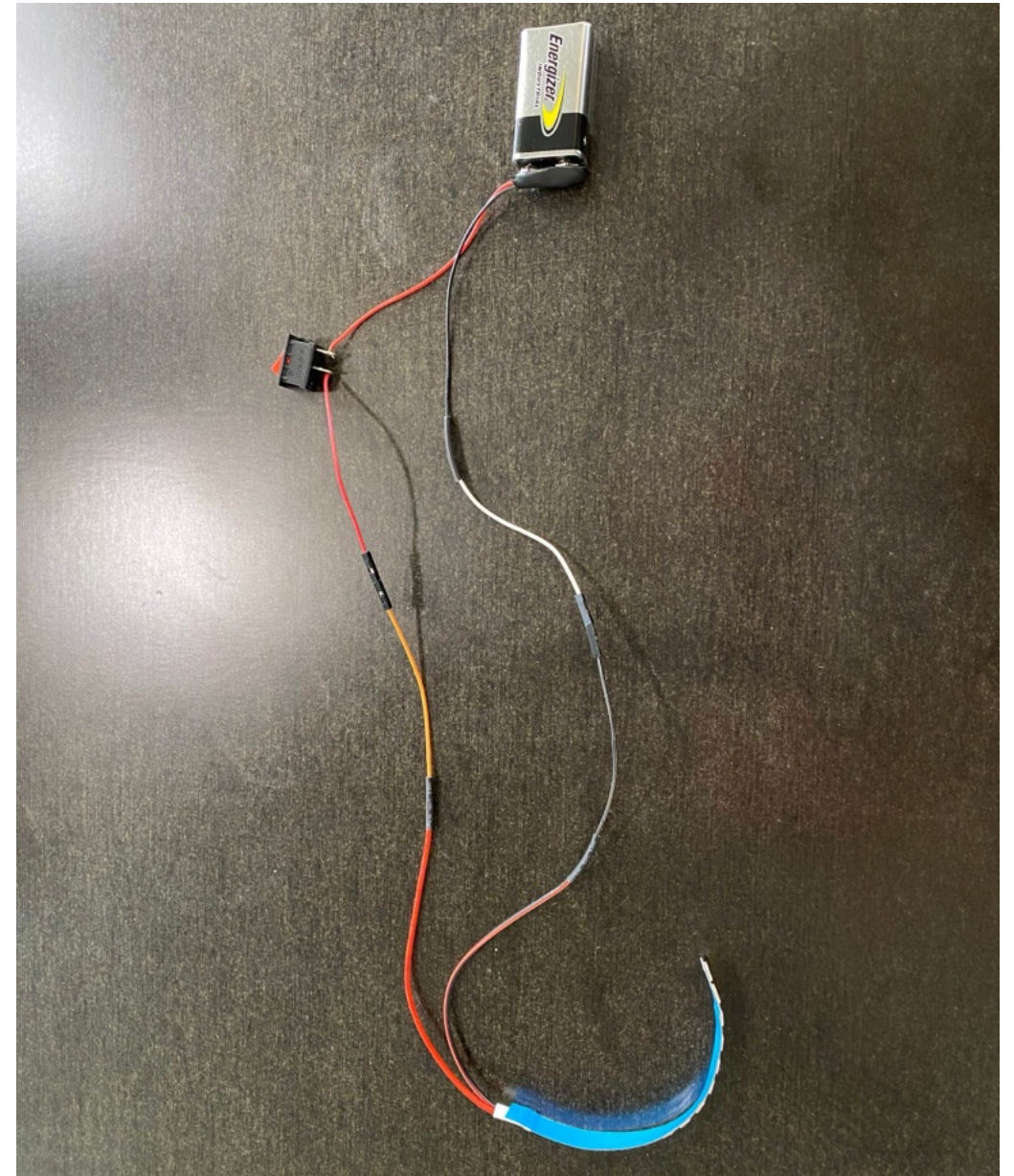


Option 1: Using an LED strip

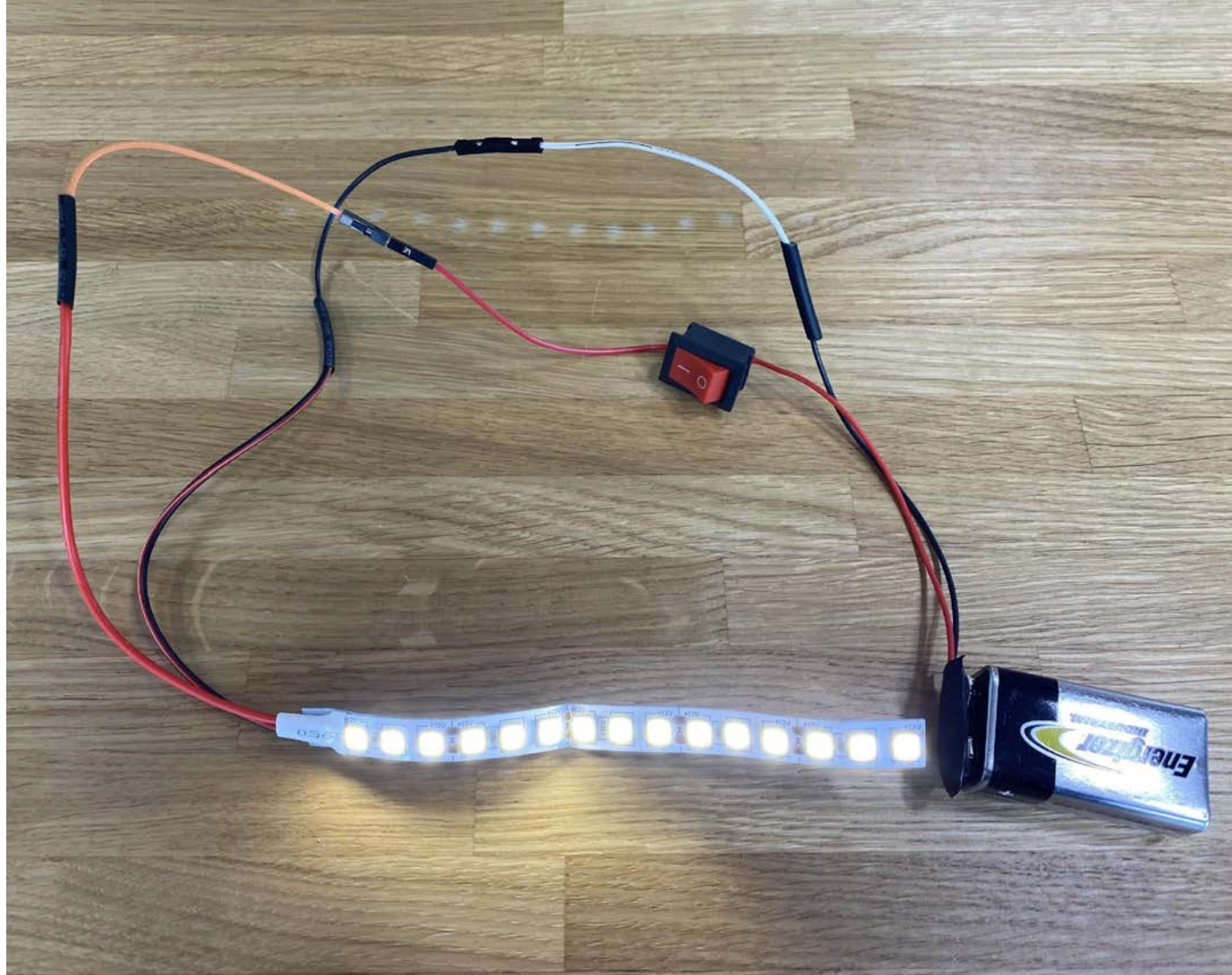
1. Take the LED strip (about 10 cm).
2. Solder two loose wires to it; one on the positive terminal (preferably red) and one on the negative terminal (preferably black). Add a piece of heatshrink tube over each one of them.
3. Strand the other side of those wires and attach two male jumper cables in exactly the same way as in the preparation of the main circuit before. Also use the heatgun to secure the heatshrink tubes on the solder joints.



4. Attach the male jumper cables of the LED strip setup to the female jumper cables of the main circuit setup. **BE CAREFUL with the polarity!** **Positive terminal of the battery needs to connect to the positive terminal of the LED strip and the same for the negative terminals.** In other words, the red cable coming from the toggle switch needs to connect to the positive terminal of the LED strip. If you followed the color scheme suggested here (red for positive and black for negative) then the same colors go together.



