

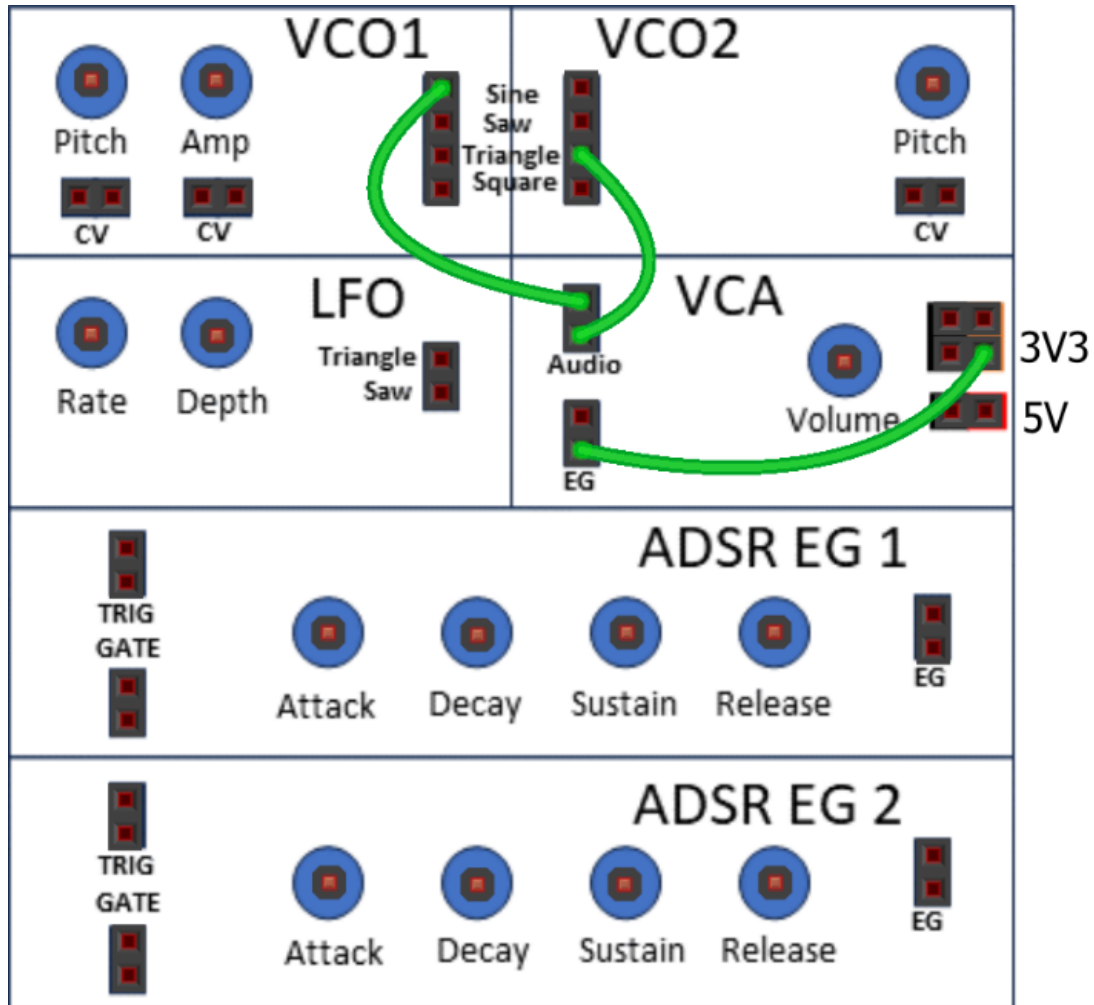
The Educational DIY Synth Thing

Project Selection – v0.1 – June 2025
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<https://diyelectromusic.com/2024/05/07/educational-diy-synth-thing/>



