

Challenges and Opportunities of Brain Machine Interfaces

Neural interfaces hold the promise to become one of the great technological advancements of the 21st century because they directly access and interpret brain intentional states. Neurotechnology, broadly defined as the integration of engineering with neuroscience, is the enabling mechanism through which we can allow alternative means for the brain to directly influence the environment, understand causality, workspace, and goal directed navigation. Bypassing the body comes at the high price of beyond state of the art technology. Today, engineers and neuroscientists must join forces to face the great biomedical technical design challenges that include problems of scale (accessing millions of neural communication channels), speed (coping with the parallel processing capabilities of the brain in our conventional computers), biocompatibility (interfacing electronics with biological neural tissues), bandwidth (data routing and transmission), and bio-signal processing (neural decoding).