

# Major Studio One: Seven in Seven

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How can I create situations which cause people to question whether something is natural or artificial?

Why is this uncertainty important?

*Because the definition of Nature and what is natural is changing more quickly with every passing moment.*

What can this emotion be used for?

*Uncertainty forces us to examine whether our current perception and beliefs reflect the world around us.*

What is the relationship between  
what is natural and what is or has  
been alive?

## a machine that breathes

the speed, depth, and wetness of the breathing  
varies in response to COVID-19 data

it can sound like different people and animals

it should be natural in the auditory component  
and artificial in the visual component

What questions should this work address?

**How/why/when is breath an indicator of life?**

What does breath mean if it is not an indicator of life?

How fragile is breath?

Who holds the power to influence our breath?

What emotion is conveyed in breath?

How far does breath as metaphor extend into our relationship with the natural world?

# Visual / Mechanical

**one:** How can a diaphragm be used to create air flow?

**three:** How can latex be used to emulate the body?

**four:** How can I create a mechanical trachea structure?

**five:** How can I support and activate the trachea?

**six:** How would I create a bronchial tree which could accommodate moisture?

# Auditory / Interaction

**two:** What is the effect of disembodied breath noises?

**seven:** Can the viewer impact the quality of breath?

# one: How can a diaphragm be used to create air flow?



# one: How can a diaphragm be used to create air flow?



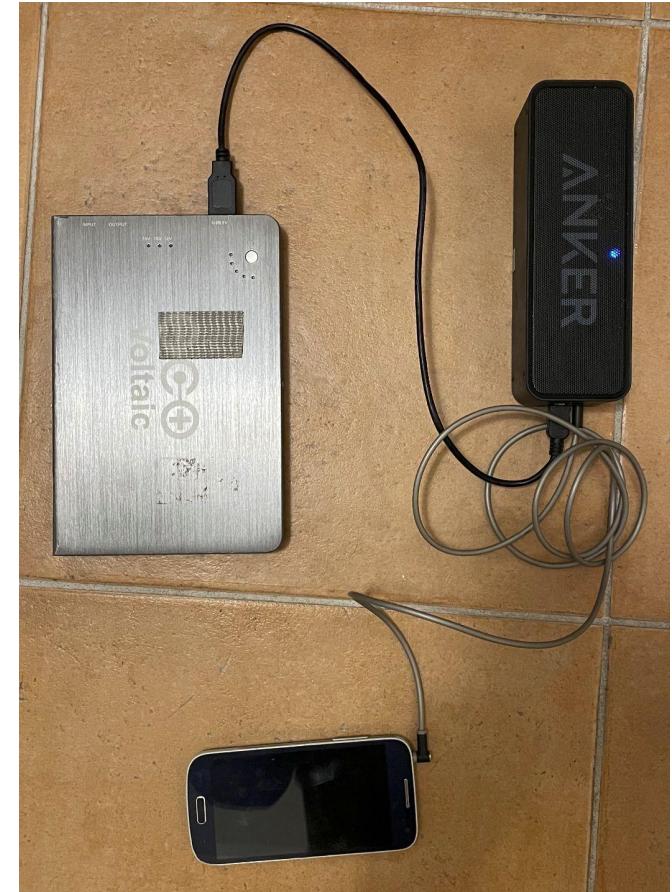
[audio](#)

How would the sound change if there was some kind of foam or cloth inside the cavity?

