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Klug Memorial Room BH 8500

Textiles for Soft Wearable Robotics

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ABSTRACT: Wearable robots and devices—garments with embedded elements that actuate to change shape or apply forces to the wearer, typically based on signals from integrated sensors—offer promise for assistive and augmentative applications including rehabilitative gloves, haptic devices, and dynamically thermoregulating clothing. Early iterations of wearables from the 50s and 60s primarily took the form of rigid exoskeletons; however, in the past twenty years, a growing subset of this field has transitioned to the use of soft components and materials to improve portability, accessibility, fit, and comfort, guided in part by advances in the related field of soft robotics. Based on the unique requirements for wearables, including personalization for varied bodies and low cost for accessibility, automated and highly customizable textile-compatible manufacturing strategies must be developed to support the fabrication and integration of all the necessary components (sensors, actuators, interconnections). This seminar will explore the intersection of knowledge from the field of textile manufacturing with the needs of soft robots and devices, specifically focusing on wearable applications, including performance metrics, material and component choices, and fabrication strategies. Several integrated design and fabrication platforms will be presented in the context of their ability to create constituent components for wearable robots and devices.

Artist Credit: Faith Humphrey Hill

BIO: Vanessa is a fashion-designer-turned-engineer working to make our clothing smarter and more assistive through focusing on the intersection of materials, manufacturing, and robotics. She currently conducts research on supramolecular shape memory polymer fibers as an NSF MPS-Ascend Postdoctoral Research Fellow in the Department of Chemical Engineering at Stanford University. She attended The Fashion Institute of Technology (FIT) for fashion design and later graduated with a BS from the Fiber Science program at Cornell University, after which she obtained her PhD at Harvard University in Materials Science and Mechanical Engineering with a focus on soft robotic textiles as part of the Harvard Microrobotics Laboratory. Her PhD was supported by the DoD NDSEG Fellowship and the GEM Fellowship, and her resulting work has been featured in Vice, Wired, and Engadget. She has been named to the list of 50 Women in Robotics You Need to Know, recognized as an ACS CAS Future Leader, and selected for Forbes 30 Under 30.

Host: Prof. Adrienne Lavine, lavine@seas.ucla.edu