

DR. ROMY LORENZ

EDUCATION

2013 – 2017	PhD Neurotechnology Thesis: <i>Neuroadaptive Bayesian optimization – Implications for the Cognitive Sciences</i> Supervisors: Dr. Robert Leech & Dr. Aldo Faisal	Imperial College London London, UK
2009 – 2012	MSc Human Factors (Distinction) neuro-cognitive psychology, neuroergonomics, brain-computer interfaces	Technical University of Berlin Berlin, Germany
2011	Study abroad biomedical engineering, system and computational neuroscience	Tsinghua University Beijing, China
2006 – 2009	BSc Business Psychology (First Class Honours) cognitive psychology, cognitive ergonomics, engineering psychology, Human Factors	Leuphana University Lüneburg, Germany
2008	Study abroad industrial psychology, usability engineering	Judson University Elgin, USA

RESEARCH POSITIONS

Jul 2017 – today	Postdoctoral Research Fellow , Department of Medicine Advancing neuroadaptive Bayesian optimization technology	Imperial College London London, UK
Oct 2013 – Jun 2017	Brain Science and Engineering PhD Training Fellow , Department of Medicine & Department of Bioengineering, Development of novel framework for optimizing experimental design in cognitive neuroscience using closed loop real-time fMRI and Bayesian optimization.	Imperial College London London, UK
Jun 2013 – Jul 2013	Multimodal Neuroimaging Training Scholar , Center for the Neural Basis of Cognition Exhaustive training in designing, conducting and analysing fMRI studies. Learning principles and limitations of other brain imaging techniques (M/EEG, NIRS, DTI).	University of Pittsburgh/ Carnegie Mellon University Pittsburgh, USA
Mar 2013 – May 2013	Visiting Researcher , Department of Cognitive Science & Swartz Center for Computational Neuroscience In-depth analyses of EEG data and application of machine-learning techniques for single-trial detection of error potentials for potential real-world application.	University of California San Diego (UCSD) San Diego, USA
Dec 2012 – Feb 2013	Research Associate , Berlin Brain-Computer Interface Group, Machine Learning Department Acquiring and analyzing EEG data and applying machine learning to identify individual stable brain patterns, which allow a reliable brain-computer interface based neuroprosthetic control.	Technical University of Berlin Berlin, Germany
Mar 2012 – Oct 2012	Graduate Thesis , Berlin Brain-Computer Interface Group, Department of Neurotechnology Evaluating usability and user experience of EEG-controlled brain-computer interface for prospective neuroprosthetic control within the EU-project MUNDUS.	Technical University of Berlin Berlin, Germany
Feb 2011 – Jun 2011	Lab Work , Institute for Neural Engineering, Department of Biomedical Engineering, School of Medicine Planning, conducting and analyzing EEG and fMRI experiments.	Tsinghua University Beijing, China
2010 – 2012	Research Assistant , Berlin Center of Mechatronical Medical Engineering Designing & evaluating user interfaces of surgical assistance systems with orthognathic surgeons. Workflow analyses in the operating room to inform design of novel X-ray.	Fraunhofer Gesellschaft/ Charité Berlin Berlin, Germany
Jul 2009 – Sep 2009	Research Assistant , Human Factors Group Analyzing eye-tracking and driving simulator data within the EU-project ISI-PADAS.	German Aerospace Center Braunschweig, Germany
Jan 2009 – Jul 2009	Research Intern , Customer Research Center Planning, conducting and analyzing usability studies of driving assistance systems.	Daimler AG (Mercedes Benz) Böblingen, Germany

TEACHING & SUPERVISION

Feb 2017	Teacher for ‘Non-invasive brain-computer interfaces’ (MSc Translational Neuroscience), Designing and teaching of one-day course, Department of Medicine, Imperial College London	
Oct 2015 – Dec 2015	Tutor for ‘The World Today’ (1 st year undergraduates), Imperial Horizons programme, Imperial College London (the team I was tutoring won one of the final prizes)	
Feb 2015 – Apr 2015	Teaching Assistant for ‘Brain-Machine Interfaces’ (MSc Biomedical Engineering/MRes Neurotechnology), Department of Bioengineering, Imperial College London	
Oct 2015– Jan 2015	Teaching Assistant for ‘Modelling in Biology’ (BEng Biomedical Engineering), Department of Bioengineering, Imperial College London	
2014 - 2016	Co-Supervision of 3 students: Lisa Evans MRes Experimental Neuroscience (Imperial College London) Amanda da Silva BEng Biomedical Engineering (Lisbon University) Paulina Majewska BSc Medical Biosciences (Imperial College London)	

