



Borinot: an open thrust-torque-controlled robot for research on agile aerial-contact motion

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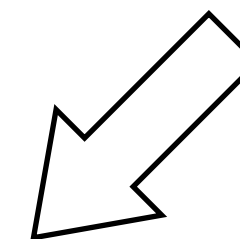
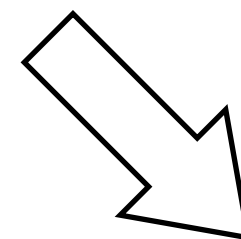
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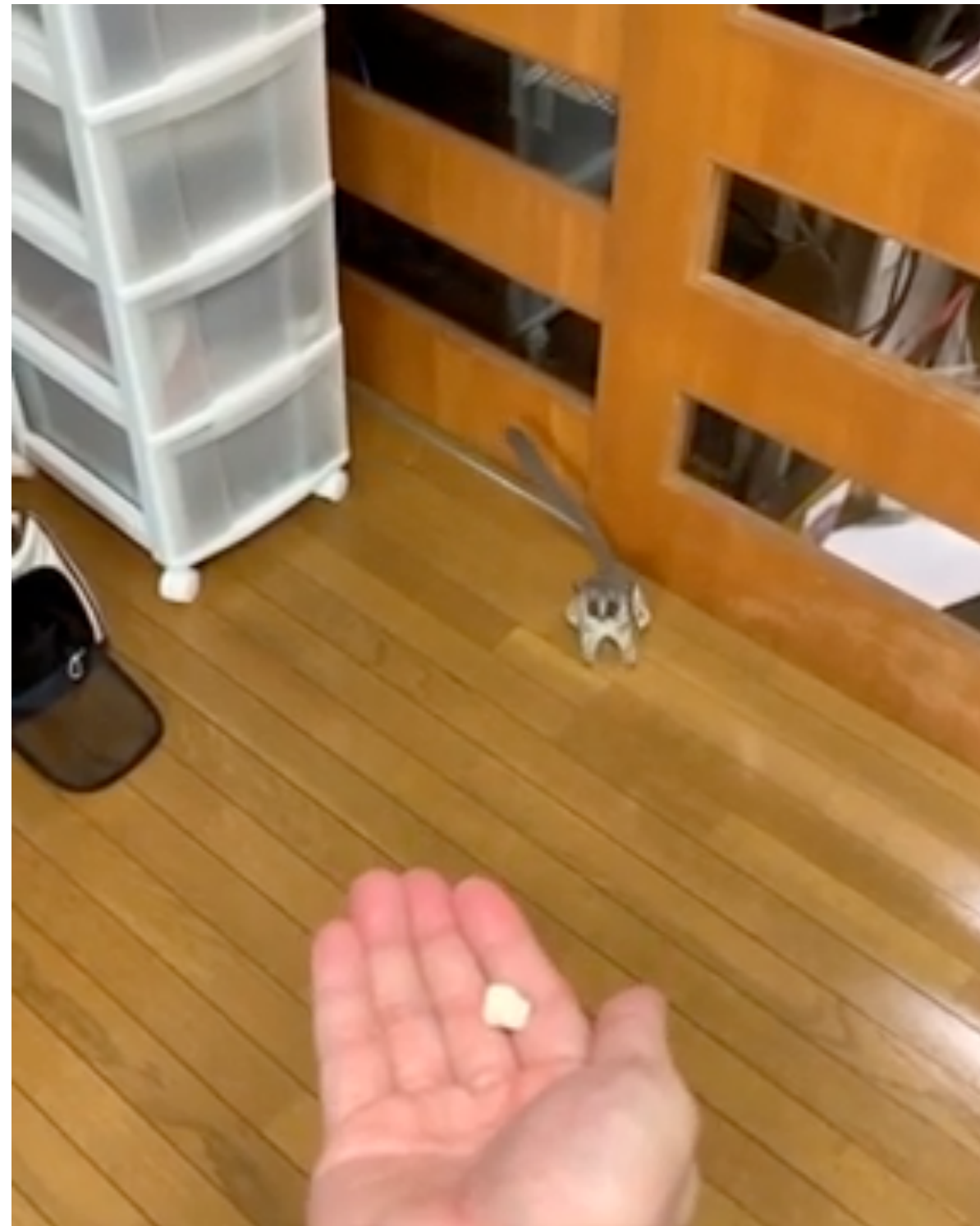


Open source (Stéphane ?)

