

↑↑↑%

↗  
(project title)



[https://github.com/msc-creative-computing/p-comp-jasper-zheng/tree/main/week\\_final](https://github.com/msc-creative-computing/p-comp-jasper-zheng/tree/main/week_final)



#### Objectives

# Organic Collaborator

↑↑↑% (up percent) is a sound installation that reveals possible interactions of natural systems, sound, light and humans. The assembled installation is sensitive to changes in the electrostatic field, which can be triggered by either a soft **touch from humans, wind, moisturisation, or the invisible turbulence inside the vessels and vines**. Measured changes control parameters of the digitally synthesised sound (oscillation frequencies, LFO rates, modulation index). Fluctuating light bulbs in the glass jar indicate the current level of activation of the system.

↓  
(the nature)



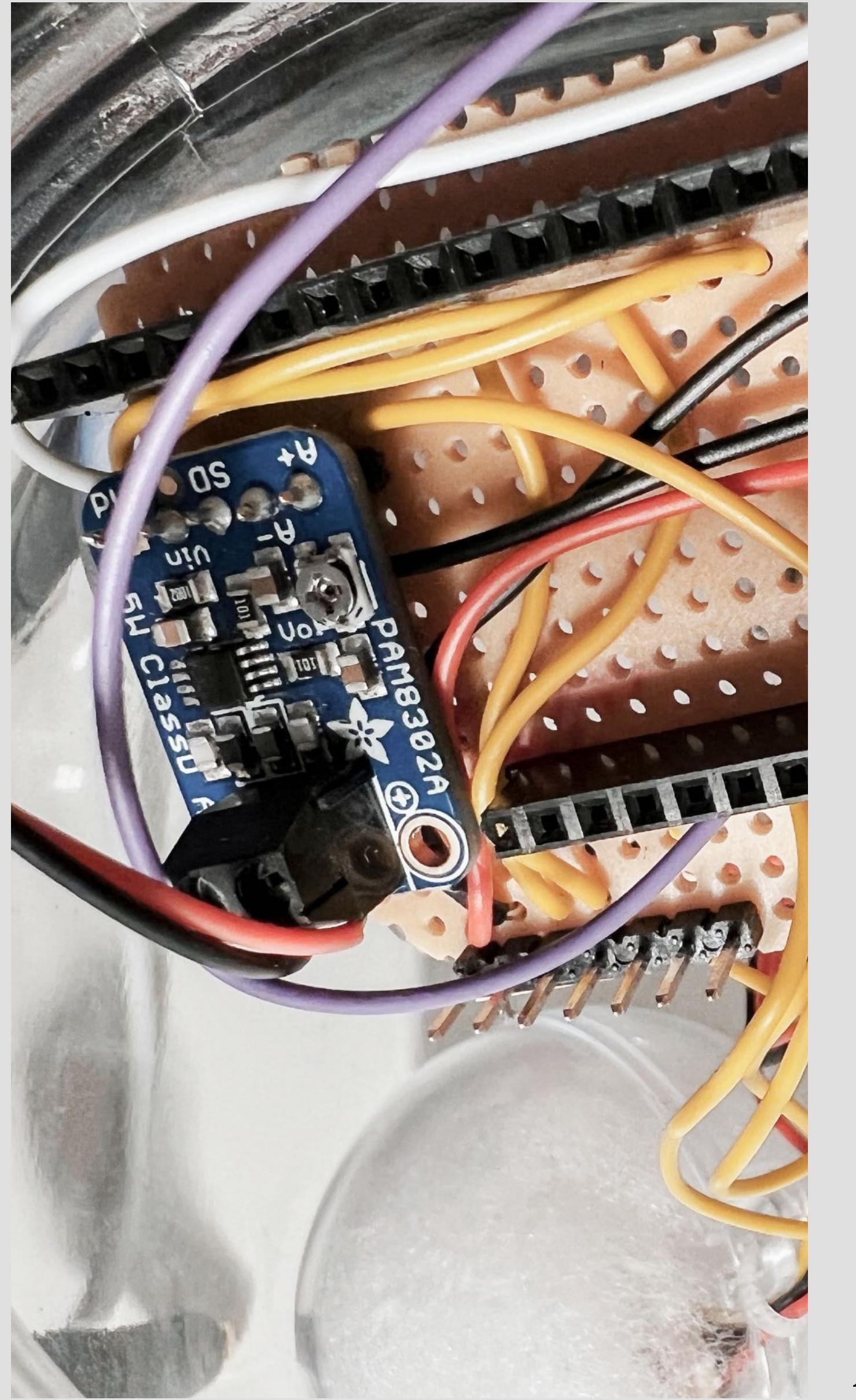
↑↑↑%  
2021, sound installation

custom plants, hand-made light blubs, glass jar, ESP32, MPR121, soil moisture sensor, photoresistor, PCBs, Mozzi library, amplifiers, speakers, alkaline batteries

