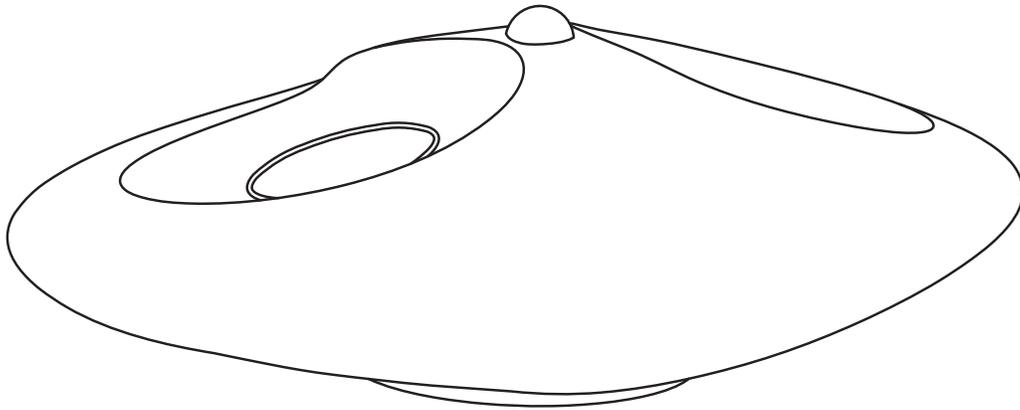


rockspeak_v1.0
assembly instructions



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| parts and materials |

----- o1_mold -----

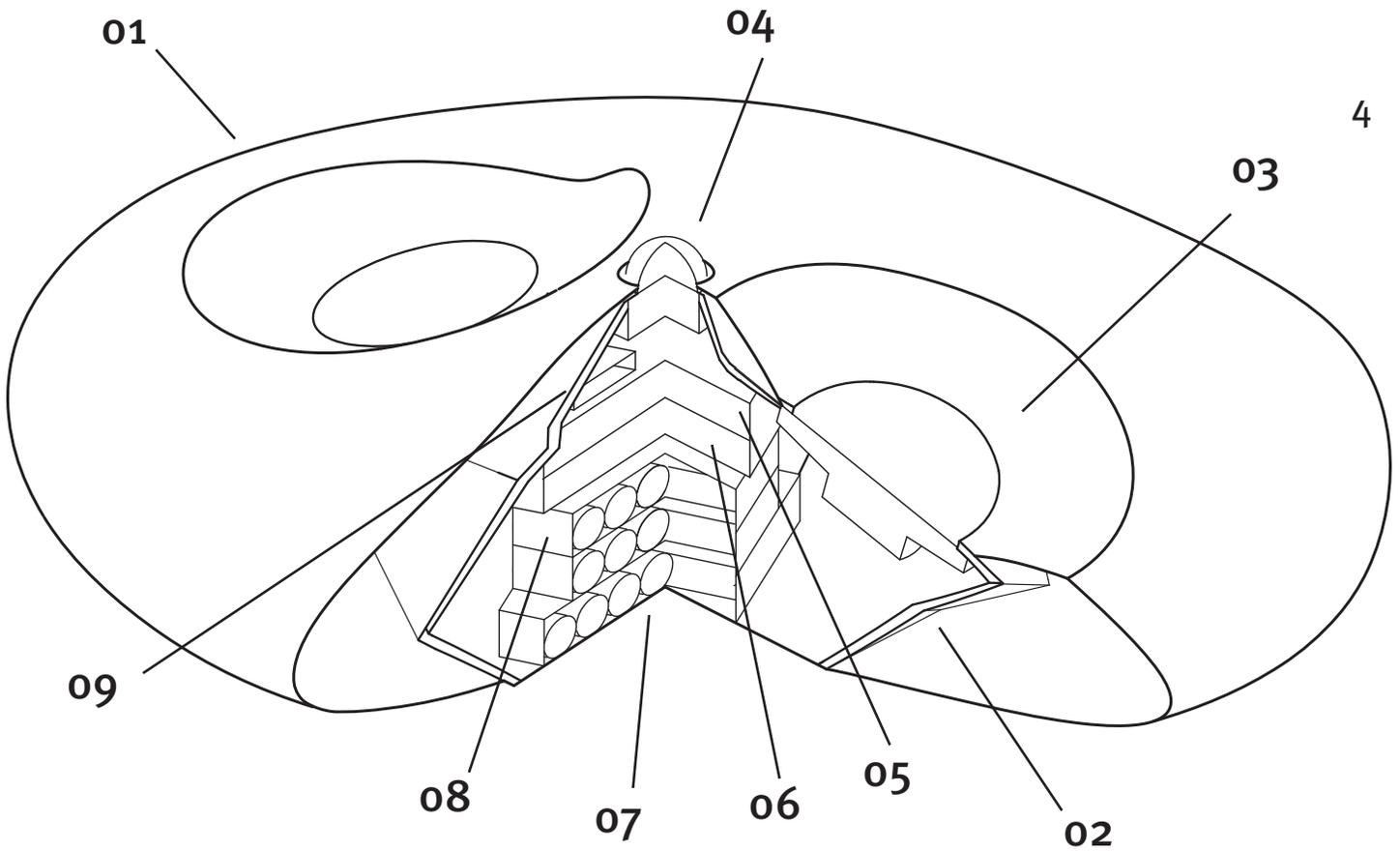
24" x 36"	EPS Foam board - dense
50lb	Ultra-cal
.5yd	Burlap cloth
2ga	Smooth-On EZ-Bag Silicone

----- o2_shell -----

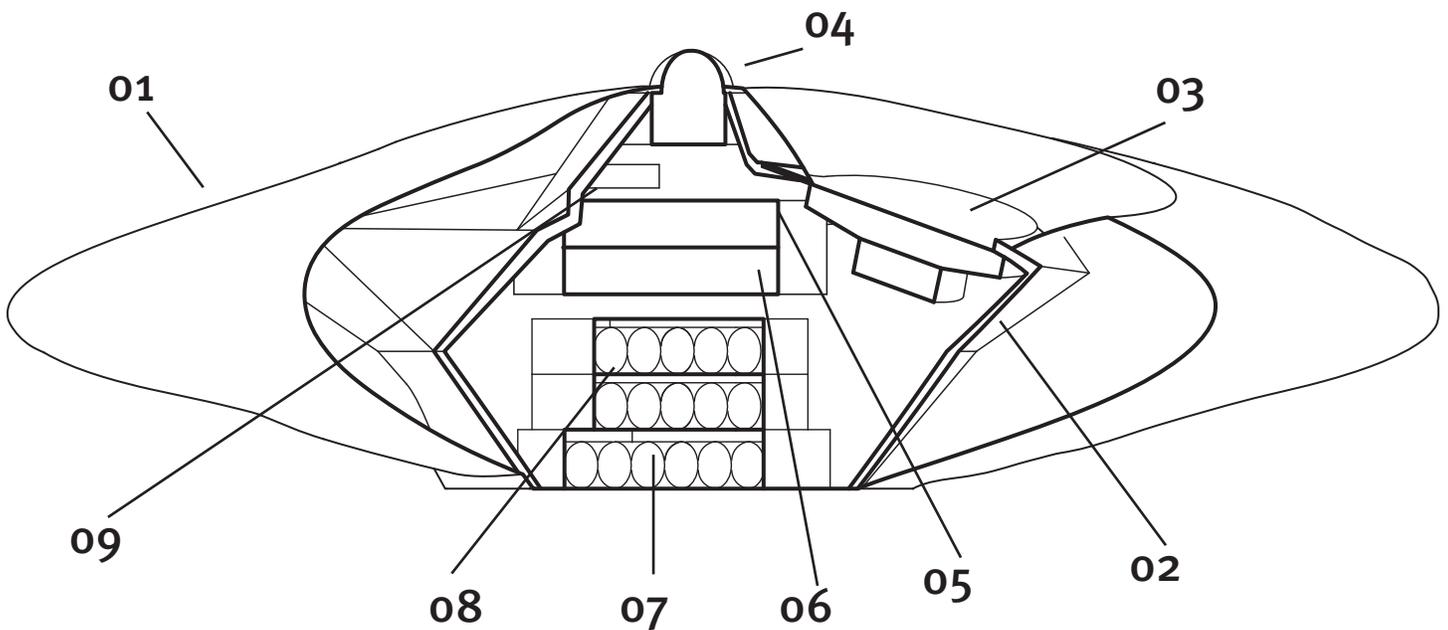
1x	PLA Plastic vessel
4x	6ft mold straps
25lb	Rockite expansion cement
1x	5ga bucket
1x	Funnel
6oz	Concrete fill + patch
.5yd	Burlap cloth
2ga	Smooth-On EZ-Bag Silicone