Benefitting from relevant OS initiatives



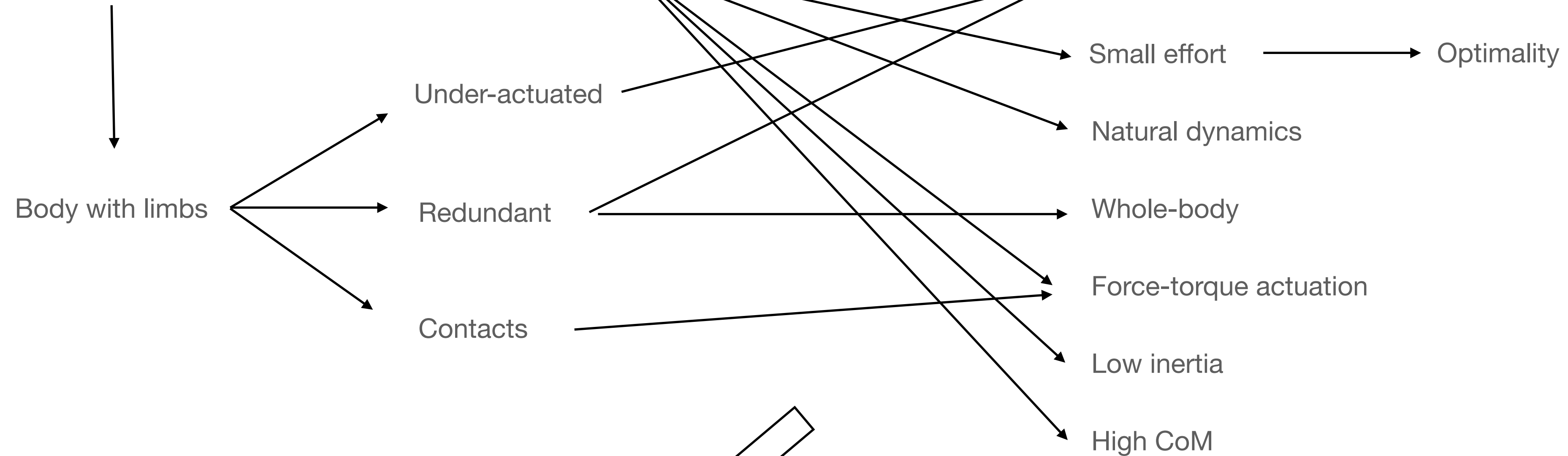
Agile aerial-contact loco-manipulation



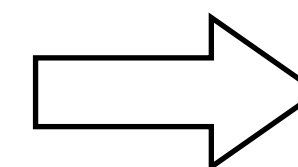
Agility

Robot conception guidelines

def: Ability to move **quickly** and **easily**



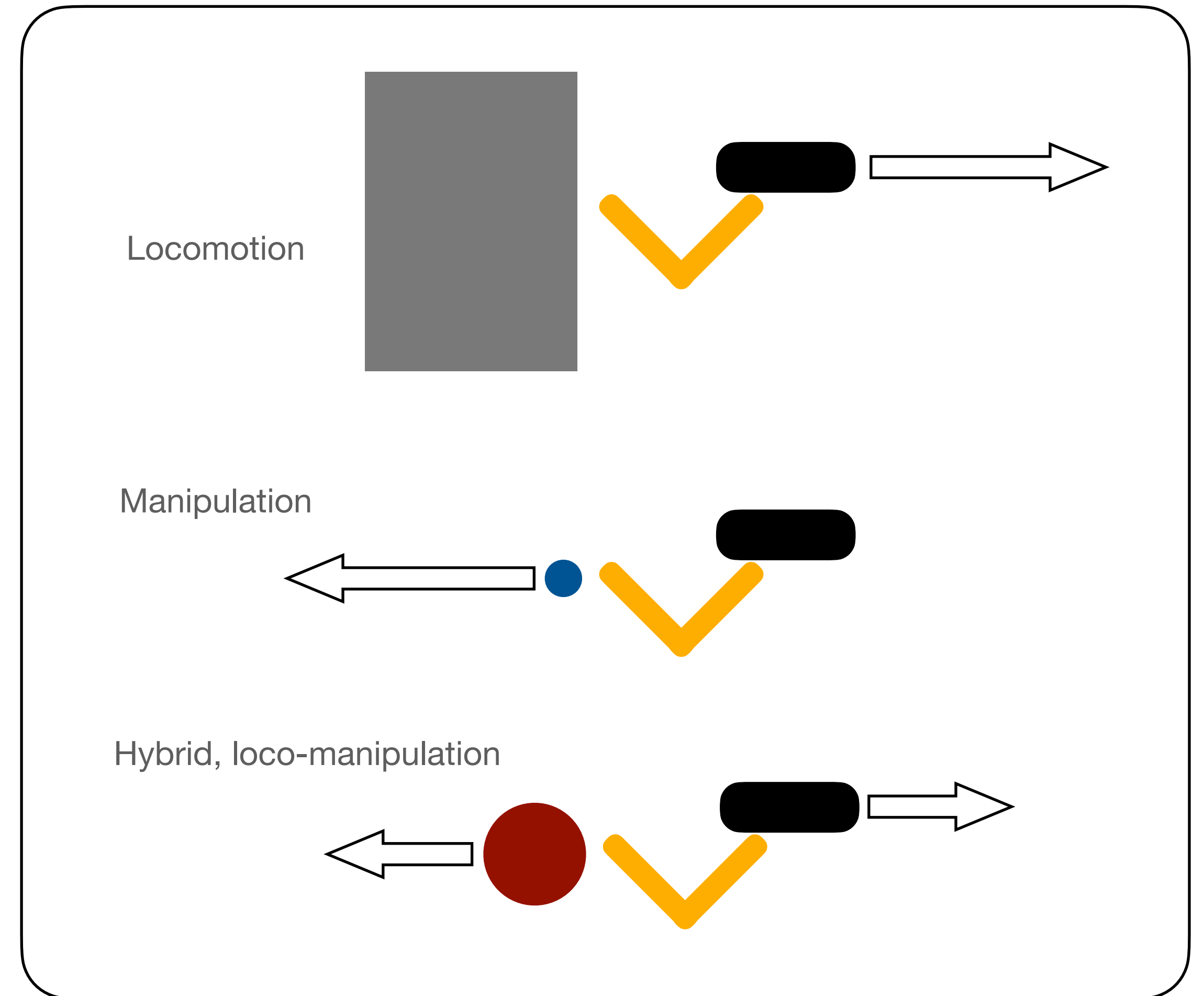
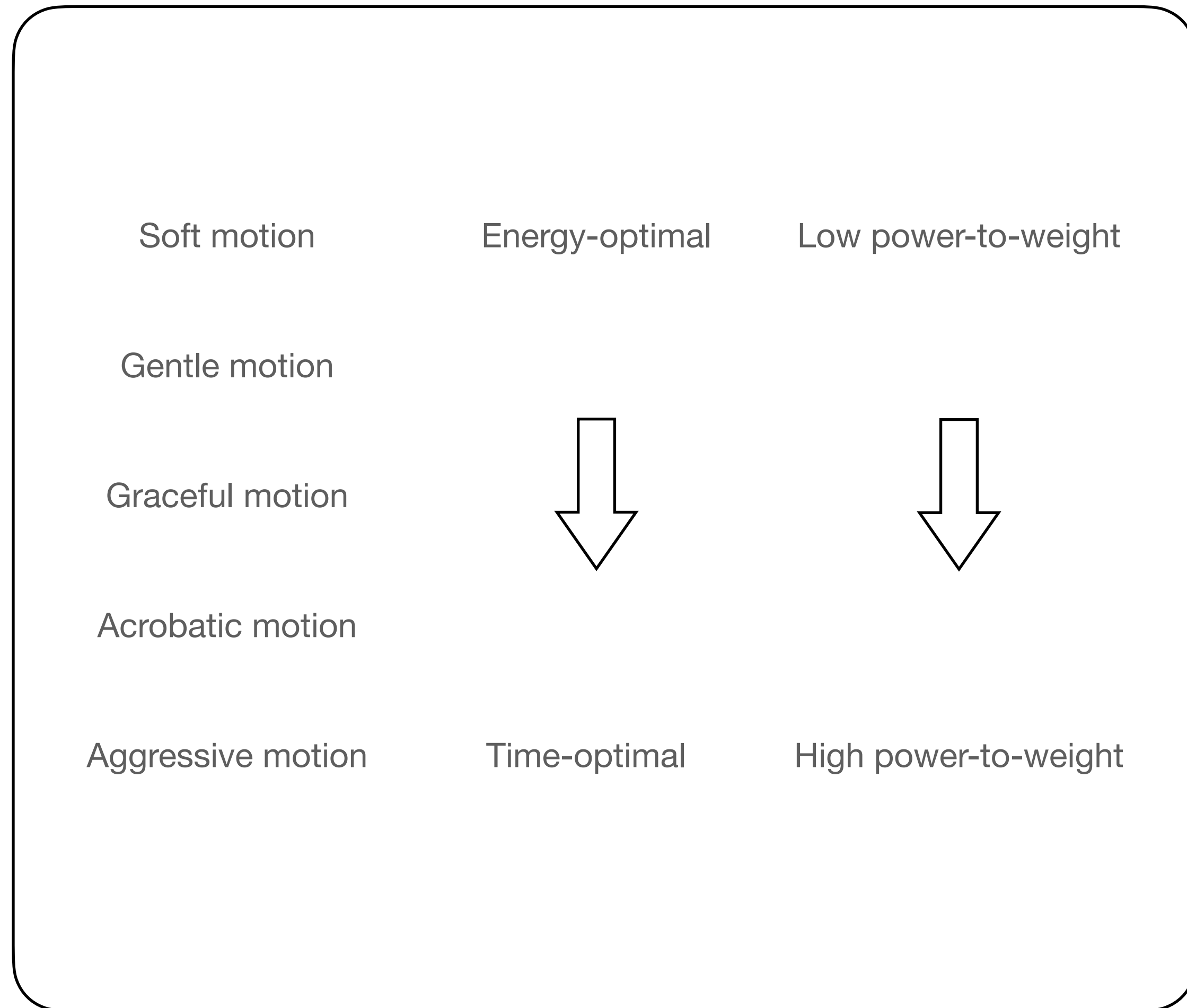
def: Ability of a **complex body** to **combine quick maneuvers easily**, using **contacts** and other **forces** against the environment



Compact, powerful, compliant, force-actuated robot
Whole-body dynamics optimal predictive control

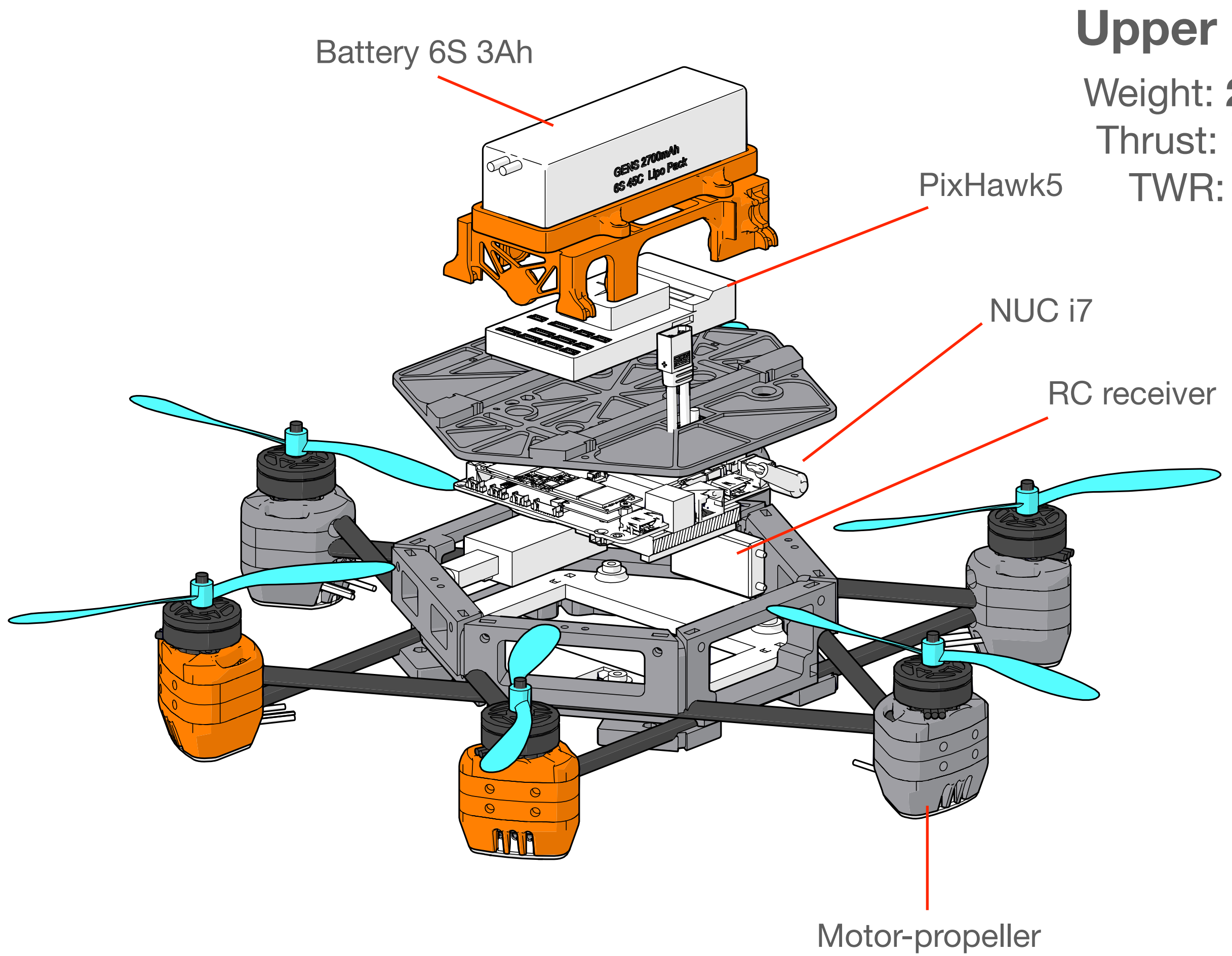
Agility

Power, inertias and semantics



Borinot's Hardware (< 3.000€)

