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Biologically Inspired Computation
Using DSP and Analog/Digital Circuits

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Abstract: There is growing interest in using biological-inspiration to improve the design of computation systems, particularly in the areas of sensory processing and pattern recognition where biological systems far outperform the best man-made devices. For instance, state-of-the- art speech and face recognition algorithms pale in comparison to human performance despite hundreds of man-years of research in these fields. We survey several examples of our work in biologically-inspired engineering designs including research with Motorola on improving cell-phone speech quality, a new type of digital camera with much wider dynamic range, an implant for wirelessly recording neural signals for brain-machine interfaces and a general computer architecture for spike-based computation. In each case, the study of biology leads to natural and effective engineering solutions that can be implemented in DSPs or in special-purpose analog VLSI circuits.

Biography:

Dr. John G. Harris earned his BS and MS degrees in Electrical Engineering from MIT in 1983 and 1986. After working a year at the Hughes Research Labs, Dr. Harris joined the first entering class of graduate students in the interdisciplinary Computation and Neural Systems Program at Caltech. After graduating with his PhD in 1991, Dr. Harris spent a two-year post doc at the MIT Artificial Intelligence Lab. Dr. Harris joined the Electrical and Computer Engineering (ECE) Department at UF in 1993. For his research, Dr. Harris develops biologically inspired circuits, architectures and algorithms for signal processing. Dr. Harris has published over 100 research papers and patents in these research areas. In August of 2011, Dr. Harris became the chair of the ECE department at the University of Florida.