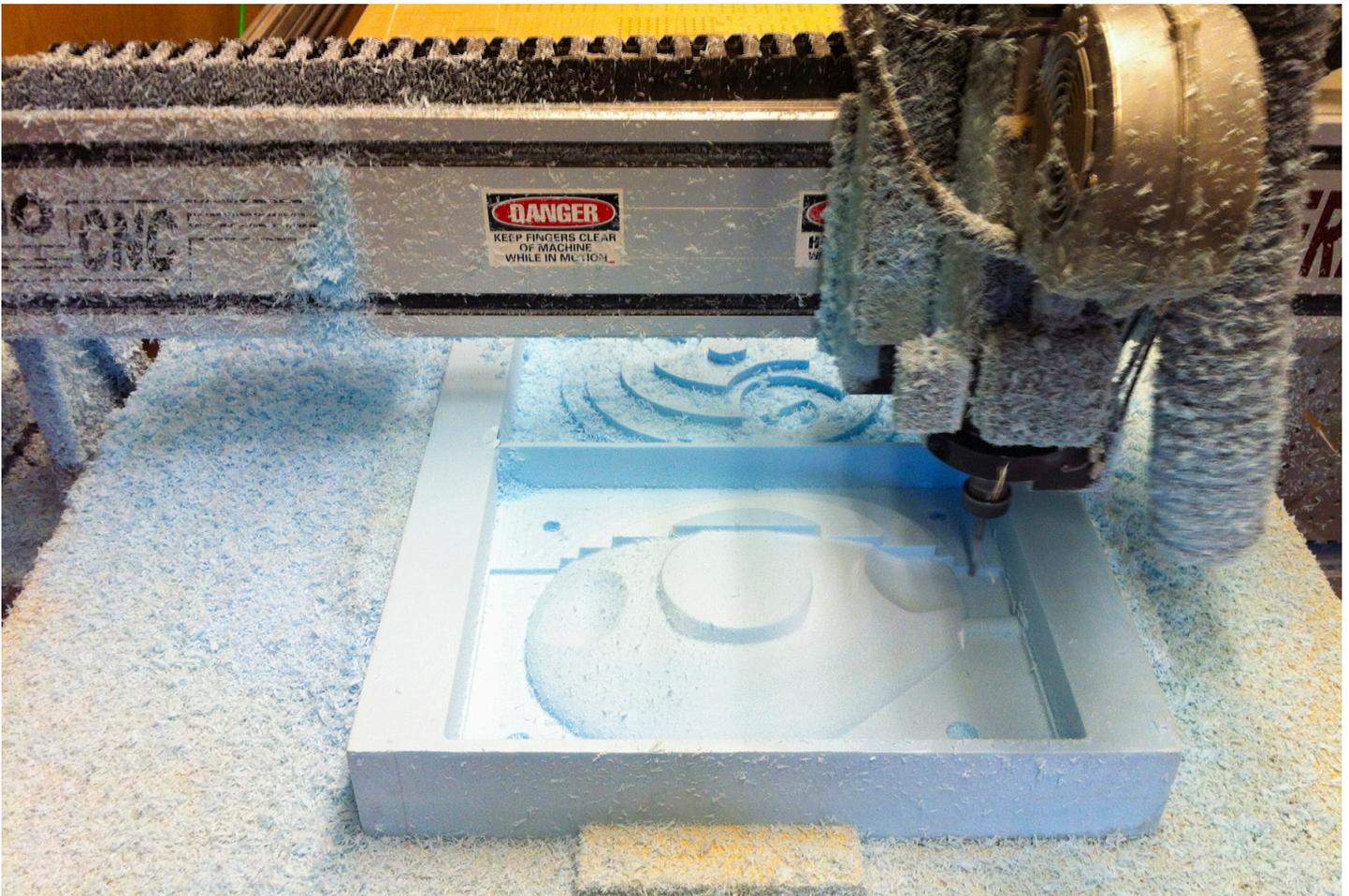
----- o3_internals -----

1x	Arduino Uno
1x	Adafruit Wave Shield
1x	Class D Amplifier
2x	4Ω 3W Speaker
1x	PIR Sensor
1x	Digital Multi-meter
2x	Battery Pack - 4AA
1x	Battery Pack - 6AA
6x	Alkaline Battery - AA
8x	NiMH Battery - AA



- | | | | |
|-----------|------------------------|-----------|--------------------------|
| 01 | cast rockite envelope | 06 | arduino uno |
| 02 | PLA plastic vessel | 07 | 9v ~2500mAh battery pack |
| 03 | 4Ω 3W speaker | 08 | 5v 4000mAh battery pack |
| 04 | PIR sensor | 09 | class d amplifier |
| 05 | wave shield for arduin | | |





| step 01 | cnc milling

| materials required |

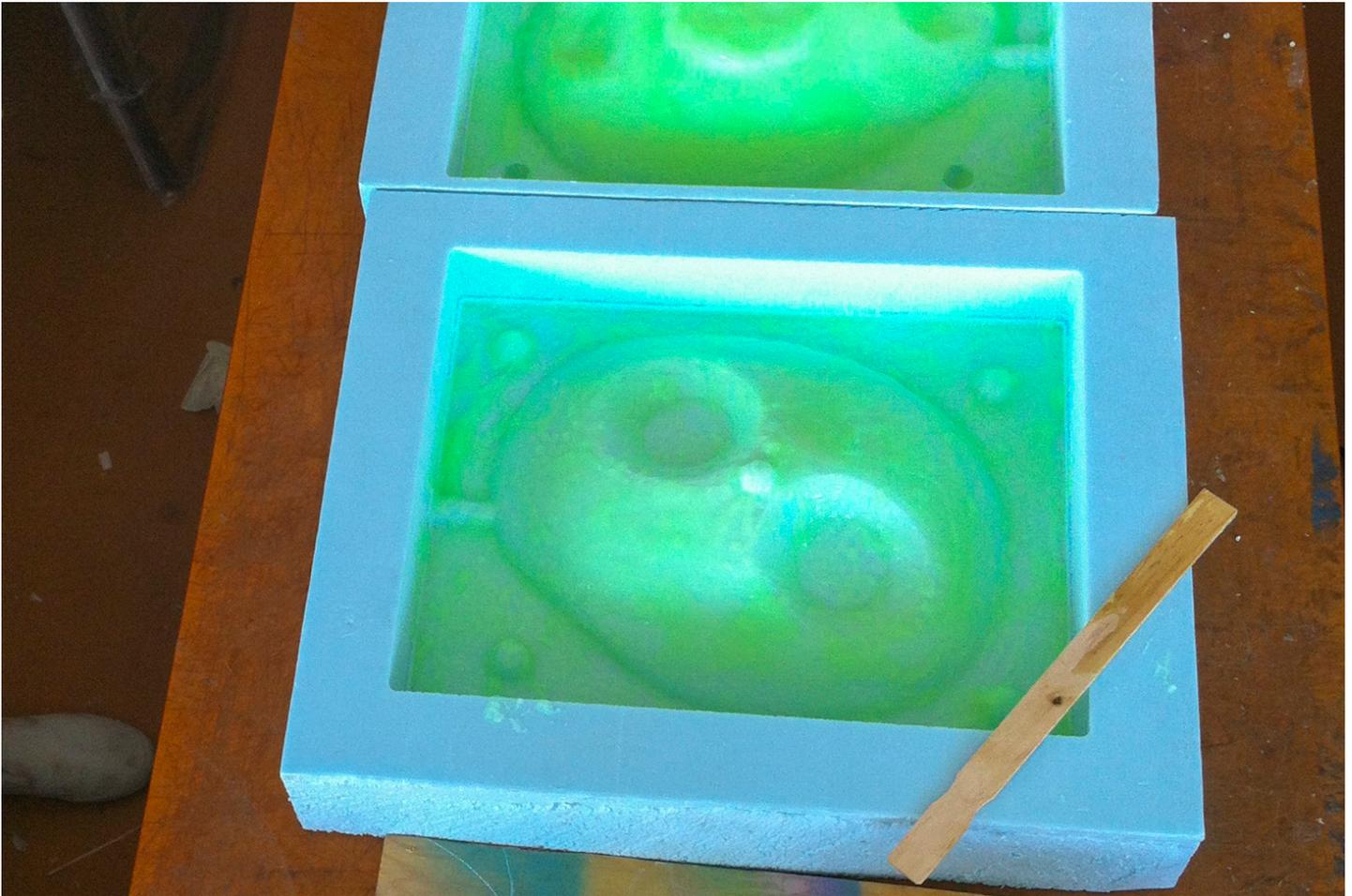
Foam should be closed cell, and as dense as possible. Press it with your finger - if it deforms noticeably, it will likely fail to hold sufficient detail.

