### Proof Of Concept Pressure Sensor Paddles using strain sensor and ADC - Arduino Nano / CS1237 ADC implementation

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#### Goal:

Powerful and flexible keyer with built-in reliable iambic paddle, easily built without specialised mechanical (machining) skills.

#### Why load sensor:

* Load sensor based paddle is self calibrating, sensitivity is adjustable from command line interface separately for dot and dash.
* In order to reduce backslash, existing mechanical paddle design utilize ball bearings. It is an overkill as angular (rotational) movement is almost non-existent.
* Mechanical contacts prone to bouncing.
* Minimal contact distance (0.1 mm) and minimal force (10 grams) difficult to maintain with mechanical paddles.
* More reliable compared to capacitive touch paddle, behaves like usual mechanical paddle.
* Sensor paddle is an order of magnitude cheaper than mechanical paddles.

#### Features:

* All [K3NG capabilities](https://github.com/k3ng/k3ng_cw_keyer/wiki) available.
* Equally suitable for beginners and experts.
* Affordable, off the shelf, load sensor and ADC components.  
  ( total approx. 10 USD CHF for two ADC and two sensors ( ADC 2x1.3 USD, sensor 2 x 2~3 USD ))
* Boards: “compatible” Nano board 1.8 CHF ; “compatible” ESP32 approx. 3-4 USD
* Can be developed as add-on to existing K3NG kits.

#### Two Prototypes:

1. Implementation [based on ESP32 based k3ng keyer - SP5IOU](https://github.com/djbr1/K3NG-Arduino-Keyer-ESP32_PlatformIO) has OLED SSD1306 display and command line interface over Bluetooth, allowing parameter change from [Android Bluetooth Seria Terminal](https://play.google.com/store/apps/details?id=de.kai_morich.serial_bluetooth_terminal) or [Web Serial](https://github.com/ok1cdj/K3NG-keyer-serial-terminal) (using Chrome) . Uses Hx711 ADC.
2. [Arduino nano implementation](https://github.com/djbr1/k3ng_cw_keyer), allows parameter change through USB interface using [Android Serial Terminal app](https://play.google.com/store/apps/details?id=de.kai_morich.serial_usb_terminal) or [Web Serial](https://github.com/ok1cdj/K3NG-keyer-serial-terminal) (using Chrome) . [CS1237 ADC](https://github.com/tremaru/iarduino_ADC_CS1237) is used.  
   [**Schematic diagram**](https://github.com/djbr1/k3ng_cw_keyer/blob/master/k3ng_keyer/ADC_CS1237/k3ng_keyer_nano_cs1237.sch_2024-09-17.pdf) (based on OK1CDJ nano keyer implementation)

#### TODO:

* PCB design
* BoM for additional components
* physical buttons as required
* optocouplers and 3.5 mm jacks for PPT and TX line
* RFI/EMI shielding
* “paddle only” output if transceiver builtin keyer is preferred

#### Pictures and videos [Youtube video showing paddle sensitivity](https://www.youtube.com/watch?v=UNnNl10UAn8) [Sensitivity demo](https://www.youtube.com/watch?v=UNnNl10UAn8)