ScienceBeam **is a forefront of technology provider of innovative solutions of electrophysiology system**

Electromodule® Data Acquisition System

Incredibly powerful. By design.

Electromodule is a General purpose data acquisition system for recording action potential (Spikes), Field Potential, EEG, ERP, ECG and EMG signals, and signal modulation by external digital events.
Electromodule is usable for Rat, Monkey and other Primates electrophysiology recording
Electromodule is your best option for vision Science researches.
Electromodule Device is designed at least a combination of twenty-five different devices in one package.
They are microelectrode amplifier, stimulator isolator, impedance meter pulse generator, digital and analog scope, amplitude window discriminator, delay line, data acquisition and powerful online spike sorting for signal Clustering.
And whatever is necessary for a good recording of one single or array electrode.
Design of Microelectrode amplifier is optimized for low noise, high dynamic range, and low power dissipation. The novel aspect the amplifier is its ability to record EEG, LFP and single-unit signals simultaneously from the stream of one electrode by one ADC channel with 24 bit precision.
We designed a specific digital impedance meter only one click is enough to see electrode impedance inside the tissue.

You can Design the best possible stimulus protocol by a digital pulse generator. (Single protocol or multi-protocol)
Electromodule has two channel DAC (digital to analog converters) and to channel mechanical stimulator.

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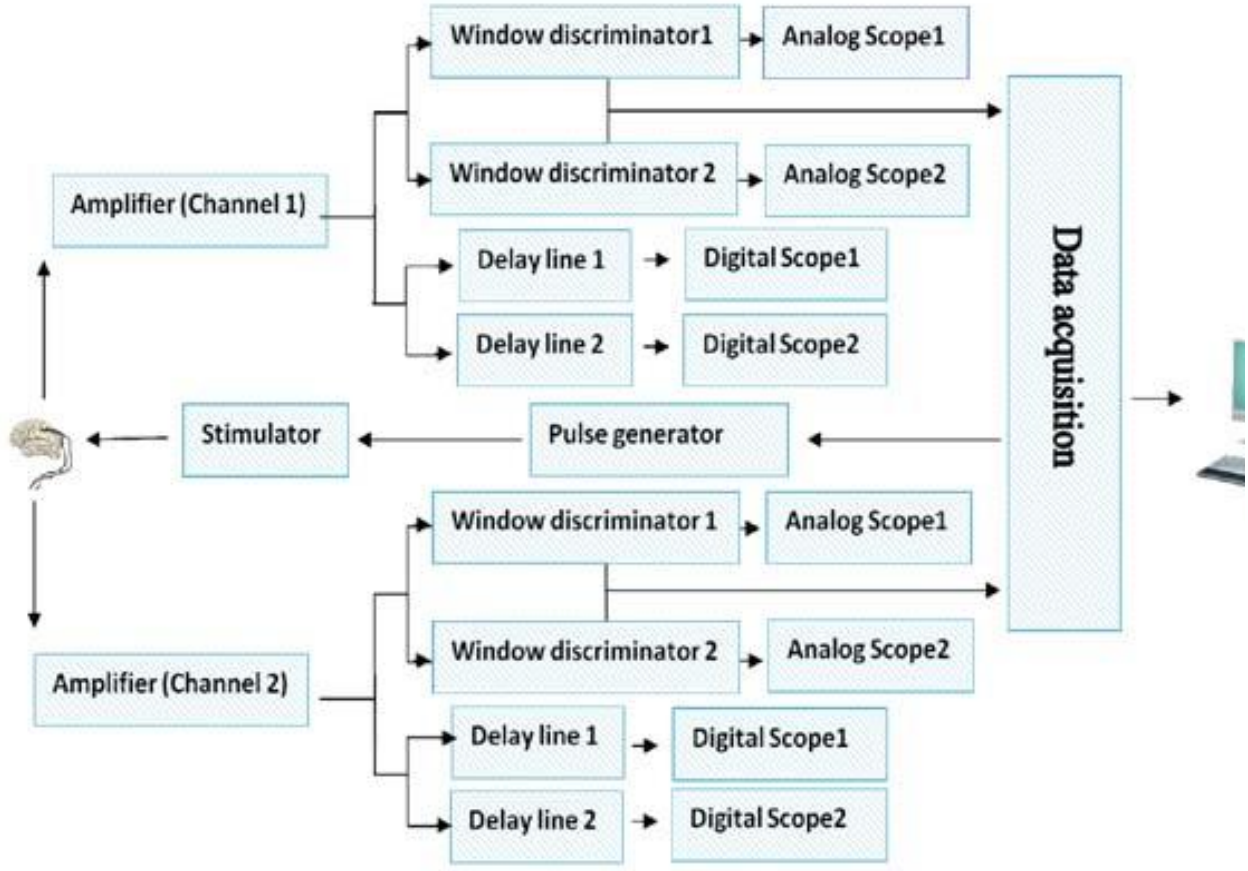
Electromodule and Neurocomet, they are what make electrophysiology easy and enjoyable

Hardware and software made for each other.

- **Electromodule + NeuroComet is equal to complete Single-Unit recording setup**
- **Electromodule + NeuroTrace is equal to complete EEG & LFP recording setup**

We put more into it.
So you can get more out of it.



Precisely engineered.
Incredibly low-noise

You've never seen any electrophysiology setup like it.

Because there's never been anything like it.