24" x 36" EPS foam

High quality EPS insulation panels can be used though lower-quality EPS and foil-backed foams should be avoided. Urethane foam may also be suitable.

Secure foam to CNC bed and follow standard safety and operating precautions.

****Always wear a respirator while milling foam****



| step 02 | silicone application

Rub mold vigorously with hands to pill and loosen excess material, then spray with compressed air to remove. This step may be repeated several times.

Ensure that mold is clean of debris. Follow manufacturer instructions in application of silicone.

Trim brush to approx. 1/2 manufactured length.

First “print” layer of silicone should be applied with care, and be quite thin. Material may be stippled into small details and recess in the model.

Subsequent layers of silicone may be up to 1/4” - 3/8” thick. Final thickness should be approx. 1/2”.

| materials required |

2ga EZ Brush Vac Bag

4” bristle brush

Mixing Cups

Stir sticks



| step 03 | mold reinforcement

| materials required |

Slake and mix Ultra-cal according to manufacturer instructions. Apply a thin layer to surface of cured silicone.

50lb Ultra-Cal

Cut burlap into small sections, dip in Ultra-cal, and layer on top of first Ultra-cal layer while both are still wet.

.5yd Burlap cloth

Allow this to dry (~1hr) and then apply another layer of burlap and Ultra-cal.

Final thickness should be 1/2" - 3/4"



| step 04 | mold preparation

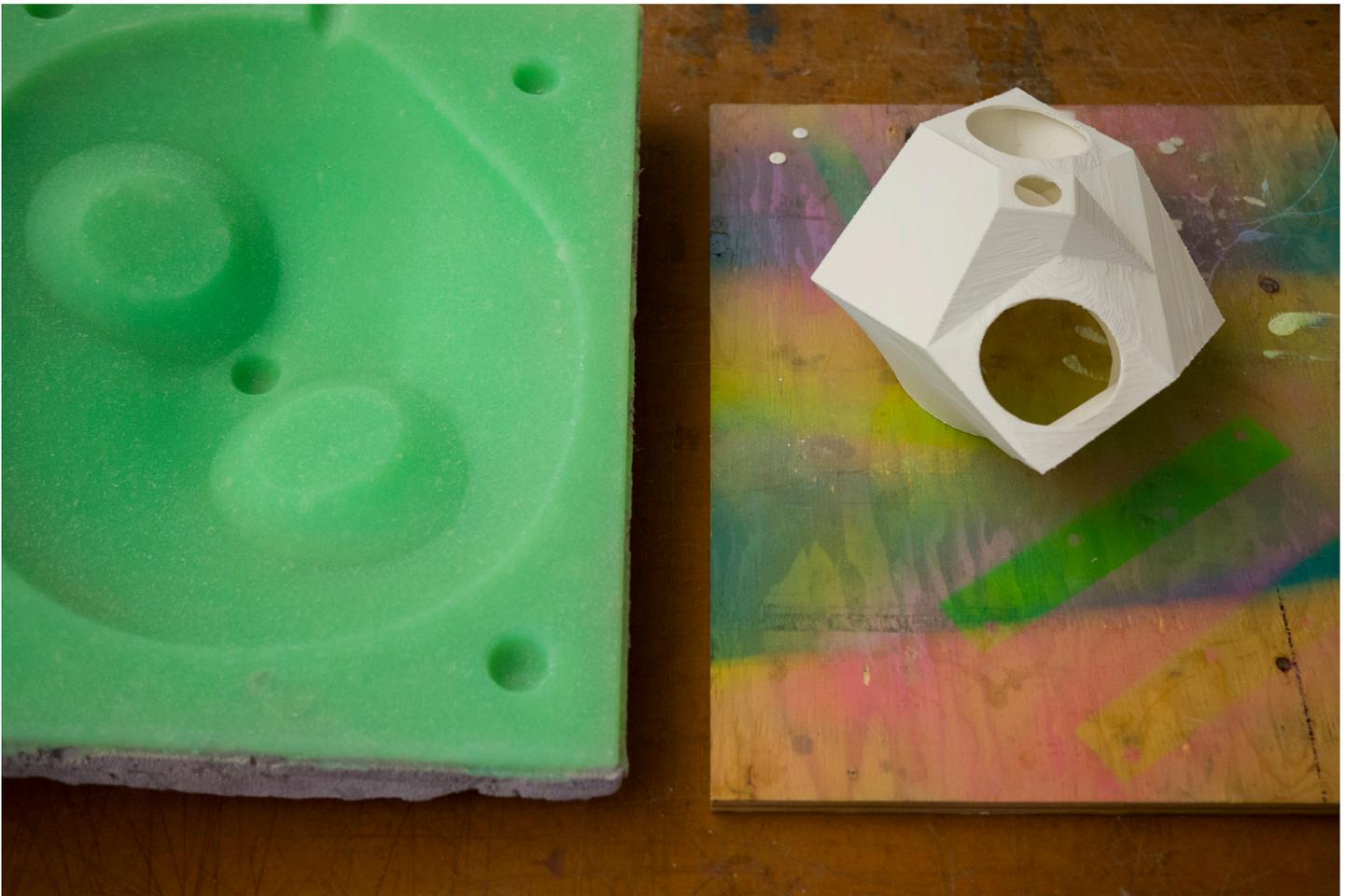
Ensure that silicone mold is clean and clear of debris.

Mark orientation of silicone mold and matching reinforcement.

