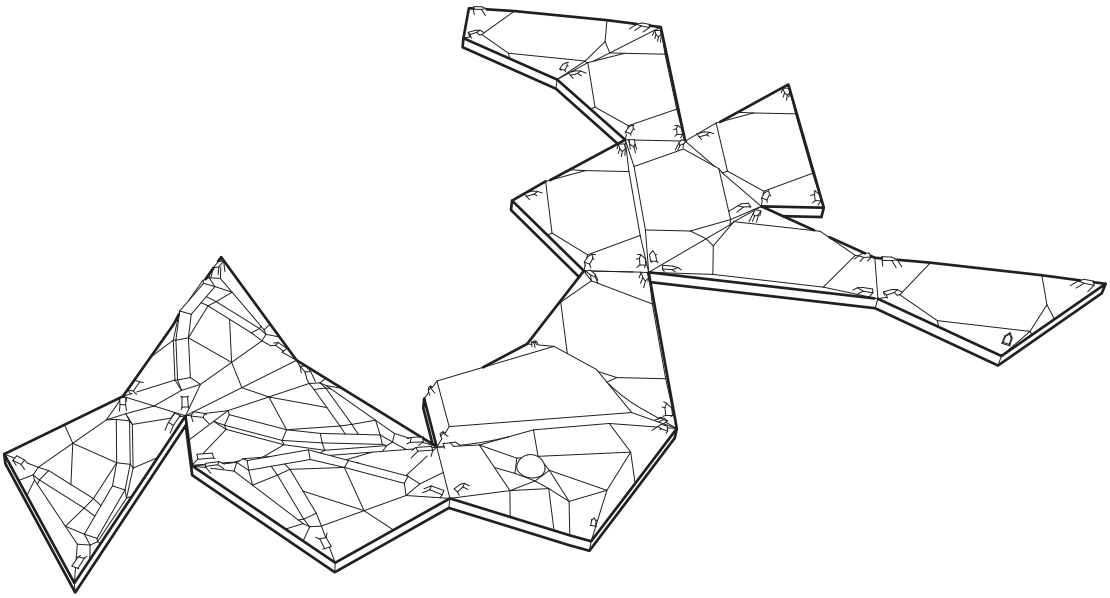
paralite_v1.0
assembly instructions



| contents |

| parts and materials |

---------- 01_mold ----------

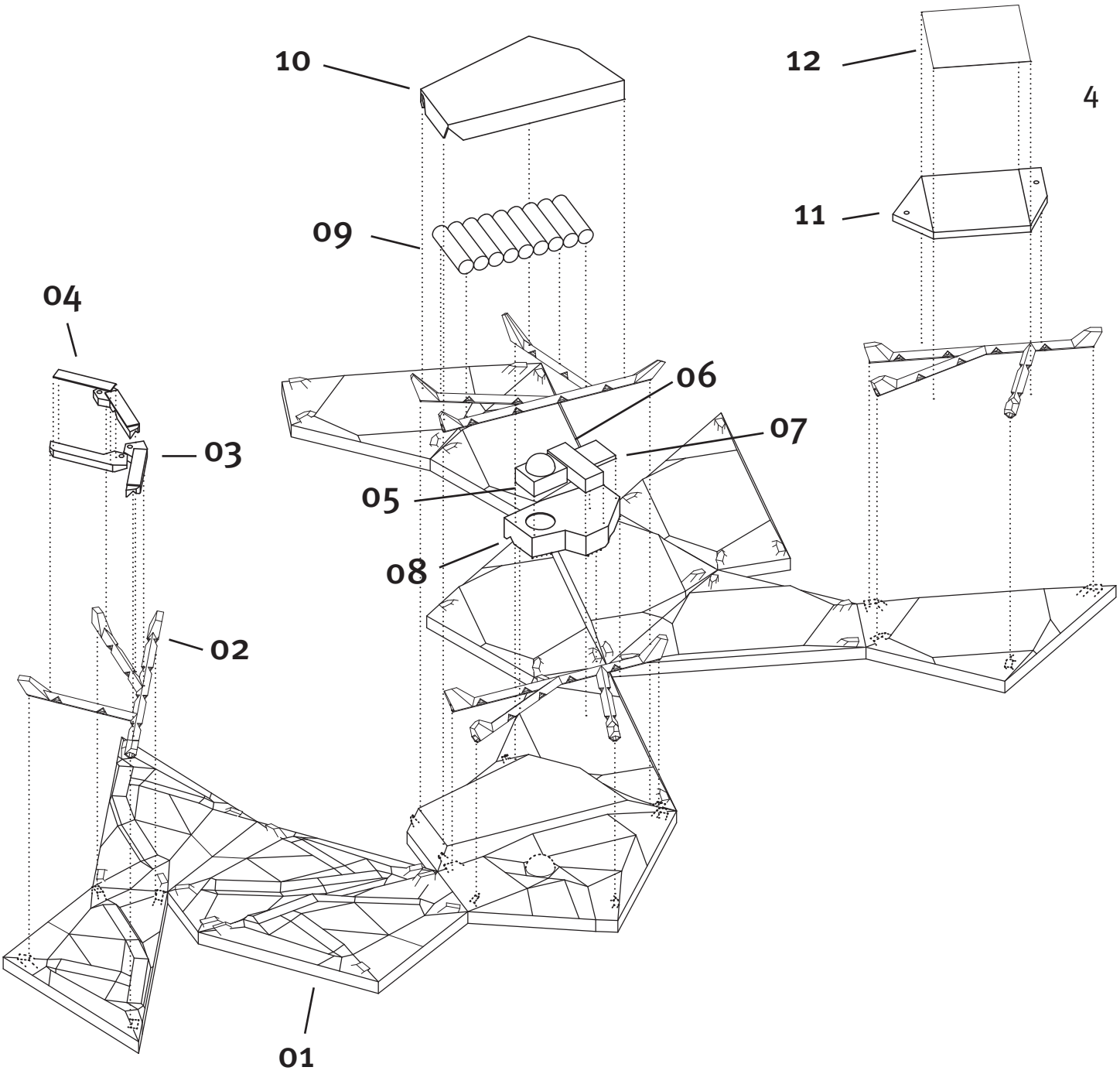
1x	Battery (a)
1x	Mold - Control (b)
2x	Mold - Photovoltaic (a + b)
2x	Mold - LED (a + b)
8x	Border rails (a + b)
8x	Mold connectors
4x	Interior rails

