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Coordinated Body Bending Improves Performance of a Salamander-like Robot YASEMIN OZKAN AYDIN, Georgia Institute of Technology, BAXI CHONG, CHAOHUI GONG, Carnegie Mellon University, JENNIFER M. RIESER, Georgia Institute of Technology, HOWIE CHOSET, Carnegie Mellon University, DANIEL I. GOLDMAN, Georgia Institute of Technology — Analyzing body morphology and limb-body coordination in animals that can both swim and walk is important to understand the evolutionary transition from an aquatic to a terrestrial environment. Based on previous salamander experiments (a modern analog to early tetrapods and performed by Hutchinson's group at RVC in the UK) we built a robophysical model of a salamander and tested its performance on yielding granular media (GM) of poppy seeds. Our servo-driven robot (405 g, 38 cm long) has four limbs, a flexible body, and an active tail. Each limb has two servo motors to control up/down and fore/aft positions of limb. A joint in the middle of the body controls horizontal bending. We assessed performance of the robot by changing the body bending limit from 0°to 90°and measured body displacement and power consumption over a few limb cycles at 0°and 10°sandy slope. We fixed the angle of the legs according to body to test the effect of body bending directly. On GM, step length increased from 0 to 9.5 cm at 0° and 0 to 7 cm at 10°slope while the average power consumption increased 50%. A geometric mechanics model revealed that on level GM body bending was most beneficial when phase offset 180°from leg movements; increasing the maximum body angular bend from 45°to 90° led to step length increases of up to 90%.

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