Department of Mechanical and Biomedical Engineering

An Adjustable Memristor Model and Its Application in Small-world Neural Networks

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Time: 3:00pm to 4:00pm
Venue: Room G4701, 4/F, AC1

Abstract

The existence of memristor—the fourth fundamental circuit element, was predicted by Professor Chua in 1971 to complete the set of basic passive devices that already included resistor, inductor, and capacitor. However, it was only after the first physical implementation of memristor in a nanoscale double-layer TiO2 thin-film by Hewlett-Packard (HP) laboratory that memristor and memristive devices started to attract increasing attentions from both academia and industry. Soon afterwards, various materials and devices demonstrating memristive characteristics were proposed with various mathematical models.

In this talk, a novel mathematical model for the TiO2 thin-film memristor device discovered by HP Lab was proposed. This model considers the boundary conditions and the nonlinear ionic drift effects by using a piecewise linear window function. Four adjustable parameters associated with the window function enable the model to capture complex dynamics of a physical HP memristor. Furthermore, we realize synaptic connections by
utilizing the proposed memristor model and provide an implementation scheme for a small-world multilayer neural network. Simulation results are presented to validate the mathematical model and the performance of the neural network in nonlinear function approximation.

**About the Speaker**

**Miss Hu** is a PhD candidate in Department of Mechanical and Biomedical Engineering at City University of Hong Kong. She received the B.E. and M.E. degrees in electronics and information engineering in 2009 and 2012, respectively, from Southwest University, Chongqing, China. Her current research focus on Memristor-based Hybrid Networks: Design, Analysis and Applications.

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**All are welcome!**

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