Functional Near Infrared Spectroscopy Workshop

Adrian Curtin[1], Frederic Dehais[1,2], & Hasan Ayaz[1]

[1] School of Biomedical Engineering, Science and Health Systems, Drexel University, Philadelphia, PA, USA
[2] ISAE-SUPAERO, Toulouse, France

Abstract / Short description

Functional near-infrared spectroscopy (fNIRS), a noninvasive brain-monitoring technology relies on optical techniques to detect changes of cortical hemodynamic responses to human perceptual, cognitive, and motor functioning, is an increasingly popular neuroergonomics tool.

This one-day workshop is focused on introducing functional near infrared spectroscopy optical brain monitoring, its physiological and physical principles, data collection and signal processing techniques as well as data analysis procedures. There will be both theory lectures as well hands-on practical sessions. The tutorial is aimed to get researchers started on fNIRS and designed for both beginner and intermediate researchers.

Keywords

fNIRS/fMRI, Mobile Brain/Body Imaging, Cognitive Workload, Working Memory, Learning, Brain-Computer Interfaces

Tentative Course Schedule (September 11th, 14:00h CET)

Day 1 (Saturday, Sep 11th)
Welcome and Introductions
Lectures Part 1 What is fNIRS?
How it works? (Physical Principles)
What it measures? (Physiological Principles)
When it measures? (Experimental paradigms, protocols, and time sync)
Where it measures? (Functional Neuroanatomy, Spatial co-registration and visualization)
Hands-on workshop / Demonstrations
Data Collection

(Sensor Setup, recording)
Signal processing (Filtering, Motion artifact rejection, quality control)
Data analysis (Statistics)
Farewell

Recommended Reading

1. Yücel, M., Lühmann, A., Scholkmann, F., Gervain, J., Dan, I., Ayaz, H., . . . Wolf, M. (2021). Best practices for fNIRS publications. *Neurophotonics, 8*(1), 012101. doi:10.1117/1.NPh.8.1.012101
2. Ferrari, M., & Quaresima, V. (2012). A brief review on the history of human functional near-infrared spectroscopy (fNIRS) development and fields of application. *Neuroimage, 63*(2), 921–935. doi:10.1016/j.neuroimage.2012.03.049
3. Ayaz, H., Izzetoglu, M., Izzetoglu, K., & Onaral, B. (2019). The Use of Functional Near-Infrared Spectroscopy in Neuroergonomics. In H. Ayaz & F. Dehais (Eds.), Neuroergonomics (pp. 17-25): Academic Press.
4. Curtin, A., & Ayaz, H. (2018). The Age of Neuroergonomics: Towards Ubiquitous and Continuous Measurement of Brain Function with fNIRS. Jpn. Psychol. Res., 60, 374-386. doi:10.1111/jpr.12227