| materials required |

Silicone mold

Mold reinforcement



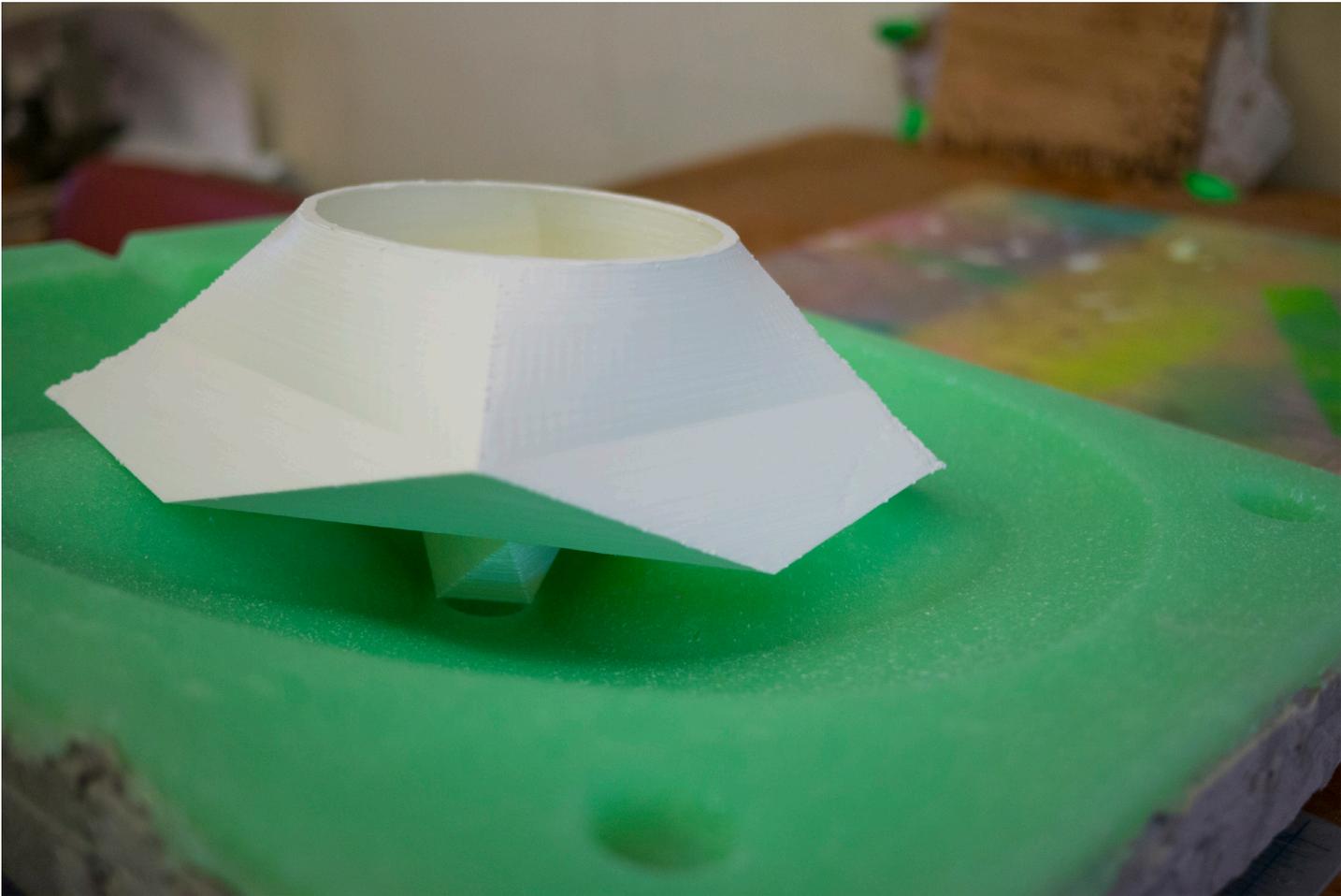
| step 05 | vessel preparation

Roughen surface of PLA vessel to improve adhesion with Rockite in subsequent step.

Trim any errors in the PLA print, paying special attention to the four circular openings and interior corners where the speakers will be attached.

| materials required |

PLA vessel



| step 06 | vessel alignment

Position the PLA print top-down in the silicone mold. Sighting through the three circular openings, ensure that it is properly aligned with the silicone mold.

Mark silicone mold with correct location of PLA openings.

| materials required |

Silicone mold

PLA vessel



| step 07 | assemble mold

Ensure that PLA vessel is correctly positioned top down against the silicone mold.

Carefully lower the bottom half of the silicone mold onto the PLA vessel, ensuring the the circular opening in the vessel seats against the matching imprint in the silicone mold.

Place mold reinforcement and strap tightly.

| materials required |

Silicone mold

Mold reinforcements

PLA vessel

Mold straps



| step 08 | pour cement

Place mold upright in appropriate location.

****Be aware that the mold may leak if not properly secured.****

Mix Rockite according to manufacturer specifications.

Fill mold.

| materials required |

Mold

Mold straps

Funnel

5ga. bucket

~22lbs. Rockite



| step 09 | de-mold shell

Remove cast part from shell after Rockite has set but before it has fully cured (~45min).

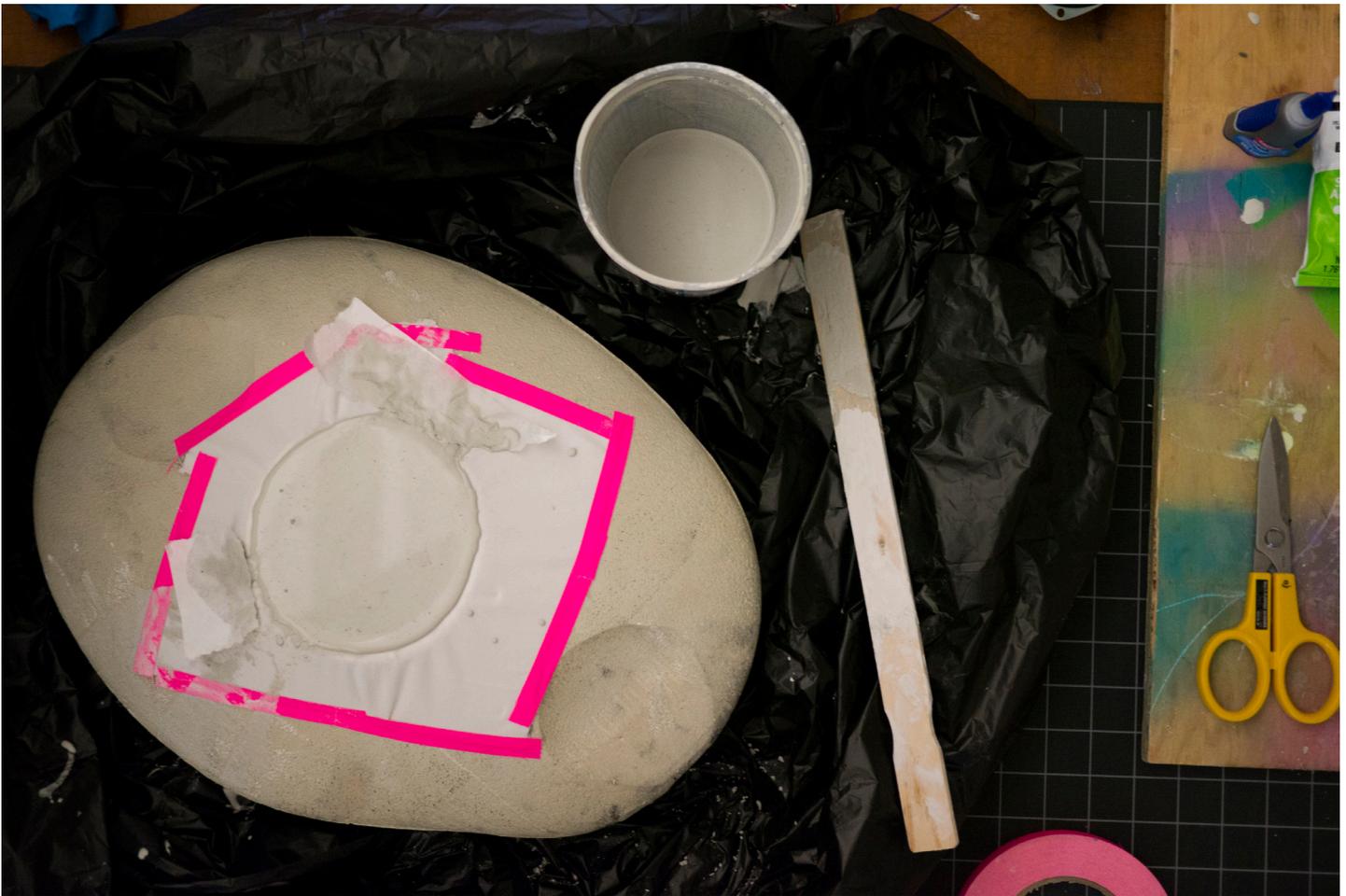
Break off pour spout, and trim to suit.

Using a heavy blade, remove the registration of the mold seam.

| materials required |

Shell

Knives



| step 10 | pour bottom-cap

Tape fabric across bottom opening, leaving some slack.

