Making an easy to build Bipedal Robot with LocoKit

Aida Mohammadi Nejad

Maziar A. Sharbafi

Questions

- How to make a biped without boom?
- How can we solve ground clearance?
- How can we detect motion phases?

Goals

- Locomote
- Lateral stability
- Investigate embodiment & control
  - Reducing impact
  - Increasing robustness
  - Optimizing motion

Suggested approaches

- Lifting or continuously rotating swing leg
- A quadruped moving like a biped
- Using two motors: adjust leg length/angle
  > Cornell ranger model
- Using two motors: adjust leg stiffness

Building steps

1) Standard quadruped to start with

2) Simple Biped with 1 active DoF

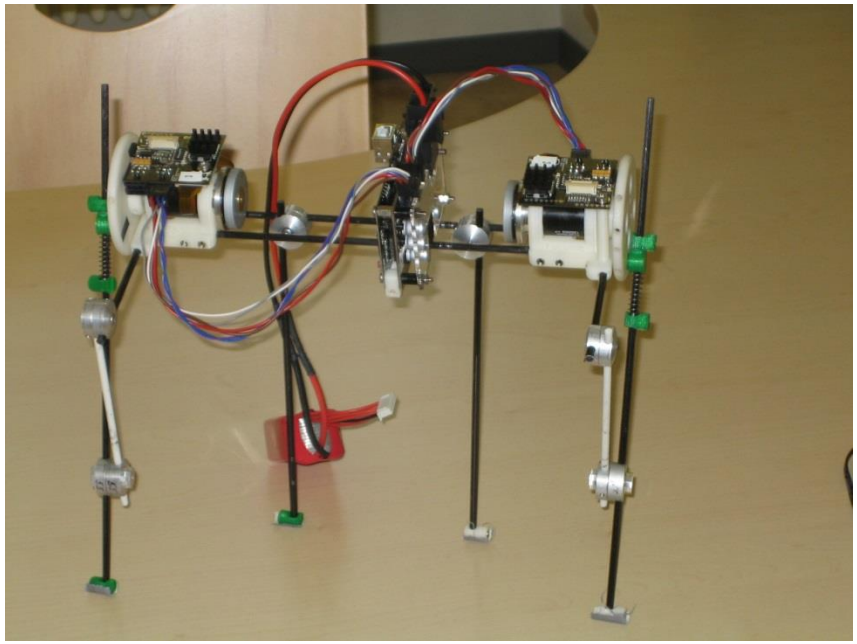
3) Cornell Ranger like robot

What we learned ?