GRANTS & FELLOWSHIPS

- 2017 **EPSRC Doctoral Prize Fellowship (£ 56,711 incl. salary)**, Imperial College London
- 2016 **Travel Grant (€ 225)**, 6th International Conference on Transcranial Brain Stimulation
- 2015 **ITMAT Funding Award (£ 68,990)**, NIHR Imperial Biomedical Research Centre, project: *Tailored non-invasive brain stimulation for rehabilitation of TBI using real-time fMRI* (co-author & named researcher, PI: Dr. Violante)
- 2015 **Student Travel Grant (\$ 1,250)**, Real-time Functional Imaging & Neurofeedback Conference 2015
- 2013 **Brain Science & Engineering PhD Training Fellowship (£ 22,500 p.a. incl. salary)**, Imperial College London
- 2013 **Multimodal Neuroimaging Training Program Scholarship (\$ 3,250)**, Carnegie Mellon University
- 2013 **G.A.-Lienert Scholarship (€ 3,000)**, Justus-Liebig University Giessen
- 2013 **VRC Corporation Exchange Grant (€ 900)**, HFES Europe
- 2011 **Chinese Government Scholarship (RMB 37,100)**

AWARDS & PRIZES

- 2017 **Merit Abstract Award (\$ 2,000)**, Organization for Human Brain Mapping 2017
- 2016 **Best Paper Award (€ 200)**, Workshop on Pattern Recognition in Neuroimaging 2016
- 2016 **Shortlisted for NeuroImage Best Paper Award 2016**, Organization for Human Brain Mapping 2016
- 2016 **Highlighted Poster Presentation**, 6th International Conference on Transcranial Brain Stimulation
- 2014 **1st place Early Career Best Paper Award (€ 500)**, HFES Europe
- 2013 **Graduate Student Excellence Award**, VDI Association of German Engineers
- 2013 **2nd place Poster Competition**, 6th Hamlyn Symposium on Medical Robotics
- 2013 **1st place 'Clara von Simson' Prize (€ 2,500)**, best thesis of a female graduate, Technical University of Berlin

PUBLIC OUTREACH

- Nov 2016 **Future Forum Talk *Zapping your teacher's brain to explore the potential of neurotechnology***, King's College School Wimbledon, London
Future Forum Talks is for teens (13-16 years) to ask questions and explore ideas. I gave an interactive presentation on how the brain works and how neurotechnology can help to treat the 'diseased' or injured brain.
- Sept 2016 **NeuroTechX panel discussion *A skeptical look into neurotech***, THECUBE, London
I initiated, organized and chaired a panel discussion about the fast growing field of neurotechnology that has created a lot of hype, misinformation and unrealistically high expectations. The aim of the panel was to better understand the limits of the field. Invited experts: NeuroSkeptic, Prof Eduardo Miranda, Dr InesViolante, Luke Mason and Tre Azam.
- 2014-2016 **Brain Injury Meet the Scientist Day**
Yearly event to engage patients suffering from traumatic brain injury and their families in our research. The event featured tours through our labs. I demonstrated EEG and brain stimulation as potential rehabilitation methods and designed questionnaires to measure the patient everyday technology usage and their readiness to learn and use new technology.
- Aug 2014 **STEM World Summer School**
This scheme offers hand-on enrichment activities in STEM subjects. I performed a live demonstration of my real-time functional brain imaging setup for a group of students (15-18 years). The students could track how brain activity changes in the motor cortex due to executed and even imagined finger movements. By this we could highlight the potential for using real-time neuroimaging for decoding cognitive states in humans.
- July 2014 **Royal Society Summer Science Exhibition**
The Summer Science Exhibition is an annual display of the most exciting cutting-edge science and technology research. I was part of the organization team and in charge of the production of the video explaining our research addressing a non-expert audience. During the one-week exhibition we interactively engaged the interested public in our research.

