Dr. Simon Nimpf: "Investigating the neural basis of magnetoreception in the pigeon" (Jan 24th 2023, 18:30 CET)

MSNE Guest talk by Dr. Simon Nimpf

Date and Venue:
January 24th 2023, 6.30 PM N1135

The talk is hosted by MSNE team (msne@ei.tum.de)

Title: **Investigating the neural basis of magnetoreception in the pigeon**

Abstract:

The remarkable ability of animals to navigate over long distances is at least in part mediated by sensing the Earth's magnetic field. Behavioral experiments on a large number of taxonomically diverse species support the existence of magnetoreceptive systems, however, the underlying sensorineural structures remain elusive. In the Keays lab we investigate where and how a magnetic stimulus is transduced into a neuronal impulse and how this information is integrated in the central nervous system of pigeons. Employing neuronal activity mapping, whole brain clearing and light sheet microscopy we show that exposing pigeons to rotating magnetic fields leads to increased activity in the brainstem vestibular nuclei, the dorsal thalamus and regions of the mesopallium and hippocampus of pigeons. These experiments provide evidence for a magnetosensory neuronal pathway originating in the pigeon vestibular system. Physical calculations, modeling and molecular ablation studies further support the hypothesis that magnetic fields might be detected by voltage sensitive ion channels in the vestibular system through a process called electromagnetic induction.

Dr. Simon Nimpf

Since Oct. 2021 Post-doctoral researcher in the labs of Prof. David Keays and Prof. Laura Busse at the Ludwig-Maximilian-University Munich**;** Project: Visual circuits in pigeons
2015 - 2020 PhD in the laboratory of David Keays at the Institute of Molecular Pathology (IMP), Vienna; Project: Neuronal basis of magnetoreception in pigeons
2012 - 2015 Master's in Molecular Biology with a focus on Molecular Medicine at the University of Vienna
2009 - 2012 Bachelor's in Microbiology and Genetics at the University of Vienna

Last update: Dec.21th 2022

Prof. Dr. Quentin Huys - Cognitive Mechanisms in Psychotherapy (November 22nd 2022, 19:00 CET - ZOOM)

MSNE Guest talk by **Prof. Dr. Quentin Huys**

https://www.mps-ucl-centre.mpg.de/person/104585
https://iris.ucl.ac.uk/iris/browse/profile?upi=QHUYS49

Date and Venue:
November 22nd 2022 - 7 PM - ZOOM

This talk is a MSNE-Student hosted talk and part of MSNE Speakers series.
Host: Thomas Schwarz (MSNE, TUM)

Cognitive Mechanisms in Psychotherapy

Despite extensive research, the cognitive processes mediating the impact of psychotherapeutic interventions remain poorly understood, and as a result difficult to quantify. Identifying such mechanisms is likely to be extremely helpful: it could help target interventions better, could support dosing therapy through monitoring, and could heighten the speed at which new interventions can be developed. Mechanisms research in psychotherapy has described a number of key difficulties to achieving this. In this and the next talk, we ask whether advances in cognitive computational neuroscience might provide some support.

Specifically, the question is whether precise cognitive probes might identify specific mechanisms of interventions. In support of this, I will first describe a pilot study in participants undergoing an adapted behavioural activation therapy. Though small, this suggests that the therapeutic effect of specific interventions may be related to the impact on computationally defined cognitive mechanisms. However, the study has substantial limitations, and calls, in the first instance, for validation of the basic premise: that computationally defined cognitive mechanisms are actually sensitive to psychotherapeutic interventions. I will then move to present preliminary results from two strands of experiments examining whether interventions derived from components of cognitive-behavioural therapy (CBT) are able to shift computationally-derived measures of their proposed psychological substrates. The first strand examines whether planning or values-based interventions based on behavioural activation (the `B' in CBT) change measures of effort and reward sensitivity during effort-based decision-making. The second strand examines whether a psychoeducation intervention based on cognitive restructuring (the `C' in CBT) is able to influence propensity to attribute events to internal (vs external) and global (vs specific) causes. Findings from both strands will be discussed with respect to challenges in developing brief, reliable, engaging, and user-acceptable measures of cognition. Overall, this outlines some early new results in using computational methods to understand therapeutic processes in the psychotherapy for depression.

Last update: October 18th 2022

Prof. Auke Ijspeert - Investigating animal locomotion using biorobots and neuromechanical simulations (November 10th 2022, 19:00 CET)

MSNE Guest talk by Prof. Auke Ijspeert

Hosted by ICS (Prof. Gordon Cheng & Dr. John Nassour)

Date and Venue:
November 10th 2022, 7 PM [N1135](N1135) (<-- new room and updated start time! All registered guests received an update email.)

Title: Investigating animal locomotion using biorobots and neuromechanical simulations

Abstract: The ability to efficiently move in complex environments is a fundamental property both for animals and for robots, and the problem of locomotion and movement control is an area in which neuroscience, biomechanics, and robotics can fruitfully interact. In this talk, I will present how biorobots and numerical models can be used to explore the interplay of the four main components underlying animal locomotion, namely central pattern generators (CPGs), reflexes, descending modulation, and the musculoskeletal system. Going from lamprey to human locomotion, I will present a series of models that tend to show that the respective roles of these components have changed during evolution with a dominant role of CPGs in lamprey and salamander locomotion, and a more important role for sensory feedback and descending modulation in human locomotion. I will also present a recent project showing how robotics can provide scientific tools for paleontology. Interesting properties for robot and lower-limb exoskeleton locomotion control will finally be discussed.

Auke Ijspeert is a professor at EPFL (the Swiss Federal Institute of Technology in Lausanne, Switzerland), IEEE Fellow, and head of the Biorobotics Laboratory (https://www.epfl.ch/labs/biorob). He has a B.Sc./M.Sc. in physics from the EPFL (1995), and a PhD in artificial intelligence from the University of Edinburgh (1999). His research interests are at the intersection between robotics and computational neuroscience. He is interested in using numerical simulations and robots to gain a better understanding of animal locomotion and movement control, and in using inspiration from biology to design novel types of robots and locomotion controllers (see for instance Ijspeert et al, Science, Vol. 315, 2007 and Ijspeert, Science Vol. 346, 2014). He is also interested in assisting persons with limited mobility using exoskeletons and assistive furniture. With his colleagues, he has received paper awards at ICRA2002, CLAWAR2005, IEEE Humanoids 2007, IEEE ROMAN 2014, CLAWAR 2015, and CLAWAR 2019. He is associate editor for the International Journal of Humanoid Robotics and the IEEE Transactions on Medical Robotics and Bionics. He is also a member of the Board of Reviewing Editors of Science magazine.

Last update: October 25th 2022

Prof. Tamar Makin - Technological Embodiment: Neuroscience considerations for the future body (May 3rd 2022, 17:30 CEST)

MSNE Guest talk by **Prof. Tamar Makin**

Date and Venue: May 3rd 2022, 5:30 PM (CEST) - Zoom Only.
We prepare for a "public viewing" environment in one of TUMs lecture rooms for MSNE-Students to meet in person.
Registration: -- > Registration Website
Zoom credentials will be provided immediatly after registration. Check your Mailbox for a confirmation by Confluence. Kindly approach msne@ei.tum.de in case of questions

Host: TUM ICS (Prof. Gordon Cheng and Nicolas Berberich)

Title: "Technological Embodiment: Neuroscience considerations for the future body"

Abstract: To successfully design devices for the human body, engineers often view the body itself as the ideal design template. Similarly, for individuals missing a limb, the development of artificial prosthetic limbs often centers on embodiment as the goal: focusing device design and control on becoming more like our biological bodies. But ultimately, the success of artificial limb will critically depend on its neural representation in our brains. Importantly, neurocognitive resources might differ radically, depending on the user's life experiences and needs. Here I will present a series of studies where we investigated the neural basis of artificial limb use for both substitution and augmentation technologies. We find that contrary to folk wisdom, the brain does not assimilate neural representations for the artificial limb with those for the biological body, creating opportunities for novel technological interfaces. Collectively, these studies suggest that although, in principle, opportunities exist for harnessing hand neural and cognitive resources to control artificial limbs, alternative non-biomimetic approaches could be also well suited for successful human-device interface.

