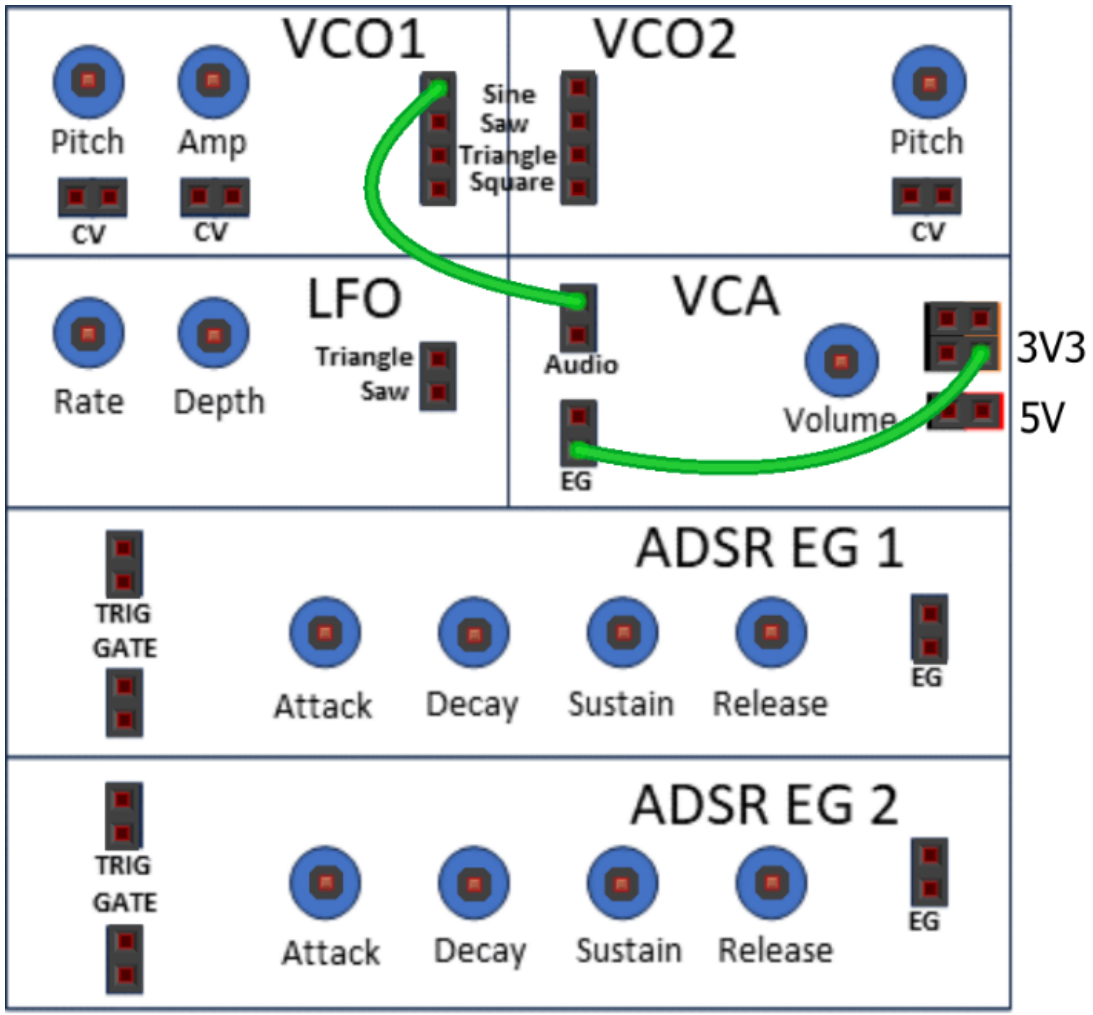
The Educational DIY Synth Thing

Project Selection – v0.1 – June 2025

https://diyelectromusic.com/2024/05/07/educational-diy-synth-thing/

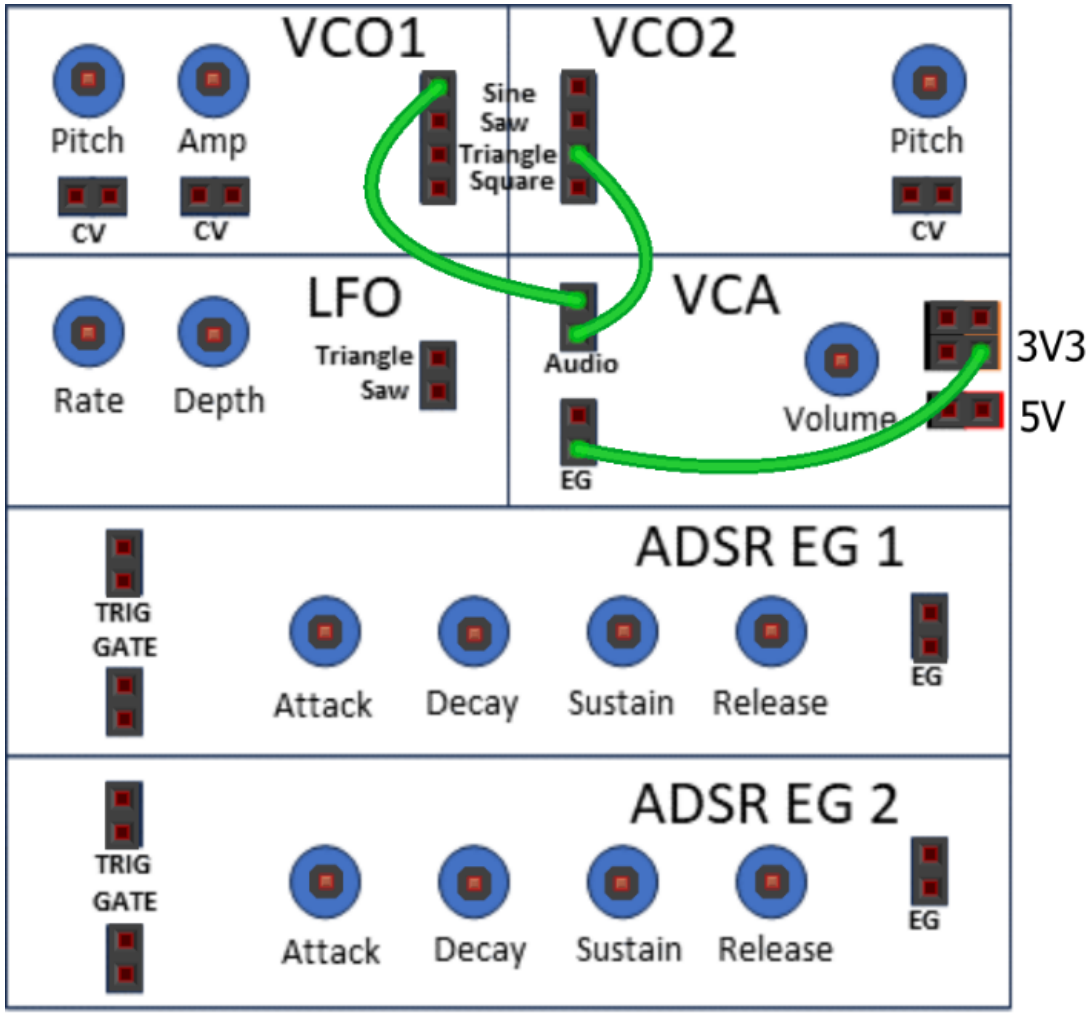
1. Basic Oscillator (VCO) Output



- VCA EG fixed at 3V3.