Pour Rockite into fabric.

| materials required |

Shell

Stretch fabric

Tape

~8oz Rockite

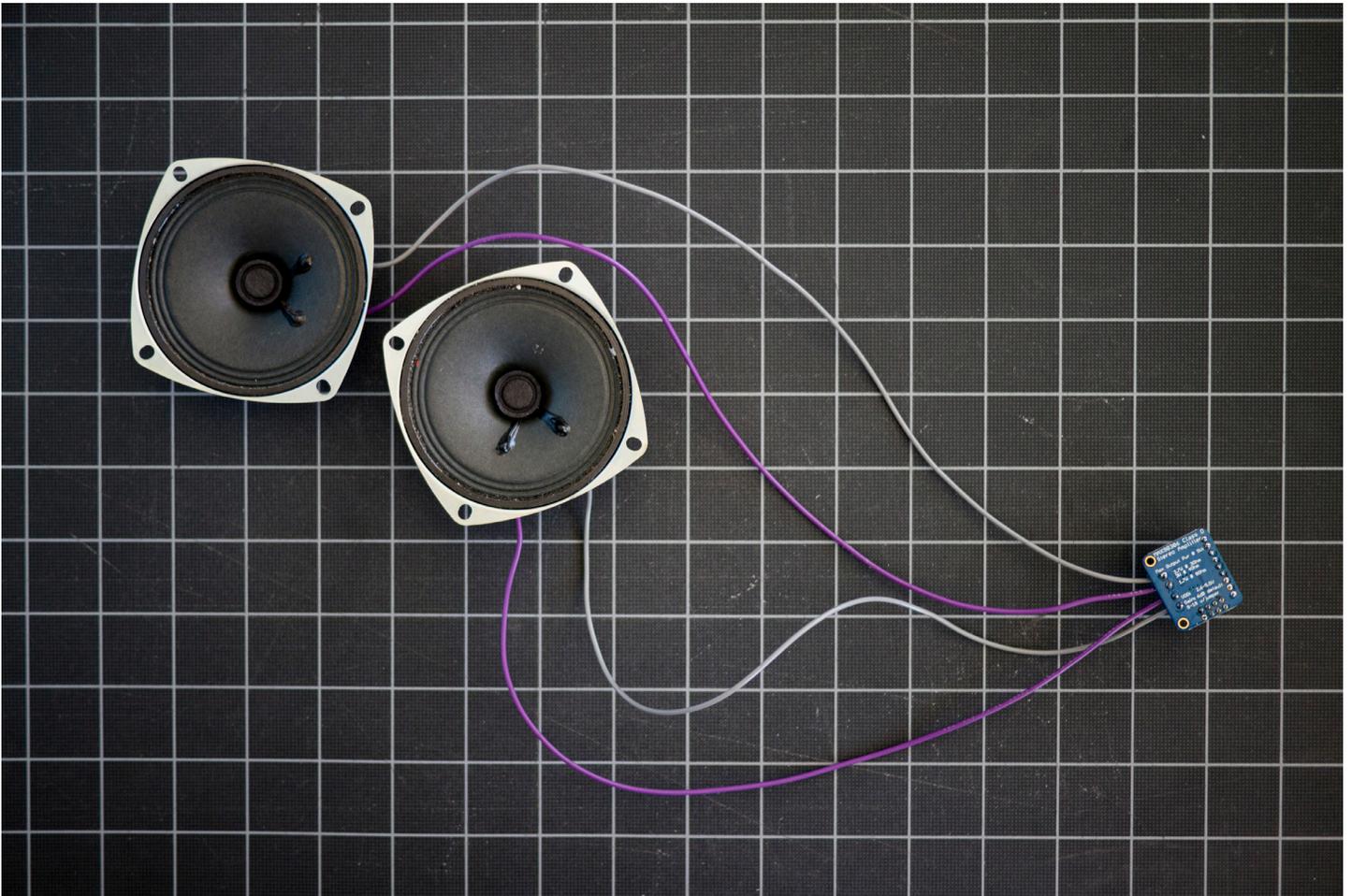


| step 11 | gather supplies

Ensure that all supplies listed in Parts and Materials section have been obtained.

| materials required |

Various



| step 12 | connect speakers + amplifier

Connect speakers to amplifier unit, following manufacturer instructions.

Walkthrough available at:

