Jerboa Inspired Robotic Tail: Determining Tail Motion with Varying Tendon Attachments

EMBiR Lab
Evolution and Motion of Biology and Robotics

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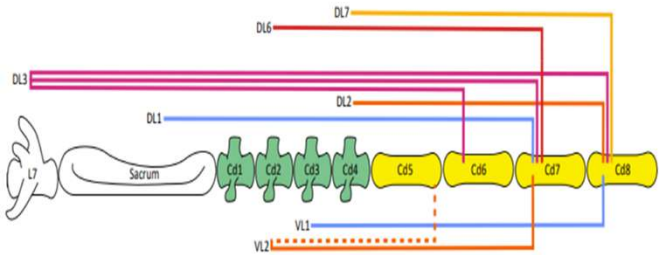
INTRODUCTION

Animal tails serve various functions. **Biologically-inspired robots** can leverage this by using tails to test **inertial maneuvering**. This study draws inspiration from **Jerboa tail anatomy** to develop a **multi-material tail test** bed to investigate the impact of **tendons** on tail motion for future validation using **OpenSim** software.

INVESTIGATING TENDON BRANCHING

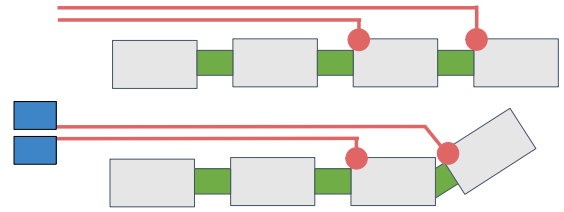
Jerboa Tail anatomy (zoomed in view L7-CD8):



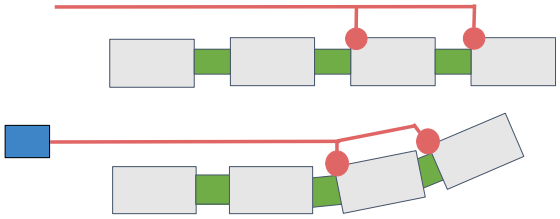
Tendon Branching Patterns:

Tendon | Bone | Ligament | Actuator

Unbranched Tendons: 2 actuators

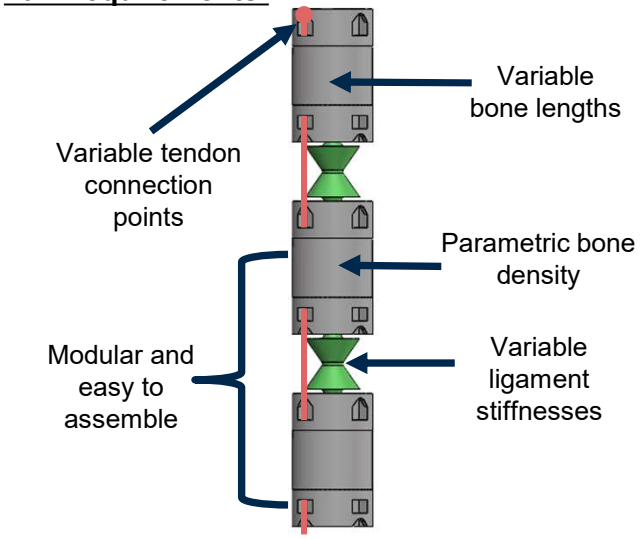


Branched Tendons: 1 actuator

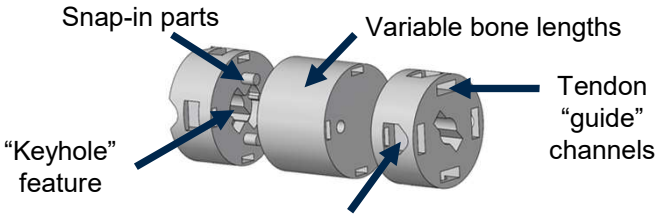


DEVELOPING MODULAR TAIL MODEL

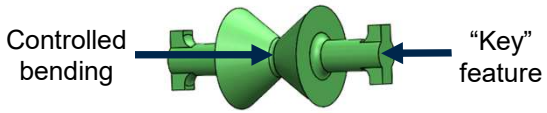
Tail Requirements:

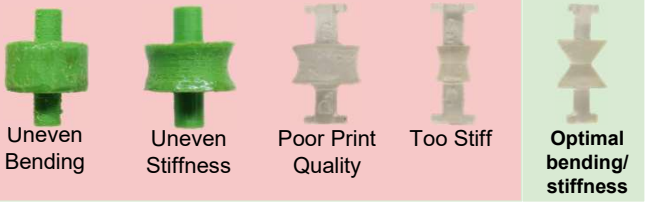


Bone Design:



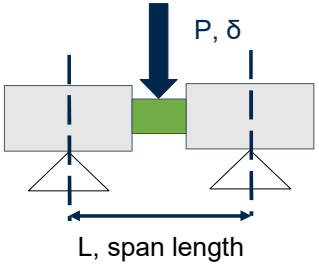
Ligament Design:





IMPACT OF JOINT STIFFNESS

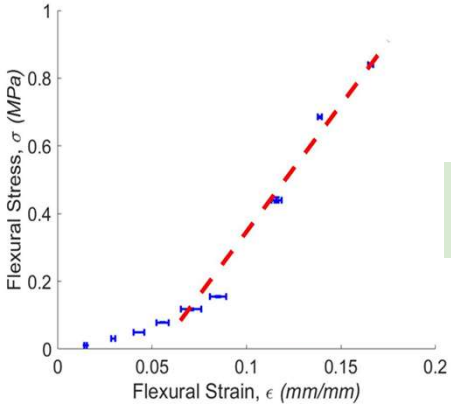
Experimental Joint Stiffness:





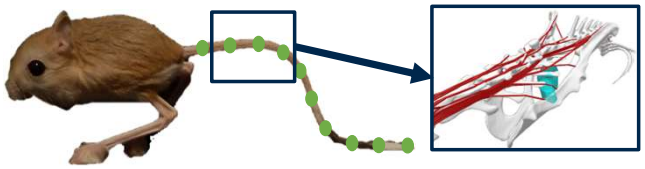
$$\sigma = \frac{FL}{\pi R^3}$$

$$\epsilon = \frac{12R\delta}{L^2}$$



Joint Stiffness:
5.66 ± 0.03 MPa

OPENSIM VALIDATION / FUTURE WORK



- Validate different tendon branching patterns with OpenSim software
- Test varying stiffness and impact on tail motion

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