Modular upper and lower bodies

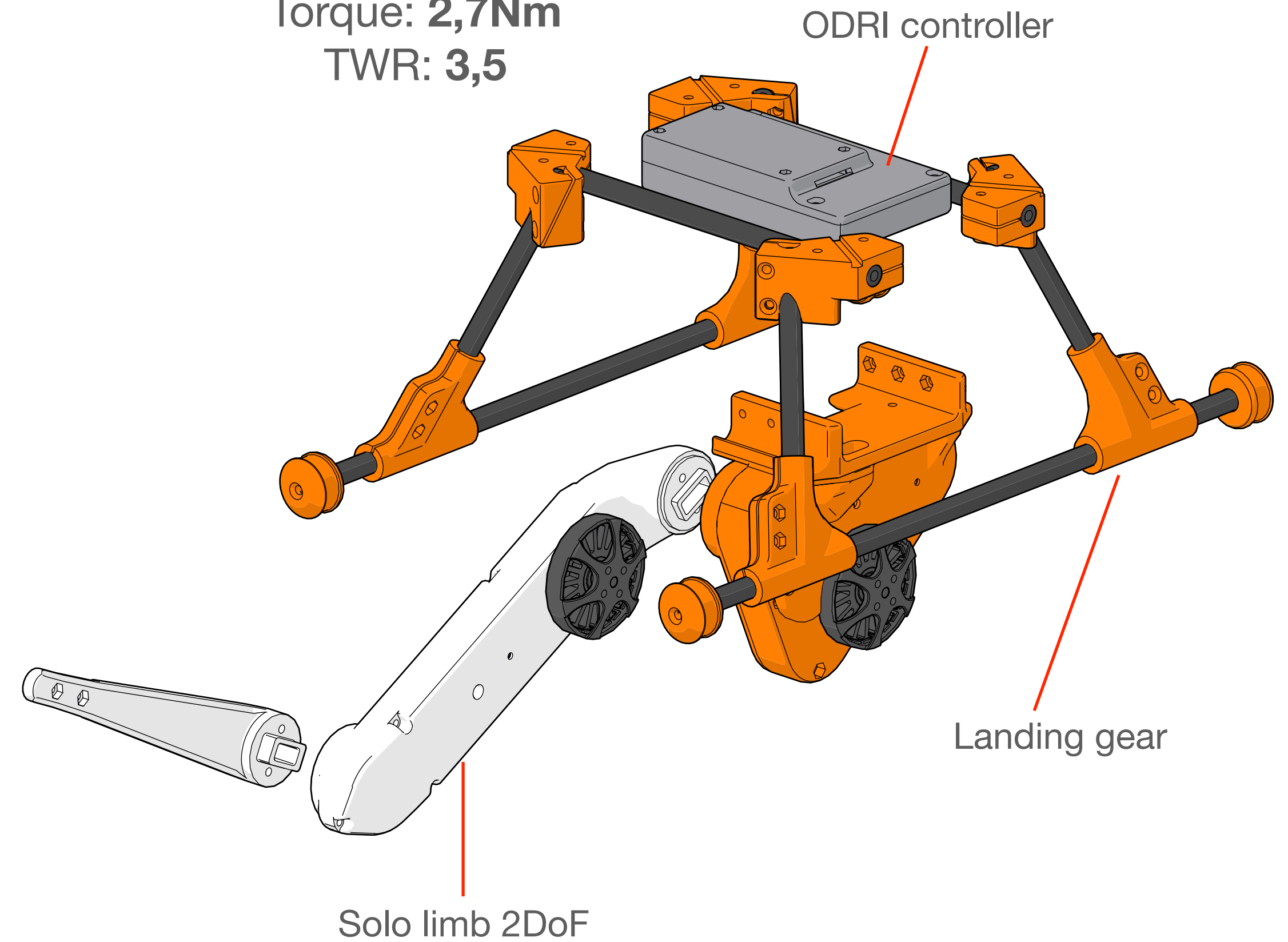


Upper body

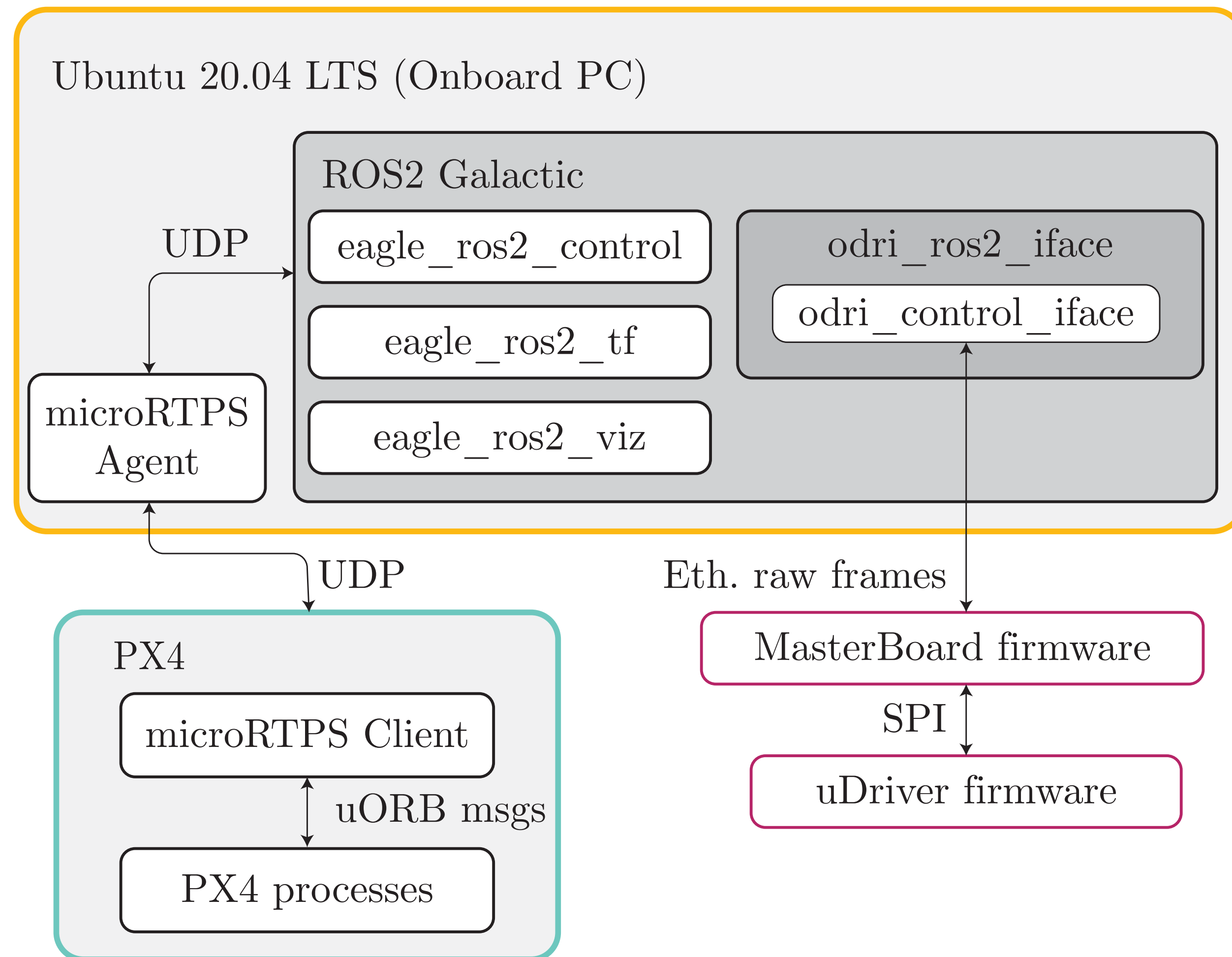
Weight: 2100g
Thrust: 100N
TWR: 4,7

Lower body

Weight: 742g
Torque: 2,7Nm
TWR: 3,5

