Mechanical Engineering Thesis Defense

Basilisk Lizard Inspired Methods for Locomotion on Granular and Aquatic Media with Robotic Applications

School for Engineering of Matter, Transport and Energy

Vidu Jayanetti
Advisor: Hamidreza Marvi

abstract

The Basilisk lizard is known for its agile locomotion capabilities on granular and aquatic media making it an ideal model organism for studying multi-terrain locomotion mechanics. The work presented here is aimed at understanding locomotion characteristics of Basilisk lizards through a systematic series of robotic and animal experiments. In this work, a legged robot inspired by the Basilisk lizard is presented. A series of robot experiments are conducted on dry and wet (saturated) granular media to determine the effects of gait parameters on robot velocity and energetics. Gait parameters studied here are stride frequency and stride length. It is observed that for a fixed stride frequency, robot velocity and stride length increase with increasing saturation, confirming the locomotion characteristics of the Basilisk lizard. It is further observed that with increasing saturation level, cost of transport decreases. Experimental results also reveal how gait parameters can be varied to achieve different desired velocities depending on the saturation level. In addition to robot experiments on granular media, a series of animal experiments are conducted to determine and characterize strategies exhibited by Basilisk lizards when transitioning from granular to aquatic media.

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