

# fNIR IMAGING

*Affordable, Portable Cognitive Assessment*  
*Continuous Wave fNIR Spectroscopy*



**Wired & Wireless  
Solutions**

*Easy Setup ... Comfortable ... Noninvasive*  
*Request a demo!*

**WWW.BIOPAC.COM**





fNIR technology measures hemodynamic response and neural activity of human subjects and empowers researchers by providing greater flexibility for study design, including working within complex lab environments and operating in non-traditional lab locations for field studies.

Subjects wear an fNIR sensor on the forehead that detects oxygen levels and provides real-time values for oxy-hemoglobin and deoxygenated hemoglobin. It provides a continuous and real-time display of the oxygen changes as the subject performs different tasks. Subjects can sit in front of a computer and take a test or perform mobile tasks.

*fNIR imaging systems measure oxygen level changes in the prefrontal cortex of human subjects.*

Each fNIR system provides real-time monitoring of tissue oxygenation in the brain as subjects take tests, perform tasks, or receive stimulation and allows researchers to quantitatively assess brain functions—such as attention, memory, planning, and problem solving—while individuals perform cognitive tasks.

**fNIR optical imaging eliminates many of the drawbacks of fMRI**

### Cognitive Function Assessment

- Safe & Noninvasive
- Comfortable sensors—adult 16-channel or pediatric 2-channel
- Record simultaneous EEG
- Affordable
- Fast & Efficient Setup
- Real-time display
- Portable—use in lab or field studies
- Avoids claustrophobia issues
- No special MR considerations
- Synchronize with other data or video

## fNIR IMAGING SYSTEMS

*real-time monitoring of tissue oxygenation*

*fNIR Systems also include isolation transformer in fNIR100A/200A/300A/400 and fNIRSoft Standard Edition in fNIR100A/200A/300A/100W and Pro Edition in fNIR400*

### fNIR100A

*Starter System*

**FNIR IMAGER**



**16 CHANNEL SENSOR**

### fNIR200A

*Data Collection System*

**DATA COMPUTER**



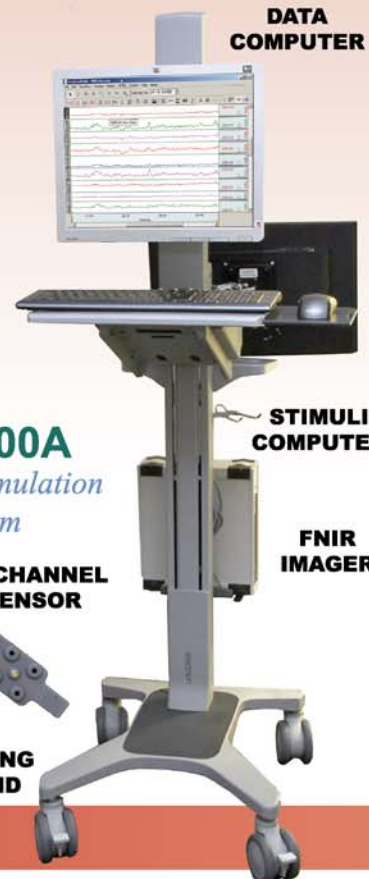
**16 CHANNEL SENSOR**

### fNIR300A

*Data & Stimulation System*

**STIMULI COMPUTER**

**FNIR IMAGER**



**16 CHANNEL SENSOR**

**FNIR IMAGER**

**ROLLING STAND**

**WATCH VIDEOS ONLINE**



# ACTIVITY IN REAL-LIFE SITUATIONS

## for functional brain imaging

Interface the fNIR hardware with a BIOPAC MP System to simultaneously record physiological data and synchronize to a variety of stimulus presentation systems including virtual reality, eye trackers, video, and observational data.

The fNIR device provides relative change in hemoglobin levels, calculated using a modified Beer-Lambert law. The powerful fNIR spectroscopy imaging tool measures NIR light absorbance in blood of hemoglobin with and without oxygen and provides information about ongoing brain activity similar to functional MRI studies—without the expense or hassle!

For a detailed subject assessment, combine fNIR data with other physiological signals such as ECG, EEG, respiration, cardiac output, blood pressure, electrodermal activity and stimulus response markers.

