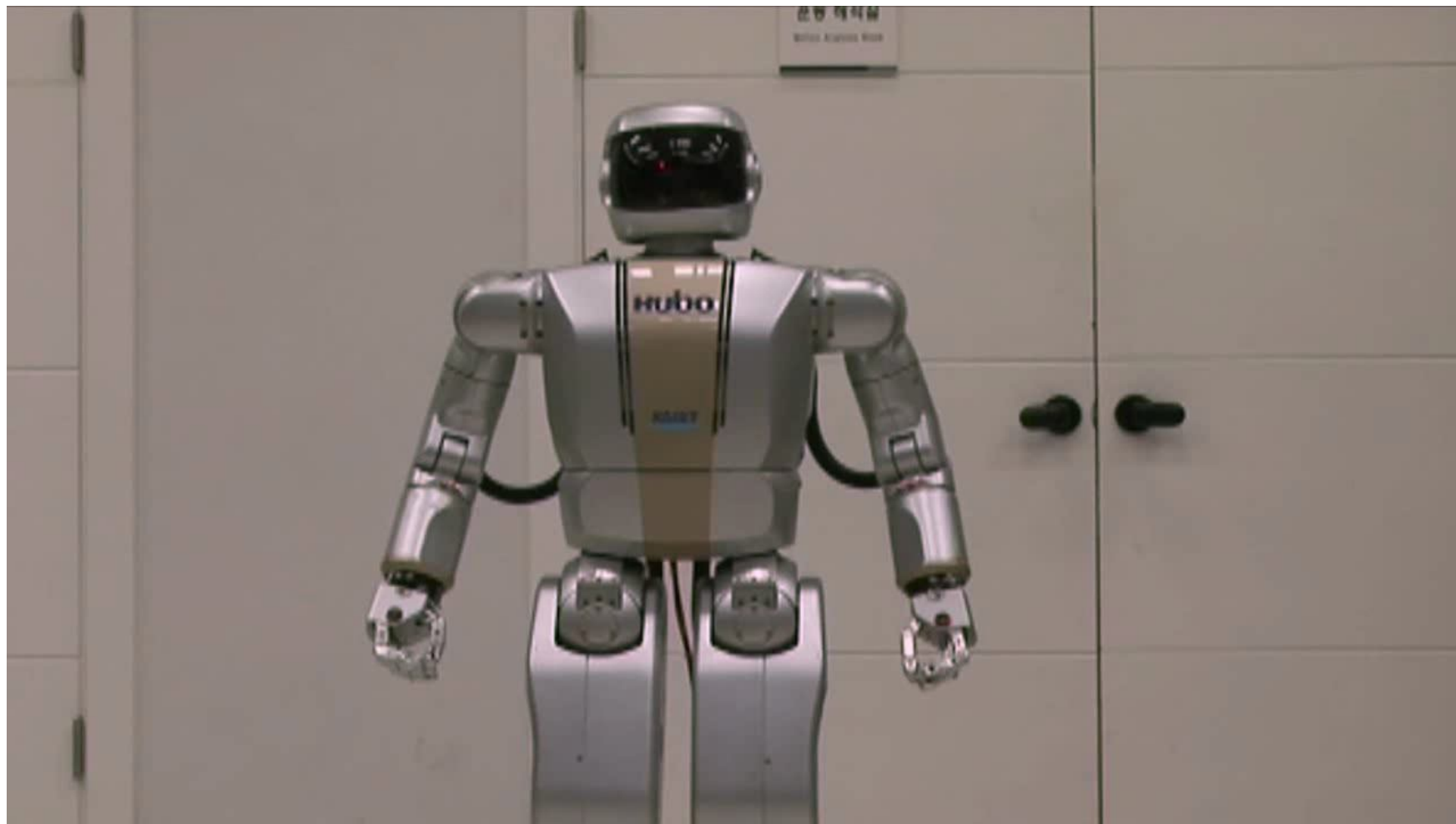


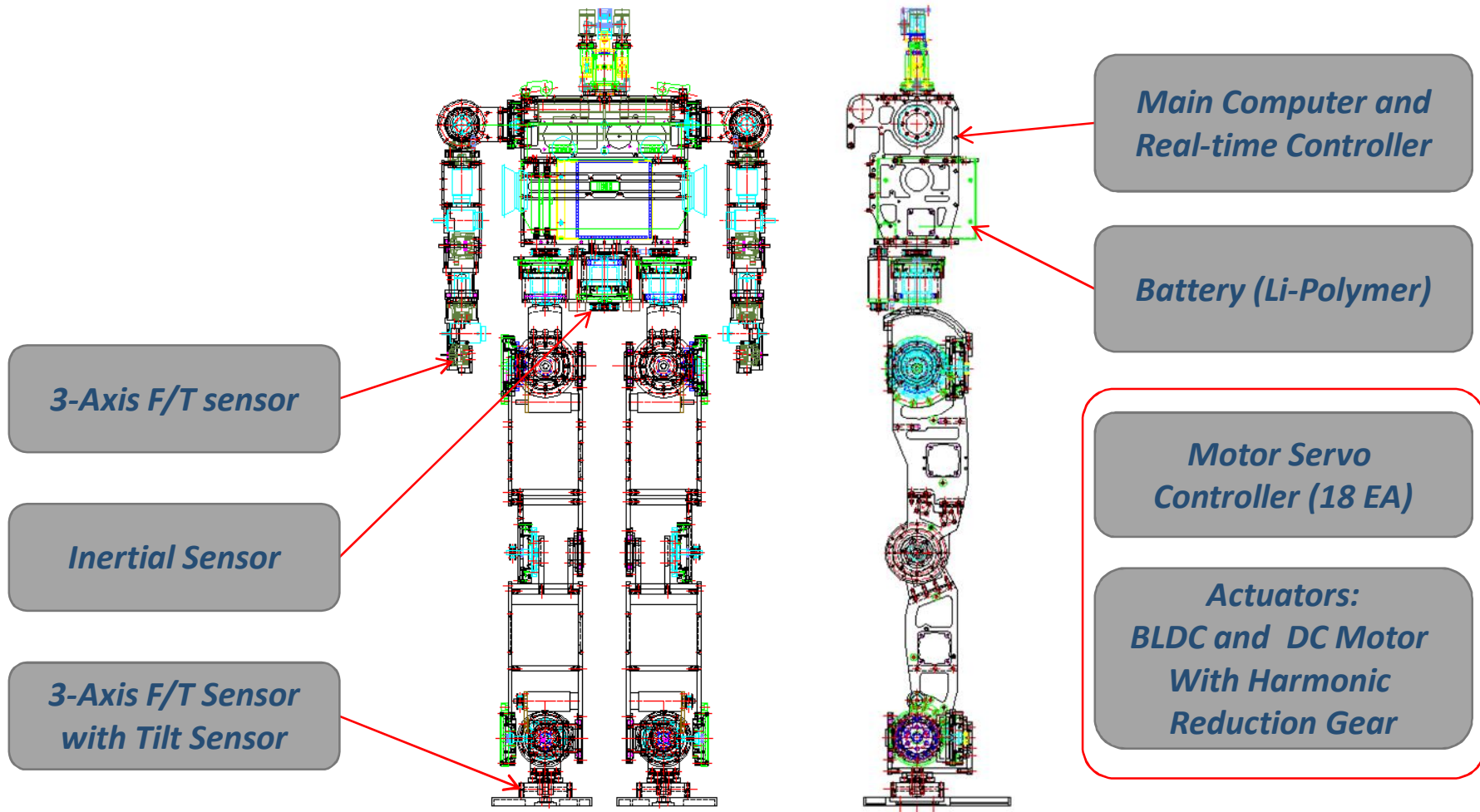
Movement of Humanoid Robot with Trajectory Optimization