- Turn up VCA Volume.
- Experiment with:
  - VCO1 Amp.
  - VCO1 Pitch.

- What are the highest and lowest frequencies?

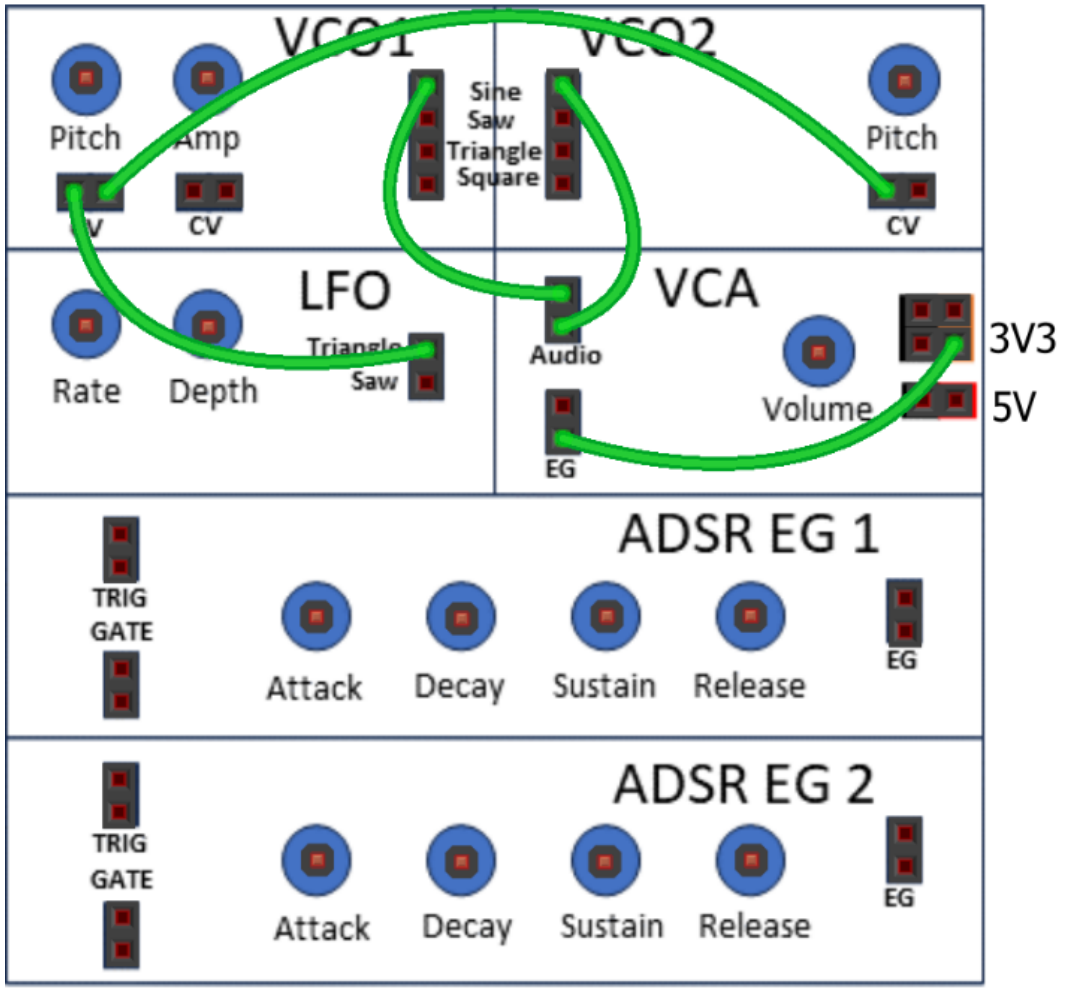
2. Dual Oscillator Output



- Change:
  - VCO1 and VCO2 Pitch.
  - VCO1 Amp.
  - VCO1 and VCO2 Waveforms.