---------- 02_carrier ----------

8x	Photovoltaic mount
12x	LED mount
1x	Battery module
1x	Control module
8x	Photovoltaic carrier
12x	LED carrier
1x	Control carrier
1x	Battery carrier
28x	Mounting pads

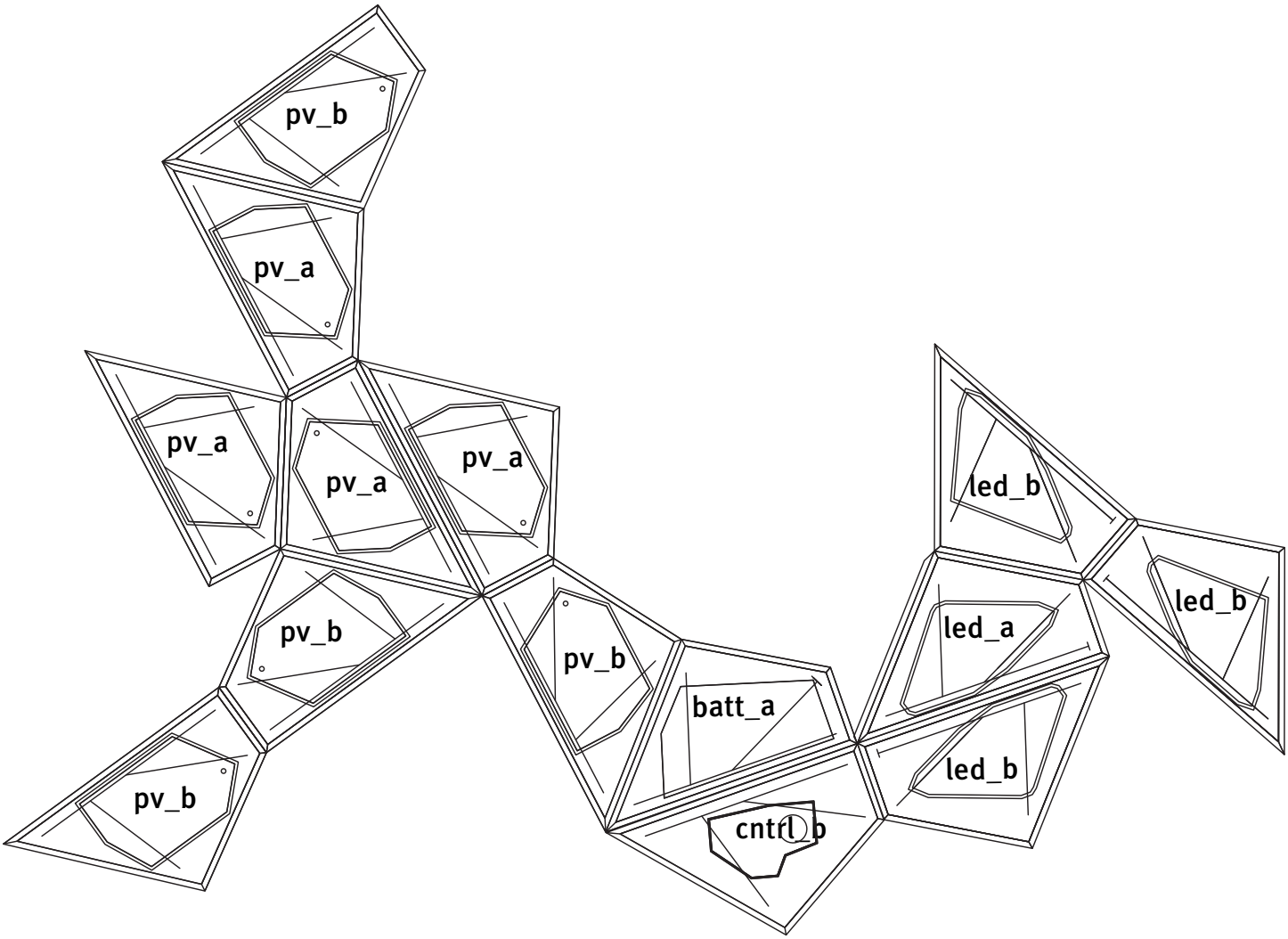
---------- 03_internals ---------

1x	Arduino Micro
2x	14v Zener Diode
1x	4v NPN Transistor
10x	NiMH Battery - AA (w/ solder tabs)
8x	3.6v 50mAh Flexible photovoltaic panels
3ft	1.75w/ft. 6000k Flexible LED strip
1x	PIR Sensor
1x	Digital Multi-meter



