Open PhD position on transcranial temporal interference to unravel the mechanisms of sensorimotor hallucinations in healthy participants and patients with Parkinson's Disease

The Laboratory of Cognitive Neuroscience (Olaf Blanke: https://www.epfl.ch/labs/lnco/) opens a new PhD position on the brain mechanisms of specific hallucinations in healthy participants and in patients with neurodegenerative diseases, such as Parkinson's disease. The project will use a range of neurotechnologies such as robotics, virtual reality (VR), artificial intelligence (AI), non-invasive brain stimulation, and functional magnetic resonance imaging (fMRI) to unravel the neural mechanism of hallucinations and related cognitive functions. The project is part of a major research project on the brain mechanisms of altered consciousness (hallucinations) and related cognitive functions.

Project description:
Hallucinations are fascinating feats of the human mind, important phenomena for the neuroscience of consciousness, and frequent symptoms in several major psychiatric and neurological diseases (i.e., Bernasconi et al., Nature Protocols, 2022). However, little is known about their neural mechanisms and a large variety of different causes have been proposed. Moreover, research on hallucinations is hampered by their unpredictable and private nature, making their investigation, quantification and assessment highly challenging. This PhD project is based on our recently developed methods using robotic and virtual reality technologies (i.e., Blanke et al., Current Biology, 2014), allowing us to induce clinically relevant hallucinations under fully controlled and safe experimental conditions in healthy participants and in patients with Parkinson's disease, who very frequently suffer from hallucinations (Bernasconi et al., Science Translational Medicine, 2021). The current project has two main aims. First, to integrate our neurotechnology with high-density EEG and fMRI and further apply specific non-invasive brain stimulation, aiming at enhancing or decreasing robot-induced hallucinations (and the related cognitive fucntions) on demand, testing healthy participants and patients with PD. Second, to improve quantification and repeated measurements of hallucinations, new methods merging generative large language models and neuropsychological interview techniques will be investigated, exploring new ways to automate and standardize in semi-structured interviews with chatbots and virtual reality interviewers.

Requirements:
The ideal candidate should have a Master degree (or equivalent) in computer science, engineering, neuroscience or neurotechnology, computer science, engineering, medicine or biology, be strongly motivated with a keen interest in cognitive-systems neuroscience and neuroimaging/signal analysis. Previous work in applied machine learning and in non-invasive brain stimulation are a plus.

Working environment:

École polytechnique fédérale de Lausanne

LNCO

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The successful applicant will join the EPFL Chair in Cognitive Neuroprosthetics which is led by Prof. Olaf Blanke and focuses on the neuroscientific study of consciousness and new diagnostics and therapeutics for patients suffering from Parkinson's disease. The Lab is based in Geneva's beautiful Campus Biotech, right next to Lake Geneva. The Ph.D. candidate will be enrolled in the EPFL Ph.D. program Neuroscience (EDNE).

Start of position:
Spring 2024

Application procedure:
Interested candidates must submit their application to the EDNE doctoral school (https://www.epfl.ch/education/phd/edne-neuroscience/edne-how-to-apply/)

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