**Full Video**

<https://youtu.be/vGd-JQdAmYI>

↑↑↑% (Sound Installation)

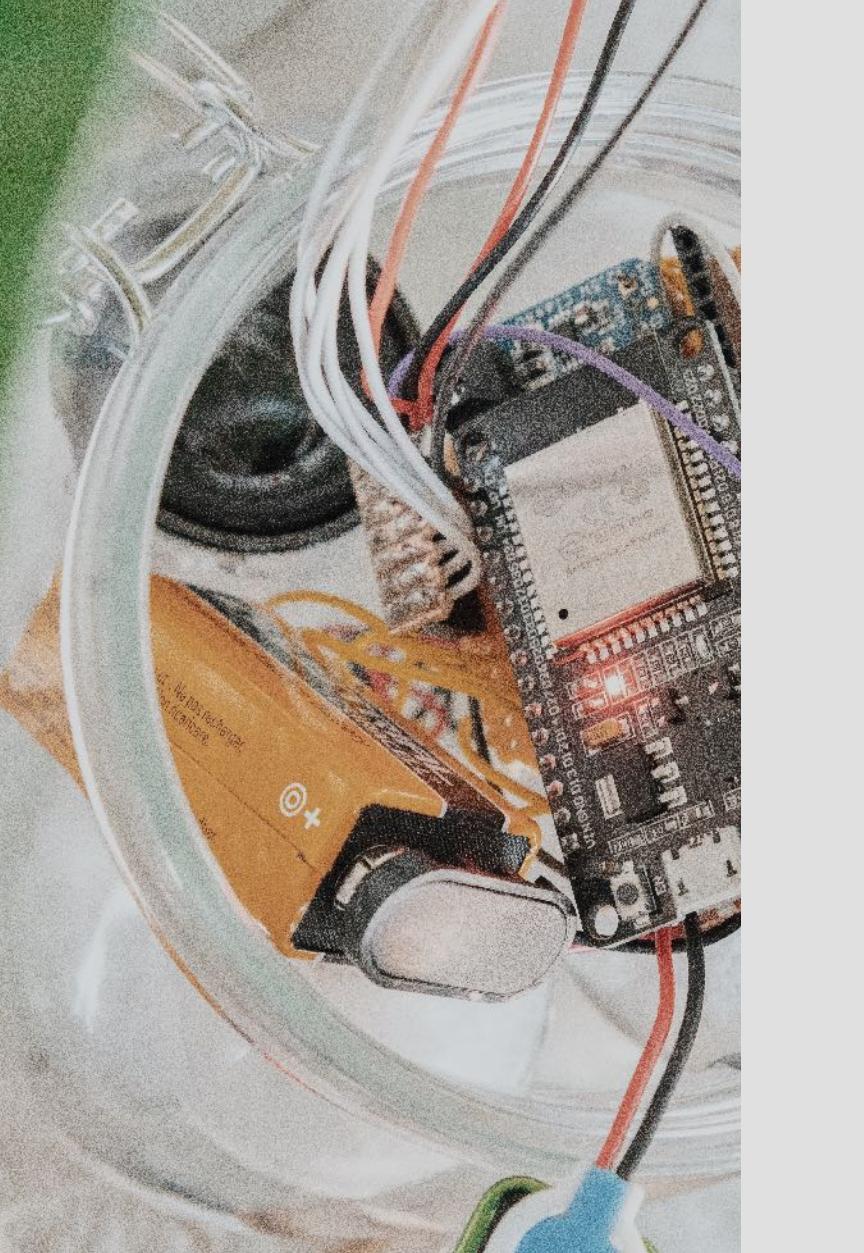


```
// harmonics
Osc1<COS8192_NUM_CELLS, AUDIO_RATE> oCos1(COS8192_DATA);
Osc1<COS8192_NUM_CELLS, AUDIO_RATE> oCos2(COS8192_DATA);
Osc1<COS8192_NUM_CELLS, AUDIO_RATE> oCos3(COS8192_DATA);
Osc1<COS8192_NUM_CELLS, AUDIO_RATE> oCos4(COS8192_DATA);
Osc1<COS8192_NUM_CELLS, AUDIO_RATE> oCos5(COS8192_DATA);
Osc1<COS8192_NUM_CELLS, AUDIO_RATE> oCos6(COS8192_DATA);
Osc1<COS8192_NUM_CELLS, AUDIO_RATE> oCos7(COS8192_DATA);

// volume controls
Osc1<COS8192_NUM_CELLS, CONTROL_RATE> kW1(COS8192_DATA);
Osc1<COS8192_NUM_CELLS, CONTROL_RATE> kW2(COS8192_DATA);
Osc1<COS8192_NUM_CELLS, CONTROL_RATE> kW3(COS8192_DATA);
Osc1<COS8192_NUM_CELLS, CONTROL_RATE> kW4(COS8192_DATA);
Osc1<COS8192_NUM_CELLS, CONTROL_RATE> kW5(COS8192_DATA);
Osc1<COS8192_NUM_CELLS, CONTROL_RATE> kW6(COS8192_DATA);
Osc1<COS8192_NUM_CELLS, CONTROL_RATE> kW7(COS8192_DATA);

// audio volumes updated each control interrupt and reused in audio till next control
int v1,v2,v3,v4,v5,v6,v7,v8,lfo_v1,lfo_v2,lfo_v3,lfo_v4;
```