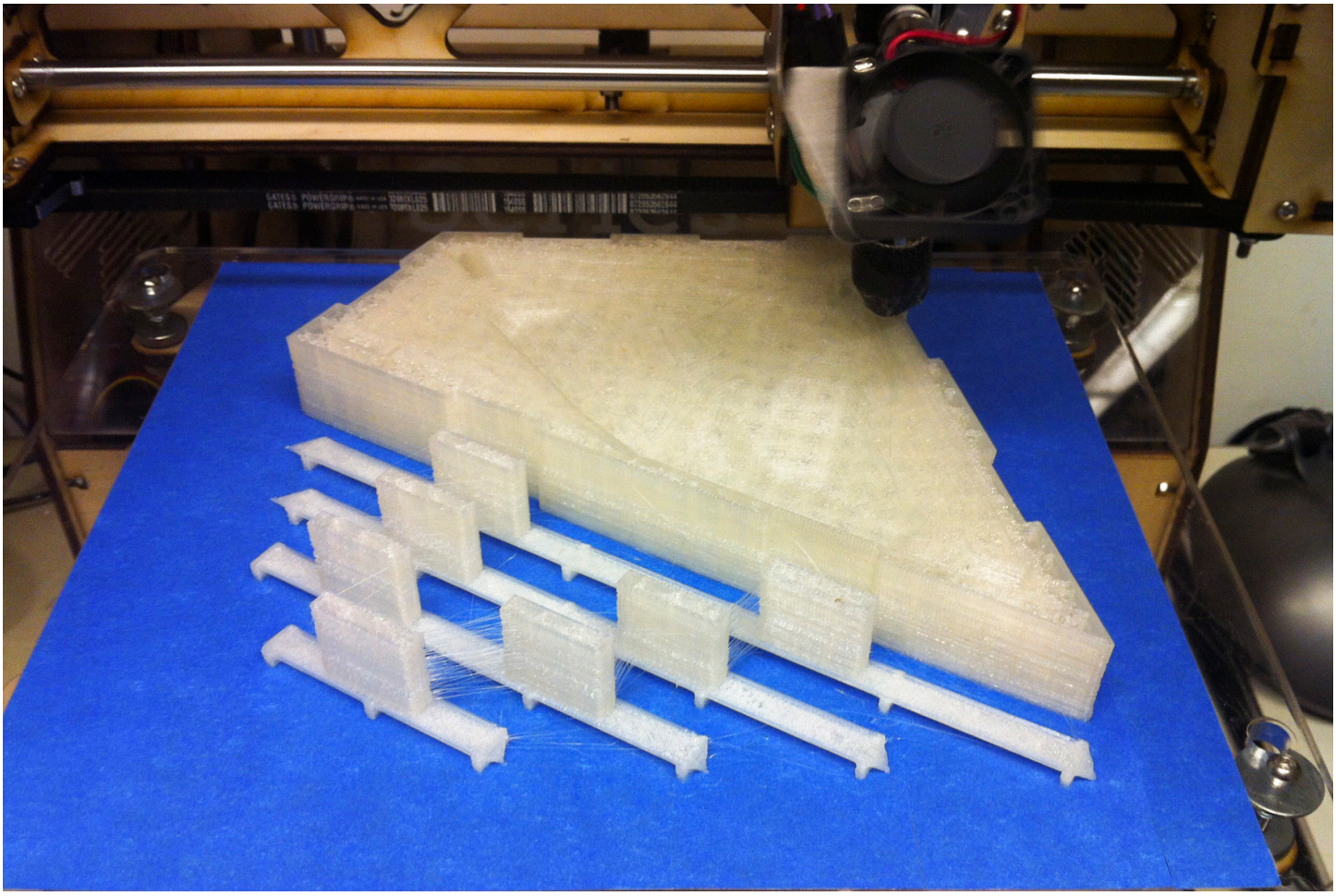
01 | silicone rubber tile
02 | pla plastic carrier
03 | led mount
04 | 6000k 3 led strip
05 | pir sensor
06 | arduino micro
07 | npn transistor
08 | control module
09 | 12v nimh battery pack
10 | battery module
11 | photovoltaic mount
12 | 3.6v 50ma photovoltaic

| 01_mold layout |



pv_a | photovoltaic unit “A”
pv_b | photovoltaic unit “A”
batt_a | battery unit “A”
cntrl_b | control unit “B”
led_a | LED unit “A”
led_b | LED unit “B”

| 01_part fabrication |



| step 01 | printing

Print molds and parts according to specifications provided in Parts and Materials section, or according to desired final layout.

This step may take between several days and two weeks.

Note: If using an alternate layout, a ratio of 2 photovoltaic units to each LED unit should be maintained. If using more than 4 LED units, a second battery pack may be required.

Files (STL) are available at:

http://files.spacehacking.net/paralite_parts

| materials required |

PLA Plastic

| 02_internals |

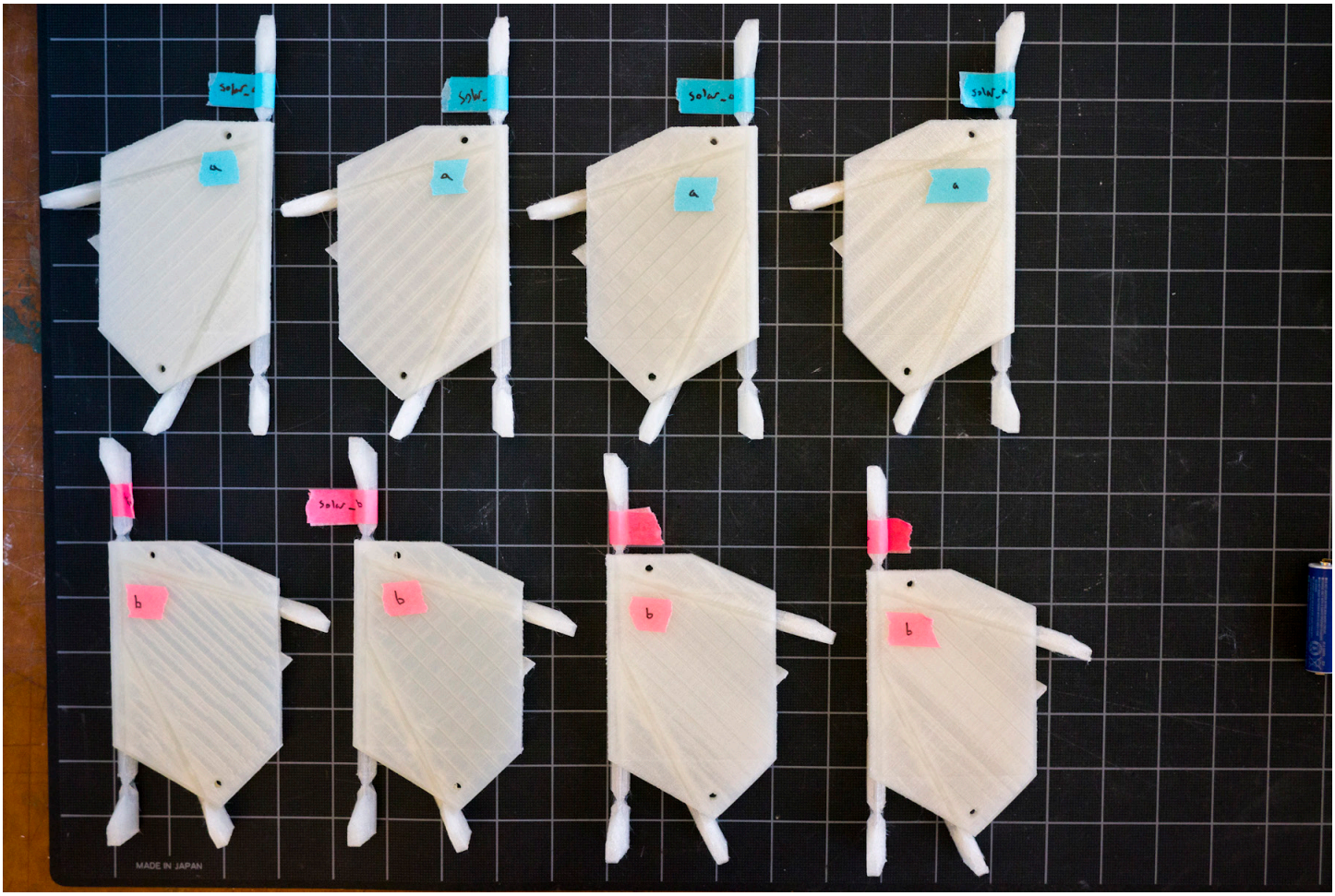
| step 02 | gather + label parts

Collect your parts - it is recommended to sort them by function, and to clearly differentiate “A” parts from “B” parts.