ART & NEUROSCIENCE

- 2016 - today **Director and Public Engagement Curator of AXNS Collective - Art x Neuroscience**
AXNS is a not-for-profit, curatorial collective that explores the intersection between art, neuroscience & technology. We are four women working across the arts and sciences and curate exhibitions, events and workshops (<http://axnscollective.org/>), such as:
 - *SINES - an LSD brain wave and sound art hackathon* with Imperial College London at Somerset House (Mar 2017)
 - Panel Discussion *Quantifying Aesthetic Emotions: What are the Implications for the Arts?* STATE Festival Berlin (Nov 2016)
 - Multi-sensory installation *Transitions of Consciousness-Dynamic Body Perceptions* with University of Cambridge (Spring 2018)

ACADEMIC COMMUNITY INVOLVEMENT

- 2016 - today **Administrator of NeuroTechX (London Chapter)** – International Neurotechnology Network
NeuroTechX is a non-profit organization whose mission is to build a strong global neurotechnology community. I co-organize meet-ups and events to bring together researchers, experts, hackers and enthusiasts (<http://meetup.com/NeuroTechLDN>).
- 2015 - today **Initiator and Organiser of 'P3NL'** – the Peer-reviewed and Published Papers News Loop
Monthly scheme to present recently published papers by lab members and to provide insights into the publishing process. P3NL is about promoting communication and transparency and stimulate new collaborations (<http://c3nl.com/events/p3nl>).
- Memberships Organization of Human Brain Mapping, International Neuroethics Society
- Reviewer **NeuroImage, Wellcome Open Research, Journal of Neural Engineering, IEEE Transactions on Neural Systems & Rehabilitation Engineering**

PROJECT WORK




















- 2016 **Freelance consultant** for project *Technology Watch*, OutSmart Insights Ltd, London, UK
Tracking and summarizing latest breakthrough developments across science, technology and engineering themes.
- 2012 **Freelance consultant** for project *Brain-Computer Interfacing in Robotic Surgery*, collaboration between Hamlyn Centre for Robotics (ICL) and Technical University of Berlin
Main advisory consultant on study design and EEG setup. The study aimed to showcase the potential of brain-computer interfaces in robotic surgery and was conducted with resident surgeons.

SKILLS

Programming	MATLAB, Python, BASH
Software	FSL, SPM, EEGLAB, FieldTrip, AFNI, SPSS, LaTeX, Adobe Illustrator, Wordpress
Lab Skills	fMRI, EEG, transcranial electrical brain stimulation, eye tracking
Languages	German (native), English (fluent)

