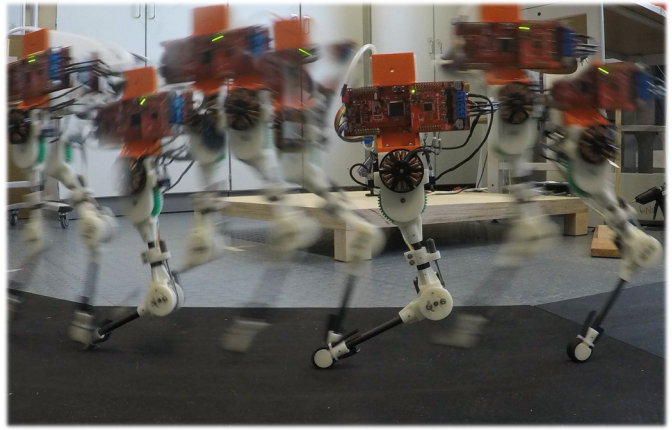
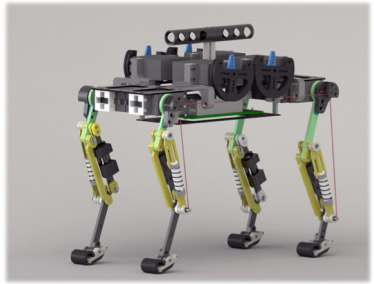
Impact of Trunk Orientation for Dynamic Bipedal Locomotion