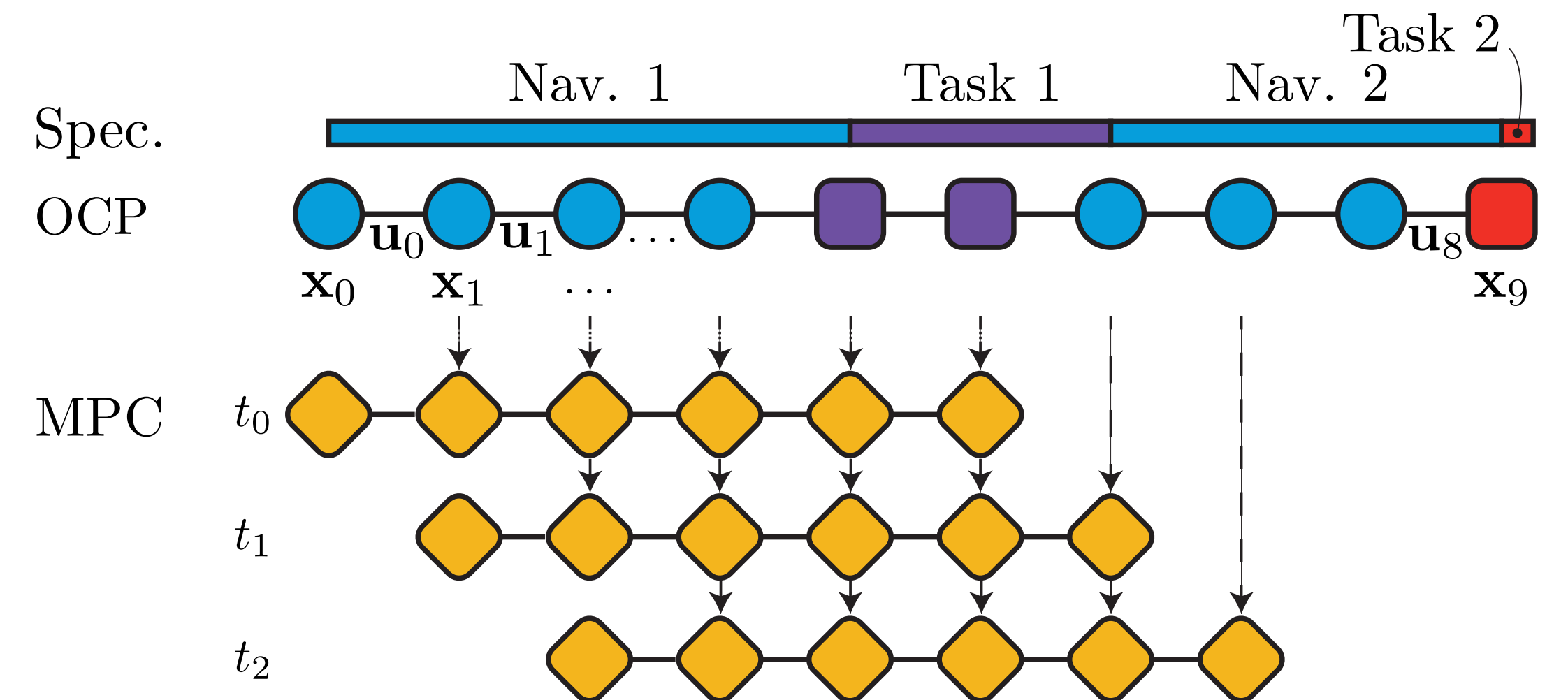
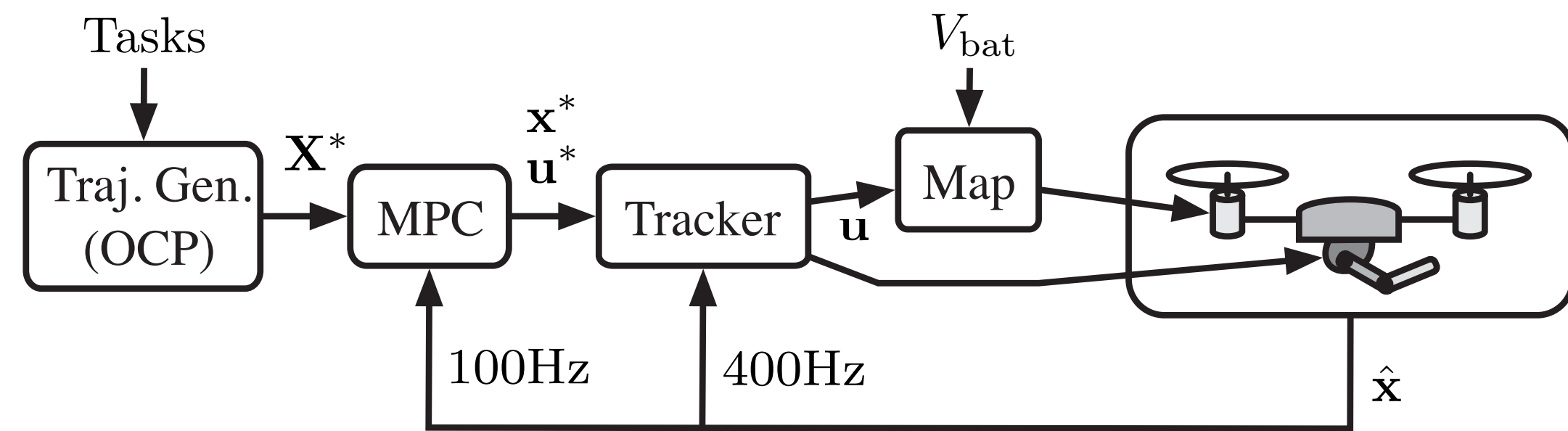


Borinot's Software



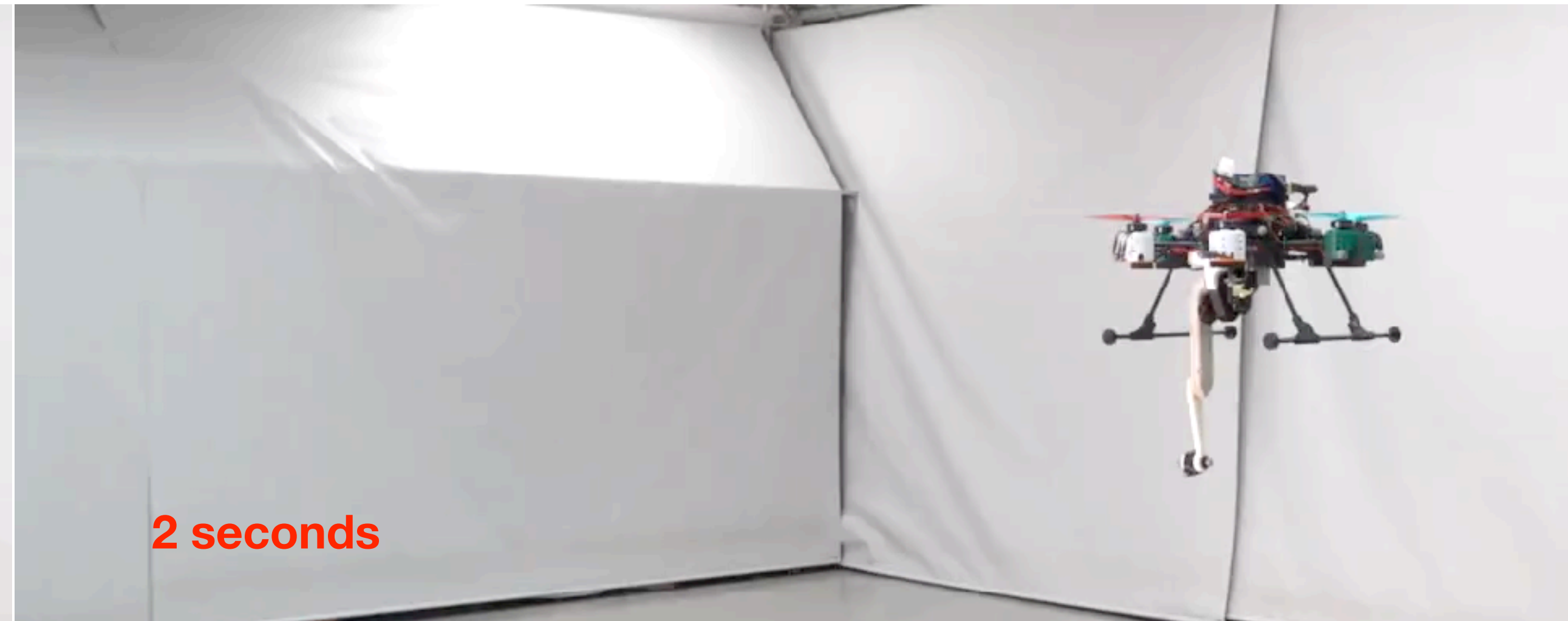
Model Predictive Control

Basic design, very limited features!