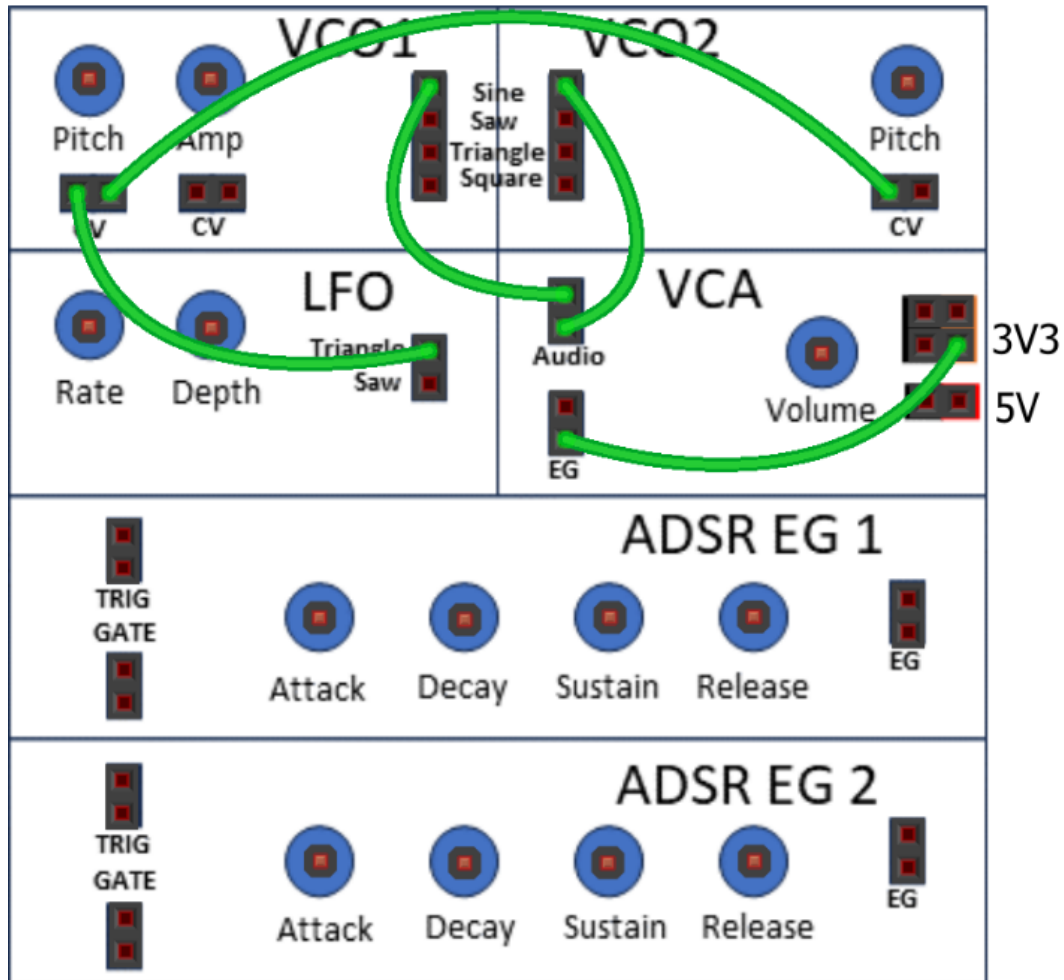
2. Dual Oscillator Output



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- 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.