Biography: Prof. Tamar Makin is a neuroscientist at UCL's Institute of Cognitive Neuroscience, heading the Plasticity Lab. Her main interest is in understanding the key drivers and limitations of reorganisation in the adult brain. Her primary model for this work is studying individuals with a hand loss. A particular focus is on how habitual behaviour, such as prosthesis usage, shapes brain reorganisation. For this purpose, she integrates methods from the fields of neuroscience, experimental psychology and rehabilitation. Her research thus lays the scientific groundworks to to enable clinicians to guide amputees and related clinical populations to take advantage of the benefits of brain reorganisation, rather than to suffer from their adverse effects.

Last update: Apr 19th 2022

Playtesting at Brainamics: Doing Neurotech in the Real World (without losing your Mind) - Vladislav Samoilov (May 10 2022, 18:00 CEST)

Title:
Playtesting at Brainamics: Doing Neurotech in the Real World (without losing your Mind)

Speaker:
Vladislav Samoilov (Brainamics)

Date, Time & Venue:
Tuesday May 10th 2022, 18:00-20:00 - room N1080

Abstract:
What is it like to do neurotechnology in real life outside of academia? Brainamics' goal is to use neurotechnology and neuroscience to understand the user experience directly from people's brain activity. We chose games as our first use case and are currently revolutionizing the entire game development process to make it experience- and data-centric. Our customers are game developers from around the world, including Huuuge, Mimimi, EA, and Activision. To extract players' emotions, we developed a machine learning algorithm that provides objective and accurate information about players' experiences. However, Brainamics is much more than just playtesting. We are researching fundamentally new applications of BCI such as adaptive experience or intention recognition.

In the talk, Vladislav Samoilov will present the technology that Brainamics uses to move from raw data to actionable suggestions for game developers. He will outline the entire data pipeline, highlight the challenges and solutions Brainamics has developed, and the TUM knowledge and courses that have helped along the way.

Biography:
Vladislav Samoilov completed his master's degree in theoretical particle physics at TUM in 2021 and conducted research at MPQ and BMW in the field of quantum computing before entering the field of neurotech after winning the Brain.io hackathon. His co-founder Philipp Zent studies Management and Technology at the TUM School of Management and worked as a area manager at Aldi Süd, where he was responsible for 6 ALDI stores alone with more than 100 employees and around 50 million euros in sales. For the development of their business ideas, they received the Start Award in the 2021 Think.Make.Start. Program (TMS), won the TUM IDEAward at the end of November 2021 and were accepted into the EXIST-Gründerstipendium program in February 2022.

Prof. Moritz Grosse-Wentrup - Brain-Artificial Intelligence Interfaces (December 7th, 2021)

Brain-Artificial Intelligence Interfaces (BAIs)

MSNE Guest Talk by Prof. Moritz Grosse-Wentrup (-> Universität Wien, Neuroinformatics)

The introduction of machine learning into the field of brain-computer interfaces (BCIs), which began almost two decades ago, enabled unprecedented performance. Today, machine learning algorithms have become an indispensable component of a BCI. Machine learning, however, has undergone a radical transformation in the past two decades, resulting in artificial intelligence (AI) systems that surpass human performance in many real-world tasks. I argue that it is time for the BCI community to embrace these developments and build Brain-AI Interfaces (BAIs), i.e., systems that leverage the power of modern AI systems to enable natural human-computer interaction. In particular, I argue that to realize BAIs we will have to move beyond our dominant decoding paradigm, in which we determine a priori the labels we intend to decode from neuronal signals, and let the AI system decide the level of granularity at which cognitive processes are interfaced with neuronal signals.

Moritz Grosse-Wentrup is full professor and head of the Research Group Neuroinformatics at the University of Vienna. He develops machine learning algorithms that provide insights into how large-scale neural activity gives rise to (disorders of) cognition, and applies these algorithms in the domain of cognitive neural engineering, e.g., to build brain-computer nterfaces for communication with severely paralyzed patients, design closed-loop neural interfaces for stroke rehabilitation, and develop personalized brain stimulation paradigms.

Date for the talk: December 7th 2021 - 7 PM
New Venue: Room N1080 (Building: TUM Main Campus, Building N1, Theresienstrasse 90)

Regulations: https://www.tum.de/en/about-tum/news/coronavirus (-> 2G for students and for guests)

Registration required -> registration webpage . Based on number of registrations, we may have to change to a bigger room in the same building. Your registration helps us organizing the event!

This talk is hosted by MSNE study program & Prof. Simon Jacob

Prof. Cristina Piazza - Modern Robotic Technologies for Bioinspired Artificial Limbs (June 22nd, 2021)

Modern Robotic Technologies for Bioinspired Artificial Limbs

MSNE Guest Talk by **Prof. Cristina Piazza (TUM)**
State-of-the-art bionic hands incorporate hi-tech devices which try to match the richness and complexity of the human hand sensory-motor system. Unfortunately, their complexity often limits mechanical robustness and intuitive prosthesis control. Recently, the translation of neuroscientific theories (i.e. postural synergies) in software and hardware architecture of artificial devices suggests a promising direction towards the next generation of high technologic bionic aids. This talk aims to exploit the potential of these emerging trends and proposes new strategies to optimise the performance of an artificial hand, achieving a useful trade-off between grasping performance and mechanical design/control complexity.

Cristina Piazza is currently Professor for Healthcare and Rehabilitation Robotics at the Technical University of Munich (TUM). She received her PhD in Robotics at University of Pisa, Italy before moving to to Chicago (USA) where she worked as a Postdoctoral Researcher at the Department of Physical Medicine and Rehabilitation, Northwestern University and the Regenstein Foundation Center for Bionic Medicine, Shirley Ryan AbilityLab (former Rehabilitation Institute of Chicago). Her main research interests include the design and control of soft artificial limbs for robotic and prosthetic applications. She has also experience in designing and conducting clinical trials with amputee subjects.

New date for the talk: June 22nd 2021 - 6 PM - via ZOOM

Login and Registration
Registration required -> registration webpage Login credentials will be provided immediately after registration. Late registrations possible by email (msne@ei.tum.de)

This talk is hosted by MSNE study program & ICS Institute for Cognitive Systems (Prof. Gordon Cheng)

"In Silico" - On the birth of simulated consciousness (Update: June. 4th 2021)

Save the date

After the film screening, there will be a short discussion and QnA session with Dr. Fabrice Morin and Dr. Benjamin Lipp.
Dr. Fabrice Morin, at Robotics and Embedded systems group in TUM informatics 6 was a manager of Sub-Project 10 of the HBP. Dr. Morin will give a short introduction of Human Brain Project (HBP) and his main research topics carried during the project.
Dr. Benjamin Lipp, from the Munich Center for Technology in Society. He will give his impression about the film and the HBP from a sociological point of view.
We would welcome a fruitful talk between you two about topics like e.g. how science management in large-scale projects works.

Referece (external link:) insilicofilm.com

Update: Confirmed date for screening this documentary movie is **Friday June 4th 2021, 7 pm (CEST).**

Registration: Registration has closed by May31st 2021. In case your studies or research are into neuroscience or neuroengineering at TUM, you may send an email to ge29vew@mytum.de for a last minute registration.