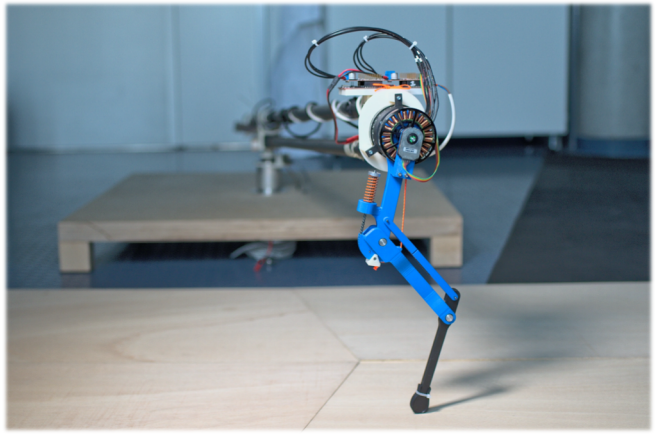
Dynamic Locomotion Group



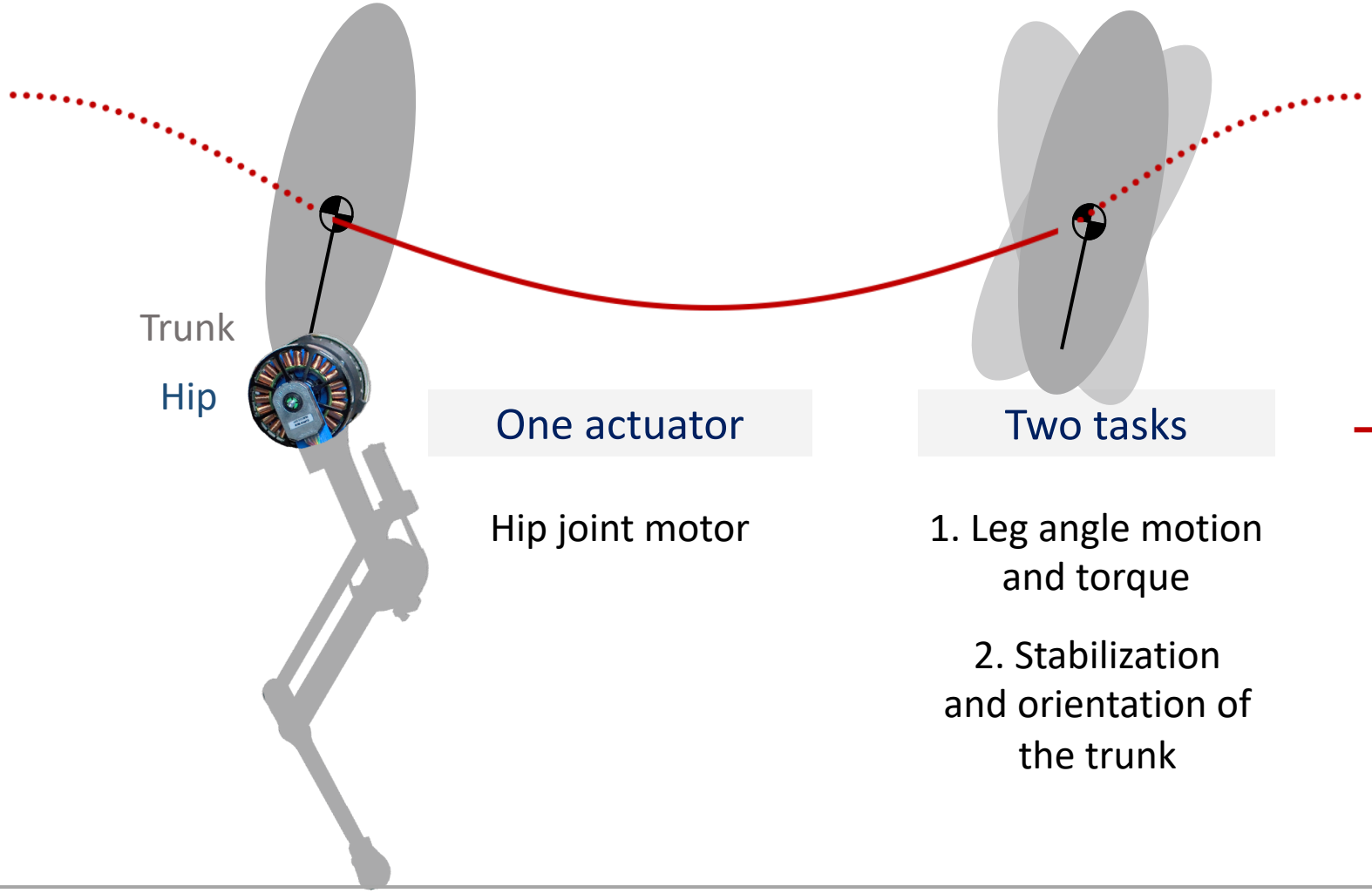


Özge Drama

Alexander Spröwitz



Bipedalism



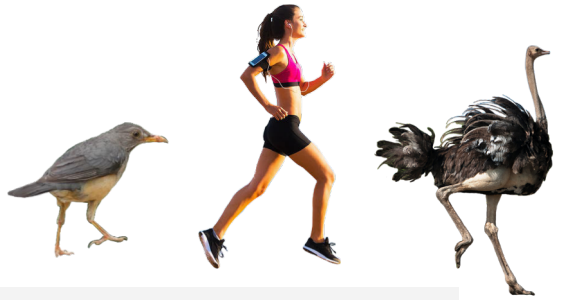
One actuator

Hip joint motor

Two tasks

1. Leg angle motion and torque

2. Stabilization and orientation of the trunk