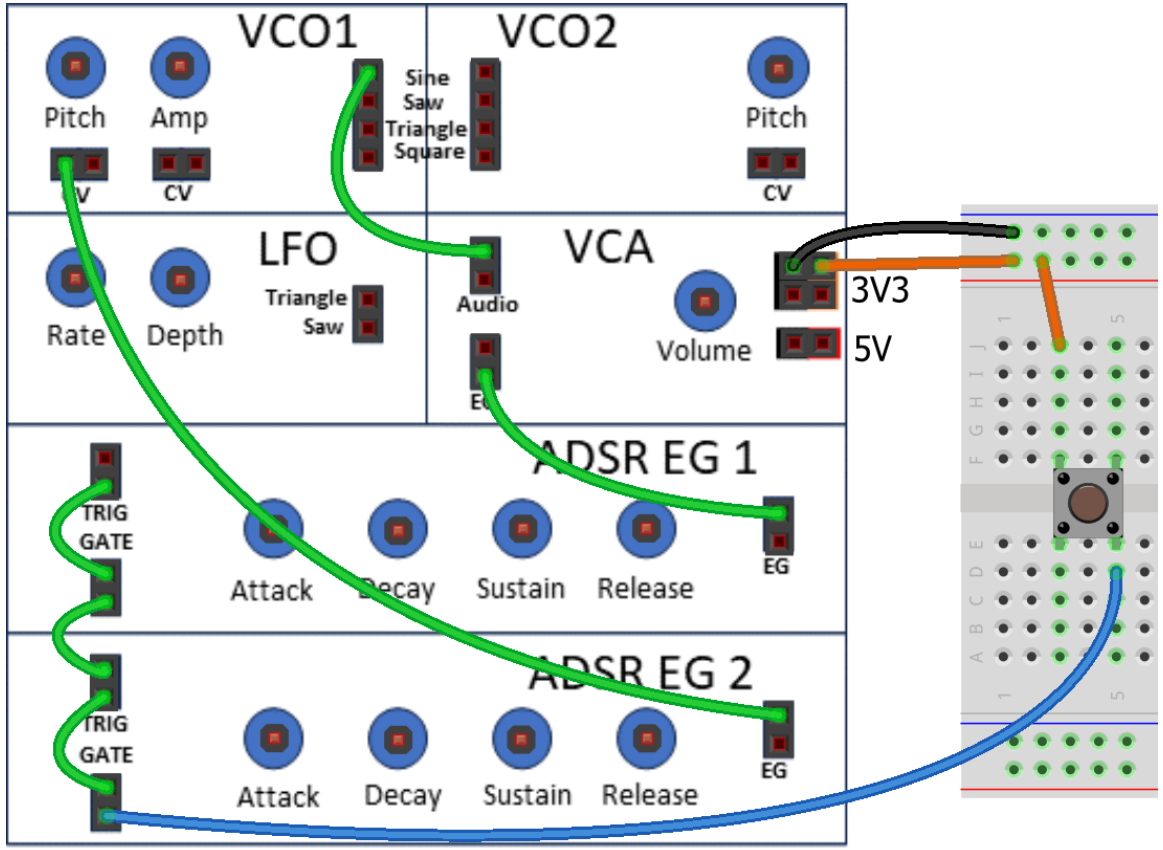
- Experiments:
  - Tune to same pitch.
  - Detune one slightly.
  - Tune to 1 octave apart.
  - Tune to 2 octaves.
  - Find other intervals.

3. Dual VCO+LFO Pitch Modulation



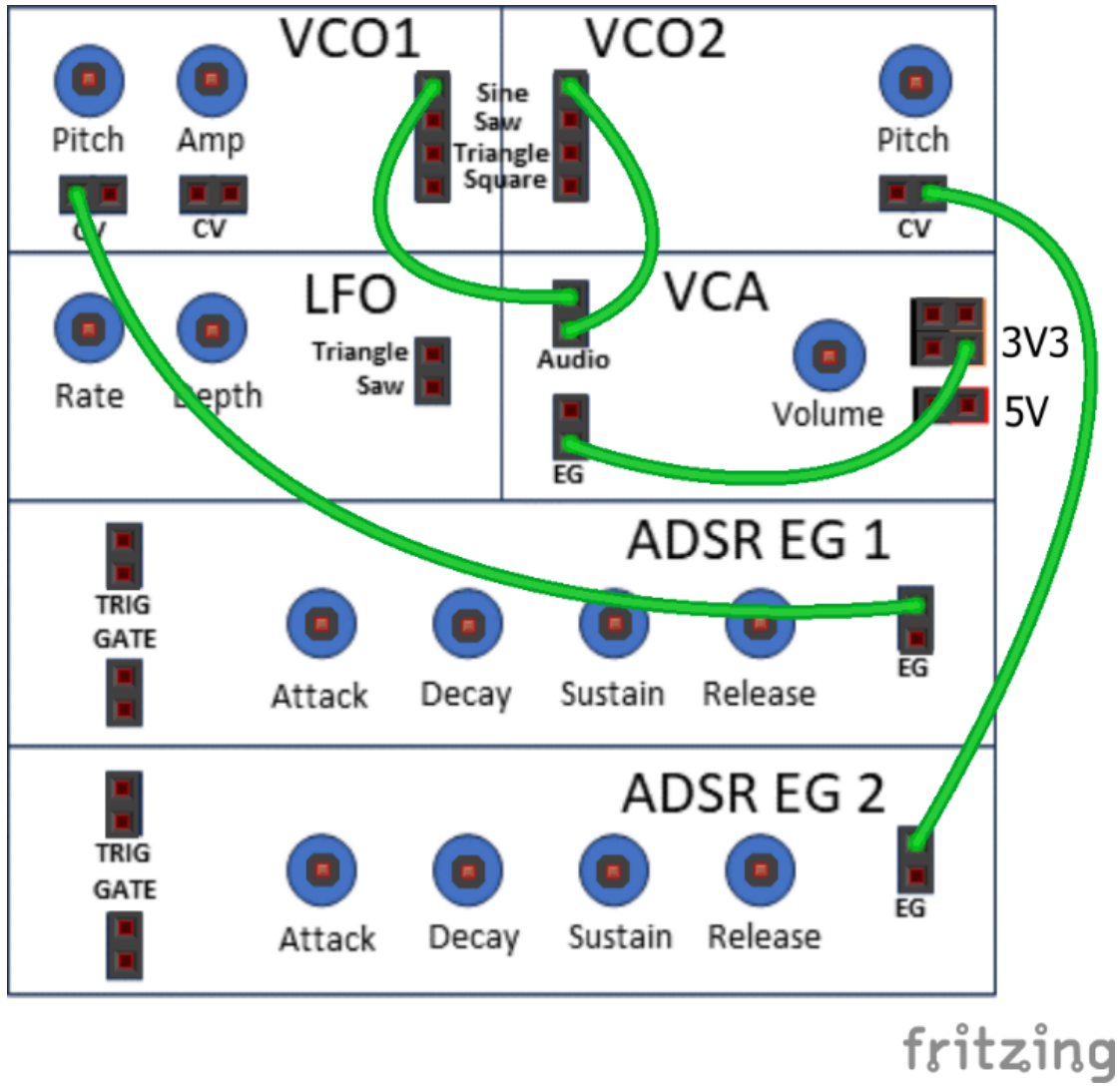
- Links VCO1 and VCO2 CVs.
- Turn LFO off and tune VCOs to 1 octave.
- Try LFO Rate and Depth.
- Try LFO waveforms.
- Connect one LFO waveform to VCO1 and one to VCO2.