박항필

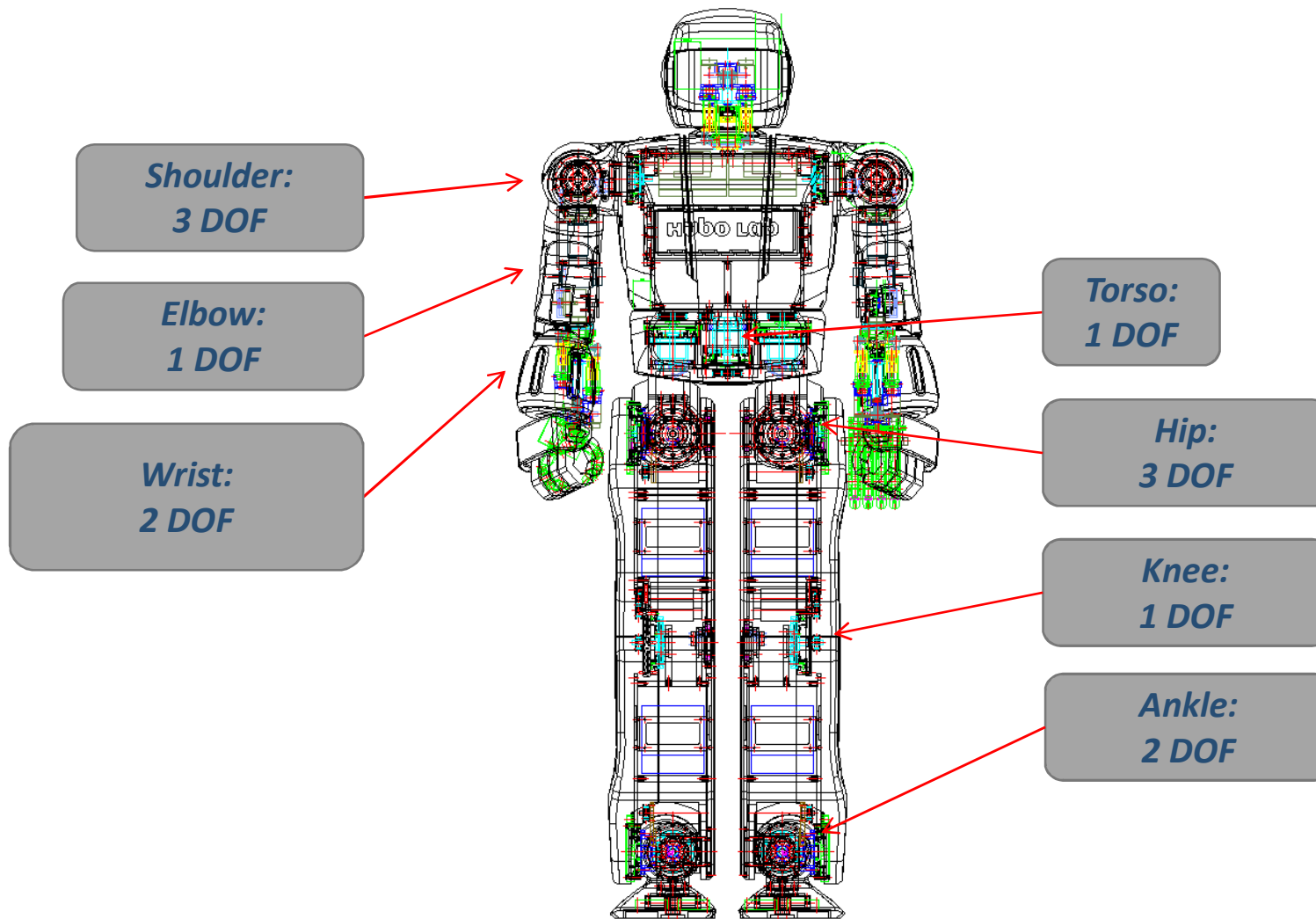
Hubo2



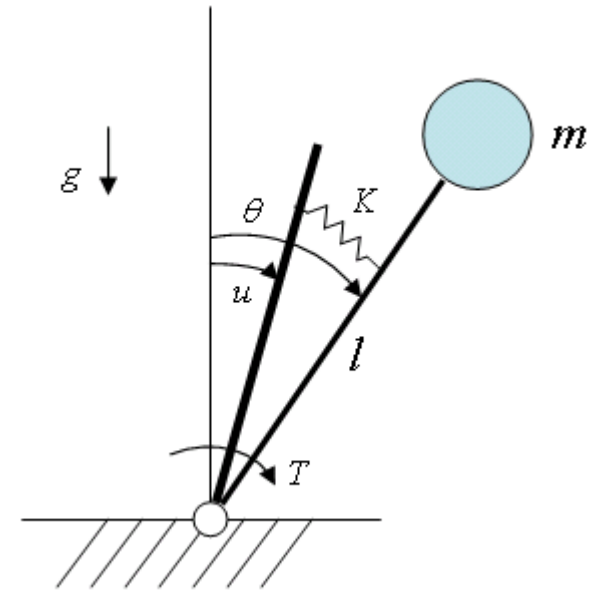