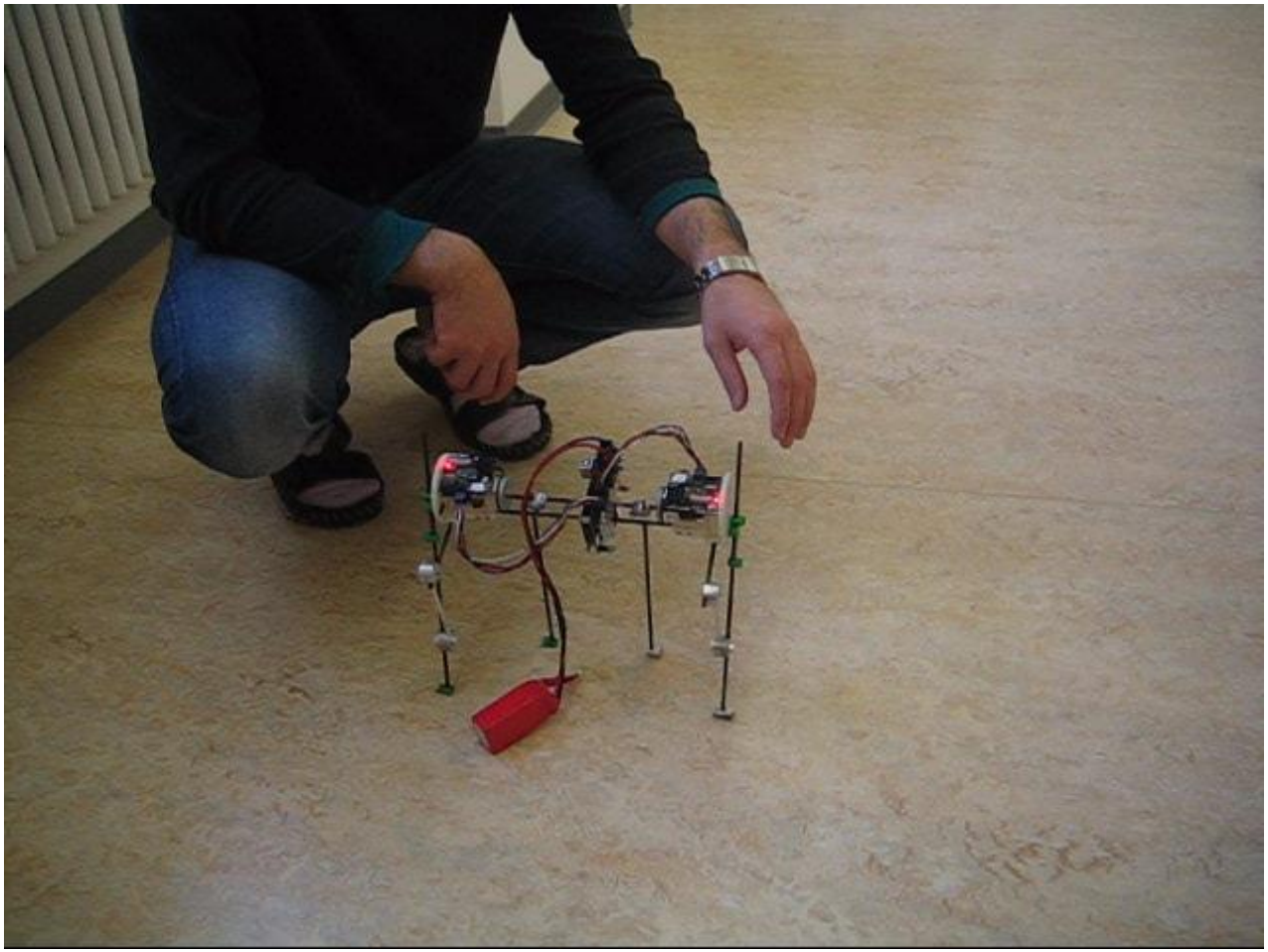
- Mechanics is important:
  - Building strong structure
    - add connections to strengthen the structure
  - Rotational and linear motion generation
- Communicate with the robot, with Jorgen
- Control of the motors

Simple Biped with 1 active DoF

- Challenges:
  - Lateral stability
  - Steady gait pattern
  - Ground clearance
  - Just one actuator
- Control targets:
  - Swinging the leg
  - Changing leg length

