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A Living Soft-Bodied Microrobot

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Abstract:

Animals are the best robots. Benefiting from the evolution through millions of years, animals have developed intricate body structures, efficient energy flow chains, and advanced motion control systems that surpass any artificial machines ever been made. Unlike most their counterparts of artificial robots, animals exhibit extreme adaptation to environment, versatile motion patterns, and high robustness to disturbance. Animals are inspiring the development of abundant amazing robots ever since the beginning of robotics. Down to the micrometer size scale, however, viscous and friction forces are usually higher than gravity by orders of magnitude, which leads to inherent difficulties for the design, fabrication, and material development of effective microrobot body structures and actuators. As an alternative route, directly harnessing the activation energy and intelligence of living tissues in synthetic micromachines provides an effective strategy to developing microrobots. This report will discuss the biological basis, modelling method, feedback and control techniques with demonstration experiments to convert a biological model organism, *Caenorhabditis elegans*, into a living soft-bodied microrobot.

Biography:

Xianke Dong is currently an algorithm & software developer in a high-tech company, SR Research, based in Toronto, Canada. He received his B.Eng. degree in automation at Harbin Institute of Technology, China, in 2012, and Ph.D. degree in Mechanical Engineering at McGill University, Canada, in 2019. Dr. Dong is the winner of the Best Conference Paper Finalist Award and Best Automation Paper Finalist Award at ICRA 2015. In recent years, his works were published on the prestigious journals of *Science Robotics*, *IEEE/ASME T-MECH*, *IEEE T-ASE*, *IEEE T-BME*, etc. His research focuses on the applications in the interdisciplinary fields of robotics, biology and artificial intelligence, which includes biorobot and microrobot, computer vision and image processing, SLAM and 3D reconstruction, to name just a few.