*Mozzi Library*



PAM8302 2.5 watt audio amplifier (blue)

## Components

# Digitally Synthesised Sound

The sound is real-time generated by the Mozzi library running on a microcontroller (ESP32). The output signal from the DAC is amplified by a mono D amplifier PAM8302, and then passed to a speaker.

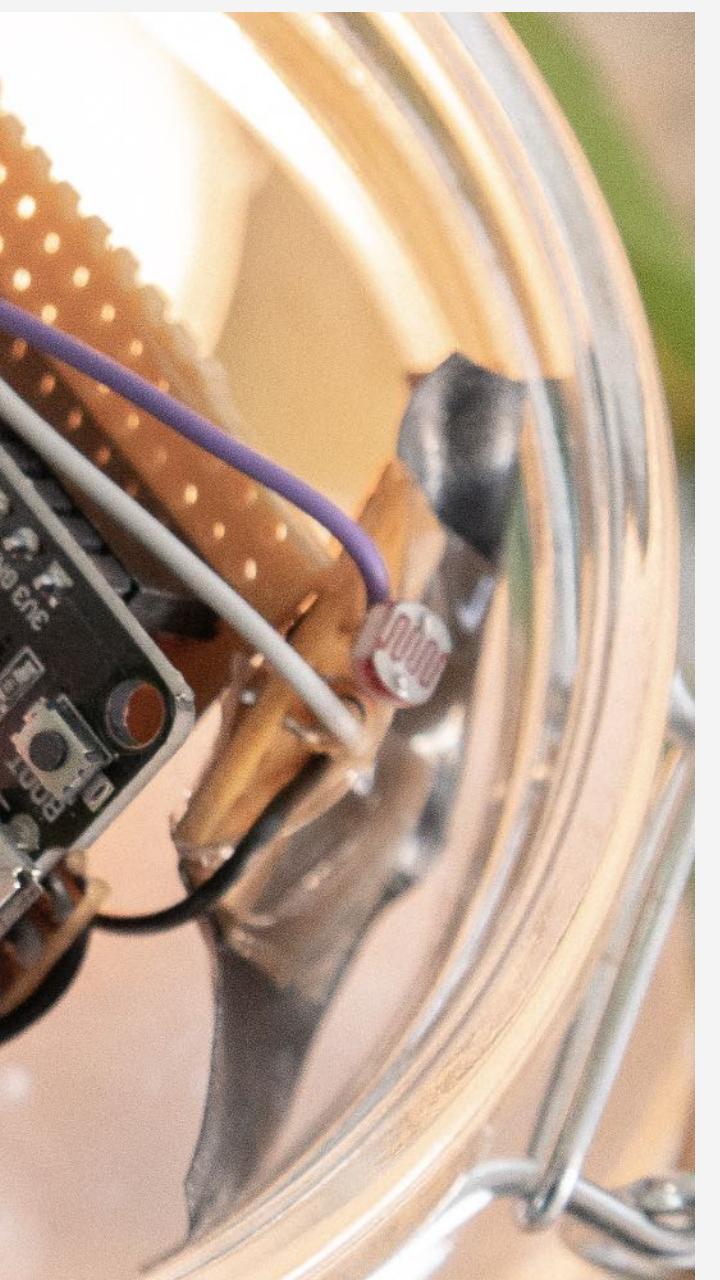
There is a 4-ohm speaker installed in the jar, however, when filming the video, I used an external loudspeaker just to get better sound recordings.

