



The LEAD Graduate School
at the University of Tübingen
invites you to attend the Lecture by
Dr. Thorsten O. Zander
(TU Berlin)

Towards neuroadaptive technology: The use of passive Brain-Computer Interfaces for implicit control

Time: Monday, June 1st, 2015, 10.15 hrs
Venue: Room 204, Europastraße 6, 72072 Tübingen
Note: The lecture will be held in English.

Abstract: In the last three decades the interaction mean of Brain-Computer Interfaces (BCIs) has been investigated extensively. While most research aimed at the design of supportive systems for severely disabled persons, the last decade showed a trend towards applications for the general population. Especially adaptive technology that adjusts to the intention and needs of its user can benefit from BCI methodology. This led to the definition of passive BCIs (pBCIs) in the year 2008. Passive BCIs can detect changes in the cognitive user state and adapt the state of the technical system accordingly -- leading to Neuroadaptive Technology. This passive interaction cycle defines a new type of interaction, which is based on implicit control. Implicit control aims at guiding a technical system by contextual or psychophysiological aspects of user state, independently of any command communicated intentionally. The technical system automatically triggers, extracts and interprets relevant information from the user. Based on this information the system can adapt automatically to the current strategies and context of the user. Hence, the user does not need to take care of translating concepts to the machine by formulating micro-commands, as it is usually done, but can focus on developing strategies for optimally reaching the overall goal of the given interaction instead. In a first study, a proof of principle is given by implementing an implicit control to guide a cursor in a 2D grid to a target. The results of this study clearly indicate the high potential of implicit control and introduce a new bandwidth of applications for passive Brain-Computer Interfaces."

Biography: Thorsten O. Zander studied mathematics with focus on mathematical logic in Münster, Germany. Following up on this he worked in research groups at the TU Berlin, the Fraunhofer FIRST, the TU Graz, and the MPI for Intelligent Systems in Tübingen. He received his PhD in 2011 at the TU Berlin for his work in the field of passive brain-computer interfaces (pBCIs), which were defined by him in the year 2008. Dr. Zander founded the work group Team PhyPA in 2005, which is still led by him today. In 2014, he founded the Community for Passive BCI Research. He is focusing on the implementation of pBCIs in adaptive human-machine systems. This work connects neurocognitive processes with state-of-the-art methods from signal processing for setting up a user-state detection for adapting learning environments.

Important Publications:

- Zander, T. O., & Kothe, C. (2011). Towards passive brain-computer interfaces: applying brain-computer interface technology to human-machine systems in general. *Journal of neural engineering*, 8(2), 025005.
- Zander, T. O., Lehne, M., Ihme, K., Jatzev, S., Correia, J., Kothe, C., ... & Nijboer, F. (2011). A dry EEG-system for scientific research and brain-computer interfaces. *Frontiers in neuroscience*, 5.
- Zander, T. O., Gaertner, M., Kothe, C., & Vilimek, R. (2010). Combining eye gaze input with a brain-computer interface for touchless human-computer interaction. *Intl. Journal of Human-Computer Interaction*, 27(1), 38-51.

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