PREFRONTAL
fNIRS IMAGING

AFFORDABLE COGNITIVE ASSESSMENT
CONTINUOUS WAVE fNIRS

WIRED AND WIRELESS SOLUTIONS

EASY SETUP • COMFORTABLE
NONINVASIVE • PORTABLE
INTEGRATES WITH BIOPAC SYSTEMS

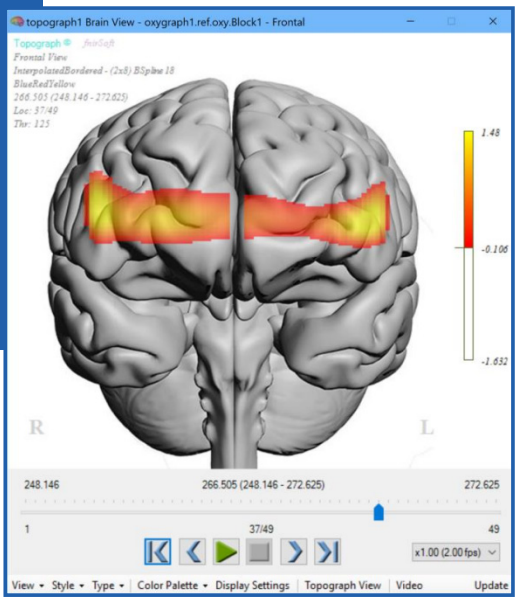
BIOPAC® Systems, Inc.

fNIR DEVICES

WWW.BIOPAC.COM

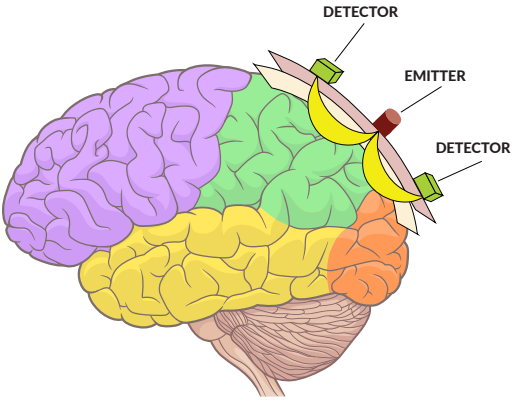
APPLICATIONS

- Cognitive Neuroscience
- Brain-Computer Interface
- Emotional States
- Ergonomics
- Human Factors
- Human Performance Assessment
- Neuroergonomics
- Pediatric Pain Assessment
- Sports Science
- Stress, Emotions, and Workload
- Virtual Reality



Functional Near Infrared Spectroscopy (fNIRS)

Assess Cognitive Activity in Real-Life Situations



fNIRS technology tracks hemodynamic response and neural activity of human subjects while providing researchers flexibility for study design, including working within complex lab environments and operating in nontraditional lab locations for field studies.

Subjects wear an fNIRS sensor on the forehead that detects blood oxygen levels and provides real-time values for oxygenated 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 tests, perform tasks, or receive stimulation, allowing researchers to quantitatively assess brain functions such as attention, memory, planning, and problem solving.

fNIRS Optical Imaging Eliminates Many of the Drawbacks of fMRI

- Advanced signal processing algorithms
- Safe & noninvasive
- Comfortable sensors—adult, pediatric or split placement
- 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 Devices: Complete Optical Brain Imaging Solutions

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

2000C Imager

Standard imaging system
Up to 18 optodes
5 Hz sampling frequency

2000E Imager

Student lab system
6 optodes
2 Hz sampling frequency

2000M Imager

Wireless and mobile system
Up to 18 optodes
10 Hz sampling frequency

2000S Imager

High density imaging system
Up to 54 optodes
10 Hz sampling frequency

About fNIRS Systems Technology

Rapid Recording and Setup

Apply the sensor array and start recording within five minutes

Real-Time Monitoring of Tissue Oxygenation

Use when subjects take tests, perform tasks, view advertisements, experience ergonomic layouts, or receive stimulation

Flexible Study Design

Works within complex lab environments or in the field for remote studies

Each System Includes

- Imager
- Sensor(s)
- Headband
- Cabling
- Power supply
- fNIRSoft & COBI Studio Software

Select systems include additional components such as computer, caddy, or pole

fNIR Devices Sample System Setup

fNIR Devic

2000S Systems	Part	Type	Max Optodes	Sensors
	FNIR103S	Tethered (USB)	54	3 x 18-chann
	FNIR203S			3 x 18-chann
	FNIR303S			3 x 18-chann 2 x 5-channe 2 x 6-channe
2000C Systems				
	FNIR103C	Tethered (USB)	18	1 x 5-channe
	FNIR203C			3 x 18-chann
	FNIR303C			3 x 18-chann
2000M Systems				
	FNIR103M	Wireless (Bluetooth 4)	18	3 x 18-chann
	FNIR203M			3 x 18-chann
	FNIR303S			3 x 18-chann 2 x 5-channe 2 x 6-channe
2000E Systems				
	FNIR103E	Tethered (USB)	6	1 x 6-channe

