BIOMEDICAL ENGINEERING
Carnegie Mellon University

Thursday, October 10, 2019
10:30 – 11:30 a.m.
HOA (Hall of the Arts) 160

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Exploring the use of low intensity ultrasound for non-invasive human neuromodulation

Abstract: Current non-invasive neuromodulatory approaches like transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS) have proven efficacious for inducing transient plastic changes in human cortex. However, these technologies have poor spatial resolution, suffer from a depth focality tradeoff and experience significant attenuation at depth. As such, these technologies cannot modulate deep neural structures and make it difficult to stimulate discrete cortical areas without inadvertently also stimulating other unintended circuits. High spatial fidelity is crucially important as inferences about the causal role of an area in behavior depend on the ability to manipulate neural acitivty with high spatial precision since interfering with multiple areas simultaneously could lead to erroneous conclusions. There is a need for a neuromodulation technology that can non-invasively stimulate discrete cortical and sub-cortical areas**.** Low-intensity focused ultrasound (LIFU) provides an energy source with millimeter resolution that can be focused anywhere in the brain safely and effectively for non-invasive transient neuromodulation. LIFU is an important advance and of great significance for global brain mapping efforts and for diagnostics and therapies in neuroscience as it provides unprecedented non-surgical access to very small neural volumes and can be focused at depth.