Smartphone EEG: Recording data out and about

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With a possibility of mobile EEG measurements, neuroergonomics body of research is exponentially growing. Ecological data collection is one of its main pillars. However, recording data in real life, unobtrusively, without influencing participant's surroundings, while still acquiring research-grade data is a complex process and needs to be handled carefully.

In this workshop participants will learn how to use smartphone for inconspicuous, wireless recording of EEG and experimental data in synchronized manner. First, hardware and software setup for Smartphone EEG will be explained followed by a tutorial with brief EEG recording using a simple experimental paradigm. Second, a processing pipeline and gait artifact removal will be addressed. In two hands-on sessions participants will be able to investigate the data recorded in the tutorial session, that will be made available to them. At the end of the workshop participants should have all the information they need to start their own Smartphone-EEG experiment.

Keywords

EEG/MEG, Mobile Brain/Body Imaging, Brain-Computer Interfaces

Prerequisites

EEG data analysis will be demonstrated using Matlab software. For hands-on sessions participants need to have an EEGLAB plug-in installed in order to independently explore the data that will be provided to them. Basic custom scripts will be provided. There are no prerequisites for other talks and demonstrations.

Course Schedule (September 11th-12th, 14:00h – 18:00 CET)

Day 1 (Saturday, Sep 11th)	
14:00	Introduction and warm-up
14:15	Smartphone-based EEG (talk)
14:35	Synchronized smartphone-EEG measurements with LSL (talk)
14:55	Setting-up a mobile EEG experiment (tutorial)
15:25	Gait artifact in EEG data (talk)
15:45	Coffee break
16:00	Hands on 1- Analyzing tutorial data
16:45	Active vs passive sensors for mobile EEG (talk)
17:05	Hands on 2- Gait artifact removal
17:25	Q&A and farewell

Maximum Intake

30

Additional requirements

Break-out room possibility. Server for sharing data with participants.

Recommended Reading

- Scanlon, J. E., Jacobsen, N. S. J., Maack, M. C., & Debener, S. (2020). Does the electrode amplification style matter? A comparison of active and passive EEG system configurations during standing and walking. European Journal of Neuroscience. https://doi.org/10.1111/ejn.15037
- Jacobsen, N. S. J., Blum, S., Witt, K., & Debener, S. (2020). A walk in the park? Characterizing gait-related artifacts in mobile EEG recordings. European Journal of Neuroscience. https://doi.org/10.1111/ejn.14965
- Blum, S., Debener, S., Emkes, R., Volkening, N., Fudickar, S., & Bleichner, M. G. (2017). EEG recording and online signal processing on android: A multiapp framework for brain-computer interfaces on smartphone. BioMed research international, 2017. https://doi.org/10.1155/2017/3072870
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