Software, Upgrades, Add-on Single and Concurrent User License Options	
FNIRSOFT-STD	fNIRSoft Standard Analysis Software
FNIRSOFT-PRO	fNIRSoft Pro Analysis Software
FNIRSOFT-UPD	fNIRSoft Update to Current License
FNIRSOFT-S-UPD1	fNIRSoft Standard - Annual License

Over 1,000 fNIRS Citations

Cognitive Neuroscience · Brain Computer Interface
Human Performance Assessment · Neurorehabilitation
Pediatric Pain Assessment · Neuroergonomics

es Specifications

	Components	Cables	Sampling Frequency	Software
el	-	2	10 Hz	fNIRSoft Pro & COBI Studio
el	1 Computer + Caddy			
el el el	2 Computers + Pole Cart			
el	-	1	10 Hz	fNIRSoft Standard & COBI
el	-	2		
el	Surface Tablet + Caddy	2		
el	-	2	10 Hz	fNIRSoft Pro & COBI Studio
el	1 Tablet/Notebook			
el el el	1 Tablet/Notebook			
el	-	1	2 Hz	fNIRSoft Education including 4 fNIRS Lessons

	Replacement Parts	
	RXFNIR-2000-18S	Shielded fNIR Sensor Pad-2000S + 18CH
	RXFNIR-2000-5	fNIR Sensor Pad-2000 5CH
	RXFNIR-2000-6	fNIR Sensor Pad-2000E 6CH
	RXFNIR-4	fNIR Sensor Pad-1200/2000 4CH

Add Virtual Reality to Any fNIRS Study

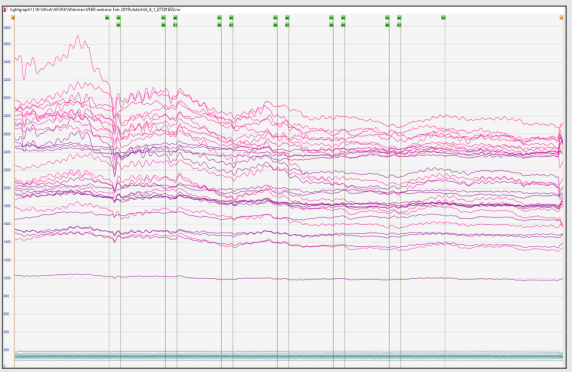
fNIR Devices are compatible with a variety of HMDs.

Software: fNIRSoft

fNIRSoft (fS) is a software package designed to record, process, analyze, and visualize functional near infrared spectroscopy signals through a graphical user interface and/or scripting (for automation). One fNIRSoft license is included with each system. Additional licenses are available to purchase.

fNIRSoft Standard

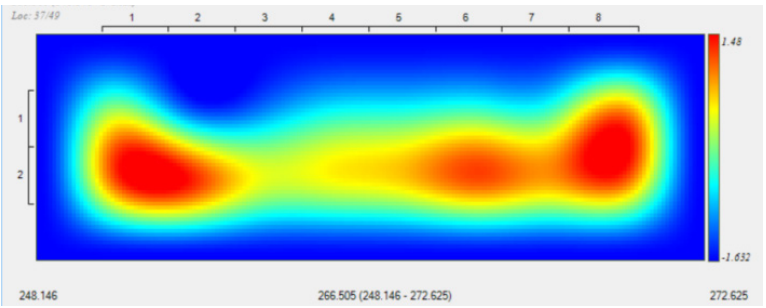
fS Viewer: Temporal Visualization & Time Series Analysis Tools



- Temporal visualization of fNIRS data
- Customizable display graphs by data type (voxel/channel/wave length), 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
- Basic noise reduction and pre-processing

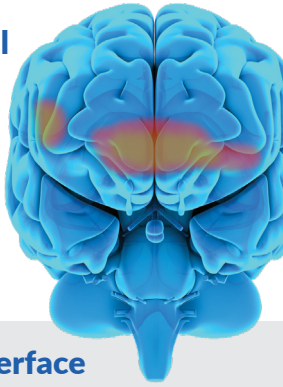
fS Viewer: Topograph Tool for Spatial Visualization of fNIRS Data