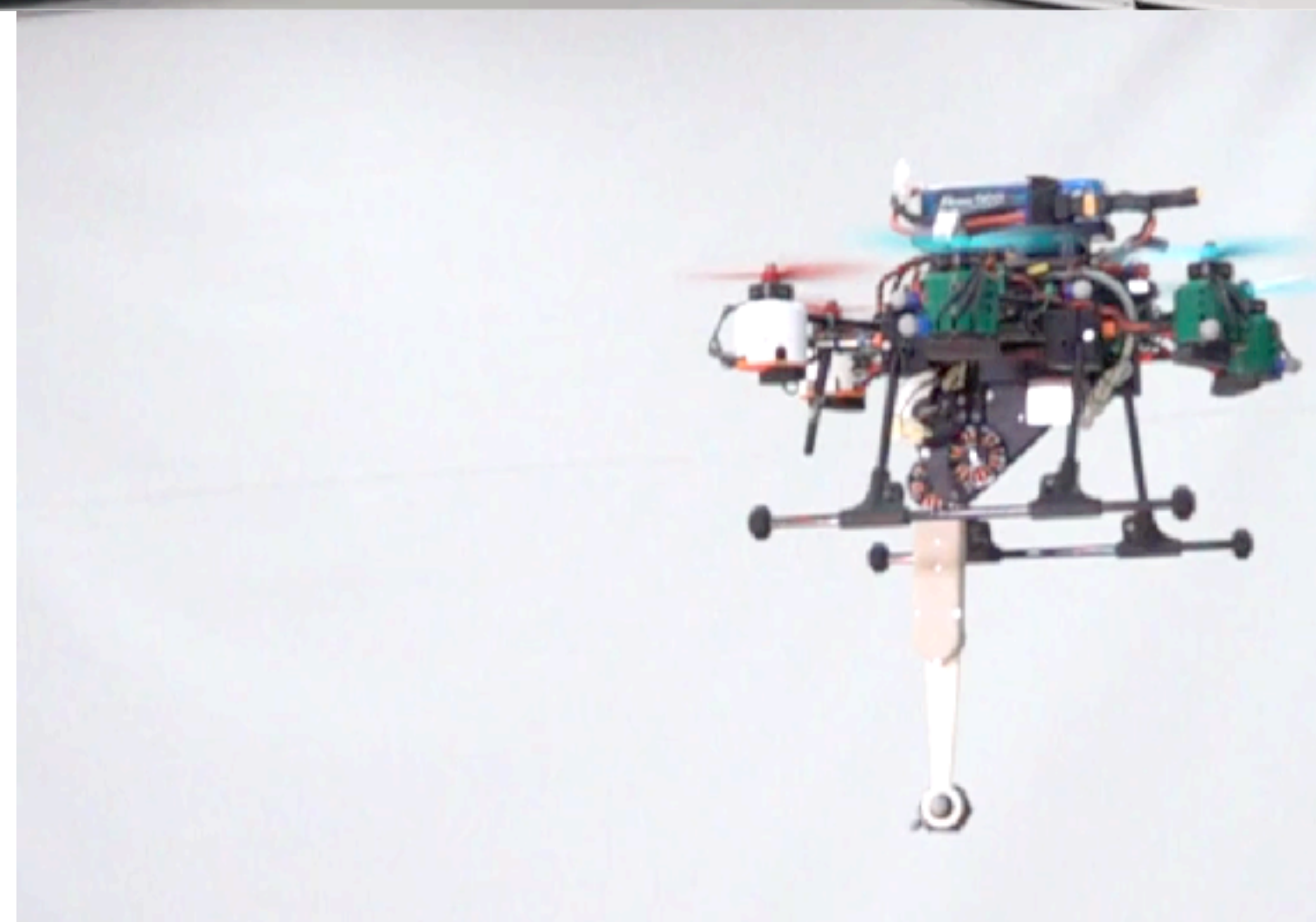
Limb as a **tail**

Static assistance in coronal plane



Limb as a tail

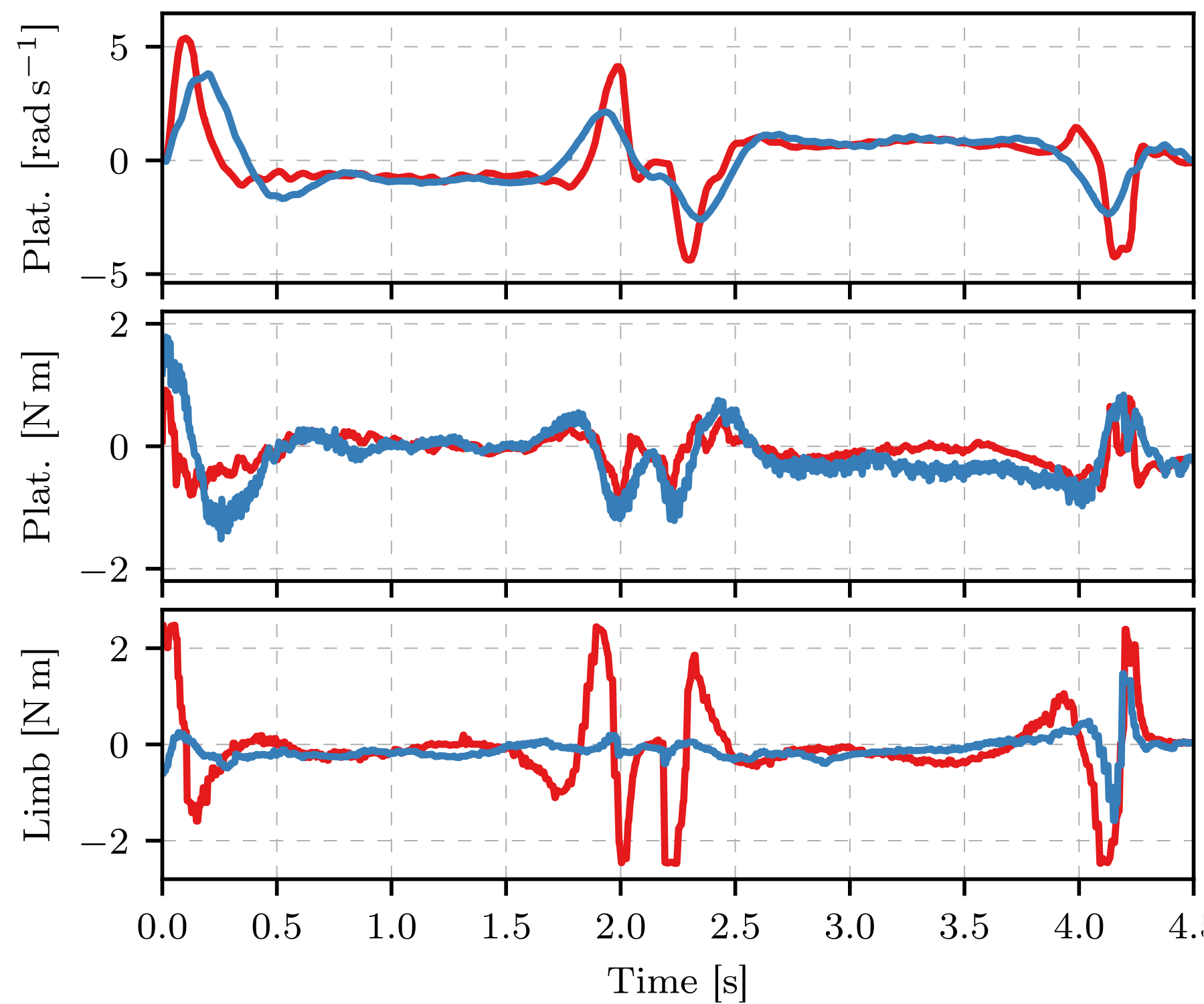
Dynamic assistance in sagittal plane