4. ADSR Envelope Generator for Amplitude and Pitch



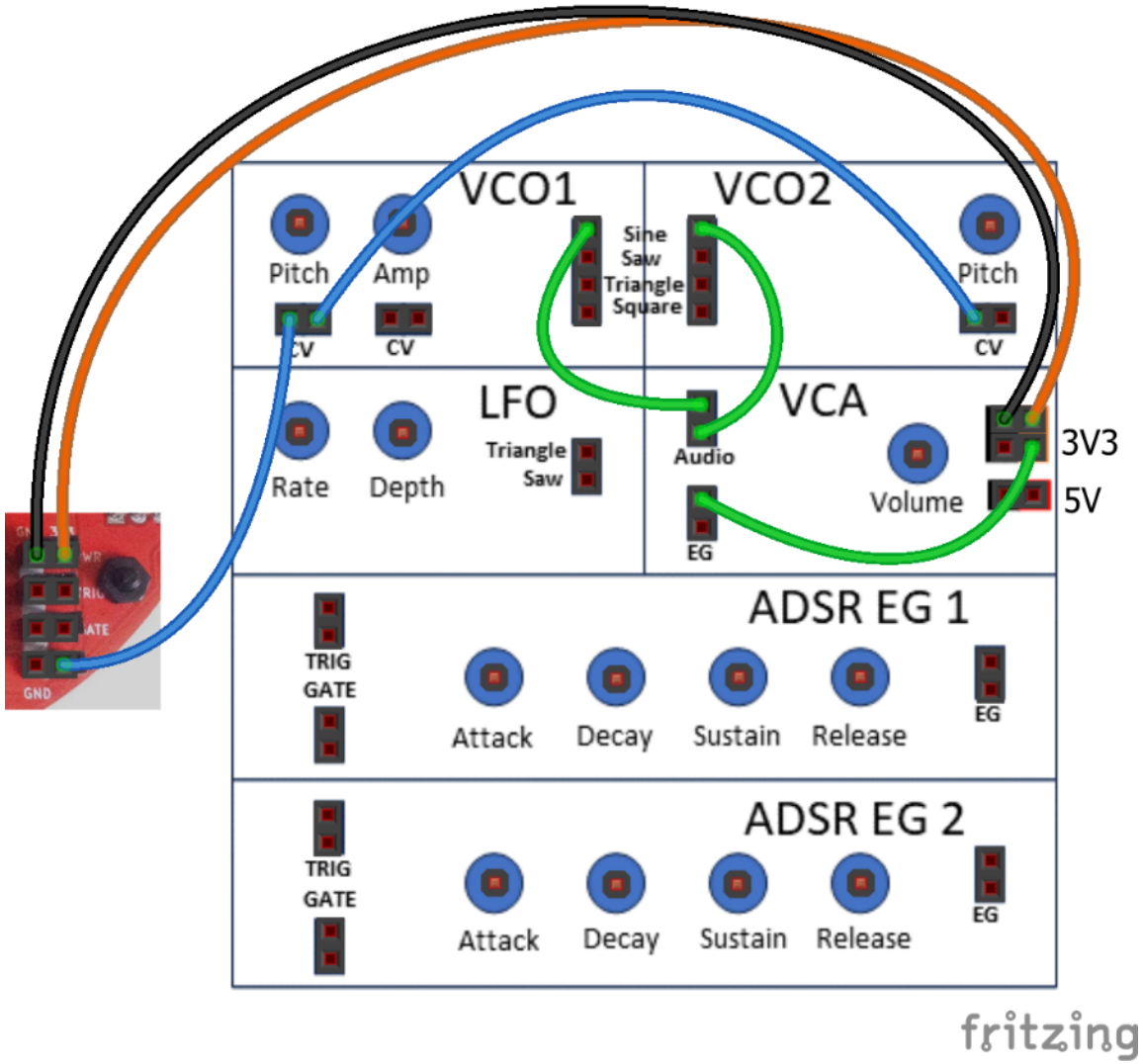
- EG1 back to controlling VCA.
- EG2 now controlling VCO Pitch.
- Try different A, D, S, R settings for both amplitude and pitch.

5. ADSR Envelope Generator – Dual Pitch



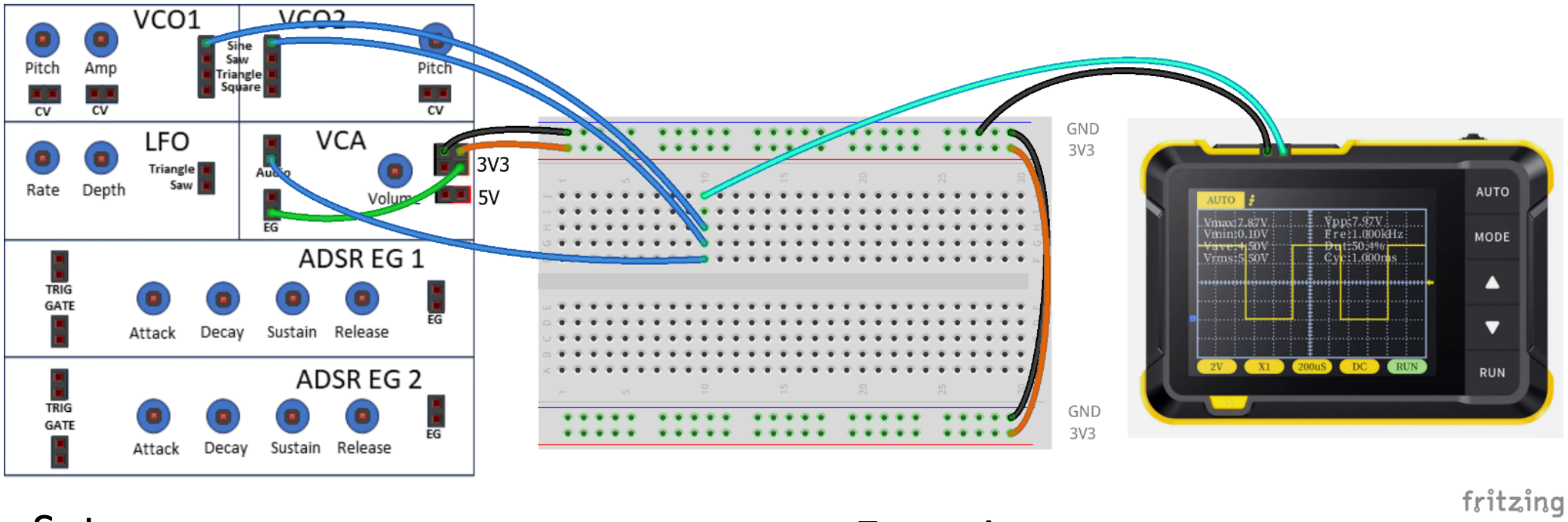
- Start with:
  - Both Pitch controls turned right down.
  - Low Sustain (S) level on each EG.
- Play some notes.
- Experiment with:
  - Both sets of ADSR Settings.
  - Detuning VCO2.
  - Setting VCOs an octave apart.
  - Different waveforms.

