

offline
optimization

Reference
poses

2 Reference Controllers Combiner

ϕ

Spline
trajectories $f(\phi, V_d)$

V_d

swing foot
trajectory $y(\phi, V_d)$

3

IP Model

ϕ

NULL speed
IPM p_x, p_z

V_d

V

IPM speed
adapater $\Delta p_x, \Delta p_z$

Target pose generation modules

4

External Forces Field
Compensation

5

ϕ V Velocity
Tuning

6

Stance Foot Contact
Control

Direct torque generation modules

External Forces module

1

Liquid simulation

Physics
engine

Σ

Target
pose

PD
controler