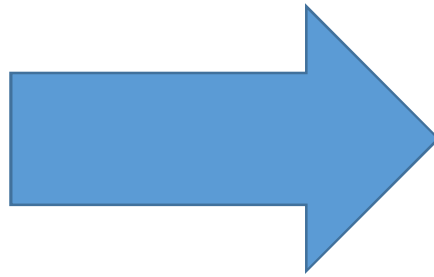
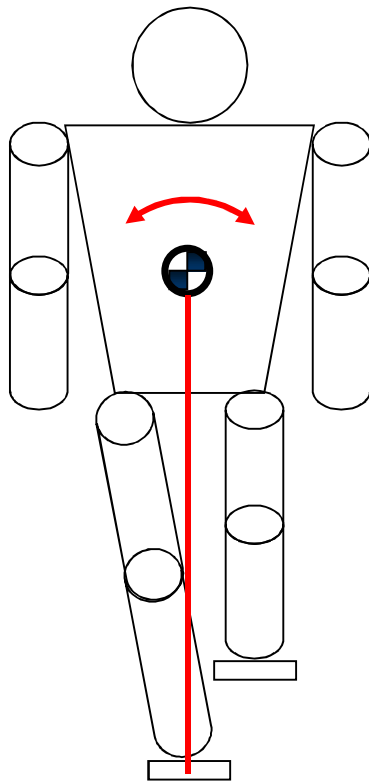
Hubo2 구조



