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**Date** Friday, October 25, 2024

**Time** 12:00 to 1:00 PM

**Location** SEC 201

Fall Detection in the Real-World

**Abstract:** In SmartFall Lab, we have experimented with various machine learning algorithms, especially the Deep Learning (DL) algorithm for learning accelerometer data sensed by smartwatches for fall detection. These fall detection models are aimed at real-world deployment on smartwatches paired with smartphones, specifically for use by older adults. DL models typically require large datasets for practical training, but large, annotated datasets are scarce in fall detection due to the rarity of fall events. Additionally, fall data is inherently noisy as wrist-worn smartwatches can mistake other motions for falls. We have performed comparative studies, including basic LSTM, ensemble LSTM techniques, and transformer-based DL approaches for fall detection using smartwatches. We are one of the few research groups that tested our fall detection model on a physical device using a carefully designed SmartFall app. Unfortunately, none of our DL-based fall detection models achieved a performance acceptable by older adults in the real world based on our small-scale user study. This highlights the limitations of using a single wrist-worn accelerometer data for fall detection in the real world. I will discuss a cross-modal learning approach leveraging Knowledge Distillation and Generative AI to address this.

**Dr. Anne H. Ngu** is a professor and PhD program director at the Department of Computer Science at Texas State University. From 1992-2000, she worked as a Senior Lecturer in the School of Computer Science and Engineering, University of New South Wales, Australia. She had held the research scientist/scholar position with Telcordia Technologies; Lawrence Livermore National Laboratory, Microelectronics and Computer Technology (MCC); University of California, Berkeley; Commonwealth Scientific and Industrial Research Organization (CSIRO), Australia, and the Tilburg University, The Netherlands. Dr Ngu has published over 130 technical papers in journals and refereed conferences in computer science. Her main research interests are in Smart Health, Large-scale service discovery and integration, Internet of Things software platforms and applications, Scientific workflows, Databases, and Software Engineering. Her professional service features key leadership roles as associate editor of IEEE Transactions in Service Computing, organization chair at the International Conference on Data Engineering (ICDE), and program chair at the Web Information Systems Engineering Conference (WISE). She was a winner of the 2013 NCWIT Undergraduate Research Mentoring Award.