PUBLICATIONS


 Open Access  Code available  Preprint available

- Lorenz R**, Hampshire A, Leech R (2017). Neuroadaptive Bayesian optimization and hypothesis testing. *Trends in Cognitive Sciences*, 21(3): 155-167, doi: 10.1016/j.tics.2017.01.006 
- Lorenz R**, Monti RP, Violante IR, Anagnostopoulos C, Faisal AA, Montana G, Leech R (2016). The Automatic Neuroscientist: A framework for optimizing experimental design with closed-loop real-time fMRI. *NeuroImage* 129: 320-334, doi: 10.1016/j.neuroimage.2016.01.032  
- Lorenz R**, Pascual J, Blankertz B, Vidaurre C (2014). Towards a holistic assessment of the user experience with hybrid BCIs. *Journal of Neural Engineering*, 11(3): 035007, doi: 10.1088/1741-2560/11/3/035007
- Monti RP, **Lorenz R**, Braga RM, Anagnostopoulos C, Leech R, Montana G (2017). Real-time estimation of dynamic functional connectivity networks. *Human Brain Mapping*, 38:202-220, doi: 10.1002/hbm.23355 
- Monti RP, **Lorenz R**, Hellyer P, Leech R, Anagnostopoulos C, Montana G (2017). Decoding time-varying functional connectivity networks via linear graph embedding methods. *Frontiers in Computational Neuroscience*, 11:14, doi: 10.3389/fncom.2017.00014  
- Dinov M, **Lorenz R**, Scott G, Fagerholm E, Sharp DJ, Leech R (2016). Novel modeling of task versus rest brain state predictability using dynamic time warping: comparisons and contrasts with DFT, EEG avalanches, EEG microstates and BOLD dynamics. *Frontiers in Computational Neuroscience*, 10:46, doi: 10.3389/fncom.2016.00046 
- Fagerholm E, **Lorenz R**, Scott G, Dinov M, Hellyer P, Mirzaei N, Lesson C, Carmichael D, Sharp D, Shew W, Leech R (2015). Cascades and cognitive state: focused attention incurs subcritical brain dynamics. *Journal of Neuroscience*, 35(11): 4626-4634, doi: 10.1523/JNEUROSCI.3694-14.2015 
- Zander TO, Shetty K, **Lorenz R**, Leff DR, Krol LR, Darzi AW, Gramann K, Yang G-Z (2016). Automated Task Load Detection with Electroencephalography: Towards Passive Brain-Computer Interfacing in Robotic Surgery. *Journal of Medical Robotics Research*, 2(1): 1750003, doi: 10.1142/S2424905X17500039
- Violante IR, Li LM, Carmichael DW, **Lorenz R**, Leech R, Hampshire A, Rothwell JC, Sharp, DJ (2017). Externally induced frontoparietal synchronization modulates network dynamics and enhances working memory performance. *Elife*, 6:e2200, doi: 10.7554/eLife.22001 
- Kaelen M, Barrett FS, Roseman L, **Lorenz R**, Family N, Bolstridge M, Curran HV, Feilding A, Nutt DJ, Carhart-Harris RL (2015). LSD enhances the emotional response to music. *Psychopharmacology*, 232(19): 3607-3614, doi: 10.1007/s00213-015-4014-y
- Vidaurre C, Pascual J, Ramos-Murguialday A, **Lorenz R**, Blankertz B, Birbaumer N, Mueller K-R (2013). Neuromuscular electrical stimulation induced brain patterns to decode motor imagery. *Clinical Neurophysiology*, 124(9): 1824-1834, doi: 10.1016/j.clinph.2013.03.009