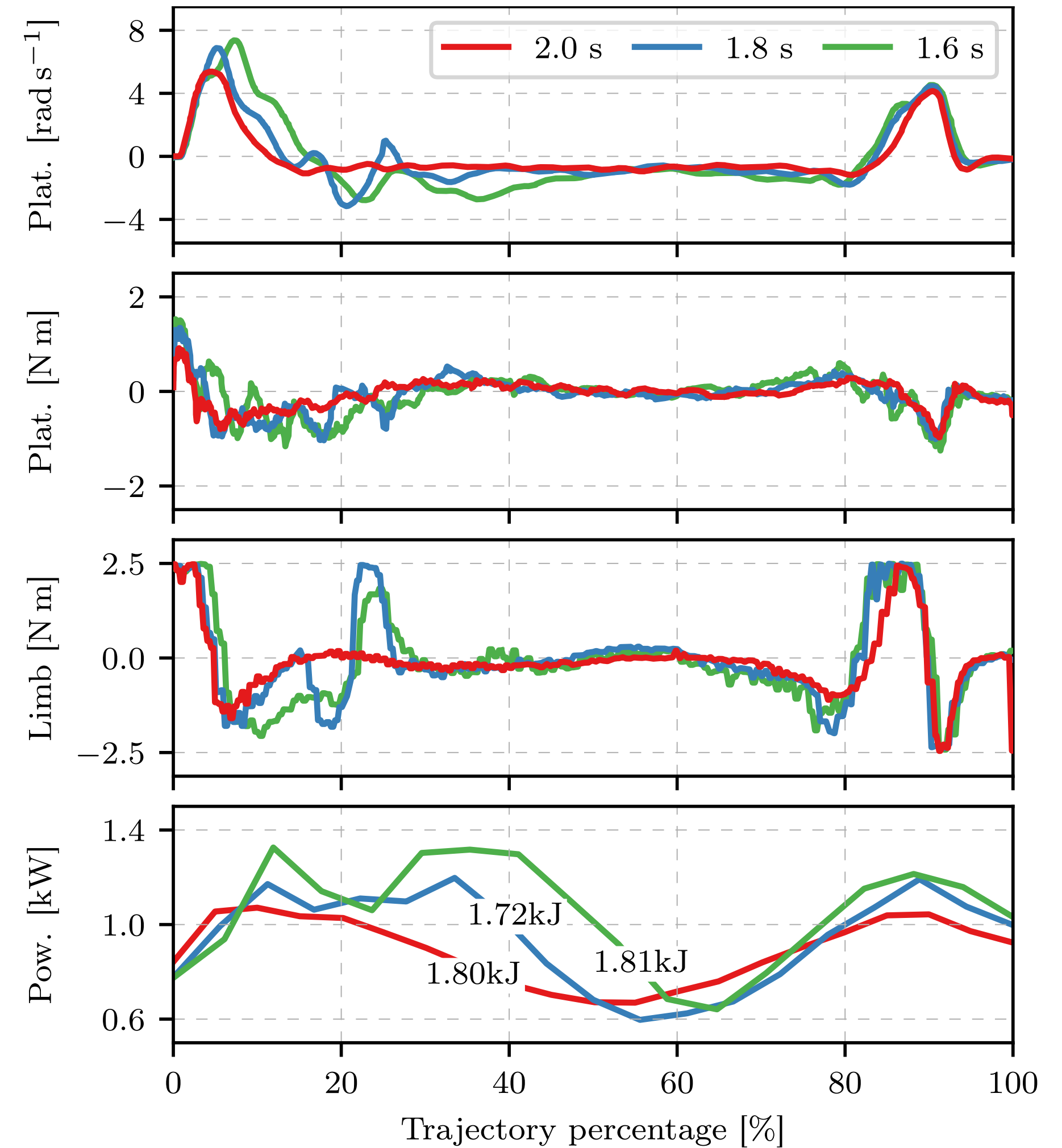
Limb as a tail

Static and Dynamic assistances

Static vs. Dynamic

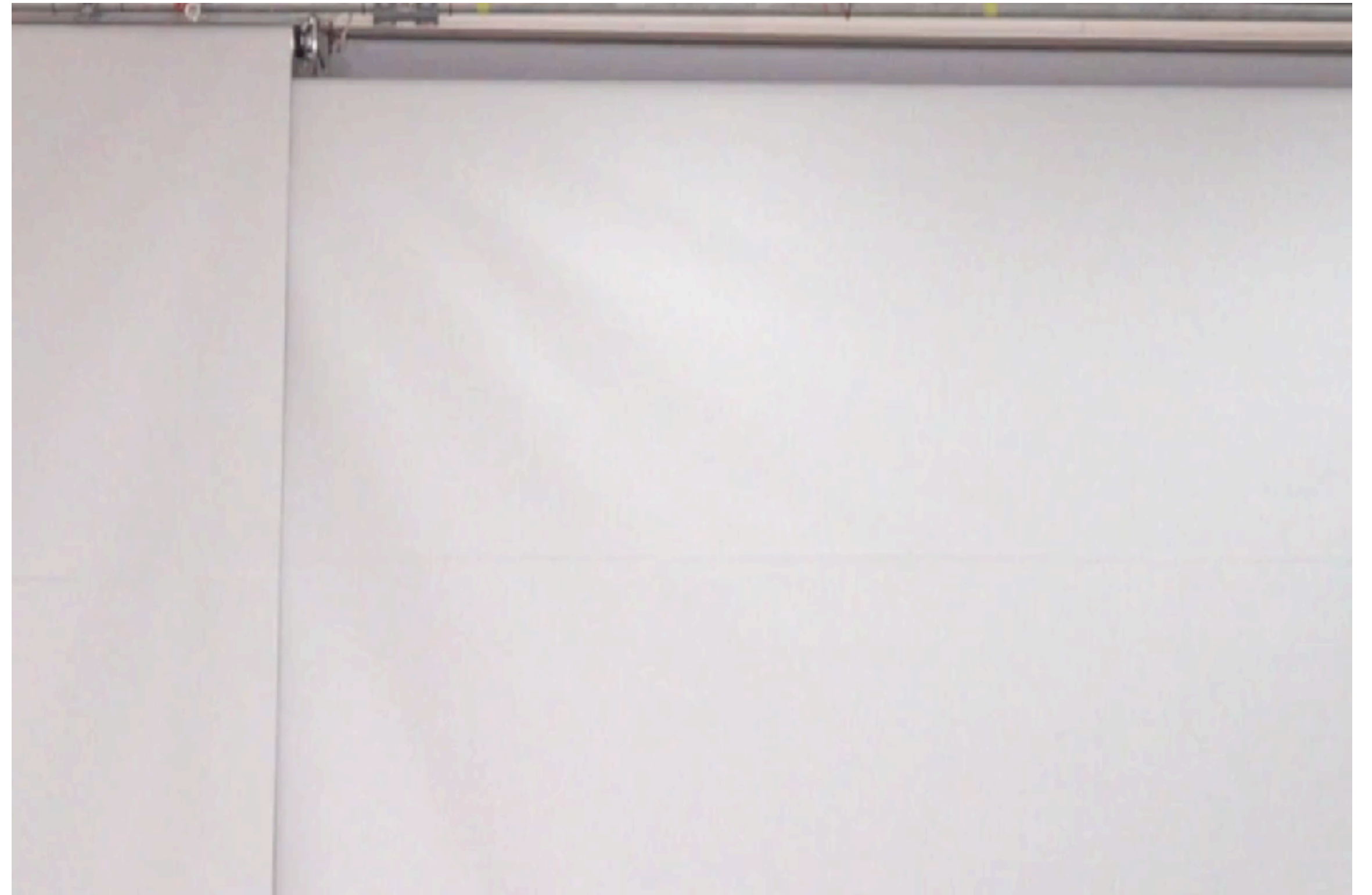
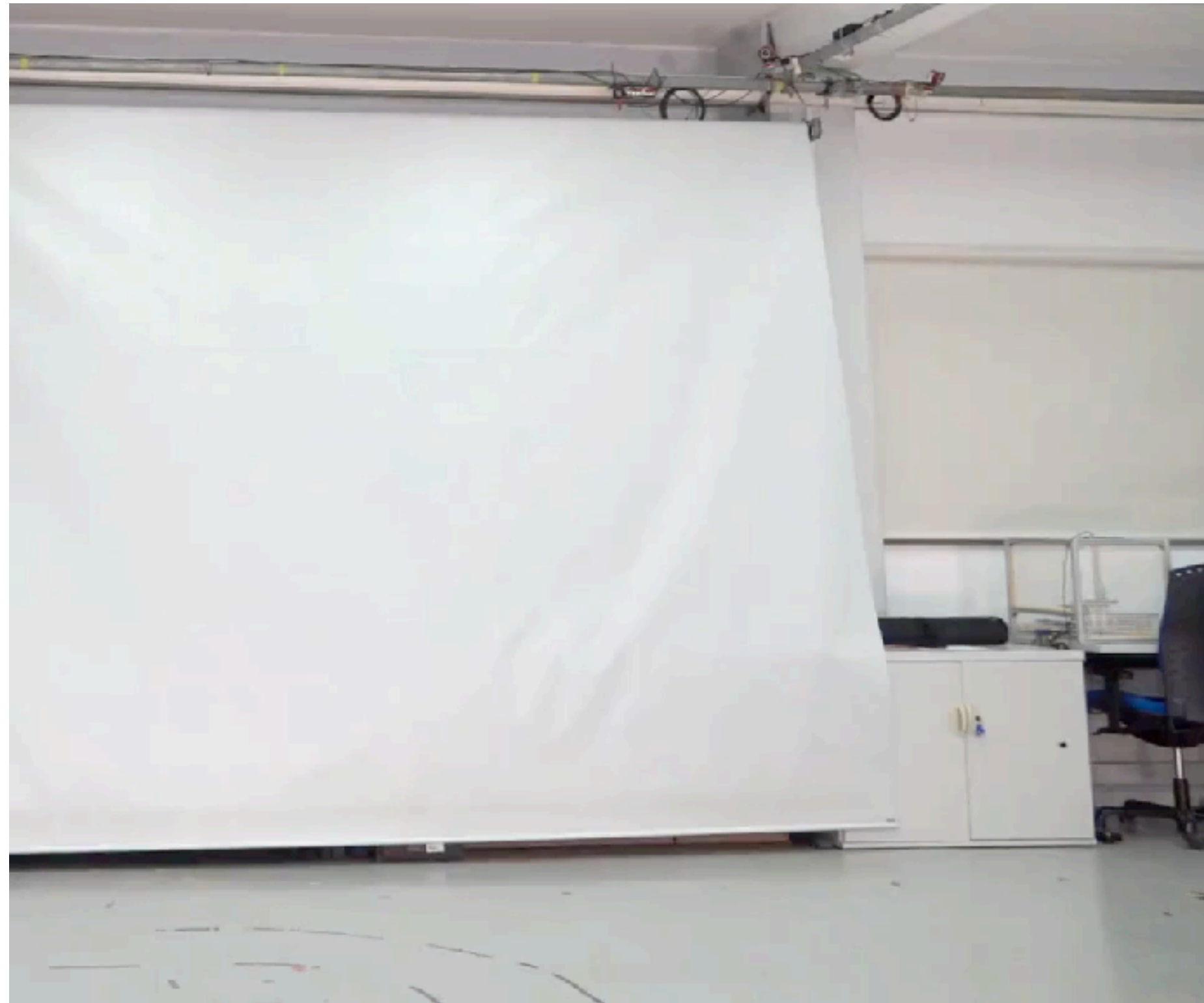


