Session 9
Electroacoustic methods

VA309 Modular Sound Synthesis @ EKA
Aubery Lis

Informational / Organisational

Coursework 3 deadline this friday!

Please don't forget to send it in.

Today

First half: general discussion and demonstrations

Second half: practical exercise

Electro + Acoustic

- How does (acoustic) sound work?

- What should we use to convert that into an electric signal?

Electro + Acoustic

- **Transducer:** microphone, guitar pickup, piezo, speaker, …
- Transducers are on **both borders**! e.g…
  - *A **microphone** is an acoustic → electric transducer*
  - *A **speaker** is an electric → acoustic transducers*
- Many transducers work both ways! Like your headphones.
- Most transducers share one common weakness. What do you think it is?

Amplification

- One of the oldest ideas in electronics: "*make signal louder*"

- Deep research started with the invention of telephone, as the microphone's own output level is *miserably tiny*

- The signal gets amplified **along with all the noise** it has (bad!)

- Back in days: vacuum tube amps with insane noise on big gains

- Today: tiny solid-state integrated circuits (chips) with less noise

Levels

Over time, signals' amplitudes and volumes got standardized.

- **Line**: your computer's output, etc. 1 volt peak-to-peak, the "standard" across most devices

- **Instrument**: about 500 times weaker

- **Microphone**: about 1000 times weaker

  meanwhile…

- **Most audio in Eurorack is 5 to 10 Vpp** (5-10x line level)

A-119

- **Asymm (line) input** with 20x amplification

- **Audio output** (two copies)

- Amplitude **envelope** output

- **Gate** output

- **Symm (mic) input** with 500x amplification

- **Gain** (both symm and asymm)

- Gate detector **threshold** ("inverse sensitivity")

External audio through the modular!

Symm in:

- Microphones

- Guitars

- Piezos

Asymm in:

- Computers, phones, etc

- Other music hardware, like a groovebox

Extract CV and logic from external audio

- **Envelope detector**

  A control voltage that represents the incoming audio's amplitude (volume) is available at the Envelope Output. Louder audio = more voltage! Use it to control modules inside the system with your voice's loudness, etc
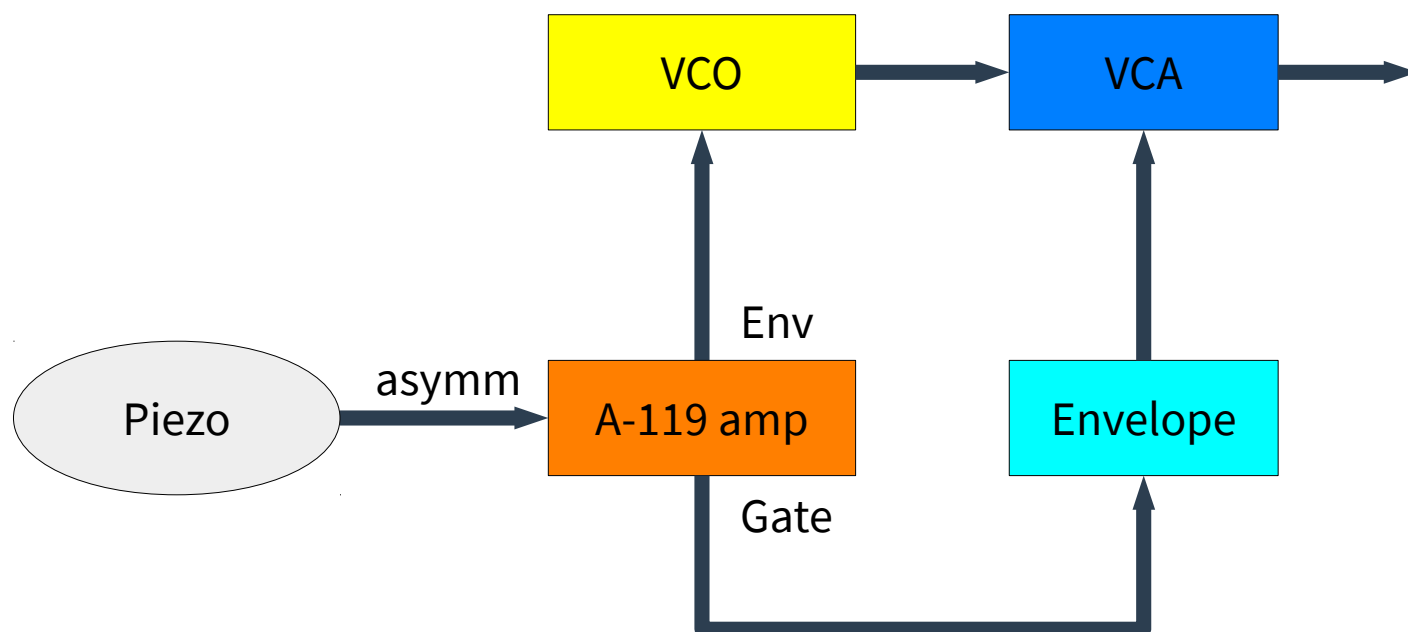
- **Gate detector**

  When the detected volume envelope crosses a set threshold, a gate signal is produced. Lower threshold → smaller envelopes get detected → quieter audio produces more gates!

