2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
October 25-29, 2020, Las Vegas, NV, USA (Virtual)

Soft Robotics and Morphological Computation

Cecilia Laschi

The BioRobotics Institute, Scuola Superiore Sant’Anna, Pisa, Italy

Soft Robotics is the use of soft materials or compliance structures in robotics. Soft robots pose interesting challenges for control, which can use model-based techniques or take model-free approaches, based on learning. Does a soft body only represent a problem for control? Or does it instead help simplifying control? According to the embodied intelligence view of robot control and behaviour, a soft body allows behaviour to emerge from the interaction with the environment, thus simplifying control. Morphological computation means the part of control done by the body itself, according to its physical characteristics. Locomotion is a good example of embodied intelligence and an ideal case for implementing morphological computation. Underwater legged locomotion is shown by marine animals with soft or compliant limbs. The U-SLIP model well describes the animal patterns of locomotion and helps designing robots with self-stabilizing locomotion patterns, underwater. SILVER and SILVER2 are underwater robots that show the ability to walk on the seabed, in lab and real settings. In conclusion, morphological computation can help simplify control and leaning-based approaches to control can better encode morphological computation in soft robots.