6. Dual Pitch Sequence



- Both VCOs connected.
- Start with:
  - VCO Pitch controls turned right down.
  - VCO1 Amp and VCA Volume right up.
  - Baby 8 steps fully clockwise (8 steps).
  - Baby 8 Run/Stop -> Run (to the right).
- Experiment with:
  - Detune VCO2.
  - Different Waveforms.
  - Different Pitch controls.
  - Adjust the sequence.

7. Dual Oscillators and Oscilloscope



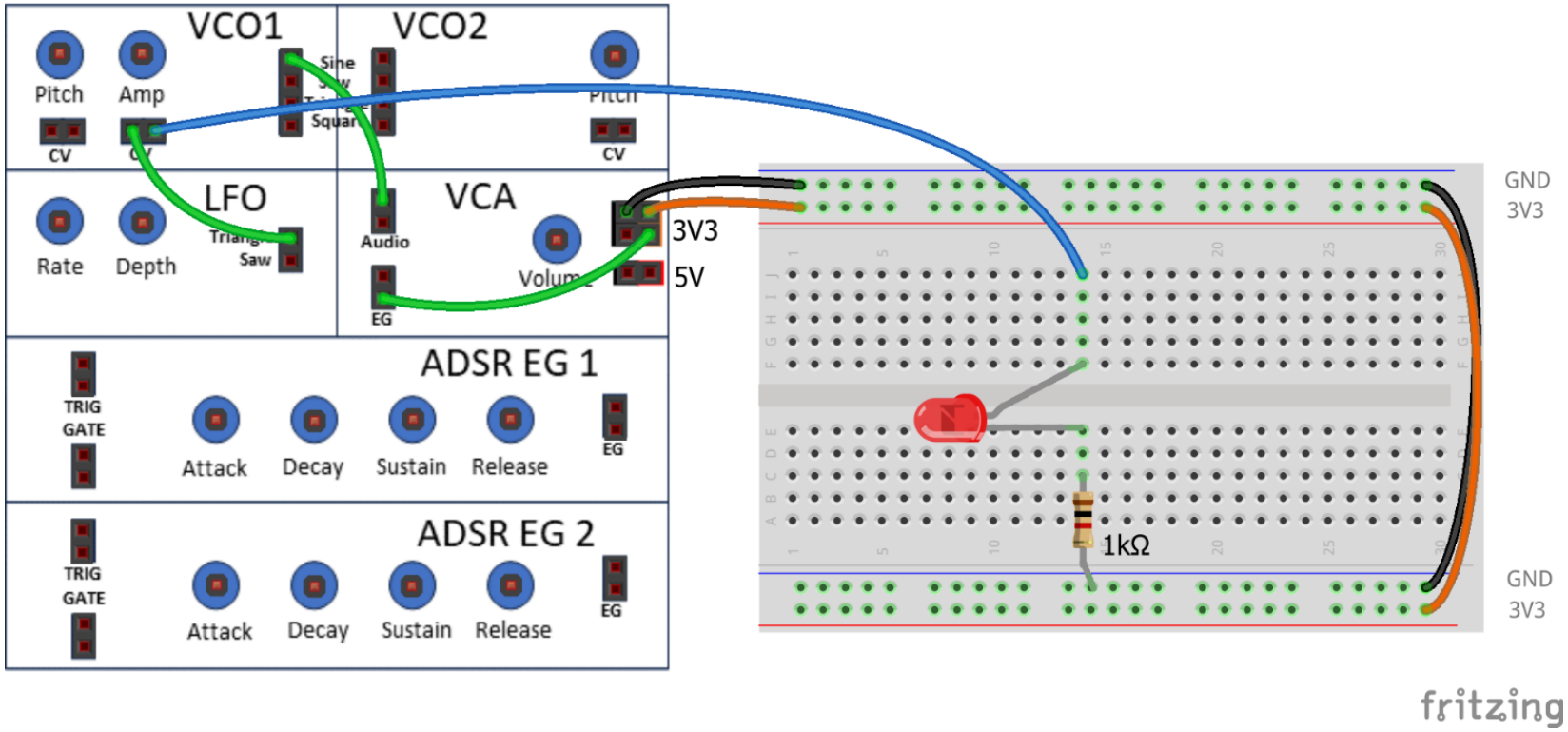
Setup:

- VCA Amp turned fully clockwise.
- VCO1 Amp fully anticlockwise (off).
- VCO1 and VCO2 Pitch half-way.
- Use both Sine outputs.

Experiment:

- Slowly increase VCO1 Amp.
- Tune both VCOs to same Pitch.
- Watch how the waveform slowly changes.