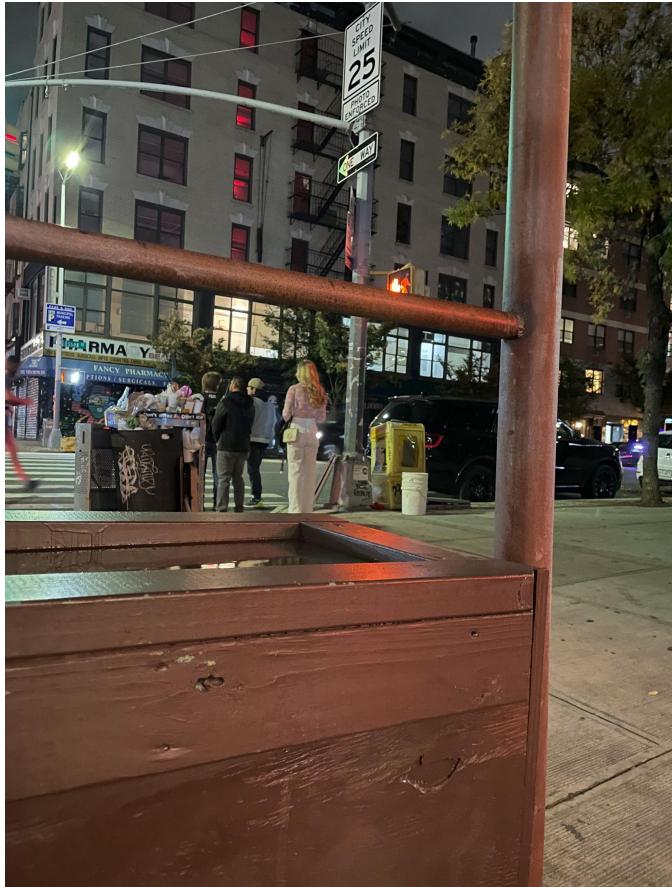
How does the length of the tube impact the sound?

How the heck am I going to automate the diaphragm?

# two: What is the effect of disembodied breath noises?



# two: What is the effect of disembodied breath noises?



Needs a quieter location.

Need a better way to control which breath sounds are playing.

What happens when the sounds change as someone approaches?

# three: How can latex be used to emulate the body?



# three: How can latex be used to emulate body parts?

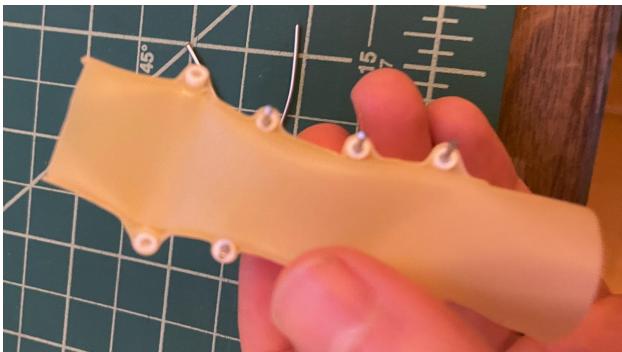
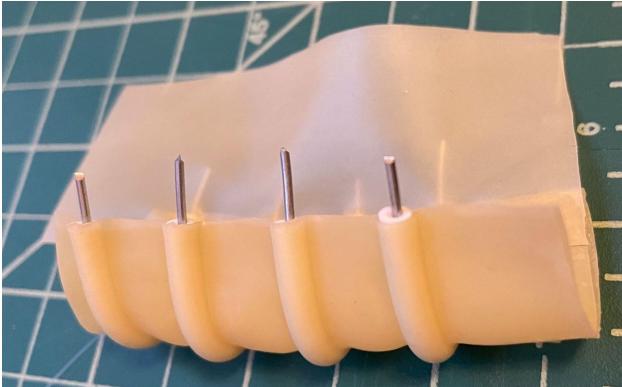


Latex was daunting at first, but a little practice went a long way.