This event is limited to students of ENB Master in Neuroengineering & ENB Master of Biomedical Neuroscience & and associated faculty. Kindly approach your student represetatives or program coorinators for more information.

Due to licence issues, we offer a total of 50 tickets. First come, first served.

Prof. Jacob T. Robinson (Rice University) - Miniature magnetic and optical neural interfaces (May. 18th, 2021)

Title: **Miniature magnetic and optical neural interfaces**
Speaker: **Prof. Jacob T. Robinson** (Rice University)
Host: ENB Elite Master Program in Neuroengineering & Neuroelectronics Group (Prof. Bernhard Wolfrum)

May 18th 2021 - 18:00 (CEST)
Using TUM Zoom System. Login credentials will be provided after **registration.**
Update by May 18th 2021**:** We already closed the event registration webpage. Kindly send an email to msne@ei.tum.de for last-minute access credentials.

Miniature implanted devices capable of manipulating and recording biological signals promise to improve the way we study biology and the way we diagnose and treat disease; however, to create an effective network of miniature bioelectronic devices we must overcome myriad engineering challenges. In this talk, I will describe how we can leverage unique device physics and material properties to overcome some of these challenges. Specifically, I will show how magnetoelectric materials allow us to effectively transmit data and power to mm-sized devices deep inside the body. I will also describe how we can engineer fast magnetic control of genetically targeted neurons. Finally, I will discuss how we can create compact wearable and implantable fluorescent imaging systems by combining photonic technology with computational imaging. Overall, these technologies provide a suite of miniature magnetic and optical neural interfaces that could support next-generation brain-computer interfaces and closed-loop electronic medicine.

Biography Jacob T. Robinson

UCLA in 2003 and a Ph.D. in Applied Physics from Cornell University in 2008. He then began a postdoctoral research position in the Department of Chemistry and Chemical Biology at Harvard University where he created silicon nanowire devices to probe the electrical and chemical activity of living cells. In 2012, he joined the ECE and BioE departments at Rice. Dr. Robinson is a performer on several DARPA neurotech and bioelectronics programs and currently leads one of the N3 teams creating non-surgical neural interfaces. Dr. Robinson is the recipient of the DARPA Young Faculty Award, the Materials Today Rising Star Award, and is a Senior Member of IEEE. He is a former co-chair of the IEEE Brain Initiative and is a core member of the IEEE Brain Neuroethics working group.

The Time after MSNE Graduation ... A Panel Discussion (Jan 19th 2021, 18:00)

MSNE Alumni and their further Career Paths

Winter 2016/17 - Pioneering in a brand-new study program, exploring opportunities and co-shaping the program by feedback and student initiatives, studying in a program which is evolving semester-wise: **MSNE Alumni/Alumna Steffen Schneider, Christoph Kocher, and Ann Kotkat** are going to look back ~4.5 years, discussing their impressions on ENB MSNE Program, their time at TUM, their time in Elite Network of Bavaria, putting a focus on their year(s) after graduation. The discussion is intended to provide a student perspective on career opportunities, on time and efforts spent in the program or afterwards that turned out fruitful or a waste of time. The event is open for all MSNE students, **all MSNE alumni/alumnae**, and MSNE associated Faculty/Team. We would like to keep this audience fixed to this group of people.

Preparing for the event, we asked three open questions to Christoph, Steffen, and Ann:

- Being in a time capsule, given all the knowledge you have now, re-starting to MSNE: What would you do in a different way?
- What have been your thoughts while deciding between PhD / Doctoral Studies at University and (research-.oriented) Industry Employment?
- Kindly provide a preview on your calendar entry of Friday, Jan 19th 2024, given that all the plans you made for the next years will turn out successful!

We will meet for this Panel discussion Tuesday, Jan 19th 2021, 18:00 in Zoom. MSNE students, MSNE alumni/ae and MSNE Associated Faculty/Team will receive an personal invitation soon.

Expected end of the evening event is 20:00 (...but we will not close zoom rooms sharp by time).

Dr. Janie M. Ondracek (TUM WZW) - Investigation of Sleep, Learning, and Memory in the Sauropsid Brain (Dec. 15th, 2020)

Current Work and Opportunities for MSNE Student Projects

Dr. Janie M. Ondracek
Chair of Zoology (Prof. Dr. Harald Luksch), Technische Universität München
https://www.zoologie.wzw.tum.de/arbeitsgruppe-ondracek.html

Title: Investigation of sleep, learning, and memory in the sauropsid brain - Current work and opportunities for student projects

Tuesday, Dec. 15th 2020, 19:00 in Zoom. MSNE students will receive an personal invitation soon.

Current Research Program: My research program aims to study the emergence of sleeping brain dynamics throughout learning and devel-opment. I use non-mammalian animal models, such as birds, to investigate the evolution of sleeping brain states in alternative neuro-architectures. My research uses diverse, interdisciplinary approaches including

• Behavioral paradigms to study natural learning in birds (vocal learning, nest building, food caching)
• Neurophysiology to examine large-scale brain dynamics during learning, memory retrieval, and sleep
• Molecular and genetic tools to perturb neural circuits in real time
• Computational tools to analyze behavior and brain state network dynamics
This work will shed light on the fundamental underpinnings of sleep and memory in all tetrapods by establishing:
• the evolutionary links between sleeping brain states in birds and mammals
• the necessary and sufficient neuro-architectures required for the generation sleep-related brain dynamics
• the emergent patterns of large-scale, synchronous neural activity during development.

Focus of the talk:
After an introduction to my current work, I will introduce opportunities for student projects, such as 6-week and 9-week research projects.

MSNE program manager Florian Rattei will support this event, introducing new students to the concept of MSNE Research Projects and answering student questions.

Expected end of the evening event is 20:00.

Prof. Dr. Shih-Chii Liu (ETH Zurich) Dec. 5th 2019 - 5 PM

Prof. Dr. Shih-Chii Liu

Institut für Neuroinformatik, University of Zürich /ETH Zürich
https://www.ini.uzh.ch/~shih/

Title: Real-time Recognition with Neuromorphic Auditory Systems

Date, Time and Venue:Thursday, December 5th 2019, 17:00 , room N1135

Registration: https://wiki.tum.de/x/TIRJFQ

Abstract: A fundamental organizing principle of brain computing enabling its amazing combination of intelligence, quick responsiveness, and low power consumption is its use of sparse spiking activity to drive computation. Recent progress in the development of higher-performance, more usable neuromorphic spike-event-based visual (DVS/ATIS/DAVIS) and auditory (AER-EAR/DAS) sensors along with versatile hardware such as FPGAs have stimulated exploration of real-time sensor processing for wearable and IoT platforms. These sensors enable "always-on" low-latency system-level response time at lower power than conventional sampled sensors. I will describe the circuits of a silicon cochlea auditory sensor that emulates the processing in biological cochleas, the event-driven deep networks that process the sensor data, and the real-time implementation of event-driven delta networks that emulate spiking networks on an FPGA platform with state-of-the-art power efficiency, latency, and throughput. I will demonstrate how we use these delta networks on a continuous spoken-digit speech recognition task.

