

# ROMY LORENZ

## EDUCATION

2013 – today	<b>PhD Neurotechnology</b> 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	<b>MSc Human Factors (Distinction)</b> 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	<b>BSc Business Psychology (First Class Honours)</b> 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

2013 – today	<b>Brain Science and Engineering PhD Training Fellow</b> , 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
June – July 2013	<b>Multimodal Neuroimaging Training Program</b> , 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 – May 2013	<b>Visiting Researcher</b> , 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 – Feb 2013	<b>Research Associate</b> , 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 – Oct 2012	<b>Graduate Thesis</b> , 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 – June 2011	<b>Lab Work</b> , 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	<b>Research Assistant</b> , Berlin Center of Mechatronic 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
July – Sept 2009	<b>Research Assistant</b> , Human Factors Group Analyzing eye-tracking and driving simulator data within the EU-project ISI-PADAS.	German Aerospace Center Braunschweig, Germany
Jan – July 2009	<b>Research Intern</b> , Customer Research Center Planning, conducting and analyzing usability studies of driving assistance systems.	Daimler AG (Mercedes Benz) Böblingen, Germany

## TEACHING & SUPERVISION

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

## GRANTS & FELLOWSHIPS

- 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* (participation, PI: Dr. Violante)
- 2013 **Brain Science and Engineering PhD Training Fellowship (£ 22,500 p.a.)**, 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

- 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 (nominated by BT Thomas Yeo)
- 2016 **Selected Poster Presentation**, 6<sup>th</sup> International Conference on Transcranial Brain Stimulation
- 2016 **Travel Grant (€ 225)**, 6<sup>th</sup> International Conference on Transcranial Brain Stimulation
- 2015 **Student Travel Award (\$ 1,250)**, Real-time Functional Imaging & Neurofeedback Conference 2015
- 2014 **1<sup>st</sup> place Early Career Best Paper Award (€ 500)**, HFES Europe
- 2013 **Graduate Student Excellence Award**, VDI Association of German Engineers
- 2013 **2<sup>nd</sup> place Poster Competition**, 6<sup>th</sup> Hamlyn Symposium on Medical Robotics
- 2013 **1<sup>st</sup> 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 **BrainTechX 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 were able to track, in real-time, 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 to explain our research addressing a non-expert audience. During the one-week exhibition we interactively engaged the interested public in our research.

## ART & NEUROSCIENCE

- Mar 2016 - today **Public Engagement Curator for 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:
- Panel Discussion *Quantifying Aesthetic Emotions: What are the Implications for the Arts?* STATE Festival Berlin (2016)
  - Web Blog Series *Exploring the Interface of Arts and Science – UCL students present their work* (2016-2017)
  - Sines: an LSD brain wave and sound art hackathon* (March 2017)
  - Multi-sensory installation *Transitions of Consciousness-Dynamic Body Perceptions* with University of Cambridge (Fall 2017)

## 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, HFES
- Reviewer **NeuroImage, 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. Decoding time-varying functional connectivity networks via linear graph embedding methods. *Frontiers in Computational Neuroscience* (in press)  
- 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* (in press) 
- 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. *Submitted*
- Lorenz R**, Simmons L, Monti RP, Arthur J, Limal S, Leech R, Violante IR. Assessing tACS-induced phosphene perception using adaptive Bayesian optimization. *In preparation*
- 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. *In preparation*
- Lorenz R\***, Evans L\*, 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 progress

Conference 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*, Human-Computer Interaction Series (pp.67-90). Springer, London, doi: 10.1007/978-1-4471-6392-3\_4
- 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 (accepted as oral presentation)
- 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 Boltzmann Machines. *6th International Workshop on Pattern Recognition in Neuroimaging (PRNI)*, 22.06.2016, Trento, Italy.
- Conference talks
- 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.
- 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 (accepted as poster presentation)
- 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.
- Conference posters (first-authored ones listed only)
- 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.

## INVITED TALKS

- April 2017 **King's College London** (Department of Neuroimaging) *Neuroadaptive Bayesian optimization – Implications for the Cognitive Sciences*
- Dec 2016 **King's College London** (Department of Bioengineering) *The Automatic Neuroscientist - Implications for the Cognitive Science*
- April 2015 **University College London** (FIL) *Towards whole-brain functional connectivity feedback and 'The Automatic Neuroscientist'*