COLLEGE OF ENGINEERING
MECHANICAL ENGINEERING
UNIVERSITY OF MICHIGAN

# ME Department Seminar

## Carbon Nanotube Neuromorphic Network


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**4:00 p.m.**
**1200 EECS**


**Abstract:**

A neural network can process massive amounts of information at an extremely high speed with low power consumption. The signals, in the format of millisecond-long potential spikes, route through billions of neurons via trillions of synapses - the junctions between neurons. The synapses process massive signals in a parallel mode in a neural network. Due to its plasticity, a synapse can be modified by the signals, which establishes the foundation for learning and memory in a neural network. Silicon-based circuits have been utilized to emulate neural networks, but the Si circuits consumed considerably more energy than a biological network and were unable to be integrated at a scale comparable with the biological neural network. In this work, we developed an electronic device based on carbon nanotubes which mimics a biological synapse with logic, memory, and learning functions and operated with extremely low power consumption (~1 nW). A neuromorphic integrated circuit have also been fabricated to emulate a biological neuron network with spatiotemporal logic, memory, parallel signal processing, and real-time learning functions.


**Bio:**

**Yong Chen** is currently a Professor in Department of Mechanical and Aerospace Engineering at University of California, Los Angeles. He obtained his PhD degree from University of California, Berkeley in 1996. Before he joined UCLA in 2003, he had worked as a Scientist in Quantum Science Research at Hewlett-Packard Laboratories since 1996. His current researches are focused on nanofabrication, nanoelectronics, and neuromorphic circuits. His lab has developed novel devices to emulate a biological synapse with an extremely low power consumption, and facilitate logic, memory, and self-adaptive learning functions of a biological synapse. His lab has also designed and fabricated neuromorphic circuits with the functions of parallel signal processing, memory, self-programming by following the architecture of the biological neural network. The algorithm of the neuromorphic circuit can be spontaneously optimized to improve the performance of complex systems. Prof. Chen is also a chief scientist of the California NanoSystems Institute (CNSI)."