Biography: Shih-Chii Liu received the B. S. degree in electrical engineering from Massachusetts Institute of Technology and the Ph.D. degree in the Computation and Neural Systems program from the California Institute of Technology in 1997. She worked at various companies including Gould American Microsystems, LSI Logic, and Rockwell International Research Labs before returning for her doctoral studies with Carver Mead. She is currently a Professor at the University of Zurich. Her research interests include low-power event-driven neuromorphic sensor and processor hardware design; and event-driven bio-inspired algorithms and deep neural networks, particularly for audio domains. Dr. Liu is past Chair of the IEEE CAS Sensory Systems and Neural Systems and Applications Technical Committees. She is current Chair of the IEEE Swiss CAS/ED Society and general co-chair of the 2020 IEEE Artificial Intelligence Circuits and Systems Conference (https://aicas2020.eu). She is also one of the lead organizers of the long-running Telluride Neuromorphic Cognition Engineering Workshop (http://tellurideneuromorphic.org). She co-directs the Sensors group (http://sensors.ini.uzh.ch) at the Institute of Neuroinformatics, University of Zurich and ETH Zurich.

The talk will be hosted by Prof. Werner Hemmert and Prof. Bernhard. U. Seeber

Prof. Dr. Wulfram Gerstner (EPFL, Lausanne) Dec. 12th 2019 - 17:30

Prof. Dr. Wulfram Gerstner

Ecole polytechnique fédérale de Lausanne (EPFL)

Registration: We kindly ask to register quickly: https://wiki.tum.de/x/U4RJFQ

Date, Time and Venue: Th, Dec. 12th 2019, starting 17:30 at TUM (Main Campus, Theresienstrasse 90, Building N1, room N1135)

Title: Eligibility traces and three-factor rules of synaptic plasticity

Abstract: Hebbian plasticity combines two factors: presynaptic activity must occur together with some postsynaptic variable (spikes, voltage deflection, calcium elevation ...). In three-factor learning rules the combination of the two Hebbian factors is not sufficient, but leaves a trace at the synapses (eligibility trace) which decays over a few seconds; only if a third factor (neuromodulator signal) is present, either simultaneously or within a short a delay, the actual change of the synapse via long-term plasticity is triggered. After a review of classic theories and recent evidence of plasticity traces from plasticity experiments in rodents, I will discuss two studies from my own lab: the first one is a modeling study of reward-based learning with spiking neurons using an actor-critic architecture; the second one is a joint theory-experimental study showing evidence for eligibility traces in human behavior and pupillometry. Extensions from reward-based learning to surprise-based learning will be indicated.

Biography: Wulfram Gerstner is Director of the Laboratory of Computational Neuroscience LCN at the EPFL. He studied physics at the universities of Tubingen and Munich and received a PhD from the Technical University of Munich. His research in computational neuroscience concentrates on models of spiking neurons and spike-timing dependent plasticity, on the problem of neuronal coding in single neurons and populations, as well as on the role of spatial representation for navigation of rat-like autonomous agents. He currently has a joint appointment at the School of Life Sciences and the School of Computer and Communications Sciences at the EPFL. He teaches courses for Physicists, Computer Scientists, Mathematicians, and Life Scientists. He is the recipient of the Valentino Braitenberg Award for Computational Neuroscience 2018 and a corresponding member of the Academy of Sciences and Literature Mainz (Germany).

The talk will be hosted by MSNE Students Jin Hwa Lee and Melanie Tschiersch.

Flyer (download)

Prof. Dr. Klaus Gramann (TU Berlin) - Mobile Brain/Body Imaging (MoBI) to image brains in action, Nov. 18th 2019, 17:30

Prof. Dr. Phil. Klaus Gramann

Institut für Psychologie und Arbeitswissenschaft Biopsychologie und Neuroergonomie
https://www.bpn.tu-berlin.de/menue/team/klaus_gramann/

Title: Mobile Brain/Body Imaging (MoBI) to image brains in action

Monday, Nov 18th 2019, 17:30 at TUM, Theresienstrasse 90, in semianr room N1135

Abstract: Recent years have shown a remarkable shift in using established EEG technologies to leave the traditional lab environments and to record brain dynamics in actively behaving participants in complex technical setups and the real world. Imaging human brain dynamics usually requires stationary setups and immobile participants to avoid movement-related artifacts from distorting the signal of interest. Interaction with technical systems, however, often requires physical movement to interact with some form of interface to reach the desired system state. This movement itself provides kinesthetic feedback that contributes to and sometimes builds the very basis of the interaction. The brain dynamics underlying such physical interaction are hitherto unknown because of the restrictions of established brain imaging modalities. To overcome these restrictions, new mobile brain imaging methods can be employed. Here, I will give an overview of new technological developments in the field and applications that are now possible using mobile electroencephalography and Mobile Brain/Body Imaging (MoBI). The requirements and pros and cons of different approaches will be discussed and examples for recent interactive VR experiments are shown. In addition, challenges regarding recording hardware and analyses approaches often leading to difficulties in comparing the results with established laboratory EEG-parameters will be discussed.

Biography: Klaus Gramann received a pre-diploma in psychology from Justus Liebig University Giessen, Germany, and the Diploma and Ph.D. degrees in Psychology from RWTH Aachen, Germany in 1998 and 2002, respectively. He was an Assistant Professor with the Ludwig Maximilians University of Munich, Germany, and a Research Associate with the Swartz Center for Computational Neuroscience, University of California at San Diego. After working as a visiting professor at the National Chiao Tung University, Hsinchu, Taiwan and as a professor for cognitive psychology at the University of Osnabrueck, Germany, he became the chair of biopsychology and neuroergonomics with the Technical University of Berlin, Germany in 2012. Since 2017, he has also been a Professor with the School of Computer Science, University of Technology Sydney, Australia. His research covers the neural foundations of cognitive processes with a special focus on the brain dynamics of embodied cognitive processes. He is involved in the field of spatial cognition, visual attention, and the development of a mobile–brain imaging method to leverage the fundamental research results in applied neuroergonomics.

The talk will be hosted by Prof. Markus Ploner

Download Program Flyer

Prof. Dr. Dr. h.c. Robert Riener - Neurorehabilitation Robotics: Mechatronic Solutions for People with Movement Disorders (Nov. 7th 2019, 17:00)

Speaker: Prof. Dr.-Ing. Dr. med. h.c. Robert Riener
Sensory-Motor Systems Lab, IRIS, ETH Zurich and University of Zurich

Date and Venue: November 7th 2019, 17:00 (s.t.), room N1135

Title: Neurorehabilitation Robotics: Mechatronic Solutions for People with Movement Disorders

Abstract: Robots for the upper and lower limbs can be very useful to restore movement abilities in two ways. First, they can promote neurorehabilitation as training devices after neurological injuries such as spinal cord injury (SCI), traumatic brain injury and stroke. Second, they can be used as assistive devices to support patients or elders with gait impairments in daily life situations. However, current mechatronic solutions are still too bulky, too heavy, with too little battery power, and thus, too inconvenient to use. Furthermore, the sensory technologies and control strategies are still too primitive to allow the correct motion intention and to provide effective assist-as-needed support. These disadvantages result to unsatisfactory performance and discomfort. In this talk I will present current engineering solutions and future trends of stationary gait and arm training robots as well as wearable exoskeleton devices that can be used for training and assistance in daily life. I will also present the Cybathlon, which is a new kind of championship, where people with physical disabilities compete against each other at tasks of daily life, with the aid of robotic technologies. The next Cybathlon will take place in Zurich, on May 2nd and 3rd 2020.