8. LED Indicator

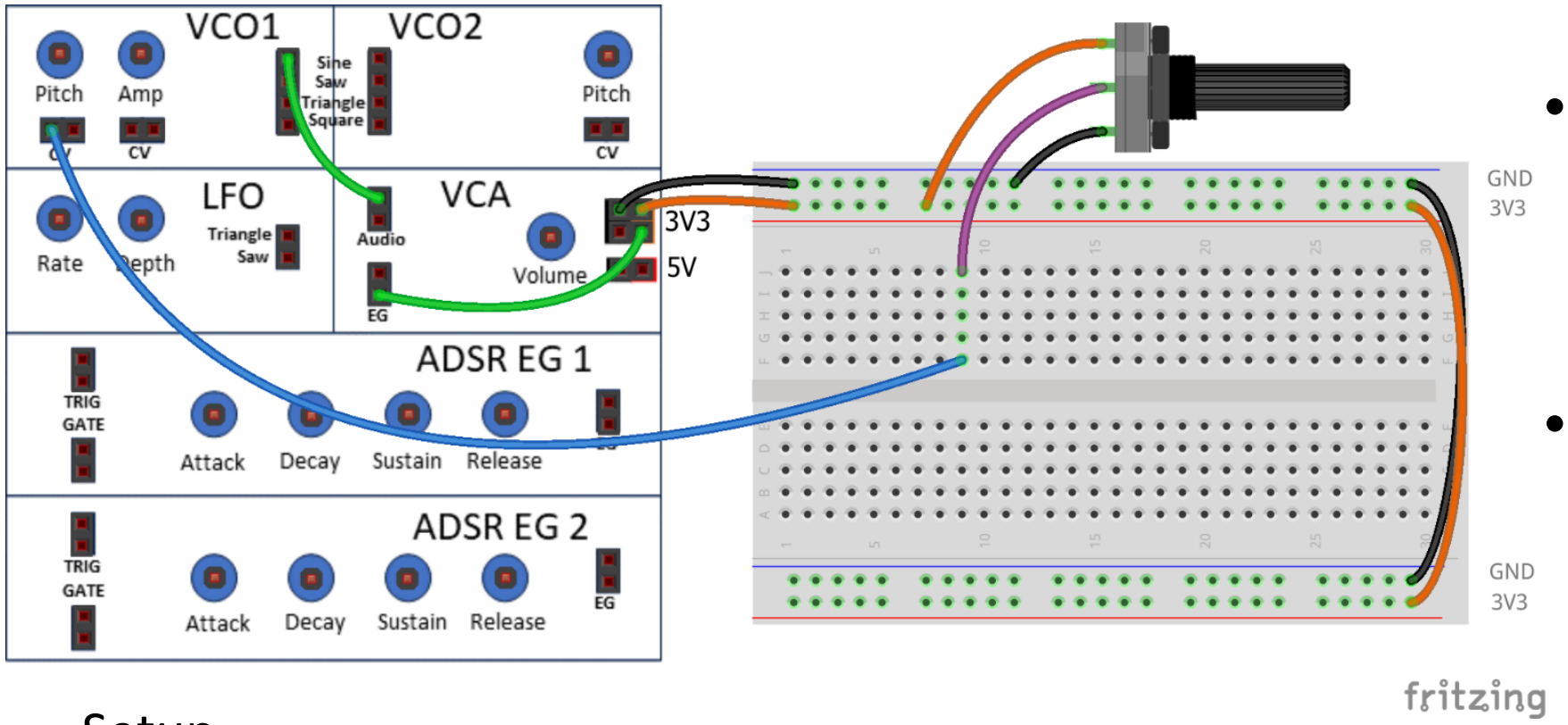


- Experiment with:
  - LFO Rate
  - LFO Depth
  - LFO Waveform
- Contrast fast rate with very slow rate.

Setup

- VCO1 Amp fully anti-clockwise (“off”).
- VCO1 Pitch half-way.
- LFO Depth half-way.
- LFO Rate fully anti-clockwise (“slow”).

9. Potentiometer Control

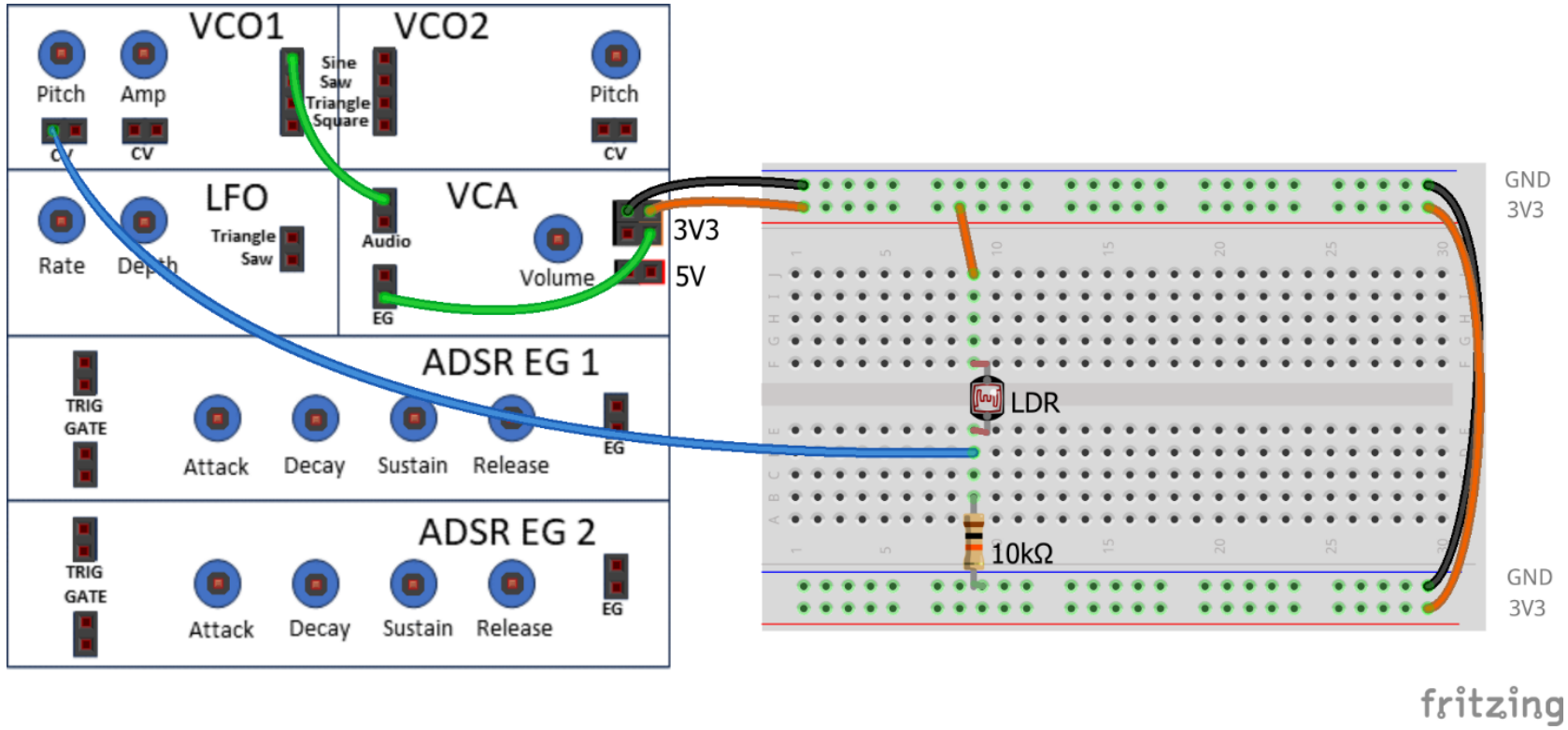


- Experiment with:
  - VCO1 Pitch
  - Pot Control
- Notice how the two add to each other…

Setup

- Pot between 3V3 and GND.
- VCO1 Amp and VCA Vol fully clockwise.

