

Auditory Processing Using Analog VLSI

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Abstract

The architectures of animal nervous systems are shaped by evolution and carried in the genetic code. The essential quality of such an architecture is that it must *learn* from the environment in which the animal lives. The single common element of learning is the time coincidence in the arrival of nerve impulses. The arrival of one impulse or burst of impulses closely followed by another is taken by the nervous system as evidence for a cause-and-effect relationship between the two. The temporal structure of auditory stimuli encodes far more information than standard engineering methods have ever been able to extract. The fact that animal nervous systems *can* extract this information leads to the conclusion that heretofore unexplored computational paradigms are involved. The design of large-scale integrated circuits employing a substantial fraction of analog processing is a promising approach to this class of problems.