| materials required |

PLA Parts - Various

Tape



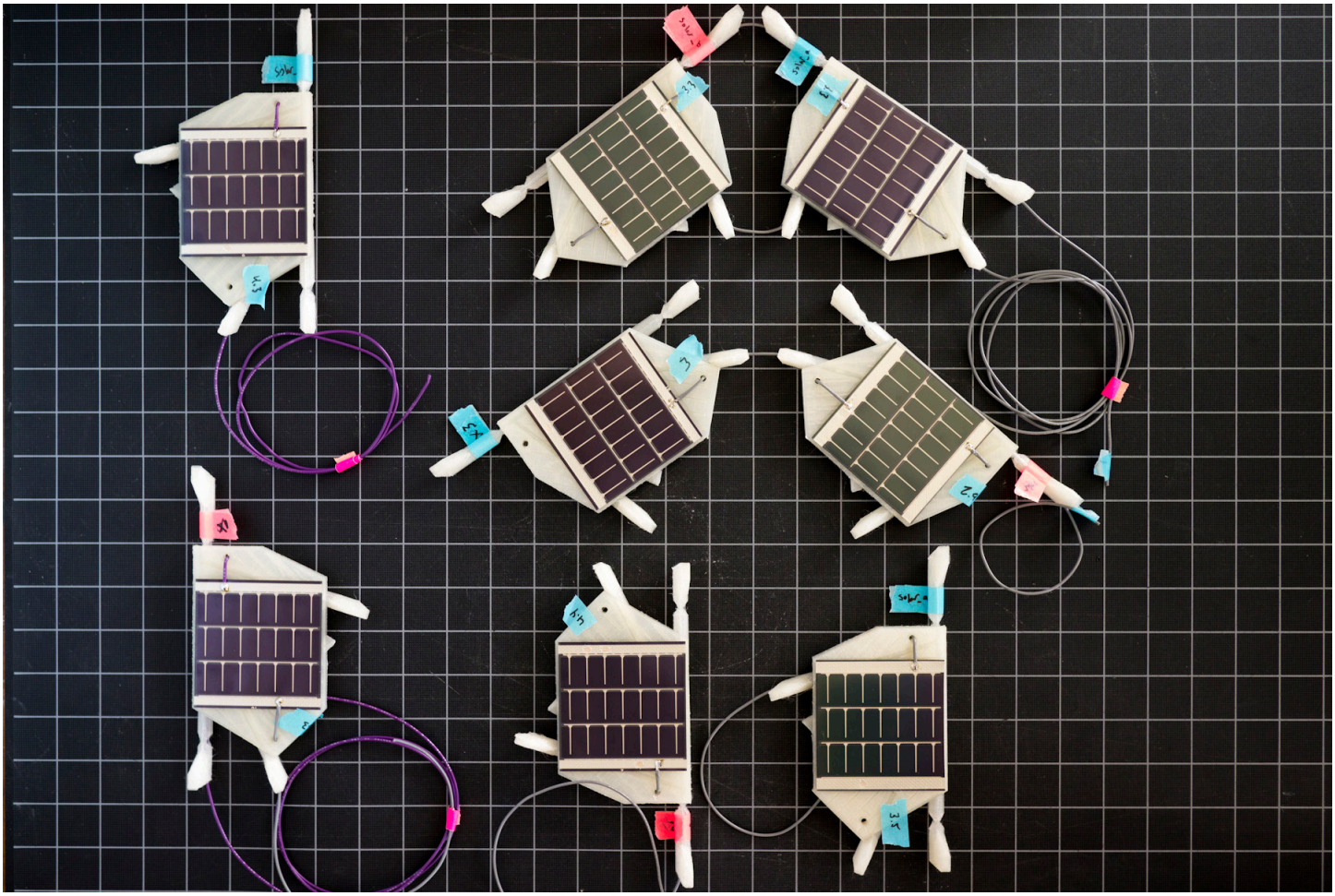
| step 03 | combine pla parts

Secure mounts to matching carriers using silicone adhesive.

| materials required |

PLA Parts - Various

Silicone adhesive



| step 04 | wire photovoltaics

Use the tip of your soldering iron to melt/loosen the plastic film on the photovoltaic panels in desired solder locations.

Solder wires to photovoltaics according to wiring diagram or to suit. Wires should be routed through interior of PLA carrier pieces.

****Note: Photovoltaic units must be wired *in series* into groups of 4 panels to deliver the correct voltage. 4-panel groups can then be wired in parallel to increase current as desired.****

