
CHAOTIC
SIGNAL
PROCESSING

DSSISCLAIMAR

‹‹‹ DPP ON DSP

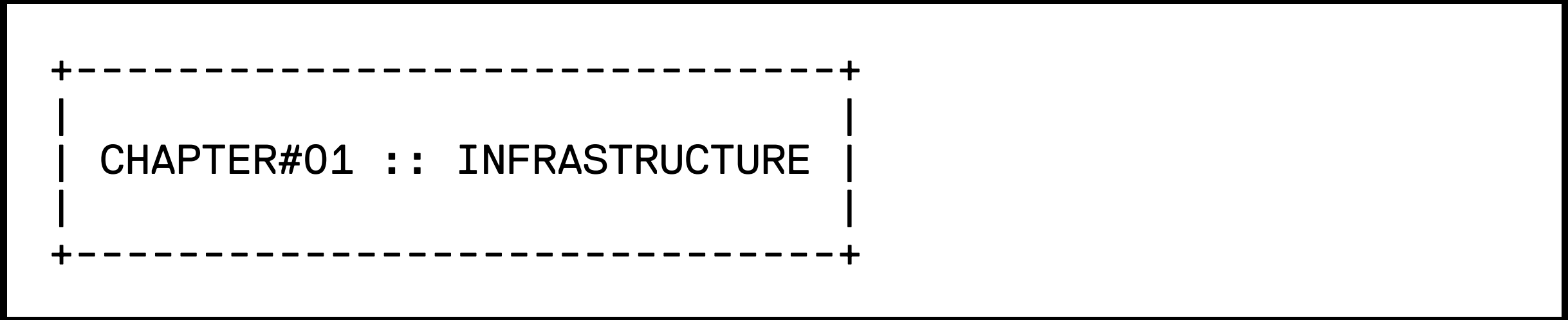
PREREQUISITE

- INSTALL WELLEN
- DOWNLOAD AUDACITY


CHAOTIC
SIGNAL
PROCESSING

CHAOTIC SIGNAL PROCESS (CSP)

C = CHAOTIC
S = SIGNAL
P = PROCESS


CHAPTER#01 :: INFRASTRUCTURE

REASON#1

LEARN THE VERY BASIC, BECOME LITERATE.
DO NOT JUST CONSUME BUT ALSO PRODUCE.

REASON#2

TRANSLATES WELL INTO OTHER CONTEXTS E.G MCU

HOW TO LEARN + USE DSP: MENTAL MODELS + PAPER (+ CHATGPT)

WHAT ARE SIGNALS?

›ROTATE YOUR HEAD TO THE SIDE‹

STREAM OF WAVES

THE SAMPLE

- CONTINUOUS TO DISCRETE
- TIME DOMAIN

#VISUALIZE

@AUDACITY
LOOK AT RECORDINGS
GENERATE TONE

ANATOMY OF A DSP SYSTEM

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ADC > PROCESSOR > DAC
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ANALOG TO DIGITAL CONVERTER (ADC)
PROCESSING UNIT (PROCESSOR)
DIGITAL TO ANALOG CONVERTER (DAC)
#VISUALIZE