Biography: Robert Riener studied Mechanical Engineering at TU München, Germany, and University of Maryland, USA. He received a Dr.-Ing. degree in Engineering from the TU München in 1997. After postdoctoral work from 1998-1999 at the Centro di Bioingegneria, Politecnico di Milano, he returned to TU München, where he completed his Habilitation in the field of Biomechatronics in 2003. In 2003 he became assistant professor at ETH Zurich and Spinal Cord Injury Center of the University Hospital Balgrist ("double-professorship"); since 2010 he has been full professor for Sensory-Motor Systems, ETH Zurich. Riener has published more than 400 peer-reviewed journal and conference articles, 20 books and book chapters and filed 24 patents. He has received 22 personal distinctions and awards including the IEEE TNSRE Best Paper Award 2010, and the euRobotics Technology Transfer Awards 2011 and 2012. Riener's research focuses on the investigation of the sensory-motor interactions between humans and machines. Riener is the initiator and organizer of the Cybathlon, which was honored with the European Excellence Award and the Yahoo Sports Technology Award. In 2018 Riener obtained the honorary doctoral degree from the University of Basel.

The talk will be hosted by Prof. Gordon Cheng

Flyer (download)

Dr. Jessica Philipps-Silver - Auditory-Vestibulomotor Temporal Processing and Crossmodal Plasticity for Musical Rhythm in the Early Blind (Jun 27th 2019)

Laboratory of Integrative Neuroscience and Cognition
Georgetown University Medical Center

https://linc.georgetown.edu/jessica-phillips-silver

Title: Auditory-Vestibulomotor Temporal Processing and Crossmodal Plasticity for Musical Rhythm in the Early Blind

Abstract: The auditory dorsal stream (ADS) is a cortical brain network responsible for sensorimotor spatiotemporal processing. However, despite the important role of vestibular input when the head or body is moving through space, as well as the strong coupling between the vestibular and visual systems, very little is known about how vestibular information is integrated with auditory-motor inputs in the ADS, nor is it known to what extent this integration is affected by early visual deprivation. Using functional magnetic resonance imaging and motion capture technology we show that the ADS includes an extension to parietoinsular vestibular cortex (PIVC) and to subcortical regions including basal ganglia and vestibular cerebellum. This circuit is engaged after sensorimotor synchronization training, during beat recognition, and is preserved in the early blind. The strength of activation of PIVC in the early blind correlates with a measure of lifetime physical spatial activity, suggesting that experience with vestibular stimulation via physical spatial activities might compensate for any negative effects of early blindness, and thus reinforcing the beneficial effects of mobility training. Finally, rhythmic entrainment provides an effective tool for studying auditory-vestibulomotor integration and music appreciation, and for developing music-based interventions for early blind individuals.

Biography: Jessica Phillips-Silver, PhD, is a researcher in the Department of Neuroscience at Georgetown University Medical Center and served as adjunct professor in the Faculty of Music, where she developed Georgetown's first course on Music and the Brain. Jessica's research examines how 'feeling the beat' in music is a multisensory experience from infancy through adulthood, and she documented the first case of the musical disorder 'beat deafness'. She currently studies the musical processing and cortical plasticity in blindness with Prof. Josef Rauschecker at Georgetown. She is also interested in the development of musical rhythm and executive functions in Deaf and hearing children, and music and dance as a model of temporal prediction and cooperation in humans.

Date and Venue: Thursday, June 27th 2019 17:45 in room **N1135**

The talk ist hosted by ICS/ Prof. Gordon Cheng

Download Program Flyer

Prof. Dr. Alin Albu-Schäffer - Nonlinear elastic resonance modes for efficient robot and biological locomotion (Jun 26th 2019)

Prof. Dr.-Ing. Alin Albu-Schäffer
Deutsches Zentrum für Luft- und Raumfahrt (DLR)
Institut für Robotik und Mechatronik

https://www.professoren.tum.de/albu-schaeffer-alin/
https://rmc.dlr.de/rm/de/staff/alin.albu-schaeffer/?url=Alin.Albu_Schaeffer

Title: Nonlinear elastic resonance modes for efficient robot and biological locomotion

Abstract: Controlling motion at low energetic cost, both from mechanical and computational point of view, certainly constitutes one of the major locomotion challenges in biology and robotics. We attempt to demonstrate that robots can be designed and controlled to walk highly efficient by exploiting resonance body effects, increasing the performance compared to rigid body designs. To do so, however, legged robots need to achieve limit cycle motions of the highly coupled, non-linear body dynamics. This led us to the research of the still not very well understood theory of nonlinear system intrinsic modal oscillation control. I will present current theoretical and experimental results therewith. One of the striking results is that biomechanics, in particular kinematics, visco-elastic and inertial properties of biological limbs are such that coordinated resonant motions of multiple joints intrinsically emerges and is therefore easy to excite and sustain. This can be also achieved by careful design for robotic systems. Some of the basic robotics control functions we developed for locomotion strikingly resemble neural functionalities and structures. For example, Hebbian lerning, one of the most basic principles of synaptic plasticity, is mathematically equivalent to robotic controllers which adapt to previously unknown resonance properties of the body. Based on the robot control approach, we propose an equivalent neural model involving neural plasticity in the spine and the serotonergic loop in the brain-stem. This hypothesis is supported by numerous experimental evidences from neuroscience.

Biography: Alin Albu-Schäffer received his M.S. in electrical engineering from the Technical University of Timisoara, Romania in 1993 and his Ph.D. in automatic control from the Technical University of Munich in 2002. Since 2012 he is the head of the Institute of Robotics and Mechatronics at the German Aerospace Center (DLR), which he joined in 1995. Moreover, he is a professor at the Technical University of Munich, holding the Chair for "Sensor Based Robotic Systems and Intelligent Assistance Systems". His research interests range from robot design and control to robot intelligence and human neuroscience. He is an author of more than 250 peer reviewed journal and conference papers and received several awards, including the IEEE King-Sun Fu Best Paper Award of the Transactions on Robotics in 2012 and 2014;

Date and Venue: Jun 26th 2019 - 17:00 in room N1135

Download Flyer

The Talk is hosted by Institute for Cognitive Systems (ICS, Prof. Gordon Cheng).

Dr. Ganesh Gowrishankar - Bad performance in sports is contagious:... (Feb 21st 2019)

Dr. Ganesh Gowrishankar, Laboratoire d'Informatique, de Robotique et de Microelectronique de Montpellier (LIRMM)

https://staff.aist.go.jp/g.ganesh/

Title: Bad performance in sports is contagious: prediction error induced motor contagions in human behaviors

Abstract: Motor contagions refer to implicit effects on one’s actions induced by observed actions. Motor contagions are believed to be induced simply by action observation and cause an observer’s action to become similar to the action observed. However, in our recent work, we discovered a new motor contagion that is induced only when the observation is accompanied by prediction errors -differences between actions one observes and those he/she predicts or expects. In two experiments with professional sportsmen, we show that this contagion is distinct and arguably more dominant than contagions induced by action observation, and can lead to deterioration in performance of professionals after observing a novice. In this talk, I will give a brief summary of my work in “human centric robotics”- in which I utilize parallel research in robotics, motor neuroscience and cognitive neuroscience to improving machines that interact with humans. I will then talk in more detail about our cognitive neuroscience experiments investigating prediction error induced motor contagions, and discuss how this contagion may be the missing link between mechanisms investigated in action observation and action production by humans.

Biography: Gowrishankar Ganesh received his Bachelor of Engineering (first-class, Hons.) degree from the Delhi College of Engineering, India, in 2002 and his Master of Engineering from the National University of Singapore, in 2005, both in Mechanical Engineering. He received his Ph.D. in Bioengineering from Imperial College London, U.K., in 2010. He worked as an Intern Researcher with the Computational Neuroscience Laboratories, Advanced Telecommunication Research (ATR), Kyoto, Japan, from 2004 and through his PhD. Following his PhD he worked at the National Institute of Information and Communications Technology as a Specialist Researcher till December 2013. Since January 2014, he is a Senior Researcher at the Centre National de la Recherché Scientifique (CNRS), and is currently located at Le Laboratoire d'Informatique, de Robotique et de Microélectronique de Montpellier (LIRMM) in Montpellier. He is a visiting researcher at the University of Tokyo, National Institute of Advanced Industrial Science and Technology (AIST) in Tsukuba, and ATR in Kyoto. His research interests include robot control, human sensori-motor control and learning, cognitive neuroscience and robot-human interactions.

