

# Robot Locomotion

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To achieve *agility*, we must first *relinquish* control



QuickTime™ and a decompressor are needed to see this picture.



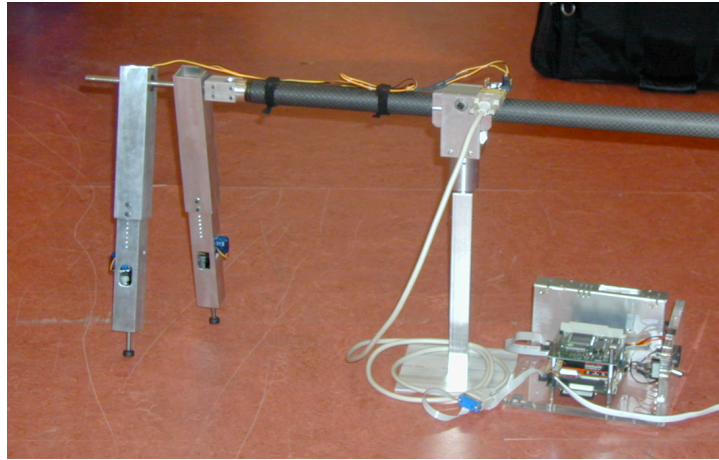


## How do you add *minimal* control?

- Clever mechanical design
- Add a few actuators to push and pull natural dynamics
- *Control techniques must address:*
  - Underactuation
  - Uncertainty
- If formulated as optimal control problem, machine learning can help:
- Solution requires all three:
  - Mechanical design
  - Nonlinear Control
  - Machine Learning

QuickTime™ and a  
MPEG-4 Video decompressor  
are needed to see this picture.

# Simple walking machines



# Flapping-winged flight

