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Neural Engineering is a new discipline at the interface between engineering and neuroscience. Neural Engineering research in my laboratory combines computational neuroscience, engineering and electrophysiology to solve problems in the central and peripheral nervous systems.

In the CNS, the mechanisms of synchronization of neuronal activity during epilepsy are investigated using in-vitro brain slice preparations, in-vivo multiple electrode recording and computer models. The interaction between applied currents and neuronal tissue are studied to determine the feasibility of controlling seizures in patients with epilepsy.

In the peripheral nervous system, novel nerve electrodes are being developed capable of stimulating and recording neuronal activity selectively. This neural interfacing methodology is applied to the hypoglossal nerve to restore patency in the airways in patients with obstructive sleep apnea and to design neural prostheses for patients with spinal cord injury and stroke. Computer simulations of both neurons and volume conductors are used in conjunction with the experiments for the quantitative analysis of neural systems and to design new electrodes for interfacing with the nervous system.

Recent Publications

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- Lertmanorat Z and Durand DM, Electrode array for reversing the recruitment order of peripheral nerve stimulation: Experimental studies, *Annals of Biomedical Engineering*, Jan;34 (1):152-60, 2006.

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- Yoo PB and Durand DM, Effects of Selective Hypoglossal Nerve Stimulation on Canine Upper Airway Mechanics, *Journal of Applied Physiology*, 99(3):937-43, 2005.

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