- Kaelen M, Roseman L, Kahan J, Ribeiros AS, Orban C, **Lorenz R** et al. (2016). LSD enhances music-induced imagery via changes in parahippocampal connectivity. *European Neuropsychopharmacology*, 26(7):1099-109, doi: 10.1016/j.euroneuro.2016.03.018
- Lorenz R**, Violante IR, Monti RP, Montana G, Hampshire A, Leech R. Dissociating frontoparietal networks using neuroadaptive Bayesian optimization. *Under revision at Nature Communication*, preprint available bioRxiv: doi.org/10.1101/128678 
- Lorenz R**, Simmons L, Monti RP, Arthur J, Limal S, Leech R, Violante IR. Assessing tACS-induced phosphene perception using adaptive Bayesian optimization. *Under review at NeuroImage*, preprint available bioRxiv: doi.org/10.1101/150086 
- Lorenz R***, Kaelen M*, Barrett F, Roseman L, Santos-Ribeiro A, Evans L, Feilding A, Nutt D, Carhart-Harris R, Leech. Effects of LSD on music-evoked brain activity. *Under review at NeuroImage*, preprint available bioRxiv: doi.org/10.1101/153031 
- Lorenz R**, Monti RP, Koush Y, Sharp D, Montana G, Hampshire A, Leech R, Violante IR. Towards tailoring non-invasive stimulation using neuroadaptive Bayesian optimization. *In preparation*
- Evans L, **Lorenz R**, Roseman L, Feilding A, Nutt DJ, Leech R, Carhart-Harris RL, Kaelen M. Changes in music-evoked brain activity and emotion after psilocybin-assisted therapy for depression. *In preparation*
- Lorenz R***, Monti RP*, Hampshire A, Koush Y, Anagnostopoulos C, Faisal A, Sharp D, Montana G, Leech R, Violante IR (2016). Towards tailoring non-invasive brain stimulation using real-time fMRI and Bayesian optimization, In *6th International Workshop on Pattern Recognition in Neuroimaging (PRNI)*, doi: 10.1109/PRNI.2016.7552338 
- Lorenz R***, Monti RP*, Violante IR, Faisal A, Anagnostopoulos C, Leech R, Montana G (2015). Stopping criteria for boosting automatic experimental design using real-time fMRI with Bayesian optimization. In *5th NIPS Workshop on Machine Learning and Interpretation in Neuroimaging: Beyond the Scanner*, arXiv:1605.04435v1, MLINI/2015/15  
- Monti RP, **Lorenz R**, Leech R, Anagnostopoulos C, Montana G (2016). Text-mining the NeuroSynth corpus using Deep Boltzmann Machines, In *6th International Workshop on Pattern Recognition in Neuroimaging (PRNI)*, doi: 10.1109/PRNI.2016.7552329  
- Monti RP, **Lorenz R**, Hellyer P, Leech R, Anagnostopoulos C, Montana G (2015). Graph Embeddings of Dynamic Functional Connectivity Reveal Discriminative Patterns of Task Engagement in HCP Data. In *5th International Workshop on Pattern Recognition in Neuroimaging (PRNI)*, doi: 10.1109/PRNI.2015.21  
- Pascual J, **Lorenz R**, Blankertz B, Vidaurre C (2013). Hybrid EEG-Based BCI User Interface for Action Selection. In Pons JL, Torricelli D, Pajaro M (eds.) *Converging Clinical & Engineering Research on Neurorehabilitation*, BIOSYSROB 1 (pp. 1171-1176). Springer, Berlin, Heidelberg, doi: 10.1007/978-3-642-34546-3_194