Example solutions: Nature

Leg segments

Crouched leg configuration

Trunk posture

Morphologies

Bipedalism: Nature has provided various solutions

Orthograde ..... Pronograde

Humans

Out/Hex Runner

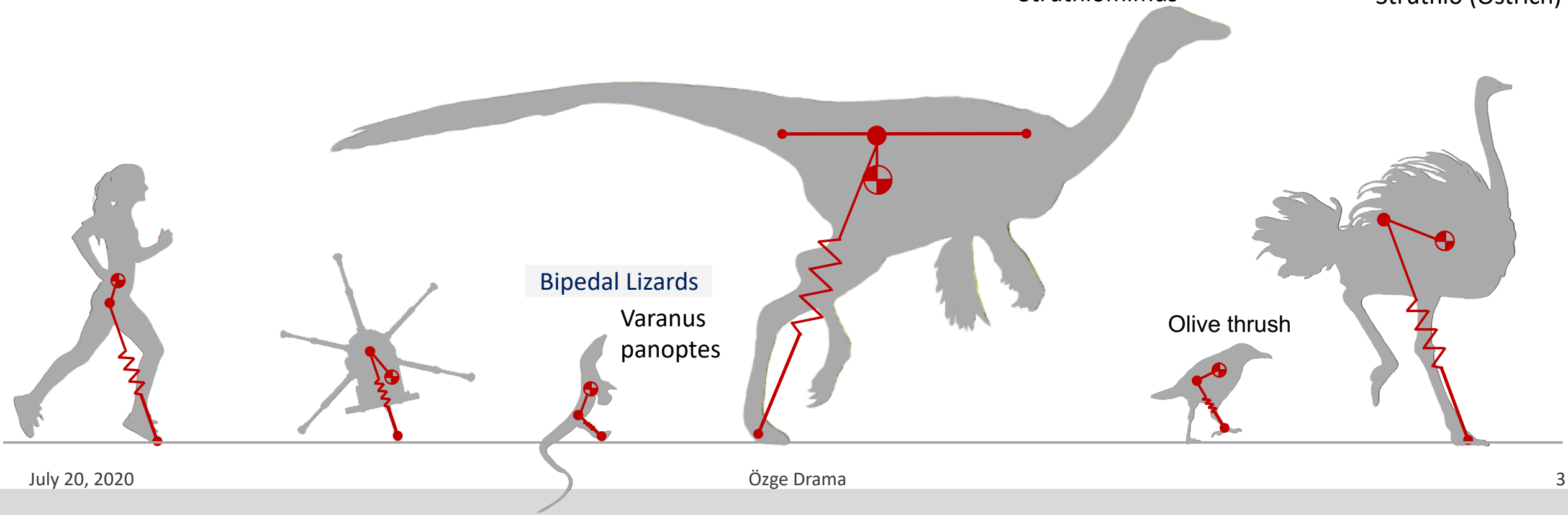
[Robotics Unlimited/IHMC]

Theropods

Struthiomimus

Birds/Ratides

Struthio (Ostrich)