****Note: Wire lengths should be calculated before beginning, to ensure correct assembly.****

| materials required |

8x 3v 50mA pv panels

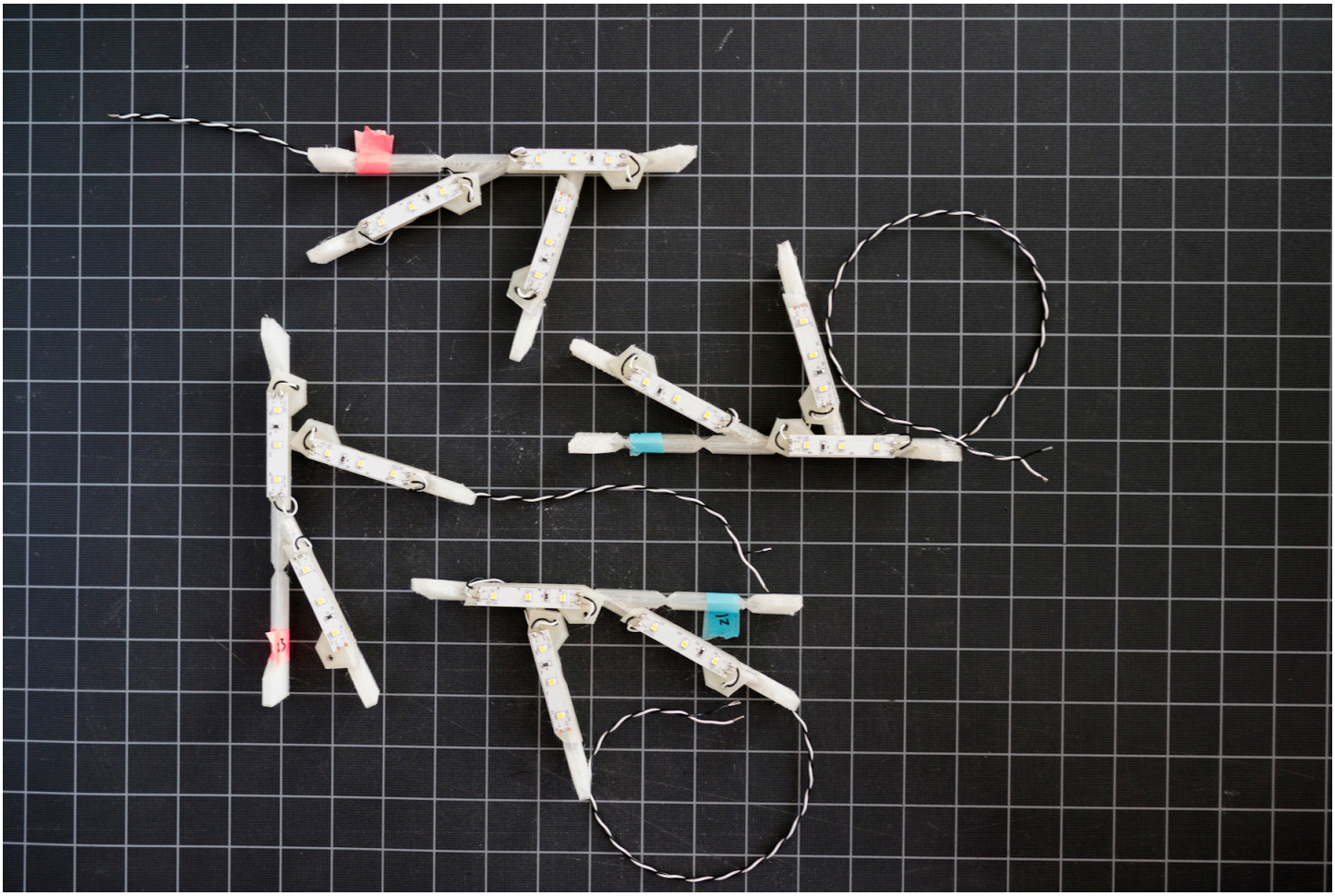
8x PV carrier

8x PV mount

Double-sided tape

20ga stranded wire

Solder



| step 05 | wire leds

Affix LED to mounts using factory-provided adhesive. Solder wires to LED strips according to wiring diagram or to suit.

****Note: LED units must be wired *in parallel* to work****

****Note: Wire lengths should be calculated before beginning, to ensure correct assembly.****

| materials required |

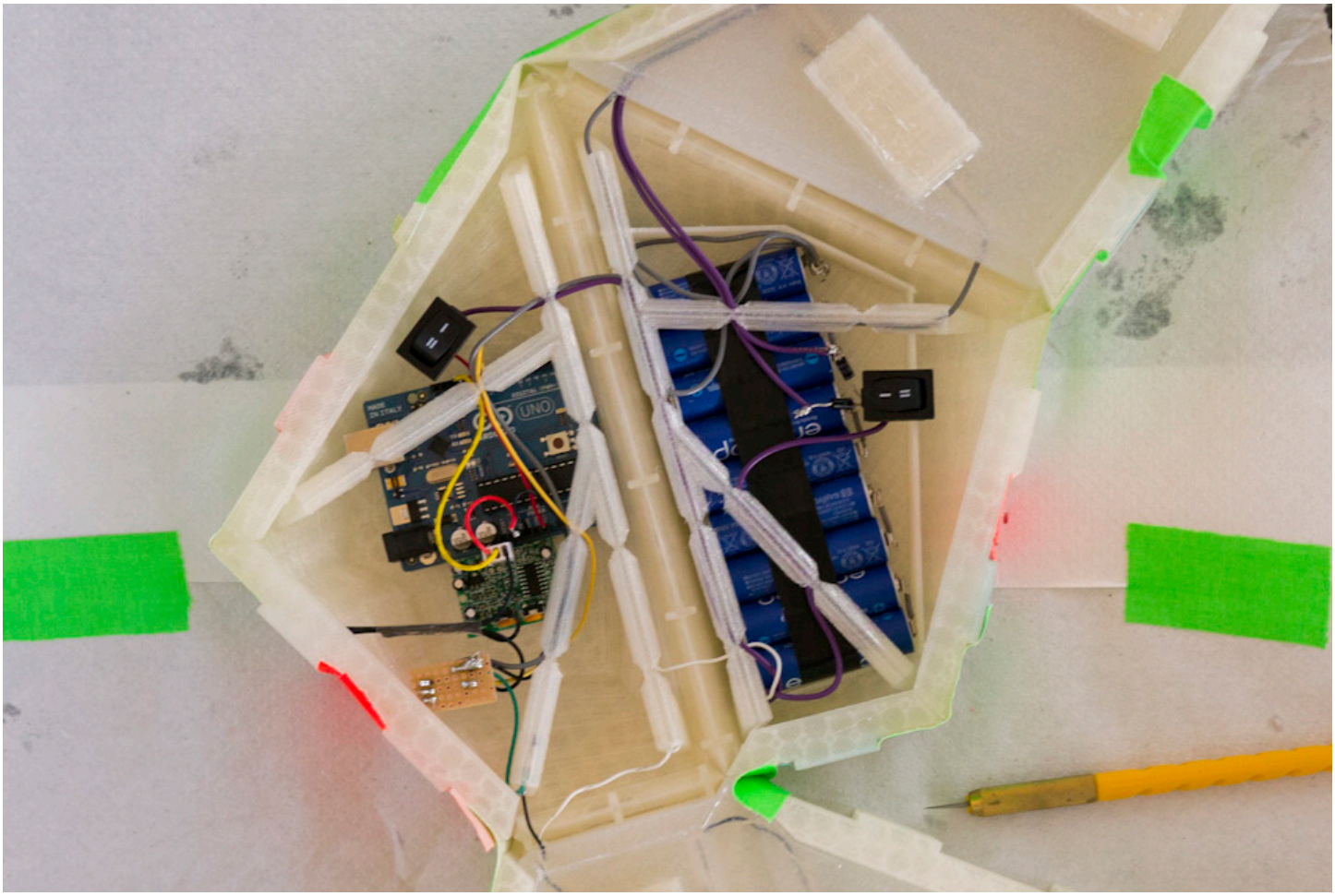
12x LED strips

4x LED carrier

4x LED mount

24ga stranded wire

Solder



| step 06 | control unit + batteries

Wire and connect control unit - Arduino microcontroller, PIR sensor, and transistor. Ensure that transistor is properly oriented, and that all parts (microcontroller, LEDs, photovoltaics, PIR, batteries) share a common ground.