<https://github.com/sensorium/Mozzi>

# Light Bulbs → (Hand-made!!)

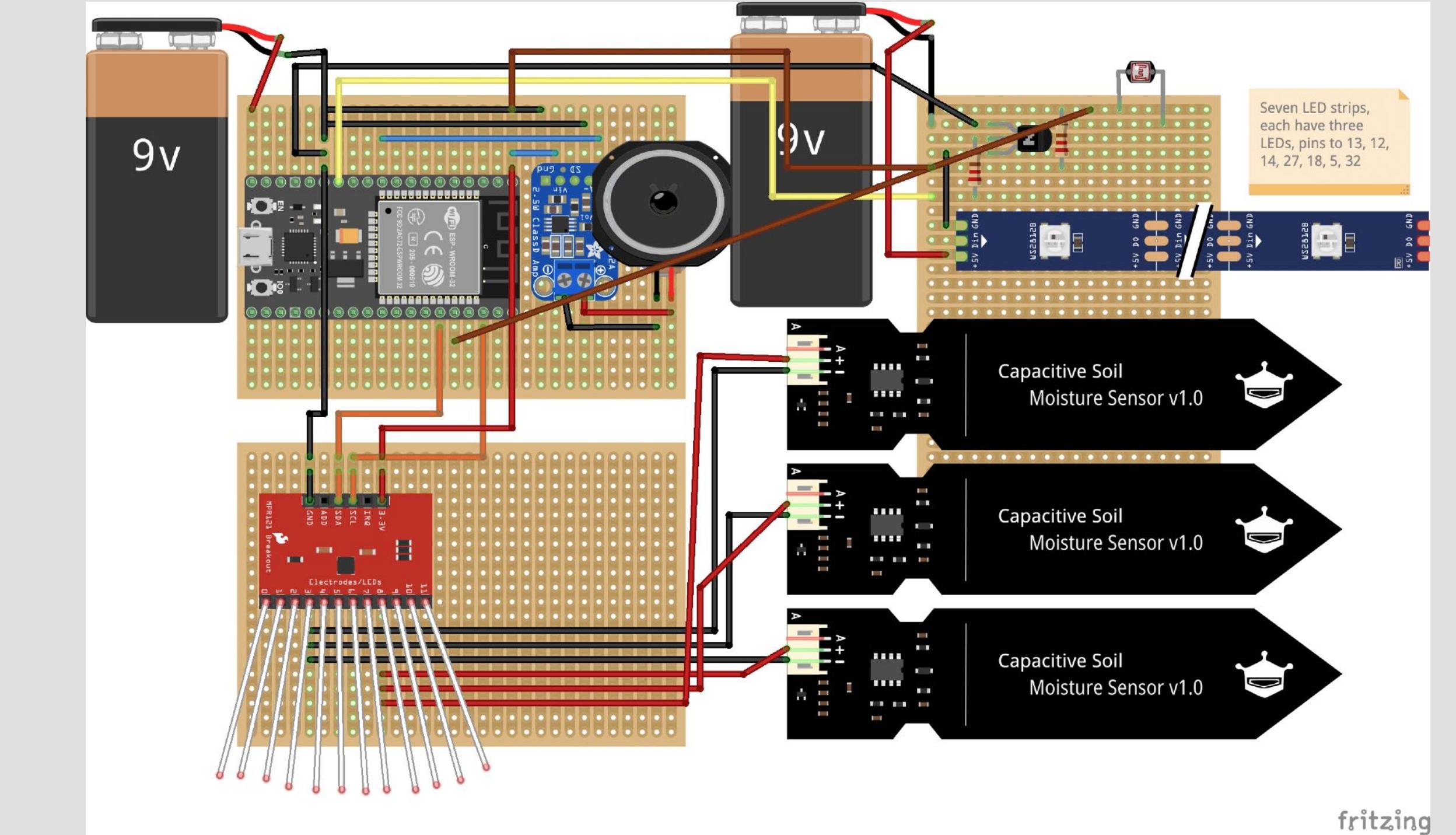


Seven hand-made light bulbs each consist of a strip with three LEDs, a control circuit on a custom PCB board, and some cotton.



