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The Ins and Outs of Brain Machine Interfaces

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ABSTRACT OF THE TALK

In 2000, a research group at Northwestern University led by Sandro Mussa-Ivaldi developed the first bi-directional brain machine interface. This achievement allowed the brainstem of a lamprey to control the wheels of a small robot while receiving commands from optical sensors on the robot. We have now begun a much more ambitious project, to implement an analogous bi-directional interface with an awake monkey.

Much of this work is at an early, formative stage. In addition to the development of specific applications, we hope to use the BMI model as a means to examine normal function of the brain. In this talk, I will describe three different components of the project: 1) The efferent interface, which uses signals extracted from the primary motor cortex to control an external device, 2) The afferent interface, which uses electrical stimulation of the primary sensory cortex to provide information to the animal about the external world, and 3) The sensory-motor interface, which represents the connections within the brain that must change their strength in order that the artificial inputs can be mapped in a meaningful way to the artificial outputs.