Wire and connect battery pack. Be careful - battery pack may easily short circuit and catch fire if handled improperly. Install switches.

****Note: All connections and polarities must be correct, or unit may be damaged or catch fire****

****Note: Wire lengths should be calculated before beginning, to ensure correct assembly.****

| materials required |

1x Arduino

1x PIR Sensor

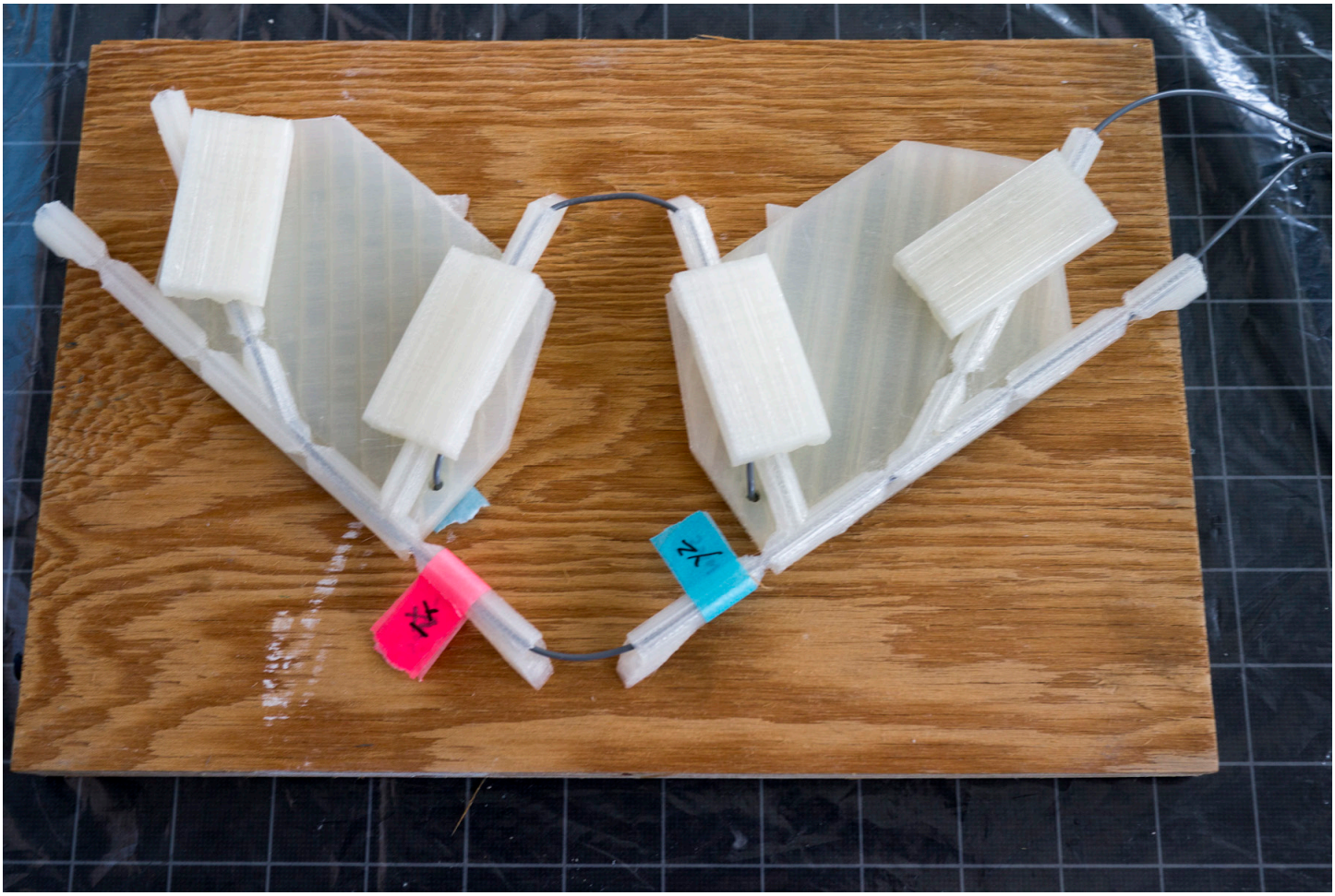
1x Transistor

Prototyping board

2x SPST rocker switch

1x Battery pack

2x 14v Zener diode



| step 07 | add feet + connect

Turn units face-down and attach mounting feet using silicone adhesive as shown in photo. A small piece of wood or similar material may be placed on top of the feet while the adhesive dries, to ensure co-planarity.

Determine casting order and connect the wiring for parts that will be cast simultaneousy.

****Note: Mounting feet are oriented differently on “A” and “B” units.****

****Note: Wire lengths should be calculated before beginning, to ensure correct assembly.****

| materials required |

Solder

Silicone adhesive

28x mounting feet

| 03_casting |

| step 08 | cast modules

Attach mold connectors to mold; arrange molds according to layout diagram or to suit.

Insert PLA carrier, ensuring good fit between carrier legs and mold.

Secure mold walls to molds. Pass wires through mold walls as necessary. Use gaffer's tape or similar on exterior to seal seam between mold and mold wall.

Mix and pour Smooth-On Dragon Skin 20 or similar. Final level of rubber should cover aproximately 1/2 - 3/4 of the depth of the mounting feet.

| materials required |

PLA molds

Mold walls

Mold connectors

Silicone rubber

3x Mixing buckets

Silicone adhesive

28x mounting feet

| step 09 | de-mold and trim

Use a small blade to break the surface joint of the mold walls and cast pieces. Remove mold walls from mold by applying steady, even pressure to the wall.

Trim any material that seeped into the joint between the mold and the mold wall - this will assist in de-molding.

De-mold the cast pieces. Work around the piece steadily, rather than lifting from one end.