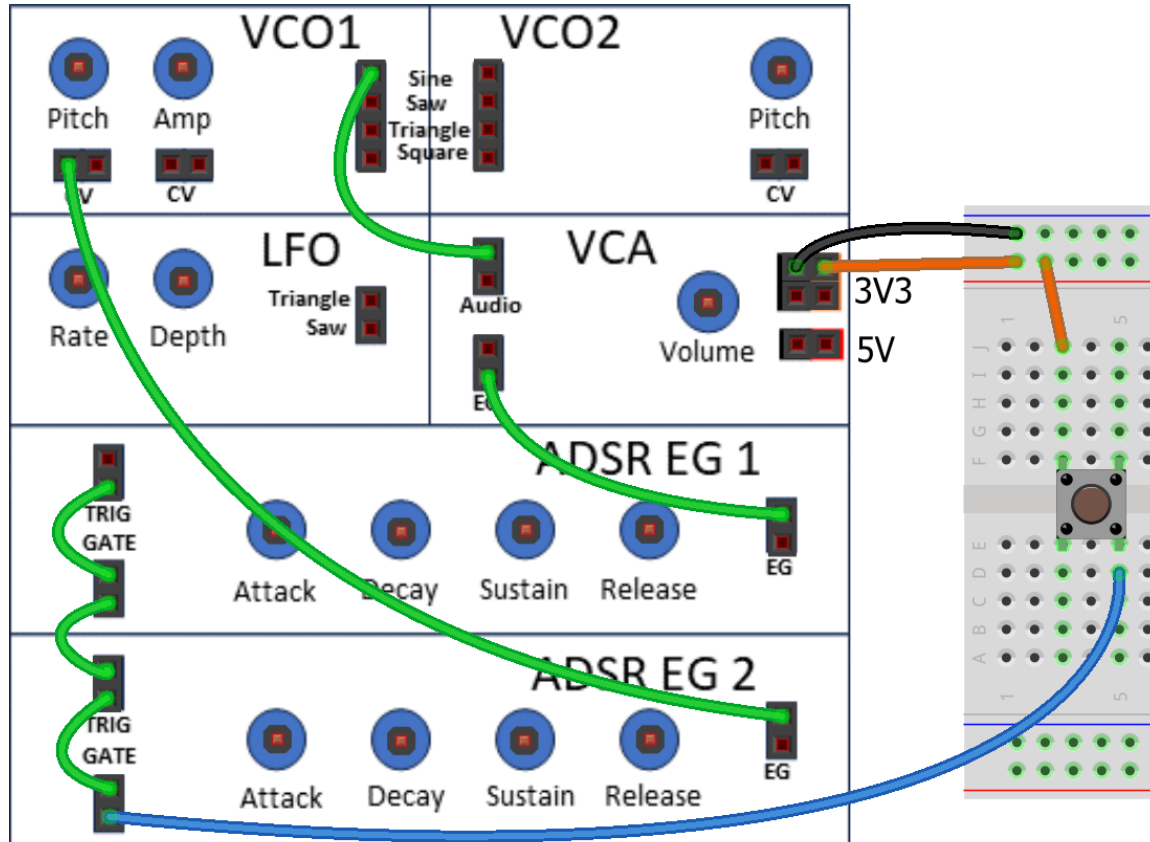
3. Dual VCO+LFO Pitch Modulation



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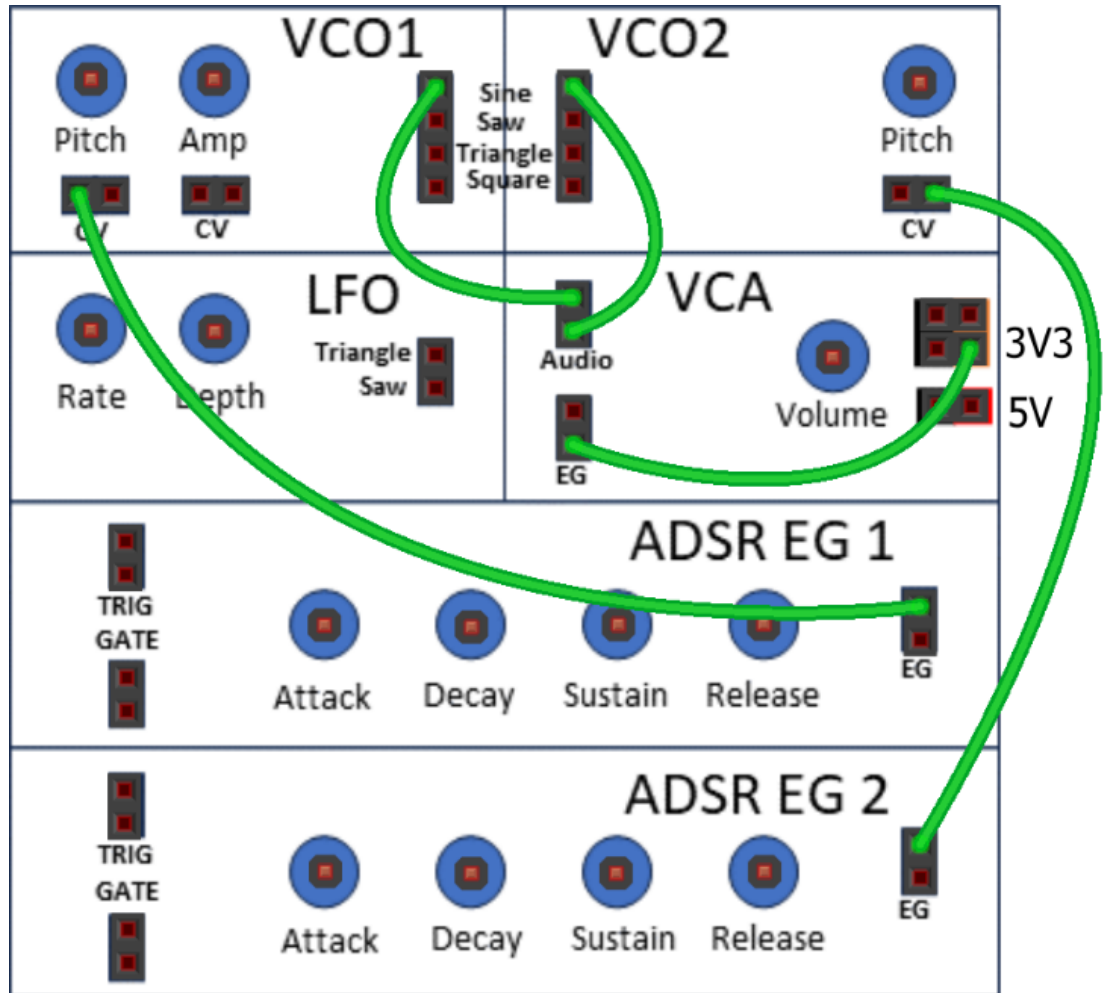
- Links VCO1 and VCO2 CVs.
- Turn LFO off and tune VCOs to 1 octave.
- Try LFO Rate and Depth.
- Try LFO waveforms.
- Connect one LFO waveform to VCO1 and one to VCO2.