- Spatial visualization of fNIRS data



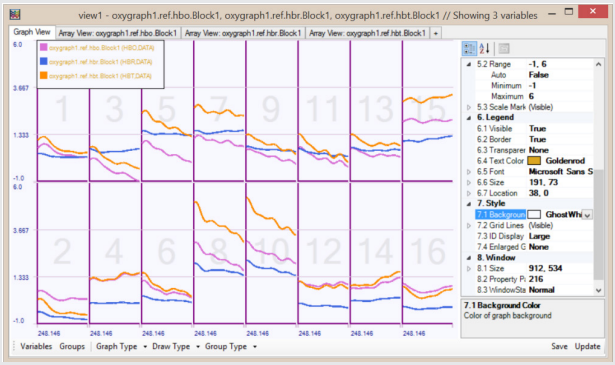
Standard & Pro

fS Data Management: Import and Export Data Tool



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

fS Scripting Engine: Built-In Command Line Interface



- fS Scripting Language (functional and data oriented)
- Editor with syntax highlighting and quick access tools
- History of commands and log operations in command pane
- Store procedures in script files

fNIRSoft Pro Includes Above Features Plus

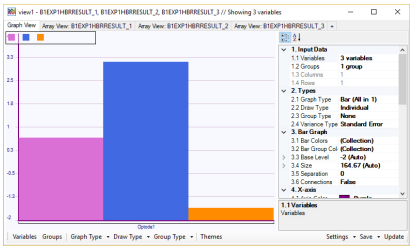
- Automated signal quality inspection
- Advanced signal processing algorithms
- Motion artifact removal algorithms
- Brain mapping and visualization over brain surface image
- Left/right/dorsal view with thresholding, animation (temporal)
- Export visualization
- fS signal analysis: data processing tools
- Temporal Processing Actions
  - Apply spatial processing actions
  - Apply cell by cell processing actions
  - Apply common statistical comparison and correlation
  - Apply advanced modified Beer Lambert Law (MBLL) oxygenation calculation

fNIRS for Education

BIOPAC's fNIRS Education System is affordable, safe (LED-based), and easy for students to use in the lab. Choose any of our four lessons listed below, including nine NIRS experiments. Give students the opportunity to observe and record well-known physiological phenomenon such as the cuff occlusion task while also discovering trends in cognitive function.

F01 | The fNIRS System and Oxygenation Changes Measured on the Forearm

Students record fNIRS measurements to study changes in HbR and HbO_2 during a cuff experiment and investigate hemodynamic changes related to muscle activity.

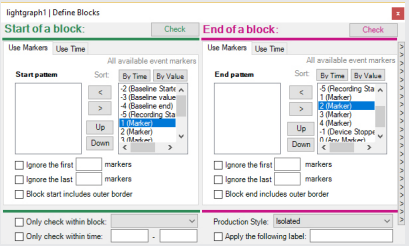


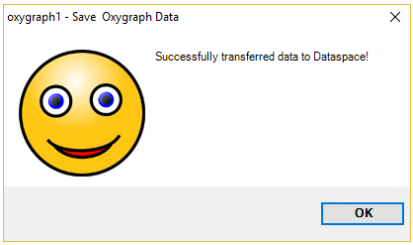
F02 | The fNIRS System, Systemic Signals, and Artifacts

Students record fNIRS measurements from the forehead while performing various activities.

F03 | fNIRS Measurements During Verbal Fluency Tasks

Students record fNIRS measurements from the forehead while performing the verbal fluency cognitive test. Students will observe changes in HbO_2 and HbR under different conditions



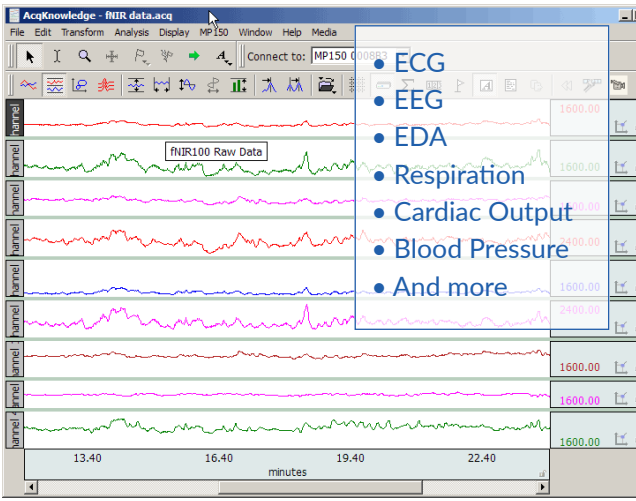


F04 | fNIRS Measurements During Single and Dual Tasks

Students record fNIRS measurements from the forehead while performing a test of different cognitive loads manipulated as single and dual task conditions.

Sync with Physiological and Neurobehavioral Measures

Interface fNIRS hardware with a BIOPAC MP System and access a wide array of wired and wireless amplifiers and transducers. Synchronize both systems with additional signals and measurements.



Stimulus Presentation • Event Marking
Virtual Reality • Multi-Subject Video Monitoring
Eye Trackers • Observational Data

Stimulus Presentation and Eye Trackers

Virtual Reality

Inspiring People and Enabling Discovery About Life

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