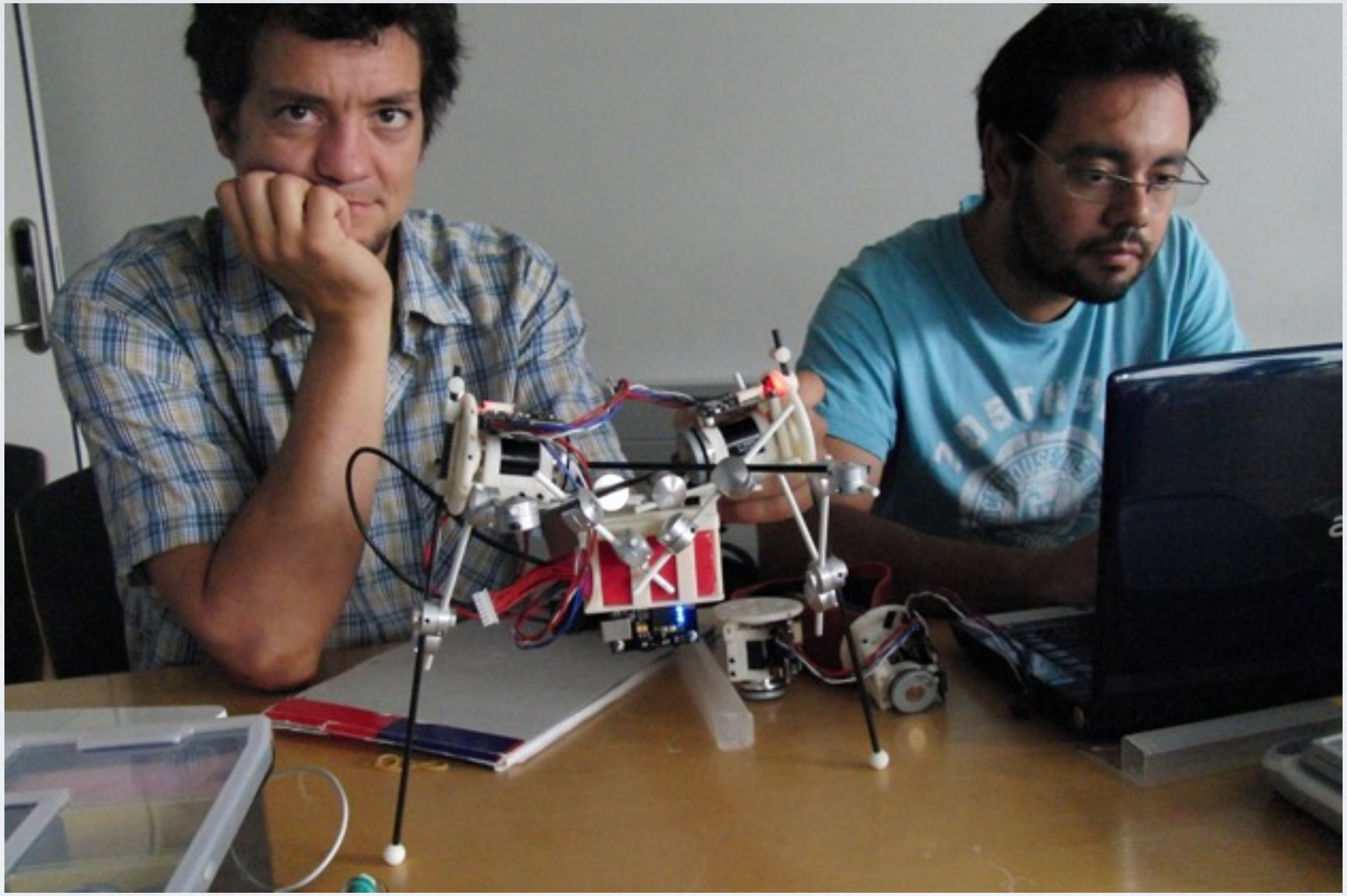