Bipedal Lizards

Varanus panoptes

Olive thrush

Model: T-SLIP

T-SLIP (Spring Loaded Inverted Pendulum Model with a Trunk) for Running

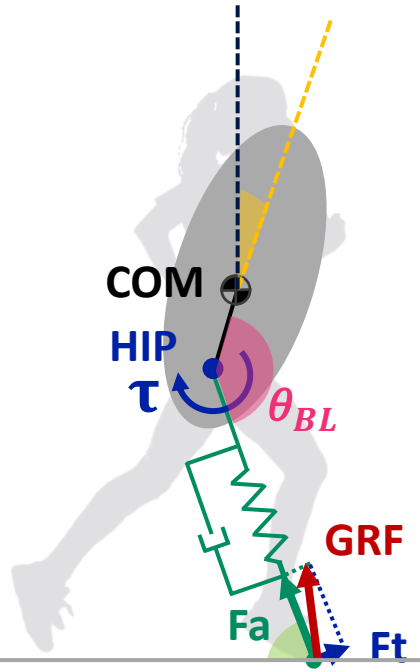
Human

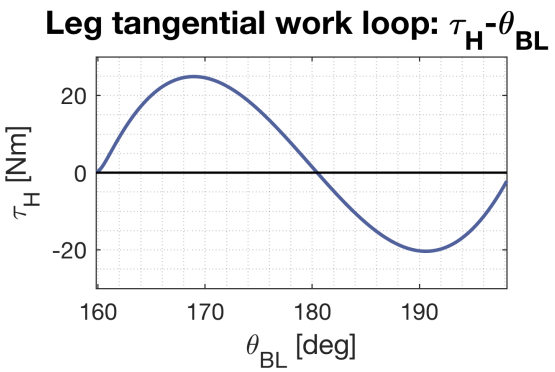
Ratite

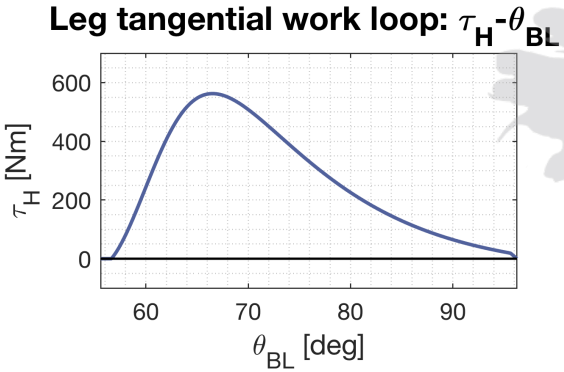
Goal: 1. Generate gaits with natural pitching oscillations

