

Emerging Biomimetic and Biohybrid Systems: Mechanics, Design and Application

Abstract: Grand challenges facing human society in the 21st century mostly emerge at the interface between human and machines. To efficiently tackle these challenges, the development of future real-world technologies will depend strongly on our understanding of the principles underlying living systems, and utilizing these capabilities in forward design of synthetic and biohybrid systems. In this talk, I will present our recent experimental and theoretical studies on emerging biomimetic and biohybrid systems including, 1) Mechanics and design of artificial compound eye camera, 2) Design and manufacturing of 3D curvy electronics, and 3) Design and fabrication of biohybrid valveless pump-bots capable of pumping fluids powered by engineered skeletal muscle. Underlying mechanics theories, design and fabrication approaches, potential biomedical applications, and the future of biohybrid designs will be discussed. The successful investigation of these systems will not only boost our capability in developing new materials, devices and robotics that possess unprecedented functions and capabilities, but also inspire new technology development for applications toward solving real world problems in health, medicine and environment.

Bio: Dr. Zhengwei Li is currently a NSF EBICS Postdoctoral Fellow in the Department of Mechanical Science and Engineering at University of Illinois at Urbana-Champaign. Dr. Li received his Ph.D. degree in Mechanical Engineering in May 2017 from University of Colorado Boulder, where he won the Outstanding Dissertation Award (one recipient each year across all different engineering disciplines). His primary research interests are in the bioinspired design for engineering and biomedical applications, including design and fabrication of biohybrid robotics (“Bio-bots”), and mechanics and design of 3D curvy electronics and soft functional materials. His research work has been recognized by several fellowships and travel awards, including Outstanding Dissertation Award, TAML Best Paper Award, Thomas & Brenda GEERS Graduate Fellowship, Summer Graduate School Fellowship, Haythornthwaite Foundation Travel Award, and NSF Travel Award.