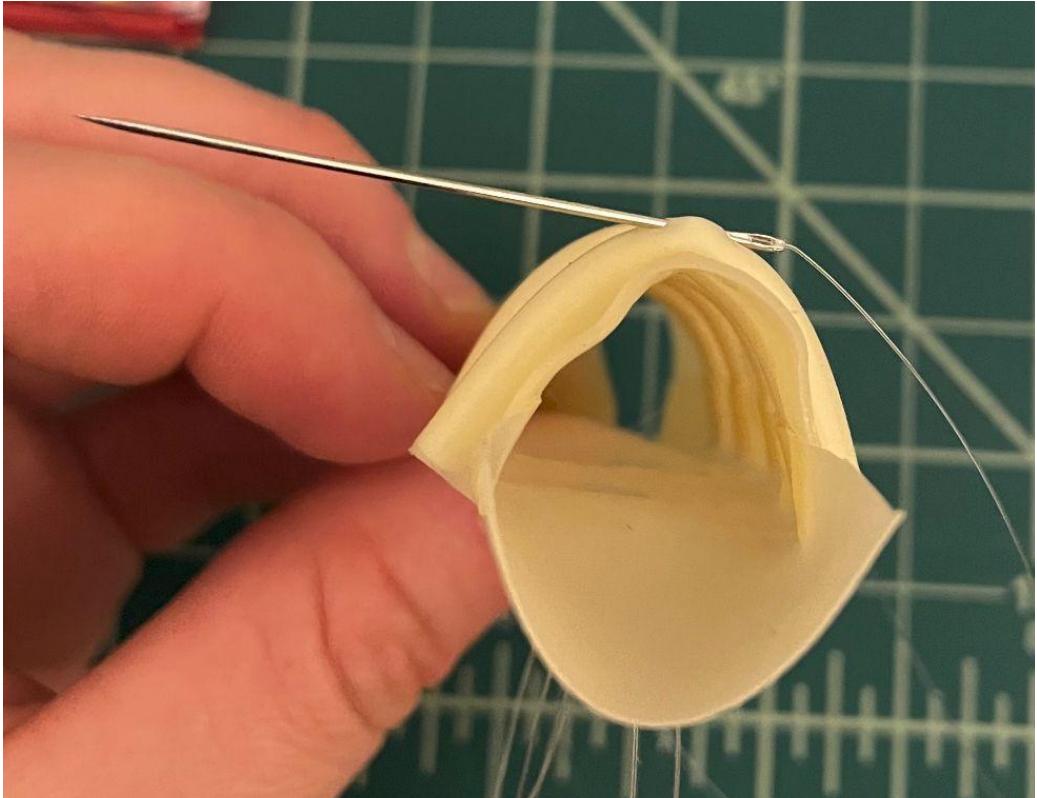
How will it interact with water?

How long will the rubber cement bonds last and do I need to do a durability test?

# four: How can I create a mechanical "trachea"?



# five: How can I support and activate the trachea?



**five:** How can I create a mechanical "trachea"?



# six: How do I create a bronchial tree that can get wet?

The image shows the OpenSCAD application interface. On the left is the code editor with the file name "bronchialtree.scad". The code defines a module "brachea" that creates a cylindrical bronchial tree with multiple concentric bands and a pink-colored interior. The right side of the interface displays the 3D preview of the model, which is a dark grey cylinder with several horizontal bands of varying thicknesses. The bottom right corner shows the OpenSCAD version "OpenSCAD 2019.05".

```
bronchialtree.scad — OpenSCAD
File Edit Design View Help
Editor
File Edit Design View Help
1 THICKNESS = 2.5;
2 HEIGHT = 200;
3 C = 3 * THICKNESS;
4
5 // a brachea chunk
6 module brachea(height){
7   r1 = height / 2;
8   r2 = height / 3;
9   echo(r1, r2);
10
11 // create the outer and inner walls
12 difference(){
13   cylinder(height, r1, r2, false);
14   cylinder(height + THICKNESS, r1 - THICKNESS, r2 - THICKNESS, false);
15 }
16
17 // add some cartilidge every 5 mm
18 for(i = [0 : 20 : height]){
19   // calculate the radius of incrementing height...this was not trivial
20   currentR = ((i - height) * (r2 - r1)) / height + r2;
21   echo(i, currentR);
22   // rotate extrude(convexity = 10)
23   // translate by the calculated radius
24   translate([currentR, i, 0])
25   circle(C);
26   // draw the circle
27   circle(C);
28 }
29
30
31 // draw the thing
32 brachea(HEIGHT);
33
34
```

Console

```
ECHO: 160, 73.3333
ECHO: 180, 70
ECHO: 200, 66.6667
Compiling design (CSG Products generation)...
Geometries in cache: 1570
Geometry cache size in bytes: 50968816
CGAL Polyhedrons in cache: 0
CGAL cache size in bytes: 0
Compiling design (CSG Products normalization)...
Normalized CSG tree has 13 elements
Compile and preview finished.
```

Viewport: translate = [ 0.00 0.00 100.00 ], rotate = [ 300.20 0.00 218.90 ], distance = 930.51 (951x743)

OpenSCAD 2019.05

# seven: Can the viewer impact the quality of breath?



breath tester

# What's next?

find a way to mechanize the diaphragm

connect the trachea to the airflow

do more user testing of disembodied breath sounds

read more about the medical categorizations of breath noises

play with the addition of moisture to the system

what type of electronic actuators will be quiet enough to support this system?