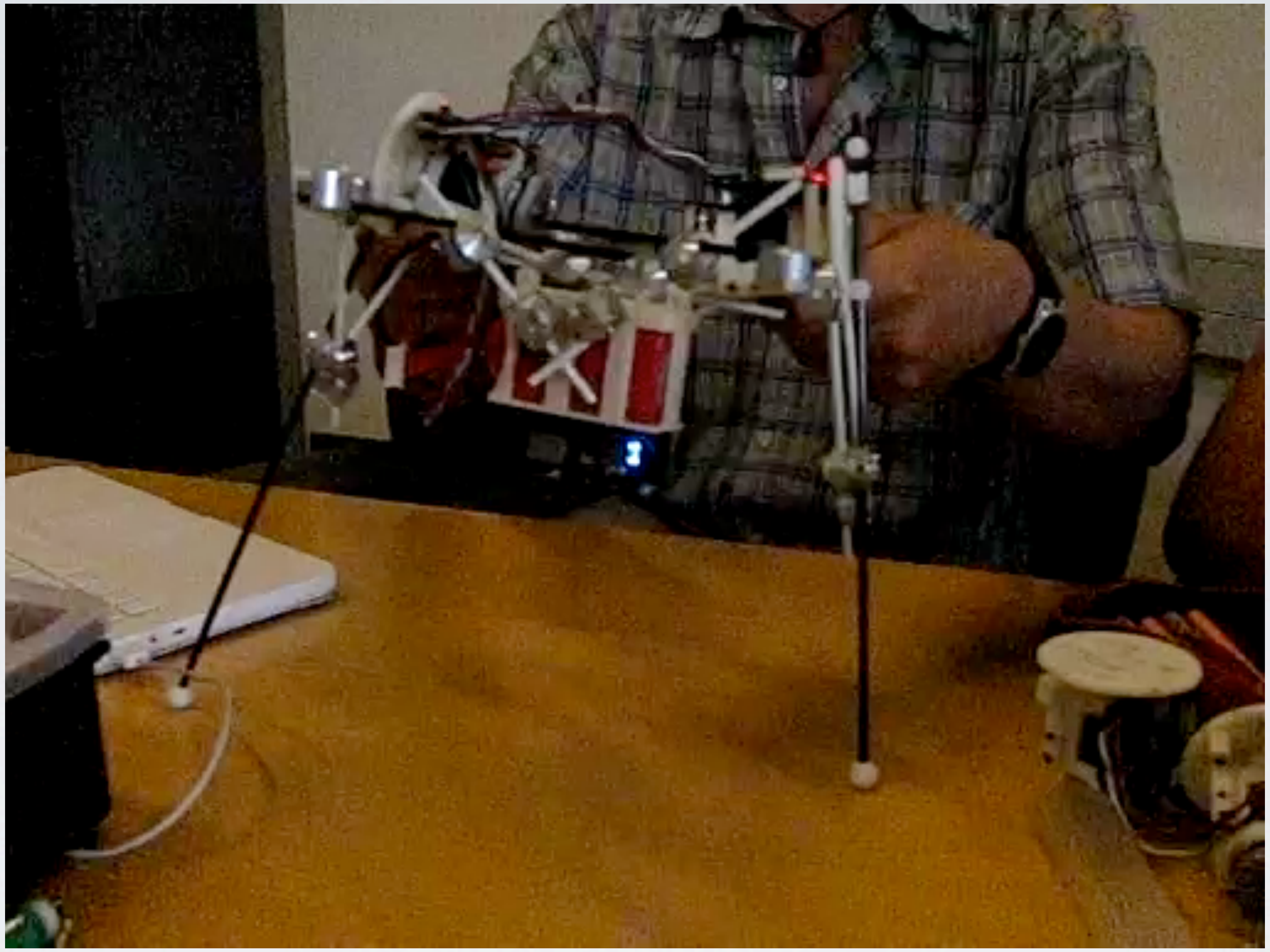
BIPEDAL ROBOT WITH SPLAYED LEGS



