cedargrove_nau7802

A CircuitPython class for operating the Cedar Grove NAU7802 24-bit ADC load cell sensor FeatherWing.

The Cedar Grove NAU7802 FeatherWing is a high-precision 24-bit ADC with analog inputs designed for load cell Wheatstone bridge differential signals. The FeatherWing accepts input from up to two load cells, providing gain management, reference voltage selection, and channel calibration/offset functions. Applications include a variety of mass measurement and calculation devices from simple weighing scales to motor rotary torque calculations.

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Implementation Notes

Hardware:

Software and Dependencies:

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

class cedargrove_nau7802.NAU7802(*, *i2c_bus*, *address=0x2A*, *active_channels=1*)

Class representing the CedarGroveMaker NAU7802.

Parameters:

- **i2c_bus** – The I2C data and clock bus signals as defined in the host device's ***board*** definition. Typical value is ***board.I2C()*** . No default value.
- a**ddress** – The I2C bus address. Defaults to ***0x2A*** (d42).
- **active_channels** – The maximum number of active analog differential input channels used. The Cedar Grove NAU7802 FeatherWing supports either one or two input channels. Can only be a positive integer with a value of ***1*** or ***2***. Defaults to ***1***.

read()

The primary function of the NAU7802 class. The ***read()*** function captures the latest 24-bit data acquired, sets the ADC data-availability status to ***False***, and returns a signed integer value. The ***read()*** function does not check the ADC data-available status nor does it initiate a data acquisition cycle.

available()

Determines the ADC data-availability status. Returns ***True*** when new data is available to read. The ***available()*** function does not initiate a data acquisition cycle.

enable(*power=True*)

Enable(start) or disable(stop) the internal analog and digital systems power. The device enters a low-power standby mode when disabled but preserves calibration information and maintains I2C communications. The device starts a 750msec power-up cycle when ***power=True***. The device will initiate a 10msec shutdown process when ***power=False***. Returns ***True*** when power is enabled; ***False*** when disabled.

Parameters:	**power** – The power enable/disable state. Accepts a ***True*** or ***False*** Boolean value. Defaults to ***True*** (power enabled).

calibrate(*mode='INTERNAL'*)

Perform the calibration procedure. Valid calibration modes are ***'INTERNAL'***, '***OFFSET'***, and ***'GAIN'***. Returns ***True*** if the calibration process was successful; ***False*** if an error occurred. For sensitive applications, calibration is recommended whenever the input channel is changed or when ambient conditions may cause measurement drift.

Parameters:	**mode** – The device calibration process to initiate. The following string values are accepted: ***'INTERNAL'*** — Ignore analog input signals and calibrate the the input offset using an internal reference voltage. This is the default calibration setting. ***'OFFSET'*** — Measure and store the external analog input offset for the selected channel. Analog input signals must be held at a zero input value during external offset calibration. Useful for determining the zero offset of an attached load cell bridge. ***'GAIN'*** — Measure and store the external gain setting of the selected channel required for full-scale. Analog input signals must be held at the equivalent full-scale value during external gain calibration. Useful for determining the gain needed to calibrate a weighted load cell at its maximum sensor range.

reset()

Resets all internal device registers and enables digital system power. Returns the power ready status Boolean value: ***True*** when the device is ready; ***False*** if not ready. All device registers are reset to the NAU7802 default settings including calibration offset and gain settings. It is not usually necessary to use the ***reset()*** function since it is executed as part of the class initialization process.

channel

A class property.

Parameters:	**channel** – Change or read the numeric value of the currently selected external analog input channel. Valid external input channel numeric values are ***1*** or ***2*** representing the NAU7802 FeatherWing's **CELL_A** and **CELL_B**, respectively. Selection of the second input channel requires ***active_channels=2*** when the class is instantiated. Defaults to ***1***.

ldo_voltage

A class property.

Parameters:	**ldo_voltage** – Change or read the representative value of the currently selected internal low-dropout (LDO) regulator's analog power and conversion reference voltage (AVCC). Valid string values are ***'2V4'***, ***'2V7'***, and ***'3V0'***, representing 2.4, 2.7, and 3.0 volts. Defaults to ***'3V0'***.

gain

A class property.

Parameters:	**gain** – Change or read the value of the currently selected programmable gain amplifier (PGA) gain setting. Valid numeric values are ***1***, ***2***, ***4***, ***8***, ***16***, ***31***, ***64***, and ***128***. Defaults to ***128***.