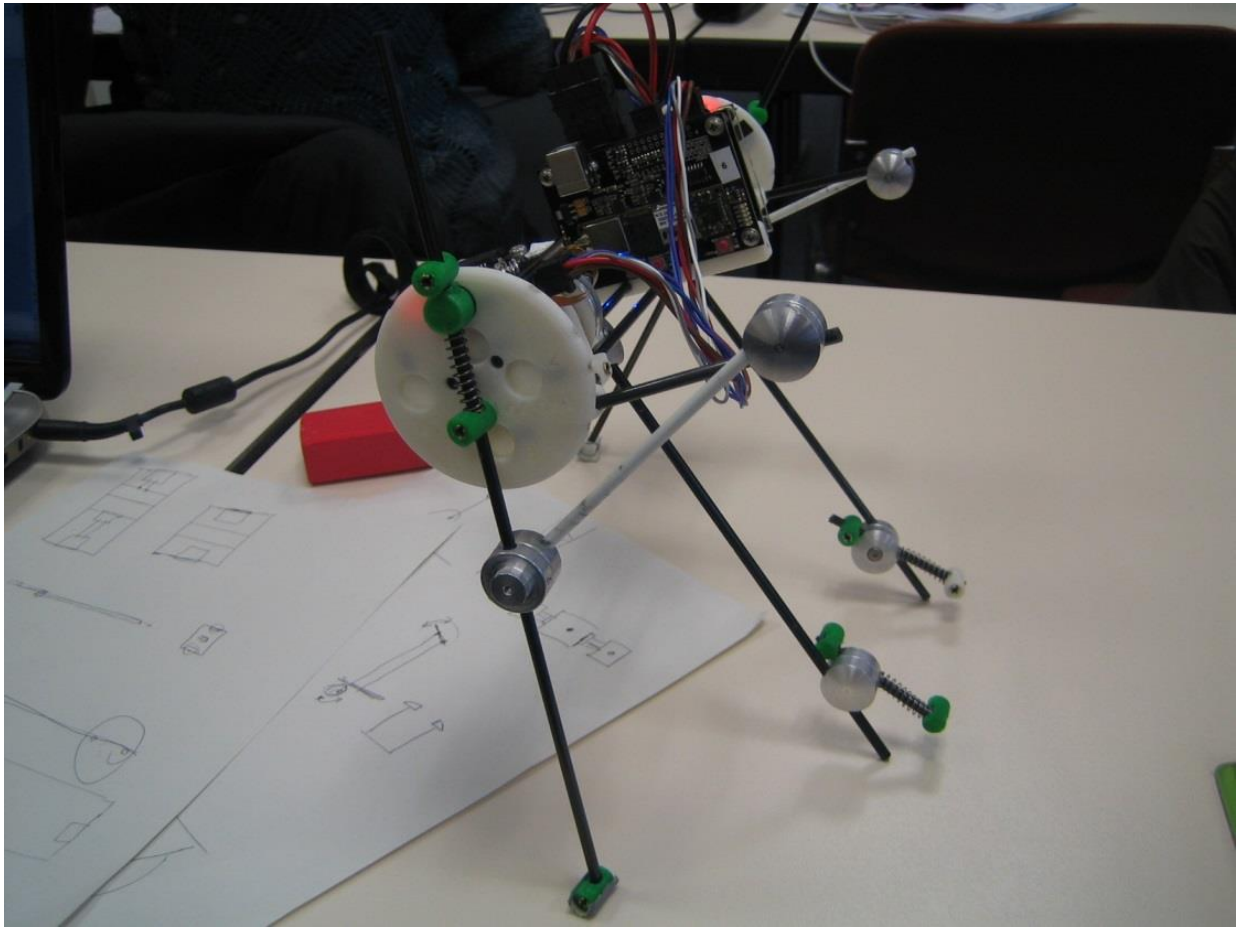


First performance

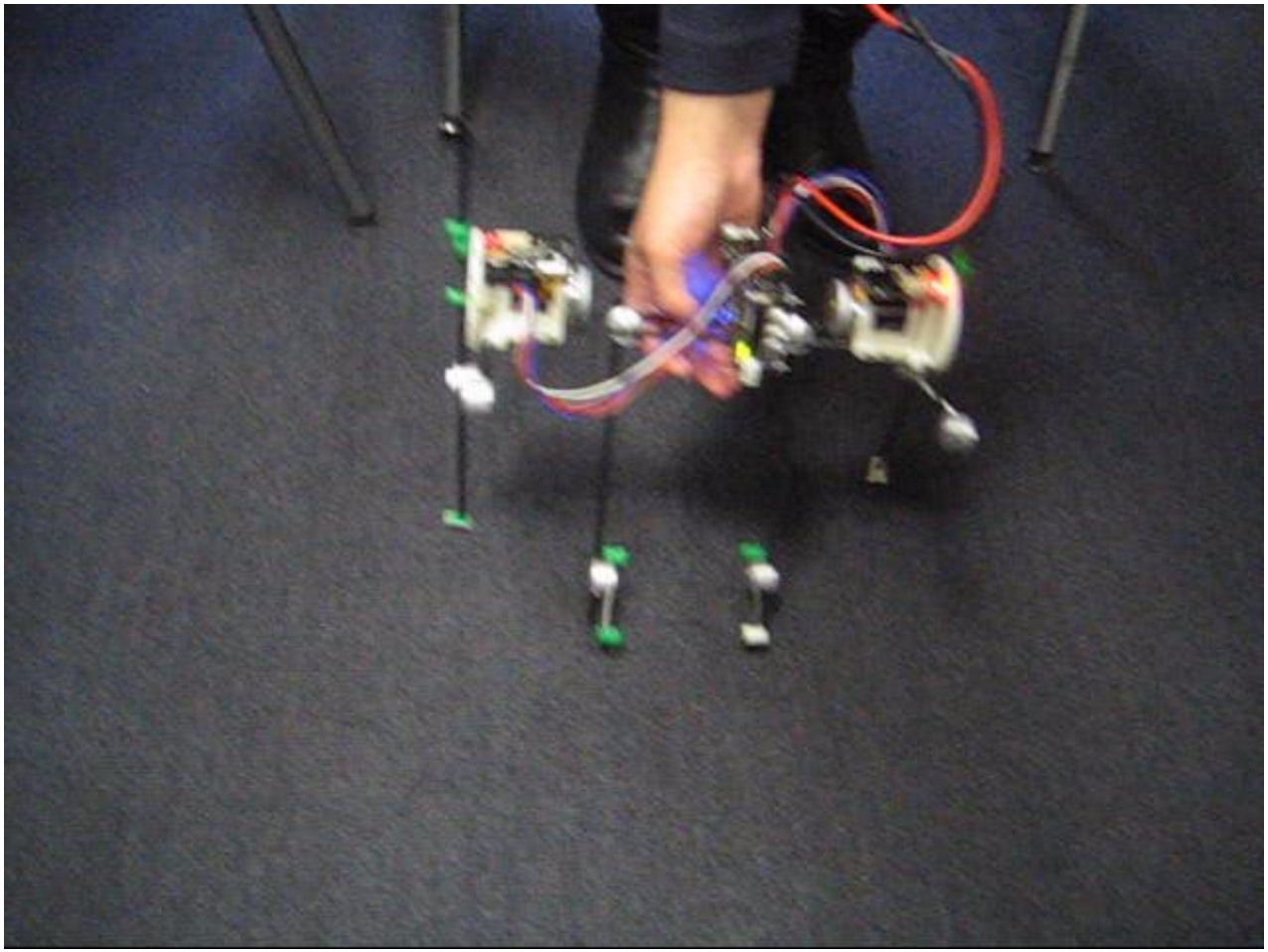


Next step

- Adding compliant feet

