

NEURAL ENGINEERING SEMINAR SERIES

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Research at the Machine-Brain-Interface: mice, men, microsystems and machines

<https://psu.zoom.us/j/94639233394>

April 19, 2023

12:15 - 1:15 p.m. (E.T.)

W306 Millennium Science
Complex



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ABSTRACT: Research on neuroscience and neurotechnology needs expertise from various disciplines. The University of Freiburg has set up a center of “intelligent machine brain interfacing technologies” (IMBIT) to promote research the interfaces between disciplines, because innovation requires the interplay of complementary knowledge and skills. At IMBIT, researchers from biology, medicine, engineering and computer sciences are conducting research side by side - to develop tools that will help us better understand how the brain works in fundamental studies and to translate this knowledge into interfaces between humans and machines in order to develop better treatment methods. Areas of research at IMBIT currently cover aspects of fundamental neuroscience (NeuroCore), neurotechnological tools (NeuroProbes) and robotics and machine learning (NeuroRobotics). Examples from the NeuroProbes field on miniaturized neural implants will be presented. They cover electrode arrays for signal recording from the brain and peripheral nerve electrode arrays applying electrical stimuli to deliver sensory feedback after amputation. Systems assembly, longevity and also some regulatory affairs aspects are boundary conditions that have been addressed during device development. Research results on these arrays will be presented and discussed with a focus on the reliability of microsystems in translational research. Studies on gait analysis after amputation complement this research to achieve insights how sensory feedback should be delivered based on movement representation and control.

BIOGRAPHY: Thomas Stieglitz was born in Goslar in 1965. He received a Diploma degree in electrical Engineering from Technische Hochschule Karlsruhe (now KIT), Germany, in 1993, and a PhD and habilitation degree in 1998 and 2002 from the University of Saarland, Germany, respectively. In 1993, he joined the Fraunhofer Institute for Biomedical Engineering in St. Ingbert, Germany, where he established the Neural Prosthetics Group. Since 2004, he is a full professor for Biomedical Microtechnology at the Albert-Ludwig-University Freiburg, Germany, in the Department of Microsystems Engineering (IMTEK) at the Faculty of Engineering and currently serves the IMTEK as managing director, is deputy spokesperson of the BrainLinks-BrainTools Center, board member of the Intelligent Machine Brain Interfacing Technology (IMBIT) Center and spokesperson of the profile neuroscience / neurotechnology of the university. He is further serving the university as member of the senate and as co-spokesperson of the commission for responsibility in research. His research interests include neural interfaces and implants, biocompatible assembling and packaging and brain machine interfaces. Dr. Stieglitz has co-authored about 170 peer reviewed journal publications, 330 conference proceedings and holds about 30 patents. He is co-founder and scientific consultant of CorTec GmbH and neuroloop GmbH, two spin-off companies which focus on neural implant technology and neuromodulation, respectively. Dr. Stieglitz is Fellow of the IEEE and serves the EMBS in the neuroethics group as well as the technical committee of neural engineering, the German Biomedical Engineering Society (DGBMT im VDE) where he is chair of the Neural Prostheses and Intelligent Implants section, the Materials Research Society. He is also founding member of the International Functional Electrical Stimulation Society (IFESS).