Features

- FPGA technology (Serial and parallel processing)
- One Dedicated CPU for electrical stimulation timing pattern control
- One Dedicated CPU for analog and digital data collection and filtering
- One Dedicated CPU for paradigm controlling (experiment states control of visual and auditory tasks)
- Optional Two Channel 8 bit digital to analog converter
- 2 analog input channels (24bits, 50KS/S) on front panel
- Four digital Input channels and outputs on front panel
- 24 digital input channels and outputs on back panel
- 2 channels bioamplifier for recording of EEG/LFP/ single unit/EOG/ECG/ECG/EMG
- 4 channel Pulse generator, 10µs pulse duration resolution
- Isolated constant current simulator (4mA/20mA)
- Optional mechanical stimulus controller
- Plug and Play (USB2 connector)
- Operating voltage: 24V DC
- Dimensions (w x h x d): 366 x 116 x 350 mm
- Net weight 3.7 kg

Application

NeuroComet is powerful software for recording and visualizing **extra cellular action potentials** (**single unit recording**)

In neuroscience, single-unit recordings provide a method of measuring the electro-physiological responses of a single neuron using a microelectrode system. When a neuron generates an action potential a microelectrode inserted into the brain can record the rate of change in voltage with respect to time. These microelectrodes must be fine-tipped, high-impedance conductors; they are primarily glass micro-pipettes or metal microelectrodes made of platinum or tungsten. In extra cellular recording technique Microelectrodes should be placed close to neurons.

There are many techniques available to record brain activity, including (EEG, MEG, fMRI) but these do not allow for single-neuron resolution. Neurons are the basic functional units in the brain that transmit information through the body using electrical signals (called action potentials). Currently, single-unit recordings provide the most precise recordings from single neurons. A single unit is defined as single firing neurons whose spike potentials are distinctly isolated by a recording microelectrode and spike sorting methods.

Single-unit recordings are widely used in studying neural correlates of Sensory, Motor, Memory and Pain functions in human and animal's brain and spinal cord. This technique can be applied in cognitive science, brain machine interface and neural engineering.

Experimental setup

The basic equipments needed to record single units are microelectrodes, pre amplifier, amplifier, Window discriminator, delay line, multiple oscilloscopes, analog to digital converter, data acquisition and sometime electrical or mechanical stimulators based on defined experiment.

Don't worry about the setup complexity, fortunately we put all these electronic devices together and made a solution named **Electromodule**.

Today single unit recording by **Electromodule** and **NeuroComet** is a piece of cake.

Electromule + NeuroComet + Microelectrode and micromanipulator **= Complete single unit recording setup.**

Specification

Data acquisition	Technology	FPGA
	FPGA Dedicated CPU	32bit, for pulse generation
	FPGA Dedicated CPU	49bit for signal filtration and data compression
	FPGA Dedicated CPU	32 bit for experiment paradigm control (in visual auditory task)
	FIFO Memory	1MB
	Data transfer	USB 2
Analog to digital converter	Channel numbers	Optional 1, 2 or 4
	ADC resolution	24bit
	Linearity error	±7.6ppm (maximum)
	Sample rate	50Ks/s per channel
	Analog input range	±2.5v
	Interface	Serial
	Isolation type	Optical
	Isolation voltage	2500V
	Isolation resistance	$10^{12}\Omega$
Electrical stimulator	Mode	Constant current, Unipolar, Isolated
	Number of channels	Optional, 1 or 2
	Current range	0 to 4mA or 0 to 20mA (optional)
	Current resolution	1µA or 5µA (optional)
	Output waveform	DC or current pulse
	current control	Yes, software control by 12 bit DAC
	Current amplitude error	3LSB (maximum)
	Polarity inversion	Yes, software control by Relay
	Output switch	Yes, software control by Relay
	Output voltage compliance	150V
	Current rise time and delay	5µs, typical (1KΩ load)
	Current fall time and delay	5µs, typical (1KΩ load)
	Isolation type	Optical

	Isolation voltage	2500V
	Isolation resistance	$10^{12}\Omega$
Microelectrode Amplifier	Amplifier Type	Differential, Isolated, Extracellular
	Number of channels	2 or 4
	Gain	10, 100, 200, 500, 1000 and 10000
	Input voltage range	±5V
	Maximum analog input voltage	±5V
	Input impedance	$10^{12}\Omega$, common mode and differential
	Input leakage current	60pA (typical)
	Input capacitance	8pF
	Common mode rejection ratio	75dB @ 50/60Hz
	Isolation type	Optical
	Isolation voltage	2500V
	Isolation resistance	$10^{12}\Omega$
	Low cut filter	0.1, 1, 10, 30, 50, 100, 300Hz
	High cut filter	30, 50,100, 300, 1000,3000,5000, 10000Hz
Pulse generator	Experiment protocols	Single trial, Multi trial , Single protocol, Multi-protocol
	Stimulation Timing pattern	4
	Pattern parameters	Delay, Pulse duration, Pulse cycle, Pulse Numbers, Trial period, Trial Number
	Timing pattern resolution	10us
	Mixers	2ch Internal stimulator, 2ch Mechanical stimulator , 2ch Digital outs,
	Mixer Inputs	Pattern1, Pattern2, Pattern3, Pattern4, Digital Input1, Digital Input2
Requirements	PC	CPU : 2core, 2Ghz, memory : 2GB Graphic : 1024,768 Audio : Internal or external sound card

Operating System	Windows 7
Software	Dot net Framework 4 or higher

Sales and Support Information

ScienceBeam branches share their technology and designer team to provide the same products locally

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