

## Development of a Real-Time Brain-Computer Interface for Interactive Robot Therapy: An Exploration of EEG and EMG Features during Hypnosis

**Authors :** Maryam Alimardani, Kazuo Hiraki

**Abstract :** This study presents a framework for development of a new generation of therapy robots that can interact with users by monitoring their physiological and mental states. Here, we focused on one of the controversial methods of therapy, hypnotherapy. Hypnosis has shown to be useful in treatment of many clinical conditions. But, even for healthy people, it can be used as an effective technique for relaxation or enhancement of memory and concentration. Our aim is to develop a robot that collects information about user's mental and physical states using electroencephalogram (EEG) and electromyography (EMG) signals and performs costeffective hypnosis at the comfort of user's house. The presented framework consists of three main steps: (1) Find the EEG-correlates of mind state before, during, and after hypnosis and establish a cognitive model for state changes, (2) Develop a system that can track the changes in EEG and EMG activities in real time and determines if the user is ready for suggestion, and (3) Implement our system in a humanoid robot that will talk and conduct hypnosis on users based on their mental states. This paper presents a pilot study in regard to the first stage, detection of EEG and EMG features during hypnosis.

**Keywords :** hypnosis, EEG, robototherapy, brain-computer interface (BCI)

**Conference Title :** ICAH 2017 : International Conference on Augmented Human

**Conference Location :** Melbourne, Australia

**Conference Dates :** February 02-03, 2017