An LDR sticks to the edge of the jar manages to sense whether the lid is closed.

# Schematic



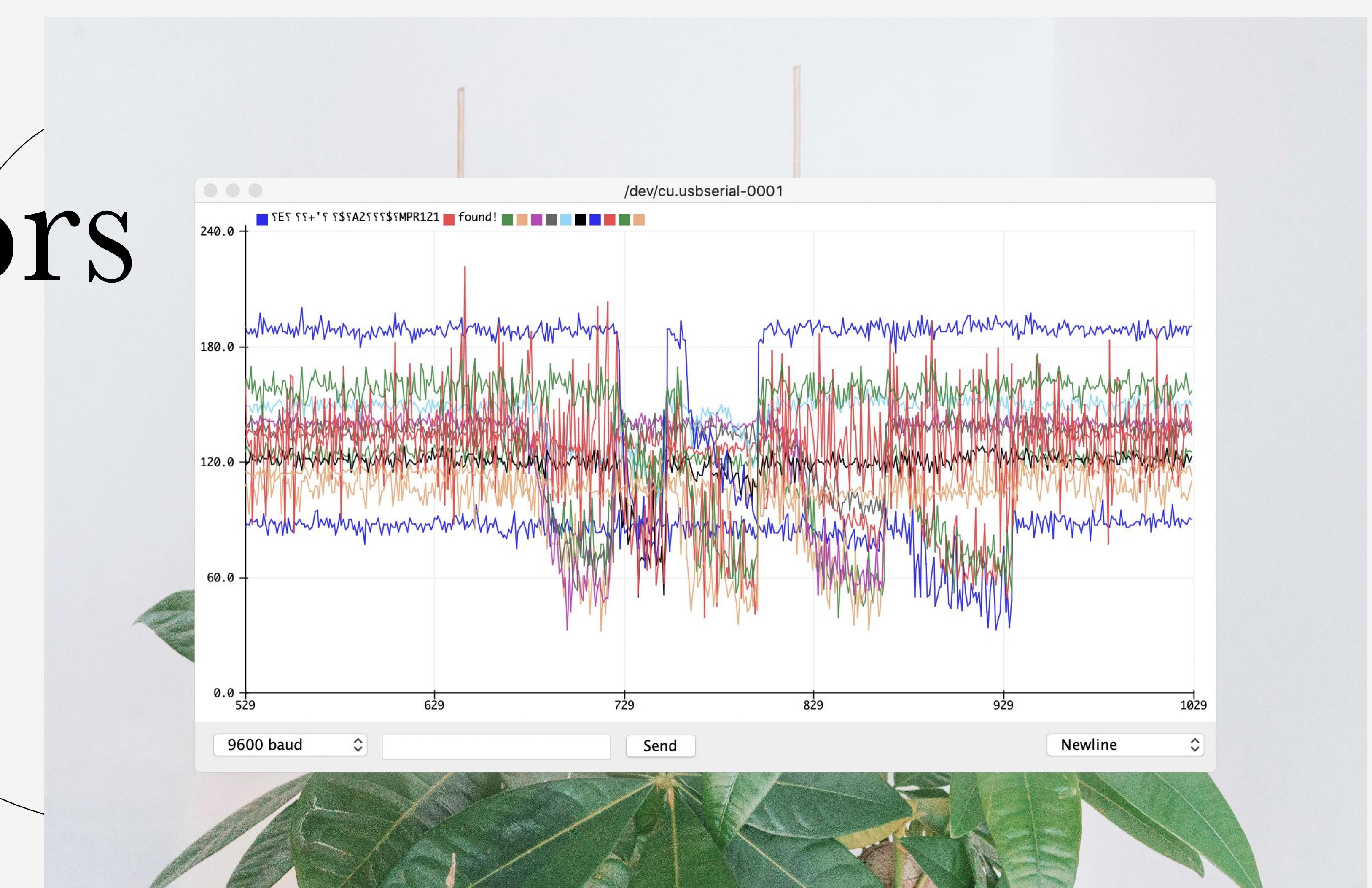
The system requires two 9v alkaline batteries (one for the light bulbs, one for the microcontroller).