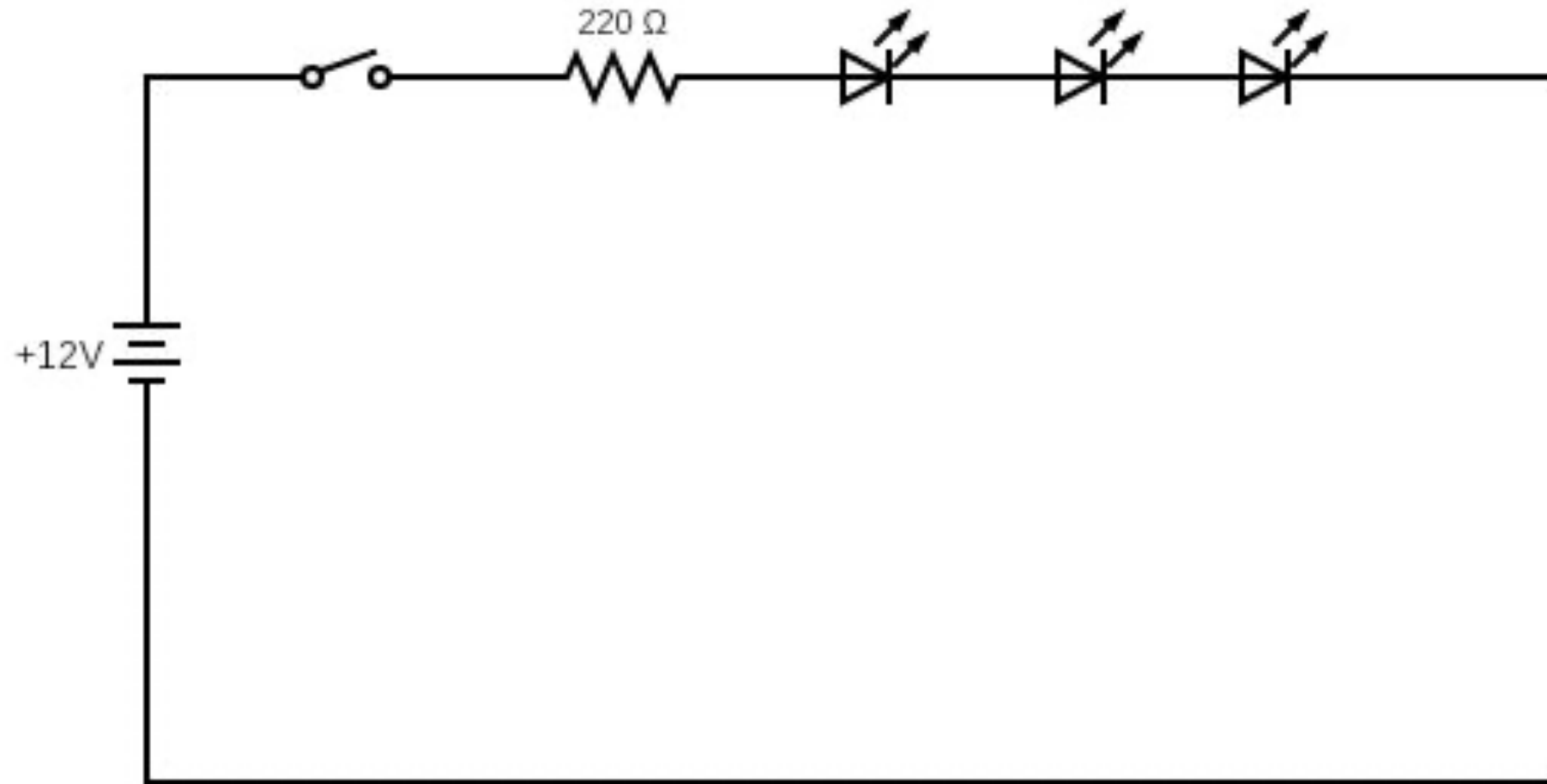
Turn on the toggle switch. The LED strip should now light up.



Option 2: Using a custom LED array (YOU ARE FREE TO CUSTOMIZE IT AS YOU WANT)

- You can freely choose LEDs from the shop of different colors and different sizes. Maybe maximum 3 or 4 to make sure all LEDs will light up in the end.
- Follow the instructions in this [article](#) (section “Multiple LEDs in a Series Circuit”) to determine the value of your resistor. For the LEDs at the SPH shop normally the $V_{LED} = 2V$ or $3V$ and $I = 20\text{ mA}$ or $0.02A$. You can check the values for your selected colors [here](#) (for 10mm), [here](#) (for 5mm) and [here](#) (for 3mm).
- Cut your prototyping board in dimensions about 8x7cm.