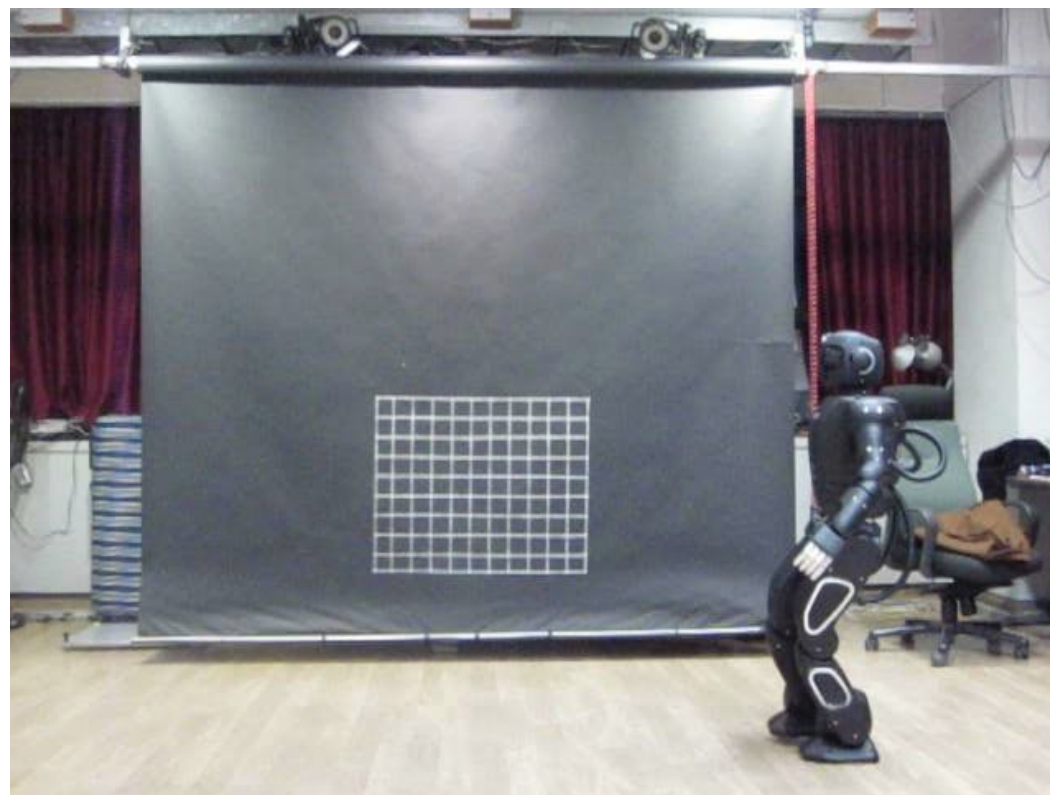
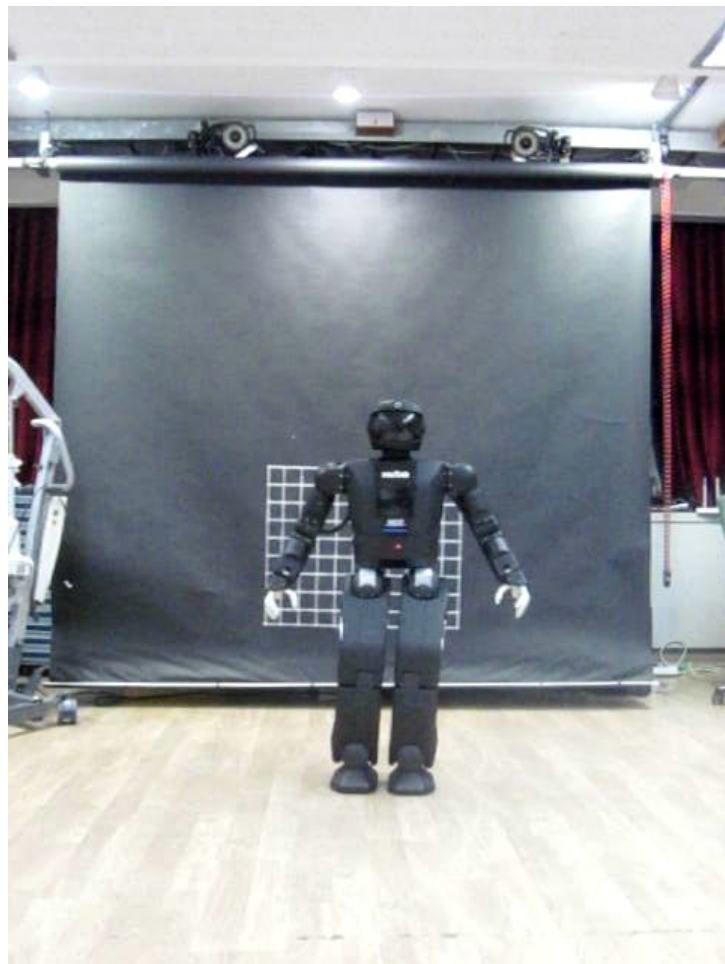
Hubo2 구조