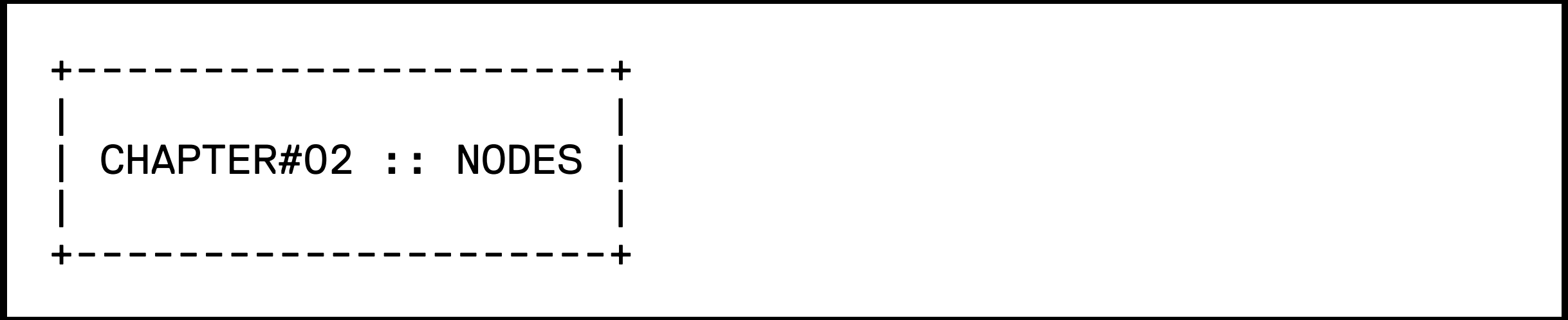
CONVENTIONS

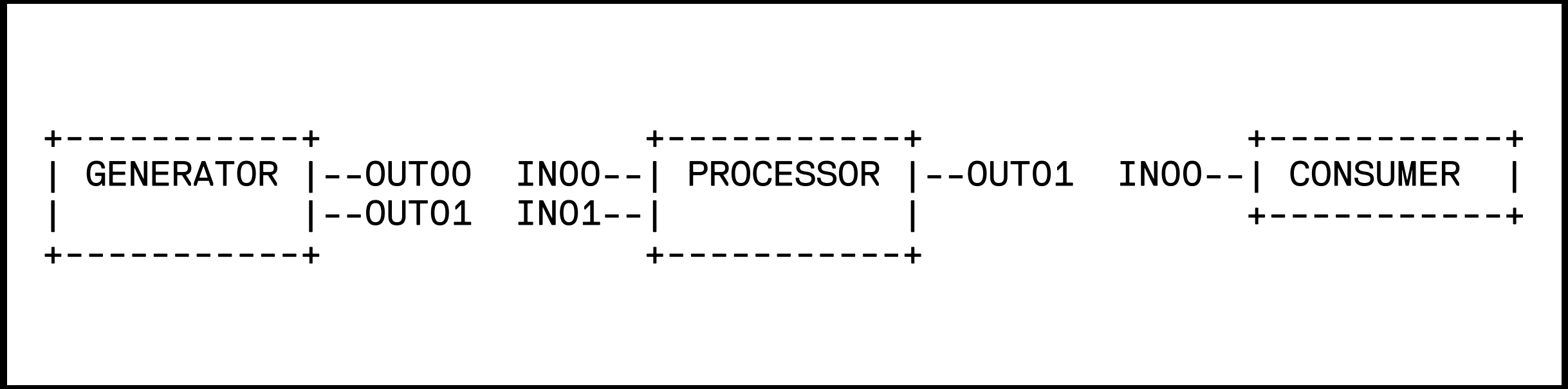
- VALUES ARE FLOATS
- RANGE FROM (-1.0, 1.0)
- SIGNAL ARE PROCESSED IN AUDIO BLOCKS
- SAMPLING RATE IS 48KHZ (BIT-DEPTH 16BIT)

PROCESSOR=IN+OUPUT-FUNCTION

- @WELLEN
- FLOAT AUDIO(FLOAT) {}
- MAGIC FUNCTION
- (E.G RANDOM)