*fNIR studies have been published for a wide range of applications, including Brain Computer Interface, Human Performance Assessment, Neuro-rehabilitation, and Pediatric Pain Assessment.*

Synchronize with a BIOPAC Research System and AcqKnowledge. The fNIR imager has a BNC trigger output that sends TTL pulses at the beginning and end of baseline, and at the beginning and end of a recording session.

Use the MP150 System with a wide array of amplifiers and transducers, including wireless BioNomadix. AcqKnowledge provides automated analysis tools for ERP, ensemble averaging, and more!



### Synchronize with other systems for a complete assessment!

- BIOPAC Research Systems for physiology monitoring
- B-Alert X10 Wireless EEG
- Subject Monitoring—frame-by-frame video
- Stimulus Presentation—E-Prime, SuperLab, etc
- Eye Tracking
- Observational Behavioral Data

**Request a demo today!**

### fNIR400

*Complete Imaging Station*

Adds phantom sensor and fNIRSoft Pro features to fNIR300A components.



**PHANTOM SENSOR**

### fNIR100W

*Wireless System*



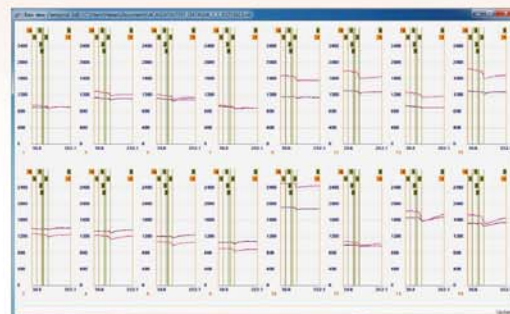
**WIRELESS FNIR IMAGER**

*Choice of 2-channel or 4-channel sensor*

**2 CHANNEL SENSOR**



**4 CHANNEL SENSOR**



**fNIRSoft Standard included in all systems**

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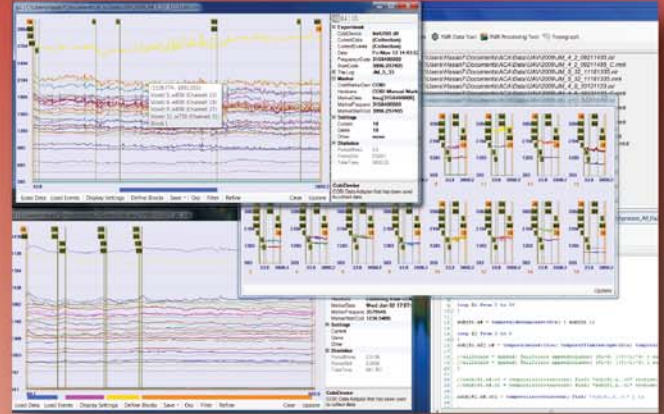
# fNIRSoft STAND-ALONE SOFTWARE



fNIRSoft PRO included in fNIR400 or as upgrade fNIRSOFT-PRO-U  
fNIRSoft Standard included in all systems

Use fNIRSoft (fS) to record, process, analyze and visualize functional near infrared (fNIR) spectroscopy signals. Easy to use GUI and wizard style tools for...

**Temporal Visualization**     **Data Management**  
**Time Series Analysis**     **Scripting Engine**  
**Topography**                     **Signal Analysis**



fNIRSoft PRO

## fS Viewer: Temporal Visualization and Time Series Analysis Tools

- Temporal visualization of fNIR Data
- Customizable display graphs by data type (voxel/channel/wavelength), sensor geometry, time period and multiple color palettes
- User interface for time series data analysis
- Inspect and manage optodes/channels/time periods visually
- Automated and user-selectable co-registration of all event marker information
- Event related and epoch analysis with customizable block definitions
- Customizable hemodynamic response calculation applying Modified Beer Lambert Law (MBLL) for oxy-Hb, deoxy-Hb, oxy and total Hb
- Basic Noise reduction, pre-processing (FIR Filter Design and application)
- **Pro** Automated signal quality inspection—eliminate saturated and problematic channels
- **Pro** Advanced signal processing algorithms for feature extraction
- **Pro** Motion artifact removal algorithms