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

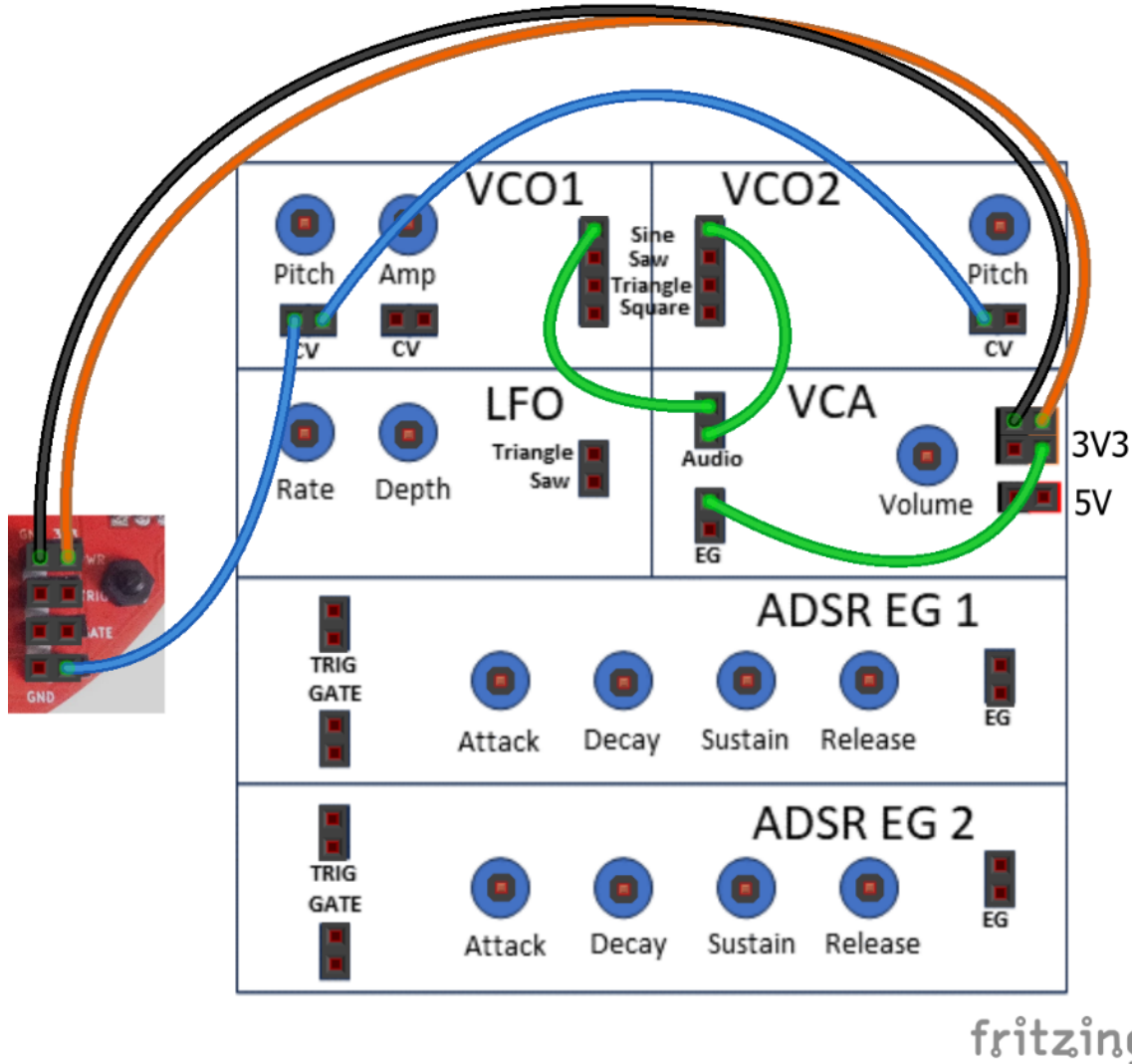


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- Start with:
 - Both Pitch controls turned right down.
 - Low Sustain (S) level on each EG.
- Play some notes.
- Experiment with:
 - Both sets of ADSR Settings.
 - Detuning VCO2.
 - Setting VCOs an octave apart.
 - Different waveforms.

