

**Department of Electrical and Computer Engineering
Materials Engineering Program
Center for Integrated Bio and Nano Systems
11:00 a.m., Feb. 26, 2021**

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**Nanoscale Phenomena in the Finger-Device Interface: Surface
Haptics and Remote Touch**

Cynthia Hipwell

Oscar S. Wyatt, Jr. '45 Chair II and Director of INVENT Lab
Texas A&M University

Abstract: The internet and telepresence have transformed industry and commerce. Transactions that once would have only happened at brick-and-mortar locations can now be done anywhere at any time, often from a device that fits in one's pocket. Yet, this is not the case for transactions and work that involves touch. We cannot imagine picking out that cozy couch fabric without feeling it, nor imagine getting a good thyroid exam without the doctor being able to palpate the thyroid region. While we have technology to decompose sight and sound into bits that can be streamed across the internet and reassembled into a way that is meaningful for our eyes and ears, we cannot do this in any meaningful way for touch.

Haptics is the field that deals with technology that stimulates the sense of touch and motion. Haptic researchers are working to create the same level of fidelity in touch-based recording and display that we currently have in audio and video. Why is this so complicated? One of the many reasons is the complexity of the finger device interaction and the role that this plays in the generation of touch perception in humans. This talk will cover the work being done at Texas A&M in the INVENT Lab to better understand the complex nanoscale phenomena impacting the finger-device interface such as capillary forces and surface tension, electrowetting, electrophoresis, multiphase flow, and soft tissue contact mechanics. It will also cover how this multiphysics understanding can be used to model and design devices with improved performance and higher reliability.



Short Bio:

Dr. Hipwell has been working in the area of technology development based upon nanoscale phenomena for over 20 years. She received her B.S.M.E. from Rice University and her M.S. and Ph.D. in Mechanical Engineering from the University of California, Berkeley. Upon graduation, she went to work at Seagate Technology's Recording Head Division in Bloomington, Minnesota to develop test equipment to characterize the interface between the head and the disk in hard disk drives. During her time at Seagate, Dr. Hipwell held various individual and leadership positions in the areas of reliability, product development, and advanced mechanical and electrical technology development. In these various roles, she established new business processes and an organizational culture that focused on developing innovative solutions from root cause understanding, improved pace of learning, and discipline in experimentation and configuration management. She was inducted into the National Academy of Engineering in 2016 for her leadership in the development of technologies to enable areal density and reliability increases in hard disk drives and was elected a National Academy of Inventors Fellow in 2018. Dr. Hipwell is currently the Oscar S. Wyatt, Jr. '45 Chair II at Texas A&M University, teaching classes on innovation and technology development as well as leading the INVENT Lab (INnoVation tools and Entrepreneurial New Technology).

Please contact Dr. Cunjiang Yu <cyu13@Central.UH.EDU> or Jiming Bao (jbao@uh.edu) if you want to meet with the speaker.