## fS Viewer: Topograph Tool

- Spatial visualization of fNIR Data
- **Pro** Brain mapping and visualization over brain surface image
- **Pro** Left/right/dorsal view with thresholding, animation (temporal changes) or group/subject/condition average
- **Pro** Export visualization: time-based for animation, threshold-based for evaluation

## fS Scripting Engine: Built-in Command Line Interface

- fS Scripting Language (functional and data-oriented)
- Editor with syntax highlighting and quick access tools for command list and run toolbar
- History of commands and log operations in command pane (save for future reference)
- Store procedures in script files and re-apply procedures to previously saved data blocks

## fS Data Management: Export and Import Data Tools

- Select and export time-series data in various formats through a wizard style tool
- Easily customizable template, import various types of text data through a wizard
- Save/Send or Load/share data in native binary format

## fS Signal Analysis: Data Processing Tools

- **Pro** Apply Temporal Processing actions (Averaging/Feature Extraction/Signal Conditioning)
- **Pro** Apply Spatial Processing actions (Averaging/Feature Extraction/Signal Conditioning)
- **Pro** Apply Cell-by-cell Processing actions (Averaging/Signal Conditioning)
- **Pro** Apply common statistical comparison and correlation
- **Pro** Apply advanced Modified Beer Lambert Law