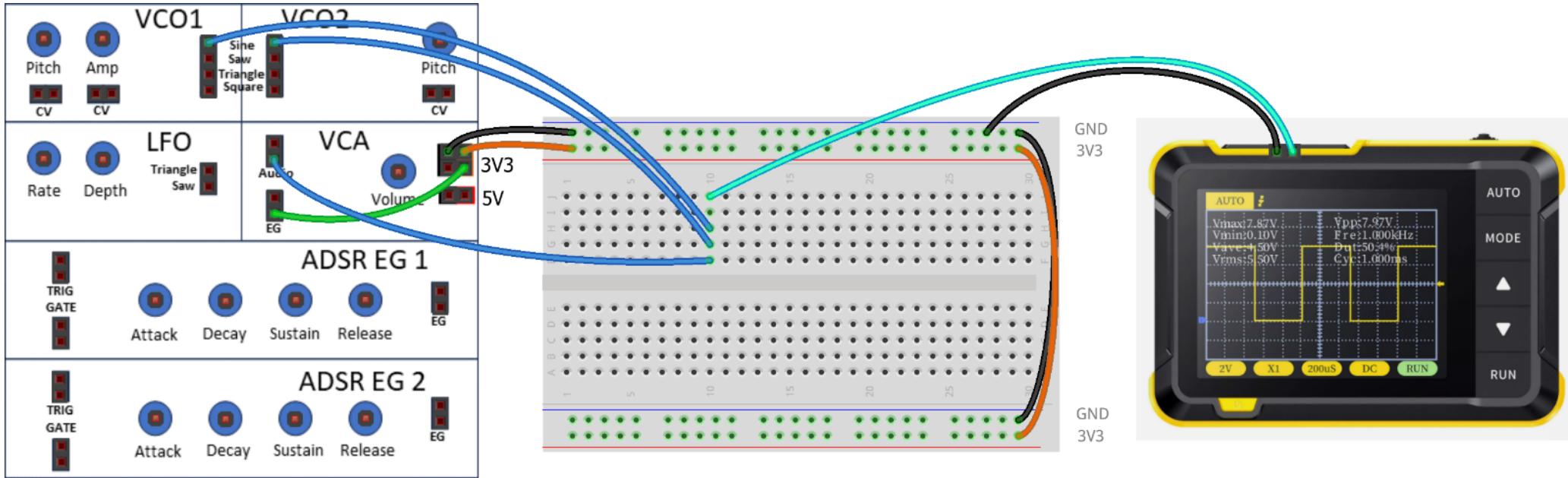


6. Dual Pitch Sequence



- 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



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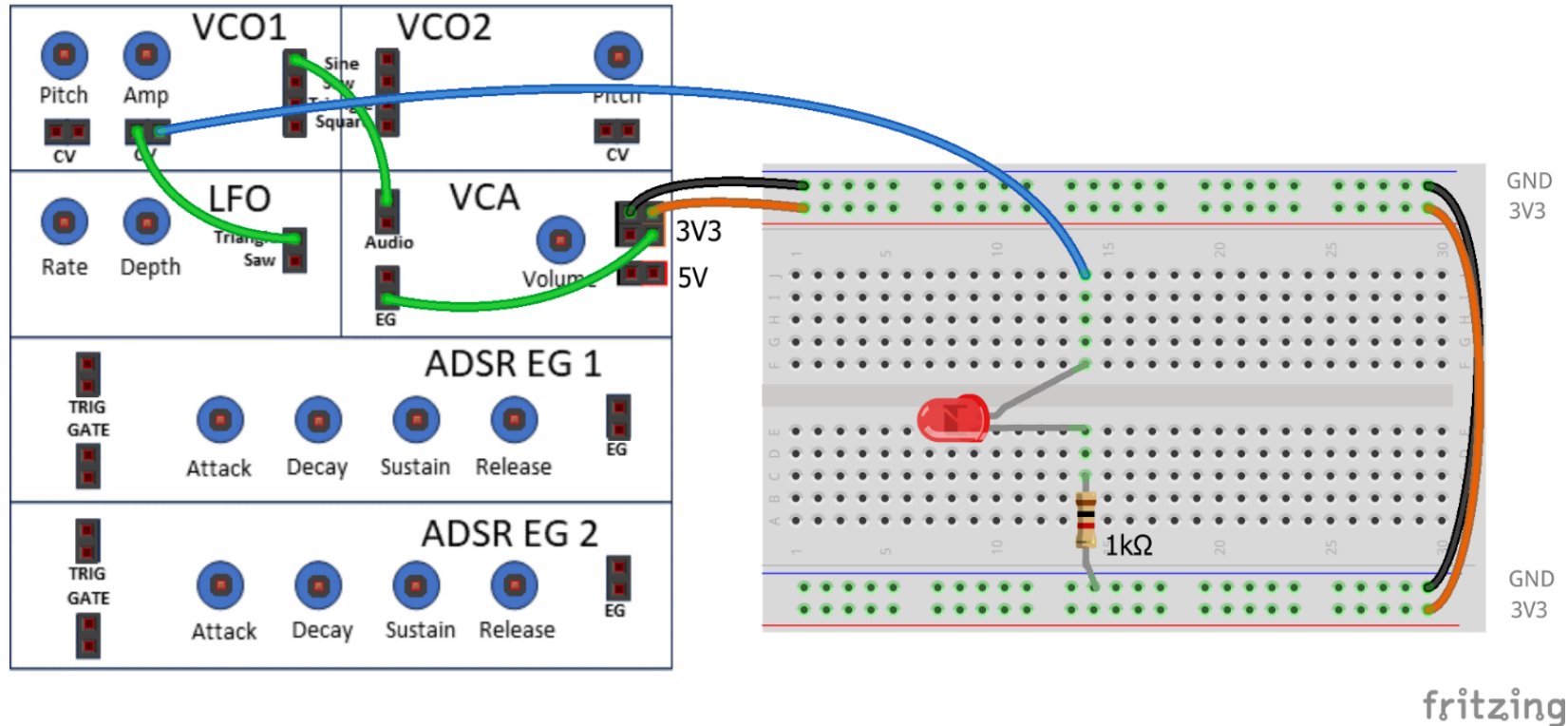
Setup:

- 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

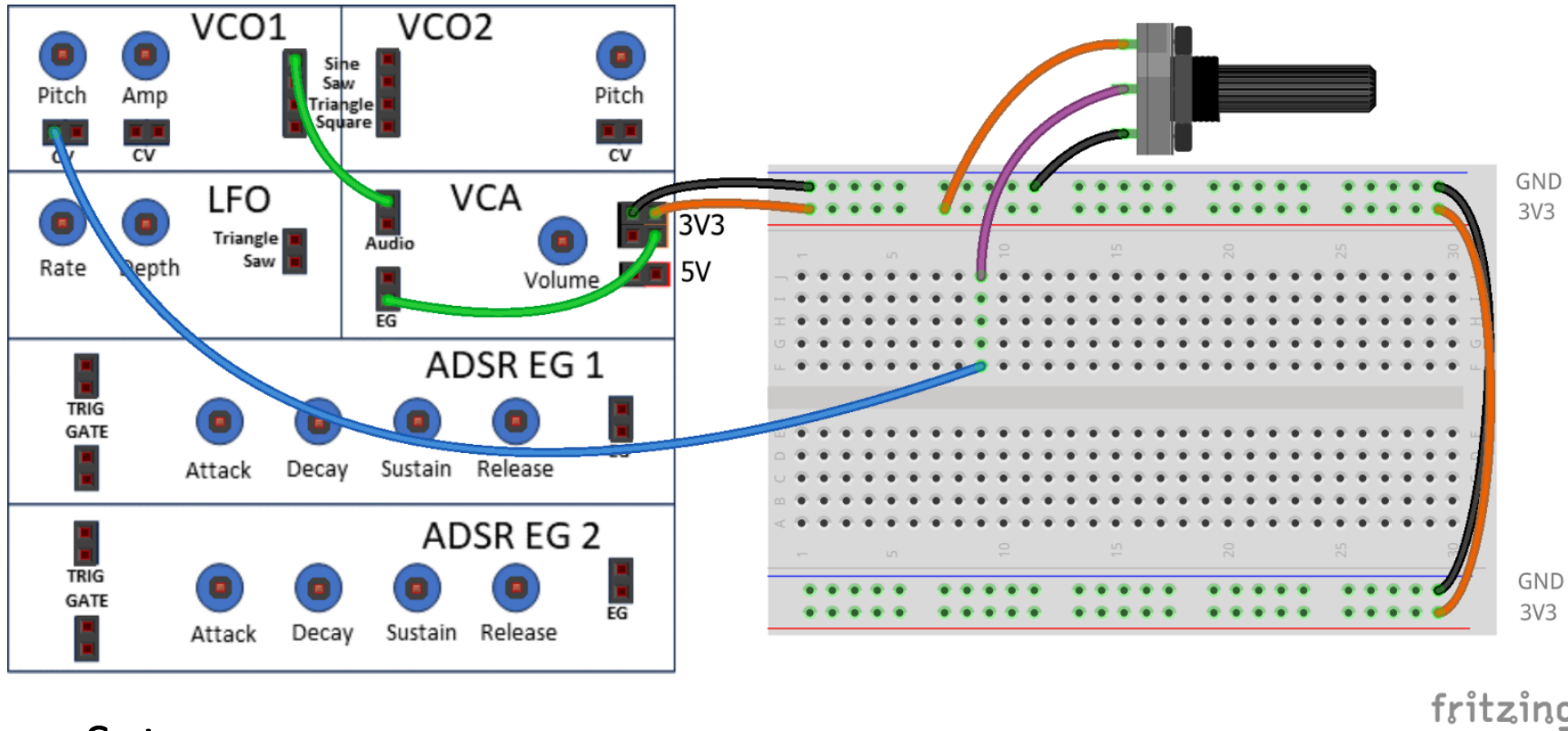


- Experiment with:
 - LFO Rate
 - LFO Depth
 - LFO Waveform
- Contrast fast rate with very slow rate.

Setup

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

9. Potentiometer Control

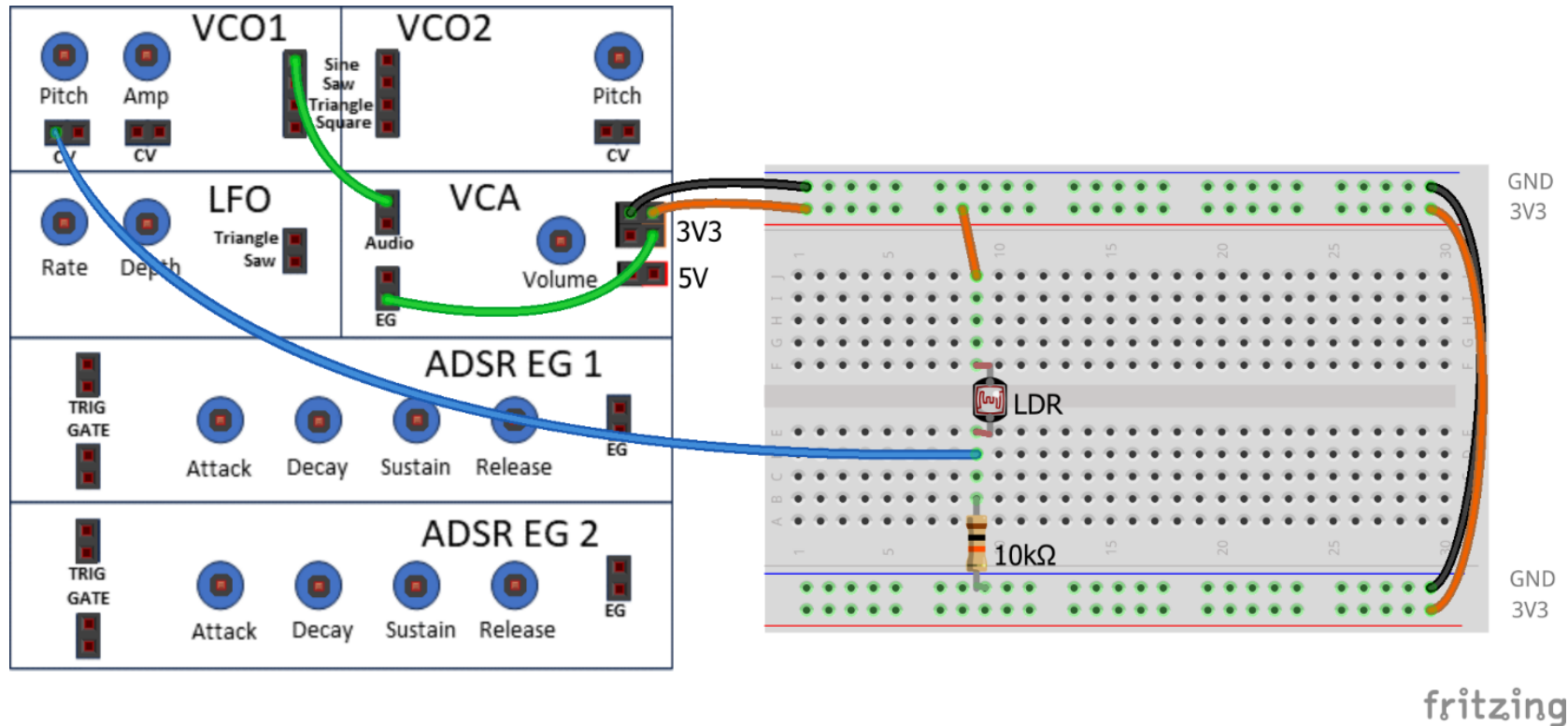


- Experiment with:
 - VCO1 Pitch
 - Pot Control
- Notice how the two add to each other...

