Revolutionizing Prosthesis through Brain Machine Interface

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Abstract

Can brains control machines? Is direct communication between brain and computers or robots or prosthesis possible? What is the brain's code to control of human limb with its amazing dexterity that allows you to play piano, do industrial assembly, and write? How can this *brain-machine interface* capability be transferred to prosthetic limbs?

Brain machine interface (BMI) technology solves this problem by decoding activity of a large number of brain cells, neurons, and brain rhythms such as EEG. Under the sponsorship of the Defense Advanced Research Project Agency an advanced prosthetic limb with 22 degrees for freedom was developed by Johns Hopkins team. This presentation will review the cutting edge frontier of prosthetic limb development and strategies for controlling the limb, from muscle signals to brain waves to orchestra of millions of brain cells.

Looking ahead, where does this field of BMI go: opportunities lie in restoring a variety of body functions, senses such as hearing and vision and actuation such as limb function. The next frontier is to develop a bidirectional communication to and from the brain. The great final frontier is to build a cognitive interface, where brain's intelligence, creativity can also be accessed and modulated for improved human health and treatment of brain cognition, due to aging or disorders such as Parkinson's and Alzheimer's.