1125-VC-152 **Jennifer A. Crodelle (Kile)*** (kilej@rpi.edu), Amos Eaton 301, RPI, 110 8th St, Troy, NY 12180, and **Gregor Kovacic** and **David Cai**. *The Role of Electrotonic Junctions between Excitatory Neurons in the Cortex.* Preliminary report.

Global oscillations in the brain have been linked to synchronized neuronal activity, which has been shown to contribute to cognitive processes such as perception, motor performance, learning and memory. Electric coupling through gap junctions may facilitate the emergence of synchronized oscillations, and influence their properties. Gap junctions between inhibitory neurons in the mammalian cerebral cortex have been well studied, but electrical synapses between excitatory, pyramidal neurons, or electrotonic junctions, have only recently been discovered experimentally. In this study, we follow experimental data to construct a detailed, comprehensive model with both synaptic and electric coupling for both excitatory and inhibitory neurons using a modified version of the Hodgkin-Huxley equations. We organize the neurons on a grid to capture the highly structured spatial properties of a network containing both synaptic and gap-junction connections, and to ensure that the probability of neurons being coupled is dependent on their location within the network. Using this model, we find that the addition of gap junctions between inhibitory neurons creates oscillations in the network, and further show that sparse pairs of electrotonic junctions are optimal for tighter oscillations. (Received September 16, 2016)