Harold Martinez (UZH),
Christian Rode, Frank Peuker (both Darmstadt)



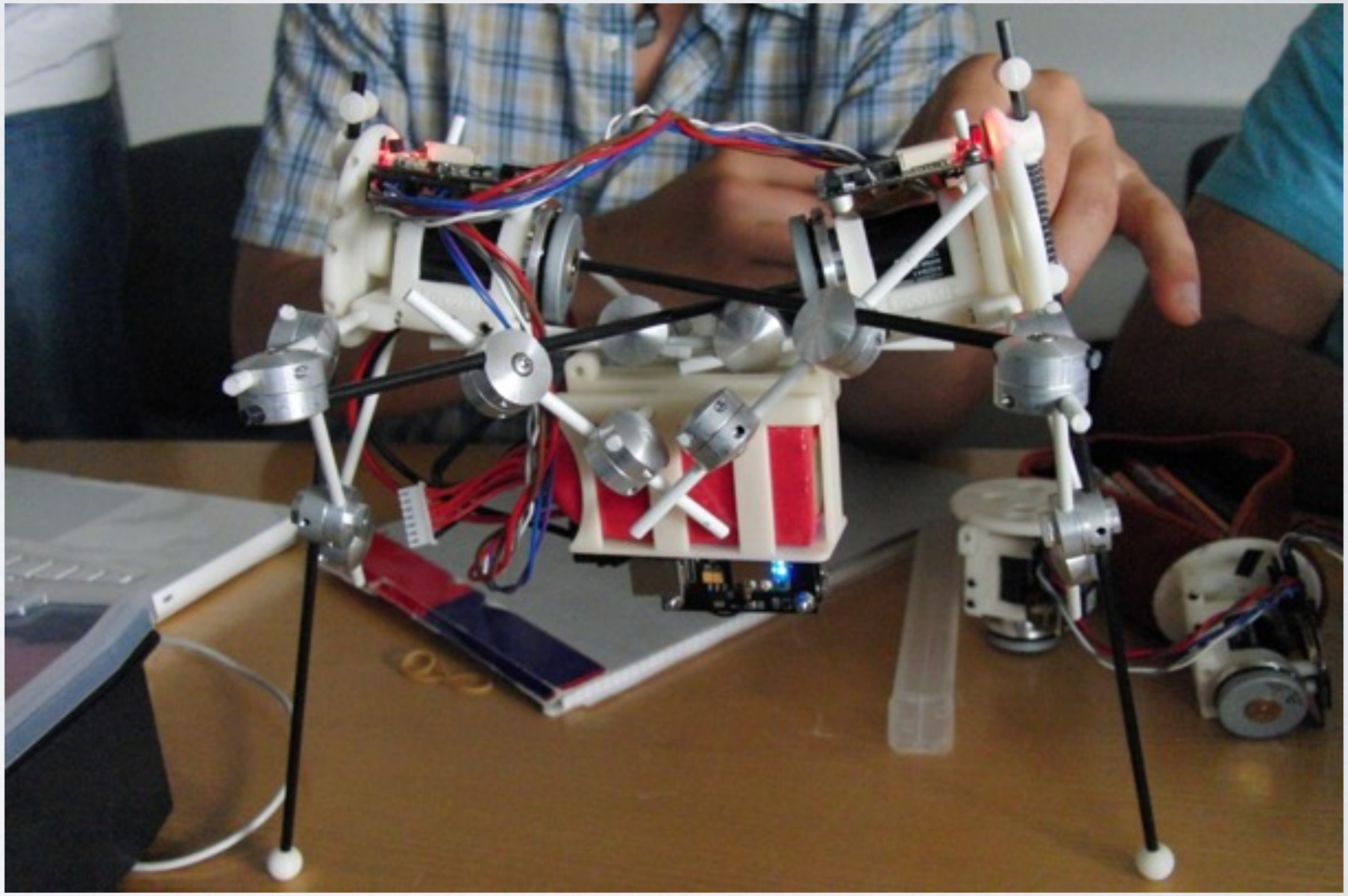
ROBOT IN SLOW MOTION

Robot, suspended by Christian

DESIGN

Robot dimensions (SLIP):

