

## Sensing for Soft Body Locomotion in Biologically Inspired Robots

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Compliance allows a robot to conform to a surface passively. This can give the robot more traction on the ground or more reliable object grasping – even for open-loop behaviors. Thus while rigid robots might need sensors to determine when and if actions successful, it might seem like sensing is less critical in soft robotics. However, when we compare current soft robots with their biological counterparts, we see that animals and plants are out-performing robotic versions. In fact, softness often makes some robots perform worse. This is evident in soft worm robots, like the ones in our lab. We can make very high traction robots, but the softer they are and the higher the friction coefficients the slower they move. This is because worm-like locomotion requires coordinated exploitation of softness. I will show the successes and failures with and without off-the-shelf sensor solutions for our worm robots. This highlights some of the problems that we need sensors to solve: shape estimation, terrain classification, traction coordination, decision-making for exploration, and more. Closed-loop behaviors for these problems will be critical for future soft robotic applications in medicine, infrastructure inspection, and search and rescue. In this workshop, our goal is to open a dialogue that connects new possibilities in soft sensor design and in robotic design for soft applications.