During the first 10 minutes, two MSNE students will present their research projects (part of their Research Excellence Certificate):

Suleman Zaidi - "Linguistic Analysis with Stereo EEG Data for functional Aphasia Location"
Francisco Zurita - "Influence of geometry on signal propagation in heartmuscle cell networks"

Time and Venue:

February 21st 2019 - 4:30 p.m., Theresienstarsse 90, Munich, room N1135

Srinivas Turaga, PhD - Connecting the structure and function of neural circuits - (Jan 16th 2019)

Srini Turaga, HHMI Janelia Research Campus

Title:
Connecting the structure and function of neural circuits

Abstract:
In this talk, I will describe how we developed deep learning based computational tools to solve two problems in neuroscience: inferring the activity of a neural network from measurements of its structural connectivity, and inferring the connectivity of a network of neurons from measurements and perturbation of neural activity.

1. Can we infer neural connectivity from noisy measurement and perturbation of neural activity? Population neural activity measurement by calcium imaging can be combined with cellular resolution optogenetic activity perturbations to enable the mapping of neural connectivity in vivo. This requires accurate inference of perturbed and unperturbed neural activity from calcium imaging measurements, which are noisy and indirect. We built on recent advances in variational autoencoderes to develop a new fully Bayesian approach to jointly inferring spiking activity and neural connectivity from in vivo all-optical perturbation experiments. Our model produces excellent spike inferences at 20K times real-time, and predicts connectivity for mouse primary visual cortex which is consistent with known measurements.

2. Are measurements of the structural connectivity of a biological neural network sufficient to predict its function? We constructed a simplified model of the first two stages of the fruit fly visual system, the lamina and medulla. The result is a deep hexagonal lattice convolutional neural network which discovered well-known orientation and direction selectivity properties in T4 neurons and their inputs. Our work demonstrates how knowledge of precise neural connectivity, combined with knowledge of the function of the circuit, can enable in silico predictions of the functional properties of individual neurons in a circuit, leading to an understanding of circuit function from structure.

Biography:

Srini Turaga is a group leader at the Janelia Research Campus of the Howard Hughes Medical Institute. He was previously a postdoctoral fellow at the Gatsby Unit at University College London, following a PhD from MIT in 2009. His research interests include machine learning and computational neuroscience, with a special focus on connectomics, variational auto-encoders, and deep learning.

www.janelia.org/lab/turaga-lab

Time and Venue:
January 16th 2019 - 10.45 a.m., Arcisstrasse 21, Munich, room 5170 -> Vorhoelzer Forum

Talk is hosted by CNE (Prof. Jakob Macke).

Prof. Patrick van der Smagt - Latent optimal control (Jan 16th 2019)

Abstract:
Control of multidimensional systems typically relies on accurately engineered models. Breaking this require-ment is problematic with neural networks, as their Gaussian data assumptions typically do not hold. In my talk, I will demonstrate how this problem can be efficiently solved by combining latent variable models with specific type of optimal control. The theory is demonstrated on various simulated closed-loop control systems as well as on real hardware.

Biography:
Patrick van der Smagt is director of the open-source Volkswagen Group AI Research Lab in Munich's Volkswagen Data Lab, focusing on probabilistic deep learning for time series modelling, optimal control, rein-forcement learning, robotics, and quantum machine learning. He previously directed a lab as professor for machine learning and biomimetic robotics at the Technical University of Munich while leading the machine learning group at the research institute fortiss, and before founded and headed the Assistive Robotics and Bion-ics Lab at the DLR Oberpfaffenhofen. Quite a bit earlier, he did his PhD and MSc at Amsterdam's universities. Besides publishing numerous papers and patents on machine learning, robotics, and motor control, he has won a number of awards, including the 2013 Helmholtz-Association Erwin Schrödinger Award, the 2014 King-Sun Fu Memorial Award, the 2013 Harvard Medical School/MGH Martin Research Prize, and best-paper awards at machine learning and robotics conferences and journals. He is founding chairman of a non-for-profit organisa-tion for Assistive Robotics for tetraplegics and co-founder of various tech companies.

Time and Venue:
January 16th 2019 - 10.00 a.m., Arcisstrasse 21, Munich, room 5170 -> Vorhoelzer Forum

Talk is hosted by CNE (Prof. Jakob Macke).

Download Invitation Flyer

Dr. Josef Ladenbauer - Statistical inference for mechanistic models of neural populations based on spike-train data (December 11th 2018)

Abstract: Multi-neuronal spike-train data recorded in vivo typically exhibit rich dynamics as well as considerable variability across cells and repetitions of identical experimental conditions (trials). The interpretation of such data often relies on abstract statistical models that allow for principled parameter estimation and model selection; however, the interpretive power of these models is limited by the low extent to which prior biophysical constraints are incorporated. In contrast, mechanistic models are useful to interpret neurocircuit dynamics, but are rarely quantitatively matched to experimental data due to methodological challenges. In my talk I will present analytical, likelihood-based methods to efficiently fit spiking population models to single-trial spike trains. I will first focus on coupled stochastic integrate-and-fire neurons, for which we statistically infer the mean and variance of hidden inputs, neuronal adaptation properties and synaptic connectivity. Then, to infer the low-dimensional collective dynamics I will consider a doubly-stochastic model that accounts for fast independent and slower shared input fluctuations. We reconstruct the shared variations, classify their dynamics, obtain precise spike rate estimates, and quantify how individual neurons contribute to the population activity, all from a single trial. Extensive evaluations based on simulated data, and validations using ground truth recordings in vitro and in vivo demonstrate that our methods efficiently yield accurate results and outperform classical approaches. Altogether, these tools enable a quantitative, mechanistic interpretation of recorded neuronal population activity.

Biography:
https://www.ni.tu-berlin.de/menue/members/postdocs/ladenbauer_josef/
https://www.researchgate.net/profile/Josef_Ladenbauer

Time and Venue:
Tuesday, December 11th 2018, 16h00 Theresienstr. 90, 80333 Munich, room N1135

Talk is hosted by CNE (Prof. Jakob Macke)

Prof. Ryad B. Benosman - What is Neuromorphic Event-based Computer Vision? Sensors, Theory and Applications (November 12th 2018)

Abstract: In this presentation, I will introduce neuromorphic, event-based approaches for image sensing and processing. State-of-the-art image sensors suffer from severe limitations imposed by their very principle of operation. These sensors acquire the visual information as a series of “snapshots” recorded at discrete point in time, hence time-quantized at a predetermined frame rate, resulting in limited temporal resolution, low dynamic range and a high degree of redundancy in the acquired data. Nature suggests a different approach: Biological vision systems are driven and controlled by events happening within the scene in view, and not – like conventional image sensors – by artificially created timing and control signals that have no relation to the source of the visual information. Translating the frameless paradigm of biological vision to artificial imaging systems implies that control over the acquisition of visual information is no longer imposed externally on an array of pixels but rather the decision making is transferred to each individual pixel, which handles its own information individually. We will introduce the fundamentals underlying such bio-inspired, event-based image sensing and processing approaches, and explore their strengths and weaknesses. I will show that bio-inspired vision systems have the potential to wipe out conventional, frame-based vision acquisition and processing systems and to establish new benchmarks in terms of data compression, dynamic range, temporal resolution and power efficiency in applications such as 3D vision, object tracking, motor control, visual feedback loops, and machine learning in real-time at several hundreds kHz.