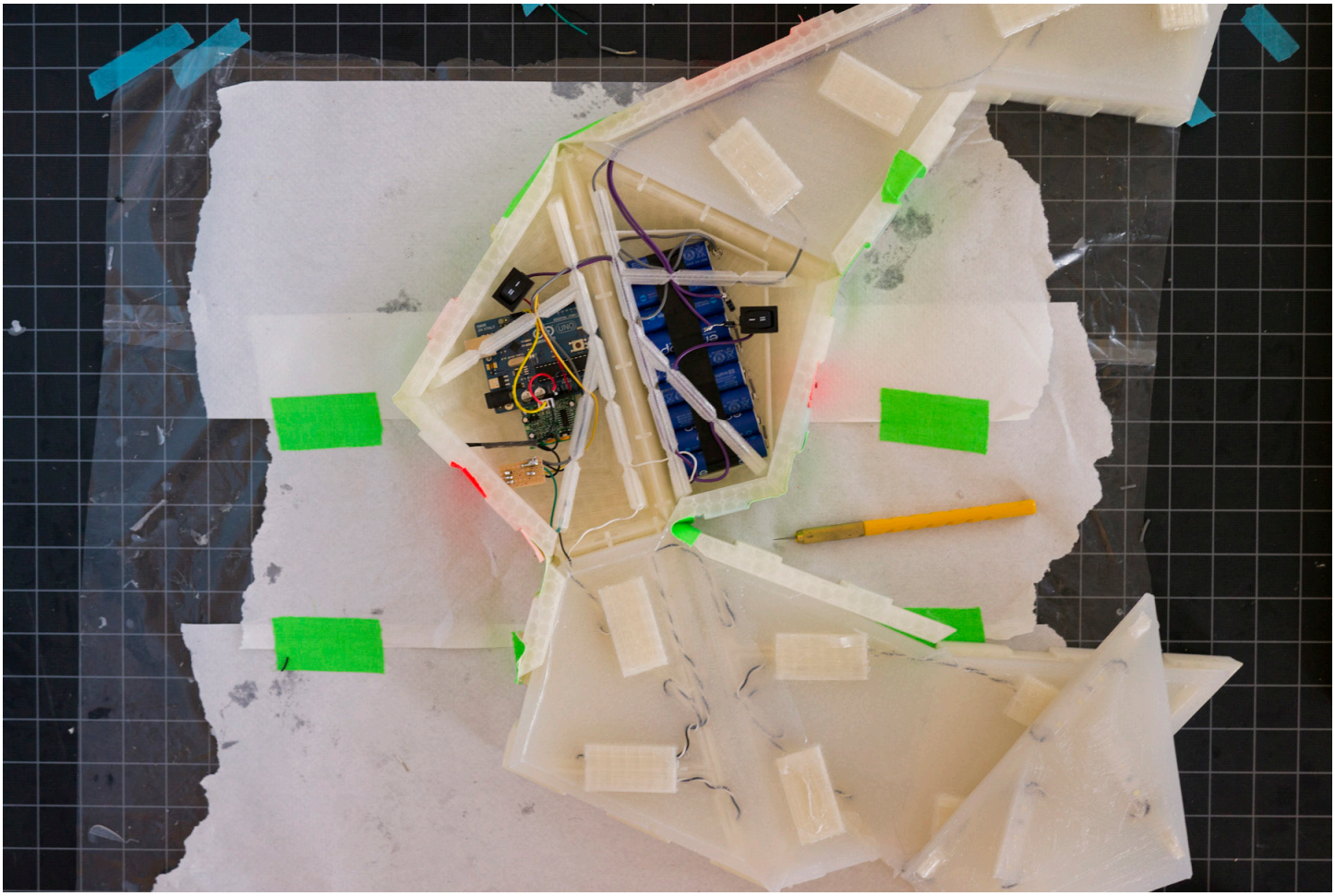
Trim excess material from cast pieces to suit.

****Note: Take care when removing interior mold rails, as they can be broken if torqued.****

| materials required |

Cast silicone pieces

Small Olfa blade



| step 10 | aggregate modules

Assemble molds, and connect to previously cast pieces as shown, to allow for aggregation. This step may be avoided if a sufficient number of molds are 3d printed to allow for a single pour.

Ensure a tight fit, when possible, between the previously cast piece and the un-cast mold. Gaps will result in silicone adhering to the face of the previously cast pieces.