10. Light Dependant Resistor Control

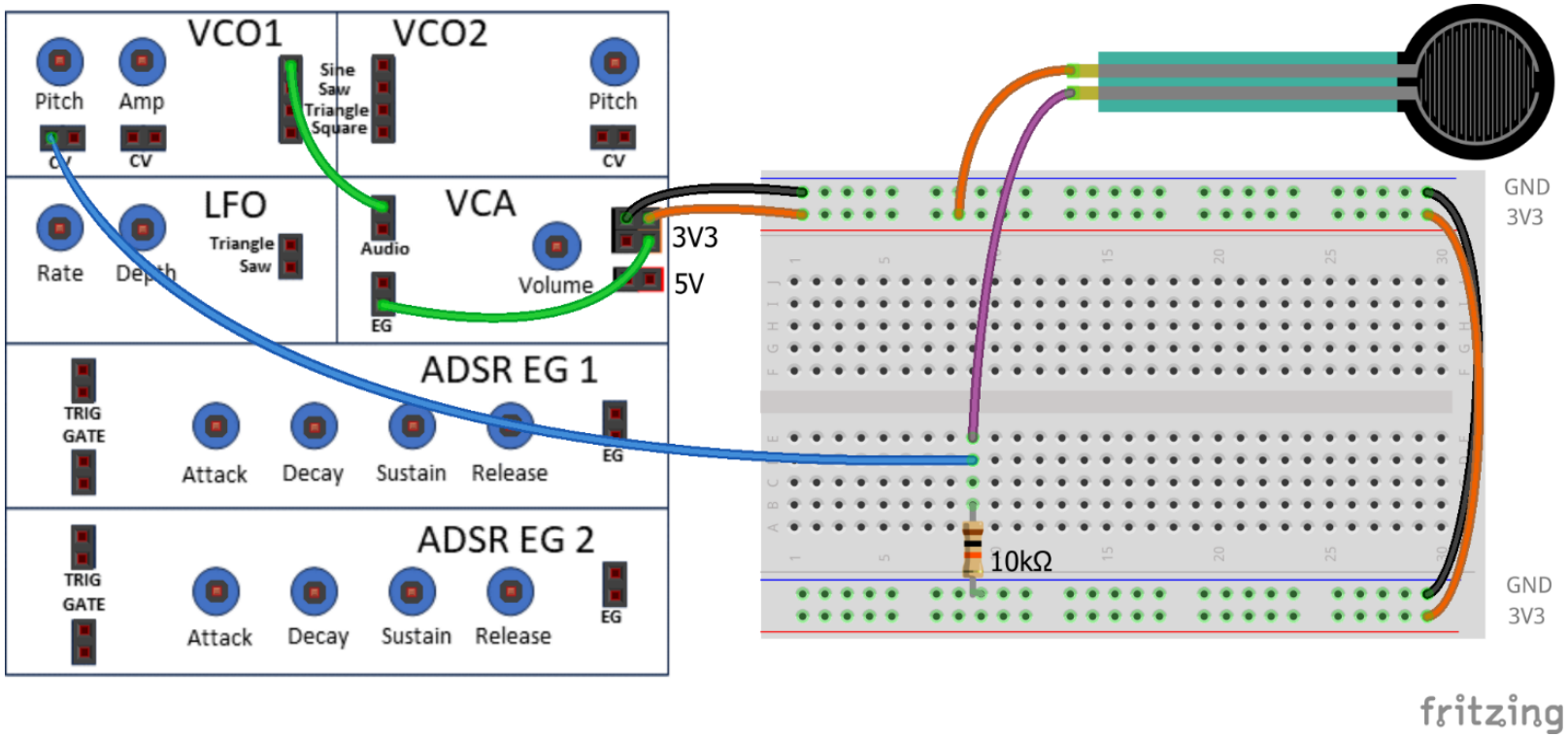


- Move hand over the LDR.
- Experiment with different positions from fully covered to fully open.
- This simulates an instrument called a “Theremin”.

Setup

- VCO1 Pitch half-way.
- VCO1 Amp and VCA Vol fully clockwise.