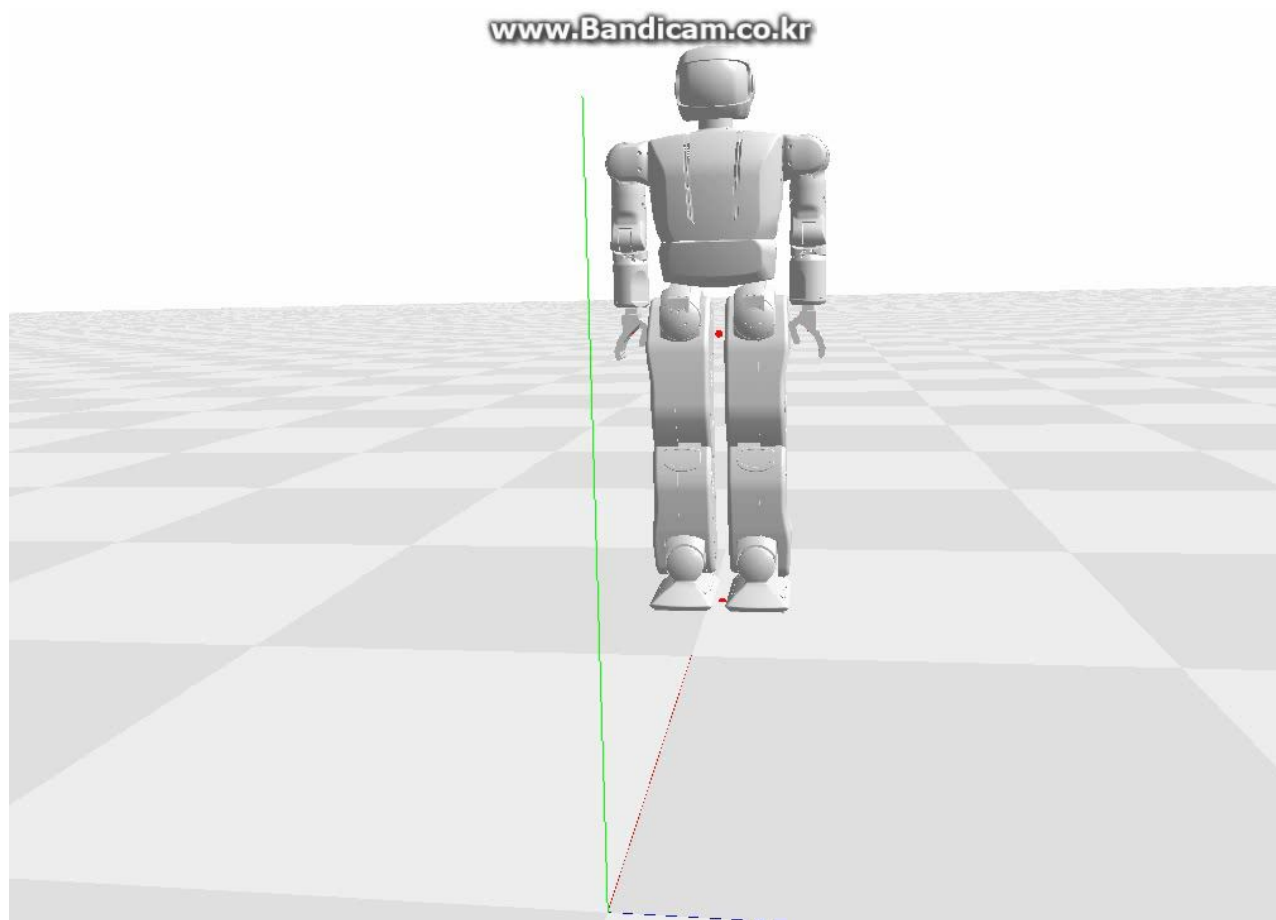
Robot as a pendulum



Quasi-static walking



Robot Simulator

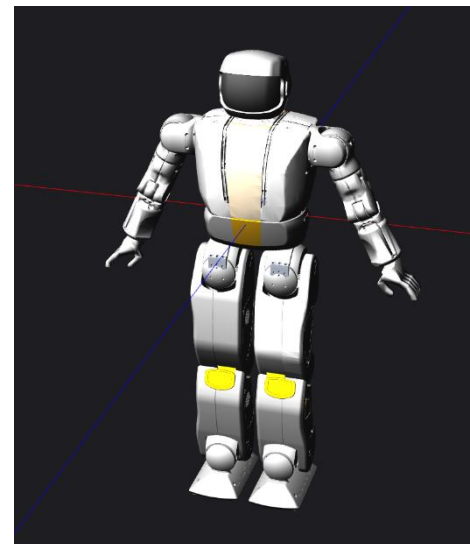
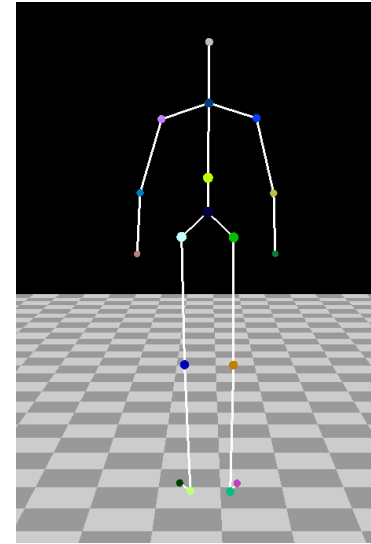