****Note: Look for gaps in the mold and block them with gaffer's tape or similar, to avoid leaks.****

| materials required |

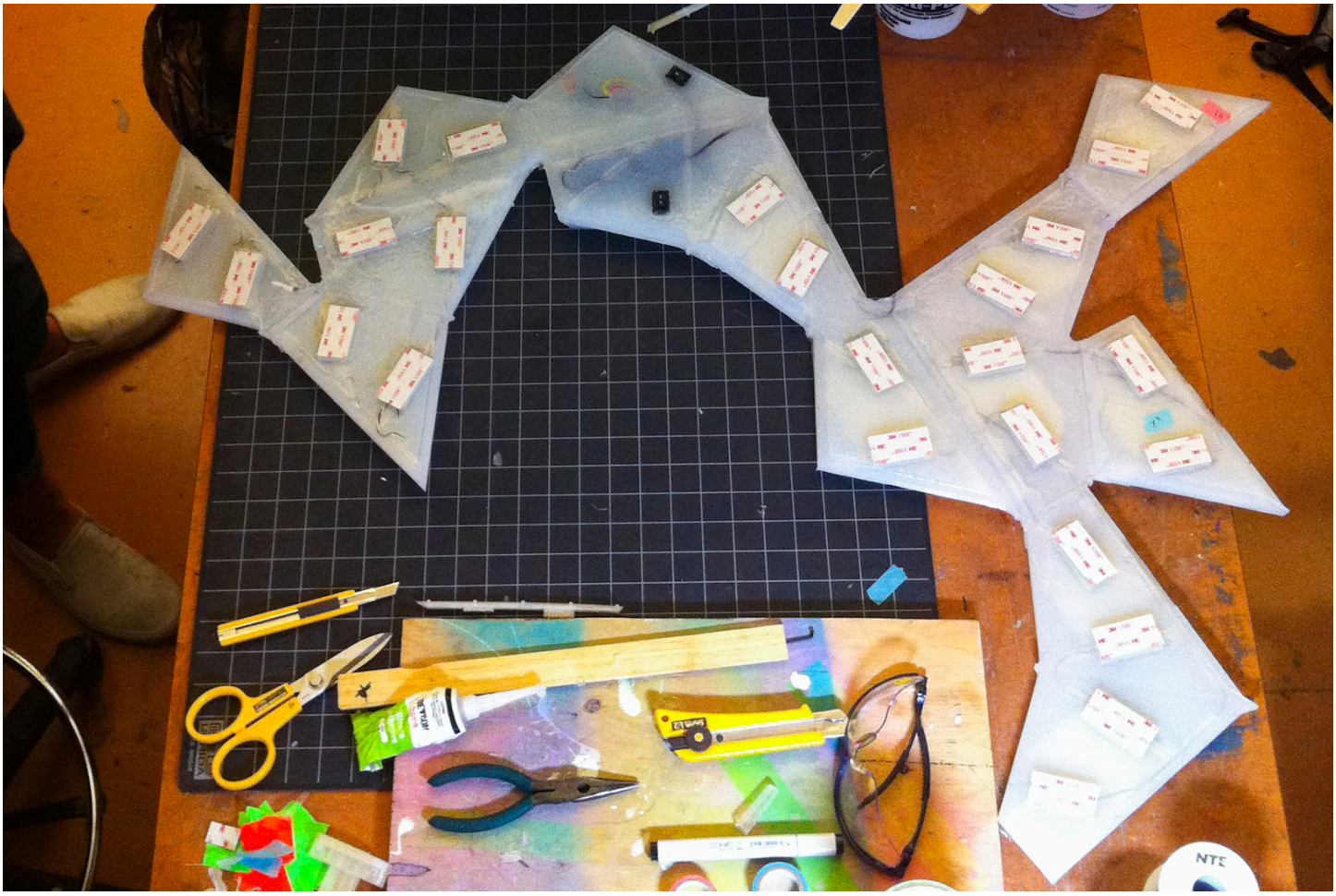
Cast silicone pieces

PLA molds

Mold walls

Mold connectors

| 04_installation prep |



| step 11 | attach adhesive

Once piece is fully cast, turn face-down on work surface and attach tin strips to PLA mounting feet using 5min epoxy or similar.

Apply VHB mounting tape or similar to tin-covered mounting feet.

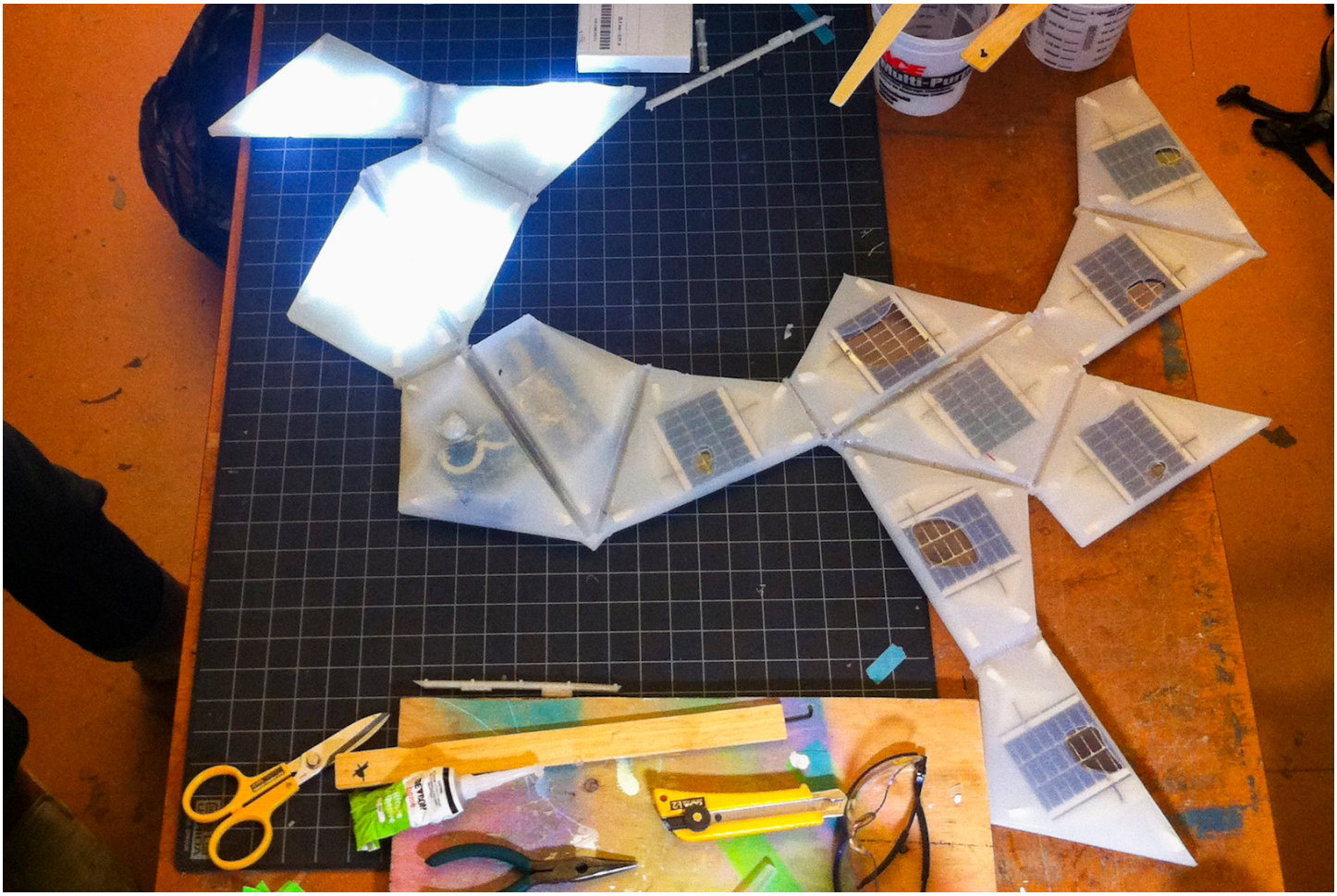
| materials required |

paralite unit

1/32” tin sheet

5min epoxy

VHB mounting tape



| step 11 | install

Install wisely.

| materials required |

paralite unit

| 05_appendix |

---------- 01_code ----------

code available for download at:
files.spacehacking.net/paralite_code

---------- 01_models ----------

model for 3d printing available at:
files.spacehacking.net/paralite_parts