Sloppy-robo voice processing patch
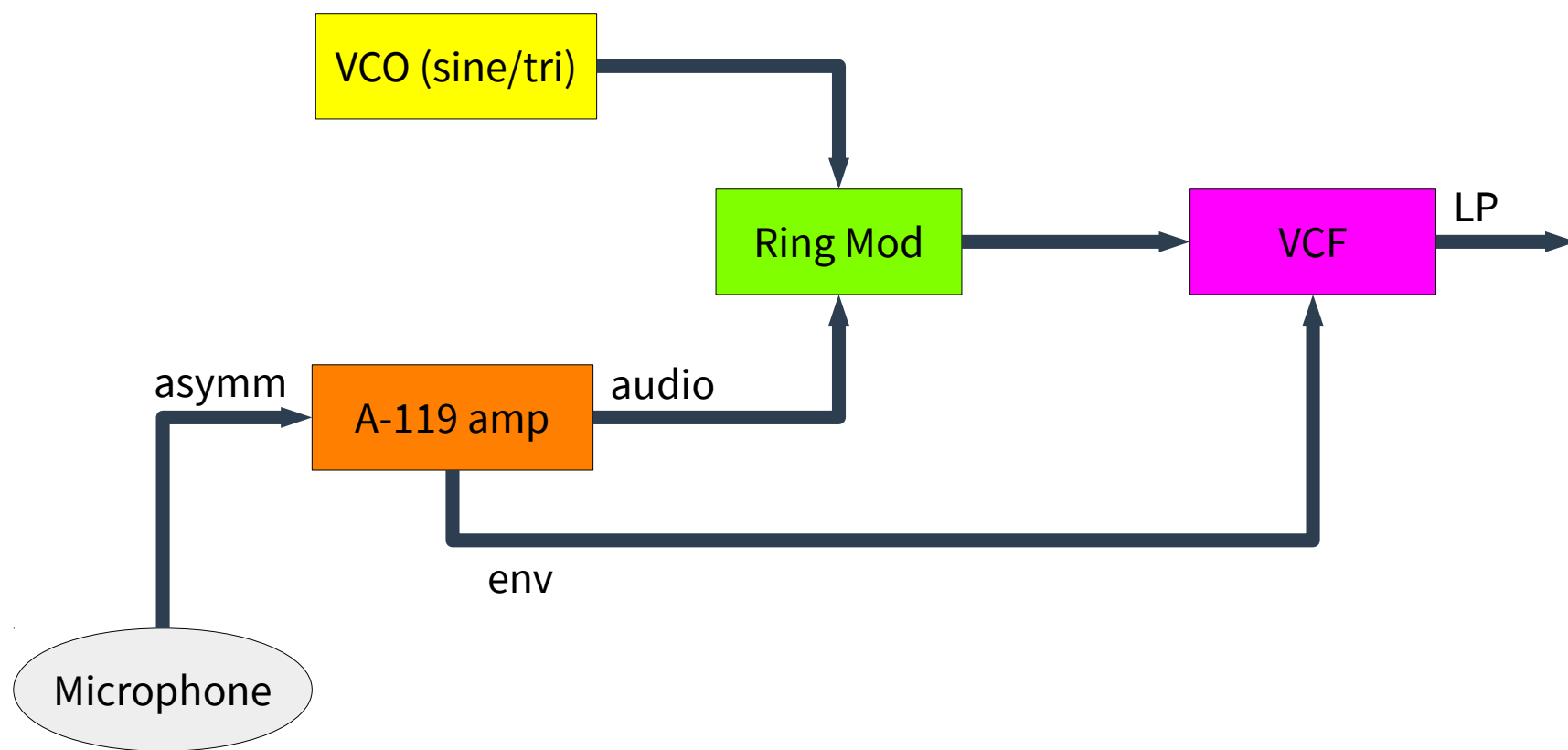
Piezo-based percussion

Exercise!

- Make your own patch that uses the A-119 interface

- Use your creativity: select your own application and patch

- The patch sheets from previous slides can be used as a reference!