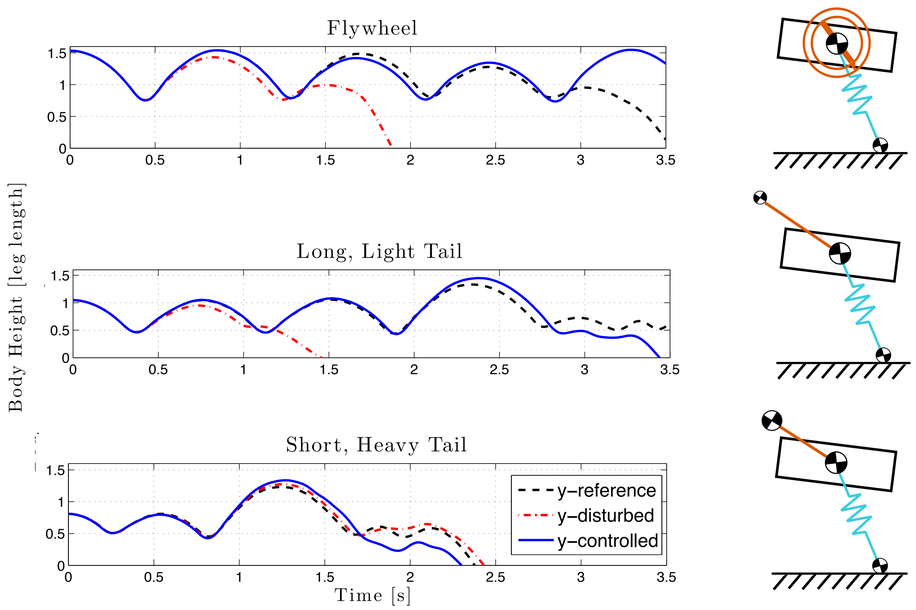
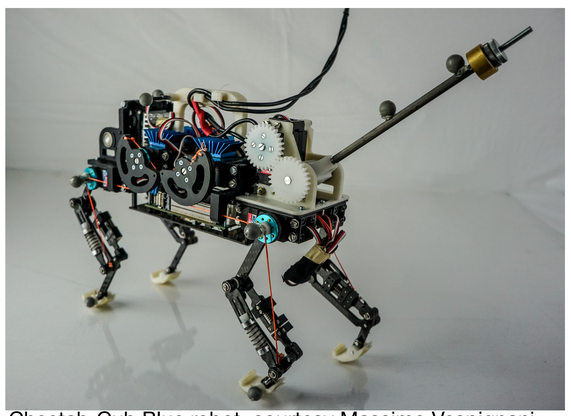
# Simplifying Control Through Active Tail Use

## Simulation Results

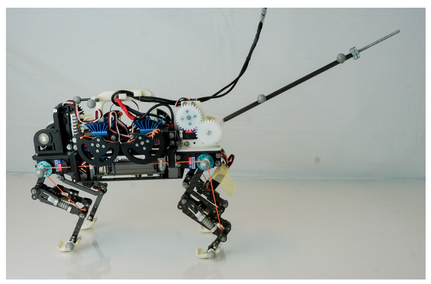


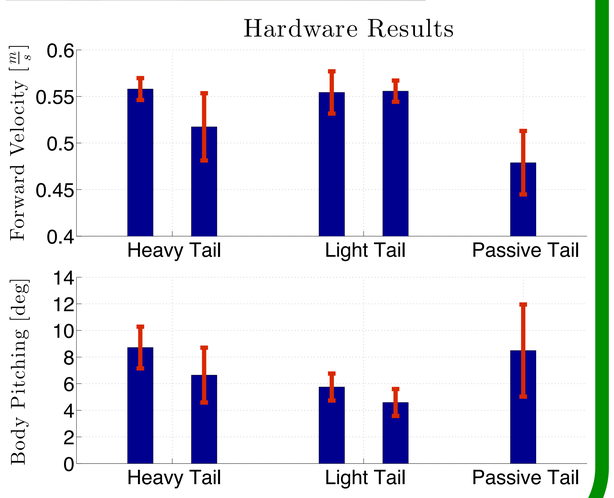

Simulations of models with the same tail moment of inertia but different mass.
*Models with lighter tails are much more robust to disturbances to body-pitching.*

## Hardware Results



Cheetah-Cub Blue robot, courtesy Massimo Vespignani






We tested tail effectiveness using the Cheetah-Cub, a cat-inspired robot using a bounding gait.
Performance was compared using tails with the same moment of inertia but different mass.
*Using a light tail, performance is much less sensitive to configuration changes.*

## Open Questions

- **Consequences of Scaling?**
  Our simplistic analysis suggests that force-requirements, and therefore muscle-mass dedicated to the tail, scale with positive allometry.

from <100 g

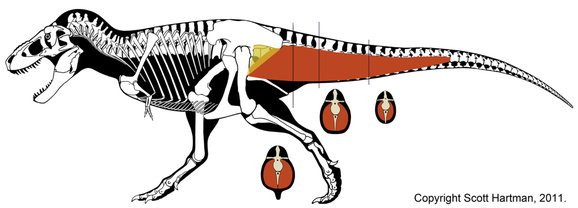
Texas Kangaroo Rat
courtesy www.geocaching.com

to <100 kg

Red Kangaroo, courtesy pixGood.com

For a more in-depth study on scaling of tails, visit the talk
"*Scaling of Effectiveness for Inertial Reorientation*"!
**Tuesday 6th, 13:45, Room 1D**, Thomas Libby*, A.M. Johnson, R.J. Full

- **The Coupled Case?**
  We focused on the advantages of decoupled-dynamics for simpler control.
  How could the coupling itself be exploited? How to balance the advantages?




T. Rex, courtesy skeletalDrawing.blogspot.com

- **Agile vs Steady?**
  We focused on very dynamic locomotion (high Froude numbers).
  Do slower animals do the same thing?

Pangolin
courtesy gviSouthAfrica.blogspot.com

Snow Leopard
courtesy SnowLeopardConservancy.org