#HANDS_ON


CHAPTER#02 :: NODES



3 KINDS OF NODES: GENERATOR, PROCESSOR, CONSUMER

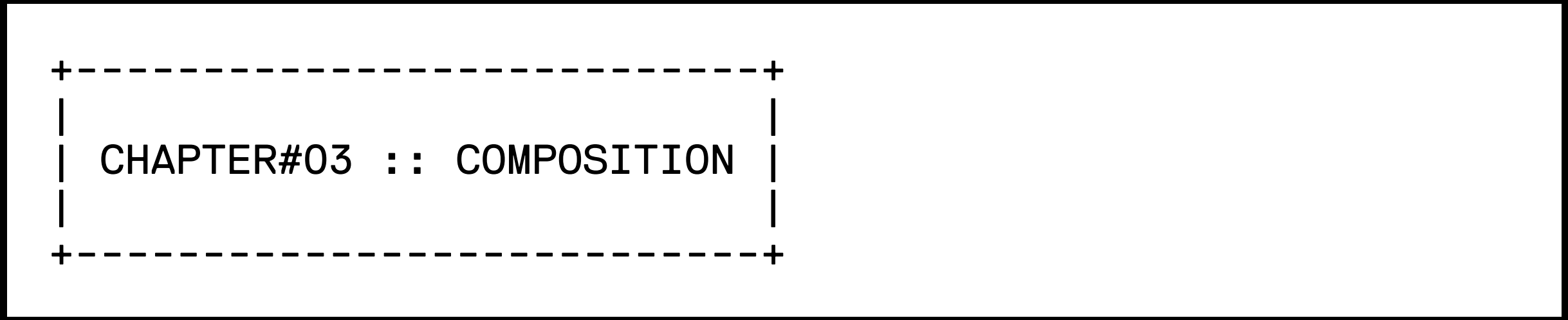
NODE CATEGORIES

- OSCILLATOR
- WAVETABLE
- NOISE
- FILTERS
- EFFECTS (E.G DISTORTION)
- ENVELOPE
- INSTRUMENTS

#VISUALIZE

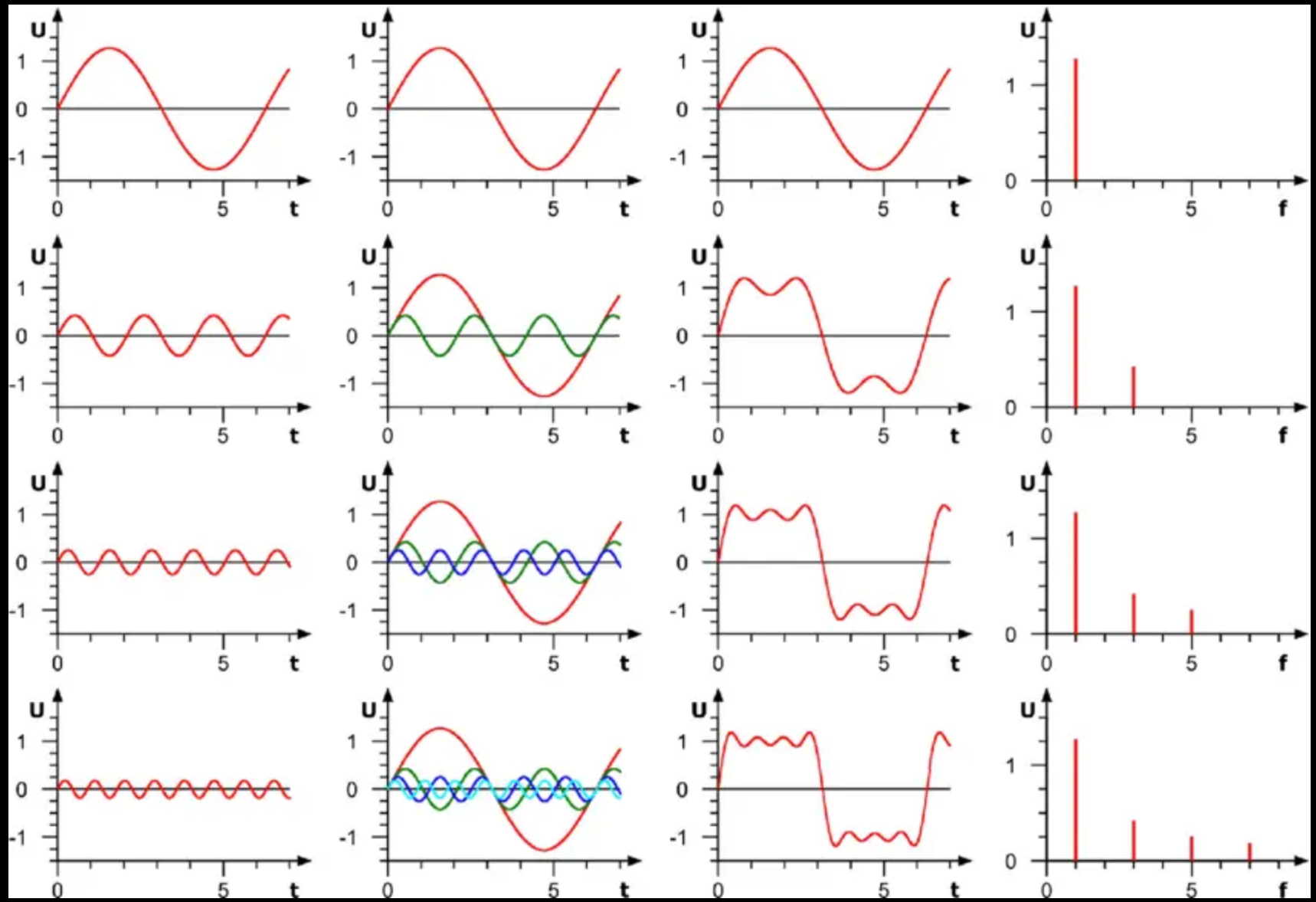
REASON#3
CREATE YOUR OWN NODES
#HANDS_ON
(E.G AMPLIFIER) #PYO