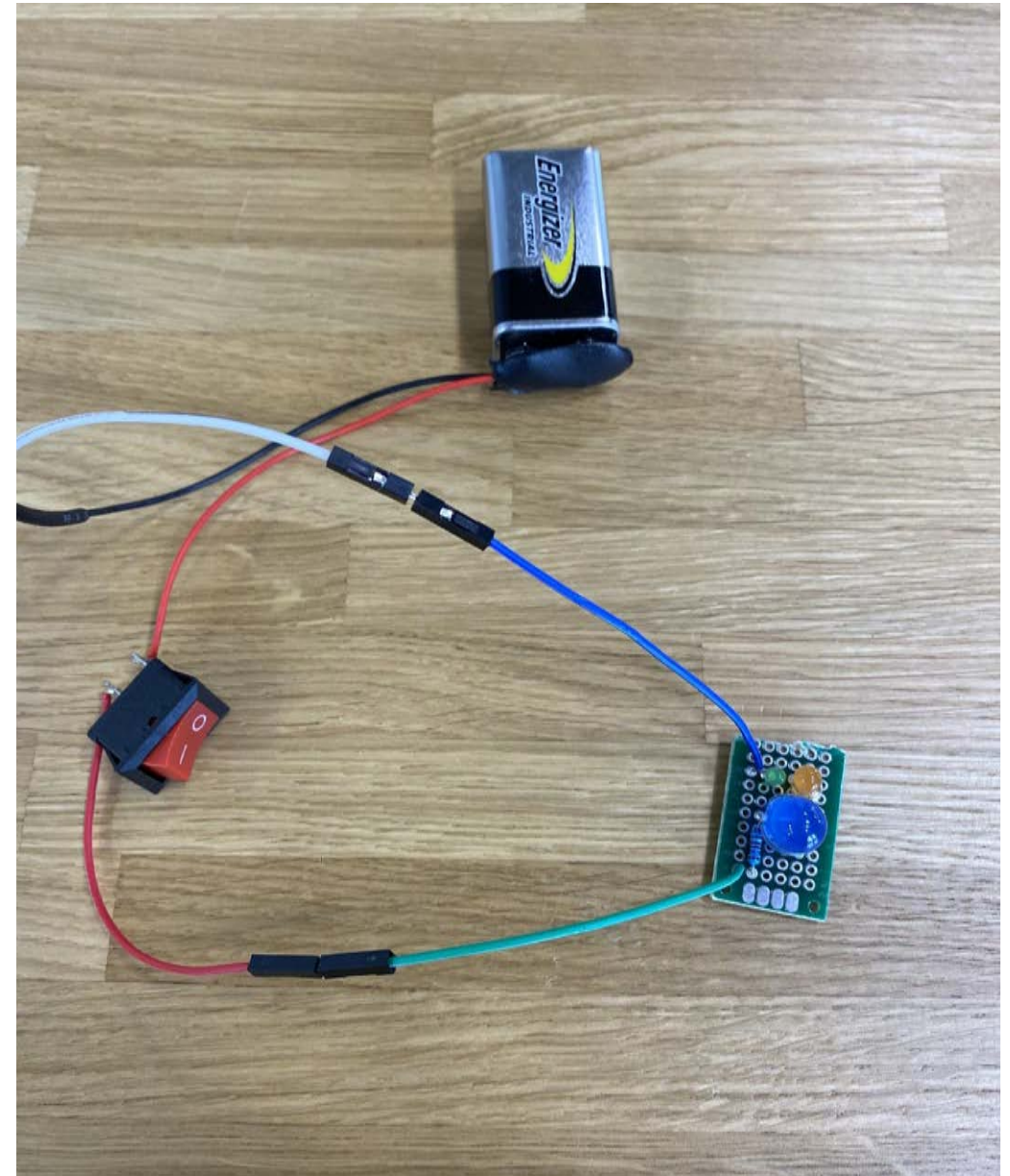
Place the components so that they can be connected according to the following schematic diagram:



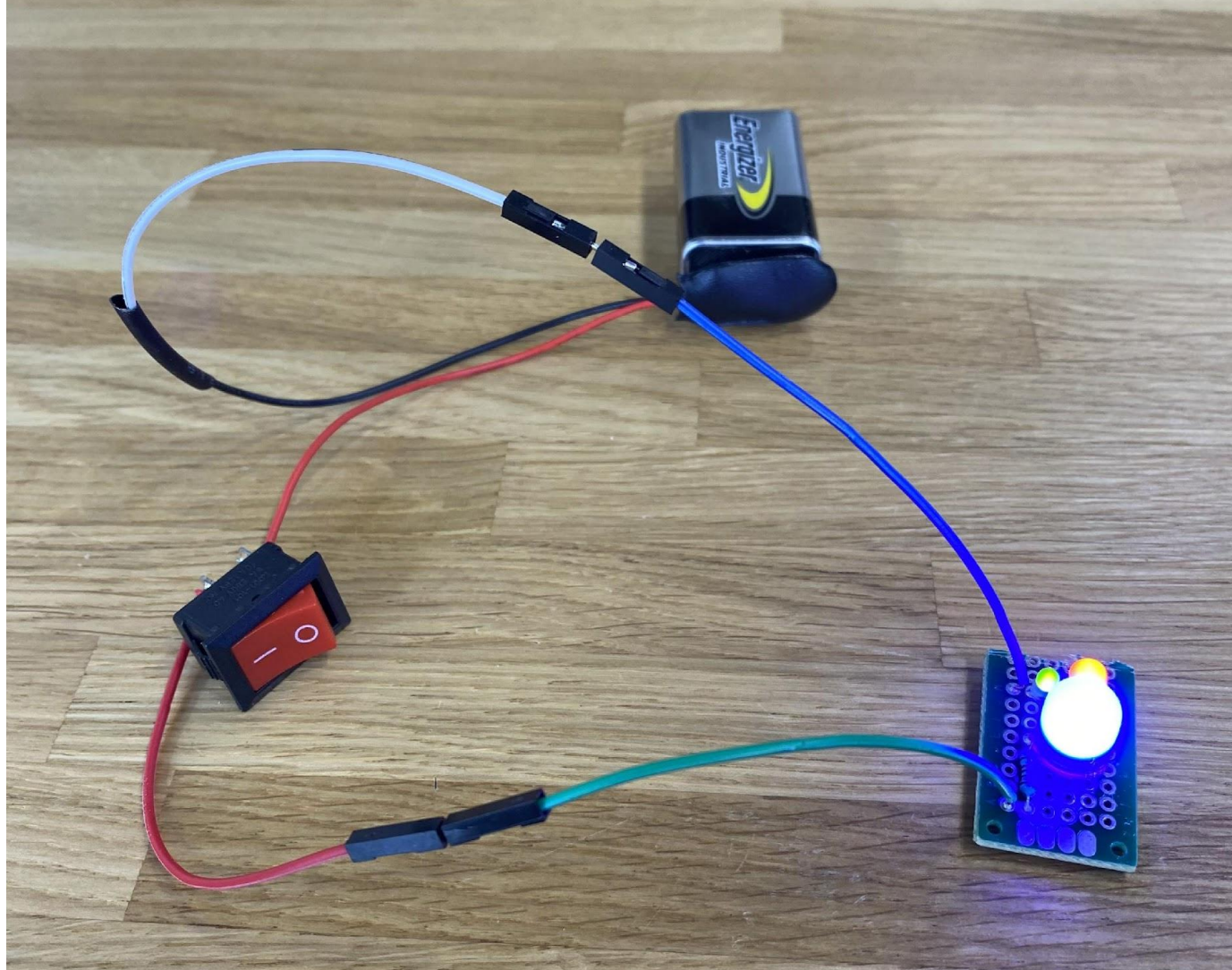
1. Solder the resistor pin to the anode of the first LED (longer pin) and then each cathode of the LED (shorter pin) to the anode of the next LED.
2. Solder all the components on the prototyping board and also solder their connections.
3. Solder two male jumper wires; one connected to the resistor (preferably red for positive terminal) and one connected to the last LED (preferably black for negative terminal).



4. Attach the male jumper cables of the LED prototype board setup to the female jumper cables of the main circuit setup. **BE CAREFUL with the polarity! Positive terminal of the battery needs to connect to the positive terminal of the LED board and the same for the negative terminals.** In other words, the red cable coming from the toggle switch needs to connect to the positive terminal of the LED board. If you followed the color scheme suggested here (red for positive and black for negative) then the same colors go together.



Turn on the toggle switch. The LEDs on the LED board should now light up.



STEP 3:

ASSEMBLE EGG AND ELECTRONICS



Slide the electronics into the base of your egg
(left without triangles).

Based on the length and shape of your cables,
you can secure some of the remaining triangles
to close up the bottom as much as possible.

Your egg is ready!

