

Translational AI Center (TrAC) Seminar Spring 2024

Dylan Shah

February 21st at 1:00 PM (US Central Time)

Zoom link and more information: <https://trac-ai.iastate.edu/event/trac-seminar-series-dylan-shah/>

A Surface-based Approach to Soft Robotics

Abstract

Typical robots are designed to achieve a single function in a controlled environment and lack the ability to generalize to new tasks. In their quest to build more capable robots, engineers have explored many avenues, including artificial intelligence, reconfigurable robots, and leveraging deformable materials that naturally absorb impacts and conform to objects. In this talk, I build upon these latter two bodies of work and introduce reconfigurable robotic skins, working toward the long-term vision of general-purpose robots. By applying the skins to different objects, new functionalities can be obtained, and this layer-based approach to robot design allows engineers to endow unused surfaces with desired actuation, sensing, and switchable structural properties. Several related technologies are presented, building upon the basic idea of embedding robotic functionality into thin 2D skins that operate in 3D environments. These range from stretchable jamming skins, to so-called sensory electronic skins (“e-skins”), to shape-sensing sheets which estimate their shape in absence of a mechanical model. The reconfigurable robotic skins introduced herein could find application in fields such as healthcare and space exploration, serving as continuum manipulators, supportive exosuits, and smart textiles. To conclude the talk, I will give my thoughts on interesting future research directions including shape-changing robots, and discuss my current research at Arieca, where we apply soft materials to solve thermal and mechanical problems in modern semiconductor and wearable electronics applications.

Short Bio

Dr. Dylan Shah is a mechanical engineer and roboticist with over 8 years of hands-on experience in fast-paced research environments, publishing numerous peer-reviewed publications in various fields including soft-material robotics, stretchable electronics, and agricultural robotics. He completed his PhD at Yale University in mechanical engineering and materials science, where he was a NASA Space Technology Research Fellow and was awarded the Henry Prentiss Becton Graduate Prize for exceptional achievement in research. Dylan began his research career at Iowa State University, where he completed an MS in agricultural engineering and BS in mechanical engineering. At Arieca, he is the director of Hardware R&D and leads research to characterize LMEE formulations in their end use cases, including both in-package and on-package applications spanning the full range of mobile and consumer electronics markets.