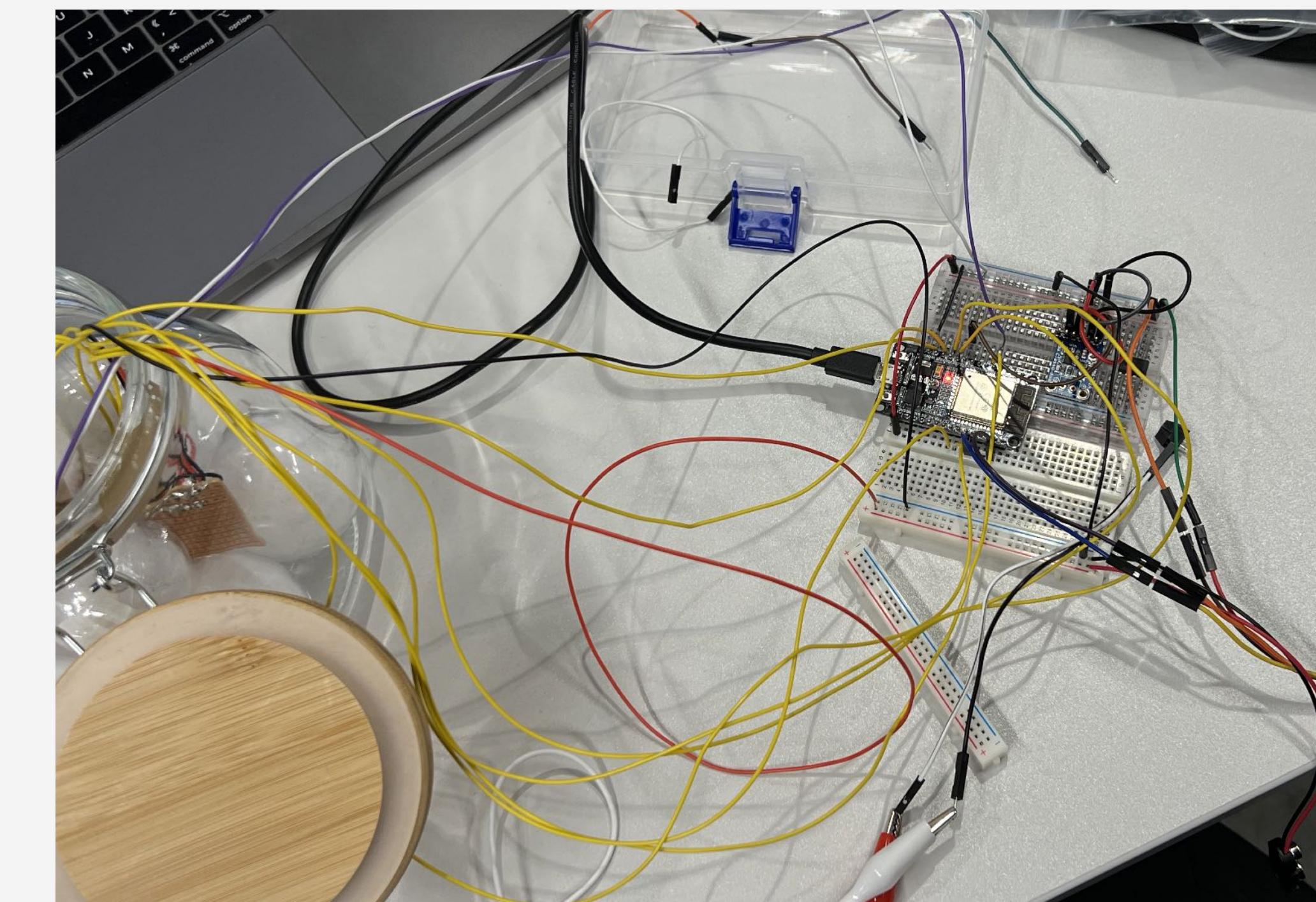
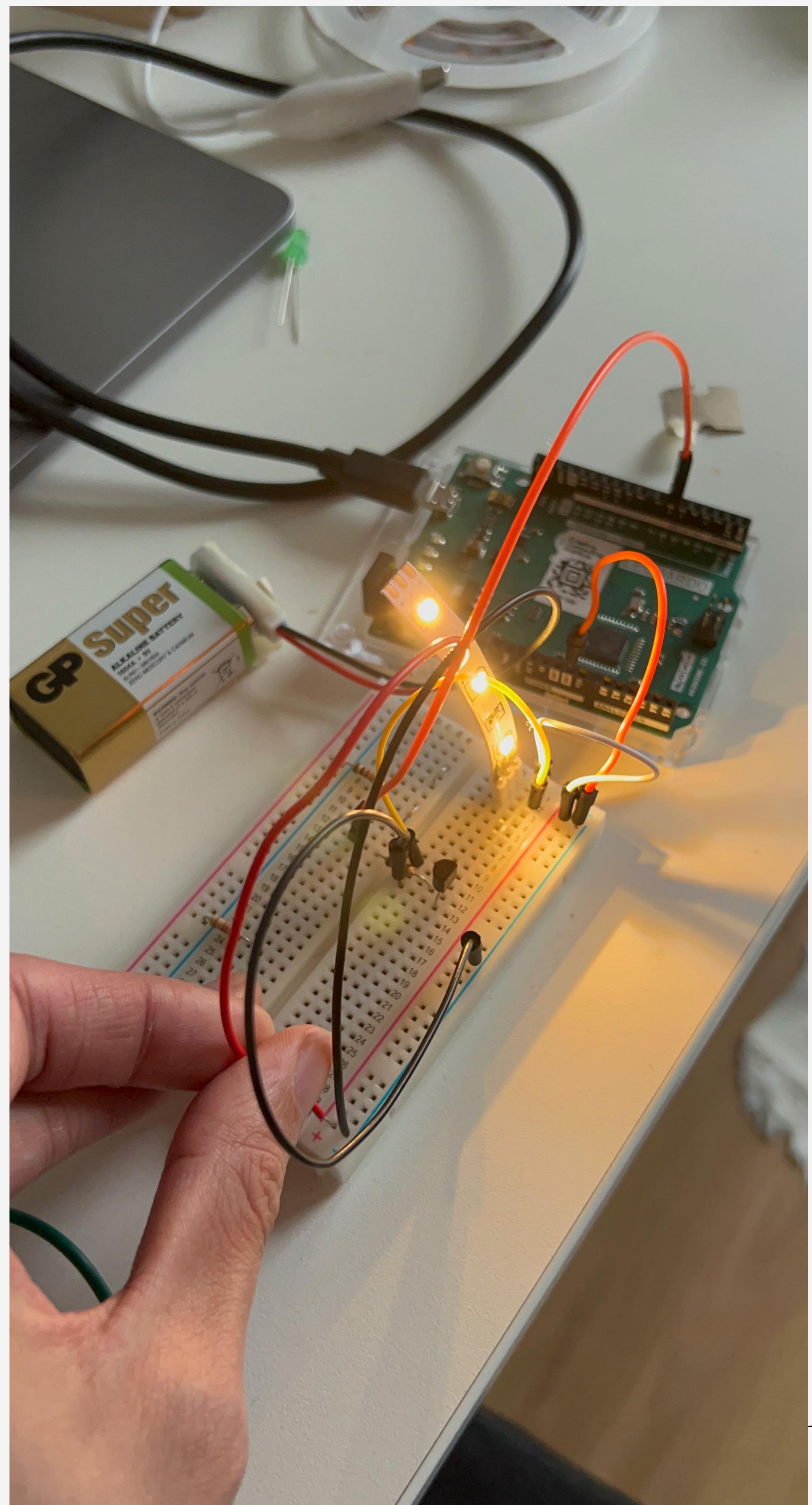
# MPR121 + Moisture Sensors

A capacitive touch sensor (MPR121) picks up the 12-channel input data from different parts of the plants.

Three moisture sensors are each attached to the soil.

<https://learn.adafruit.com/adafruit-mpr121-12-key-capacitive-touch-sensor-breakout-tutorial>







# Epilogue

↑↑↑% attempts to aestheticise the chaotic dynamics in the physical world. As we program our digital system to generate noise procedurally, we are more than welcome to take the input from natural systems and trigger undetectable patterns.

While the plants produce unpredictable signals that manipulate the light and the tonal terrain, we are invited to review the possibility of 'organic collaborators' that we might confront in the future.

**Video 1**

<https://youtu.be/vGd-JQdAmYI>

**Video 2**

<https://youtu.be/jQ1evAxYSqI>

**Github Repositories (Codes, and other documentations)**

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