cedargrove_rangeslicer

A CircuitPython class for scaling a range of input values into indexed/quantized output values. Output slice hysteresis is used to provide dead-zone squelching.

The Slicer class is a general-purpose analog value converter that linearly compresses or expands the input then quantizes it into a collection of precise output slice values. To eliminate dead-zone noise issues, the class detects input value changes and applies selectable hysteresis when slice edge thresholds are reached. Applications include converting rotary knob position to discrete ranges of MIDI values, analog signal noise processing, level detection, and signal display.

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Implementation Notes

Hardware:

Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: https://github.com/adafruit/circuitpython/releases

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class cedargrove_rangeslicer.Slicer(*, *in_min=0, in_max=65535, out_min=0, out_max=65535, slice=1.0, hyst_factor=0.10, out_integer=False*)

Class representing the CedarGroveMaker rangeslicer.Slicer.

Parameters:	
	• **in_min** – The input range minimum. Can be any positive or negative value, smaller or larger than the input range maximum. Input range minimum and maximum values cannot be equal. Defaults to 0.
	• **in_max** – The input range maximum. Can be any positive or negative value, smaller or larger than the input range minimum. Input range minimum and maximum values cannot be equal. Defaults to 65535.
	• **out_min** – The output index minimum. Can be any positive or negative value, smaller or larger than the output index maximum. Output index minimum and maximum values cannot be equal. Defaults to 0.
	• **out_max** – The output index minimum. Can be any positive or negative value, smaller or larger than the output index maximum. Output index minimum and maximum values cannot be equal. Defaults to 65535.
	• **out_slice** – The size of an output index slice. Can be any positive or negative value other than zero. Defaults to 1.0.
	• **hyst_factor** – The size of the hysteresis threshold expressed as a factor of the slice size. Can be any positive or negative value. Defaults to 0.10 (10% of the slice size value).
	• **out_integer** – Truncates the output value to an integer data type. Boolean value. Defaults to False to allow a floating data type.

range_slicer(*range_in=0*)

The primary function of the Slicer class. Applies the slicer algorithm to an input value using the initialization parameters. Returns 1) the output index floating point value (default) or optionally truncated integer value and 2) a flag that is True when the output value is not equal to the previous result. This is the primary function of the Slicer class.

Parameters:	**range_in** – The input value to convert. Can be any positive or negative numeric value. Defaults to 0.

range_min(*in_min=0*)

Changes the default input range minimum to a new value.

Parameters:	**in_min** – The input range minimum. Can be any positive or negative value, smaller or larger than the input range maximum. Input range minimum and maximum values cannot be equal. Defaults to 0.

range_max(*in_max=65535*)

Changes the default input range maximum to a new value.

Parameters:	**in_max** – The input range maximum. Can be any positive or negative value, smaller or larger than the input range minimum. Input range minimum and maximum values cannot be equal. Defaults to 65535.

index_min(*out_min=0*)

Changes the default output index minimum to a new value.

Parameters:	**out_min** – The index output minimum. Can be any positive or negative value, smaller or larger than the output index maximum. Output index minimum and maximum values cannot be equal. Defaults to 0.

index_max(*out_max=65535*)

Changes the default output index maximum to a new value.

Parameters:	**out_max** – The output index maximum. Can be any positive or negative value, smaller or larger than the output index minimum. Output index minimum and maximum values cannot be equal. Defaults to 65535.

index_type(*out_integer=False*)

Changes the default output index data type to a truncated integer (True) or floating (False).

Parameters:	**out_integer** – Truncates the output value to an integer data type. Boolean value. Defaults to False (floating data type).

slice(*size=1.0*)

Changes the default slice size to a new value.

Parameters:	**size** – The size of an index output slice. Can be any positive or negative value other than zero. Defaults to 1.0.

hysteresis(*hyst_factor=0.25*)

Changes the default hysteresis threshold to a new value.

Parameters:	**hyst_factor** – The size of the hysteresis threshold expressed as a factor of the slice size. Can be any positive or negative value. Defaults to 0.10 (10% of the slice size value).