2. Investigate the function of **Leg -- Trunk – Control**
[Clemente 2017]

Means: 1. Bio-mechanical characteristics

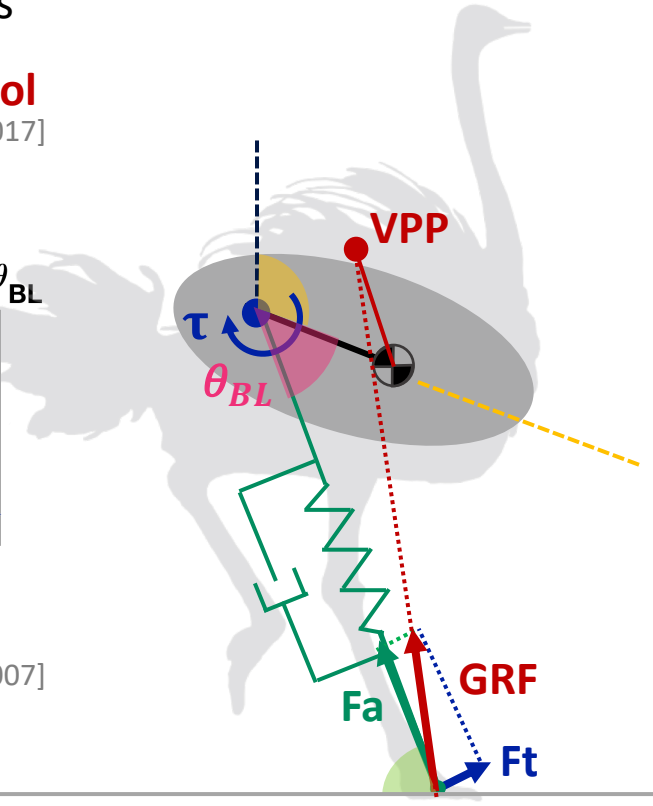






2. Robustness: Step down perturbations [Biewener, Daley 2007]

3. Control: PID and VPP concepts

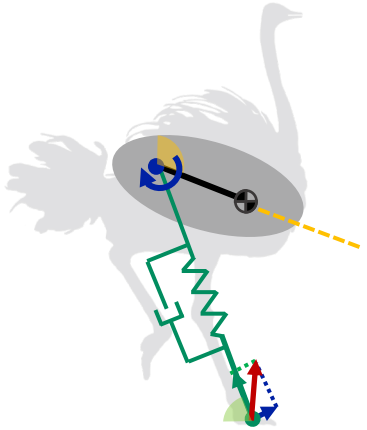


Preliminary Results

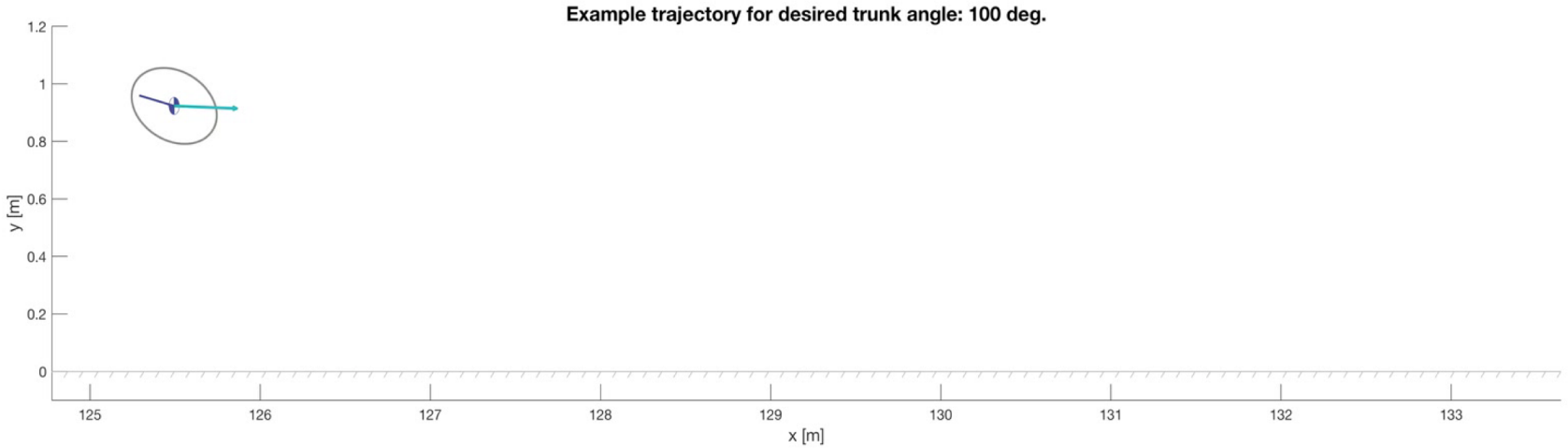
