Affordable 32 channel portable wireless electrophysiology recording system with Open Ephys GUI plugin enables labs with limited research resources to participate in untethered research.

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Introduction

32 channel battery powered wireless recording systems are prohibitively expensive. Especially so for labs in underserved locations with limited research resources.

DSPW is currently developing low-cost battery powered Wi-Fi recording systems for electrophysiology experiments using Intan RHD2132/16 head-stages and ICs.

We focus on small battery powered portable wireless Hw designs that target 32 channels or less.

Leveraging the Brain Initiative funded Open Ephys GUI we have developed a plugin for DSPW portable WiFi products.

The OpenSource DSPW RCB-LVDS plugin allows users to have waveform display, processing, and recording of WiFi streaming data from DSPW Wi-Fi devices.

Our solution is designed to facilitate untethered, awake, behaving recordings in university lab environments.

Why affordable tools are needed

Cost is a barrier to increasing the number of untethered behaving research experiments.

Affordable devices encourage increased experimentation.

Limited resource labs can afford multiple low-cost systems.

Inexpensive, quick, lab assessment of pros/cons that are present when using a wireless battery powered system.

For example:
Recharging batteries and management of Wi-Fi spectrum, router and antenna present new challenges that may change how an experiment is designed.

Time length of experiment must be in line with capacity of battery. Capacity is directly related to size and weight.

May need secluded test area away from other Wi-Fi and RF interference. Not near the lab microwave oven!

DSPW RCB WiFi OE GUI plugin

Select, display and record 32 RHD channels @ 20 ksps per channel, up to16 RHD channels @ 30 ksps

Intan RHD Lower/Upper Bandwidth, DSP HPF cutoff and Sample Rate selection controls.

RCB Wi-Fi module Power Amp attenuation control.

Status shows Network Packet, Battery, Intan RHD health.

TCP HTTP Post for command and control, UDP data packet. Open network API and data packet format.

MIT MWorks IO device support for remote network triggering and synchronization with other systems.

Release planned in Q3 2023. Install using Open Ephys plugin installer. Win10 and MacOS. Open Source.

Work in progress. Plugin features continue to evolve.

DSPW RCB WiFi LVDS Hw module

2.4GHz 802.11n IoT RFSoC Wi-Fi module with DSPW custom firmware. Works with COTS 2.4GHz Wi-Fi routers.

12 pin Omnetics Nano LVDS SPI connector. Connects to existing Intan RHD2136/16 head-stages and cables.

Simple to use Web browser interface for Wi-Fi network SSID and WPA2 password provisioning.

Removable, rechargeable battery provides 3+ hours of 32 channels @ 20 ksps continuous data. 24+ hrs of standby.

NB-11L rechargeable battery & charger available at Amazon. Clever reuse of a digital camera battery.

2.0" x 1.5" x 0.55" package is suitable for jacket / backpack mount on rat or larger animal models.

Battery power + wireless = no yucky ground noise!

Contact DSPW for info on Hw design variants.

DSPW RCB WiFi recording system

Open Ephys GUI Source plugin - Win10, MacOS NEW!
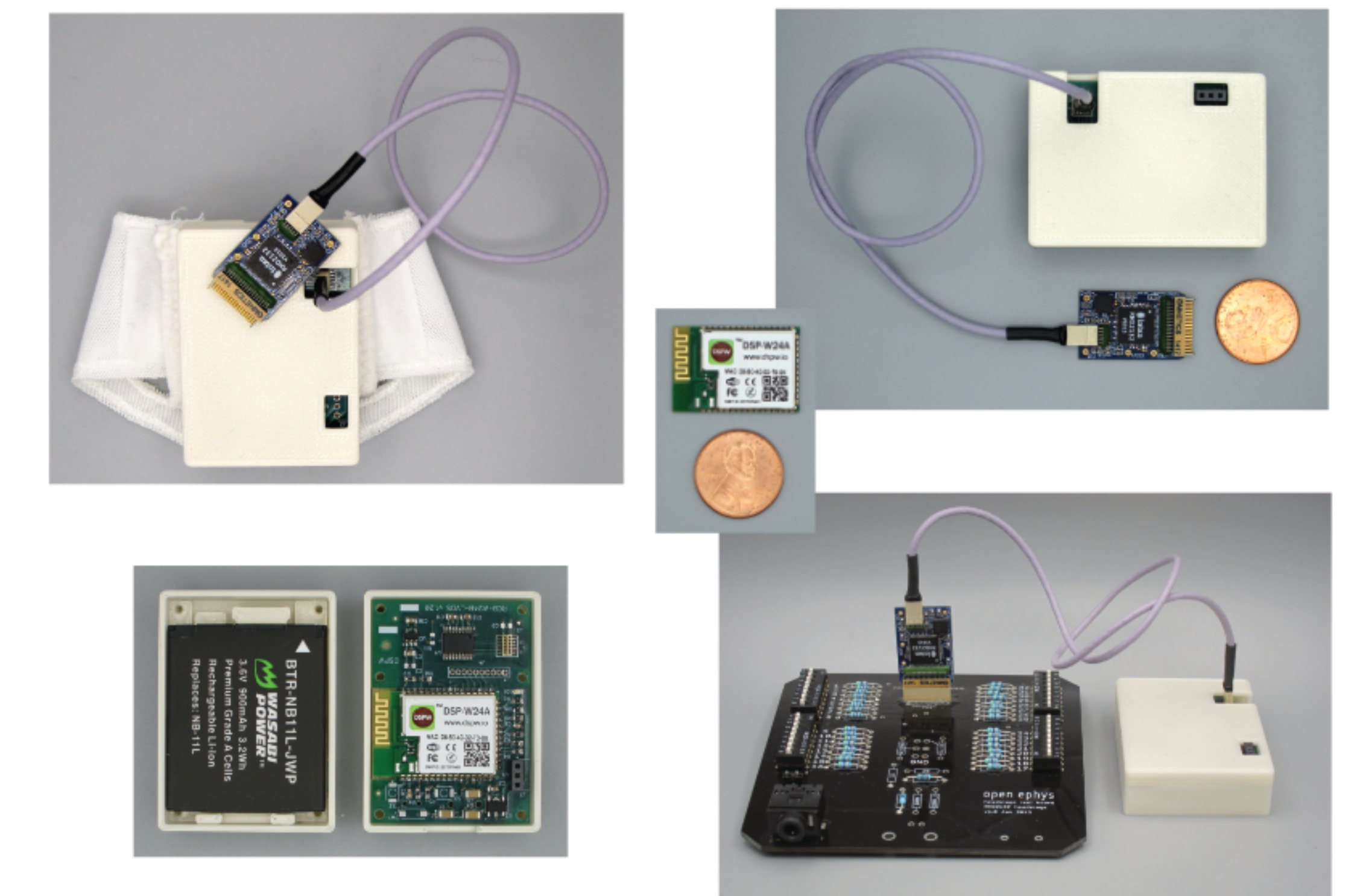
RCB Wi-Fi LVDS module connected to Intan RHD2132 headstage.