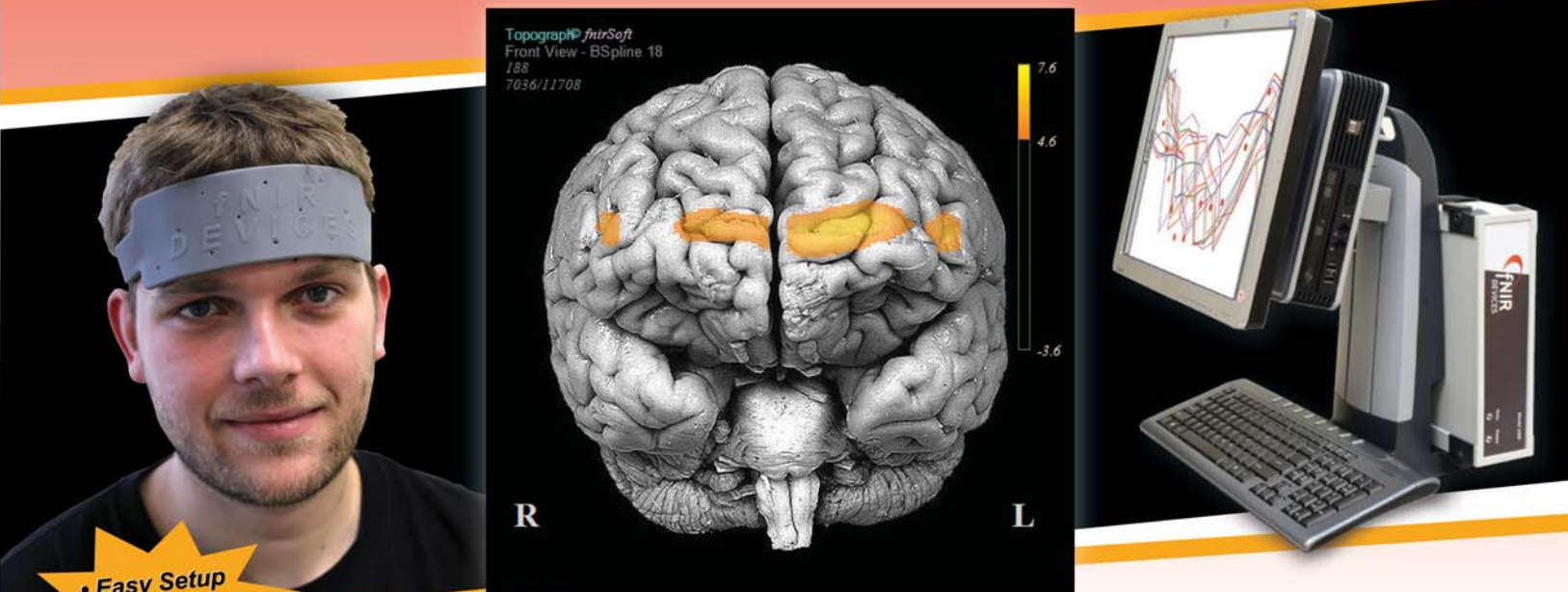
EXTENSIVE CITATIONS — REVIEW ONLINE NOW



# fNIR IMAGING

CONTINUOUS WAVE fNIR SPECTROSCOPY

*Affordable, Portable Cognitive Assessment*



- Easy Setup
- Comfortable
- Portable

## **Complete Optical Brain Imaging Solutions**

- Hemodynamic response & neural activity in the prefrontal cortex
- 16-CH Systems or new Wireless System (2-CH pediatric or 4-CH adult)
- Real-time oxy-Hb and deoxy-HB values
- Comfortable sensors — adult or pediatric
- Record simultaneous EEG
- Synchronize with physiological variables — add a BIOPAC Research System for ECG, RESP, dZ/dt, BP, EDA, etc.
- Record EEG data and fNIR data at the same time — works with wireless BioNomadix EEG, wireless B-Alert X10, and more!
- fNIRSoft standalone software — record, process, analyze and visualize fNIR signals
- Trigger Acquisition & Record Digital Triggers

**Request a demo today!**

**[www.biopac.com](http://www.biopac.com)**

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# fNIR IMAGER SYSTEMS

Real-time information about changes in oxy-Hb and deoxy-Hb concentration

Easy setup! Comfortable to wear for prolonged periods!



DOC81

fNIR System	Type	Max CH	Included Sensor	Software (*pre-loaded)	Computer	Stand	Isolation	Ext Cbl.
fNIR100A	tethered	16	16-CH	fNIRSoft Standard and COBI	--	--	yes	2
fNIR200A	tethered	16	16-CH	fNIRSoft Standard* and COBI*	All-in-one	Caddy	yes	2
fNIR300A	tethered	16	16-CH	fNIRSoft Standard* and COBI*	2 x All-in-one	Pole cart	yes	2
fNIR400	tethered	16	16-CH & Phantom	fNIRSoft Pro* and COBI*	2 x All-in-one	Cart w/shelf	yes	2
fNIR100W	wireless	4	2-CH or 4-CH	fNIRSoft Standard and COBI	--	--	n/a	1

Forehead Sensor ( <i>prefrontal cortex</i> ):	Fit	Channels	Detectors	Emitters	Inter-optode distance	Compatible System
RXFNIR:	Adult	16	10	4	25 mm	tethered only
RXFNIR-4:	Split	4	4	2	25 mm	all
RXFNIR-PED:	Pediatric	2	2	1	20 mm	all
FNIR-PHANTOM:	Phantom	--	--	--	--	all
Photo-detectors:	Silicon photodiode with integrated trans-impedance preamp					
Photo-emitters:	730 nm/850 nm dual wave-length LED					
Material:	silicone rubber over-molded					

Time resolution of measurements:	500 ms
Trigger output:	TTL level positive-going pulse at start of the device, baseline and data collection fNIR100W: TTL level positive-going pulse at start data collection and markers
PC connection:	USB 2.0 cable fNIR100W: wireless (IEEE 802.15.4 radio link)
Extension Cable(s):	2 x 1.5 m 14-conductor fNIR100W: 1 x 1.5 m 14-conductor
Operating environment:	0 to 50°C, 10% to 90% R.H. non-condensing
Imager dimensions (W x H x D):	250 mm x 100 mm x 320 mm fNIR100W: 83 mm x 20 mm x 105 mm
Imager weight:	3 kg fNIR100W: 200 g
Power requirements:	90-264 VAC, 50/60 Hz, 20 W fNIR100W: 90-264 VAC, 50/60 Hz, 10 W
Manuals (digital):	fNIRSoft User Manual - step-by-step guide for using fS Standard and Pro fNIRSoft Scripting Manual - automation programming and command line options
Warranties:	Imager: 12-month Sensor: 3-month limited

fNIR Computer Requirements	CPU (processor):	2 GHz or better, quad-core recommended
	Memory (system RAM):	1 GB minimum, 2 GB or more recommended
	Operating Systems:	Windows 8 / 7 / Vista / XP
	fNIR Imager interface:	USB 2.0 ports; National Instrument NIDAQmx driver
	Network interface:	Wireless or LAN Network adapter



REQUEST A DEMO TODAY

WWW.BIOPAC.COM

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