OBSERVE+MODIFY
#HANDS_ON


CHAPTER#03 :: COMPOSITION

- COMPOSING WITH NODES
- COMPOSING WITH STRUCTURES

ADDITIVE VS SUBTRACTIVE VS FM SYNTHESIS



ADDITIVE SYNTHESIS
#VISUALIZE
#HANDS_ON

STRUCTURES

- BEAT
- EVENTS/TRIGGER (MODULO)
- PATTERNS/ARPEGGIO
- LOOPS/PHASING

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LOOP_A: x---x---x---x---x---x---x---x---x---x---x---x---
LOOP_B: x--x--x--x--x--x--x--x--x--x--x--x--x--x--x--x-
LOOP_C: x----x----x----x----x----x----x----x----x----x---
```

REASON#4

GENERATIVE COMPOSITION CAN CREATE TRUELY COMPLEX STRUCTURES

REASON#5

SONIFICATION (DATA + PARAMETERS + INTERACTIONS)

ASK CHATGPT SOME QUESTIONS:

- CAN YOU LIST DIGITAL AUDIO EFFECTS?
- CAN YOU LIST DIGITAL AUDIO FILTERS?
- CAN YOU EXPLAIN ADDITIVE, SUBTRACTIVE AND OTHER FORMS OF AUDIO SYNTHESIS?
- WHAT MAKES A SQUARE WAVE A "COMPLEX" WAVEFORM?
- CAN YOU SHOW SOME DISTORTION ALGORITHMS?
- CAN YOU WRITE AN ALGORITHM IN C++ THAT PERFORMS AN OVERDRIVE DISTORTION?
- CAN YOU WRITE C++ CODE THAT EMULATES AN ANALOG SPEAKER DISTORTION?

IDEAS FOR EXPERIMENTS

- EXTERNAL DEVICES (MIDI, GUITAR, MULTI-CHANNEL)
- PLAYING WITH GUIS
- SIMPLE GRANUALAR SYNTHESIS (MANY FRAGEMENTS OF THE SAME SAMPLE)
- THE HUMAN VOICE (SYNTHESIZED, RECORDED)

#HANDS_ON