MAX-PLANCK-GESELLSCHAFT

imprs-is

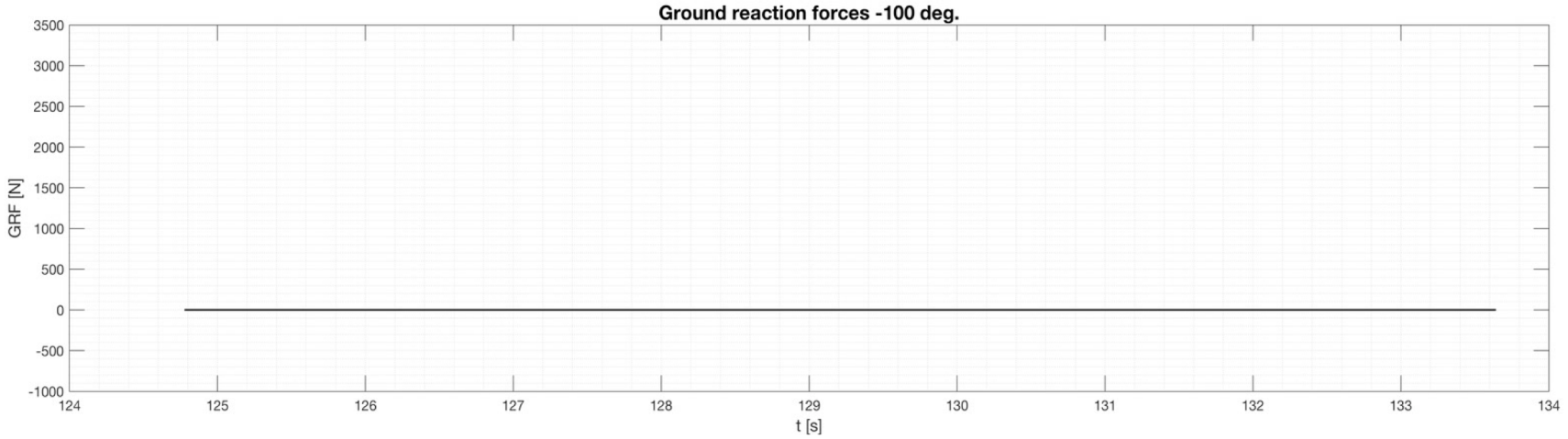
Ratite Morphology



1.Gait Database

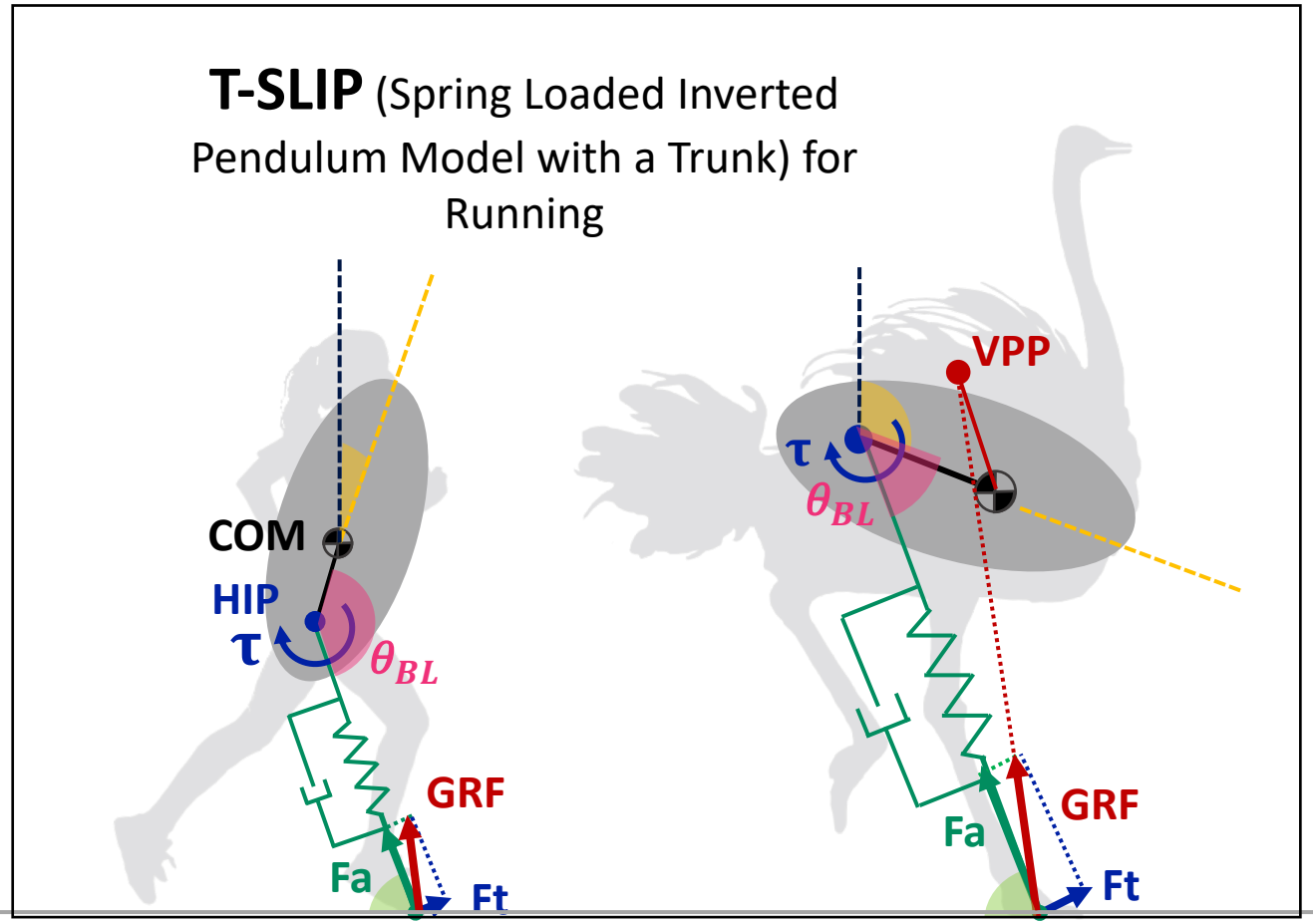


2.Starting biomechanical analysis



Thank You!

Model: T-SLIP


T-SLIP (Spring Loaded Inverted Pendulum Model with a Trunk) for Running
COM
HIP
τ
θ_{BL}
GRF
Fa
Ft
VPP
τ
θ_{BL}
Fa
GRF
Ft