<http://learn.adafruit.com/stereo-3-7w-class-d-audio-amplifier/assembly>

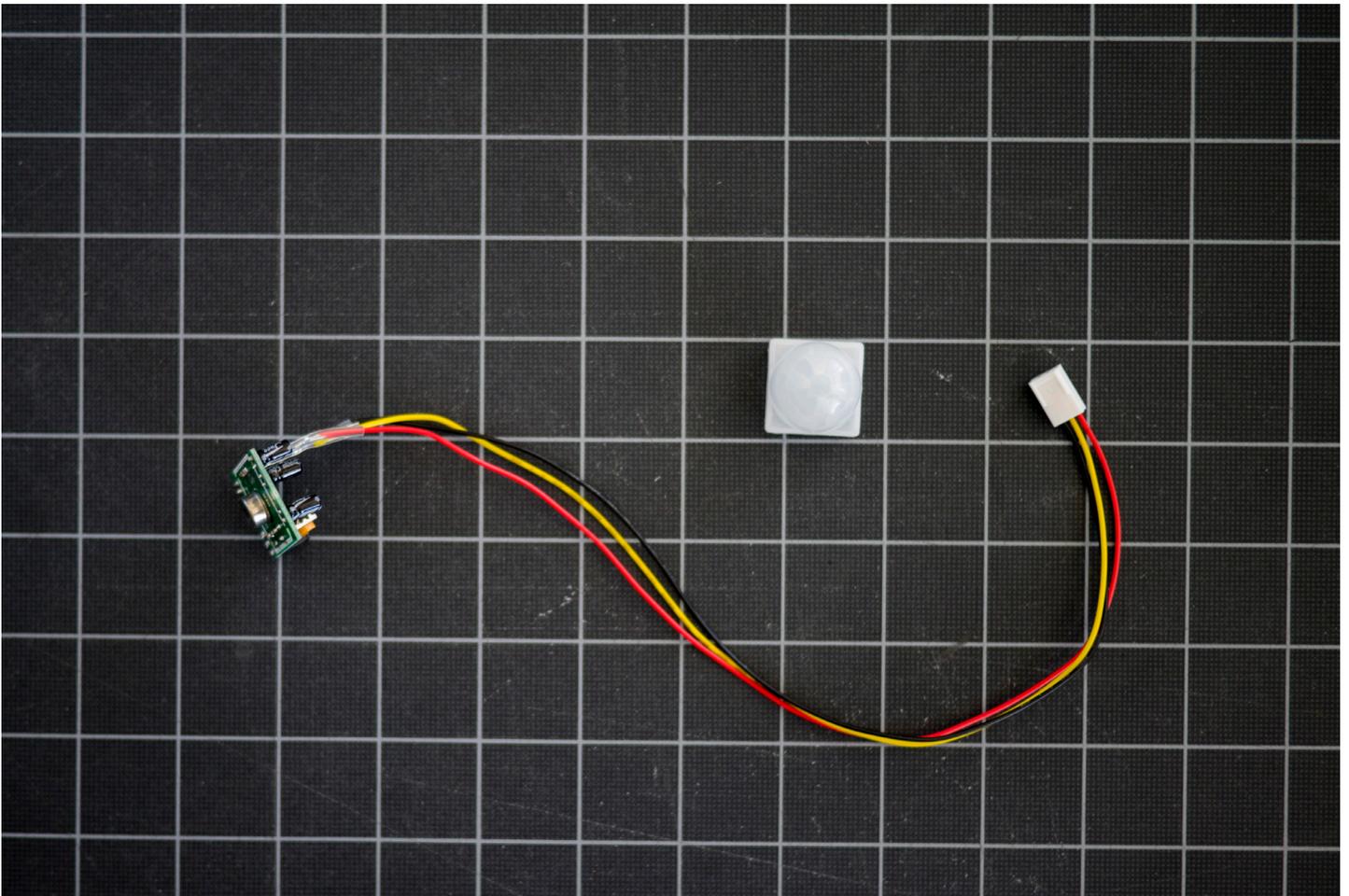
| materials required |

4Ω 3W speakers

Class D amplifier

20ga Stranded wire

Solder



| step 13 | wire pir sensor

| materials required |

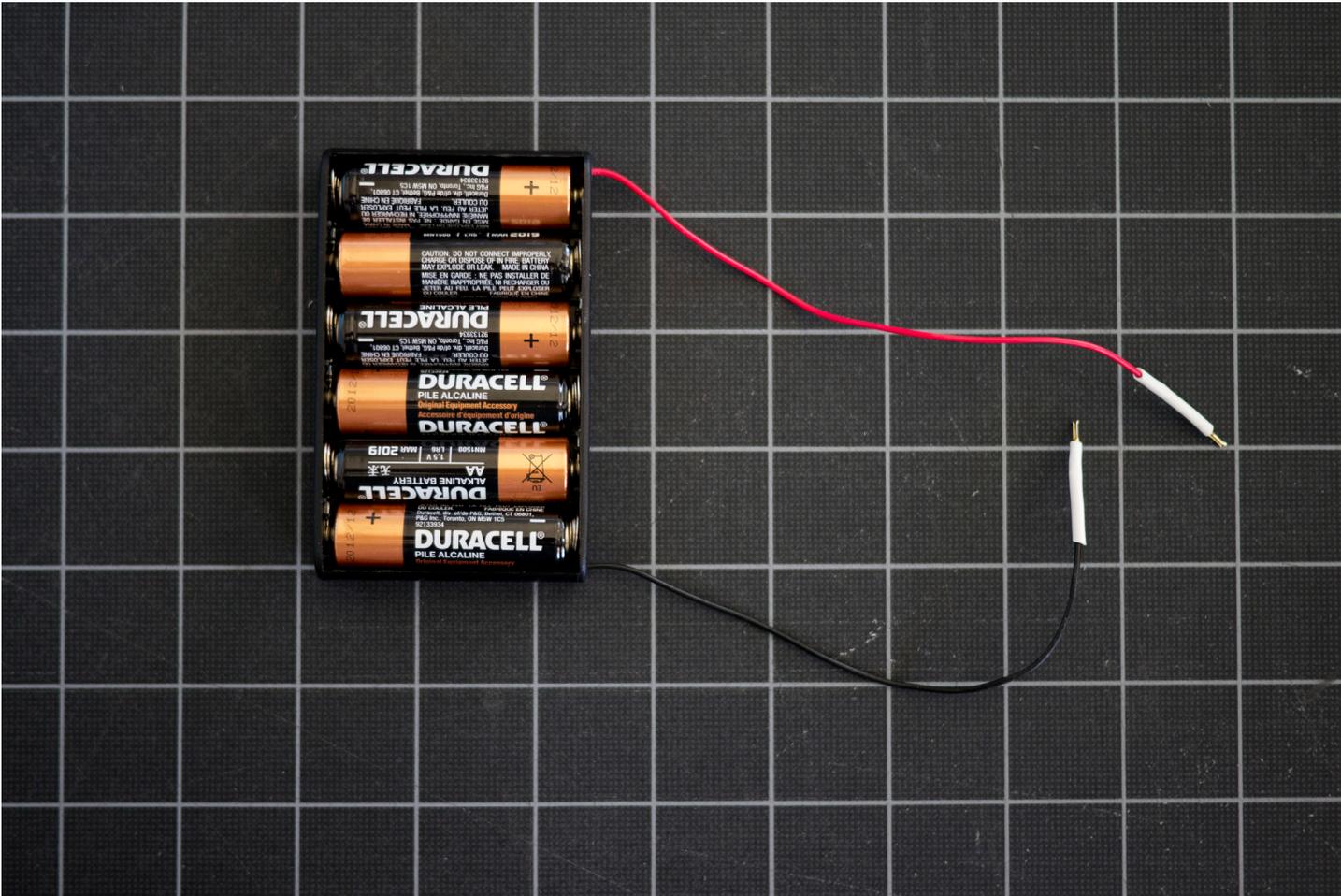
Solder three pin female header to three wires.

PIR sensor

Solder wire ends to PIR sensor.

Sensor specifications can be found at:

<http://www.ladyada.net/learn/sensors/pir.html>



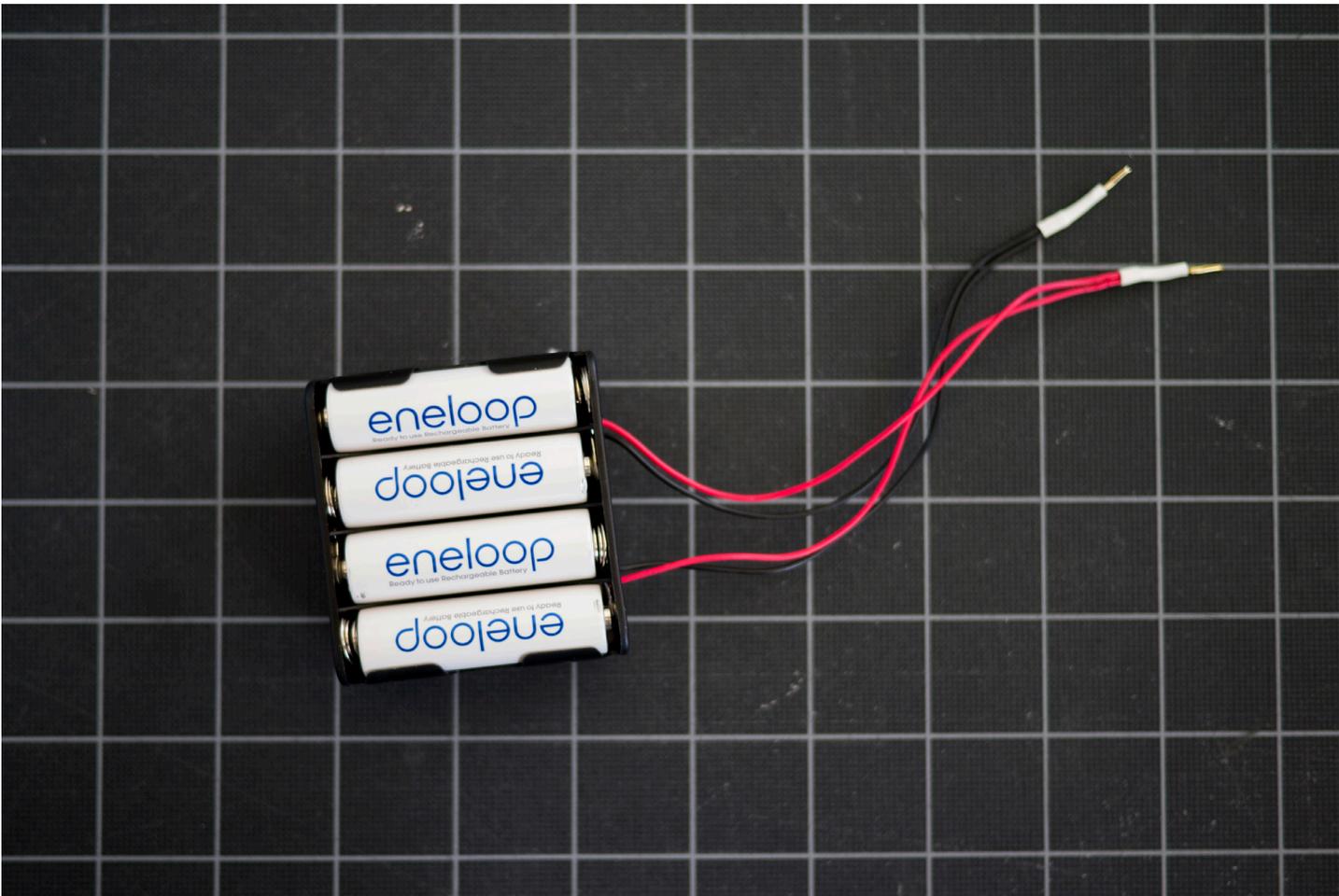
| step 14 | wire 6x aa battery pack

Solder crimp-on header receivers to battery pack wire ends.

| materials required |

6x aa batteries - alkaline

6x aa battery holder



| step 14 | wire 8x aa battery pack

Attach four-battery packs to each other using silicone adhesive.

