



DEPARTMENT OF
COMPUTER SCIENCE

TEXAS TECH

Whitacre College of Engineering

Neuromorphic Computing for Near Sensor Machine Learning

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Tuesday, October 14, 2025

3:30 p.m.

Zoom

Abstract: The IoTs and edge devices are on the frontier of interacting with the physical world for sensing, perception, and recognition. The limited battery capacity of these devices demands highly energy efficient information representation, computing and communication. The constantly changing environment and mission requirements call for the ability of online learning and adaptation. Inspired by structure and behavior of biological neural systems, spiking neural network (SNN) models and neuromorphic computing hardware adopt many energy efficient features of biological systems. They have been proven to be effective for mobile and edge applications. In this talk I will introduce our works on applying SNNs and neuromorphic computing in processing multivariate time sequences such as sensor readings. Using neurons modeled as a network of infinite impulse response filters, our SNN network can either work as a classifier to detect temporal patterns from the input sequences or as a generator to generate desired temporal sequence. The ability to discern temporal patterns allows us to adopt very sparse input representation, where information is encoded by the intervals between spike events. When coupled with event driven computing and communication, such temporal coding provides significant energy savings. Online learning and domain adaptation of the model will also be discussed in this talk.

Bio: Dr. Qinru Qiu received her PhD in Electrical Engineering from University of Southern California in 2001. She is currently a Distinguished Professor in the Department of Electrical Engineering and Computer Science at Syracuse University. Dr. Qiu is a fellow of IEEE and a distinguished member of ACM. She also is a recipient of NSF CAREER award in 2009 and IEEE Region 1 Technological Innovation award in 2020. She serves as an associate editor of multiple journals including IEEE Transactions on Neural Networks and Learning Systems (TNNLS), IEEE Transactions on Computers, IEEE Transactions on Cognitive and Developmental Systems, etc. She has also served as a technical program committee member of many conferences including DAC, ICCAD, ISLPED, DATE, etc. She is the director of the NSF I/UCRC (Industry University Collaborative Research Center) ASIC (Alternative Sustainable and Intelligent Computing) Center Syracuse Site.

