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A gait pattern generator for closed-loop position control of a soft walking robot

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ABSTRACT

This presentation presents an approach to control the position in Cartesian space of a gecko-inspired soft robot. By formulating constraints under the assumption of constant curvature, the joint space of the robot is reduced in its dimension from nine to two. The remaining two generalized coordinates describe respectively the walking speed and the rotational speed of the robot and define the so-called velocity space. By means of simulations and experimental validation, the direct kinematics of the entire velocity space (mapping in Cartesian task space) is approximated by a bivariate polynomial. Based on this, an optimization problem is formulated that recursively generates the optimal references to reach a given target position in task space. Finally, we show in simulation and experiment that the robot can master arbitrary obstacle courses by making use of this gait pattern generator.

Keywords: mobile robotics, gait pattern generator, closed-loop position control, gecko-inspired soft robot, locomotion controller

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