Journal papers

Journal papers
– in progressConference
papers

Curriculum Vitae – ROMY LORENZ

- Book chapters
- Zander TO, Brönstrup J, **Lorenz R**, Krol LR (2014). Towards BCI-based Implicit Control in Human-Computer Interaction. In S Fairclough and K Gilleade (eds), *Advances in Physiological Computing*, HumanComputer Interaction Series (pp.67-90). Springer, London, doi: 10.1007/978-1-4471-6392-3_4
- Conference talks
- Lorenz R**, Violante IR, Monti R, Montana G, Hampshire A, Leech R (2017). Fractioning frontoparietal brain networks using neuroadaptive Bayesian optimization. *Organization for Human Brain Mapping Annual Meeting 2017*, 30.6.2017, Vancouver, Canada. Slides available: https://figshare.com/articles/RomyLorenz_OHBM2017_pdf/5160877
- Lorenz R**, Monti RP, Hampshire A, Koush Y, Anagnostopoulos C, Faisal A, Sharp D, Montana G, Leech R, Violante IR (2016). Towards tailoring non-invasive brain stimulation using real-time fMRI and Bayesian optimization. *6th International Workshop on Pattern Recognition in Neuroimaging (PRNI)*, 23.06.2016, Trento, Italy.
- Lorenz R**, Monti RP, Leech R, Anagnostopoulos C, Montana G (2016). Text-mining the Neurosynth corpus using Deep Boltmann Machines. *6th International Workshop on Pattern Recognition in Neuroimaging (PRNI)*, 22.06.2016, Trento, Italy.
- Lorenz R**, Monti RP, Violante IR, Anagnostopoulos C, Faisal AA, Montana G, Leech R (2015). Stopping criteria for boosting automatic experimental design using real-time fMRI with Bayesian optimization. *5th NIPS Workshop on Machine Learning and Interpretation in Neuroimaging: Beyond the Scanner*, 11.12.2015, Montreal, Canada.
- Lorenz R**, Monti RP, Violante IR, Anagnostopoulos C, Faisal AA, Montana G, Leech R (2015). The Automatic Neuroscientist: towards optimising patient-tailored cognitive rehabilitation therapy. *International Conference on Brain Informatics & Health*, 30.08.2015, London, UK.
- Lorenz R**, Pascual J, Blankertz B, Vidaurre C (2013). Assessing the User Experience with Hybrid BCIs. *4th TOBI Workshop – Practical Brain-Computer Interfaces for End-Users: Progress and Challenges*, 23.01.2013, Sion, Switzerland.
- Conference posters (first-authored ones listed only)
- Lorenz R**, Simmons L, Monti RP, Arthur J, Limal S, Leech R, Violante IR. Assessing tACS-induced phosphene perception using adaptive Bayesian optimization. *Organization for Human Brain Mapping Annual Meeting 2017*, Vancouver, Canada.
- Lorenz R**, Monti RP, Koush Y, Anagnostopoulos C, Faisal A, Sharp D, Hampshire A, Montana G, Leech R, Violante IR (2016). The Automatic Neuroscientist: Tailoring non-invasive brain stimulation using real-time fMRI and Bayesian optimization, *6th International Conference on Transcranial Brain Stimulation*, Göttingen, Germany.
- Lorenz R**, Monti RP, Koush Y, Anagnostopoulos C, Faisal A, Sharp D, Hampshire A, Montana G, Leech R, Violante IR (2016). Tailoring non-invasive brain stimulation using real-time fMRI and Bayesian optimization, *Organization for Human Brain Mapping Annual Meeting 2016*, Geneva, Switzerland.
- Lorenz R**, Monti RP, Koush Y, Anagnostopoulos C, Faisal A, Sharp D, Hampshire A, Montana G, Leech R, Violante IR (2016). Tailoring non-invasive brain stimulation using real-time fMRI and Bayesian optimization, *Brain Stimulation and Imaging Meeting*, Geneva, Switzerland.
- Lorenz R**, Monti RP, Braga R, Anagnostopoulos C, Faisal A, Montana G, Leech R (2015). Turning fMRI experiments on its head using rt-fMRI: opening new avenues in cognitive neuroscience. *Organization for Human Brain Mapping Annual Meeting 2015*, Honolulu, US.
- Lorenz R**, Monti RP, Cole J, Faisal A, Anagnostopoulos C, Montana G, Leech R (2015). Towards steering the chronnectome - on the potential of dynamic functional connectivity-based neurofeedback of large scale brain networks. *Real-time Functional Imaging and Neurofeedback Conference 2015*, Gainesville, US.
- Lorenz R**, Faisal AA, Dinov M, Violante IR, Leech R (2014). Neurofeedback training of large-scale brain networks. *Annual Meeting of Society of Neuroscience 2014*, Washington DC, US.
- Lorenz R**, Pascual J, Blankertz B, Vidaurre C (2013). Towards a broad-scale Usability Evaluation of Hybrid BCIs. *5th International Brain-Computer Interface Meeting 2013*, Pacific Grove, US.
- Open peer-reviews
- Leech R & **Lorenz R** (2017) Review for: J Westfall, TE Nichols, T Yarkoni. Fixing the stimulus-as-fixed-effect fallacy in task fMRI. [Wellcome Open Research](https://doi.org/10.21956/wellcomeopenres.11977.r21481), doi: 10.21956/wellcomeopenres.11977.r21481 

INVITED TALKS

- Aug 2017 *Neuroadaptive Bayesian optimization – Implications for the Cognitive Sciences* **Cardiff University**, School of Psychology, Cardiff, UK
- Apr 2017 *Neuroadaptive Bayesian optimization – Implications for the Cognitive Sciences* **King's College London**, Department of Neuroimaging, London, UK
- Dec 2016 *The Automatic Neuroscientist - Implications for the Cognitive Science* **King's College London**, Department of Bioengineering, London, UK
- Apr 2015 *Towards whole-brain functional connectivity feedback and 'The Automatic Neuroscientist'* **University College London**, Wellcome Trust Centre for Neuroimaging, London, UK

UPCOMING INVITED TALKS

- Sep 2017 *Neuroadaptive Bayesian optimization – Implications for the Cognitive Sciences* **National University of Singapore**, Institute for Neurotechnology, Singapore
- Nov 2017 *The Automatic Neuroscientist* **WIRED Live**, London, UK
- Dec 2016 *Neuroadaptive Bayesian optimization for the Cognitive Sciences* **NIPS Workshop on Bayesian Optimization**, Los Angeles, US