Dynamic at different speeds



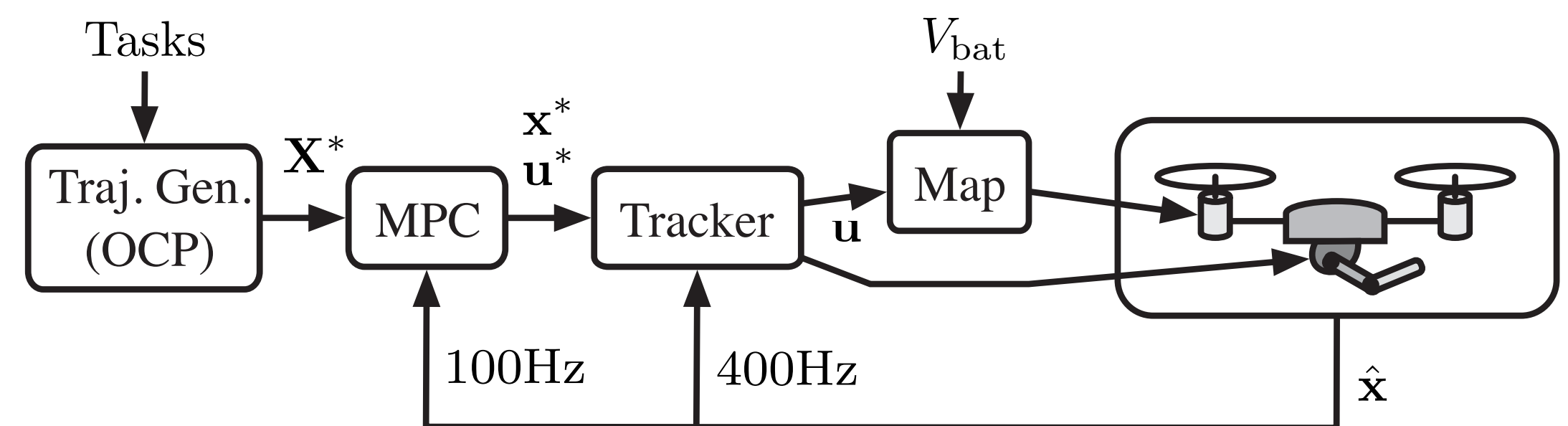
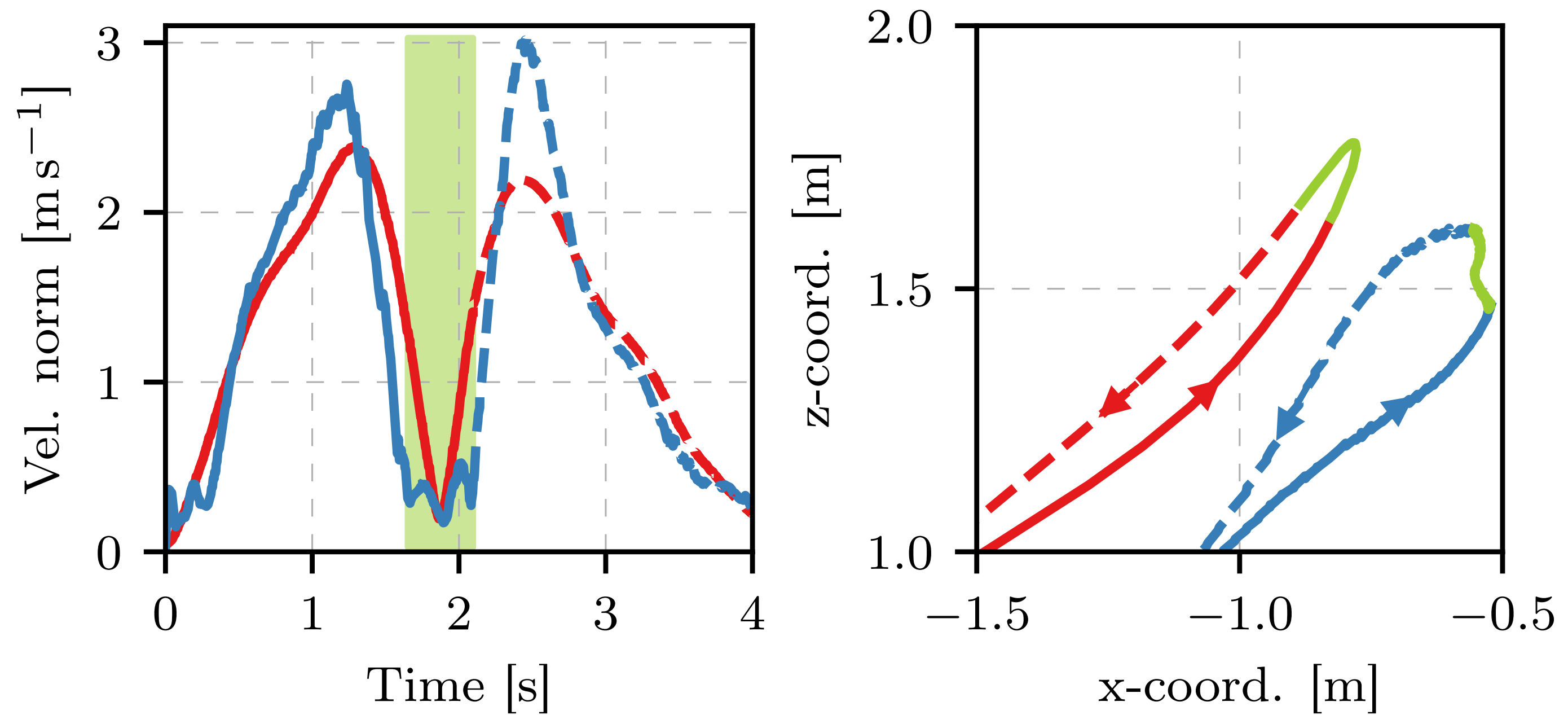
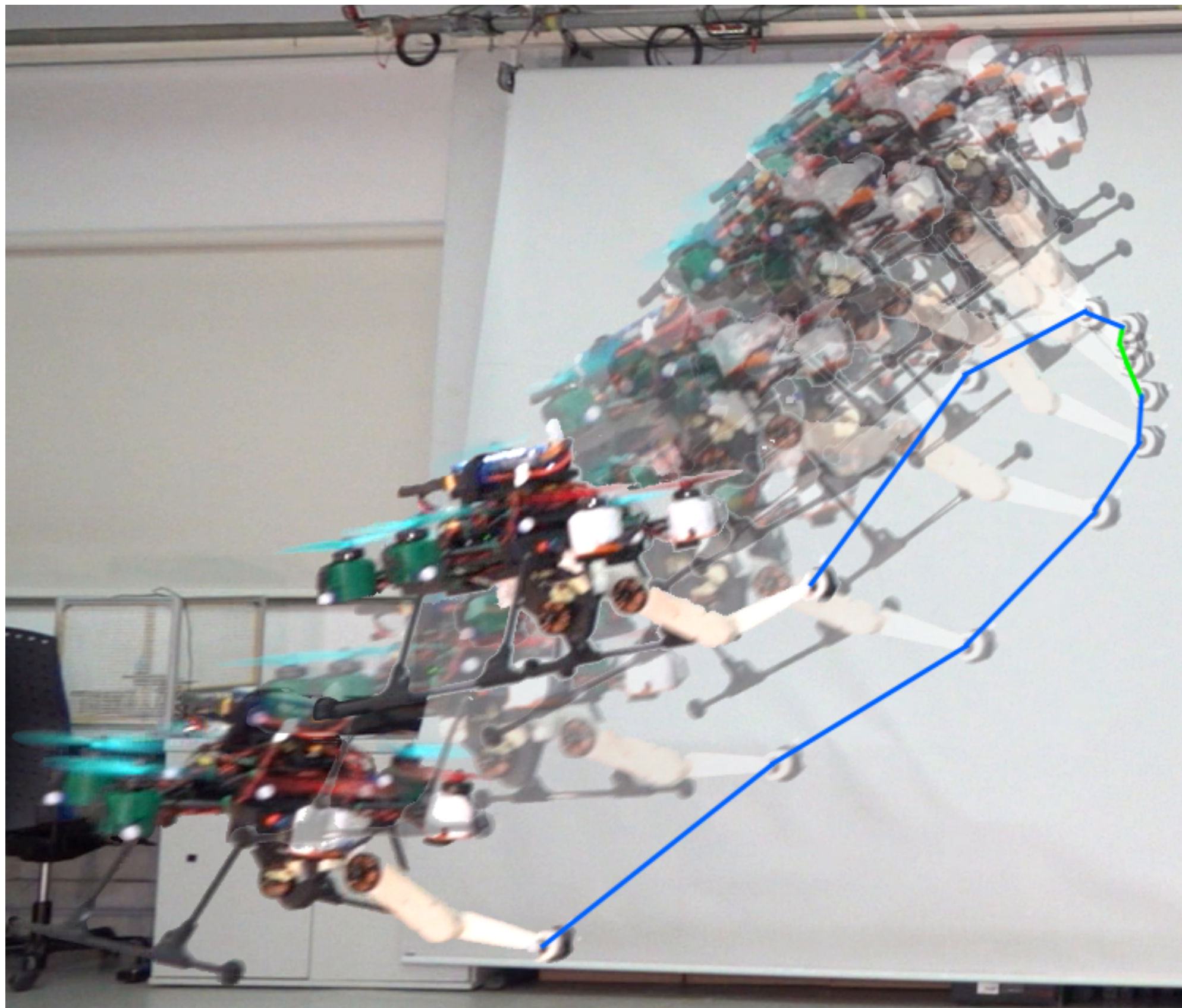
Limb as an **arm**

