real-time fMRI neurofeedback training for motor control

Project Leader
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1. Objective

This project is aimed at real-time fMRI neurofeedback training for motor control. Real-time fMRI neurofeedback is a technique in which brain images are analyzed in real-time and the estimated activation level allows a participant to self-regulate their own brain activity. This technique has potential in medical applications, such as the treatment of depression and pain management. This project investigates the changes of brain activity after real-time fMRI neurofeedback training, which is constructed by using MRI equipment (Siemens, Verio, 3T) at Kochi University of Technology. This project will contribute to the enhancement of human motor learning.

2. Project Outline

To that end, the project will consist of the following phases:

(a) The development of a real-time fMRI neurofeedback system
(b) Training for motor control by using a real-time fMRI neurofeedback system
(c) Evaluation of the changes of brain activity

3. Expected Performance

In this project, the successful candidate would be expected to:

(a) Work independently on a research topic
(b) Contribute to the supervisor's and lab members' projects
(c) Publish more than two papers in international journals

4. Required Skills and Knowledge

The successful candidate for this project will have the following knowledge and skills:

(a) Background in neuroscience and/or motor control research
(b) Proficiency in Matlab programming, and statistical methods
(c) Ability to communicate through spoken and written English

References

(1) deCharms, R. C. Applications of real-time fMRI. Nature Reviews Neuroscience, 9, 720-729, 2008.
(2) Kadota, H. Hirashima, M. and Nozaki, D. Functional modulation of corticospinal excitability with adaptation of wrist movements to novel dynamical environments. The Journal of Neuroscience, 34, 12415-12424, 2014.
(3) Kadota, H., Sekiguchi, H., Takeuchi, S., Miyazaki, M., Kohno, Y. and Nakajima, Y. The role of the dorsolateral prefrontal cortex in the inhibition of stereotyped responses. Experimental Brain Research, 203, pp593-600, 2010.
(4) Kadota, H., Nakajima, Y., Miyazaki, M., Sekiguchi, H., Kohno, Y., Amako, M., Arino, H., Nemoto, K. and Sakai, N. An fMRI study of musicians with focal dystonia during tapping tasks. Journal of Neurology,

257, pp1092-1098, 2010.

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