Biography:
Ryad B. Benosman is a full Professor at both the University of Pittsburgh Medical Center, Carnegie Mellon University and Sorbonne Universitas where he does research at the intersection of robotics, computer vision and neuroscience. Specifically, he investigates the use of standard and neuromorphic cameras to enable au-tonomous, agile robotics, brain-machine interfaces focusing on retina prosthetics, optogenetics stimulation and recently visual cortex stimulation. Ryad did his PhD in robotics and computer vision at University of Pierre and Marie Curie after studying pure and applied mathematics. He is a pioneer and a leading researcher in the field of event based neuromorphic computer vision. His lab developed the ATIS neuromorphic camera. He has authored more than 200 papers, 60 of which are considered to provide the foundations of neuromorphic computer vision. He also founded sev-eral companies such as Prophesse (formerly Chronocam) the leading company in event-based vision, Pixium Vision (retina prosthetics), Chronolife (eHealth) and more recently Brainiac (neural processor computer).

Time and Venue:
Monday, November 12th 2018, 17h00 Theresienstr. 90, 80333 Munich, room N1135

Talk is hosted by ICS (Prof. Gordon Cheng)

Download Flyer

Prof. Josef Rauschecker - Internal models of the brain in speech and music (June 26th 2018)

Abstract:
At first glance, the monkey brain looks like a smaller version of the human brain. Indeed, the anatomical and functional architecture of the cortical auditory system in monkeys is very similar to that of humans, with dual pathways segregated into a ventral and a dorsal processing stream. Yet, monkeys do not speak. Repeated attempts to pin this inability on one particular cause have failed. A closer look at the necessary components of language, according to Darwin, reveals that all of them got a significant boost during evolution from nonhuman to human primates. The vocal-articulatory system, in particular, has developed into the most sophisticated of all human sensorimotor systems with about a dozen effectors that, in combination with each other, result in an auditory communication system like no other. This sensorimotor network possesses all the ingredients of an internal model system that permits the emergence of sequence processing, as required for phonology and syn-tax in modern languages.

Biography:
Josef P. Rauschecker studied at Technical University Munich (TUM) and Ludwig-Maximilians-University (LMU) Munich, Germany (Electrical Engineering and Medical Science) and at the Universities of Sussex (Ex-perimental Psychology and Artificial Intelligence) and Cambridge, England (Physiology). He received his Ph.D. (Dr.-Ing.) from TUM in 1980 for research performed at the Max Planck Institute (MPI) for Psychiatry in Munich and received his Habilitation (D.Sc.) in Neurophysiology from Eberhard-Karls-University Tübingen in 1985. After working as a junior staff scientist at the MPI for Biological Cybernetics from 1981-1989, he joined the Na-tional Institute of Mental Health (USA) as a Senior Investigator in the Laboratories of Neuropsychology and Neurophysiology in 1989. Since 1995, he has been a Professor of Physiology and Biophysics, Neurology, Psychology, and Neuroscience at Georgetown University, Washington, DC (USA), where he has also served on the university's Executive Council, Steering Committee and Director of Cognitive Science. Josef Rauschecker is the director of the La-boratory of Integrative Neuroscience and Cognition (LINC) as well as of an international education and re-search Program in Cognitive and Computational Systems (PICCS).

Time and Venue:
Tuesday, June 26th 2018, 17h30 Theresienstr. 90, 80333 Munich, room N1135

Talk is hosted by ICS (Prof. Gordon Cheng).

Download Invitation Flyer

Prof. Marc Spehr - Chemosensory Mechanisms of Conspecific Communication (Jan 10th 2018)

Abstract:
In most mammals, conspecific chemical communication controls complex behaviors. Information about individuality, social and reproductive status is conveyed by an elusive class of chemical cues – pheromones. The highly reproducible character of pheromone responses offers a unique opportunity to uncover the neuronal basis of genetically programmed behavior. Despite its fundamental significance, however, the basic chemosensory mechanisms of social communication remain largely unknown. To address these issues, my laboratory has developed a multi-faceted approach to uncover the mechanisms underlying mammalian pheromone sensing. My research, therefore, focuses on the molecular and cellular architecture of chemosensory communication in conspecific mammals – an innovative and interdisciplinary field of neurobiology. Combining molecular, biochemical, (electro)physiological, and live-cell imaging methods, as well as behavioral techniques in wildtype and mutant mouse models, my research challenges existing models of signal transduction in the olfactory system, analyzes the principle coding logic of pheromone detection, and, thus, sheds light on the neurophysiological basis of social behavior.

Biography:
Marc Spehr is a Lichtenberg-Professor and head of the Chemosensation Laboratory at RWTH Aachen University in Aachen, Germany. He received his Diploma in biology as well as his Ph.D. (summa cum laude) from Ruhr-University Bochum, Germany. As a graduate student, Marc Spehr analyzed chemosensory signaling pathways in the mouse main and accessory olfactory systems. For his postdoctoral training he joined the group of Frank Zufall at University of Maryland School of Medicine in Baltimore, USA, where he investigated the role of the olfactory system in social recognition. In 2006, he was awarded an Emmy Noether grant by the German Research Counsel and returned to Ruhr-University Bochum as a principal investigator. As PI, his interests focused on the largely enigmatic function of pheromones in conspecific chemical communication. In wildtype and mutant mouse models, Marc Spehr addressed questions of both pheromone detection in the periphery and pheromone processing in the brain. In 2009, he was appointed a Lichtenberg-Professor of the Volkswagen Foundation at RWTH Aachen University where his laboratory continues to study the coding logic of pheromone detection and neurophysiological basis of social behavior.

Time and Venue:
Wednesday, January 10th 2018, 17h00 Theresienstr. 90, 80333 Munich, room N1135

Talk is hosted by the Neuroelectronics group (Prof. Wolfrum).

Download Invitation Flyer

Prof. Tom Francart - EEG in response to running speech: applications in diagnostics and noise suppression (Jan 15th 2018)

Biography/Abstract:
Tom Francart, born 1981 received the M.S.and Ph.D. degrees in engineering from the University of Leuven, Belgium, in 2004 and 2008, respectively. Since 2013 he is a research professor at the University of Leuven. His research interests include sound processing for auditory prostheses, binaural hearing and objective measures of hearing. His work follows a multidisciplinary approach that links electrical engineering with audiology and neuroscience. His current research focuses on the development of individualised and self-adapting sound processing for cochlear implant and hearing aid users.

The talk will be on EEG in response to running speech: applications in diagnostics and noise suppression.

Time and Venue:
Monday, January 15th 2018, 17:15 o'clock at Theresienstrasse 90, 80333 München, room N1135

The talk is hosted by Prof. Seeber (Audio Information Processing)

Download Invitation Flyer

Dr. Mikhail A. Lebedev (Duke University) - Brain-Machine Interfaces for Restoration of Movements and Sensations (Feb 6th 2018)

Abstract: Brain-machine interfaces (BMIs) connect the nervous system to various external devices, with the goal of restoring and/or enhancing motor, sensory and cognitive functions, and neurorehabilitation. BMIs can be used by patients with different neurological conditions as assistive devices or by healthy individuals as tools for brain augmentation. Over the past half-century, BMIs have advanced significantly from the early ideas that sounded like science fiction to the modern high-tech implementations. In particular, invasive recordings using multichannel implants have enabled real-time control of artificial limbs by nonhuman primates and human subjects. Furthermore, neural prostheses can provide artificial sensory feedback, allowing users to perceive the movements of prosthetic limbs and their haptic interaction with external objects. Recently, neuroprosthetic approach was employed to build brain-nets that incorporate several brains exchanging information or performing cooperative tasks. Notwithstanding these achievements, even more spectacular developments are expected in the future.