Dynamic aerial manipulation



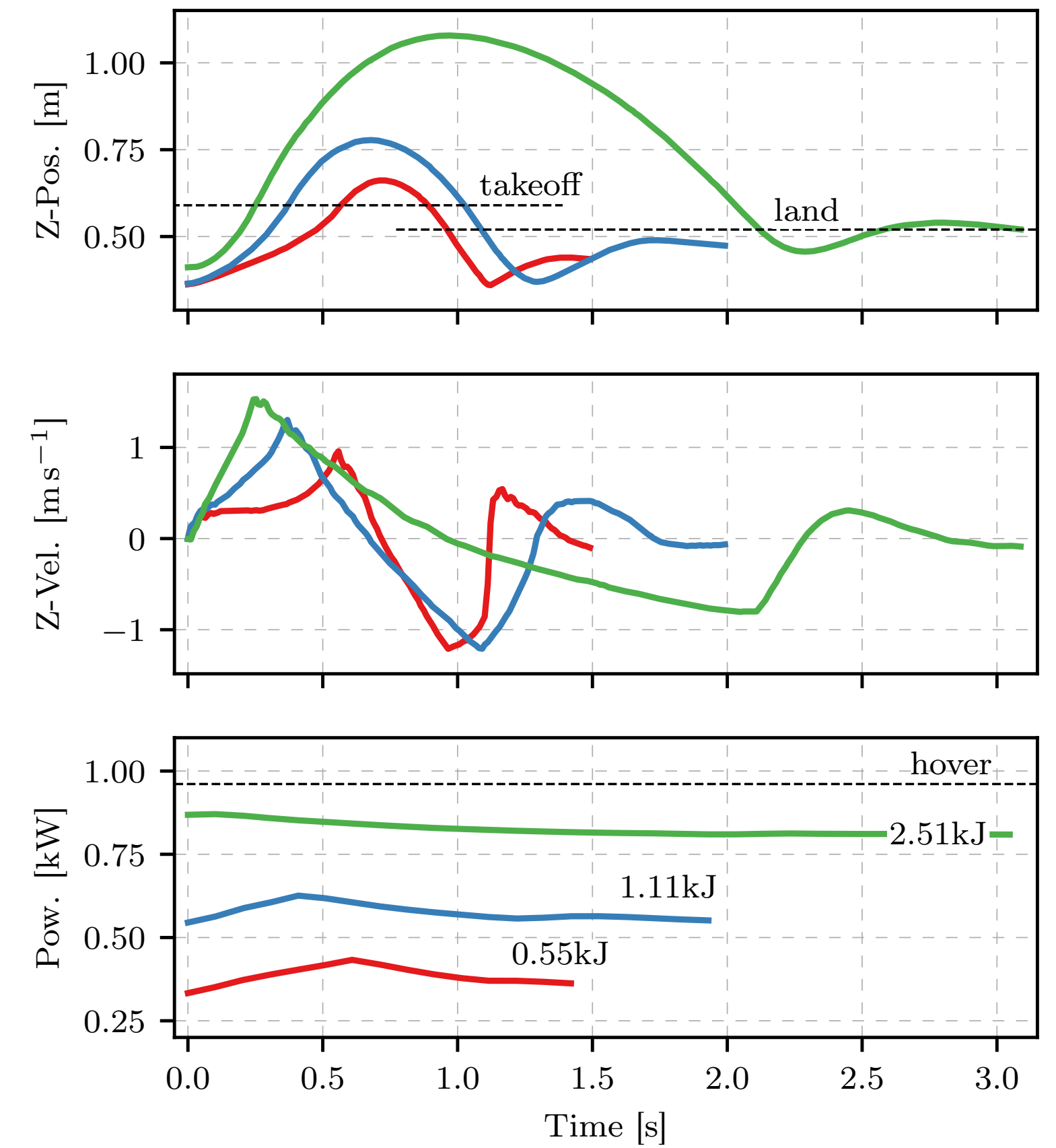
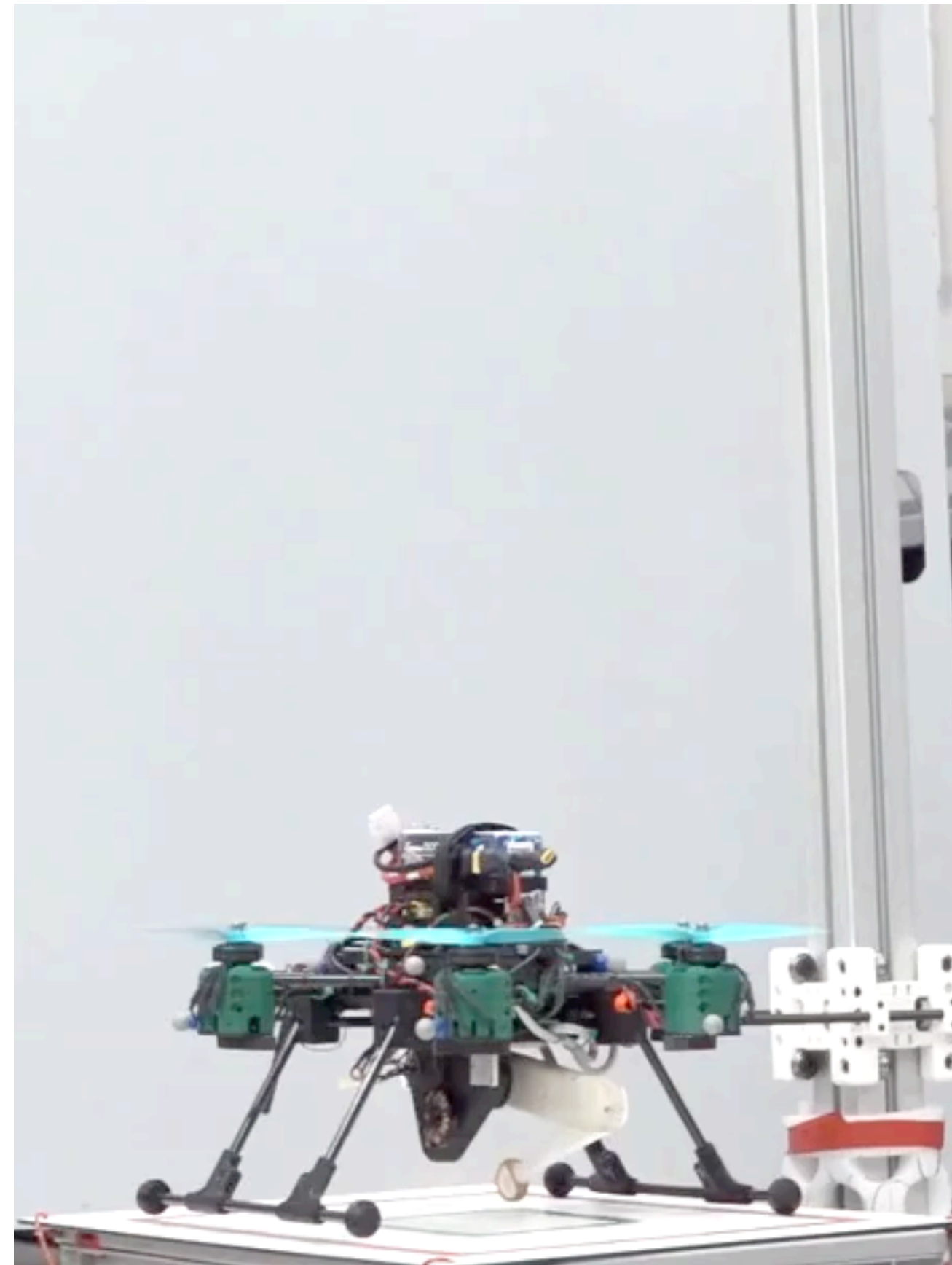
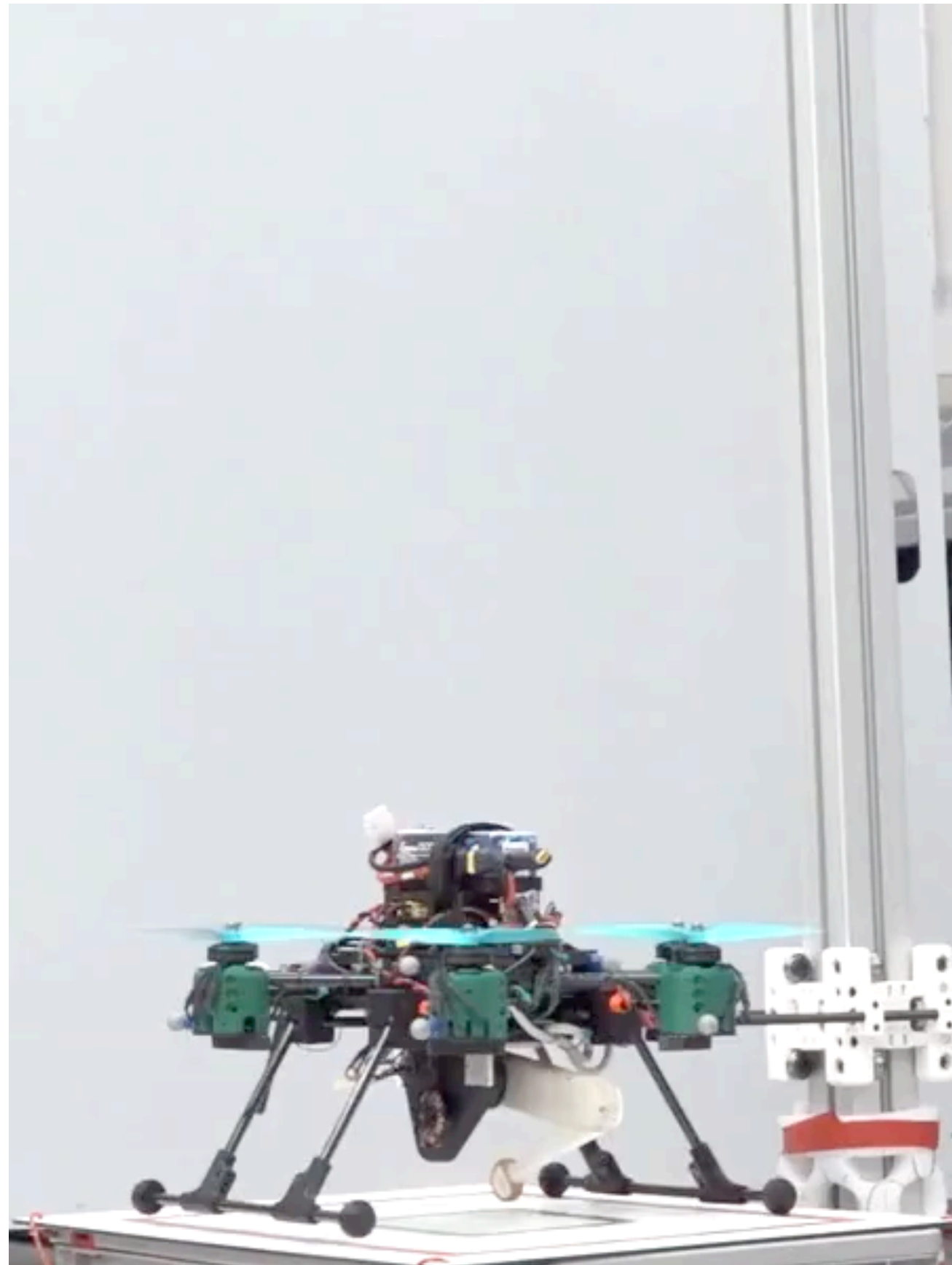
Limb as an **arm**

Dynamic aerial manipulation



Limb as a leg

Jump-and-flight locomotion



Thank you!