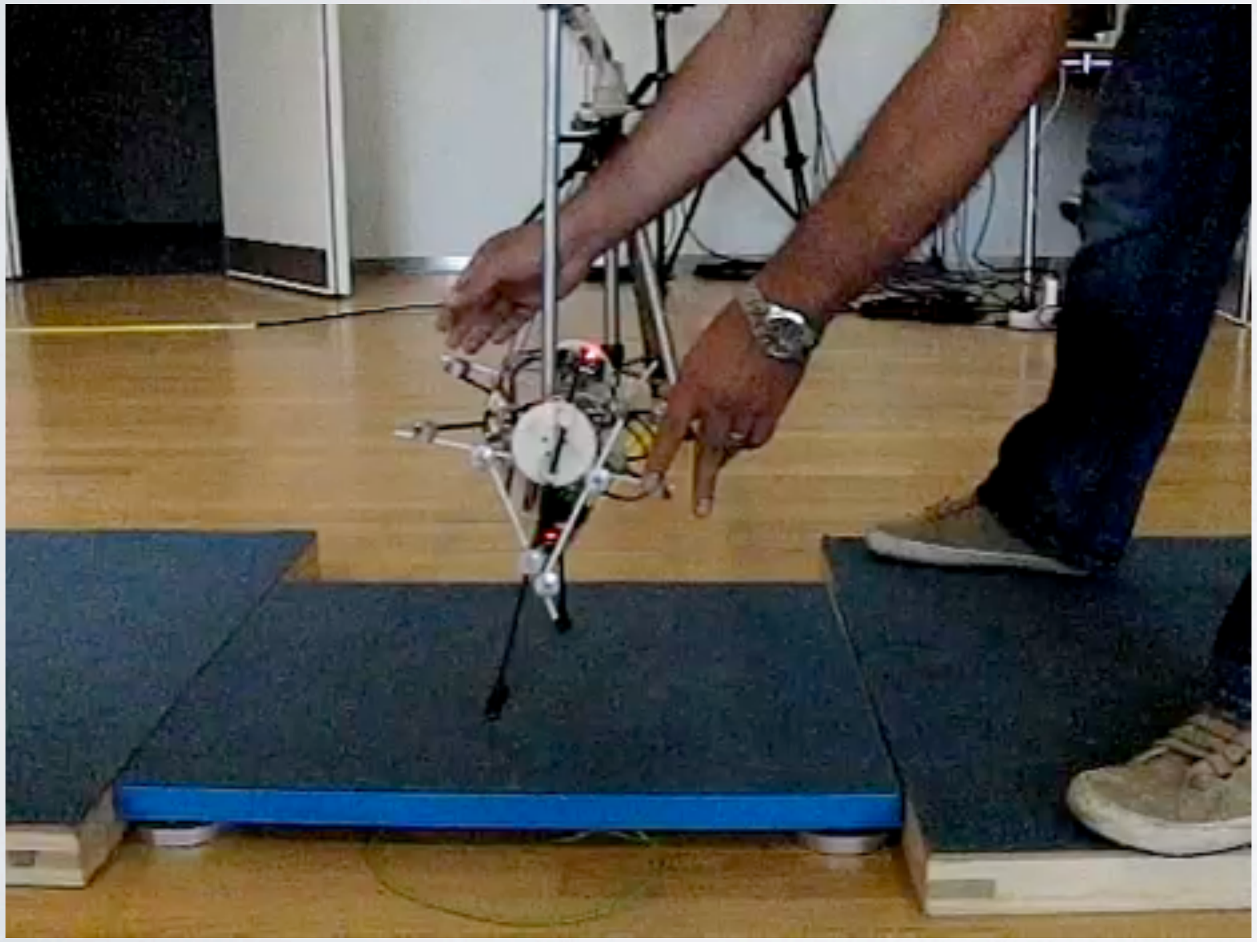
- leg length = 25 cm
- body width was adjustable
- mass = 900 g
- stiffness = 650 - 1000 N/m
- forward speed = 0.3 - 0.6 m/s
- motor frequency: 2 - 3 Hz (according to stable SLIP)