Flow

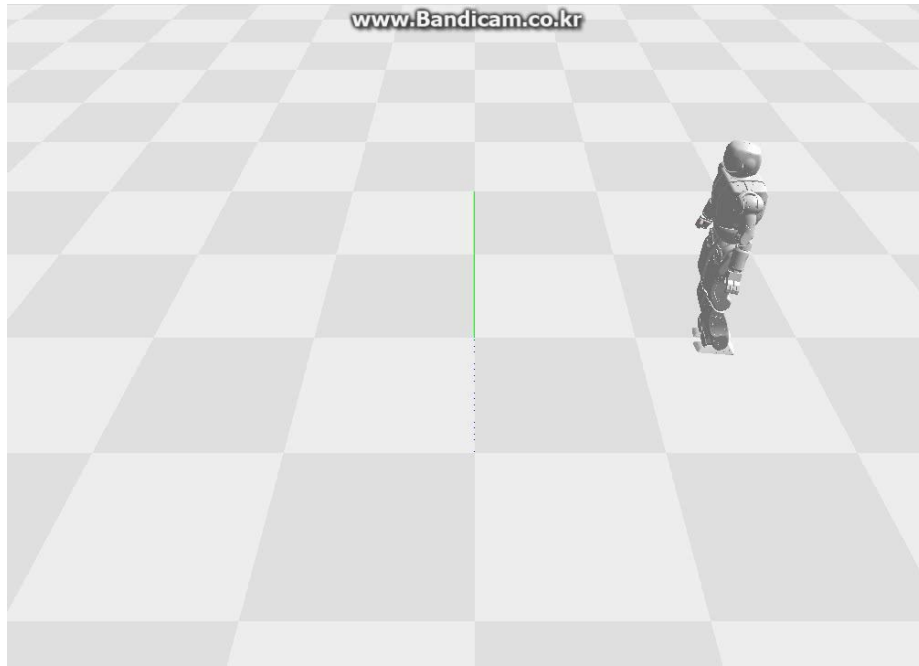
1. Human Motion Capture Data

2. Retargeting to Hubo2
(reference motion)

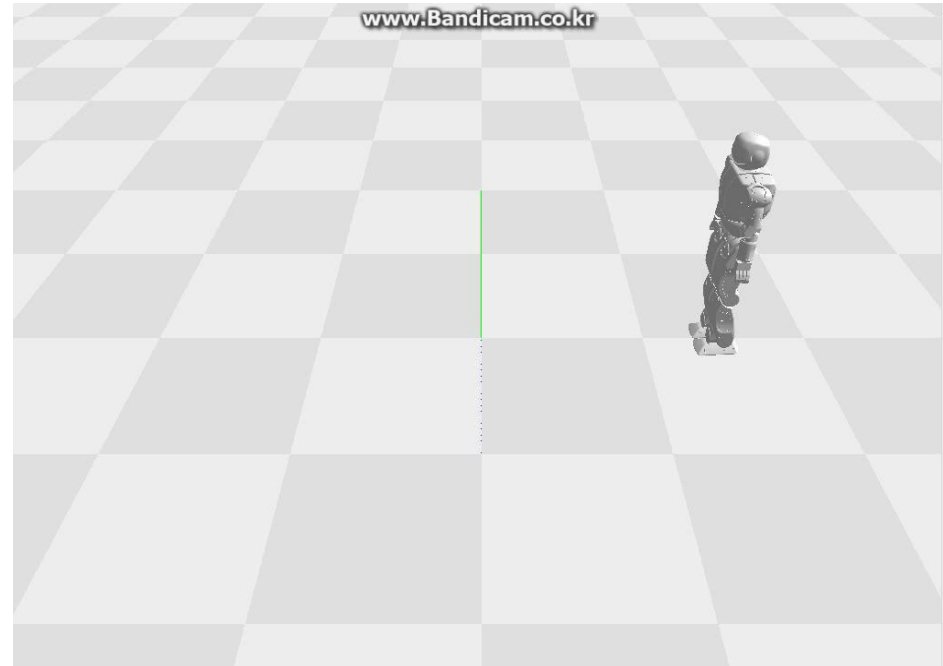
3. Physically Simulated
Hubo2 Motion



Reference motion
(retargeted)



PD control (just tracking reference)



Trajectory optimization

- 시뮬레이션 하는 모든 시간 동안의 경로에 대해 최적화를 수행

- 지금은 tracking하는 경로를 최적화 중

$$\theta_{tracking} = \theta_{reference} + \Delta\theta$$

$$\operatorname{argmin}_{\Delta\theta} \sum_t \|\vec{c}_{ref} - \vec{c}\|^2, \vec{c} = \text{center of mass}$$

www.Bandicam.co.kr



Simulation -> Real Robot

- Robot의 정확한 물리적 특성
 - 무게, 회전관성, 크기, 모터의 성질, ...
- Simulation과 오차 발생시 오차를 상쇄할 수 있는 controller

- Controller parameter를 최적화 변수로 삼아 최적화 할 수 있음
- Controller parameter를 최적화 하는 경우 interpolation 하는 데에 활용할 수 있음