cedargrove_wavebuilder

A CircuitPython class to construct a ***synthio.ReadableBuffer*** composite wave table object from a simple list of fundamental and overtone frequencies, amplitudes, and wave types (sine, square, triangle, saw).
https://github.com/CedarGroveStudios/CircuitPython_WaveBuilder

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Implementation Notes

Software and Dependencies:

- µlab for CircuitPython
- Adafruit CircuitPython firmware for the supported boards: https://circuitpython.org/downloads

class cedargrove_wavebuilder.WaveBuilder(**, oscillators, table_length, sample_max=32767, lambda_factor=1.0, loop_smoothing=True, debug=False*)

The WaveBuilder class creates a composite ***synthio*** waveform table from a collection of oscillators. The table is created from a list of oscillator characteristics, sample length, maximum sample value, a lambda factor, and loop smoothing parameters. The waveform table is a ***synthio.ReadableBuffer*** of type 'h' (signed 16 bit).

Parameters:

- **oscillators** – A list of oscillator characteristics. Each oscillator is described as a tuple of wave shape, frequency or overtone ratio, and amplitude. The wave shape is specified by using a member of the ***WaveShape*** class (type: string). The floating point oscillator frequency is defined as either a frequency in Hertz or overtone ratio based on the fundamental (lowest) frequency. The amplitude is a floating point value between -1.0 and 1.0 (inclusive). Amplitude values less than zero will flip the phase of the resultant oscillator waveform 180 degrees. No default.
- **table_length** – The integer number of samples contained in the resultant waveform table. No default.
- **sample_max** – The maximum positive value of a sample, limited to a signed 16-bit integer value (0 to 32767). Default is 32767.
- **lambda_factor** – The number of fundamental oscillator wavelengths per wave table, useful to improve waveform rendering when an oscillator with a much higher frequency than the fundamental is included. Use cautiously since ***synthio*** expects a single wavelength to be contained in a wave table. Defaults to 1.0.
- **loop_smoothing** – Smooth the transition between the start and end of the waveform table to reduce loop distortion. Defaults to ***True*** (smooth the last two sample values in the waveform table).
- **debug** – A boolean value to enable debug print messages. Defaults to ***False*** (no debug print messages).

wave_table

The composite waveform wave table; ***synthio.ReadableBuffer*** of type 'h' (signed 16 bit). Read-only.

oscillators

The tuple list of updated oscillator characteristics. An oscillator tuple contains (wave_shape, frequency or ratio, amplitude).

table_length

The number of samples contained in the resultant waveform table.

sample_max

The maximum positive value of a sample, limited to a signed 16-bit integer value (0 to 32767).

lambda_factor

The number of fundamental oscillator wavelengths per wave table.

loop_smoothing

Smooth the transition between the start and end of the waveform table to reduce loop distortion.

loop_distortion

The loop distortion value. The value is based on the difference between the first and last sample values of the wave table, calculated as a percentage. Read-only.

summed_amplitude

The sum of all oscillator amplitudes. Read-only

debug

Enable debug print messages.

class cedargrove_wavebuilder.WaveShape

A collection of predefined wave shapes.

SubClasses:

- **WaveShape.Noise**
- **WaveShape.Saw**
- **WaveShape.Sine**
- **WaveShape.Square**
- **WaveShape.Triangle**