Seminar

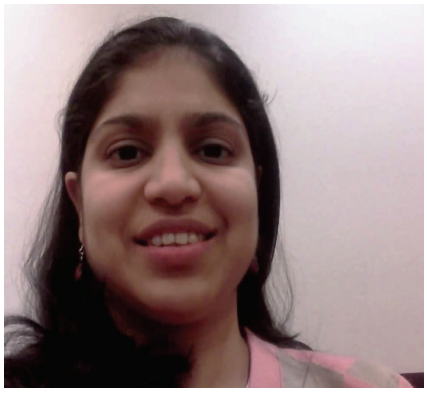
CENTER FOR ADAPTIVE NEURAL SYSTEMS

IRA A. FULTON SCHOOL OF ENGINEERING

Neural Mechanisms Underlying a Brainstem Substrate Guiding Taste-induced Rhythmic Motor Behaviors

Sharmila Venugopal

Abstract: Intrinsic properties together with synaptic inputs dictate the firing patterns of a central pattern generator (CPG) guiding rhythmic motor behaviors such as locomotion and mastication. Recently, we have shown how kinetics of inhibitory synaptic currents can be critical to switching from an ingestive to rejective motor pattern using a hypothetical mathematical network model for a brainstem CPG. In an ongoing study, we use whole-cell electrophysiology to explore the intrinsic membrane properties of identified pre-hypoglossal neurons in the lower brainstem that potentially drive taste-induced ingestion and rejection behaviors. We show that a history of hyperpolarization alters the firing response of these neurons to the same level of depolarization. We further provide evidence for the existence of hyperpolarization-activated ionic currents that could potentially lead to such altered firing responses. Interestingly, we have identified two antagonistic phenomena in a majority of these cells that are both hyperpolarization-dependent: i) sag in the membrane potential during hyperlarization that tends to enhance neuronal excitability resulting in higher firing rates, and, ii) delay in the onset of action potentials tending to impede excitability and lower firing rate. Ongoing efforts include development of a single-compartment mathematical neuronal model to include both these phenomena to gain insights into the nature of interaction between them and the implication of resulting firing patterns in motor pattern generation.



Sharmila Venugopal is a Doctoral student in Electrical Engineering at The Ohio State University. Her research interests include experimental and computational neuroscience. Her master's thesis entailed design and development of Field Programmable Gate Array-based hardware module for linear and non-linear filters for 3D medical images.

Her current research involves understanding the cellular and synaptic mechanisms of a Central Pattern Generator orchestration a critical function of the taste system.

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Location and Time:
Location: SCOB 152
Date: February 1,2008
Time: 12:15pm

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Map: http://www.asu.edu/map/interactive/?campus=tempe&building=SCOB

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