Locomotion control strategies for reconfigurable modular robots

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Abstract

Reconfigurable Modular Robots are assemblies of autonomous robotic units, referred to as modules, joined together using connection mechanisms. By rearranging the connectivity of these modules it is possible to change the morphology of the modular robot to make it fit to different environmental circumstances. The locomotion control of reconfigurable modular robots is therefore characterized by a large number of degrees of freedom with a morphology that might not be known a priori. In this talk I will present different strategies that can be employed to speed up the search for suitable locomotion controller parameters. The body/limb finder algorithm allows for the selective reduction of the number of active degrees of freedom that require optimization. Hybrid optimization reduces the gap to reality, improving the matching between simulation results and hardware experiments. Passive compliance can help reduce the need for perfectly tuned locomotion controller parameters.

Bio

Massimo Vespignani is a graduating PhD student (Dec 2015) in the Biorobotics Laboratory (BioRob) at the Swiss Federal Institute of Technology (EPFL). His work has focused on the design and control of compliant modular robots. He received his M.S. degree in Biomedical Engineering from Campus Bio-Medico University (Rome, Italy) in 2009, working on the control of upper-limb rehabilitation robots.

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