11. Force Sensitive Resistor Control

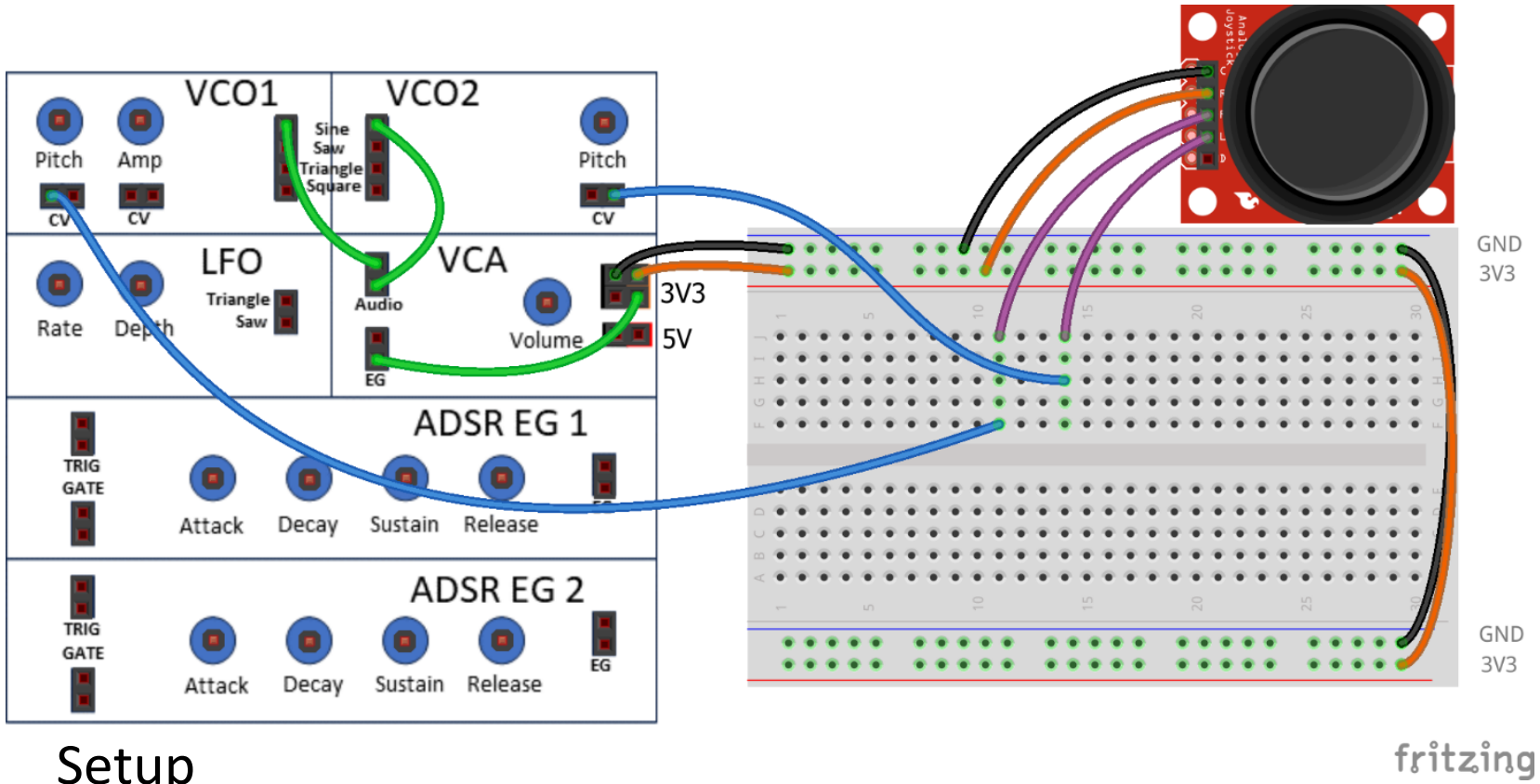


- Apply Pressure to the FSR…
- Now acts as a “pitch bend” for the Synth Thing.

Setup

- FSR between 3V3 and via 10KΩ resistor to GND.
- VCO1 Amp and VCA Vol fully clockwise.
- VCO1 Pitch half-way.

12. “Thumb” Joystick Control

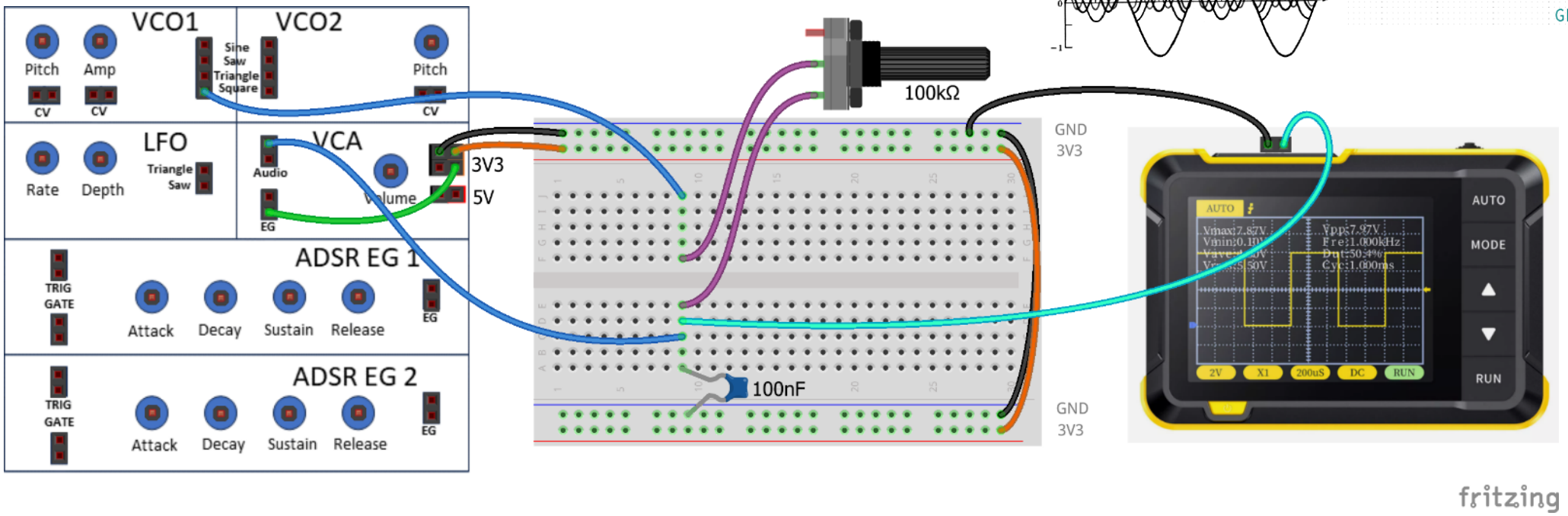


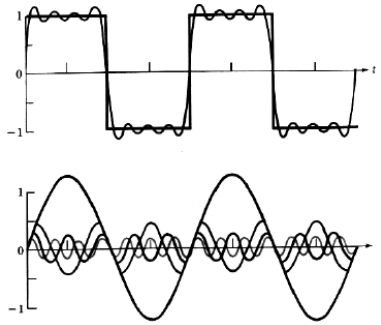
- Joystick is two potentiometers.
- Experiment with different directions.
- This now acts as a simple “dual pitch bend” for the Synth Thing.

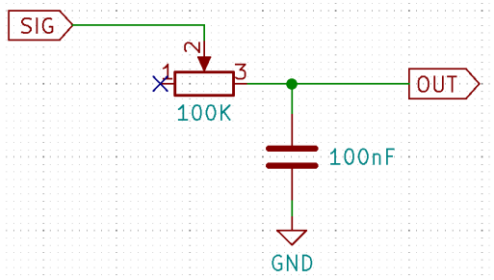
Setup

- “X” output to VCO1 CV, “Y” output to VCO2 CV.
- Double check wiring of the joystick module.
- VCO1 Amp and VCA Vol fully clockwise.
- VCO1 and VCO2 Pitch half-way.

13. Adjustable Low-pass Filter







Setup

- VCO1 Amp and VCA Amp fully clockwise.
- VCO1 Pitch half-way.
- Use the VCO1 square wave output.

- Turn the external potentiometer either fully clockwise or fully anti-clockwise until a square wave can be seen on the oscilloscope.
- Gradually turn the external potentiometer and note what happens to the resulting waveform – both by listening and by looking at the oscilloscope.
- Repeat the experiment with the saw, triangle and sine waves in that order.