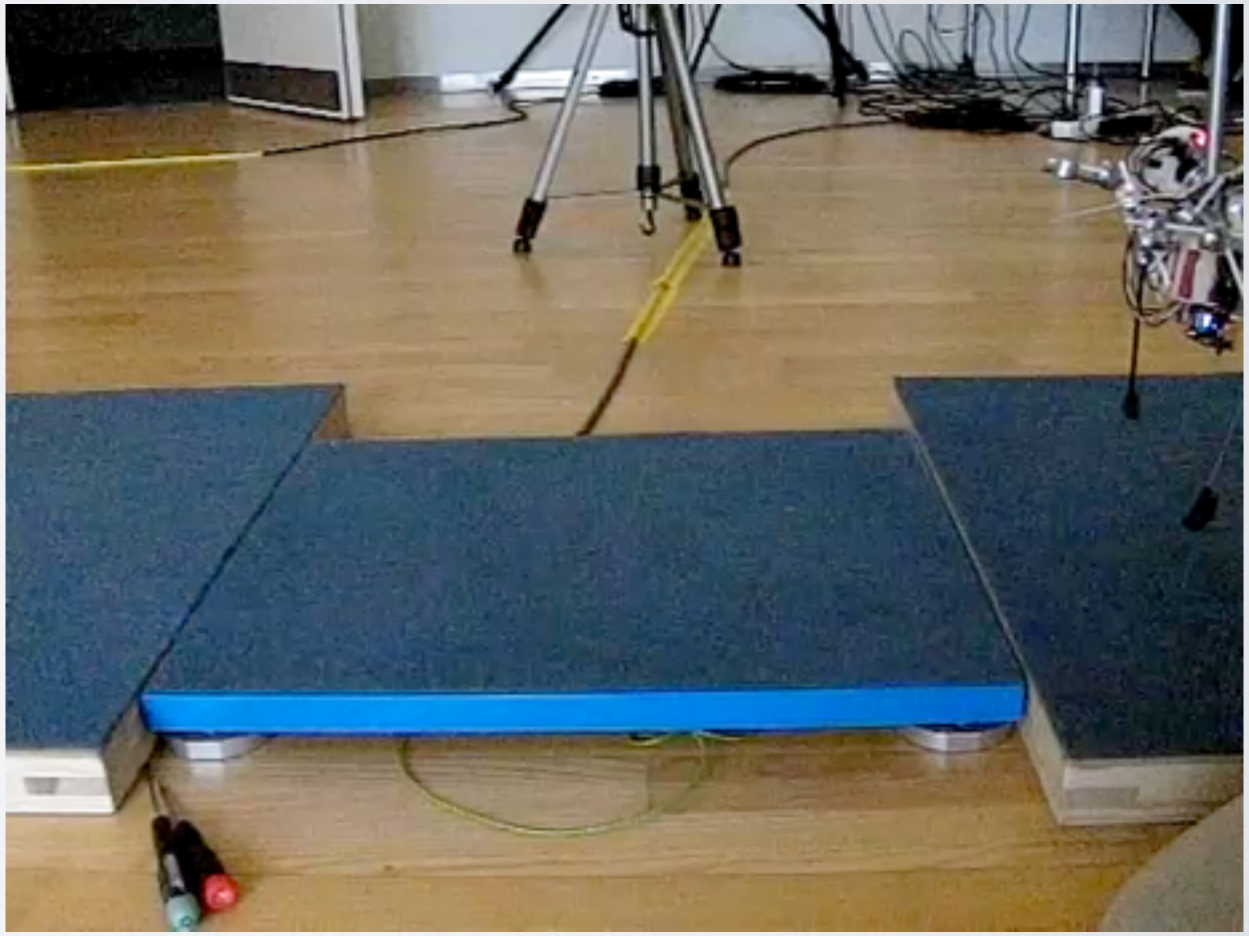
EXPERIMENTAL RESULTS

- Attached robot on a boom provided by Jørgen

