ABSTRACT:
Soft robots use geometric and material deformation to absorb impacts, mimic natural motions, mechanically adapt to motion or unevenness and to store and reuse energy. Soft robots, by virtue of these traits, offer potential to grasp robustly, adapt to unstructured environments and work safely alongside, or are even worn by, humans. However, compliance breaks many of the assumptions underpinning traditional approaches to robot design, dynamics, control, sensing and planning, and new or modified approaches are required. During this talk, I will introduce the concept of soft robots as soft structures, with capabilities and behaviors derived from the type and organization of their active and passive elements. I will present my current and prior work on the development and analysis of soft robotic structures, with a particular focus on the mechanics of soft arms. I will show how structure and mechanics affect concepts critical to robotics, such as workspace size, applied force and modeling the robot’s state for control and planning.