Biography: Mikhail Lebedev, a Senior Research Scientist at Duke University, works in the fields of Neurorophysiology and Neuroprosthetics. He received a Master's degree in Physics from Moscow Institute of Physics and Technology (1986), and a PhD in Neurobiology from the University of Tennessee, Memphis (1995). His early research was on human sensorimotor integration. Since 1991, Lebedev works in the field of primate and rodent neurophysiology; he has studied neuronal mechanisms of cortical and basal ganglia circuits. Lebedev has investigated neuronal encoding of movements, somatic sensation, spatial attention and working memory. Since 2003, Lebedev works with Miguel Nicolelis; he supervises the primate laboratory at Duke University. The major focus of his current research is on BMIs, such as BMIs for reaching and grasping, BMIs that reproduce bipedal locomotion patterns, and sensorized BMIs that both extract motor command from the brain and deliver sensory information back to the brain. Lebedev is an editor of several journals, books and special issues.

Date, Time, and Venue: Tuesday, February 6th 2018, **16:00 o'clock** at Theresienstrasse 90, 80333 München, room N1135

The talk is hosted by Prof. Cheng (Institute for Cognitive Systems)

Download Invitation Flyer

Dr. Caroline Ling Li - Investigating into methods for multidimensional biomedical data analysis (13 January 2017)

ENB Elite Master Program Neuroengineering (MSNE)
Invited Presentation

Abstract
This talk focuses on how the signal processing and data analysis methodologies can be applied into the biomedical signal analysis in the data fusion framework. In our analysis, brain activities are measured through Electroencephalography (EEG) signals which were obtained from intensive care unit in hospital. In order to identify the brain consciousness states of those patients, various signal processing and predictive analytics methods were used. In this talk, some advanced methods are presented which overcomes the weakness of traditional methods in both time and frequency domains for EEG analysis. Moreover, an online signal nature tracking method based on collaborative adaptive filter is also presented in order to monitoring the brain states in real time. We then discuss how these methodologies can be further extended as a general framework for studying human biological functions and performances, ranging from hand gesture recognition to sport sciences.

Biography
Dr. Caroline Ling Li has been a Lecturer in the school of Computing at the University of Kent since 2011. She is also the founding coordinator of Laboratory of Brain | Cognition | Computing (BC2 Lab) of the school responsible for coordinating multidisciplinary research between Computing, Sports and local NHS. In 2015, she organized the BIH'15 conference as the local chair, which is a gathering event for three of the biggest brain initiatives (Speakers include Prof Allan Jones, Prof Karlheinz Meier, Prof David Van Essen). Before she joined the University of Kent, she had six-year research experience at Imperial College London in signal processing with a focus of analyzing body sensor data (EEG, EMG, ECG, eAR-sensor, and etc.). She started her research study within the Department of Electrical and Electronic Engineering at Imperial and then worked as a research associate in the £6 million EPSRC "ESPRIT with Pervasive Sensing" project at the Department of Computing of Imperial College. She has been focused on developing advanced signal processing methods for understanding sensor data with biomedical applications such as EEG-based biomarker for brain diseases, EMG-controlled robotics, ECG pattern extraction, and human motion analysis.

Time and Venue

Friday, January 13th 2017, 14h15 , Karlstr. 45, 80333 Munich, Room 1025
Talk is hosted by the Professorship for Neuroscientific System Theory (Prof. Conradt).

Invitation Flyer

Dr. Michael Pfeiffer - Deep Spiking Neural Networks – Low-Latency, Low-Compute Classifiers for Neuromorphic Platforms (20 December 2016)

ENB Elite Master Program Neuroengineering (MSNE)
Invited Presentation

Abstract
Spiking neural networks (SNNs) originate from computational neuroscience, but in recent years there has been growing interest in using brain-inspired event-based computing for real-time pattern recognition. In my talk I will present novel approaches that merge ideas from SNNs and Deep Learning, the currently most successful machine learning paradigm for computer vision, speech recognition, and many real-world applications. Deep SNNs are particularly attractive for implementation in neuromorphic hardware platforms, which emulate the operation of spiking neurons in hardware, and achieve significant savings in power and latency over conventional models. New algorithmic insights allow us to reach accuracy levels that match traditional networks, while exploiting the advantages of SNNs. Deep SNNs exhibit a performance-latency tradeoff, which allows them to produce good first guesses very quickly, even before all neurons in the network are updated. I will show recent results that demonstrate how latency and computing costs in Deep SNNs can be reduced significantly, making them attractive models for fast and power-efficient information processing on power-constrained systems.

Biography
Dr. Michael Pfeiffer is a research engineer at Robert Bosch Corporate Research, where he investigates Cognitive Systems and Deep Learning. In 2010 he obtained his PhD in mathematics and computer science from Graz University of Technology, Austria, investigating machine learning methods as tools to understand computations in nervous systems. He then joined the Institute of Neuroinformatics at the University of Zurich and ETH Zurich as a postdoc, working on theories of neural computation and learning and neuromorphic computing. In 2012 he became group leader and program coordinator of the MSc in Neural Systems and Computation, an interdisciplinary specialized masters program combining systems neuroscience, theoretical neuroscience, neurotechnologies, and neuromorphic engineering. He has made substantial contributions towards understanding synaptic plasticity models such as STDP in the framework of machine learning. His work on deep and spiking neural networks has been influential for transferring recent breakthroughs from machine learning onto novel neuromorphic computing platforms

Time and Venue

Tuesday, December 20th 2016, 11h30 , Karlstr. 45, 80333 Munich, Room 2026
Talk is hosted by the Professorship for Neuroscientific System Theory (Prof. Conradt).

Invitation Flyer

Prof. Maarten De Vos - Towards mobile and wearable brain monitoring (25 November 2016)

ENB Elite Master Program Neuroengineering (MSNE)
Invited Presentation

Abstract

All non-invasive technologies for the study of human brain activity suffer from the requirement that only artificial, movement-constrained behavior is allowed. However, by reducing “normal” behavior to a min-imum the ecological validity of the results can be limited. To overcome these limitations, we developed a truly mobile EEG system suitable for field recordings and natural situations which allows to decode single-trial brain responses in outdoor situations. We also demonstrated that signal quality of the mobile EEG system is equivalent to that of a standard lab amplifier in a traditional BCI experiment. Besides mobility and robustness with respect to motion, the critical issue before introducing EEG routinely in large studies became the electrode, as ideal EEG electrode would allow high quality and concealed recordings that can be conveniently attached to the head. We will demonstrate that a newly introduced cEEGrid electrode concept fulfills all these requirements and allows to monitor auditory attention relia-bly over long amounts of time.

Biography

Maarten De Vos is Associate Professor at the IBME, in the University of Oxford, following a Junior Professorship at the University of Oldenburg, Germany. He obtained his Ph.D. in electrical engineering from KU Leuven, Belgium, focusing on tensor-based decomposition methods. His academic work focuses on innovative biomedical monitoring and signal analysis, in particular the derivation of biosignatures of patient health from data acquired via wearable sensors and the incorporation of smart analytics into unobtrusive systems. He pioneering research in the field of mobile real-life brain-monitoring, which was awarded with several innovation prizes. His work on neonatal brain monitoring also achieved impact in patient care through the Neo-guard implementation project. After successful completion of the Biodesign faculty training at Stanford University, he started the Oxford Biodesign program.

Time and Venue

Friday, November 25th 2016, 15h00 at Karlstr. 45, 80333 Munich, Room 1025