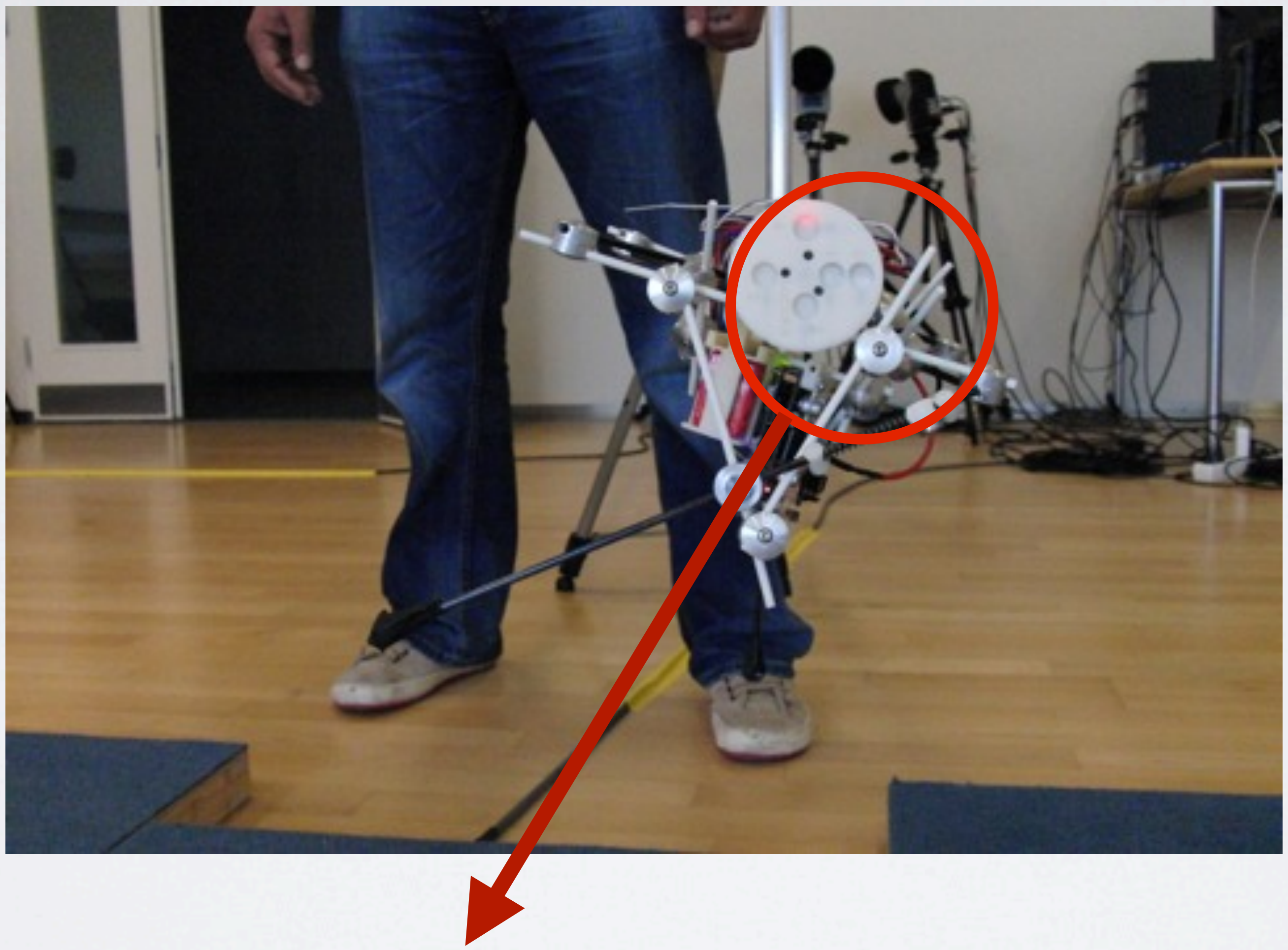
2 Hz



3 Hz

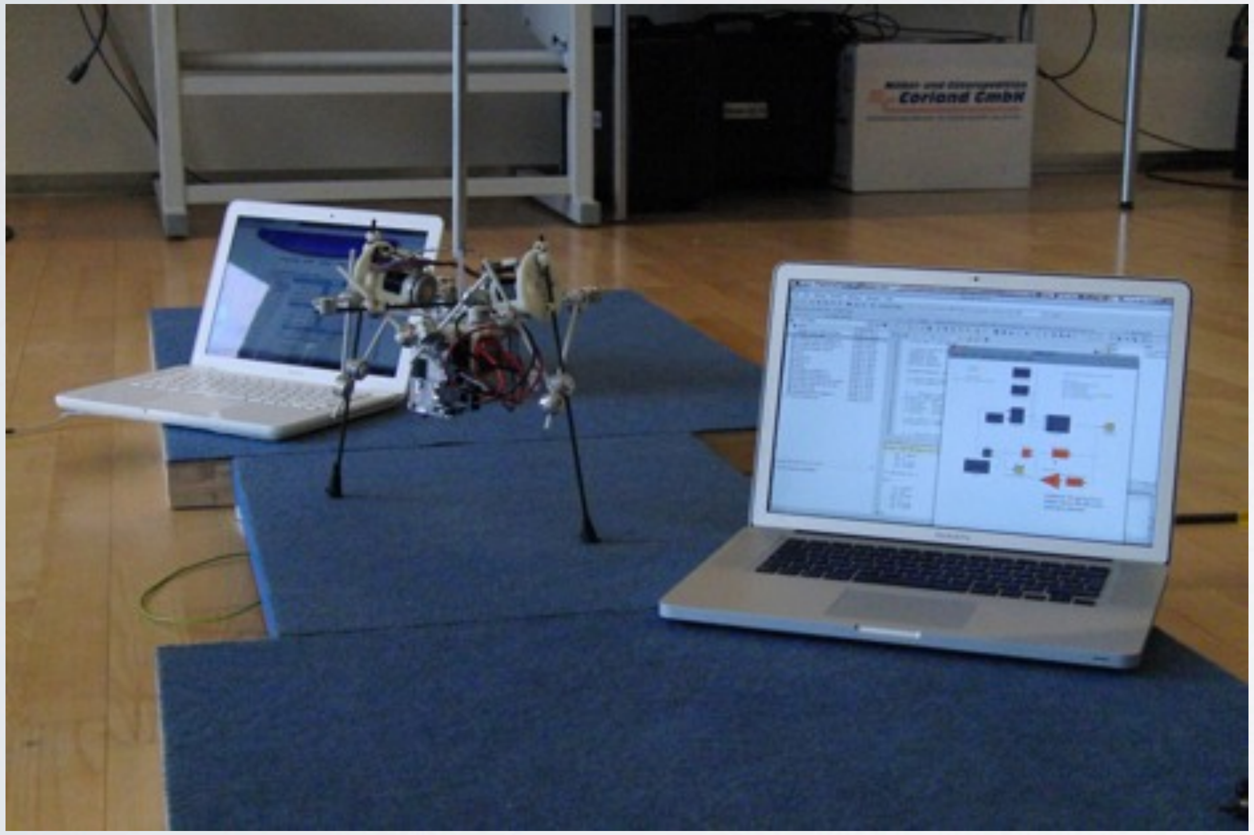


TECHNICAL LIMITATIONS



- Rotating disc not very well aligned with motor
- Most of bearing joints broke because of high impacts