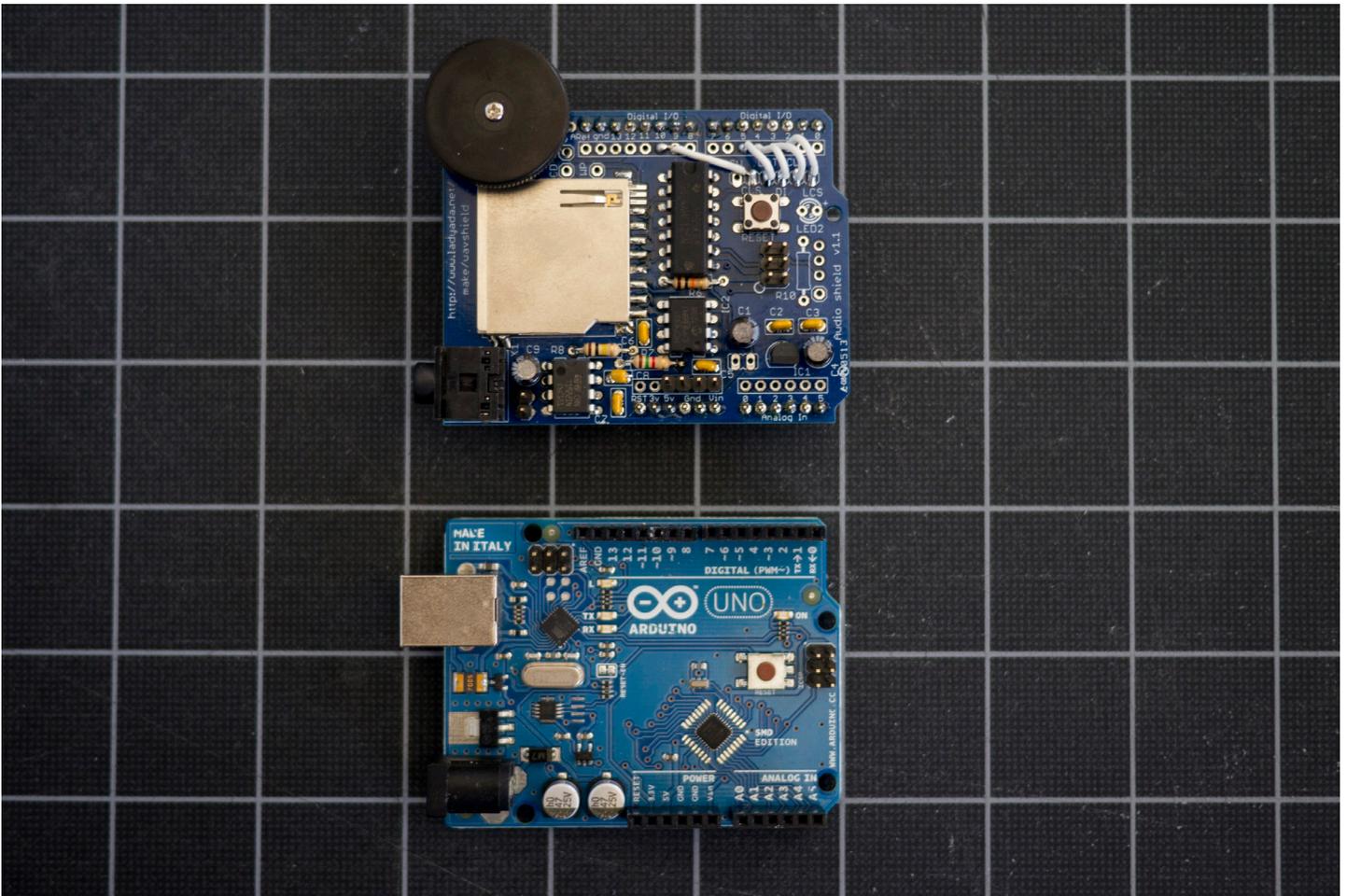
Solder crimp-on header receivers to battery pack wire ends.

| materials required |

8x aa batteries - NiMH

2x 4x aa battery holder

Silicone adhesive



| step 16 | assemble wave shield

Assemble Wave Shield for Arduino and install.

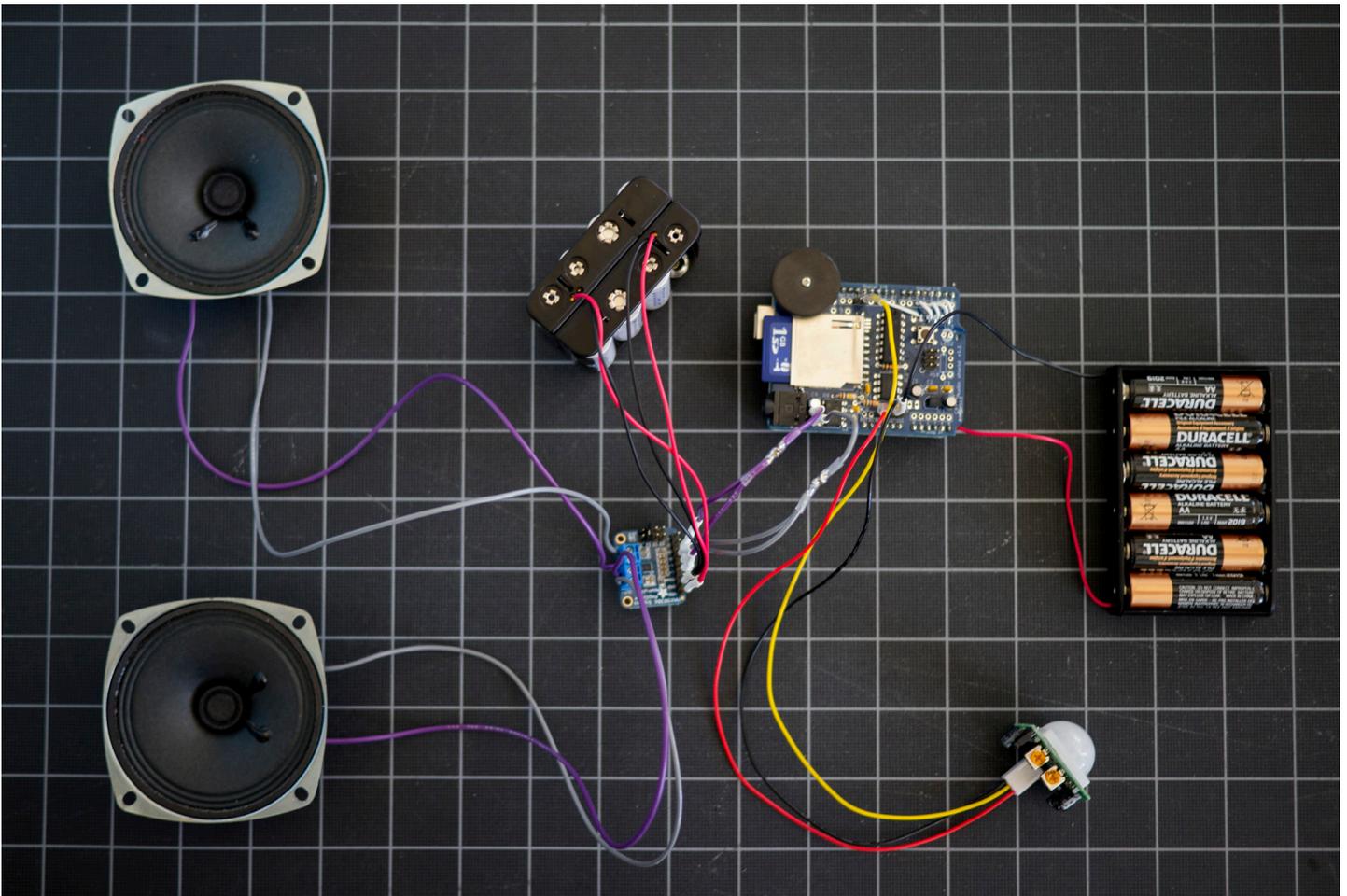
Walkthrough available at:

<http://www.ladyada.net/make/waveshield/make.html>

| materials required |

Adafruit Wave Shield

Arduino Uno



| step 17 | connect internal assemblage

Attach 8x aa NiMH battery pack to Class D amplifier.

Attach 6x aa alkaline battery pack to Arduino Uno + Wave Shield.