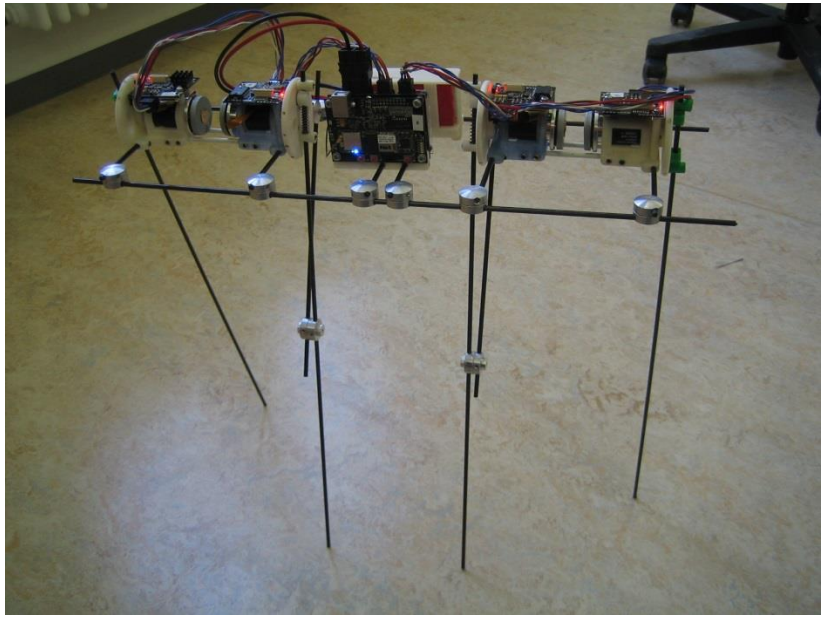


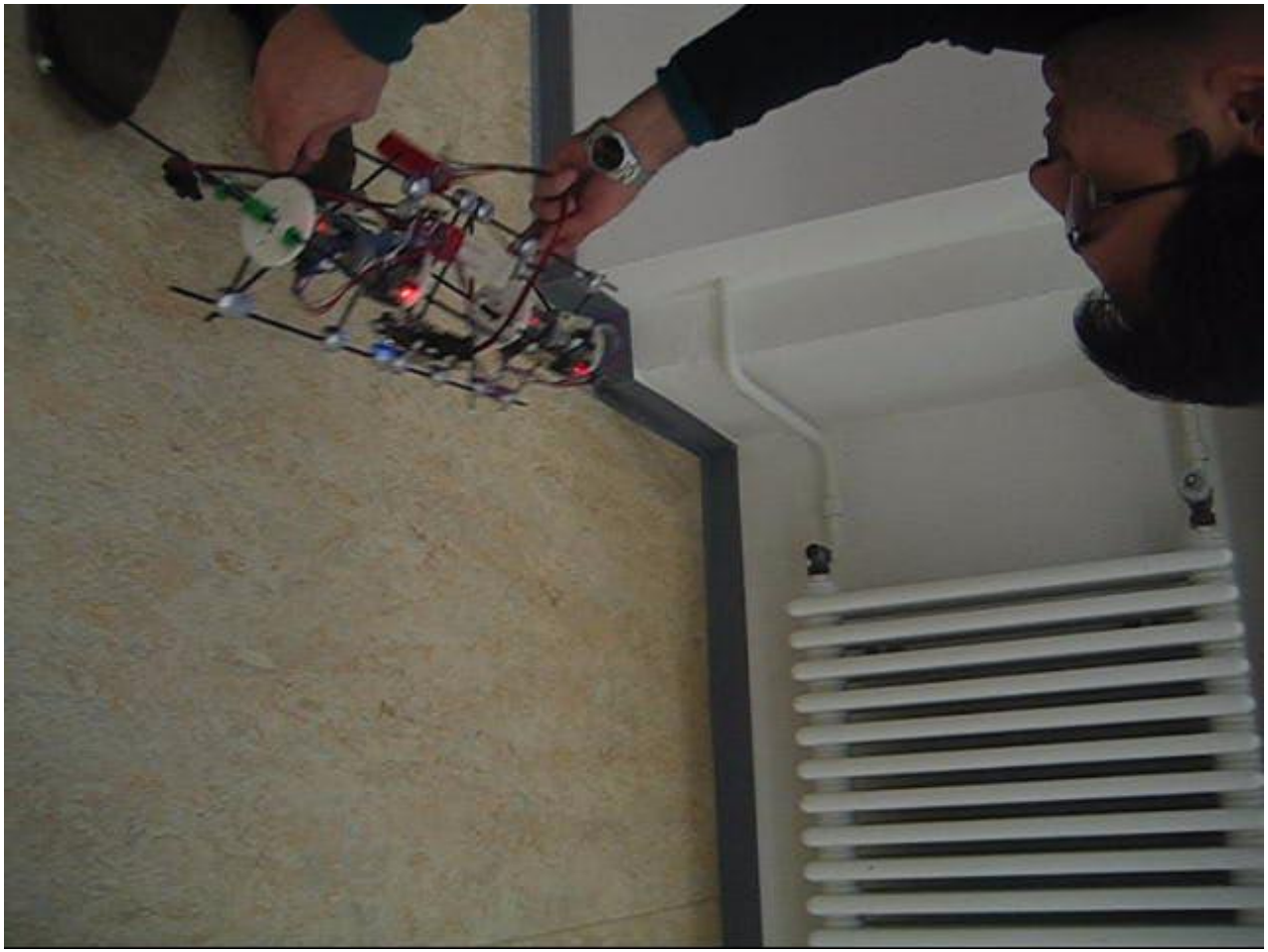
Performance



Cornell Ranger robot

- 2 motors swinging the outer leg
- 2 motors changing the leg length
- Synchronizing motions





Problems

- Long legs produce leg deflection
- Increasing the structure solidity with addition of more connections