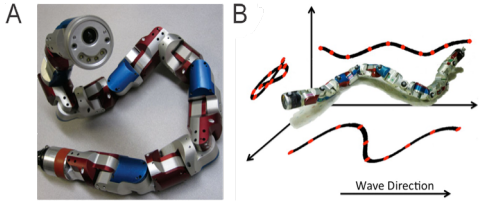
Robotics



Compound Serpenoid Curve

Model three-dimensional biologically inspired snake-like motions with in-plane as well as out-of-plane motion

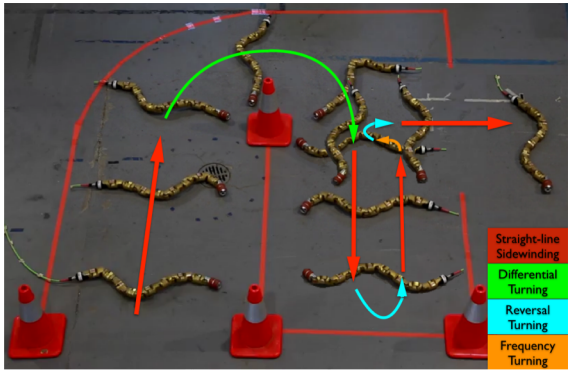
Hyper Redundant Mechanism in **3-D space** (>16 DoFs)

$$\alpha(n,t) = \begin{cases} \beta_h + A_h(n)\sin(\theta_h) \\ \beta_v + eA_v(n)\sin(\theta_v + \delta) \end{cases}$$

$$\theta_{h,v}(n,t) = \Omega_{h,v}n + \omega_{h,v}t$$

Lower Dimensionality (in **3-D space**)

Heuristics for low-dimensional motion design for snake robots from biological control templates intuition, enhancing pre-existing capabilities as well as designing entirely new behaviors



Extension from robotic compound serpenoid curve to biological compound-wave control template

Validation on robots

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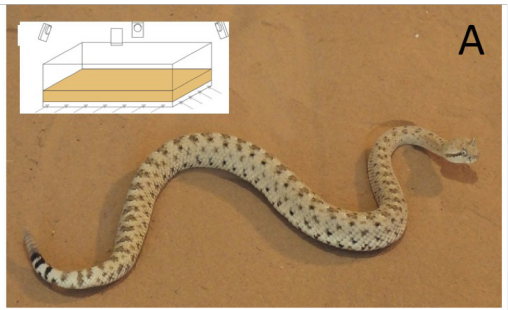
Biology



Control Template

A model of a behavior that "contains the smallest number of variables and parameters that exhibits a behavior of interest" .

Planar Limbless Biological Locomotor

use low-dimensional models to represent and subsequently study various aspects of biological motion control

Lower Dimensionality (in **2-D space**)

Compound-wave Control Template

A biological means to better model and examine the 3-D behaviors exhibited by limbless locomotion systems

How Compound-Wave Control Alleviates Hyper-Redundant Control Complexity