MODEL-BASED ANALYSIS

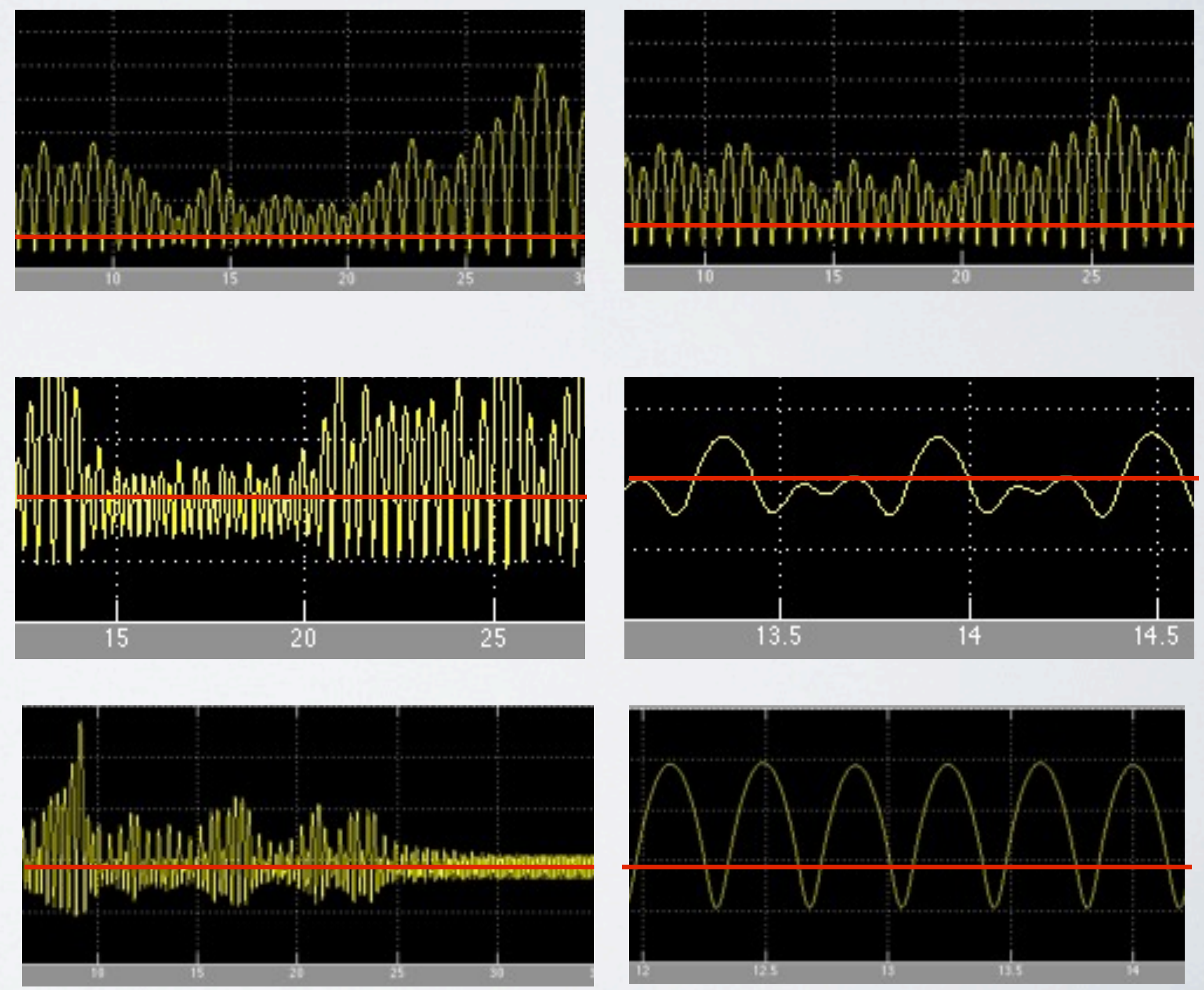


- SLIP model should describe robot locomotion (based on non-dimensional analysis)
- Difference: Rotatory actuation by Locokit motor
- => Is it possible to have a limit cycle with this actuation ? (cmp. CPG talk of Auke)

MODEL-BASED ANALYSIS

- Added sinusoidal actuation to hopper (Frank‘s tutorial)
- Influence of leg damping and actuation frequency on stability of hopper oscillation
- Tiny leg damping already helps when forcing is close to natural frequency

	57 rad/sec	**33 rad/sec** (Eigenfrequency)
No damping		
Tiny damping (20 passive hops)		
Small damping (8 passive hops)		



FINAL CONCLUSIONS

- Mechanical damping may be considered as built-in feedback
- To account for actuation we increased motor frequency towards estimated eigenfrequency (Hopper model from Tutoriall)
- Locokit mechanics could not safely progress to estimated eigenfrequency (Bearing joints broke!)