Setup

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

10. Light Dependant Resistor Control

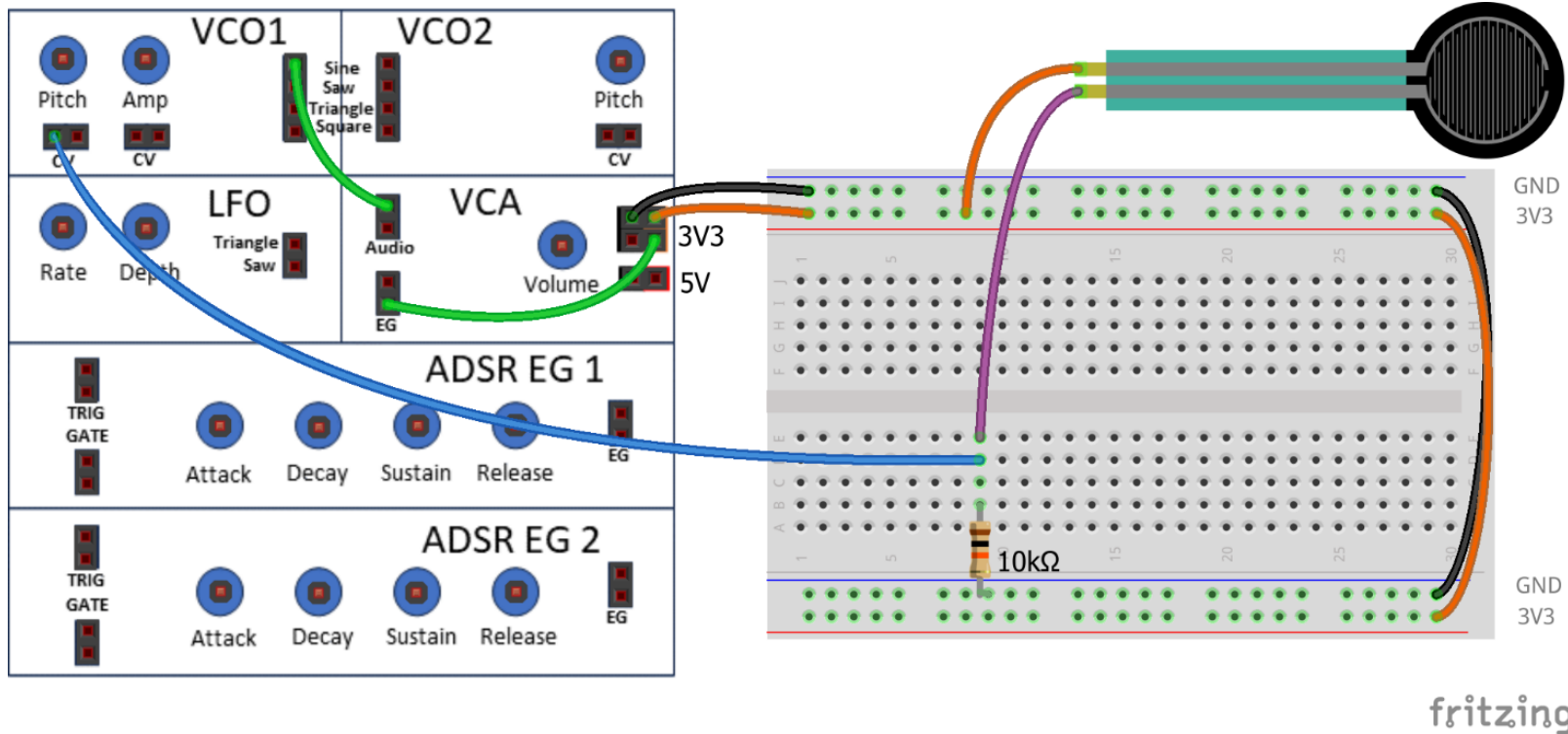


Setup

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

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

11. Force Sensitive Resistor Control

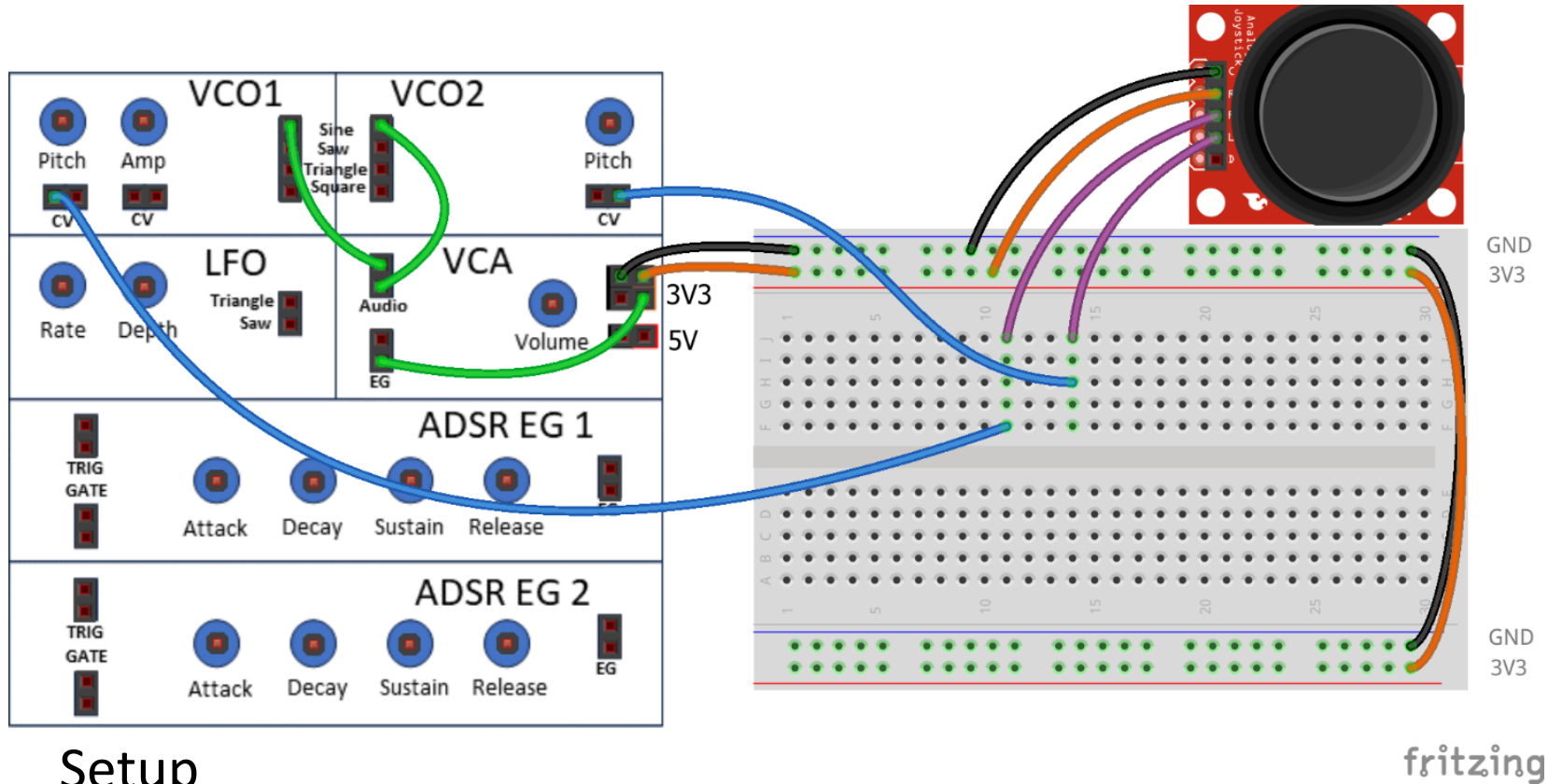