Attach PIR sensor to Wave Shield.

| materials required |

4Ω 3W speakers

Class D amplifier

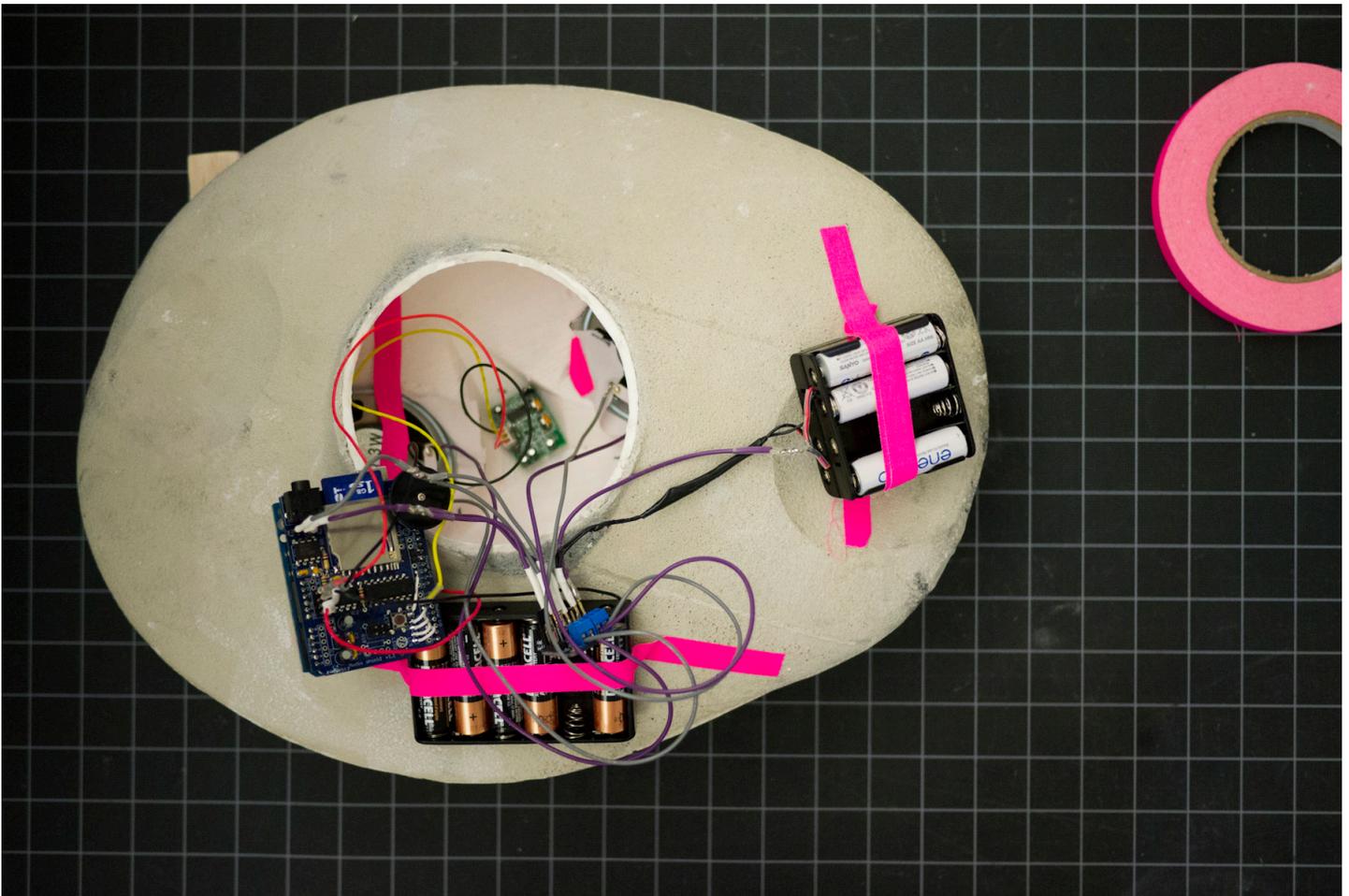
8x aa Battery pack

6x aa Battery pack

Adafruit Wave Shield

Arduino Uno

PIR sensor



| step 18 | install internals

Attach lycra cloth to speaker face by slitting cloth and stretching corner to corner.

Apply silicone adhesive to junction between PIR sensor and fresnel lens.

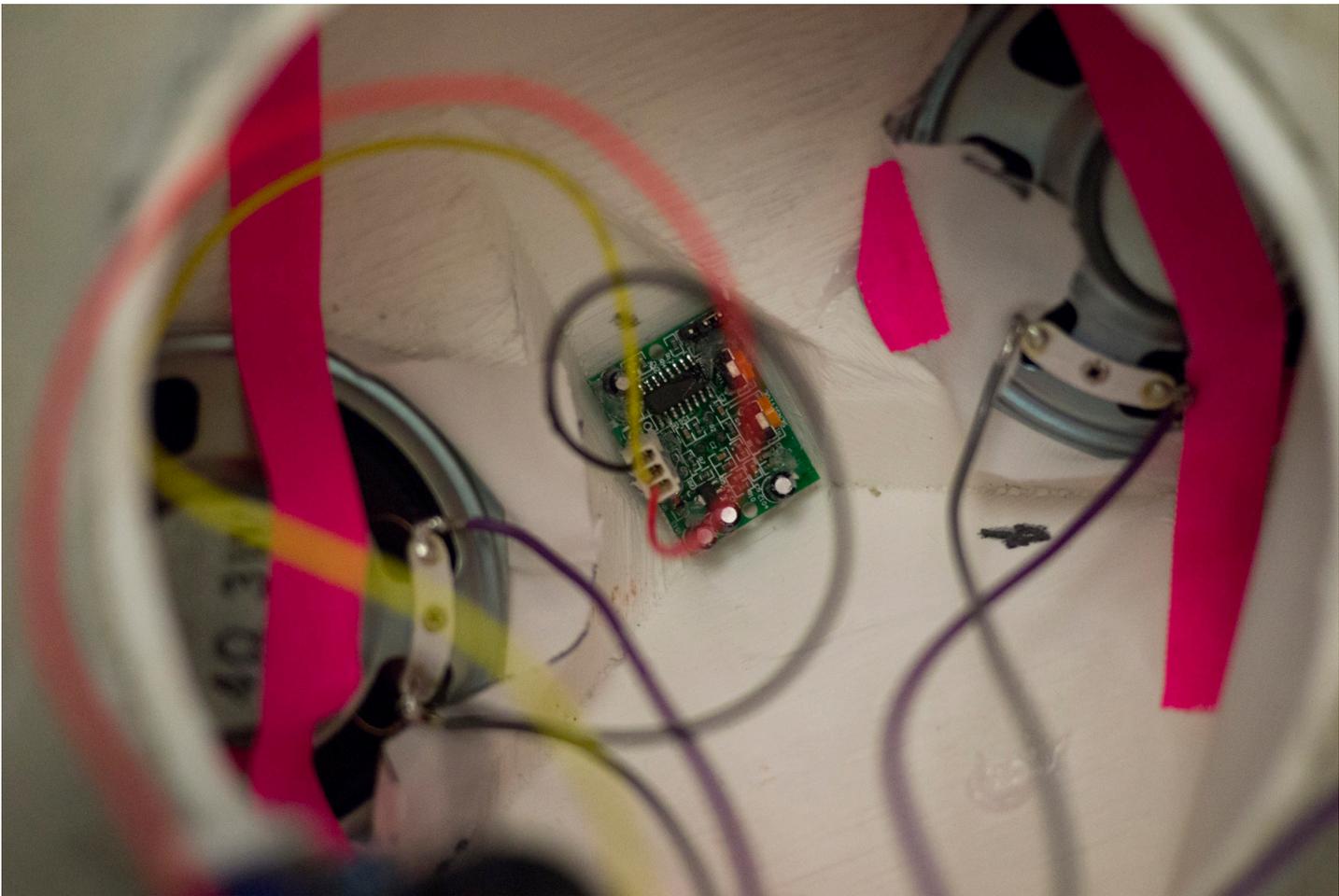
Position internals for final fastening.

| materials required |

Internal assemblage

Lycra cloth

Silicone adhesive



| step 19 | glue internals

Secure speakers and PIR sensor to PLA vessel using epoxy adhesive.

Once dry, install Arduino unit and battery packs.

| materials required |

Internal assemblage

5min epoxy



| step 20 | close and install

Once unit is fully assembled, bottom cap may be secured to Rockite shell using silicone adhesive.

Install wisely.

| materials required |

rockspeak unit

| o4_appendix |

----- o1_code -----

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

----- o1_models -----

model for cnc milling available at:
files.spacehacking.net/rockspeak_cnc

model for 3d printing PLA vessel available at:
files.spacehacking.net/rockspeak_vessel