CG-PiScale

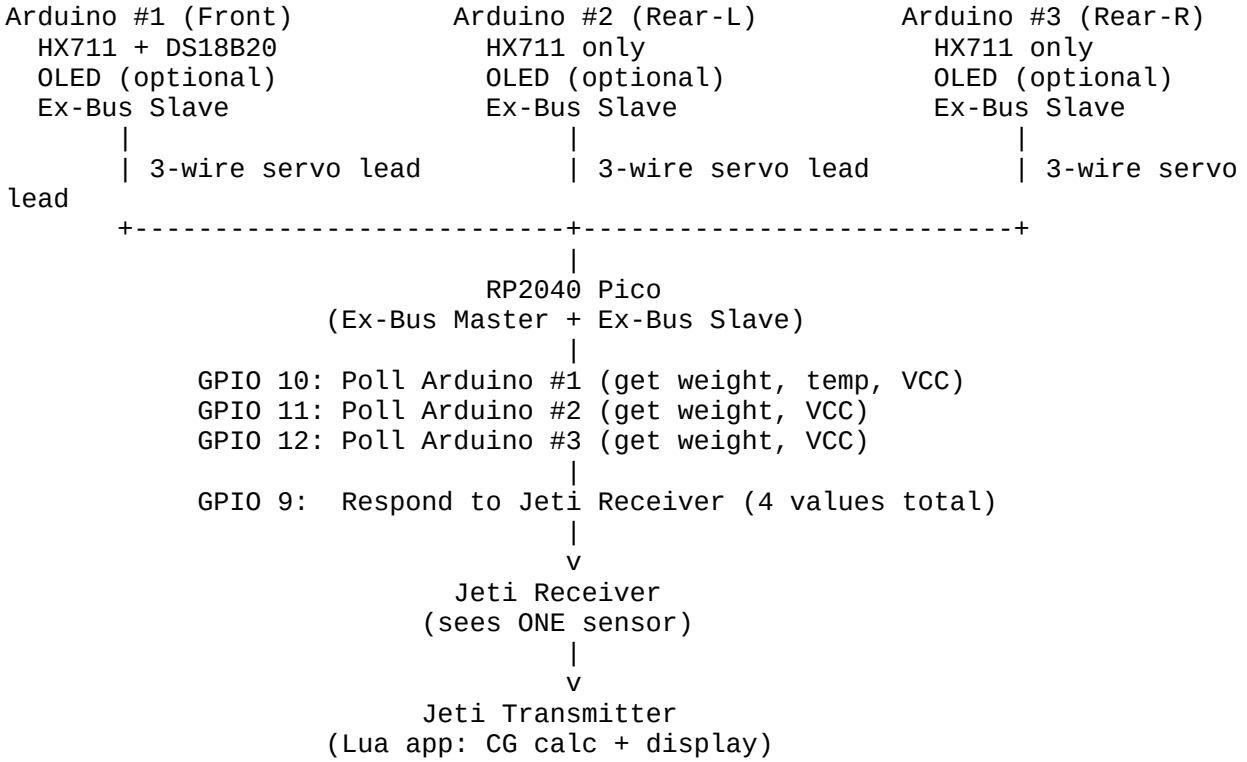
A Jeti Ex-Bus Center of Gravity scale system for model aircraft using RP2040 bridge and Arduino sensor nodes.

What It Does

CG-PiScale measures aircraft center of gravity by:

- Reading weight from 3 load cells via Arduino Pro Mini sensor nodes
- Each Arduino node: HX711 + load cell + optional DS18B20 temperature + OLED display
- RP2040 bridge aggregates data from 3 Arduino nodes via Ex-Bus master
- RP2040 presents combined data to Jeti receiver as single Ex-Bus slave sensor
- Jeti transmitter runs Lua app for CG calculation, display, and data logging

System Architecture



Hardware Requirements

RP2040 Bridge

- Raspberry Pi Pico (RP2040 or RP2350)
- Micro-USB cable for programming
- Power from Jeti receiver (5V via servo lead) or separate 5V supply

Sensor Nodes (3x Arduino)

- Arduino Pro Mini 328p @ 16MHz (Pro Mini Schematic)

- HX711 24-bit load cell amplifier
- Load cells (5-10kg rating typical)
- DS18B20 temperature sensor (only on node #1)
- 0.96" I2C OLED display 128x64 (optional, for debugging)
- 5k-ohm resistor for half-duplex Ex-Bus (TX/RX bridge)
- 3-wire servo leads for connections

Jeti Integration

- Jeti receiver with Ex-Bus capability
- Standard servo lead connectors

Alternative Approach (Not Pursued)

The repository also contains a Raspberry Pi-based approach using Python for Ex-Bus protocol implementation. This approach was explored but not implemented in favor of the RP2040 bridge architecture. The Raspberry Pi code remains in the repository for reference but is not part of the current system design.

Software Stack

Arduino Sensor Nodes (`/firmware/platformio/`)

- **Hardware:** Arduino Pro Mini 328p @ 16MHz
- **Sensors:** HX711 load cell amplifier + DS18B20 temperature sensor (node #1 only)
- **Display:** Optional I2C OLED (128x64) for debugging
- **Library:** nichtgedacht/JetiExBus - proven working Ex-Bus implementation
- **Connection:** 5k-ohm resistor between TX/RX for half-duplex Ex-Bus
- **Build System:** PlatformIO
- **Status:** Working - responds to Ex-Bus polls from Jeti receiver

RP2040 Bridge (`/firmware/rp2040-bridge/`)

- **Hardware:** Raspberry Pi Pico (RP2040)
- **Base:** mstrens/oXs_on_RP2040 test branch
- **Features:** PIO state machines for precise Ex-Bus timing
- **Dual Role:** Ex-Bus master (polls 3 Arduinos) + Ex-Bus slave (responds to Jeti receiver)
- **Build System:** CMake + Pico SDK
- **Status:** Cloned, ready for development

Jeti Transmitter (`/lua/`)

- **Platform:** Jeti DS-16/DS-24 transmitter
- **Language:** Lua
- **Features:** CG calculation, tare, configuration storage, data logging
- **Status:** Planned