- Apply Pressure to the FSR...
- Now acts as a “pitch bend” for the Synth Thing.

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

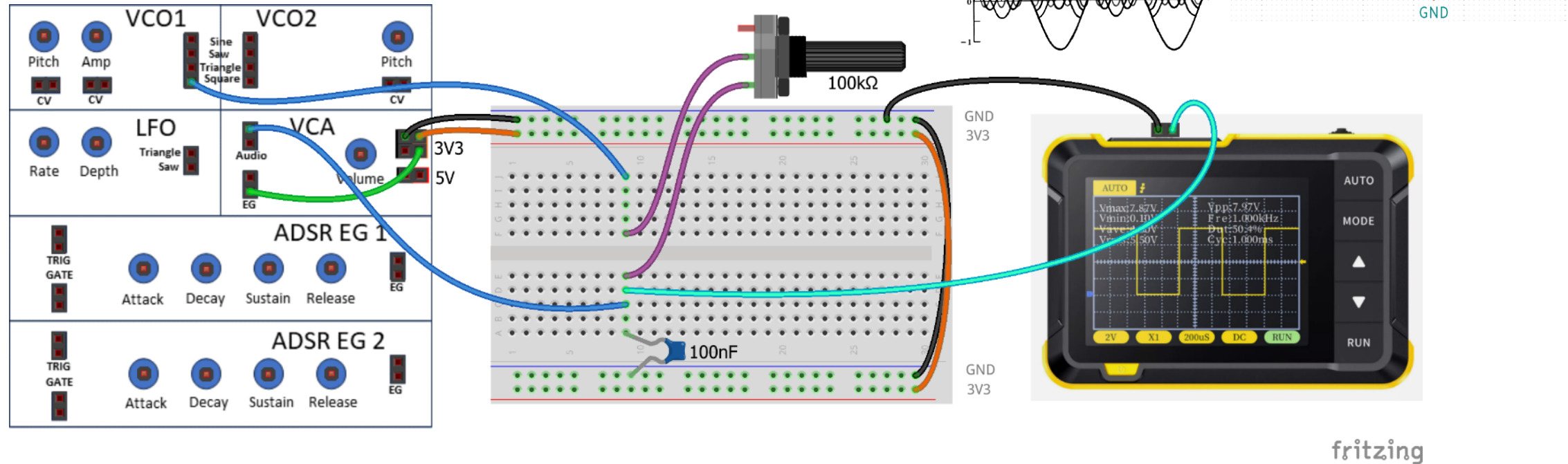


Setup

- “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.

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

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.